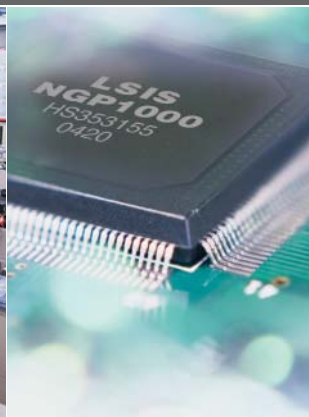


# Programmable Logic Controller **XGT Series**

Fast, Compact, Open Network Solution  
Next Generation Technology



## Automation Equipment



**LS** Industrial Systems

New Name of  LG Industrial Systems





Programmable Logic Controller

# XGT Series

XGT series incorporate the latest technological achievements in Programmable Logic Controller, made possible by experience and dedication to quality in design and manufacturing.

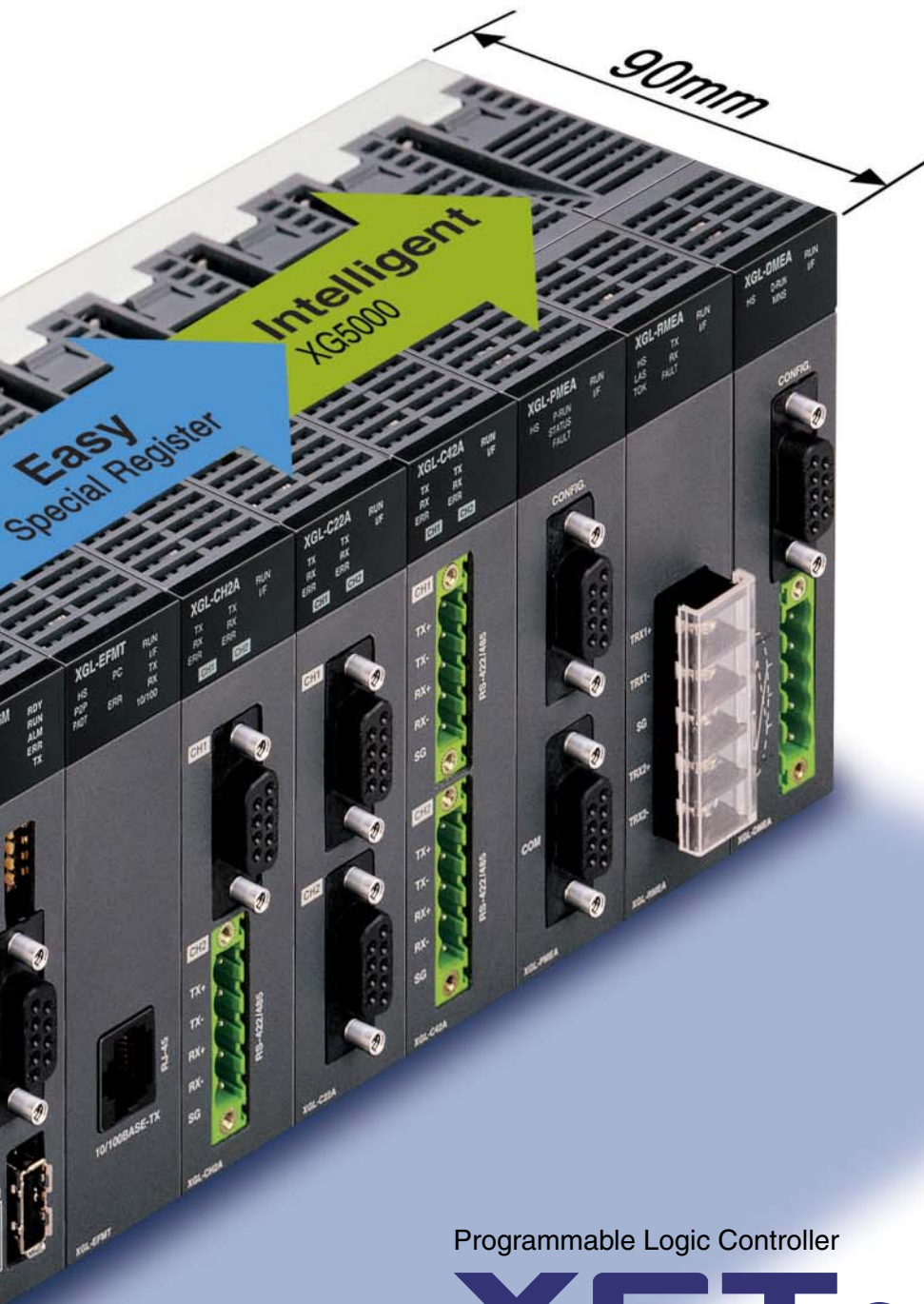
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Overview

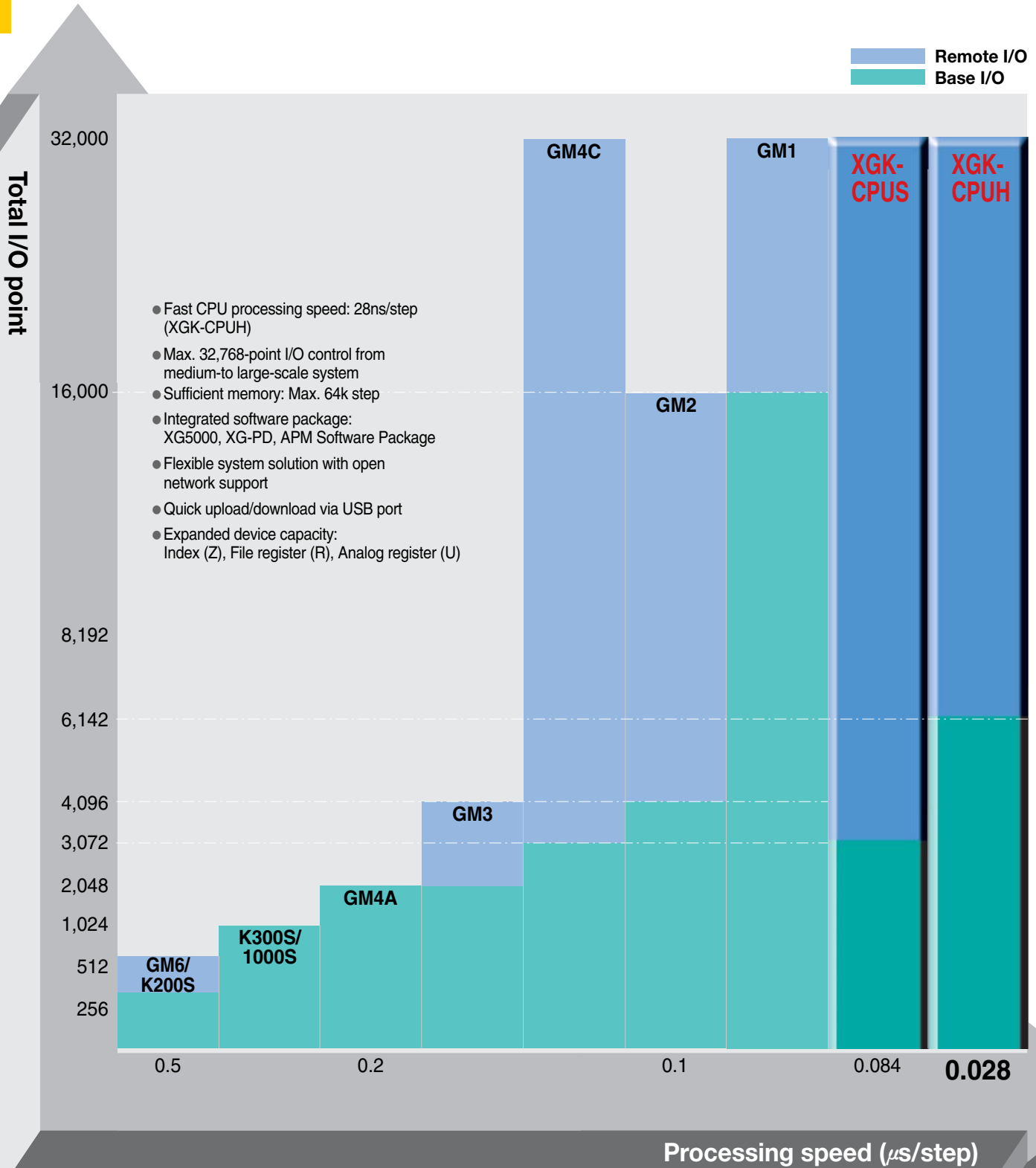
Programmable Logic Controller

# XGT Series

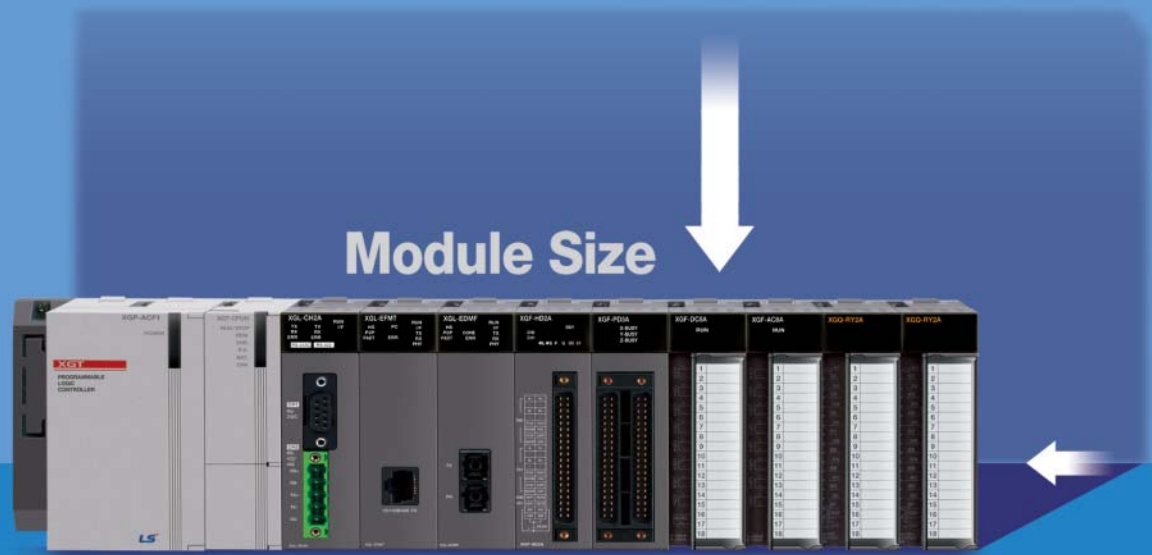
## neXt Generation Technology

XGT series is the next-generation solution with a new concept providing advanced engineering environment based on open network, fastest processing speed, compact size and user-friendly software.

XGT series is the Industrial Workhorse that can support various applications within the typical industrial plant.







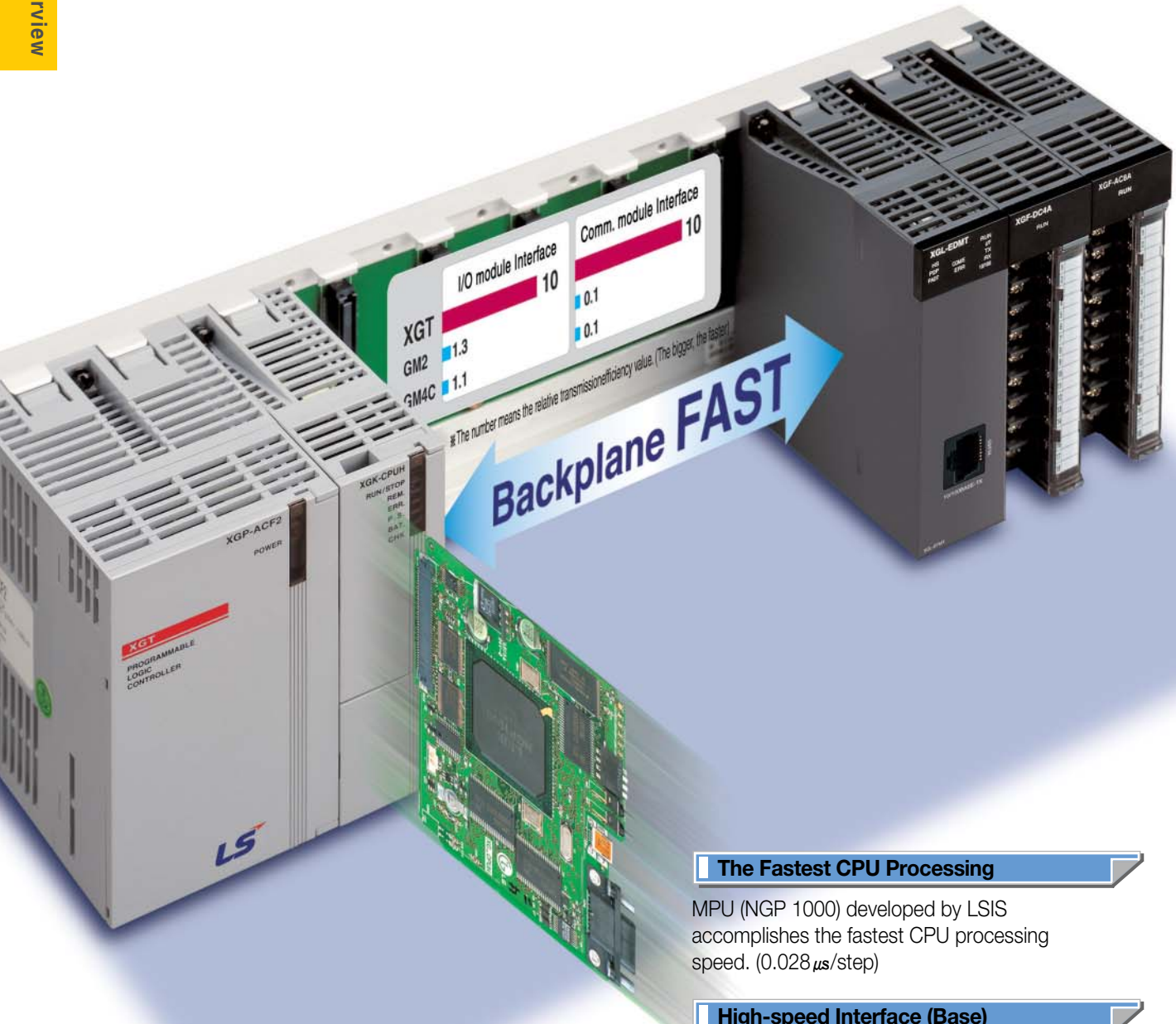
## Size Innovation. . . **Compact**

### The smallest size

The smallest size (Dimensions 27 × 98 × 90) achieves cost-efficiency and various applications.

Item	Power Supply	CPU	8-slot Base
Size (W × H × D)	55 × 98 × 90	27 × 98 × 90	318 × 98 × 15

# Speed Innovation. . . Fast



I/O module Interface		Comm. module Interface	
XGT	10		10
GM2	1.3		0.1
GM4C	1.1		0.1

\*The number means the relative transmission efficiency value. (The bigger, the faster)

**Backplane FAST**

**The Fastest CPU Processing**

MPU (NGP 1000) developed by LSIS accomplishes the fastest CPU processing speed. (0.028  $\mu$ s/step)

**High-speed Interface (Base)**

Dedicated bus controller and High-speed transmission algorithm achieve high performance of internal interface.

Main Base	Expansion Base
20Mbyte/sec	5Mbyte/sec

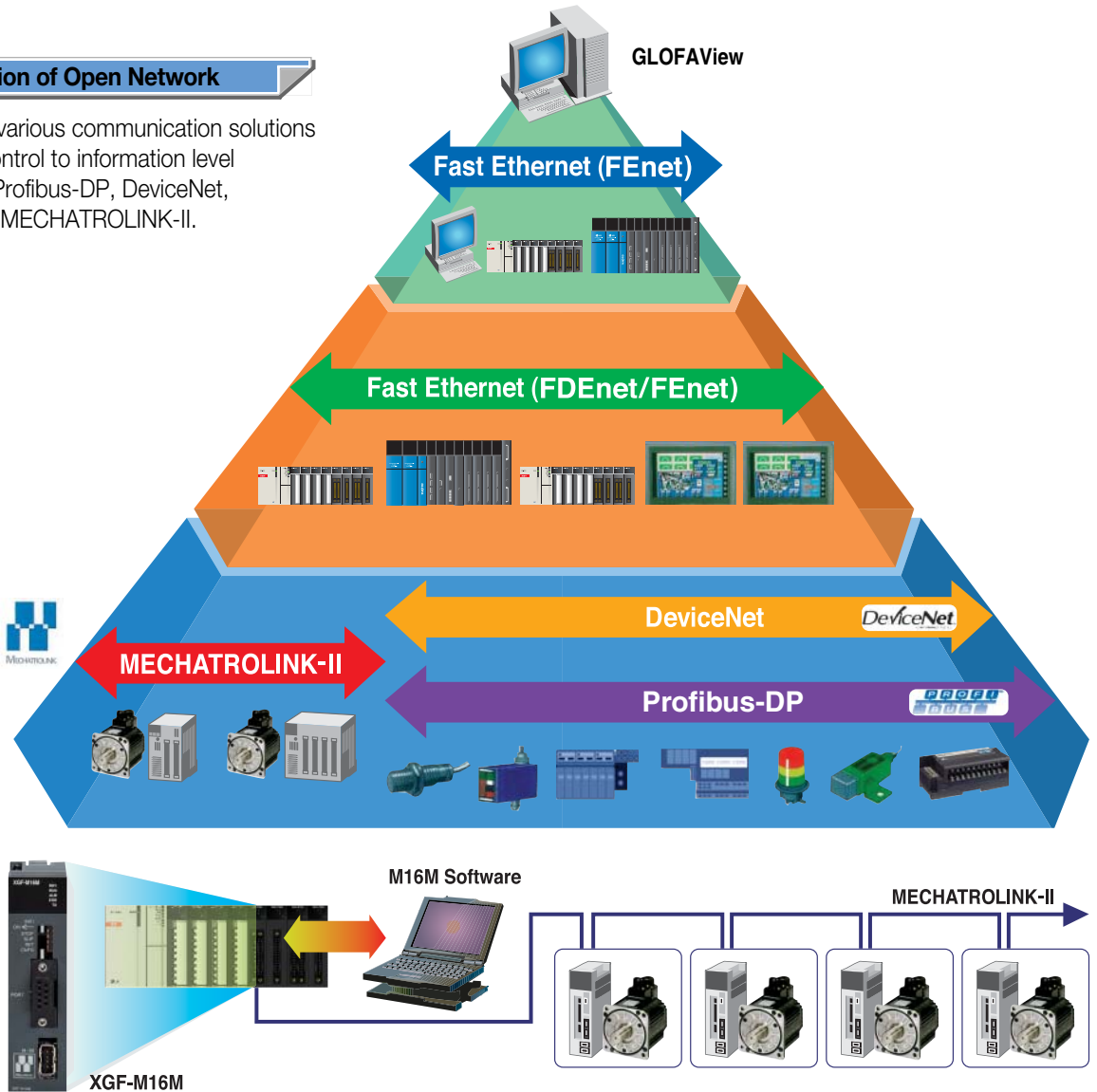


# Network Innovation. . . Flexible

Overview

## System Integration of Open Network

XGT series support various communication solutions ranging from field control to information level with Fast Ethernet, Profibus-DP, DeviceNet, MODBUS and even MECHATROLINK-II.



Item	Fast Ethernet		Cnet	Profibus-DP	DeviceNet	MECHATROLINK-II
	FEnet	FDEnet				
Transmission speed	100 / 10Mbps		300 ~ 115,200bps	Max. 12Mbps	Max. 500Kbps	10Mbps
Transmission distance	100m (Node to Node, UTP/ STP) 2Km (Node to Node, Fiber Optic)		Max 500m (422 / 485)	Max. 1.2Km	Max 500m	Max 50m
Max. number of station	64 (HS link)		32	126	64	16 (# of axis)
Service	HS link	●	-	●	●	-
	XG protocol	●	-	-	-	-
	General Protocol	● (MODBUS)	-	● (MODBUS)	-	-
	P2P	●	●	●	-	-
	XG5000 I/F	●	●	●	-	-
E-Mail	●	-	-	-	-	-
Configuration software	XG-PD		XG-PD & SyCon		-	
Number of installation	24 ( HS link Service: 12, P2P Service: 8)					No limit

**Special Register**

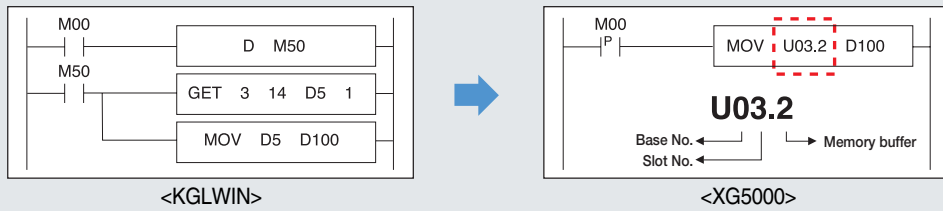
XGT series expand device memory and support advanced programming environment with Index register (Z), File register (U), and Analog register (U).

**R File register**  
As a non-volatile memory type, data are secured even in times of blackout or CPU reset.

**U Analog register**  
Assigning base, slot and memory buffer of an analog module to device, A/D conversion data can be accessed without analog commands.

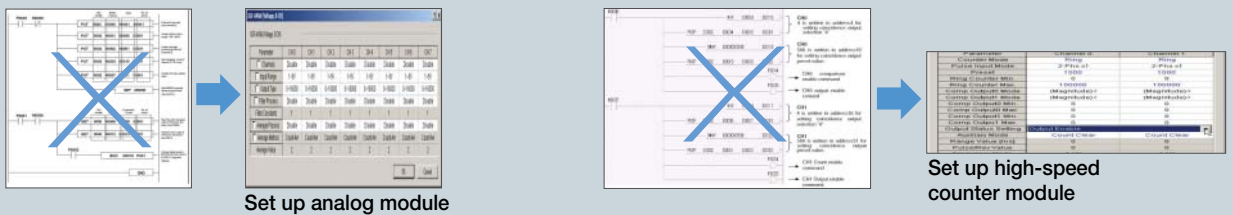
**Z Index register**  
Index register is used in the sequence program for array operation.

**Example of Analog Register**



**Analog Operation without Programming**

Special module setup and operation is achieved by just parameter setting without additional program.



**Program Modularization and Task Operation**

Available to run multifull programs through modularization of scan programs based on functions and author, and to operate task programs triggered by specific conditions.

Program type	Description	Number
Scan program	Scan	Executed in every scan
	Initialization task	Executed only one time when power turns on
	Time driven task	Executed with a constant time interval specified in parameter setting
Task program	Internal task	Executed by internal condition
	External interrupt task	Executed by external interrupt input



# Software Innovation. . . Intelligent



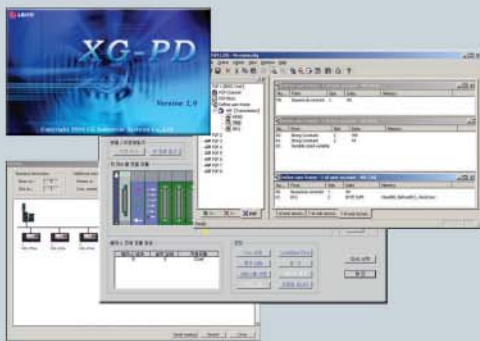
## Integrated Programming & Engineering

XG5000 Software Package provides integrated engineering environment from basic programming to different special module setting as well as diagnosis. This package consists of XG5000 (PLC programming), XG-PD (Communication programming) and APM Software Package (Positioning programming).



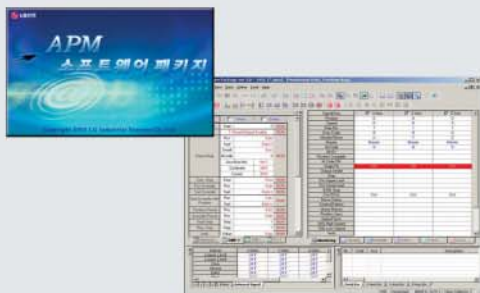
### XG5000

- Program Editing & Engineering Software
- Windows-based Easy Operation
- Multi-PLC Multi-Programming Support
- Various Monitoring & Diagnosis Functions



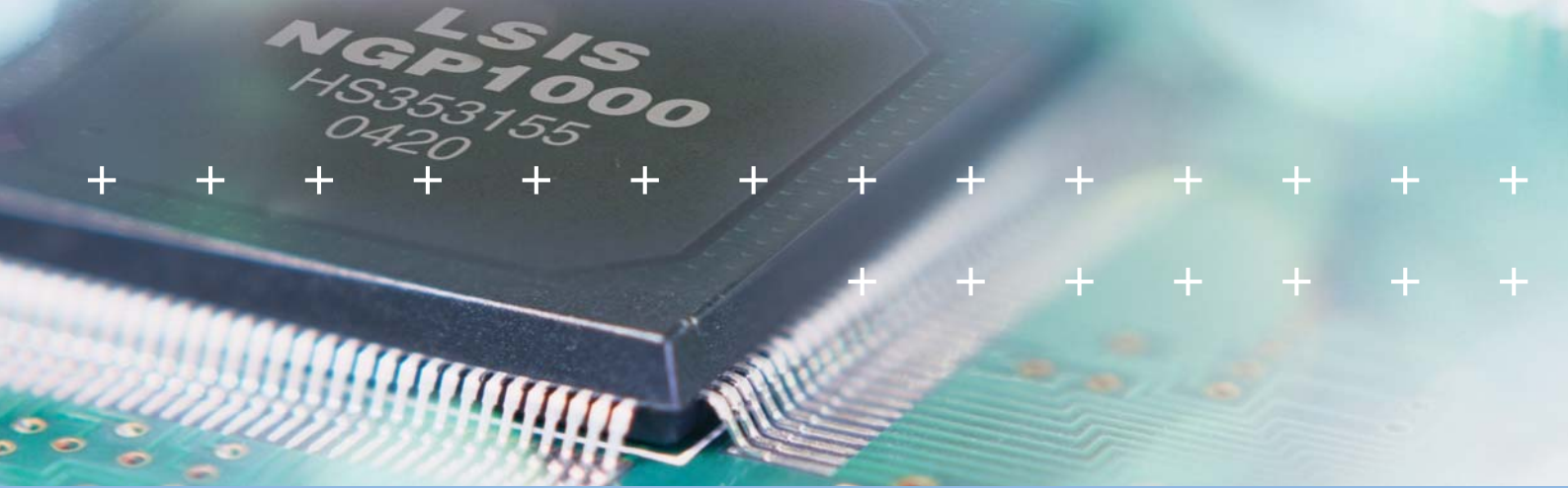
### XG-PD

- Comm. & Network Parameter Setting
- Protocol Editing / Network Diagnosis
- Frame Monitoring / Protocol Analysis

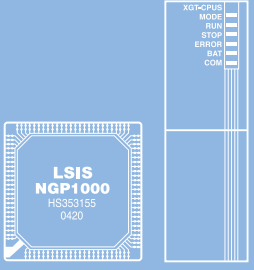


### APM S/W package

- Positioning Parameter Setting
- Data Editing in EXCEL
- Various Monitoring & Diagnosis
- Tracking Function

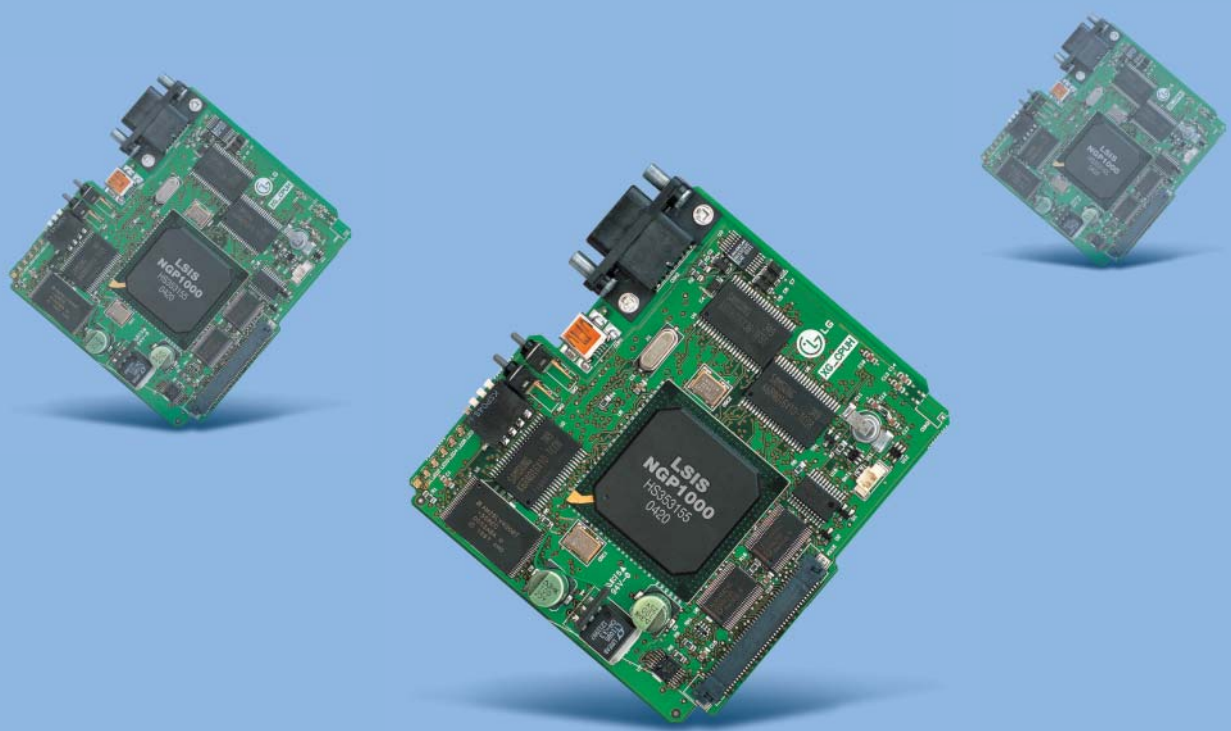


CPU



# CPU & System configuration

XGT series contain XGK-CPUS and XGK-CPUH for customized solutions which support wide coverage from small/middle- to large size-system control.







ne **X** t

**G**eneration  
**T**echnology



Premium CPU for high-speed and large scale application

## XGK-CPUH

- Program capacity: 64K steps
- I/O points: 6,144
- I/O device point: 32,000 (Remote I/O)
- Processing speed: 28ns/step

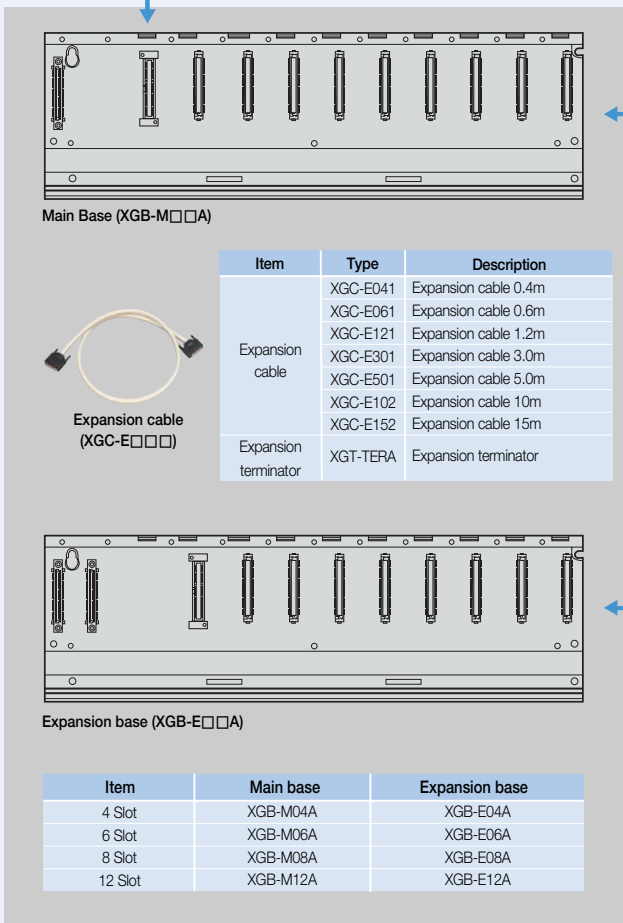
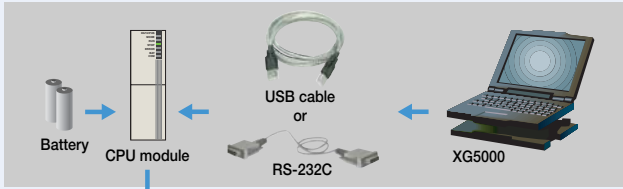


General sequence controller PLC CPU

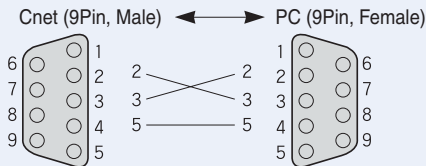
## XGK-CPUS

- Program capacity: 32K steps
- I/O points: 3,072
- I/O device point: 32,000 (Remote I/O)
- Processing speed: 84ns/step

System composition



• XG5000 Cable (RS-232C)



CPU module		
Type	I/O point	
XGK-CPUH	6,144	
XGK-CPUS	3,072	

Item	Type	Description
USB cable	USB-301A	USB downloading cable
RS-232C cable	KIC-050A	RS-232C downloading cable

Power module			
AC	Free Voltage	XGP-ACF1	DC5V 3A
		XGP-ACF2	DC24V 0.6A
DC	220V	XGP-AC23	DC5V 6A
		XGP-DC42	DC5V 6A

Item	Input module		
	AC110V	AC220V	DC24V
8 points	-	XGI-A21A	XGI-D21A
16 points	XGI-A12A	-	XGI-D22A
	-	-	XGI-D22B
32 points	-	-	XGI-D24A
	-	-	XGI-D24B
64 points	-	-	XGI-D28A
	-	-	XGI-D28B

Item	Output module		
	Relay	Triac	Transistor
8 points	XGQ-RY1A	-	-
16 points	XGQ-RY2A	XGQ-SS2A	XGQ-TR2A
	XGQ-RY2B	-	XGQ-TR2B
32 points	-	-	XGQ-TR4A
	-	-	XGQ-TR4B
64 points	-	-	XGQ-TR8A
	-	-	XGQ-TR8B

Special module		
Analog input	XGF-AV8A	Voltage input type, 8Ch
	XGF-AC8A	Current input type, 8Ch
Analog output	XGF-DV4A	Voltage output type, 4Ch
	XGF-DC4A	Current output type, 4Ch
	XGF-DV8A *	Voltage output type, 8Ch
	XGF-DC8A *	Current output type, 8Ch
High-speed counter	XGF-HO2A	Pulse (OC) input type, 2Ch
	XGF-HD2A	Pulse (LD) input type, 2Ch
Positioning	XGF-PO3A	Pulse (OC) output type, 3 axes
	XGF-PO2A	Pulse (OC) output type, 2 axes
	XGF-PO1A	Pulse (OC) output type, 1 axis
	XGF-PD3A	Pulse (LD) output type, 3 axes
	XGF-PD2A	Pulse (LD) output type, 2 axes
	XGF-PD1A	Pulse (LD) output type, 1 axis
Motion control	XGF-M16M	Motion dedicated net (M-Il) type, 16 axes Motion dedicated net (M-Il) type, 8 axes
Temperature control	XGF-TC4S *	Temperature (TC) input, 4Ch, Insulation
	XGF-RD4A *	Temperature (RTD) input, 4Ch

\* OC: Open Collector  
LD: Line Driver

Communication module		
Cnet	XGL-CH2A	RS-232C/RS-422
	XGL-C22A	RS-232C, 2Ch
	XGL-C42A	RS-422, 2Ch
FEnet (Open Ethernet)	XGL-EFMF	Optical, Master, SC type
	XGL-EFMT	Electric, Master, RJ-45
FDEnet (Dedicated Ethernet)	XGL-EDSF	Optical, Slave, SC type
	XGL-EDST	Electric, Slave, RJ-45
	XGL-EDMF	Optical, Master, SC type
	XGL-EDMT	Electric, Master, RJ-45
Rnet	XGL-RMEA	Fnet, Master, TP
Dnet	XGL-DMEA	DeviceNet, Master, ODVA Standard
Pnet	XGL-PMEA	Profibus-DP, Master, DP Standard

## Specifications

Item	Description	Standard
Ambient temperature	0 ~ 55 °C	
Storage temperature	-25 ~ +70 °C	
Ambient humidity	5 ~ 95%RH (Non-condensing)	
Storage humidity	5 ~ 95%RH (Non-condensing)	
Vibration resistance	Occasional vibration	
	Frequency	Acceleration
	10 ≤ f < 57Hz	-
	57 ≤ f < 150Hz	9.8m/s <sup>2</sup> {1G}
	Pulse width	
	0.075mm	
Vibration resistance	Continuous vibration	
	Frequency	Acceleration
	10 ≤ f < 57Hz	-
	57 ≤ f < 150Hz	4.9m/s <sup>2</sup> {0.5G}
	Pulse width	
	0.035mm	
Shock resistance	<ul style="list-style-type: none"> <li>Peak acceleration: 147 m/s<sup>2</sup> {15G}</li> <li>Duration: 11ms</li> <li>Half-sine, 3 times each direction per each axis</li> </ul>	IEC 61131-2
Noise resistance	Square wave impulse noise	±1,500Vp-p
	Electrostatic discharge	±4KV
	Radiated electromagnetic field noise	27-500MHz, 10V/m
	Fast transient/ Burst noise	0.25KV
Operating Ambience	Free from corrosive gases and excessive dust	
Altitude	Up to 2,000m	
Pollution degree	Less than equal to 2	
Cooling	Air-cooling	

\* Pollution degree 2 is nonconductive pollution of the sort where occasionally a temporary conductivity caused by condensation must be expected.

Item	Description		Remarks
	XGK-CPU5	XGK-CPUH	
Operation method	Cyclic execution of stored program, Time-driven interrupt, Process-driven interrupt		
I/O control method	Batch processing by scan synchronization (Refresh), Direct input/output by instructions		
Program language	Ladder diagram, Instruction list		
Number of instructions	Basic	42	
	Application	600	
Processing speed	Sequence instruction (μs)	0.084 μs/step	0.028 μs/step
	Application instruction (μs)	0.252 μs/step	0.084 μs/step
	Floating instruction (μs)	±: 0.602 μs (S), 1.078 μs (D) ×: 1.106 μs (S), 2.384 μs (D) ÷: 1.134 μs (S), 2.66 μs (D)	±: 0.602 μs (S), 1.078 μs (D) ×: 1.106 μs (S), 2.384 μs (D) ÷: 1.134 μs (S), 2.66 μs (D)
Program capacity	32K Steps	64K Steps	
I/O points (available to install)	768 (16-point I/O)	1536 (16-point I/O)	
	1536 (32-point I/O)	3072 (32-point I/O)	
	3072 (64-point I/O)	6144 (64-point I/O)	
Data area	P	P0000 ~ P2047F (32768 points)	
	M	M0000 ~ M2047F (32768 points)	
	K	K000 ~ K2047F (32768 points)	
	L	L000 ~ L11263F (32768 points)	
	F	F000 ~ F2047F (32768 points)	
	T	100ms: T0000 - T0999	
		10ms: T1000 - T1499	
		1ms: T1500 - T1999	
	C	0.1ms: T2000 - T2047	
		C0000 ~ C2047	
S	S00.00 ~ S127.99		
D	D0000 ~ D19999	D0000 ~ D32767	
U	U0.0~U7F.31		
Z	128points		
File register	R	RAM: 1 block	RAM: 2 blocks
		Flash: 2M byte, 32 blocks	
Program type	Total program	256	
	Initialization	1 (L_INT)	
	Time-driven	32	
	External	32	
Internal	32		
Operation mode	RUN, STOP, DEBUG		
Self-diagnosis	Execution, Delay, Memory error, I/O error, Battery error, Power error		
Programming port	RS-232C (1Ch), USB (1Ch)		MODBUS slave
Data retention at power failure	Set "retain" at data declaration		
Max. expansion stage	4 (Main + Expansion), up to 15m	8 (Main + Expansion), up to 15m	
Current consumption (mA)	960	960	
Weight (Kg)	0.12	0.12	



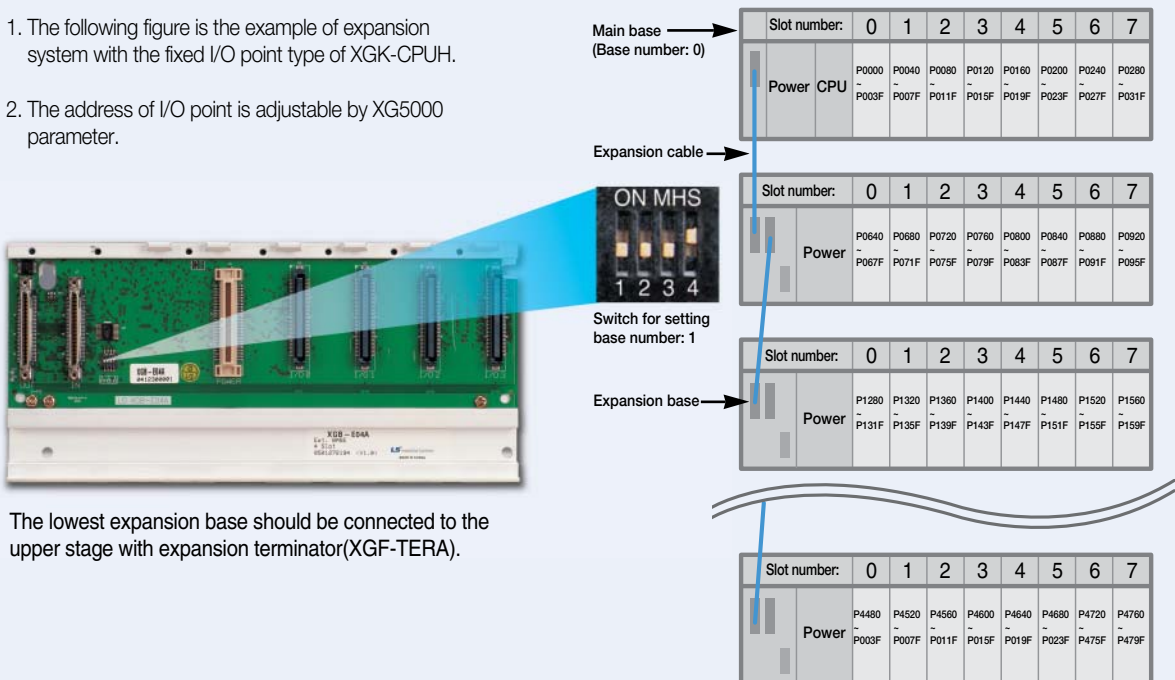
Main system composition

Item	XGK-CPUS	XGK-CPUH																																																				
Max. expansion stage	3 stages	7 stages																																																				
Max. installation of module	48 modules	96 modules																																																				
Max. number of I/O point	3,072	6,144																																																				
Max. expansion distance	15m	15m																																																				
Assignment of I/O number (Fixed)	<ul style="list-style-type: none"> <li>64 points are assigned to each slot of base regardless of installation of module.</li> <li>I/O numbers equivalent to 12 slots are assigned to a base.</li> <li>The starting number of base '0' is P0000.</li> <li>Refer to the following figure regarding the I/O number assignment of 12 slots</li> </ul> <table border="1"> <thead> <tr> <th>Slot number:</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> </tr> </thead> <tbody> <tr> <td>Power</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> <td>64 points</td> </tr> <tr> <td></td> <td>P003F</td> <td>P007F</td> <td>P011F</td> <td>P015F</td> <td>P019F</td> <td>P023F</td> <td>P027F</td> <td>P031F</td> <td>P035F</td> <td>P039F</td> <td>P043F</td> <td>P047F</td> </tr> </tbody> </table>		Slot number:	0	1	2	3	4	5	6	7	8	9	10	11	Power	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points		P003F	P007F	P011F	P015F	P019F	P023F	P027F	P031F	P035F	P039F	P043F	P047F													
	Slot number:	0	1	2	3	4	5	6	7	8	9	10	11																																									
Power	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points	64 points																																										
	P003F	P007F	P011F	P015F	P019F	P023F	P027F	P031F	P035F	P039F	P043F	P047F																																										
Assignment of I/O number (Variable)	<ul style="list-style-type: none"> <li>I/O point is assigned automatically according to the installed module.</li> <li>I/O parameter is used to install modules.</li> <li>The starting number of base '0' is P0000.</li> <li>16 points are assigned automatically to the slot of special or communication module</li> <li>Refer to the following figure regarding the I/O number assignment of 12 slots.</li> </ul> <table border="1"> <thead> <tr> <th>Slot number:</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> </tr> </thead> <tbody> <tr> <td>Power</td> <td>16 points</td> <td>16 points</td> <td>32 points</td> <td>64 points</td> <td>16 points</td> <td>32 points</td> <td>32 points</td> <td>64 points</td> <td>32 points</td> <td>16 points</td> <td>32 points</td> <td>32 points</td> </tr> <tr> <td></td> <td>P000F</td> <td>P001F</td> <td>P003F</td> <td>P007F</td> <td>P008F</td> <td>P009F</td> <td>P0010F</td> <td>P0012F</td> <td>P0016F</td> <td>P0018F</td> <td>P0019F</td> <td>P0021F</td> </tr> <tr> <td></td> <td>P0020F</td> <td>P0022F</td> <td>P0023F</td> <td>P0027F</td> <td>P0028F</td> <td>P0029F</td> <td>P0031F</td> <td>P0032F</td> <td>P0035F</td> <td>P0036F</td> <td>P0037F</td> <td>P0039F</td> </tr> </tbody> </table>		Slot number:	0	1	2	3	4	5	6	7	8	9	10	11	Power	16 points	16 points	32 points	64 points	16 points	32 points	32 points	64 points	32 points	16 points	32 points	32 points		P000F	P001F	P003F	P007F	P008F	P009F	P0010F	P0012F	P0016F	P0018F	P0019F	P0021F		P0020F	P0022F	P0023F	P0027F	P0028F	P0029F	P0031F	P0032F	P0035F	P0036F	P0037F	P0039F
Slot number:	0	1	2	3	4	5	6	7	8	9	10	11																																										
Power	16 points	16 points	32 points	64 points	16 points	32 points	32 points	64 points	32 points	16 points	32 points	32 points																																										
	P000F	P001F	P003F	P007F	P008F	P009F	P0010F	P0012F	P0016F	P0018F	P0019F	P0021F																																										
	P0020F	P0022F	P0023F	P0027F	P0028F	P0029F	P0031F	P0032F	P0035F	P0036F	P0037F	P0039F																																										

The standard I/O number assignment is 64 points. (Fixed)

Expansion system composition

- The following figure is the example of expansion system with the fixed I/O point type of XGK-CPUH.
- The address of I/O point is adjustable by XG5000 parameter.



The lowest expansion base should be connected to the upper stage with expansion terminator(XGF-TERA).

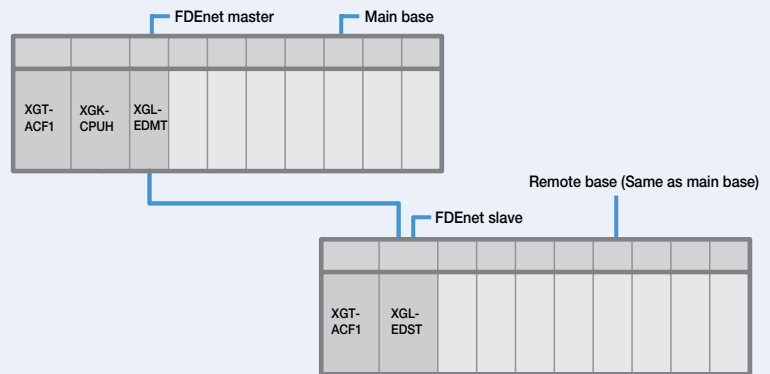
### Remote I/O system application

Item	Network type (Master)	XGT base type remote I/O	Block type remote I/O (Smart I/O)
1	FDEnet	0	X
2	Profibus-DP	X	0
3	DeviceNet	X	0
4	Rnet	X	0
5	MODBUS (Cnet)	-	0

### XGT base type remote I/O system

#### XGT base type remote I/O system (Under development)

This system can be configured using only FDEnet.  
The master module of main base should be connected to the slave module (XGL-EDST) of remote base. (XGL-EDST is under development)



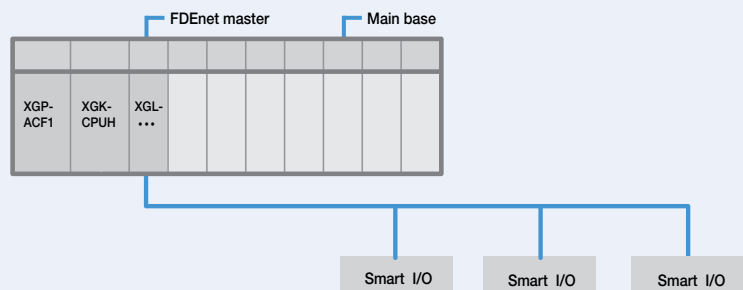
#### Remark) Assignment of device memory and I/O number

- Through High-speed link parameter, users can assign device memory such as 'P', 'M', 'K', and 'D' to remote I/O. Area 'P' should be set to use various functions such as initial reset, forced ON/OFF.
- Max. available point of I/O device memory (P) is 32,768 (P00000~P2042F)
- In case of constructing remote system, the assignment of I/O number is 'fixed' type (64 points, 4 words per slot)
- When setting up High-speed link parameter, the whole device memory of expansion base should be assigned at once regardless of distinction of I/O.

Ex) In case input module is set on 0, 2 slot and output module is set on 1, 4 slot in the remote 12 station,  
 - Reception: Starting address - P00000, Size - 20 words (0,1,2,3,4 slot)  
 - Transmission: Starting address - P00000, Size - 20 words (0,1,2,3,4 slot)

### Block type remote I/O system

Block type remote I/O system consists of Profibus-DP, DeviceNet, Rnet. Users can use this I/O system regardless of which series it is. Complying with the global standard, Profibus-DP and DeviceNet can be connected to LS Smart-I/O as well as other company's products.



Features

- 8, 16, 32, 64 points I/O module
- Operation monitoring by LED display
- Easy maintenance: Terminal block type, one-touch installation of module



Input module specifications

Input type	DC input						AC input		
Type	XGI-D21A	XGI-D22A	XGI-D22B	XGI-D24A	XGI-D24B	XGI-D28A	XGI-D28B	XGI-A12A	XGI-A21A
Input point	8	16		32		64		16	8
Rated input voltage	DC24V						AC100~120V	Free voltage	
Rated input current	4mA						8mA	17mA	
ON voltage/current	19V or more / 3mA or less						AC80V or more / 5mA or less	AC130V or more / 10mA or less	
OFF voltage/current	DC11V or more / 1.7mA or less						AC30V or more / 1mA or less	AC60V or more / 2mA or less	
Response	Off→On	1ms/5ms/10ms/20ms/70ms (set by CPU parameter) Initial value: 3ms						15mA or less	
	On→Off	1ms/5ms/10ms/20ms/70ms (set by CPU parameter) Initial value: 3ms						25mA or less	
Common (COM)	8 points/COM	16 points/COM		32 points/COM		64 points/COM		16 points/COM	8 points/COM
Insulation method	Photocoupler								
Current consumption (mA)	20	30		50		60		30	20
Weight (Kg)	0.1	0.12		0.1		0.15		0.13	0.13

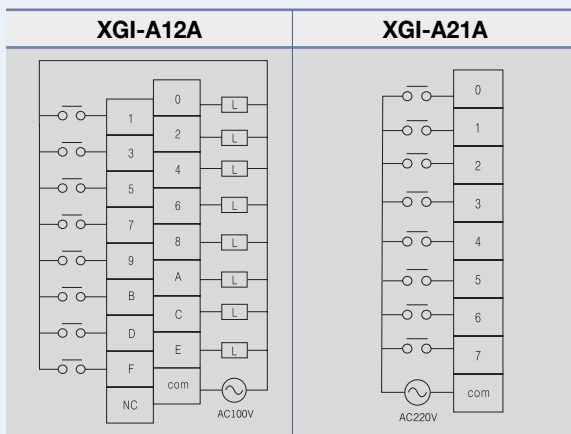
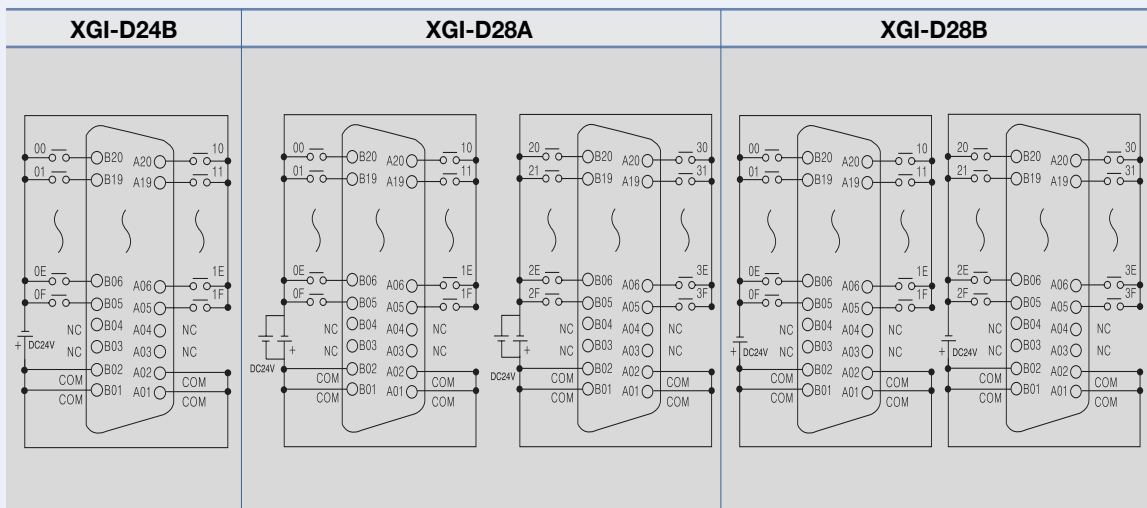
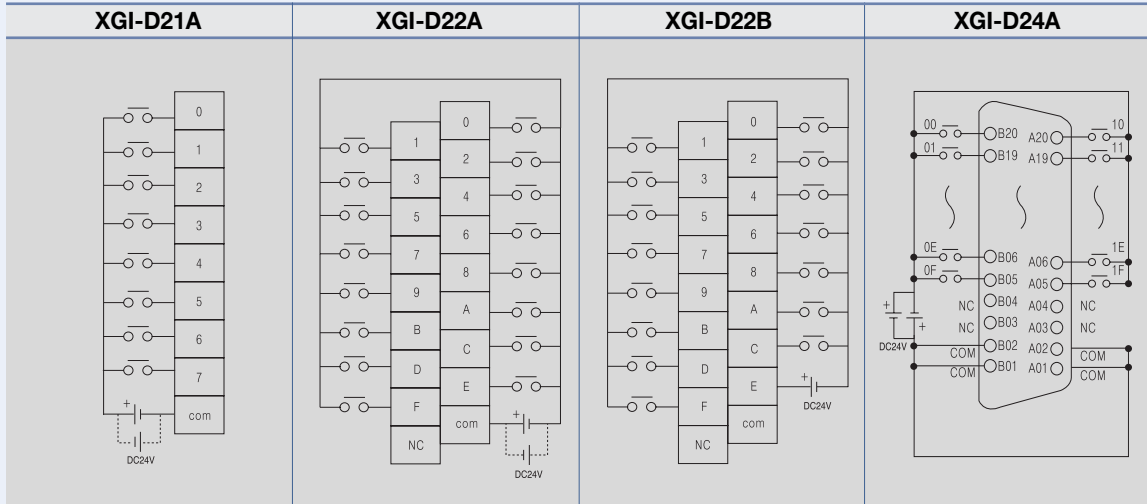
Output module specifications

Input type	Relay			Transistor				Triac		
Type	XGQ-RY1A	XGQ-RY2A	XGQ-RY2B	XGQ-TR2A	XGQ-TR2B	XGQ-TR4A	XGQ-TR4B	XGQ-TR8A	XGQ-TR8B	XGQ-SS2A
Output point	8	16		16		32		64		16
Rated load voltage	DC12/24V, AC110/220V			DC12/24V						AC110/220V
Rated output current	1 point	2A		0.5A		0.1A				0.6A
	Common	5A		4A		2A				4A
Response time	Off→On	10ms or less				1ms or less				1ms or less
	On→Off	12ms or less				1ms or less				0.5cycle +1ms or less
Common (COM)	1 point/COM	16 points/COM		32 points/COM						16 points/COM
Insulation method	Relay			Photocoupler						
Current consumption (mA)	260	500		70		130		230		300
Weight (Kg)	0.13	0.17	0.19	0.11		0.1		0.15		0.2
Surge killer	-		Varistor	Zener diode						Varistor
External power supply	-			DC						-

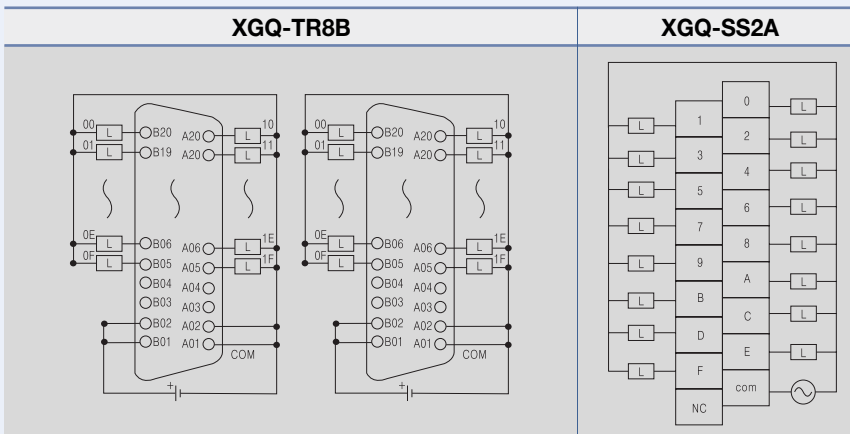
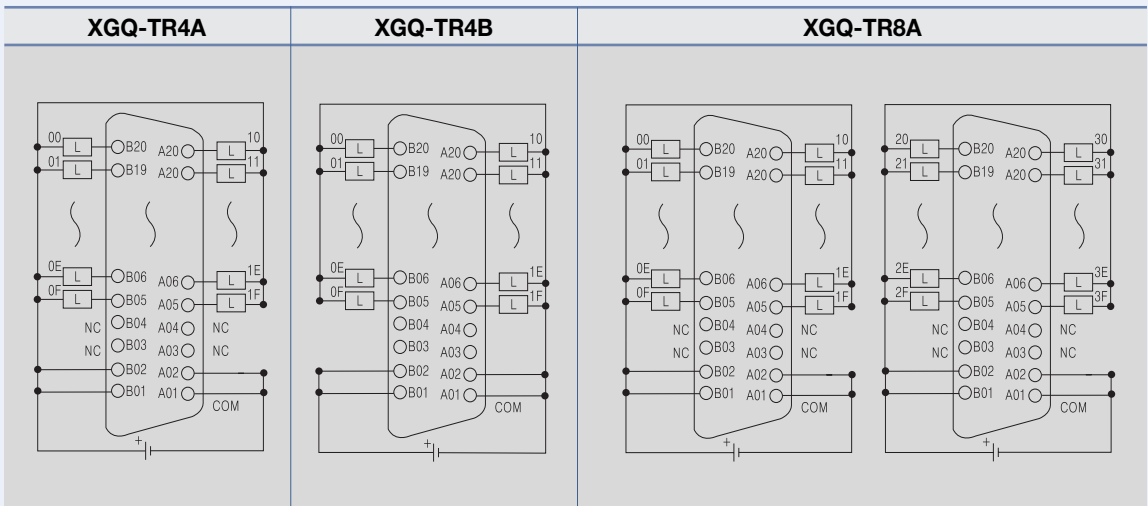
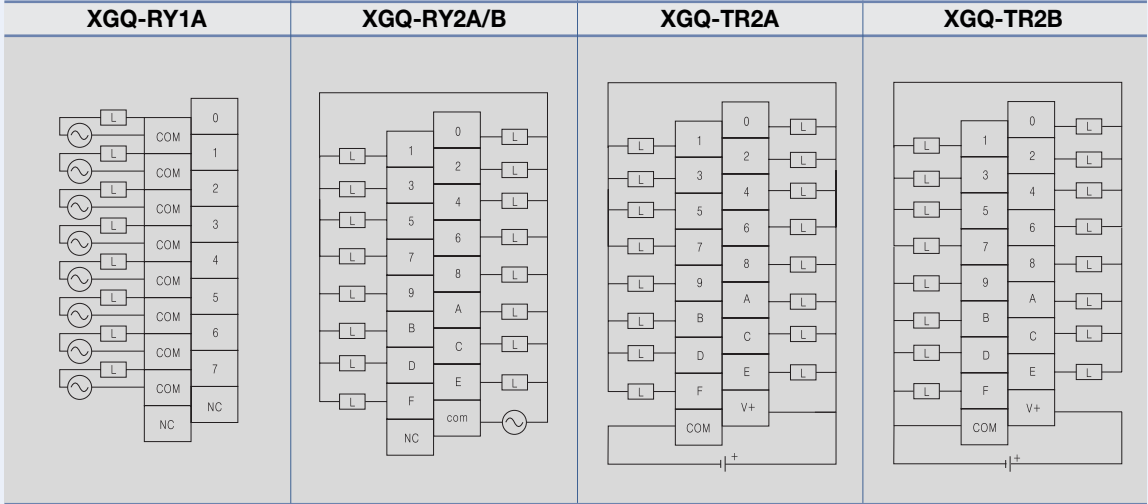
Note) B1, B2 of 32, 62 points terminal (connector) are shorted inside of the product.



Wiring diagram for input modules



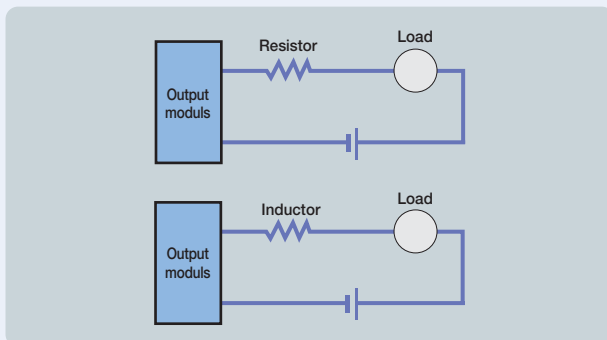
Wiring diagram for output modules



## CPU & System configuration / I/O module

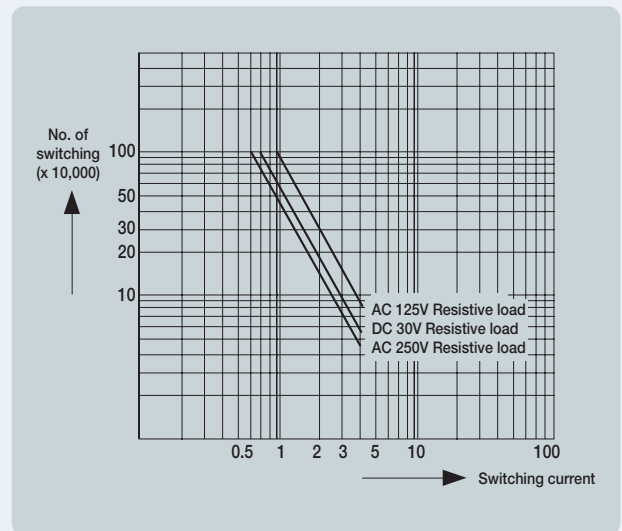
### Precaution during installation of I/O module

- XGT has 2 kinds of digital input type: Current sink input, Current source input. For DC input module has different wiring depending on the input type, digital input type should be selected with consideration about connected input device.
- Max. number of simultaneous input point differs according to the module type. Therefore, review specification of input module before its application.
- Use an interrupt module when a response of high-speed input is demanded. But only one interrupt module can be installed per CPU module.
- If switching frequency is high or inductive switching load is used, the lifespan of relay output module will be reduced. Therefore, it is recommended to use transistor output module or triac output module.
- When driving an inductive load with output module, set the maximum switching frequency as 'ON' for 1 second and 'OFF' for 1 second.
- When using counter or timer with DC/DC converter, it is possible to have inrush current which cause a break down. Therefore to reduce an effect of inrush current, connect resistor or inductor to load or use the module whose max. load current is high.

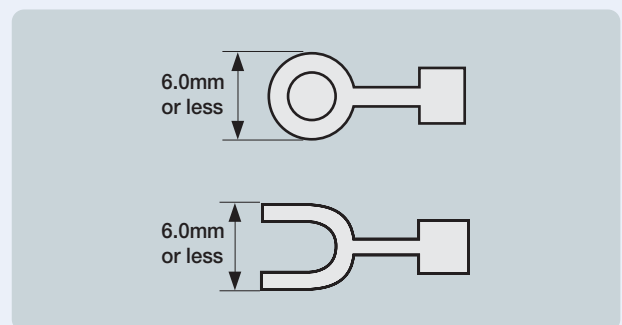


- Fuse of output module is not exchangeable to prevent a damage of external wiring when output module has a short-circuit.
- The number of simultaneous 'ON' points varies depending on input voltage, ambient temperature. Refer to the specification of input module.

- The following graph presents the relay lifespan of relay output module. It shows the maximum lifespan of relay which is used in the relay output.



- Compressed terminal attaching sleeve cannot be mounted to XGT terminal block. The following picture shows appropriate compressed terminals for terminal block.



- Use 0.3~0.75mm<sup>2</sup> twisted pair, below 2.8mm thickness cable for connecting to terminal block.
- Be careful when choosing and using the cable since the permissible current differs according to the insulation thickness.
- Joint torque of fixed screw and terminal block screw of the module needs to be within the range in the following table.

Joint	Joint torque range
I/O module terminal block screw (M3)	42~58 N · cm
I/O module terminal block fixed screw (M3)	68~89 N · cm

- Thermal protector is built in transistor module. Thermal protector is a function that protects PLC from an overload and overheating.





Network



# Network

Along with Ethernet, Profibus-DP, and DeviceNet, XGT series provide the maximum in control integration and communication flexibility.





ne X t

Generation  
Technology

# XGT



## XGT FEnet / FDEnet (Fast Ethernet)

- 10/100Mbps High-speed Ethernet for industrial use
- 10/100Base-TX, 100Base-FX (Optical)
- Open Ethernet (FEnet) and LSIS dedicated Ethernet (FDEnet)
- High reliability and performance with 32-bit processor
- Various connection to MMI S/W (XGT, MODBUS/TCP)



## XGT Cnet

- RS-232C/485/422 communication
- Long-distance communication via modem connection
- Various connection to MMI S/W (XGT, MODBUS RTU, MODBUS ASCII)
- User-defined communication support
- Convenient P2P master (XGT, MODBUS)



## XGT Rnet

- Economical network
- Communication speed: 1Mbps
- Communication distance: Max. 750m
- Available to use max. 6 repeaters (Support up to 5.25Km)
- Network management using Auto-scan (Slave module information)



## XGT Dnet (DeviceNet)

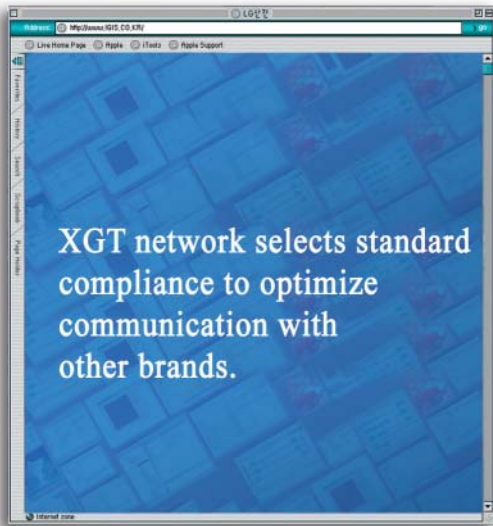
- Connectable to other PLCs and control device
- Compliance of the ODVA standard
- Flexible communication speed setting: 125/250/500Kbps
- Multi-drop and T branch connection
- Communication distance: Max. 500m
- Convenient parameter setting through SyCon/HS link parameter



## XGT Pnet (Profibus-DP)

- Low cost network appropriate to field level
- Proper to communicate among a master automation device and distributed slave I/O devices
- Fast slave communication omitting application layer
- Long communication distance: Max. 1200m
- Convenient parameter setting through SyCon/HS link parameter

Features



**XGT FEnet / FDEnet (Fast Ethernet)**

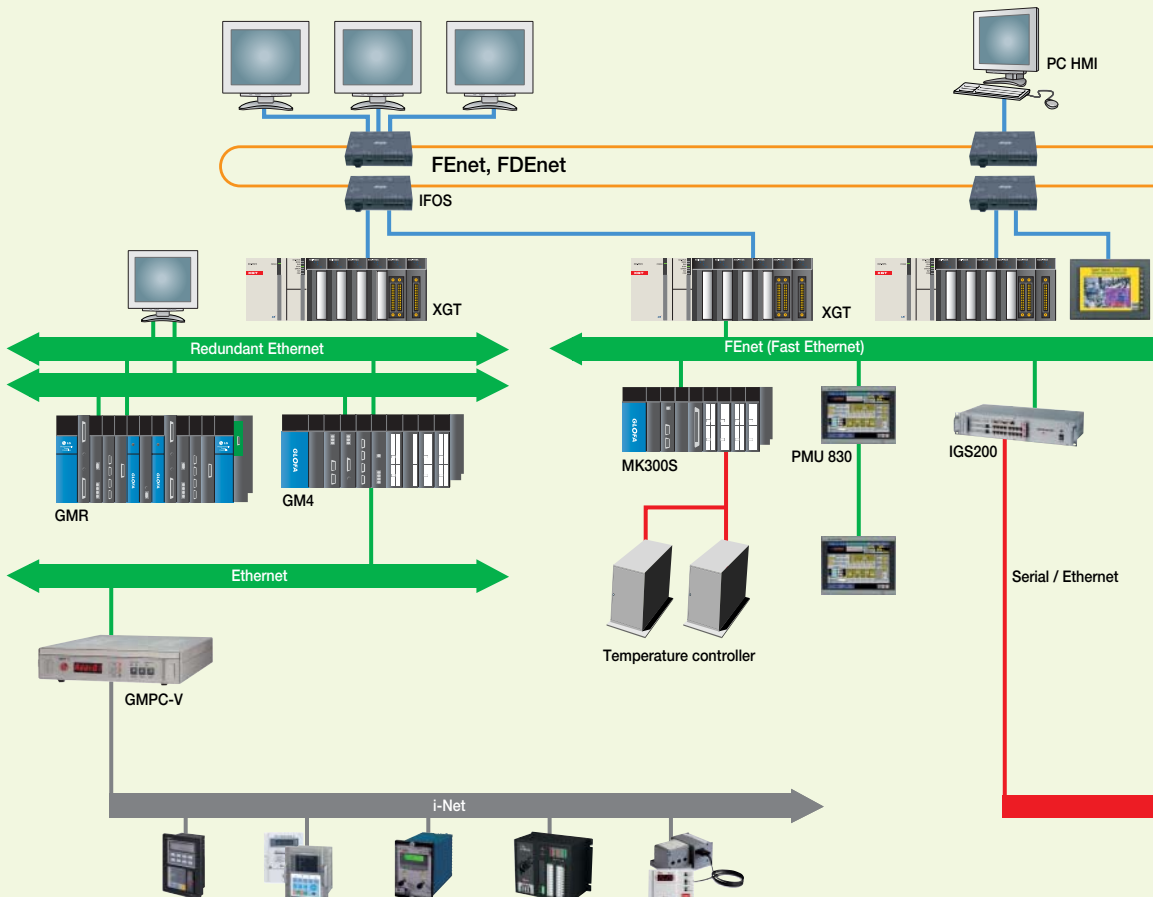
- 10/100Mbps High-speed Ethernet for industrial-use
- 10/100Base-TX, 100Base-FX (Optical)
- Open (Information level) Ethernet and LSIS dedicated (Between LS PLCs) Ethernet: FEnet and FDEnet
- High reliability and performance with 32-bit processor
- Various connection to MMI S/W (XGT, MODBUS)

**XGT Cnet**

- RS-232C/485/422 communication
- Long-distance communication via modem connection dedicated line modem connection
- Various connection to MMI S/W (XGT, MODBUS RTU, MODBUS ASCII)
- User-defined communication support
- Convenient P2P master (XGT, MODBUS)

**XGT Rnet**

- Economical and various network
- High-speed communication: 1Mbps
- Long communication distance: Max. 750m
- Available to use max. 6 repeaters (Up to 5.25Km)
- Network management using Auto-scan (Slave module information)





### XGT Dnet (DeviceNet)

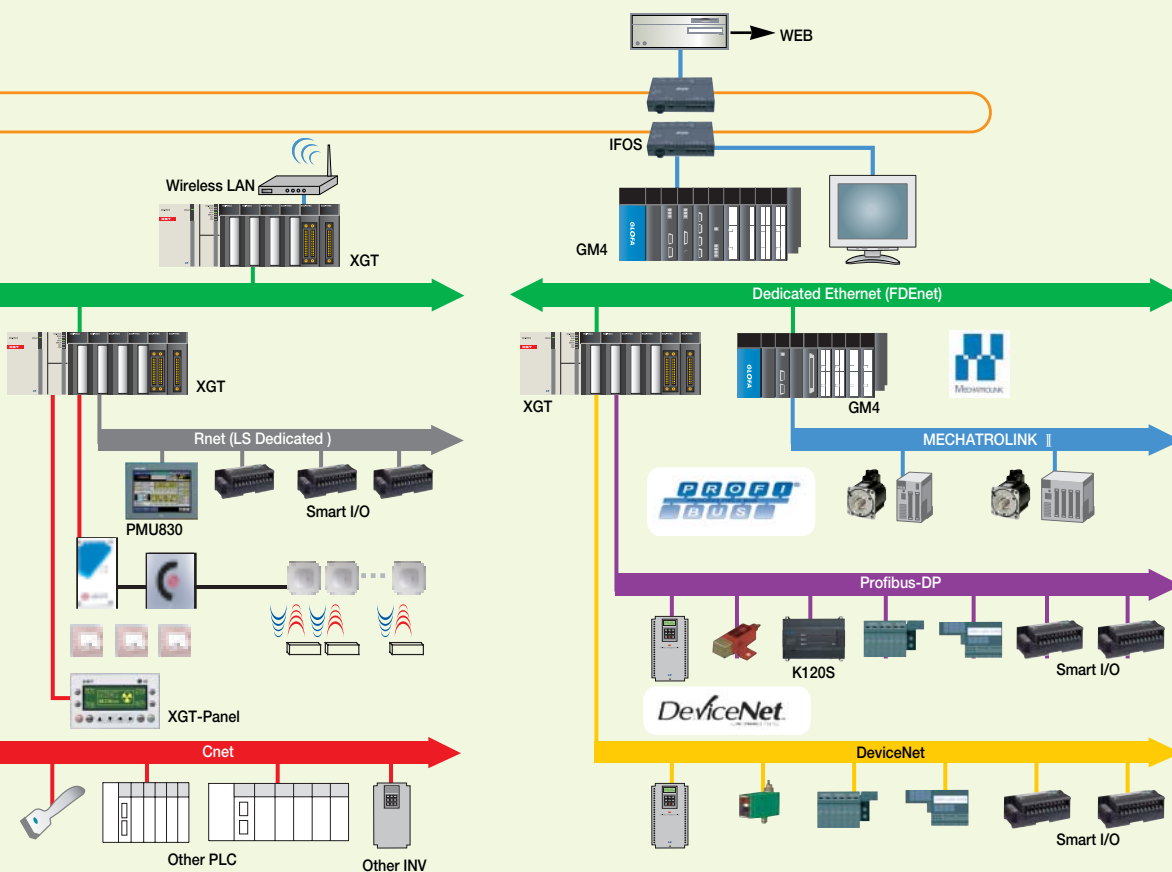
- Connectable to other PLCs and control device
- Compliance of the ODVA standard
- Flexible communication speed setting: 125/250/500Kbps
- Multi-drop and T branch connection
- Long communication distance: Max. 500m

### XGT Pnet (Profibus-DP)

- Low cost network appropriate to field level
- Proper to communicate among a master automation device and distributed slave I/O devices
- Fast slave communication omitting application layer
- Long communication distance: Max. 1200m
- Communication using High-speed link parameter

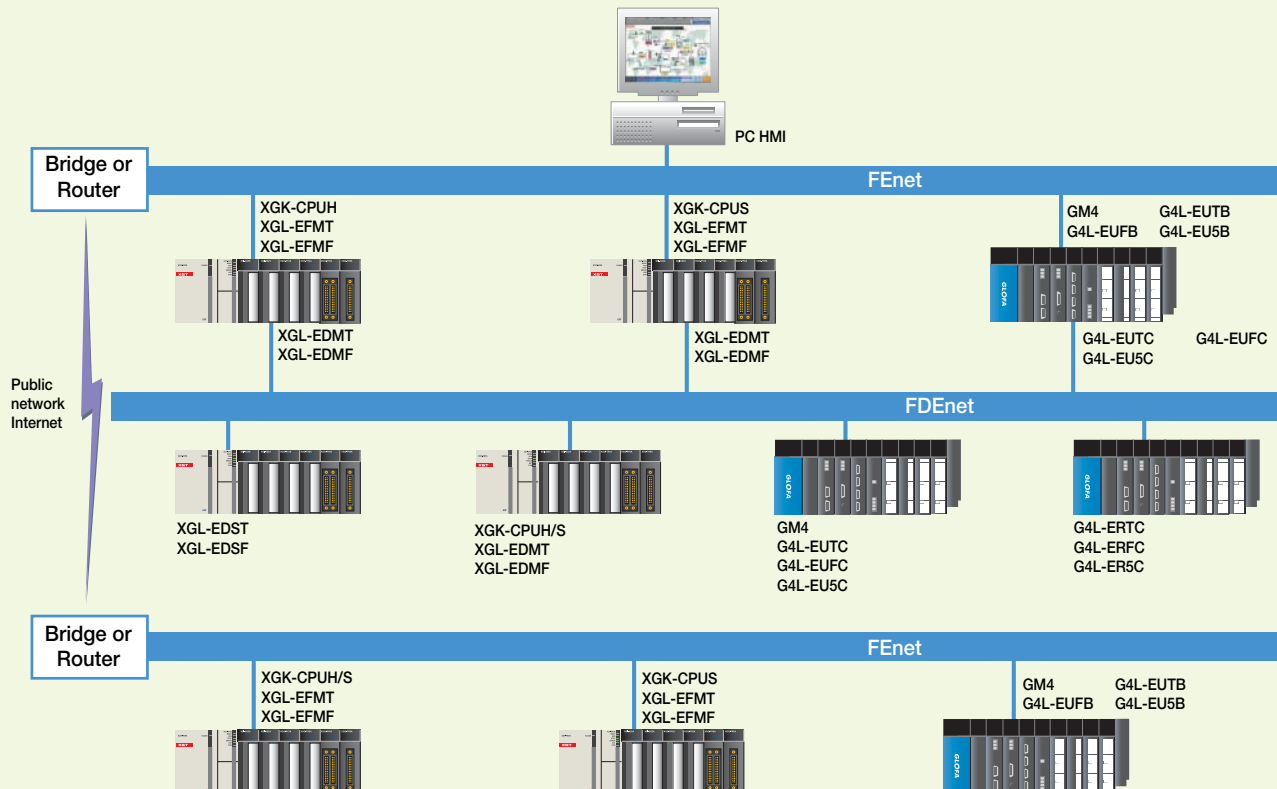
### No. of network module available

Item	XGK-CPUH	XGK-CPUS
Total network module	24	24
High-speed link module	12	12
P2P service	8	8



Features

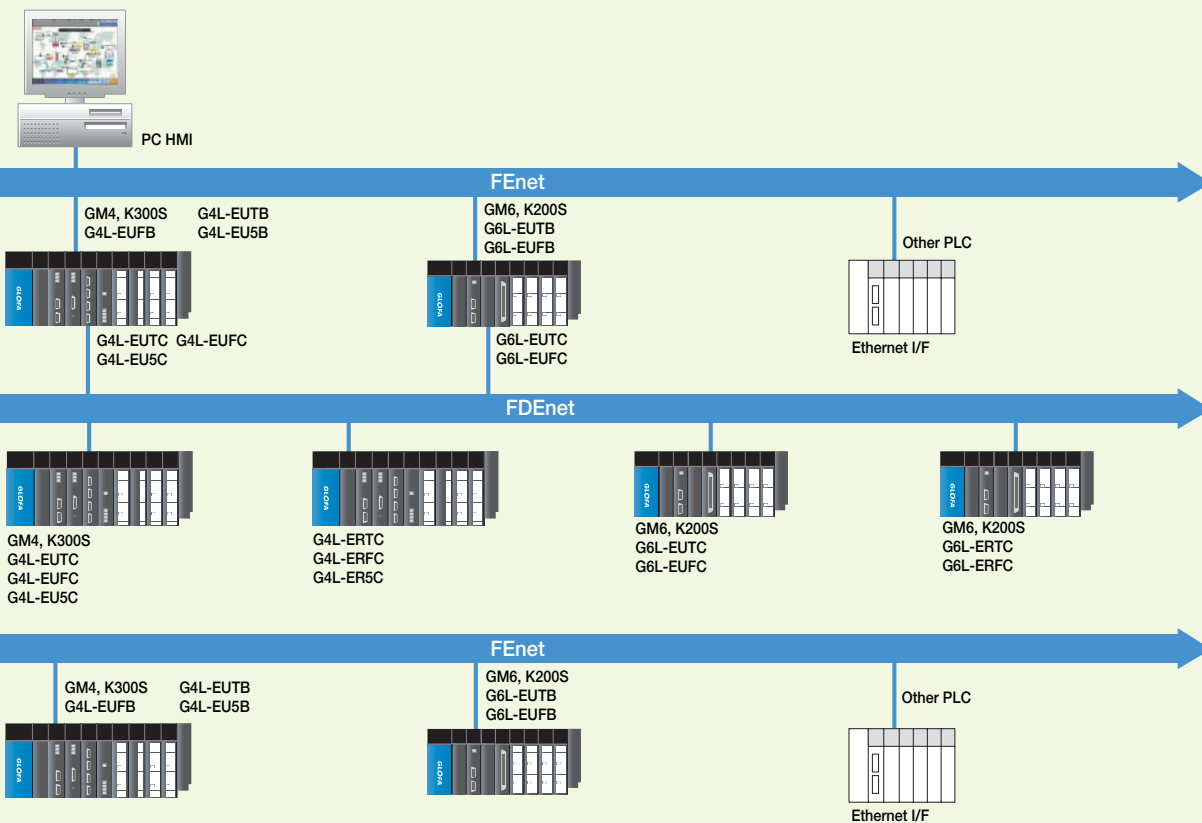
- 10/100Mbps High-speed Ethernet for industrial use (IEEE802.3)
- Expanded High-speed link block (128 blocks)
- 10/100Base-TX, 100Base-FX (Optical)
- Open (Information level) Ethernet and LSIS dedicated (Between LS PLCs) Ethernet: FEnet and FDEnet
- High reliability and performance with 32-bit processor
- Remote programming, monitoring and PLC mode control by XG5000
- E-Mail transmission support
- Easy programming (MODBUS/TCP) with other brands' built-in protocol (Device Driver)
- Providing information of network system by Auto-scan
- Providing XGT/MODBUS communication drivers (MMI/PC communication)
- Easy setting of network configuration and various diagnosis/monitoring: XG-PD
- User protocol editing and command application by P2P service (Connectable to other brands)
- Module checking function (PING)
- Providing information of services (High-speed link, P2P, dedicated service, media condition)



**Specifications**

FDnet	Item	XGL-EFMT	XGL-EFMF
	Communication spec.	10/100 BASE-TX	100 BASE-FX, Fiber Optic
Protocol	TCP/IP, UDP/IP		
Service	With LS PLCs	High-speed link, P2P service	
	With other devices	P2P service	
	Application	Dedicated protocol service, XG5000 service, E-Mail service	
HS link sending/receiving data	200 words/block (Max. 128 blocks)		
No. of channel connectable to upper stage	16 channels		
General use	Communication with PC (HMI) and external devices, High-speed communication among LSIS PLCs		
Media	UTP/STP Category 5	62.5/125 $\mu$ m, Multi-mode, SC connector	
Current consumption (mA)	410	630	
Weight (Kg)	0.11	0.15	

FDEnet	Item	XGL-EDMT	XGL-EDMF
	Communication spec.	10/100 BASE-TX	100 BASE-FX, Fiber Optic
Protocol	Dedicated protocol		
Service	With LS PLCs	High-speed link, P2P service	
	With other devices	-	
	Application	XG5000 service	
Sending/receiving data	200 words /block		
No. of connection stations	64 stations		
General use	High-speed link communication among LSIS PLCs		
Media	UTP/STP Category 5	62.5/125 $\mu$ m, multi-mode, SC connector	
Current consumption (mA)	410	630	
Weight (Kg)	0.11	0.15	



**Features**

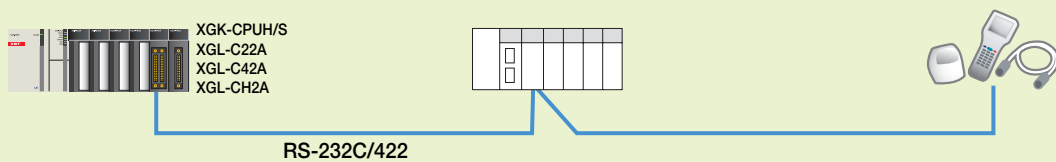
- Various protocol editing and communication parameter setting: XG-PD
- Long-distance communication via modem connection
- Dedicated protocol for multi-drop configuration connectable up to 32 units
- RS-232C/422 communication port
- Flexible communication speed setting (300~115,200bps)
- Supporting full duplex and half duplex communication
- Max. 12 modules available in one CPU
- P2P service: User-defined communication and XGT/MODBUS master
- Various connection to MMI S/W (XGT, MODBUS RTU, MODBUS ASCII)
- Various diagnosis functions using XG-PD (I/O, link status, service status), monitoring sending/receiving frame simultaneously and displaying frame's result
- Communication service information (Dedicated service, P2P service)
- Supporting simultaneously dedicated service in remote connection
- Communication without additional setting when replacing communication module

**Various independent operation mode**

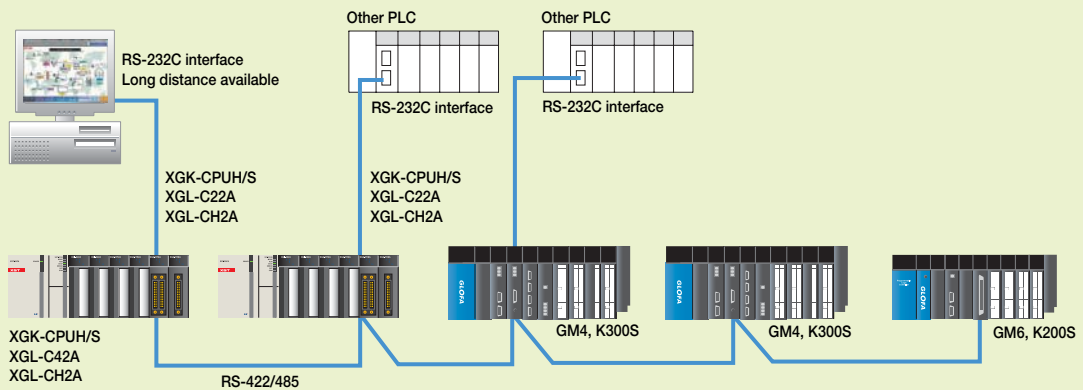
- Operation mode
- Dedicated protocol mode (Simultaneous support)
- Program upload/download by XG5000 protocol (RS-232C)  
Communication using LSIS dedicated protocol
- User-defined communication of P2P mode and XGT/MODBUS master



**Communication via RS-232C/422**



**1: N and N: M connection (LSIS and other)**

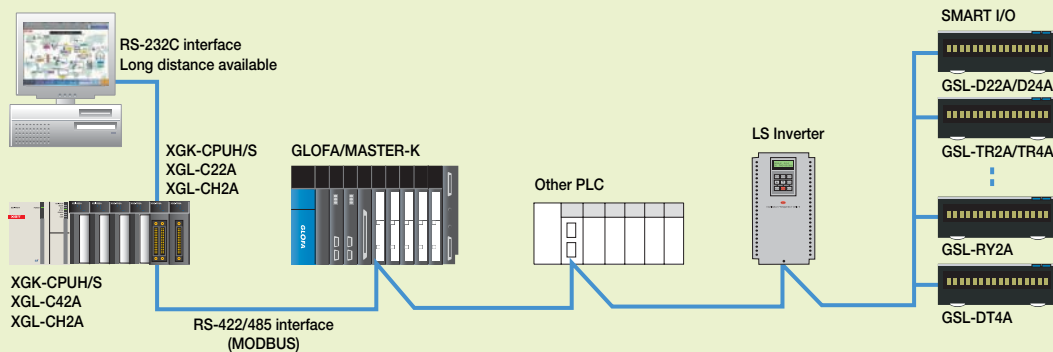




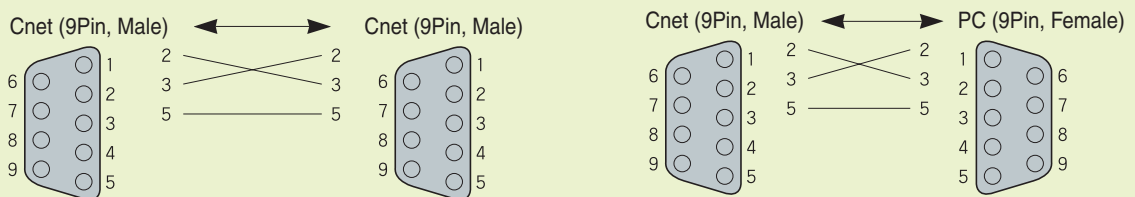
## Specifications

Item	Specifications		
	XGL-C22A	XGL-C42A	XGL-CH2A
Interface	RS-232C, 2 channels	RS-422, 2 channels	RS-232C/RS-422, 1 channel
Modem connection	Remote communication with external devices via modem connection. Available for only RS-232C port.		
Communication mode	Dedicated mode	1: 1 or 1: N communication using LSI dedicated protocol	
	XG5000 mode	Program upload/download and remote control	
	P2P mode	Communication by protocol using XG-PD (Interface with other PLCs), XGT, MODBUS RTU/ASCII master communication	
Operation mode	Server (Slave)	Remote connection simultaneously using XGT/MODBUS Server, user-defined	
	Master	XGT, MODBUS RTU/ASCII master, user-defined	
Data type	Start Bit	1	
	Data Bit	7 or 8	
	Stop Bit	1 or 2	
	Parity	Even/Odd/None	
	Setting	Basic parameter setting with XG-PD	
Synchronization	Asynchronous		
Transmission speed (bps)	Selectable among 300/600/1,200/2,400/4,800/9,600/19,200/38,400/57,600/115,200 bps		
Station number setting	Up to 32 stations from 0 to 31 with XG-PD		
Transmission distance	RS-232C: Max. 15m (Extendible by using modem), RS-422/485: Max. 500m		
Modem communication	Available	Not available	Available via RS-232C
Network configuration	RS-232C 1: 1, RS-422 1: 1, 1: N, N: M		
Diagnosis function	Available through LED and XG-PD diagnosis service		
Max. number of installation	12		
Current consumption (mA)	310	300	310
Weight (Kg)	0.12	0.12	0.12

## MODBUS



## Cnet cable connection

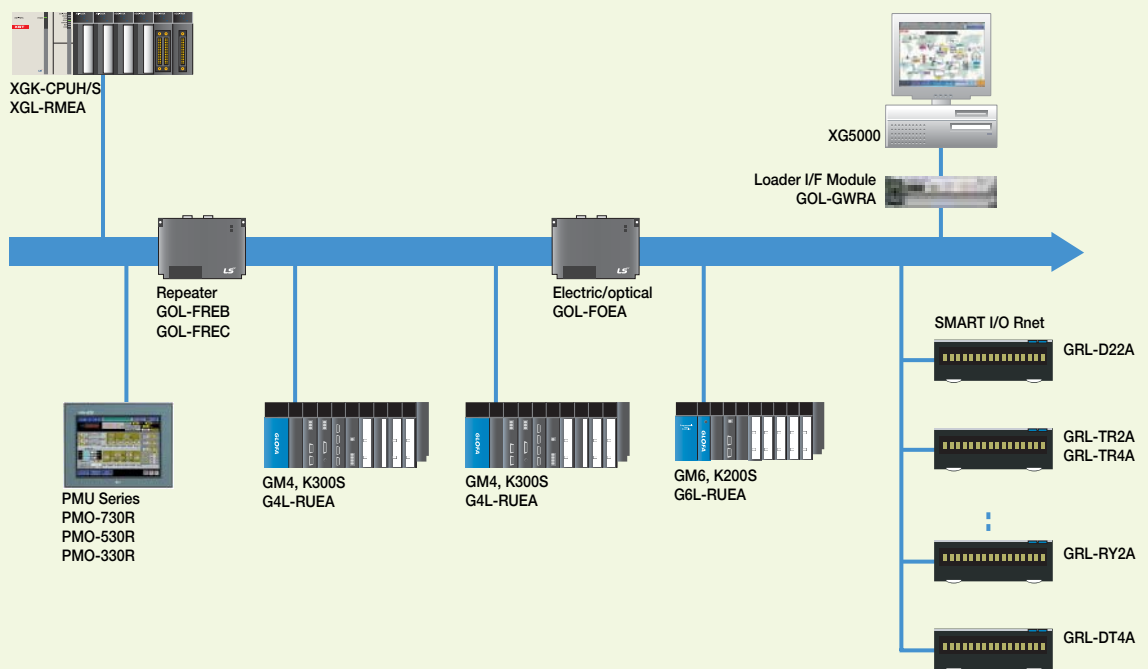


Features

- Economical network
- Communication speed: 1Mbps
- Communication distance: Max. 750m
- Available to use max. 6 repeaters (Up to 5.25Km)
- Network management using Auto-scan (Slave module information)
- Multi-drop network with smart I/O
- Network diagnosis and monitoring by XG-PD
- Max. 64 stations of slave modules controlled by one master module



System configuration



## Specifications

Item	Specifications (XGL-RMEA)
Transmission speed	1Mbps
Encoding	Manchester Biphase-L
Transmission distance (Per segment)	Max. 750m
Transmission distance (When using repeater)	Max. 750m * (6 repeater + 1) = 5.25Km
Transmission cable	Twisted pair shield cable
Max. number of connection stations	Master + Slave = 64 stations (with repeater), 1 segment=32 stations (with master)
Max. size of protocol	256 bytes
Medium access method	Circulated Token Passing
Frame error check	CRC 16 check
Max. number of installation	12
Installation position	Main base or expansion base
Current consumption (mA)	410
Weight (Kg)	0.12

## SMART I/O

- Reduction of wiring and real-time control of distributed I/O
- Various I/O module (16/32 points)



## Repeater specifications

Item	Specifications
Type	G0L-FREB: AC110V ~ AC220V, G0L-FREC: DC 24V
Communication speed	1Mbps
Transmission method	Twisted pair shield cable
Transmission distance	Max. 750m per repeater
Max. number of installation between stations	Max. 6 repeaters
Max. distance between stations	5.25Km (when 6 repeaters are installed)
Faulty data reception	Error data transmission
Frame error check	CRC 16 check

## Network cable and peripheral devices

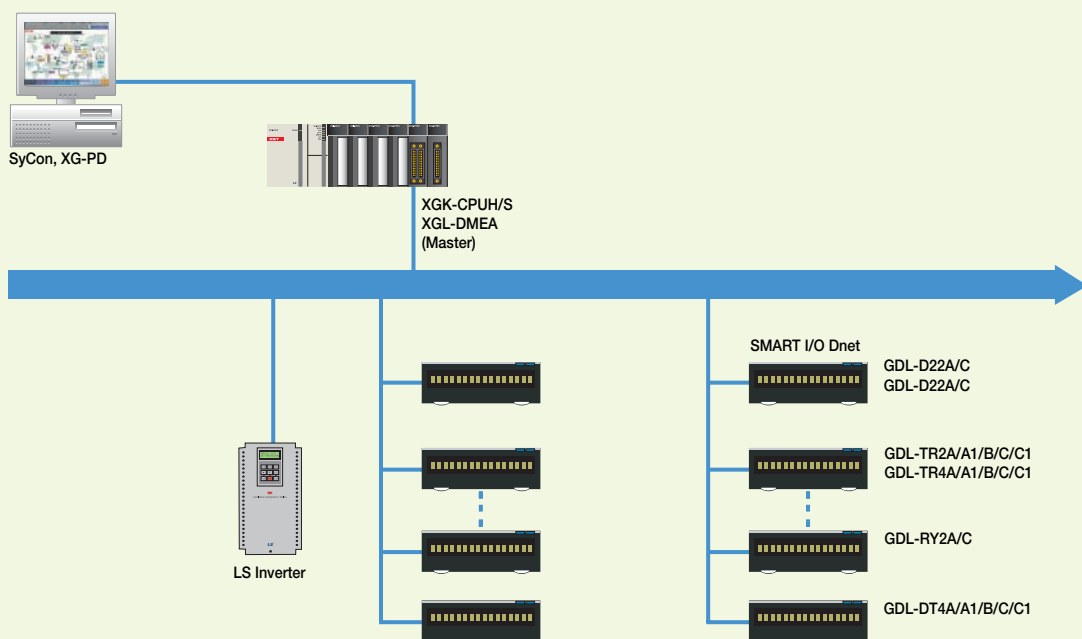
Item	Specifications	Remarks
Twisted pair electric cable	LREV-AMESB, 2 x 1mm, 18AWG	LS cable
RF terminator	110Ω, 1/2 Watt	-

Features

- DeviceNet protocol
- Direct control of various I/O devices via Dnet system
- Max. 63 slave modules controlled by one master module
- Flexibility in network configuration: Multi-drop and T branch connection
- Connectable to other master module and various slave modules
- Providing 'Auto Network Scan' function and various information with configuration tool (SyCon)
- Communication using High-speed link parameter
- Connectable to various slave I/O including other module (Common I/O, Actuator, Switch, Optical switch, Valve, Inverter, A/D module, Position controller etc..)
- Automatic monitoring of slave modules in the network: Auto-scan (XG-PD)
- Easy expansion for abundant I/O & line: 1 CPU module affordable up to 12 master modules
- Network setting by SyCon/XG-PD (Parameter setting, diagnosis and monitoring)



System configuration with LSIS products

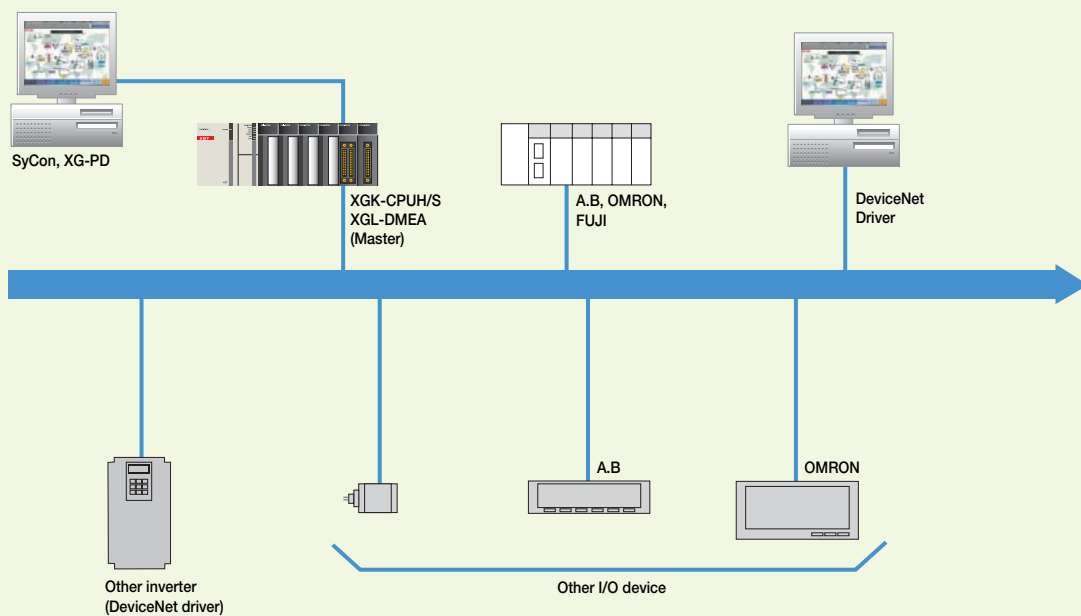




## Specifications

Item	Specifications (XGL-DMEA)			
Module type	Master			
Transmission distance and speed	Trans. speed	Max. network length	Max. drop cable	Length of all drop cable
	500kbps	100m	6m	39m
	250kbps	250m	6m	78m
	125kbps	500m	6m	156m
Max. number of connection stations	64 stations (Master 1 + Slave 63)			
Max. number of node	Max. 64 MAC ID (Node address)			
Communication method	Bit Strobe, Poll, COS, Cyclic			
Diagnosis function	Duplicated station check Abnormal station detection/CRC error check/Scan List/Operation display (LED)			
Cable	Dnet dedicated cable: 5 (Signal: 2, power: 2, shield: 1)			
Max. number of installation	12			
Configuration tool	SyCon			
Configuration port	RS-232C Configuration Port			
Current consumption (mA)	440			
Weight (Kg)	0.11			

## System configuration with other products

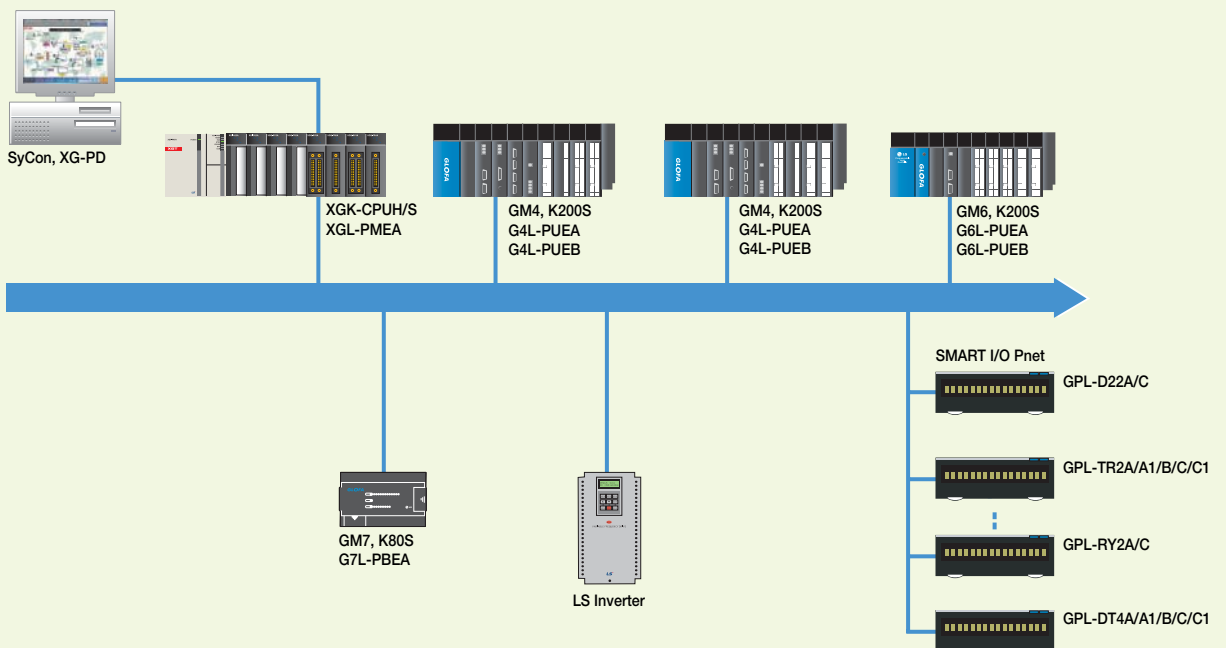


**Features**

- Profibus-DP protocol
- Low cost network appropriate to field level
- Proper to communicate among a master automation device and distributed slave I/O devices.
- Fast slave communication without application layer
- Transmission speed: 9.6Kbps ~ 12Mbps
- Transmission distance: Max. 1,200m
- Max. 126 slave stations available (32 stations per segment)
- Network setting using SyCon/XG-PD  
(Parameter setting, diagnosis and monitoring)
- Available to use 7Kbytes I/O data of master station
- Automatic monitoring of slave modules in the network:  
Auto-scan (XG-PD)
- Supporting multi-master
- Providing 'Auto Config' and various information  
with configuration tool (SyCon)



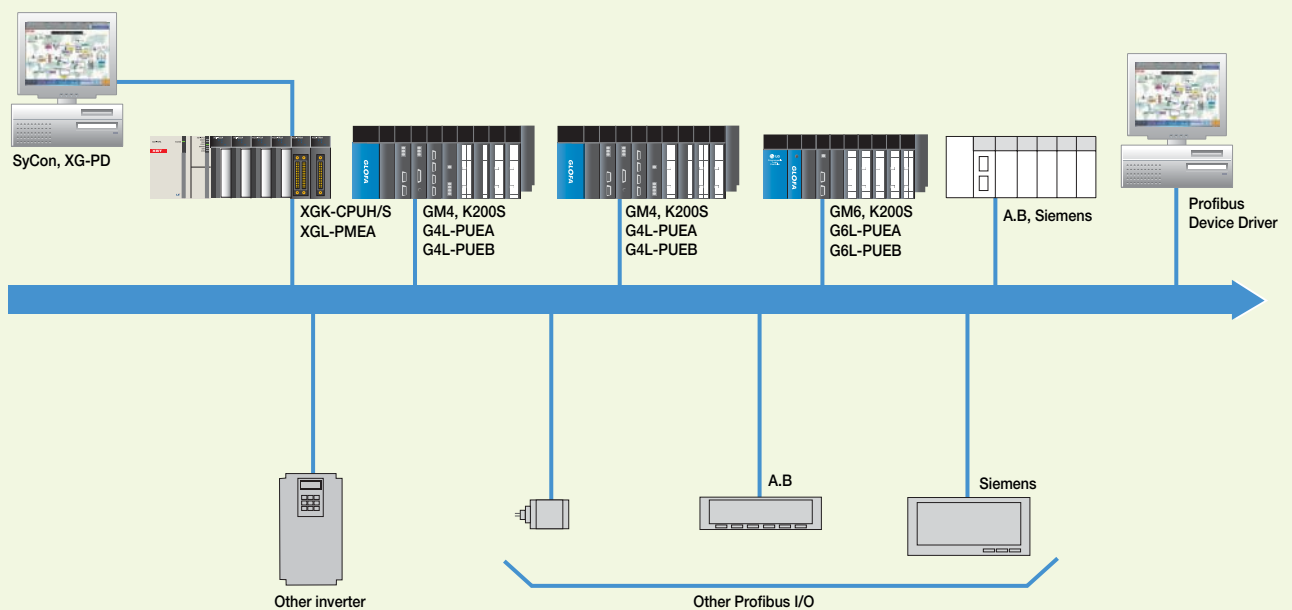
**System configuration with LSIS products**



## Specifications

Item		Specifications (XGL-PMEA)
Module type		Master
Network type		Profibus-DP
Standard		EN50170/DIN19245
Interface		RS-485 (Electric)
Media access		Token Passing & Poll
Topology		Bus
Modulation		NRZ
Cable		Shield Twisted Pair Cable
Transmission distance and speed	1,000m	9.6K-187Kbps
	400m	500Kbps
	200m	1.5Mbps
	100m	3M-12Mbps
Max. number of slave per network		126
Max. number of slave per segment		32
Max. I/O data		Input: 3584byte, Output: 3584byte
Max. number of communication points		7Kbytes
Communication parameter setting		XG-PD, SyCon
Max. number of installation		12
Configuration Tool		SyCon
Configuration Port		RS-232C Configuration Port
Current consumption (mA)		550
Weight (Kg)		0.11

## System configuration with other products



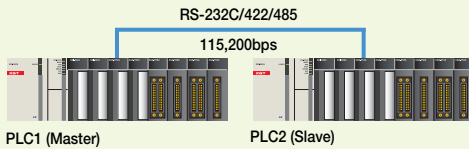
## Network / Communication example (Cnet)

### Communication among PLCs

This is a system configuration communicating between XGT PLCs by serial communication. In this case, PLC 1 is the master (Client) and other PLC should be slaves (Server). It is called Master/Slave communication. Master PLC is defined by comm. basic parameter and P2P setting. And slave PLC is defined by basic parameter and driver setting.

### Configuration

PLC1 reads present value, C0000 of PLC2's up-counter and then saves it in M0200 of PLC1.

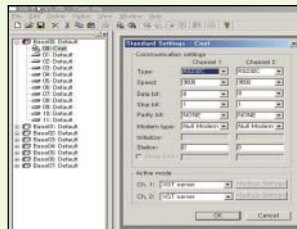


### Data memory

PLC station	PLC memory	Setting Item
PLC 1	M0100	1. XG-PD parameter setting, 2. XG5000 programming
PLC 2	C0000	1. XG-PD parameter setting, 2. XG5000 programming

### XG-PD setting

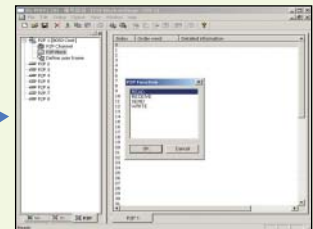
#### PLC 1 setting (Master)



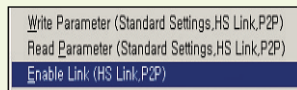
**Communication basic parameter setting**  
Setting up station number, communication speed, etc. And setting up the operation mode as P2P



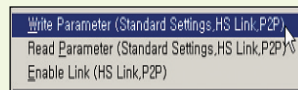
**P2P channel setting**  
Setting up channel 01 as [XGT client]



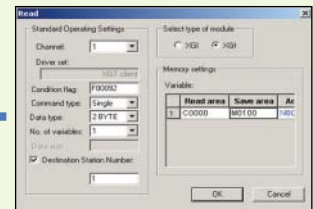
**P2P setting**  
Setting up P2P block (READ)



**Enable Link**  
Enabling P2P for communication start

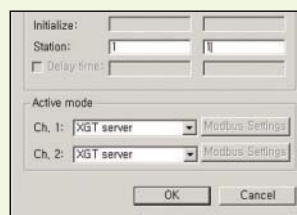


**Parameter writing**  
Downloading parameters to PLC after online connection

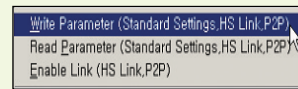


**Communication data setting**  
Setting up Read area, Save area, etc.

#### PLC 2 setting (Slave)



**Communication parameter setting**  
Setting up station number and channel 01 mode as 1 and XGT server



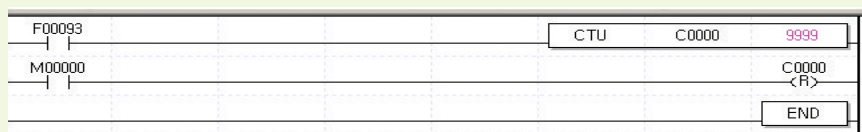
**Parameter writing**  
Downloading parameters to PLC after online connection

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

### XG5000 programming

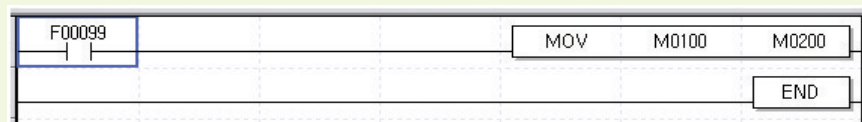
#### PLC station 2 setting

Make up-counter program using CTU command



#### PLC station 1 setting

Check out the counter value of M0100 is transmitted.

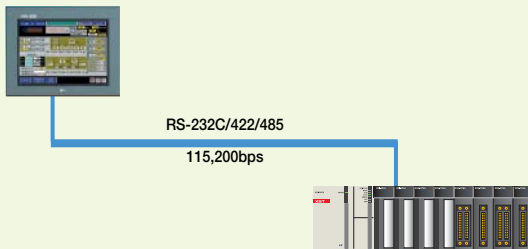


**HMI communication configuration**

This is a system configuration to monitor and control PLC (XGT) by PMU (HMI). In this case, PLC is the slave (Server) and PMU should be the master (Client). PLC is defined by comm. basic parameter and driver setting.

**Configuration**

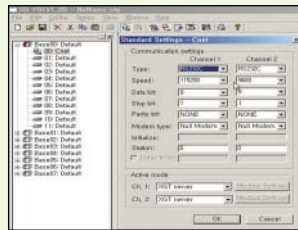
Making On/Off touch tag for controlling M0001 of XGT



**Data memory**

PLC memory	Setting item	PMU
M000D1	1. XG-PD parameter setting	Using touch tag
	2. XG5000 programming	

**XG-PD setting**



**Basic communication parameter setting**  
Setting up station number, communication speed, etc. And setting up the operation mode as XGT server

Write Parameter (Standard Settings, HS Link, P2P)  
Read Parameter (Standard Settings, HS Link, P2P)  
Enable Link (HS Link, P2P)

**Parameter writing**  
Downloading parameters to PLC after online connection

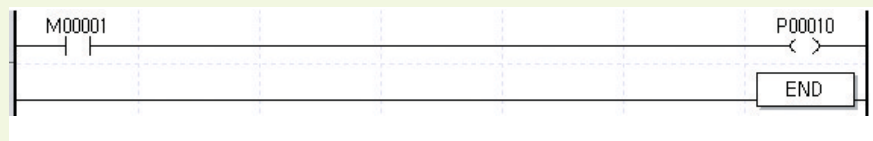


**PMU setting**  
Setting up communication setting (speed, data, stop, parity, etc) same as XGT

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

**XG5000 programming**

Create program that P00010 is on right after M00001 is on.





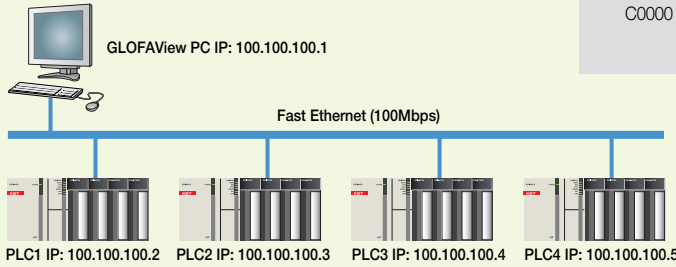
# Network / Communication example (FEnet)

## HMI communication configuration

This is a data communication system configuration among XGT PLCs via Ethernet network. In this case, communication is possible by HS link among PLCs. It just needs basic parameter setting and HS link item setting.

### Configuration

Read the up-counter value C0000 of PLC1 and monitor it in GLOFAView.

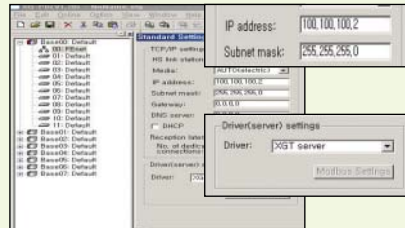


### Data memory

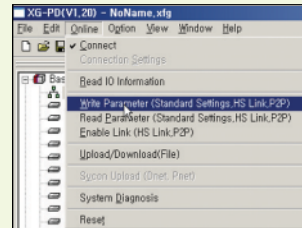
PLC memory	Setting item	GLOFAView
C0000	1. XG-PD parameter setting	Using analog tag
	2. XG5000 programming	

### XG-PD setting

#### PLC 1 setting (Master)



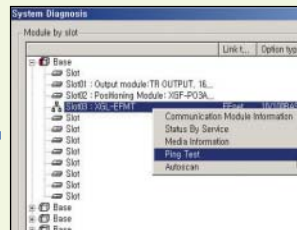
**Basic communication parameter setting**  
Specifying IP address and Subnet mask of PLC as above



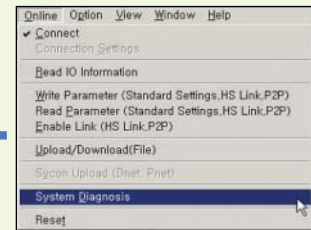
**Parameter writing**  
Downloading parameters to PLC after online connection



**Ping Test**  
Starting diagnosis after inputting IP address of PLC



**System Diagnosis**  
Selecting Ping Test



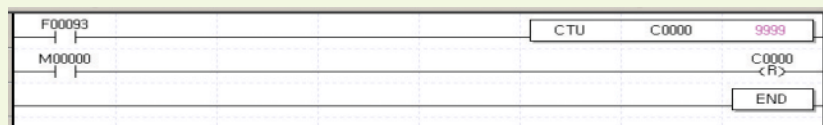
**Communication test**  
Checking online and system diagnosis

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

### XG5000 programming

Make the up-counter program using CTU command.

Check out if the counter value of CTU value is transmitted.

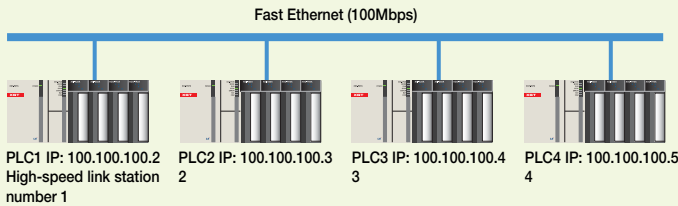


**High-speed link communication**

This is a configuration for XGT to communicate each other via Ethernet. It just needs communication basic parameter setting and High-speed link item setting.

**Configuration**

Read present value C0000 of PLC1 and transmit it to M0000 of PLC2.

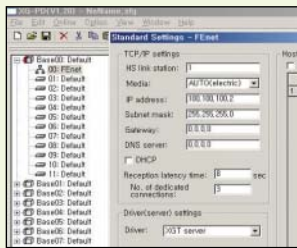


**Data memory**

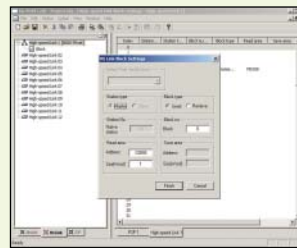
PLC station	PLC memory	Setting Item
PLC 1	C0000	1. XG-PD parameter setting, 2. XG5000 programming
PLC 2	M0100	1. XG-PD parameter setting, 2. XG5000 programming

**XG-PD setting**

**PLC station 1 setting**



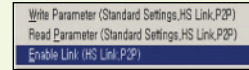
**Basic communication parameter setting**  
Specifying HS link station, IP address and Subnet mask of PLC as above



**Communication data setting**  
Setting up communication data in HS link item as above

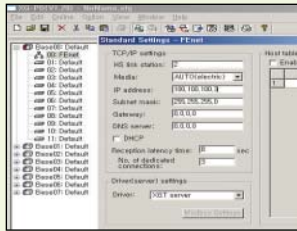


**Parameter writing**  
Downloading parameters to PLC after online connection



**Enable Link**  
Enabling link for communication start

**PLC station 2 setting**



**Basic communication parameter setting**  
Specifying HS link station, IP address and Subnet mask of PLC as above



**Communication data setting**  
Setting up communication data in HS link item as above



**Parameter writing**  
Downloading parameters to PLC after online connection



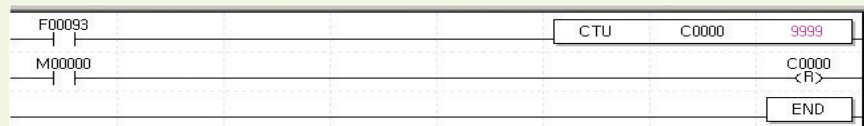
**Enable Link**  
Enabling link for communication start

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

**XG5000 programming**

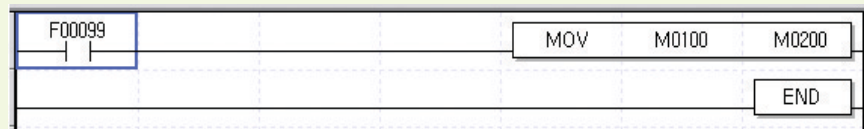
**PLC1 setting**

Make the up-counter program using CTU command



**PLC2 setting**

Check out if the counter value of M0100 is transmitted.



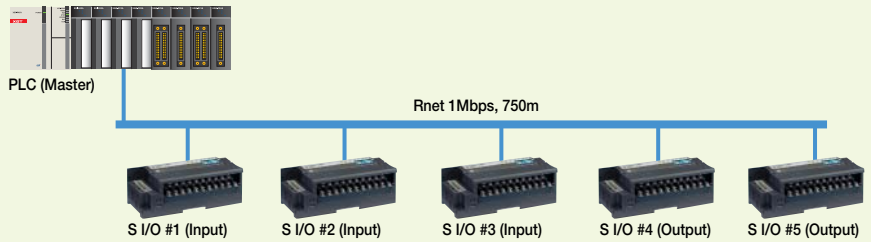
# Network / Communication example (Rnet)

## Remote I/O configuration

LSIS developed communication method is Rnet which is 'Distributed Control System' using Smart I/O. In this case, PLC is the master and the other Smart I/O are slaves. It just needs basic parameter setting for communication and High-speed link setting.

### Configuration

PLC controls each Smart I/O (16-point).

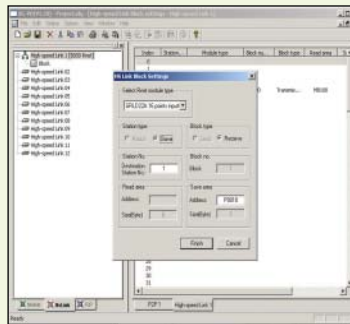


### Data memory

Smart I/O #	Smart I/O address	PLC address	Setting item
1	P0000	P0010 (P0010~P0010F)	1. XG-PD parameter setting, 2. XG5000 programming
2	P0000	P0011 (P0011~P0011F)	
3	P0000	P0012 (P0012~P0012F)	
4	P0000	P0013 (P0013~P0013F)	
5	P0000	P0014 (P0014~P0014F)	

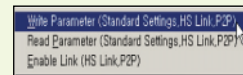
### XG-PD setting

Communication data setting  
Setting up type name, station number, address of each station's Smart I/O in HS link item as following example.

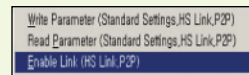


Station	Station No.	Smart I/O Type	Block no.	Block Type	Start area	Start area	End area
1	1	GPLR220A 16 points in...	1	Reception	P0010	P0010	2
2	2	GPLR220A 16 points in...	1	Reception	P0011	P0011	2
3	3	GPLR220A 16 points in...	1	Reception	P0012	P0012	2
4	4	GPLR220A 16 points in...	1	Transmission	P0013	P0013	2
5	5	GPLR220A 16 points in...	1	Transmission	P0014	P0014	2

HS link registration completed



Parameter writing  
Downloading parameters to PLC after online connection

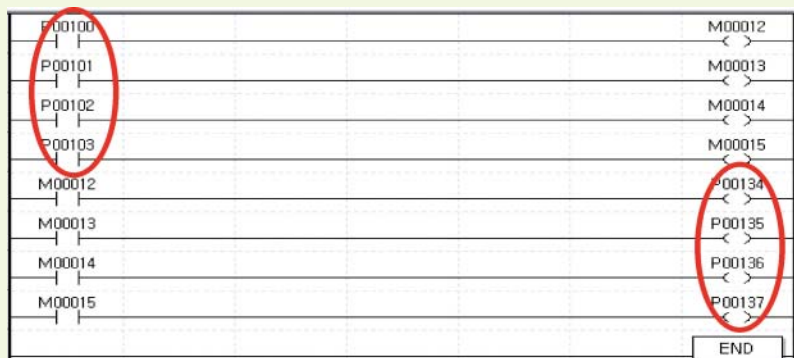


Enable Link  
Enabling link for communication start

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

### XG5000 programming

Write a program using I/O address of Smart I/O.



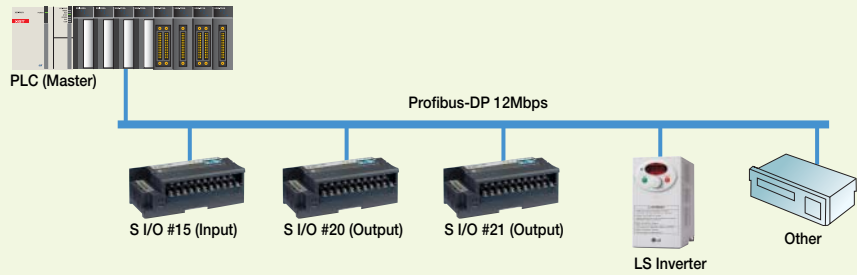
## Network / Communication example (Pnet)

### High-speed link communication among PLCs

XGT can create 'Distributed Control System' with Smart I/O, Inverter, pneumatic device via Profibus-DP. In this case, PLC is the master and the other devices such as Smart I/O are slaves. It just needs SyCon, basic parameter and High-speed link setting.

### Configuration

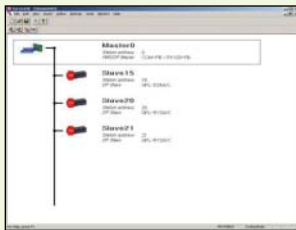
PLC controls each Smart I/O (16-point).



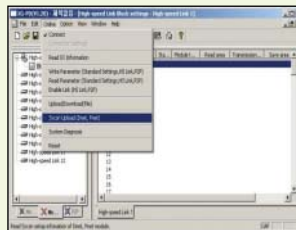
### Data memory

Smart I/O #	Smart I/O address	PLC address	Setting item
15	P0000	P0010 (P00100~P0010F)	1. SyCon setting 2. XG-PD parameter setting, 3. XG5000 programming
20	P0000	P0011 (P00110~P0011F)	
21	P0000	P0012 (P00120~P0012F)	

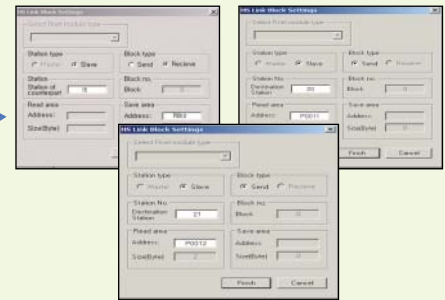
### XG-PD setting



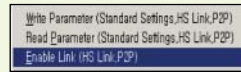
**SyCon setting**  
For detailed setting instruction, refer to page 43 (SyCon setting)



**HS link setting**  
Uploading SyCon and setting up each Smart I/O station as following example



**Parameter writing**  
Downloading parameters to PLC after online connection

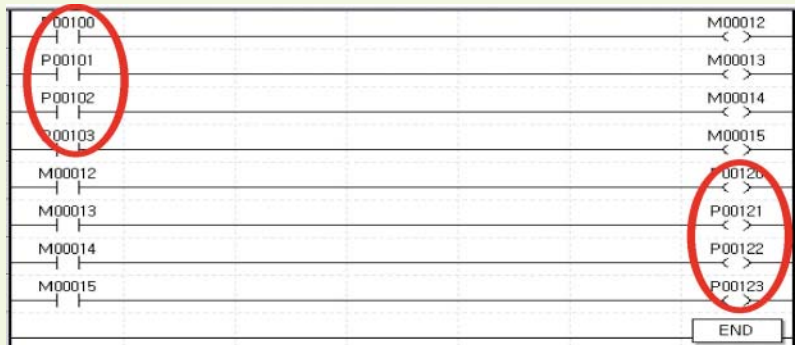


**Enable Link**  
Enabling link for communication start

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

### XG5000 programming

Write a program using I/O address of Smart I/O Pnet



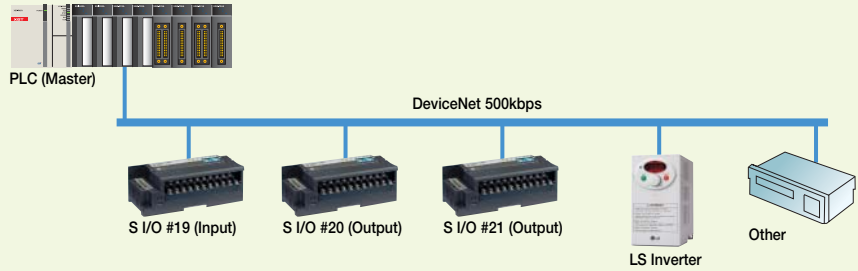
## Network / Communication example (Dnet)

### High-speed link communication between PLCs

XGT can create 'Distributed Control System' with Smart I/O, Inverter, pneumatic device via Dnet. In this case, PLC is the master and the other devices such as Smart I/O are Slaves. It just needs SyCon, basic parameter and High-speed link setting.

### Configuration

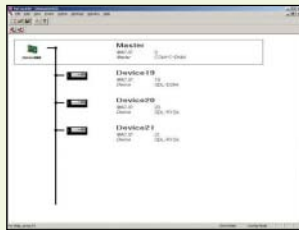
PLC controls each Smart I/O (16 points).



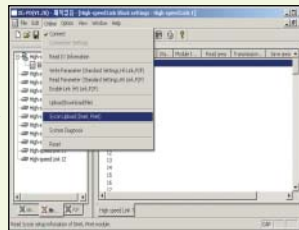
### Data memory

Smart I/O #	Smart I/O address	PLC address	Setting item
19	P0000	P0010 (P00100~P0010F)	1. SyCon setting 2. XG-PD parameter setting, 3. XG5000 programming
20	P0000	P0011 (P00110~P0011F)	
21	P0001	P0012 (P00120~P0012F)	

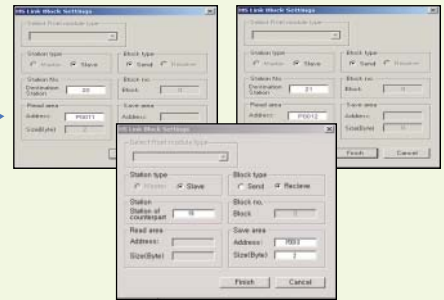
### XG-PD setting



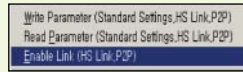
**SyCon setting**  
For detailed setting instruction, refer to page 43 (SyCon setting)



**HS link setting**  
Uploading SyCon and setting up each Smart I/O station as following example



**Parameter writing**  
Downloading parameters to PLC after online connection

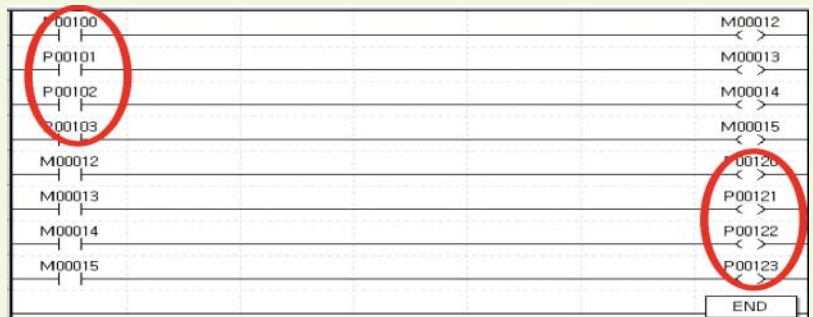


**Enable Link**  
Enabling link for communication start

\* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

### XG5000 programming

Write a program using I/O address of Smart I/O Dnet.





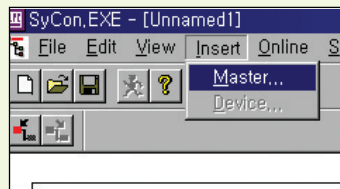
## Network / Communication example (SyCon setting for Pnet, Dnet)

SyCon is the dedicated software that help user set up the communication environment for Profibus-DP and DeviceNet more easily and conveniently.

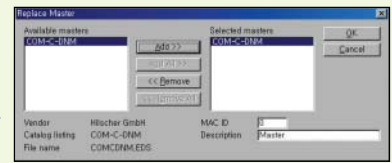
### Example of application



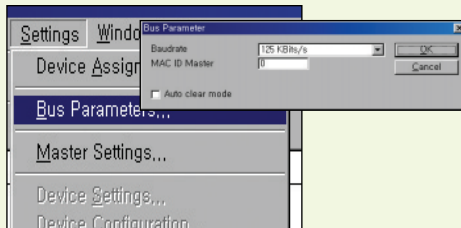
**New file**  
Select fieldbus that is used.



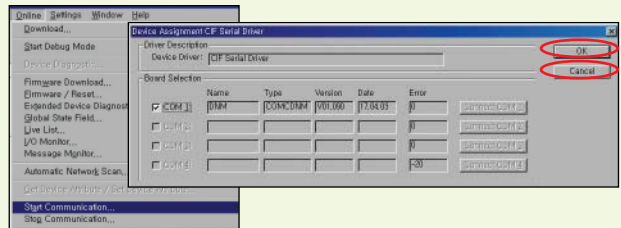
**Basic communication parameter setting**  
Select [Master] in Insert menu.



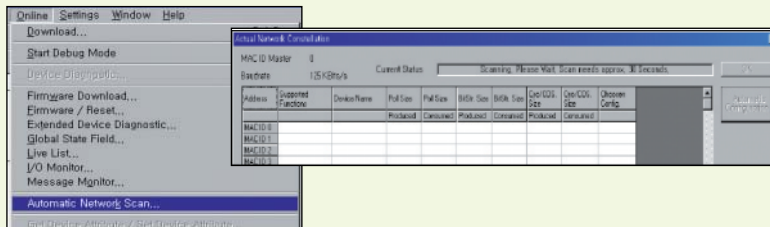
**Master module setting**  
Select [COM-C-DNM] for DeviceNet.  
Select [COM-C-DPM] for Profibus-DP.



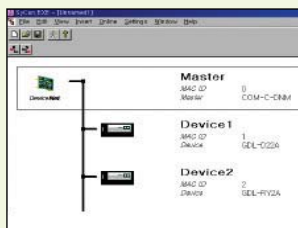
**Bus parameter setting**  
Set up communication speed of master module.



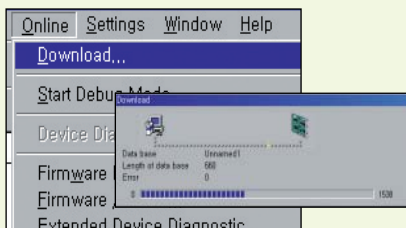
**Master module setting**  
After clicking the port button, check the right check-box.



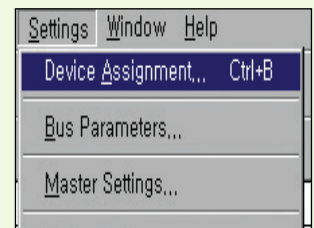
**Automatic network scan of connected Smart I/O**  
Perform automatic network scan after station number setting and wiring with remote device such as Smart I/O.  
At this time, all remote devices should be in normal connection (Power-On, etc).  
After network scan is completed, press [Automatic Configuration] button and [OK] button.



**Network checking**  
Check normal network (remote) condition.



**Parameter download**



**Disconnect**  
Disconnect the port in Device Assignment.

Features

- Wiring reduction and real time control of distributed I/O
- Supporting Rnet, DeviceNet, Profibus-DP, MODBUS (RS-422/485)
- Various I/O (DC/TR/Relay) modules with the unit of 16/32 points



Specifications

Item	Input		Output			Mixed module	
	DC (Sink/Source)		Transistor (Sink)		Relay	DC (Sink/Source)	Transistor (Sink)
No. of point	16	32	16	32	16	16	16
Rated input (Load voltage)	DC 24V		DC 24V		DC 24V/AC 110V/220V	DC 24V	DC 24V
Input current (Load current)	7mA		0.1A/2A, 0.5A/3A		2A/5A	7mA	0.1A/2A, 0.5A/3A
Response time	Off → On	3ms or less	3ms or less		3ms or less	3ms or less	3ms or less
	On → Off	3ms or less	3ms or less		3ms or less	3ms or less	3ms or less
Common	16 points/COM		16 points/COM		16 points/COM	16 points/COM	16 points/COM
Current consumption	200mA	300mA	280mA	380mA	550mA	350mA	
Network	Rnet	GRL-D22A	GRL-D24A	GRL-TR2A	GRL-TR4A	GRL-RY2A	GRL-DT4A
	Profibus-DP	GPL-D22A ●	GPL-D24A ●	GPL-TR2A ▲	GPL-TR4A ▲	GPL-RY2A ●	GPL-DT4A ▲
	DeviceNet	GDL-D22A ●	GDL-D24A ●	GDL-TR2A ▲	GDL-TR4A ▲	GDL-RY2A ●	GDL-DT4A ▲
	MODBUS	GSL-D22A	GSL-D24A	GSL-TR2A	GSL-TR4A	GSL-RY2A	GSL-DT4A

Note1) Specification stated in the table is specification of type A.  
Refer to XGT user's manual.  
● A, C ▲ A, A1, B, C, C1

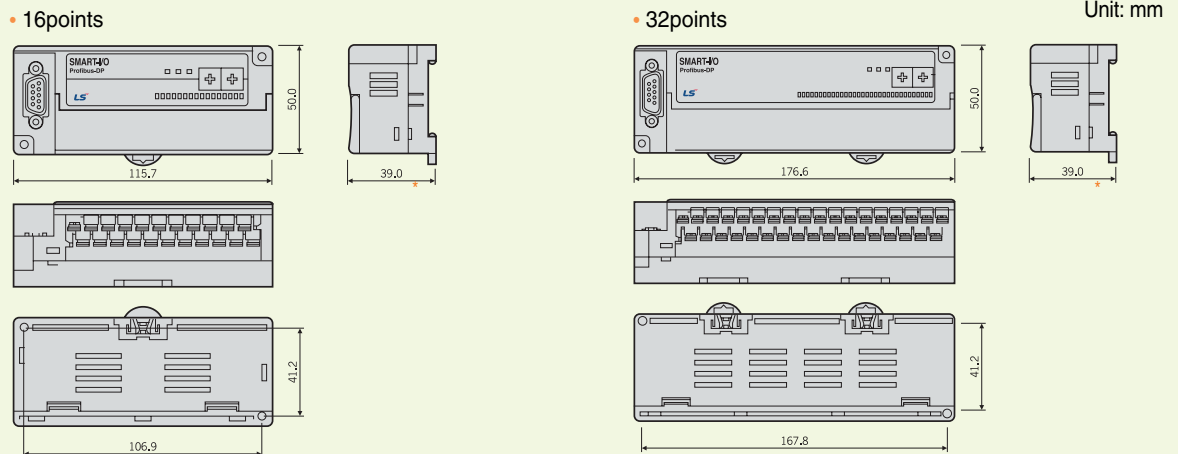
A Sink, Rated current: 0.1A, terminal fixed type  
A1 Sink, Rated current: 0.5A, terminal fixed type  
B Source, Rated current: 0.5A, terminal fixed type  
C Source, Rated current: 0.5A, terminal separated type  
C1 Sink, Rated current: 0.5A terminal separated type

Communication specifications

Item	Rnet (Dedicate network for LSIS Smart I/O)	Profibus-DP	DeviceNet	MODBUS
Protocol	LSIS dedicated protocol (Fnet for Remote)	Profibus-DP (RS-485/EN50170)	DeviceNet (CAN)	MODBUS (RS-422/485)
Transmission speed	1Mbps	9.6kbps ~ 12Mbps	125/250/500Kbps	2.4Kbps ~ 38.4Kbps
Transmission distance	750m/segment	100m ~ 1.2Km	500/250/125m (Thin cable: 100m)	500m
Topology	Bus Token	Bus	Trunk & Drop	Bus
Transmission	Pass & Broadcast	Token Pass & Master/Slave (Poll)	CSMA/NBA (Poll, Cyclic, COS, BitStrobe)	Master/Slave (Poll)
No. of stations	32/segment (Input: 32, Output: 32)	32/segment, 99/network	64	32
Link capacity	2,048 points/master (64 stations x 32 points)	7Kbyte/master	2,048 points/master	64 points/station

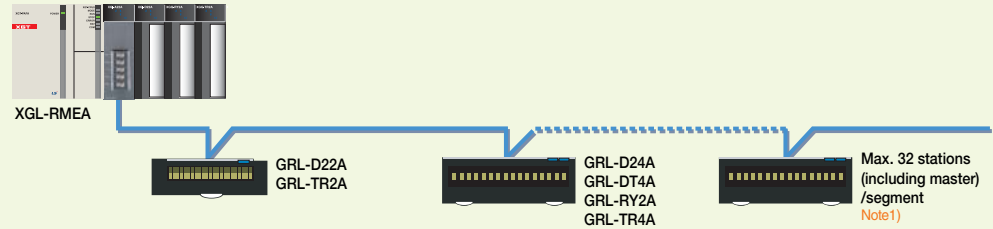
Note1) Smart I/O supports Poll type currently, but is supposed to support Cyclic, COS and Strobe later on.

Dimensions

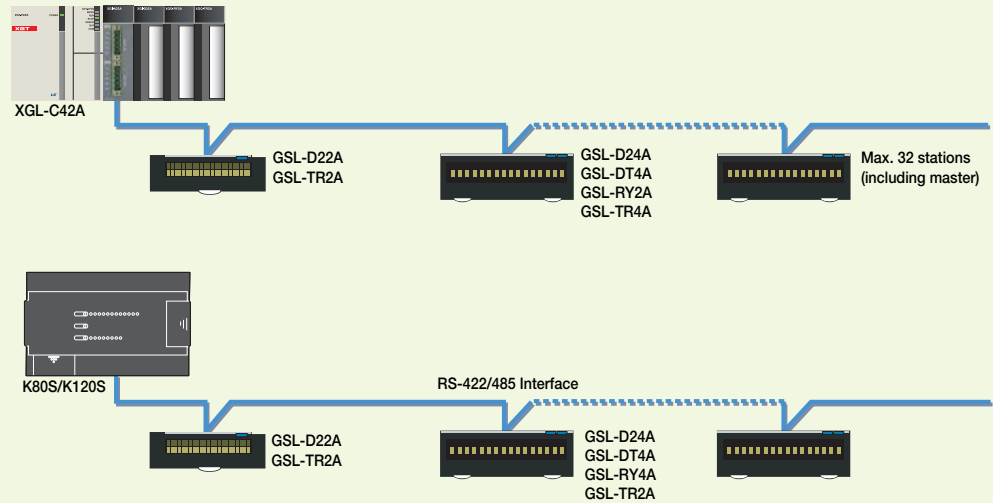


• GxL-RY2 (16-point relay output) module follows the dimension of 32-point module.  
• The length of C type Smart I/O is 47.5mm

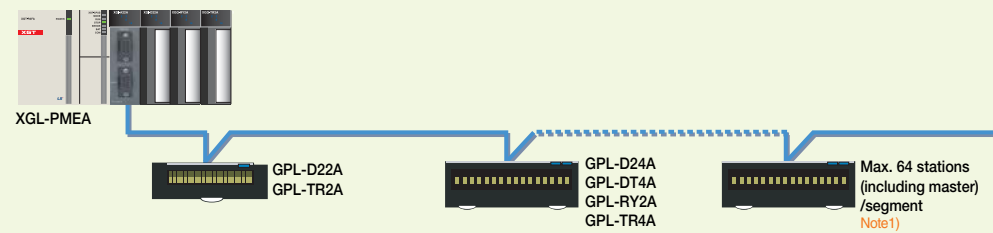
### Smart I/O Rnet system



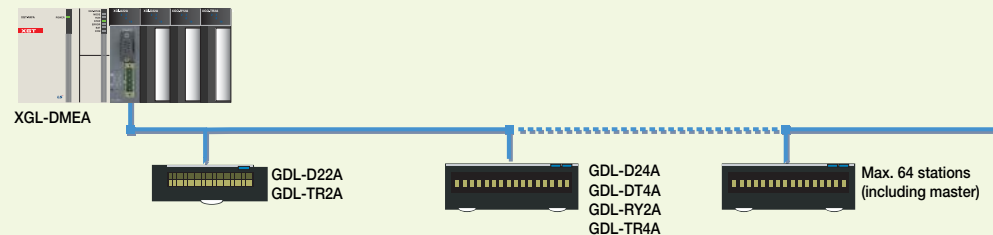
### Smart I/O MODBUS system



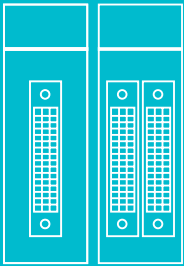
### Smart I/O Profibus-DP system



### Smart I/O DeviceNet system



*Note 1)* Segment: Communication section that does not use repeater or second master.



# Special

Special

XGT series offer diverse special modules such as analog, HSC, and positioning to satisfy complicated industrial needs.



## Revolution of easy to use ...XGT Special module

### Fast processing of parameter and data of special module

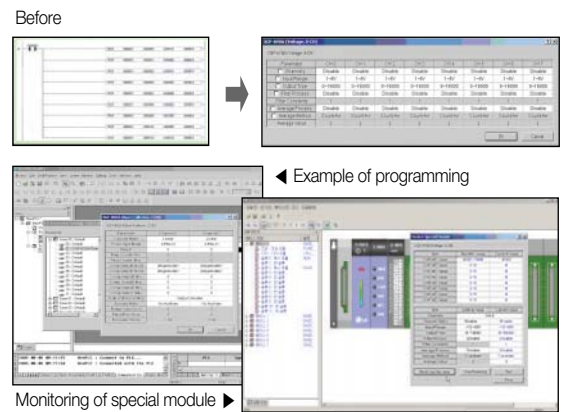
- Continually refreshing operation data of special module by CPU module
- Including contact points such as conversion data of AD/DA module and command of HSC & positioning module

### Easy-to-use (Easy operation parameter setting and data monitoring)

- Convenient parameter setting available through XG5000
- Providing useful functions that can monitor and test operation data and contact points through XG5000

### Simple maintenance (Changing online module)

- Without turning off and holding CPU, users can change special module with ease.



Analog input module	
XGF-AV8A	8 channels, voltage input
XGF-AC8A	8 channels, current input
XGF-AD4S	4 channels, voltage/current input

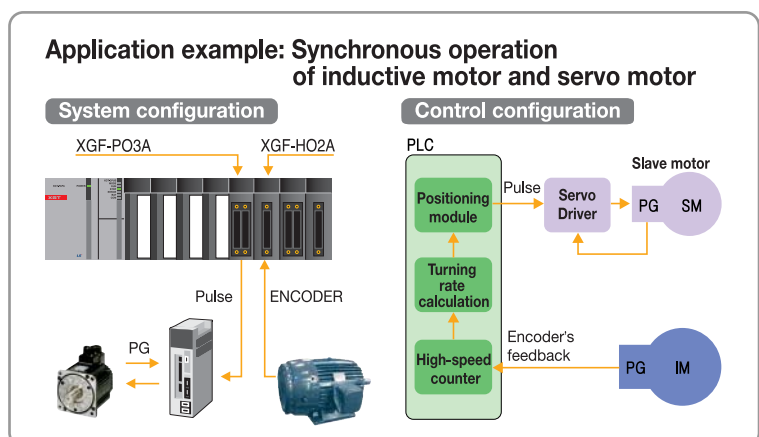
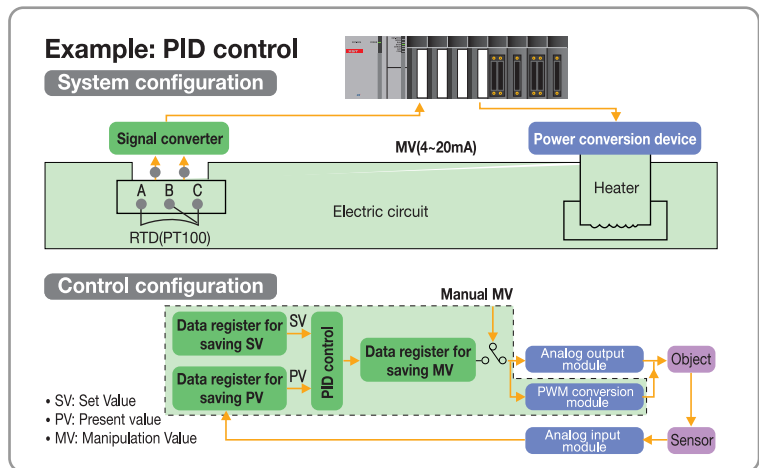
Analog output module	
XGF-DV4A	4 channels, voltage output
XGF-DV4S	4 channels, voltage output, insulation
XGF-DC4A	4 channels, current output
XGF-DC4S	4 channels, current output, insulation

Temperature input module	
XGF-TC4S	4 channels, thermocouple input, Insulation
XGF-RD4A	4 channels, RTD input
XGF-RD4S	4 channels, RTD input, Insulation

High-speed counter module	
XGF-HO2A	2 channels, Open collector
XGF-HD2A	2 channels, Line driver

Positioning module	
XGF-PO(1/2/3)A	1/2/3-axis, Open collector
XGF-PD(1/2/3)A	1/2/3-axis, Line Driver

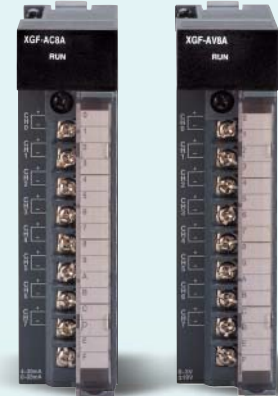
Motion control module	
XGF-M16M	Mechatrolink-II, 16-axis





Features

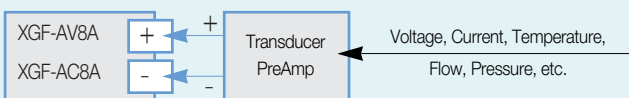
- Fast conversion processing
- High resolution
- Setting and monitoring the special module parameter through XG5000
- Supporting 4 types of digital output data format



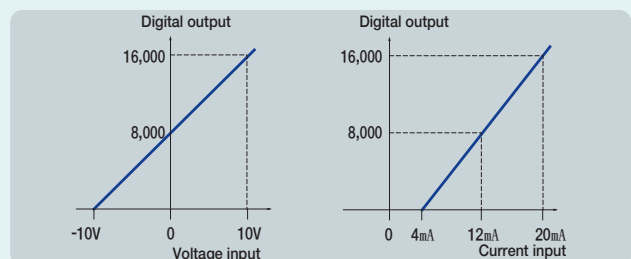
Specifications

Item	XGF-AV8A (Voltage input)	XGF-AC8A (Current input)	XGF-AD4S (Voltage/Current input)						
No. of input channel	8 channels		4 channels						
Analog input	DC 1~5V, 0~5V, 0~10V, -10~10V	DC 4~20mA, 0~20mA	DC 1~5V, 0~5V, 0~10V, -10~10V DC 4~20mA, 0~20mA						
	Selection of input range in program or S/W package (Available to be set per channel)								
Digital output	Voltage	Analog input		1~5V	0~5V	0~10V	-10~10V		
		Digital output	Unsigned value		0~16,000				
			Signed value		-8000~8,000				
			Precise value		1,000~5,000	0~5,000	0~10,000	-10,000~10,000	
	Percentile value		0~10,000						
	Current	Analog input		4~20mA		0~20mA			
		Digital output	Unsigned value		0~16,000				
			Signed value		-8,000~8,000				
			Precise value		4,000~20,000		0~20,000		
	Percentile value		0~10,000						
	Voltage / Current	Analog input		1~5V	0~5V	0~10V	-10~10V	4~20mA	0~20mA
		Digital output	Signed value		-32,000~32,000				
Precise value			1,000~5,000	0~5,000	0~10,000	-10,000~10,000	4,000~20,000	0~20,000	
Percentile value			0~10,000						
Resolution	1/16,000		1/64,000						
	1~5V	0.250mV	4~20mA	1.0μA	1~5V	62.5μV	4~20mA	250nA	
	0~5V	0.3125mV			0~5V	78.1μV			
	0~10V	0.625mV	0~20mA	1.25μA	0~10V	156.3μV	0~20mA	312.5nA	
-10V~10V	1.250mV	±10V			312.5μV				
Accuracy	±0.2% or less (Ambient temperature 25°C), ±0.3% or less (Range of operation temperature)								
Conversion speed	250μs/channel								
Max. absolute output	15V	±30mA		Voltage: ±15V, Current: ±30mA					
Insulation method	Photo-coupler insulation between input terminal and power supply								
	No insulation between channels			Insulation between channels					
Connection terminal	18 points								
No. of occupied I/O points	Fixed type (Setting in basic parameter): 64 points Variable type (Dissolving in basic parameter): 16 points								
Current consumption	DC 5V : 420mA								
Weight (Kg)	0.14								

Configuration



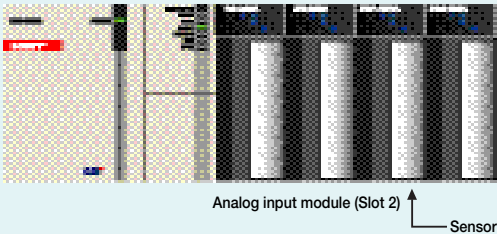
A/D conversion characteristics



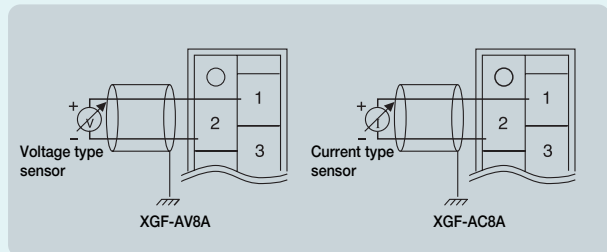
## Special module / Analog input module (Example)

This is a simple example to start Analog input module setting. For more details, refer to user's manual.

### System configuration



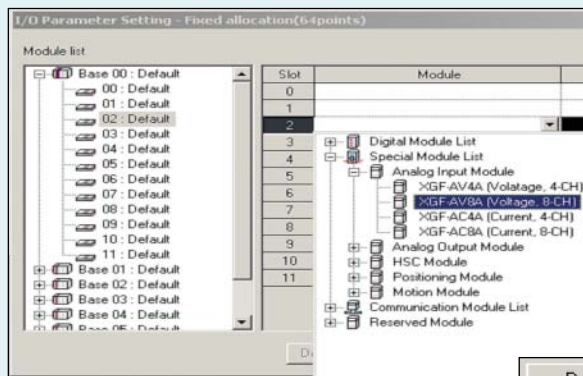
### Wiring



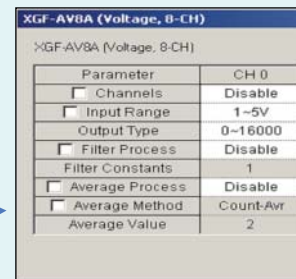
### Parameter setting

In the parameter setting box, select slot and analog module that you want to use.

(This example shows to select '0' channel of voltage input type.)



Press the <Details> button at lower end of parameter setting box after selecting the module.



You need to fill out each item suitable for your system.

### Programming

Create a program for A/D conversion (0~10V to 0~16000).

#### Special devices for programming

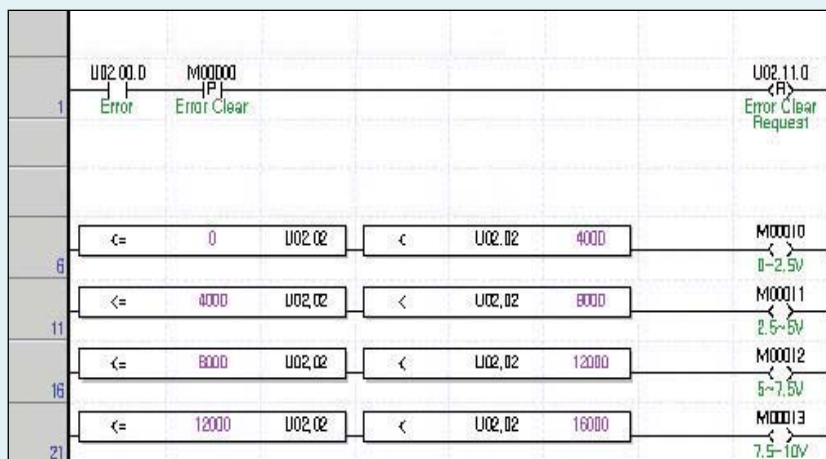
Refer to user's manual for more details.

U02.0.0: Error

U02.11.0: Requesting error-clear

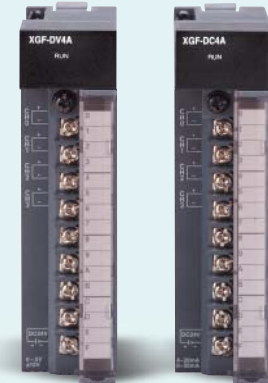
U02.02: Memory of channel A/D value

Uxy.aa.bb  
x: Base number  
y: Slot number  
aa,bb: Refer to user's manual.



Features

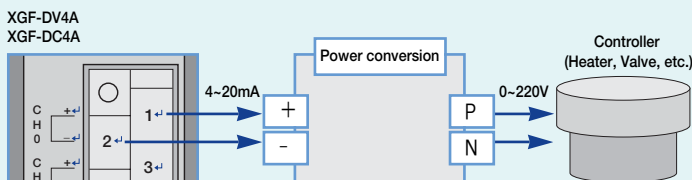
- Fast conversion processing
- High resolution
- Setting and monitoring the special module parameter through XG5000
- Supporting 4 types of digital input data format



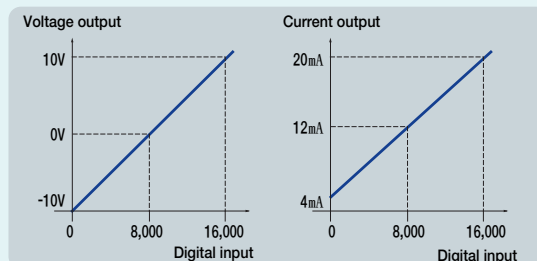
Specifications

Item	XGF-DV4A, XGF-DV4S (Voltage output type)		XGF-DC4A, XGF-DC4S (Current output type)					
No. of output channel	4 channels							
Analog output range	DC 1~5V, 0~5V		DC 4~20mA					
	DC 0~10V, -10~10V		DC 0~20mA					
Selection of input range in the program or S/W package (Available to set per each channel)								
Digital input range	Analog output	Voltage type		1~5V	0~5V	0~10V	-10~10V	
		Digital input	Unsigned value		0~16,000			
			Signed value		-8,000~8,000			
			Precise value	1,000~5,000	0~5,000	0~10,000	-10,000~10,000	
			Percentile value	0~10,000				
	Analog output	Current type		4~20mA		0~20mA		
		Digital input	Unsigned value		0~16,000			
			Signed value		-8,000~8,000			
			Precise value	4,000~20,000		0~20,000		
			Percentile value	0~10,000				
16-bit binary value: selection of input type by program or parameter (Available to be set per each channel)								
Max. resolution	1/16,000 (Per each input range)							
	1~5V	0.250mV	4~20mA		1.0μA			
	0~5V	0.3125mV						
	0~10V	0.625mV	0~20mA		1.25μA			
	±10V	1.250mV						
Accuracy	±0.2% or less (Ambient temperature 25°C), ±0.3% or less (Range of operation temperature)							
Conversion speed	250μs/channel							
Max. absolute output	±15V			±24mA				
Insulation method	Photo-coupler insulation between terminal and power supply XGF-DV4A, XGF-DC4A: No insulation between channels XGF-DV4S, XGF-DC4S (Insulation type) : Insulation between channels							
Connection terminal	18 point terminal							
No. of occupied points	Fixed type (Setting in basic parameter): assign 64 points							
	Variable type (Dissolving in basic parameter): assign 16 points							
Current consumption	Internal	DC 5V: 190mA		Internal	DC 5V: 190mA			
	External	DC24V: 250mA		External	DC24V: 400mA			
Weight (Kg)	0.15							

Output wiring



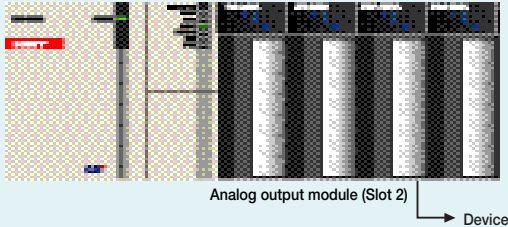
I/O conversion characteristics



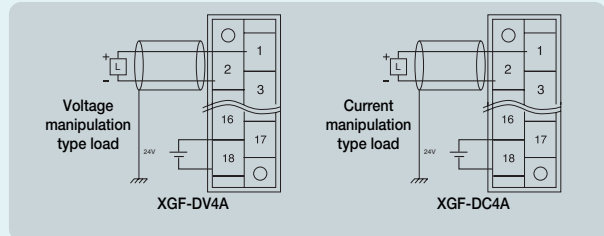
## Special module / Analog output module (Example)

This is a simple example to start Analog output module setting. For more details, refer to user's manual.

### System configuration

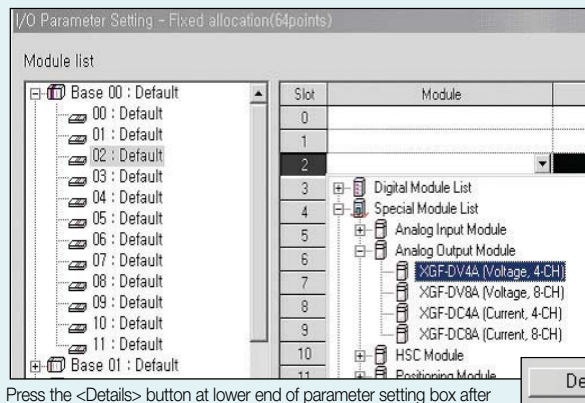


### Wiring

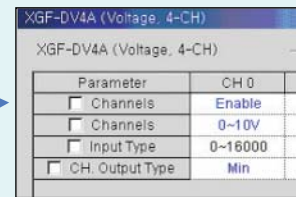


### Parameter setting

In the parameter setting box, select slot and analog module that you want to use. (This example shows to select '0' channel of voltage output type.)



Press the <Details> button at lower end of parameter setting box after selecting the module.



You need to fill out each item suitable for your system.

### Programming

Create a program for D/A conversion (0~16000 to 0~10V).

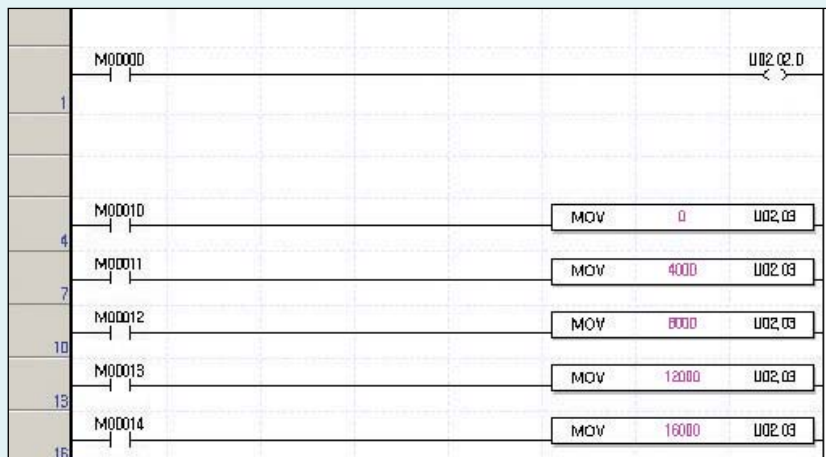
#### Special devices for programming

Refer to user's manual for more details.

U02.02.0: Admitting Channel 0 output

U02.03: Output data of channel 0

Uxy.aa.bb  
 x: Base number  
 y: Slot number  
 aa,bb: Refer to user's manual.



Features

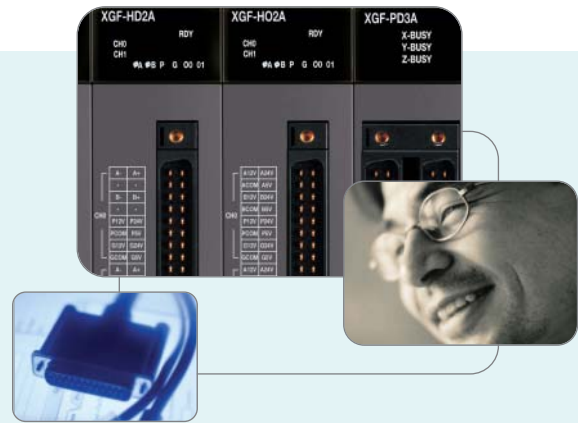
- Parameter setting and monitoring using XG5000
- Incremental encoder available
- Supporting various pulse input (5V, 12V, 24V)
- Various multiplication (1/2 phase pulse input)
- External present input
- Providing function to prevent from counting external signal
- Supporting HTL-level incremental encoder in the line-drive input type



Specifications

Item		Specification			
		XGF-HO2A			XGF-HD2A
No. of command	Signal	A Phase, B Phase			
	Input type	Voltage input (Open Collector)			Differential input (Line Driver)
	Signal level	DC 5/12/24V			RS-422 Line Drive/HTL LEVEL Line Drive
	Input voltage	24V DC (17.0V ~ 26.4V)	12V DC (9.8V ~ 13.2V)	5V DC (4.5V ~ 5.5V)	Line Driver  RS-422 Line Drive HTL Level Line Drive
	Input current	7~11mA	7~11mA	7~11mA	
	Min. On guaranteed voltage	17.0V	9.8V	4.5V	
	Max. Off guaranteed voltage	4.5V	3.0V	1.7V	
	Counter enable	Set by program (Count only in 'Enable')			
Max. counting speed	200Kpps			500Kpps (HTL input: 250Kpps)	
No. of channels	2 channels				
Counting range	Signed 32 Bit (-2,147,483,647 ~ 2,147,483,647)				
Counting type	Linear count				
(Program setting)	(Generating Carry/Borrow when exceeding counting range, Max/Min value)				
Input mode	1 Phase input				
(Program setting)	2 Phase input				
	CW/CCW input				
Signal type	Voltage				
Up/Down counter setting	1-phase input	Program or B-phase			
	2-phase input	Phase difference			
	CW/CCW	A-phase input: Up count    B-phase input: Down count			
Multiplication	1-phase input	1/2 multiplication (Programming)			
	2-phase input	1/2/4 multiplication (Programming)			
	CW/CCW	1 multiplication			
Control input	Signal	Preset signal, Signal to admit additional signal (Setting by terminal block or programming)			
	Signal level	DC 5V/12V/24V input type (Selecting terminal)			
	Signal type	Voltage			
External output	No. of output point	2 points/channel: Terminal output available			
	Type	Single comparison (>,>=,=<,<) or section comparison			
	Output type	Open Collector (Sink)			
Operating status display	Input signal	A-phase, B-phase, Preset signal, Signal to admit additional signal			
	Output signal	OUT1, OUT2			
	Operation status	Module Ready, Pulse input status of A, B phase			
Addition functions (Program setting)	<ul style="list-style-type: none"> <li>• Count clear, Count latch</li> <li>• Section count (Set time value:1~60000ms)</li> <li>• Measuring counting number per a unit time (Set time value:1~60000ms)</li> <li>• Preventing from counting (Setting by internal/external input during counting)</li> <li>• Pulse frequency count (Each input channel)</li> </ul>				
No. of occupied I/O points	Fixed type (Setting in basic parameter): 64 points				
	Variable type (Dissolving in basic parameter): 16 points				
Terminal block	40-pin connector				
Current consumption	270			330	
Weight (Kg)	0.09				





### Terminal block configuration

#### XGF-HO2A

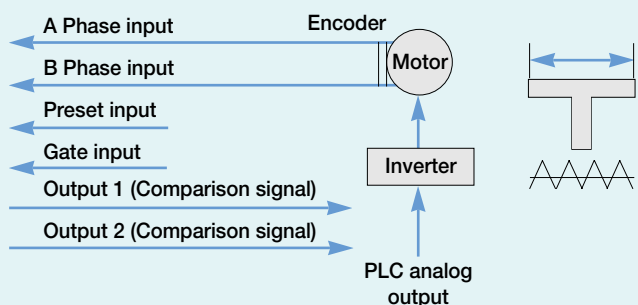
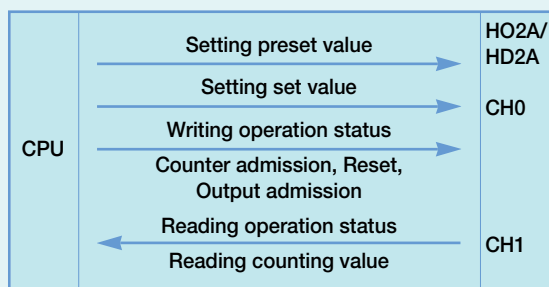
Pin layout	Pin number		Signal name
	CHO	CH1	
	1	17	A12V A phase DC12V input
	2	18	A24V A phase DC24V input
	3	19	A_C A phase COM
	4	20	A5V A phase DC5V input
	5	21	B12V B phase DC12V input
	6	22	B24V B phase DC24V input
	7	23	B_C B phase COM
	8	24	B5V B phase DC5V input
	9	25	P12V Preset DC12V input
	10	26	P24V Preset DC24V input
	11	27	P_C Preset COM
	12	28	P5V Preset DC5V input
	13	29	G12V Gate DC12V input
	14	30	G24V Gate DC24V input
	15	31	G_C Gate COM
	16	32	G5V Gate DC5V input
	33	35	OUT1 Comparison output OUT1
	34	36	OUT0 Comparison output OUT0
	37	38	24V External power supply
	39	40	24G DC24V

#### XGF-HD2A

Pin layout	Pin number		Signal name
	CHO	CH1	
	1	17	AI- AI-Input (LINE DRIVE TTL LEVEL Input)
	2	18	AI+ AI+Input (LINE DRIVE TTL LEVEL Input)
	3	19	AI- AI-Input (LINE DRIVE HTL LEVEL Input)
	4	20	AI+ AI+Input (LINE DRIVE HTL LEVEL Input)
	5	21	BI- BI-Input (LINE DRIVE TTL LEVEL Input)
	6	22	BI+ BI+Input (LINE DRIVE TTL LEVEL Input)
	7	23	BI- BI-Input (LINE DRIVE HTL LEVEL Input)
	8	24	BI+ BI+Input (LINE DRIVE HTL LEVEL Input)
	9	25	P12V Preset DC12V input
	10	26	P24V Preset DC24V input
	11	27	P_C Preset COM
	12	28	P5V Preset DC5V input
	13	29	G12V Gate DC12V input
	14	30	G24V Gate DC24V input
	15	31	G_C Gate COM
	16	32	G5V Gate DC5V input
	33	35	OUT1 Comparison output OUT1
	34	36	OUT0 Comparison output OUT0
	37	38	24V External power supply
	39	40	24G DC24V

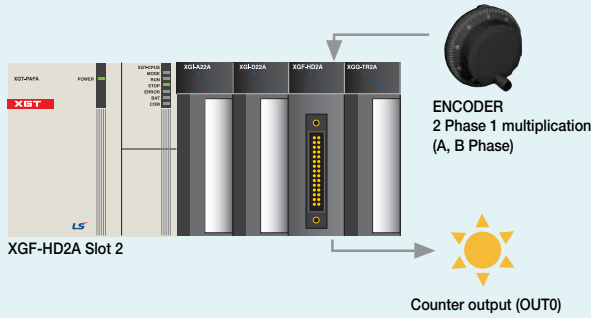
Special

### Configuration

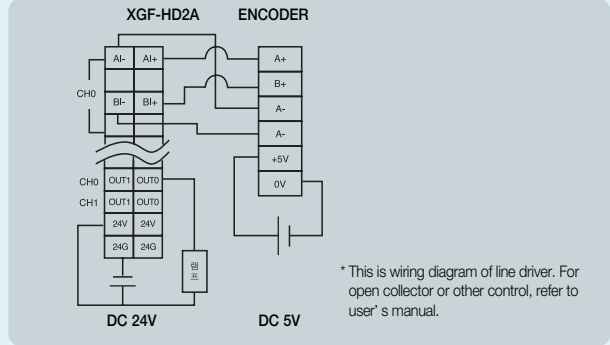


This is a simple example of high-speed counter module setting.  
For more details, refer to user's manual.

**System configuration**



**Wiring**

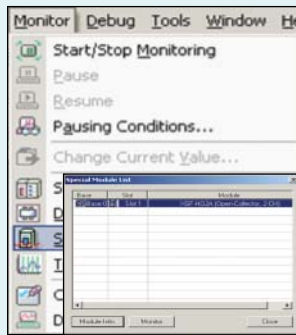


**Control configuration**

- Light a lamp of output when present value reaches 1000 of pulse input counted by encoder.
- Current value of pulse is saved in D100~D101 and is monitored.

**Module test (On Line)**

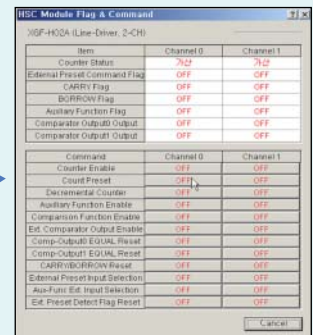
- Module test function of XGT enables to monitor operation status of high-speed counter module and to test-run.



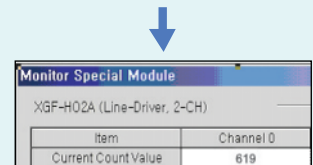
Select [Monitor] → [Special Module Monitoring] in menu and appoint high-speed counter.



After pressing the button for [Start Monitoring], press the button [FLAG monitor].



Change [Counter Enable] status to ON.

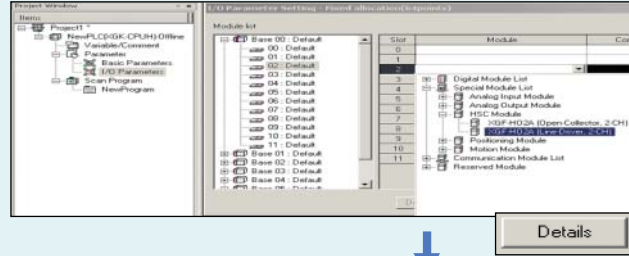


Check current counting value in 'Monitor Special Module' screen box.

### Parameter setting

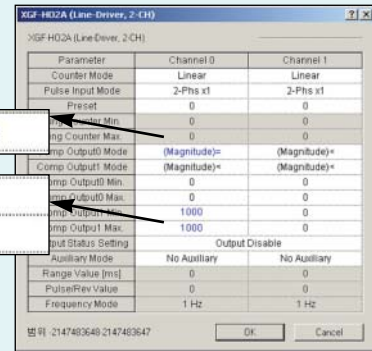
- In I/O parameter setting box, select slot and analog module that you want to use.  
(This example shows to select 2-channel line driver.)

Press the <Details> button at lower end of parameter setting box after selecting the module.



Input 1000 as Max. and Min. comparison output.

Comp Output0 Mode	(Magnitude)=
Comp Output1 Min.	1000
Comp Output1 Max.	1000



### Programming

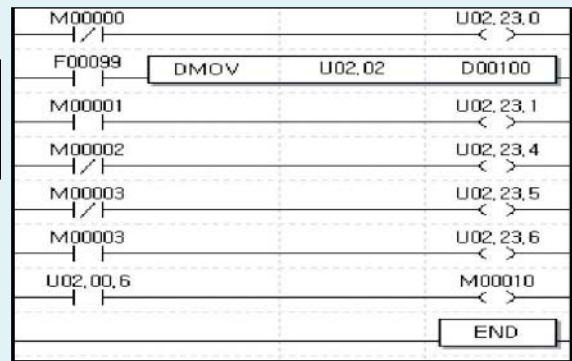
- After completing programming like following figure, download it to PLC and check operation status.

#### Special devices for programming

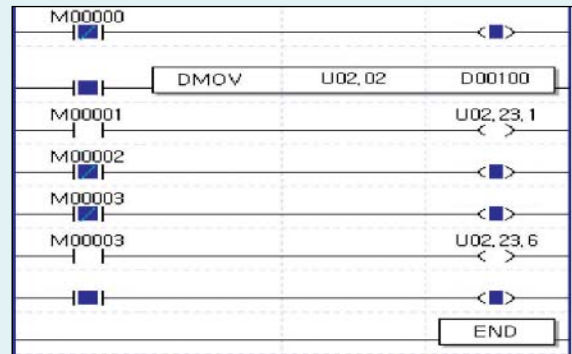
Refer to user's manual for more details.

- U02.23.0: Count operation admission
- U02.23.1: Count preset
- U02.23.4: Consistent output admission
- U02.23.5: Output external terminal admission
- U02.23.6: OUT0 consistent signal reset
- U02.00.6: Contact for checking external output (Practically effective output is outputted through OUT0 terminal)
- U02.02-U02.03: Counter present value

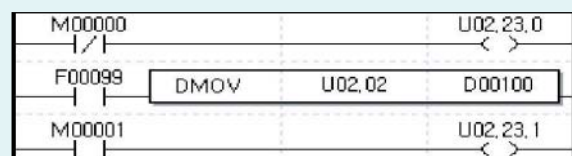
Uxy.aa.bb  
x: Base number  
y: Slot number  
aa,bb: Refer to user's manual



After downloading, monitor operation status.



For monitoring just present value, follow the example.



Special

Features

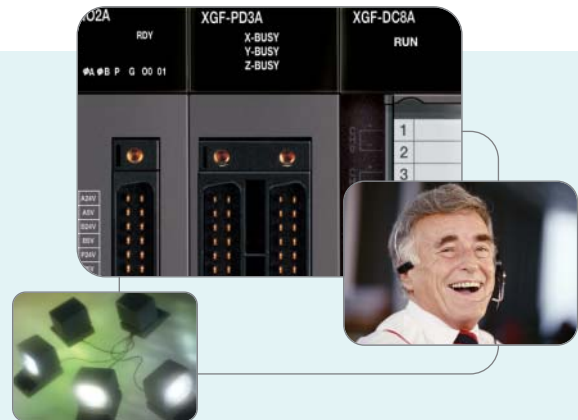
- Highly reliable position control with LSIS ASIC-embedded processor
- Enhanced control with fast control processing speed
- High-speed motor control (Max. pulse output: 1Mbps)
- Circular/linear interpolation, separate/synchronous operation
- Trapezoidal & S-curve acceleration/deceleration
- Easy and quick control through external input (JOG operation included)
- Encoder input support
- High-speed processing of command (4ms)
- Easy to set positioning parameters (Windows)
- Monitoring/Tracking/Simulation
- Available to edit operation parameter data in EXCEL
- Self-diagnosis
- Real-time information and solution for each error



Specifications

Item	Specifications		
	XGF-PO1A, XGF-PD1A	XGF-PO2A, XGF-PD2A	XGF-PO3A, XGF-PD3A
Number of axis	1	2	3
Interpolation	2-axis linear interpolation, 2-axis circular interpolation		2/3-axis linear interpolation, 2-axis circular interpolation
Control method	Position control, speed control, speed/position control, position/speed control		
Setting unit	Pulse, mm, inch, degree		
Positioning data	Each axis has 400 data items (Operation step number 1~400). It is available to set with software package or programming.		
Software package	Available (Connected with RS-232C Port of CPU module)		
Data backup	Flash memory (No battery)		
Positioning	Positioning method		Absolute / relative method
	Position address range	mm	-214748364.8 ~ 214748364.7 (μm)
		Inch	-21474.83648 ~ 21474.83647
		Degree	-21474.83648 ~ 21474.83647
		Pulse	-2147483648 ~ 2147483647
	Type		XGF-PO□A: Open collector, XGF-PD□A: Line Driver
	Position speed range	mm	0.01 ~ 20000000.00 (mm/min)
		Inch	0.001 ~ 2000000.000 (inch/min)
		Degree	0.001 ~ 2000000.000 (degree/min)
		Pulse	XGF-PO□A: 1~200,000 (pulse/sec), XGF-PD□A: 1~1,000,000 (pulse/sec)
Accel/Decel pattern		Trapezoidal & S-curve acceleration/deceleration	
Accel/Decel time		1 ~ 65,535ms	
Max. output pulse	XGF-PO□A: 200Kpps / XGF-PD□A: 1Mpps		
Max. distance	XGF-PO□A: 2m / XGF-PD□A: 10m		
Max. encoder input	200 Kpps		
Error display	LED		
Operation display	LED		
Connection connector	40 Pin connector		
Size of cable	AWG #24		
Occupied points of I/O	64 points (Fixed type), 16 points (Variable type)		
Current consumption (mA)	XGF-PO1A: 340	XGF-PO2A: 360	XGF-PO3A: 400
	XGF-PD1A: 510	XGF-PD2A: 790	XGF-PD3A: 860
Weight (Kg)	0.12	0.13	0.135

※ XGF-PO□O: Open Collector type, □: Number of axis  
 XGF-PD□D: Line Drive type, □: Number of axis

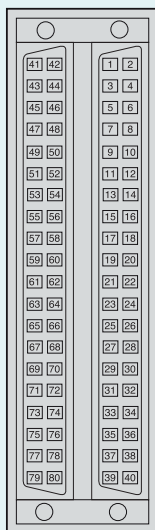


**Terminal block configuration**

Pin layout



1 axis

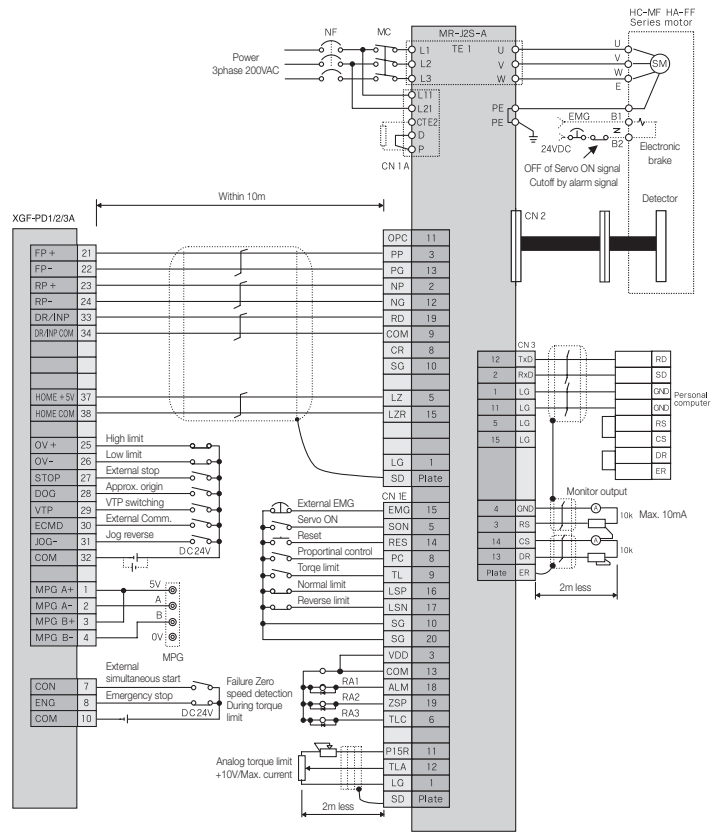


2/3 axes

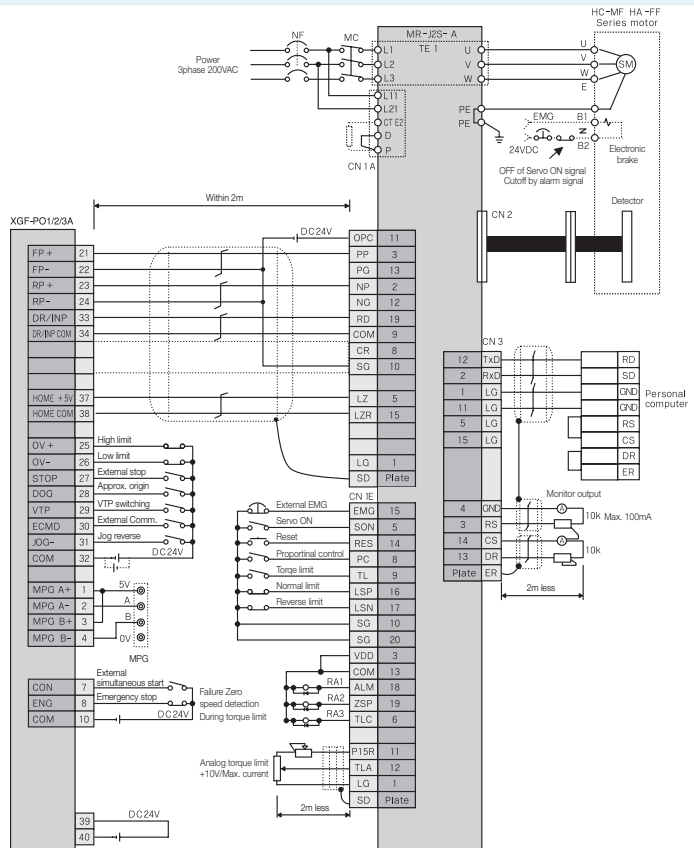
For	Pin number			Signal name	Signal direction APM - Ext. device	Condition	
	X	Y	Z				
A x i s	21	41	61	FP+	Pulse output (Differential +)	→	
	22	42	62	FP-	Pulse output (Differential -)	→	
	23	43	63	RP+	Pulse sign (Differential +)	→	
	24	44	64	RP-	Pulse sign (Differential -)	→	
	25	45	65	OV+ *	High limit	←	
	26	46	66	OV- *	Low limit	←	
	27	47	67	STOP	External stop signal	←	
	28	48	68	DOG	Approximate origin	←	
	29	49	69	VTP	Speed/Position switching signal	←	
	30	50	70	ECMD command signal	External	←	
					Start	←	
					Skip	←	
				JOG+ (Forward)	←		
	31	51	71	JOG-	JOG reverse operation	←	
	32	52	72	COM	Common (OV+, OV-, STOP, DOG, VTP, ECMD, JOG-)	↔	
	33	53	73	DR/INP	Inposition/Driver Ready signal	←	
34	54	74	DR/INP COM	Inposition/Driver Ready signal Common	↔		
35	55	75	HOME +24V	Zero signal (+24V)	←		
36	56	76	NC	Not used			
37	57	77	HOME +5V	Zero signal (+5V)	←		
38	58	78	HOME COM	Zero signal (+24V, +5V) Common	↔		
39	59	79	24V	24V Power supply (Not used in case of line drive output)			
40	60	80	P COM	External 24V GND (Not used in case of line drive output)			
C o m m o n	1			MPG A+	Manual pulse generator/Encoder A+ Input	←	
	2			MPG A-	Manual pulse generator/Encoder A- Input	←	
	3			MPG B+	Manual pulse generator/Encoder B+ Input	←	
	4			MPG B-	Manual pulse generator/Encoder B- Input	←	
	5			NC	Not used	←	
	6			NC	Not used	←	
	7			CON	External simultaneous start	←	
	8			EMG *	Emergency stop	←	
	9			NC	Not used		
	10			COM	(CON, EMG) Common	↔	
	11~20			NC	Not used		

Connection with MR-J2/J2S-□A

- XGF-PD1/2/3A (Line Driver)



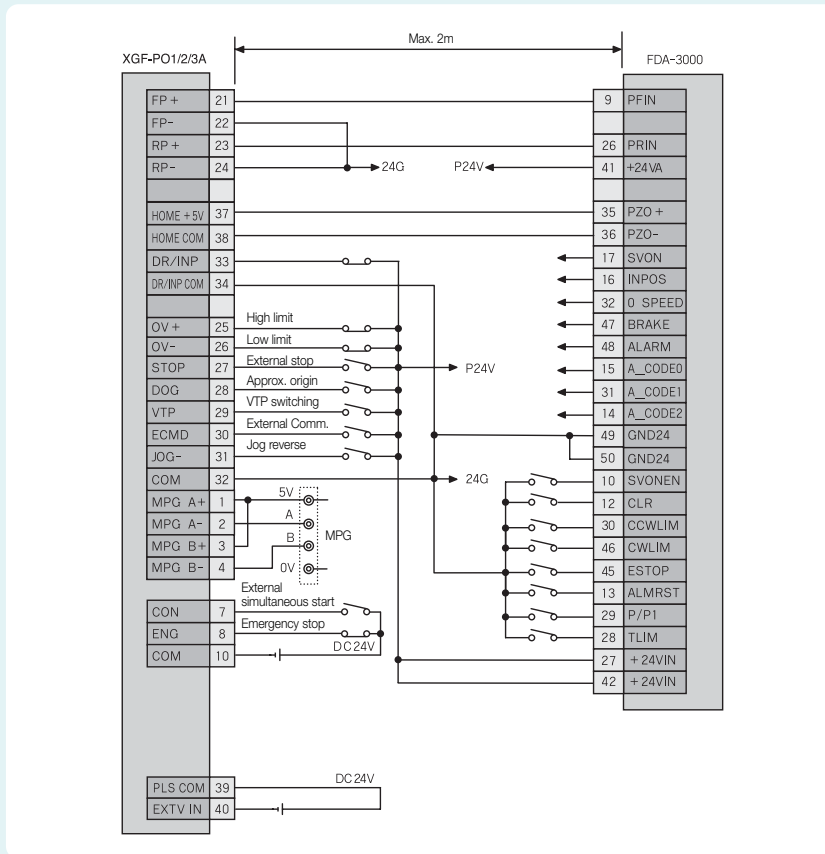
- XGF-PO1/2/3A (Open Collector)





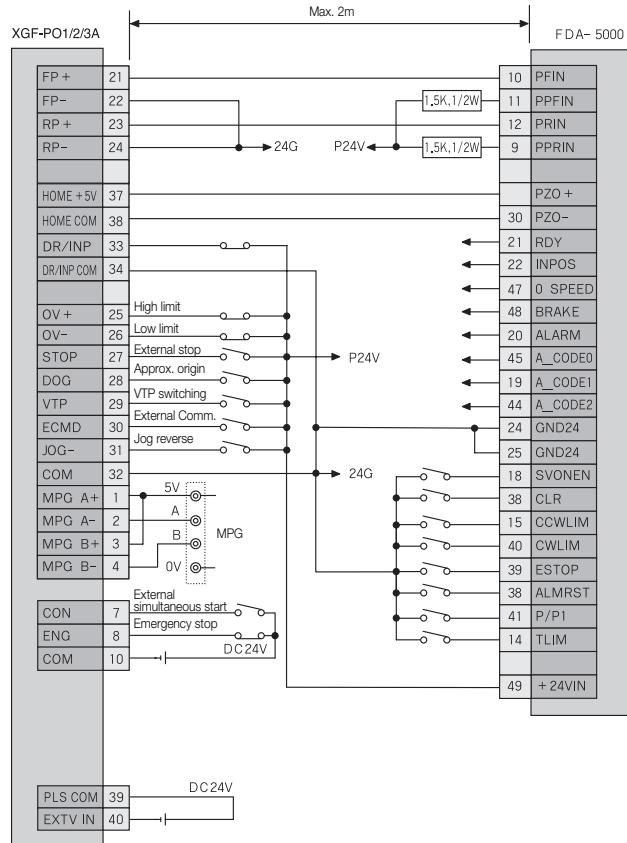
**Connection with FDA-3000 AC Servo driver**

- XGF-PO1/2/3A (Open Collector)

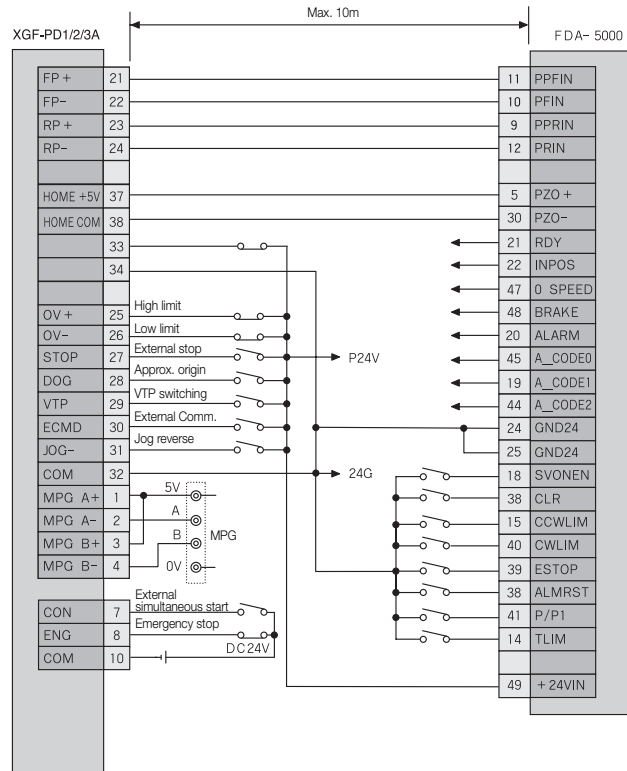


Connection with FDA-5000 AC Servo driver

- XGF-PO1/2/3A (Open Collector)



- XGF-PD1/2/3A (Line Driver)

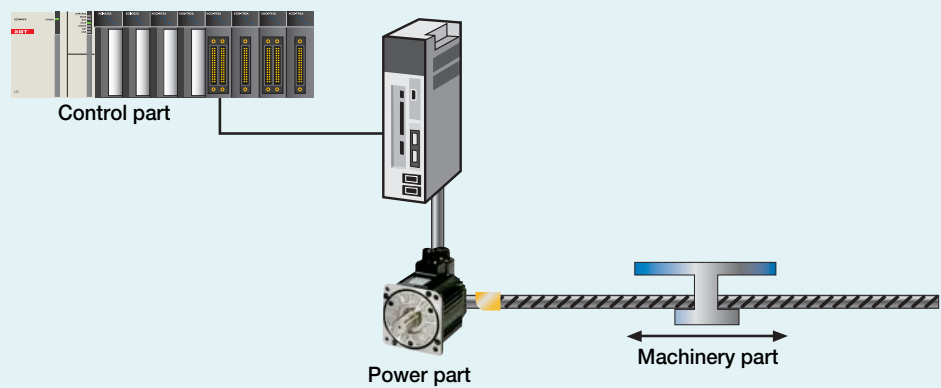


## Special module / Positioning module (Example)

This is a simple example to control 1-axis servo motor.

### System configuration

- Positioning system consists of control part, power part, and machinery part.
- Control part: Install APM module on base and complete parameter setting and programming.
- Power part: Power part generates momentum, and it consists of [servo-driver + servo-motor] and [step-driver + step-motor].
- Machinery part: Machinery part is to transport objects, and it can be ball screw, timing belt and rack gear.

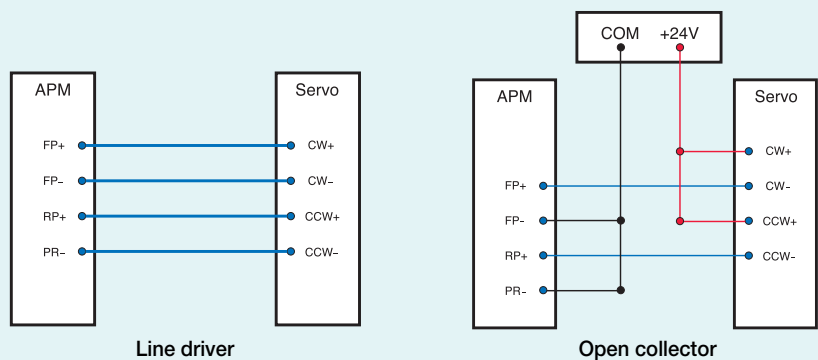


### System design

- APM: Determine type and quantity considering the number of control axis and operation function.
- Driver: Select driver with identical output type of APM.  
(In case output type of APM is line driver, driver should support a pulse train input type of line driver.)
- Motor: Select capacity considering operation characteristics of load.
- Mechanical: Design precise mechanical system to minimize error.

### Connection to drivers

- The following picture is wiring pulse train signal between driver and APM for pulse train signal.
- Terminal besides pulse train signal is used additionally according to user-purpose, system characteristics.
- For wiring of optional terminal of Servo (Step) driver, refer to user's manual.



Parameter, data setting and transmission

- Set system characteristic, target location, operation speed, and operation type using APM software package.
- Transmit operation parameter and data to APM.

	Item	X-Axis
Basic Parameter	Unit	1: mm
	Pulse per Rotation	5000 pls
	Travel per Rotation	5000.0 um
	Unit Multiplier	0 x 1
	Pulse Output Mode	0: CW/CCW
	Bias Speed	0.01 mm/m
	Speed Limit	10000.00 mm/m
	ACC/DEC No.1	500 ms
	ACC/DEC No.2	1000 ms
	ACC/DEC No.3	1500 ms
ACC/DEC No.4	2000 ms	
	S/W Upper Limit	214748364.7 um
	S/W Lower Limit	-214748364.8 um
	Backlash Comp	0.0 um
	Position Complete Time	1000 ms
	Ext. Command Selection	0: Start

Setting parameter of system characteristic



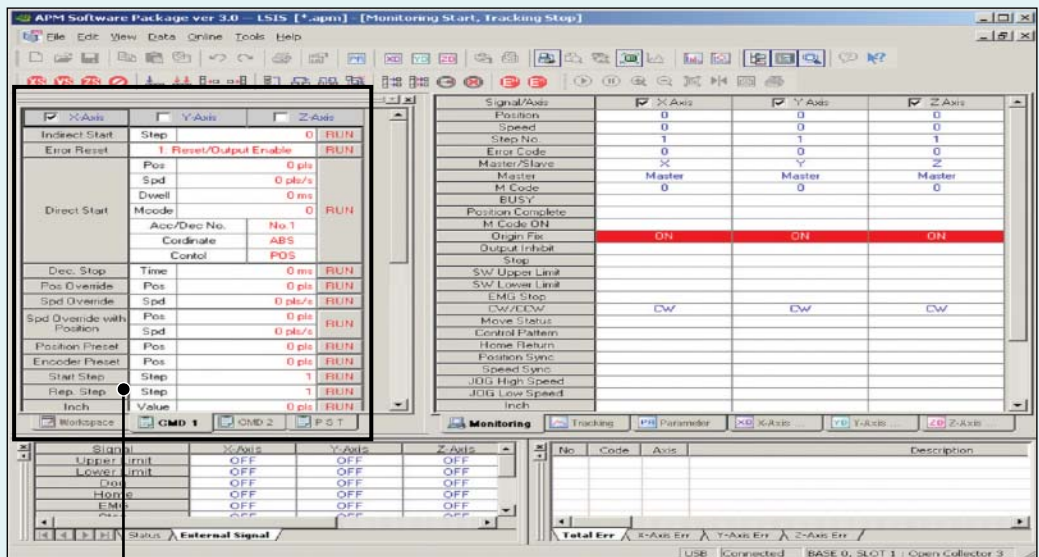
APM software package

Step	Code	Control	Pattern	Method	Address [um]	Sub-Address [um]	M Code	A/D No.	Speed [mm/m]	Dwell [ms]	Cl Int Dr
1	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
2	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
3	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
4	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW

Target location, speed, operation type, operation data

Initial system inspection

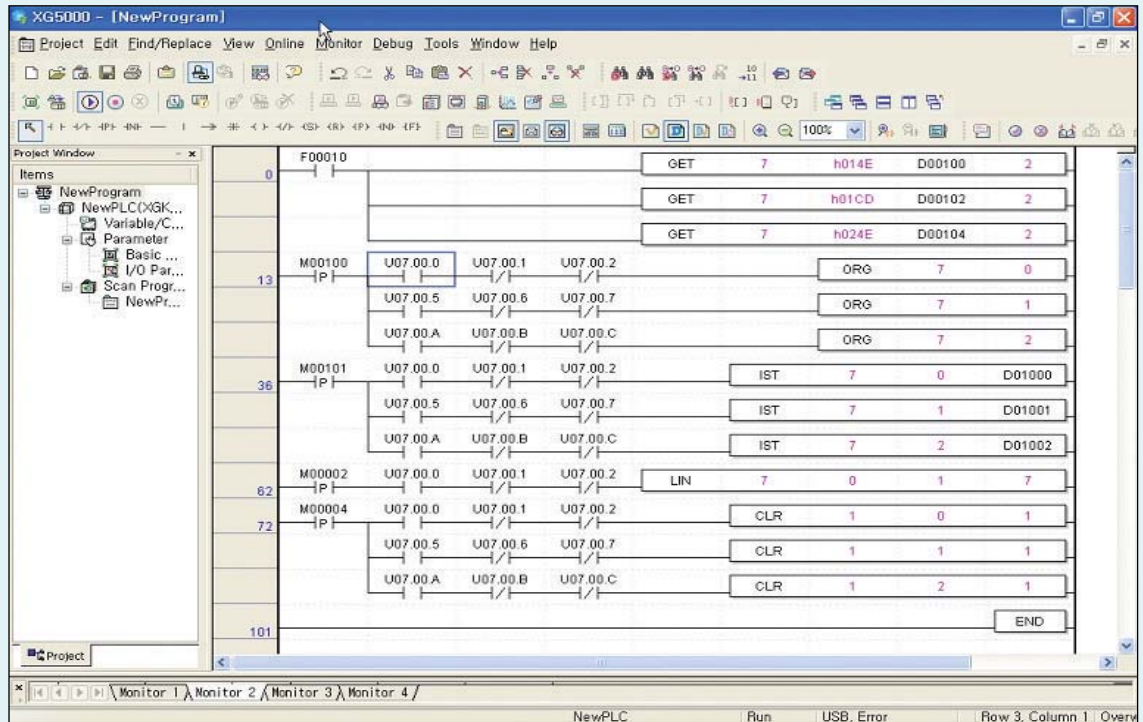
- Perform a trial-run using APM Software Package, and check external wiring, operation data setting, and status of machinery part. It is recommended to do trial-run before programming.
- If a program is saved in CPU and operation mode is 'RUN', a unexpected fault can occur due to disagreement between operation condition of operation control program and operation result of APM Software Package.



Operate APM without positioning programming

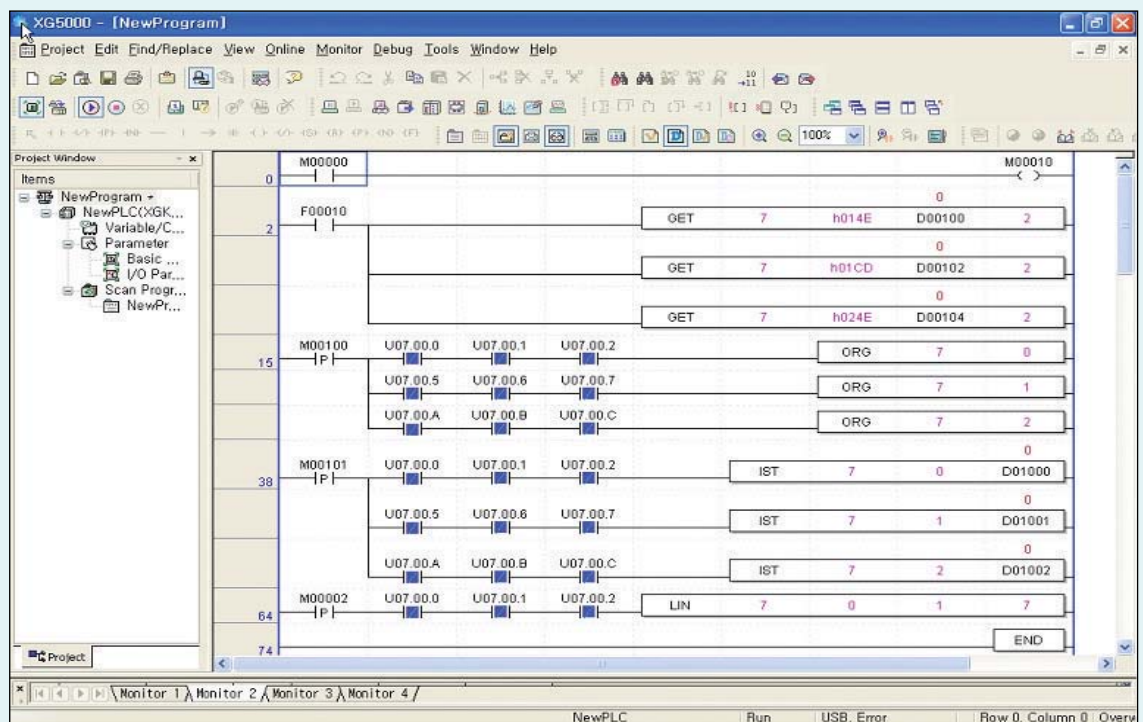
## Programming

- Create a program using dedicated command for APM control.  
ex) Origin point return-ORG, Independent operation-IST



## Program monitoring

- Monitor output condition following input condition and inspect operation status of APM and correct programming error.



Features

**Motion control module adopting Mechatrolink-II**

- Quick and precise motion control via high-speed network (Mechatrolink-II)  
(Transmission speed: 10Mbps, Transmission period: 1ms/1.5ms/2ms)

**Enhanced performance of motion synchronization**

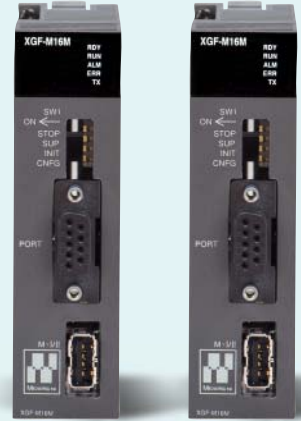
- Perfect synchronization of Max. 16 axes
- High-speed synchronous motion control by synchronizing execution period of application with transmission period of network

**Efficient system**

- Wiring reduction with motion control system via network
- Enhanced stability and efficiency of system through absolute-coordinate operation

**Multi-function engineering tool -> M16M software package**

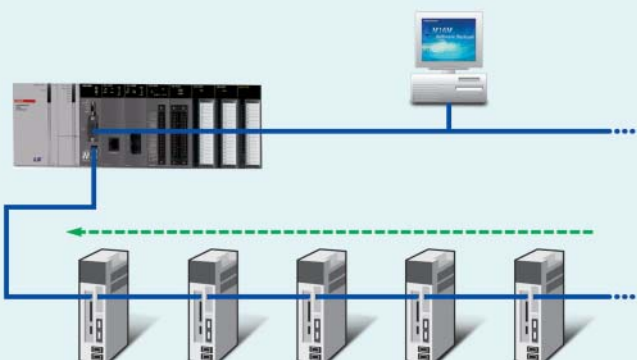
- Providing various functions from system design to maintenance
- Automatic setting of communication & servo parameter by 'Self Configuration'



Specifications

Item		XGF-M16M
Control performance	Control axis	Motion: 6 axes/1ms, MOV: 16 axes/2ms
	Data transmission time	9 axes/1 port (M II -1ms)
		15 axes/1 port (M II -1.5ms)
		16 axes /1 port (M II -2ms)
	15 axes/1 port (M II -17byte-1ms)	
Max. number of control axis		16 axes
Max. transmission distance		50m
Count range		Signed 32 Bit (-2,147,483,648 ~ 2,147,483,647)
Scan time setting		1.0~32.0ms (Unit: 0.5ms)
Memory capacity	RAM	32MB (SDRAM)/512KB (SRAM)
	FLASH	8MB (Firm 2MB/User 6MB)
	User memory	6MB
Data trace		128kW (32kW x 4Gr)
Program language	Motion language	No. of program: 256
		No. of command: about 70
		No. of simultaneous execution: 16
Memory backup		FLASH
Engineering port		RS-232C x 1
Self-configuration		○
No. of occupied I/O points		Fixed type (Setting in basic parameter): 64 points Variable type (Dissolving in basic parameter): 16 points

System configuration



**MECHATROLINK-II**

- Max. number of station: 16
- Transmission period: 1ms/1.5ms/2ms
- Features: Simple and easy system setup using 'Self-Configuration'
- SW: M16M software package



## Special module / M16M software package

### Features

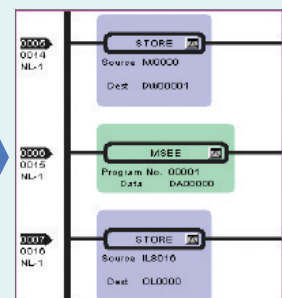
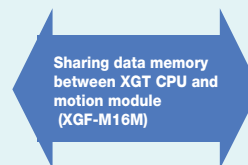
- Providing 'Self-Configuration'
- Reduced system setting time thanks to automatic recognition of network motion system and automatic setting of comm. & servo parameter
- Providing various screens (6 types of Manager, E-CAM tool)
- Supporting dedicated language and ladder language for motion control
- Easy programming and maintenance



### Programming

Program for data exchange with M16M using motion instruction of XG5000  
 Programming and editing ladder and motion program using M16M software package

GETM	1	h0200	D00000	3
PUTM	1	0	M0004	4



### Motion language

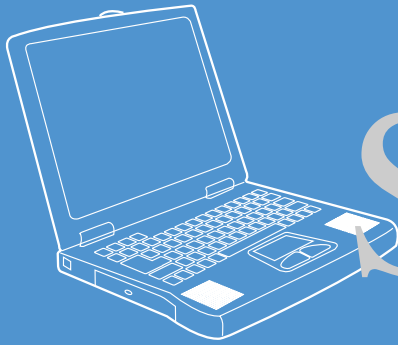
Easy and convenient programming and editing using structured Text-type language.

```
abs:
:
: "Servo ON":
:
: ob80000 = 1;
: ob80800 = 1;
: ob81000 = 1;
: ob81800 = 1;
: ob81b5 = 200;
: tim t10;
:
: fms: t500000000;
: while lw0001 == 0;
:
: vel [a1]200000 [b1]200000 [c1]200000 [d1]200000;
: mov [a1]65535 [b1]65535 [c1]65535 [d1]65535;
: tim t10;
:
: mvs [a1]1131072 [b1]262144 [c1]393216 [d1]524288 fi 00000000;
: tim t20;
: wend;
:
: "Servo OFF":
:
: ob80000 = 0;
: ob80800 = 0;
: ob81000 = 0;
: ob81b5 = 0;
```

### Drivers & motors for MECHATROLINK-II

Driver	Motor	Option	Remarks
SGDH	Σ-II series (Servo motor)	JUSP-NS115	Installing option module in servo module
	Σ-III series	—	Servo motor
SGDS	Linear Σ series	—	Linear motor
	Direct-drive Σ series	—	Direct drive motor

Special



# Software

Software innovation for integrated solution.

XG5000 is the optimum software which can cover various programming needs, debugging, and easy maintenance. Especially, XG-PD achieves customer satisfaction with useful maintenance tool by internet.





## Programming software XG5000

- Program editing & Engineering software
- Windows-based easy operation
- Multi-PLC, Multi-programming support
- Various monitoring and diagnosis functions
- Windows 2000, XP (Limited use in Windows 98, ME)

**Ladder monitor**

**Variable monitor**

PLC	Type	Device	Name	Var. Label	Comment
1	PLC1	RELAY	00000000	001	Mar1000010
2	PLC1	RELAY	00000001	002	Mar1000011
3	PLC1	RELAY	00000002	003	Mar1000012
4	PLC1	RELAY	00000003	004	Mar1000013
5	PLC1	RELAY	00000004	005	Mar1000014
6	PLC1	RELAY	00000005	006	Mar1000015
7	PLC1	RELAY	00000006	007	Mar1000016
8	PLC1	RELAY	00000007	008	Mar1000017
9	PLC1	RELAY	00000008	009	Mar1000018
10	PLC1	RELAY	00000009	010	Mar1000019
11	PLC1	RELAY	00000010	011	Mar1000020
12	PLC1	RELAY	00000011	012	Mar1000021
13	PLC1	RELAY	00000012	013	Mar1000022
14	PLC1	RELAY	00000013	014	Mar1000023
15	PLC1	RELAY	00000014	015	Mar1000024
16	PLC1	RELAY	00000015	016	Mar1000025
17	PLC1	RELAY	00000016	017	Mar1000026
18	PLC1	RELAY	00000017	018	Mar1000027
19	PLC1	RELAY	00000018	019	Mar1000028
20	PLC1	RELAY	00000019	020	Mar1000029
21	PLC1	RELAY	00000020	021	Mar1000030
22	PLC1	RELAY	00000021	022	Mar1000031
23	PLC1	RELAY	00000022	023	Mar1000032
24	PLC1	RELAY	00000023	024	Mar1000033
25	PLC1	RELAY	00000024	025	Mar1000034
26	PLC1	RELAY	00000025	026	Mar1000035
27	PLC1	RELAY	00000026	027	Mar1000036
28	PLC1	RELAY	00000027	028	Mar1000037
29	PLC1	RELAY	00000028	029	Mar1000038
30	PLC1	RELAY	00000029	030	Mar1000039
31	PLC1	RELAY	00000030	031	Mar1000040
32	PLC1	RELAY	00000031	032	Mar1000041
33	PLC1	RELAY	00000032	033	Mar1000042
34	PLC1	RELAY	00000033	034	Mar1000043
35	PLC1	RELAY	00000034	035	Mar1000044
36	PLC1	RELAY	00000035	036	Mar1000045
37	PLC1	RELAY	00000036	037	Mar1000046
38	PLC1	RELAY	00000037	038	Mar1000047
39	PLC1	RELAY	00000038	039	Mar1000048
40	PLC1	RELAY	00000039	040	Mar1000049
41	PLC1	RELAY	00000040	041	Mar1000050
42	PLC1	RELAY	00000041	042	Mar1000051
43	PLC1	RELAY	00000042	043	Mar1000052
44	PLC1	RELAY	00000043	044	Mar1000053
45	PLC1	RELAY	00000044	045	Mar1000054
46	PLC1	RELAY	00000045	046	Mar1000055
47	PLC1	RELAY	00000046	047	Mar1000056
48	PLC1	RELAY	00000047	048	Mar1000057
49	PLC1	RELAY	00000048	049	Mar1000058
50	PLC1	RELAY	00000049	050	Mar1000059
51	PLC1	RELAY	00000050	051	Mar1000060
52	PLC1	RELAY	00000051	052	Mar1000061
53	PLC1	RELAY	00000052	053	Mar1000062
54	PLC1	RELAY	00000053	054	Mar1000063
55	PLC1	RELAY	00000054	055	Mar1000064
56	PLC1	RELAY	00000055	056	Mar1000065
57	PLC1	RELAY	00000056	057	Mar1000066
58	PLC1	RELAY	00000057	058	Mar1000067
59	PLC1	RELAY	00000058	059	Mar1000068
60	PLC1	RELAY	00000059	060	Mar1000069
61	PLC1	RELAY	00000060	061	Mar1000070
62	PLC1	RELAY	00000061	062	Mar1000071
63	PLC1	RELAY	00000062	063	Mar1000072
64	PLC1	RELAY	00000063	064	Mar1000073
65	PLC1	RELAY	00000064	065	Mar1000074
66	PLC1	RELAY	00000065	066	Mar1000075
67	PLC1	RELAY	00000066	067	Mar1000076
68	PLC1	RELAY	00000067	068	Mar1000077
69	PLC1	RELAY	00000068	069	Mar1000078
70	PLC1	RELAY	00000069	070	Mar1000079
71	PLC1	RELAY	00000070	071	Mar1000080
72	PLC1	RELAY	00000071	072	Mar1000081
73	PLC1	RELAY	00000072	073	Mar1000082
74	PLC1	RELAY	00000073	074	Mar1000083
75	PLC1	RELAY	00000074	075	Mar1000084
76	PLC1	RELAY	00000075	076	Mar1000085
77	PLC1	RELAY	00000076	077	Mar1000086
78	PLC1	RELAY	00000077	078	Mar1000087
79	PLC1	RELAY	00000078	079	Mar1000088
80	PLC1	RELAY	00000079	080	Mar1000089
81	PLC1	RELAY	00000080	081	Mar1000090
82	PLC1	RELAY	00000081	082	Mar1000091
83	PLC1	RELAY	00000082	083	Mar1000092
84	PLC1	RELAY	00000083	084	Mar1000093
85	PLC1	RELAY	00000084	085	Mar1000094
86	PLC1	RELAY	00000085	086	Mar1000095
87	PLC1	RELAY	00000086	087	Mar1000096
88	PLC1	RELAY	00000087	088	Mar1000097
89	PLC1	RELAY	00000088	089	Mar1000098
90	PLC1	RELAY	00000089	090	Mar1000099
91	PLC1	RELAY	00000090	091	Mar1000100
92	PLC1	RELAY	00000091	092	Mar1000101
93	PLC1	RELAY	00000092	093	Mar1000102
94	PLC1	RELAY	00000093	094	Mar1000103
95	PLC1	RELAY	00000094	095	Mar1000104
96	PLC1	RELAY	00000095	096	Mar1000105
97	PLC1	RELAY	00000096	097	Mar1000106
98	PLC1	RELAY	00000097	098	Mar1000107
99	PLC1	RELAY	00000098	099	Mar1000108
100	PLC1	RELAY	00000099	100	Mar1000109

**System monitor**

**Special module monitor**

**Forced I/O**

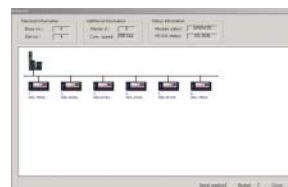
**Trend monitor**

### Programming XG5000

- Easy how to use**  
Letter type, color, short key, tool bar
- Convenient editing**  
Undo, Redo, Excel editing
- Structuralized program**  
Scan, task (Initialization, normal cycle, external contact point, internal device)
- Various monitoring**  
Special module, trend, user-event, etc

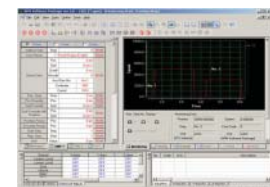
### Network set up, diagnosis XG-PD

- Communication module parameter setting**  
Basic, high-speed link parameter setting
- System diagnosis and monitoring**  
Ping/Self test  
Monitoring of sending/receiving frame  
Display of status and diagnosis of each module



### Positioning APM S/W Package

- Easy parameter setting**
- Data editing in Excel**
- Monitoring and trace**



## Features

- Program editing & Engineering software
- Windows-based easy operation
- Multi-PLC, Multi-program, Multi-task in one project
- Various monitoring and diagnosis functions
- Windows 2000, XP (Limited use in Windows 98, ME)



## Programming tools

### MPMP (Multi-PLC Multi-programming)

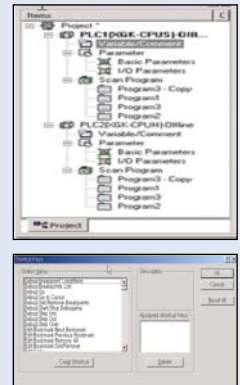
Different PLC systems can be edited, monitored, and managed simultaneously in one project.

### Drag & Drop

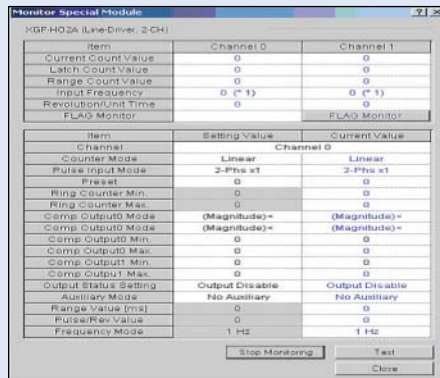
It is available in project, variable/comment, ladder diagram editing and monitoring.

### User-defined shortcut keys

User-defined shortcut keys increase editing convenience.

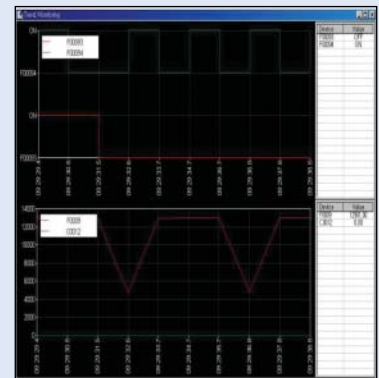


## Monitoring



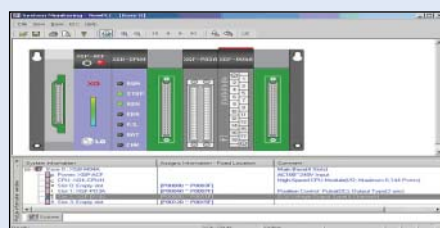
### Special module monitoring

Monitoring and test-run of various special modules are available.

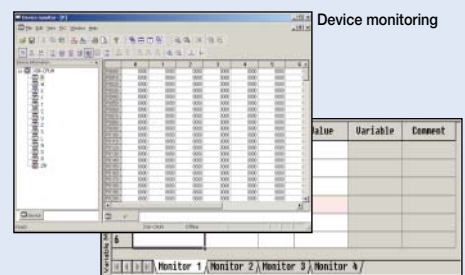


### Trend monitoring

The changing value of specific device can be monitored and saved as a file.



### System monitoring



### Variable monitoring

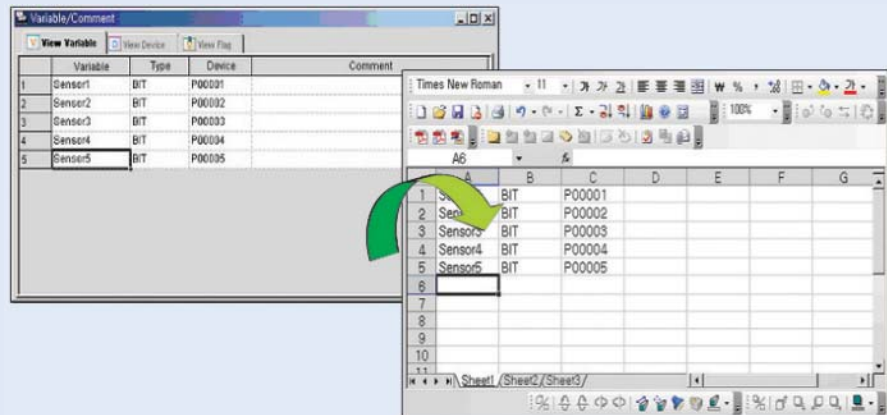


### System requirement

Item	System requirement
O/S	Windows 2000, XP (Limited use in Windows 98, ME)
CPU	IBM compatible PC with Min. 200MHz Pentium processor
Memory	Min. 128M
HDD	100 MB (Free memory space)
Serial port	Communication port for program transmission (RS-232C, USB)
Printer	Compatible with Windows 98 or later
Mouse	Compatible with Windows 98 or later

### Variable and programming editing

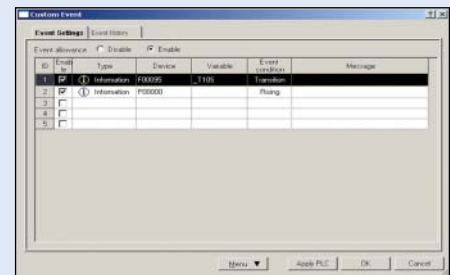
- Data input like EXCEL
- Cell-unit edit
- Auto Fill function
- Compatible with Microsoft Excel
- Redo and Undo (Unlimited)
- Segment screen edit



### Improved diagnosis and maintenance



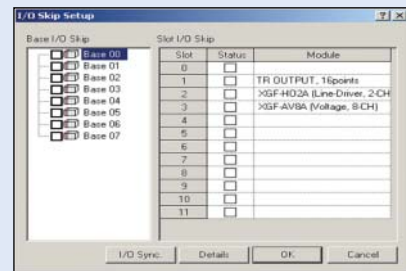
**Module exchange wizard**  
It supports safe module exchange during 'RUN' mode.



**User-defined event**  
By registering user-defined event, users can read the record of specified event and use it for PLC operation and debugging.



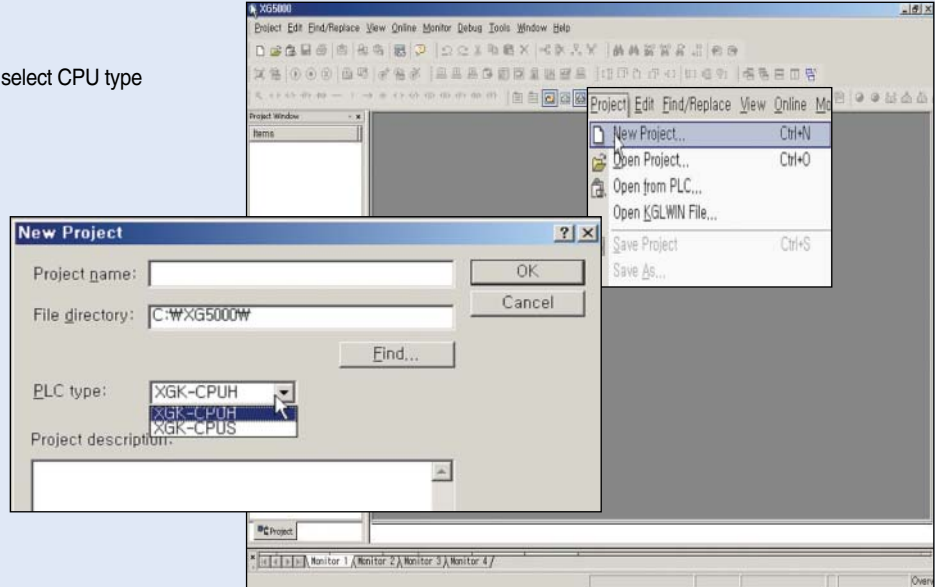
**Forced I/O**  
The status of external output device can be checked without program. And when input device breaks down, forced input function specifies ON/OFF and can operate the system without interruption of equipment.



**I/O skip, Error Mask**  
I/O inspection and renewal can be set for specific module and continuous operation is available when an error is occurred.

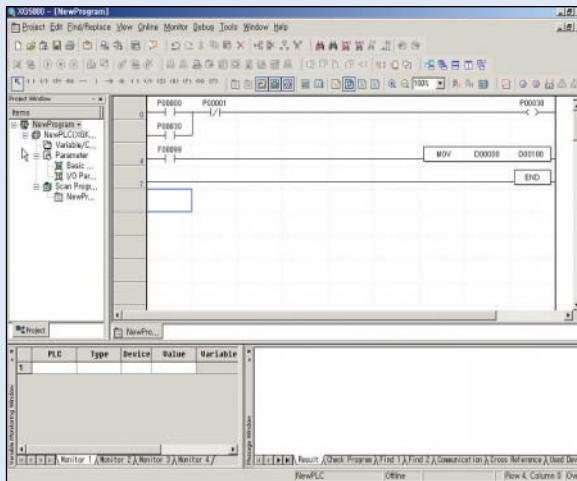
**Program editing**

- Start XG5000
- Select [New Project]
- Write project name and select CPU type



**Configure ladder lines as below with ladder input tool bar**

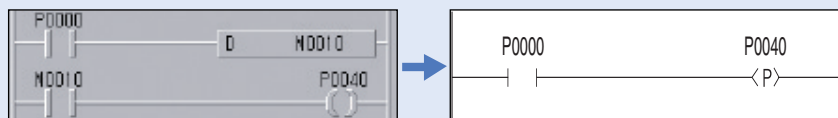
- Select input point and command with ladder tool bar.



Icon	Description	Short key
	Arrow mode	ESC
	Normally open contact	F3
	Normally closed contact	F4
	Positive transition-sensing contact (On for 1 scan when Off-->On)	Shift+F1
	Negative transition-sensing contact(On for 1 scan when On-->Off)	Shift+F2
	Horizontal line	F5
	Vertical line	F6
	Fill horizontal line.	Shift+F8
	Coil	F9
	NOT instruction contact	Shift+F9
	Negated coil	F11
	SET coil	Shift+F3
	RESET coil	Shift+F4
	Positive transition-sensing coil (On for 1 scan when Off-->On)	Shift+F5
	Negative transition-sensing coil (On for 1 scan when On-->Off)	Shift+F6
	Function	F10

**Note) Addition of 'EDGE' detection instructions**

Develop user-friendly programming through adding D, D NOT instructions (Rising EDGE, dropping EDGE) to contact and output coil.





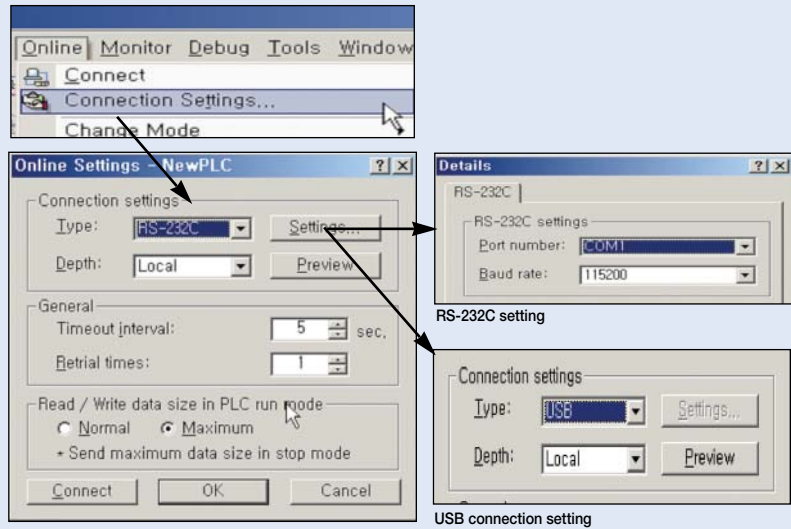
## Program download

### Connection setting

- Check a setting for connection between XGT and XG5000
- XGT supports USB and RS-232C

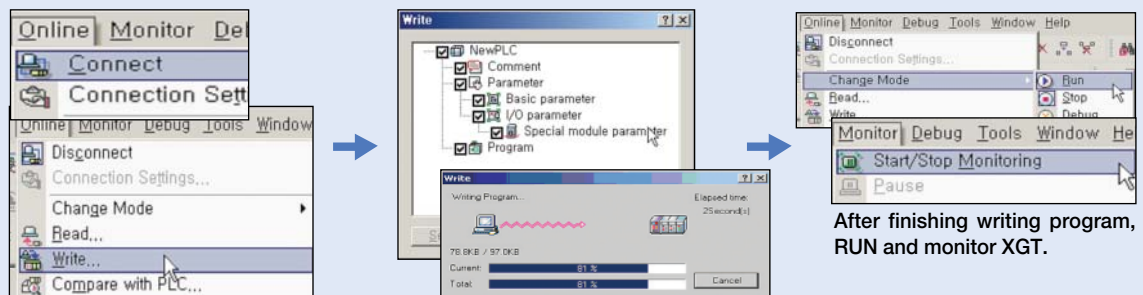
Set up communication port and download speed

\* using 'USB TO RS-232C' converter, 115,200bps connection may be unavailable depending on characteristics of converter. In this case, change the communication speed to 38,400bps.



### Connection

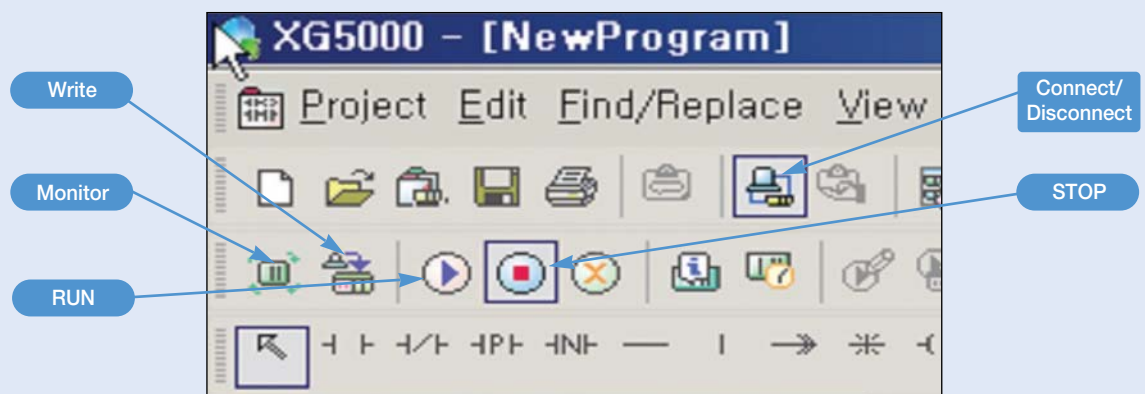
Connect to PLC and download the program as below.



After finishing writing program, RUN and monitor XGT.

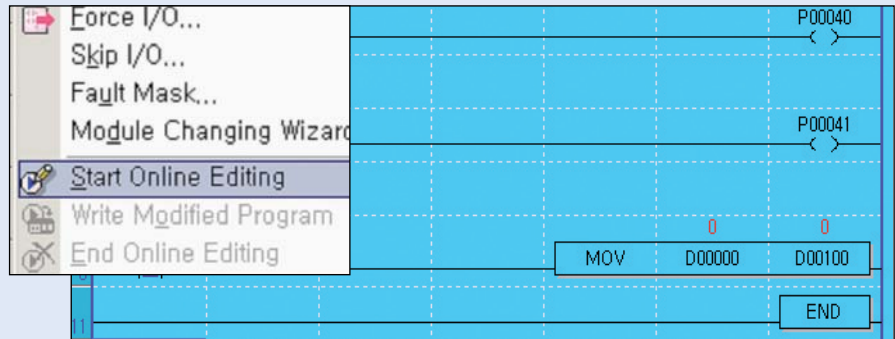
### Short icon

\* XGT doesn't support collective-writing monitoring for system safety.



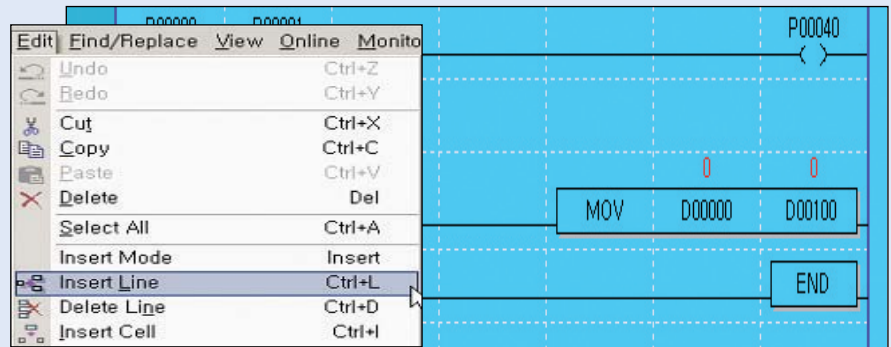
**Online Editing**

Select [Start Online Editing] in Online menu.



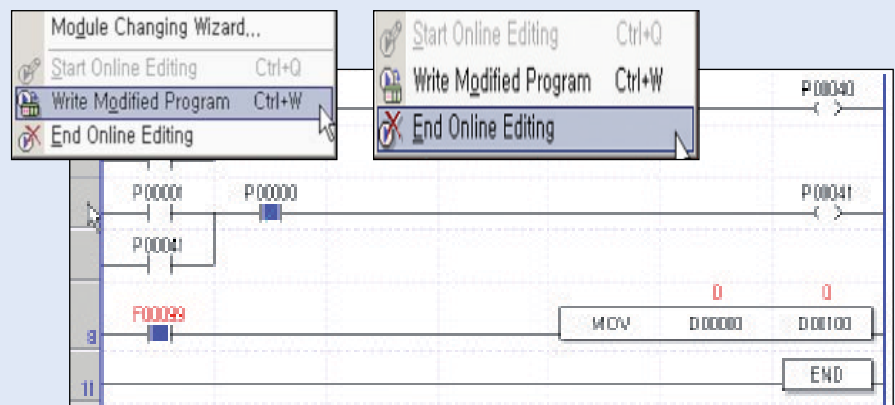
When starting Online Editing, the screen color becomes blue.

Modify the program.



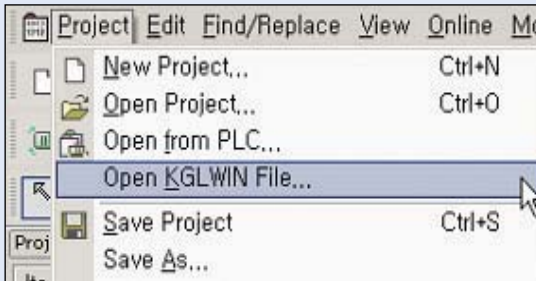
Edit menu

After finishing modifying the program, select [Write Modified Program] and [End Online Editing].

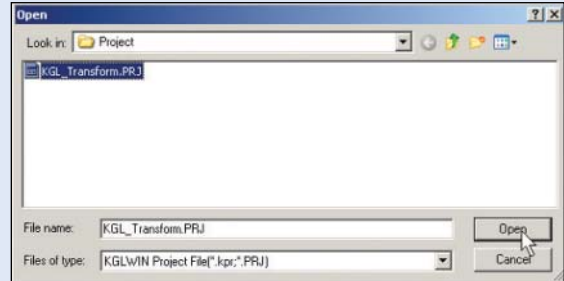


After finishing 'Online Editing'

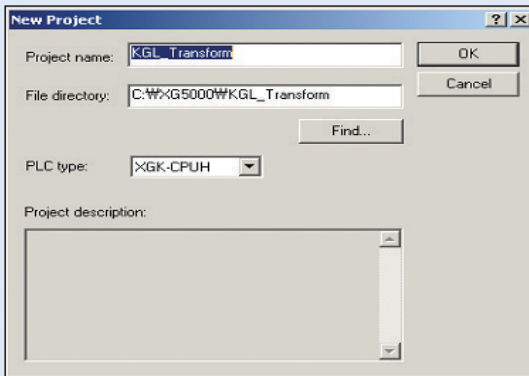
**Open a project written in KGL-WIN**



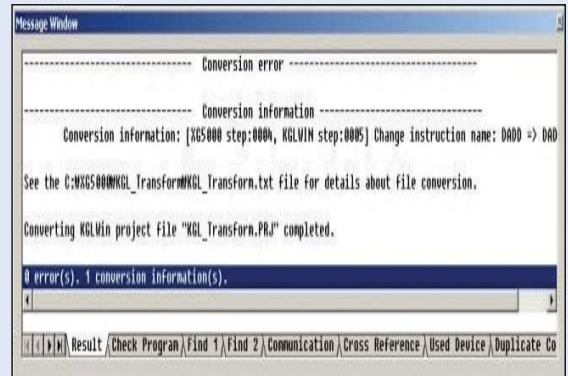
Select [Open KGLWIN file] in project.



Select the file.

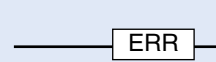


Select the type of XGT CPU.



Check converted information in the message window.

**Note)** Dedicated instructions and special parameters for MASTER-K cannot be converted.  
Mostly General instructions and descriptions are converted.  
Information impossible to be converted is displayed as ERR.

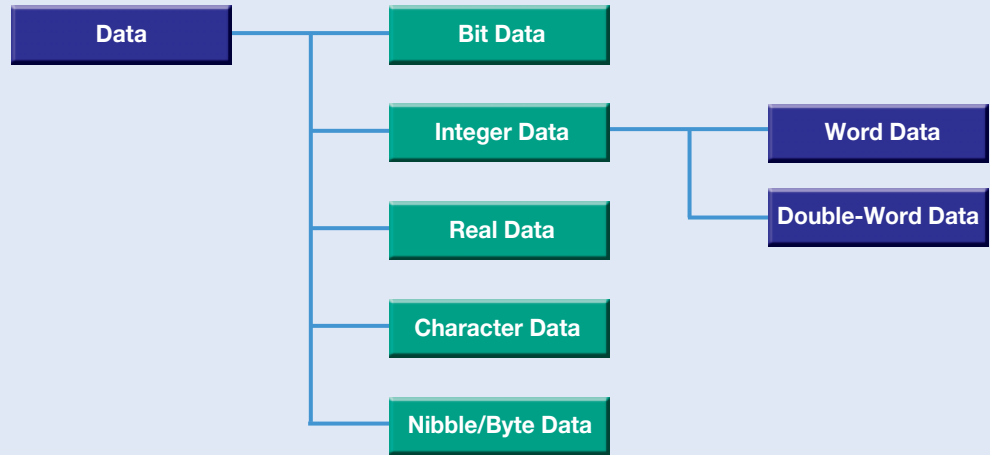


• Content of main special flag (F) change

MASTER-K	XGT	Specifications
F10	F99	ON regularly
F11	F9A	OFF regularly
F12	F9B	ON during first one scan
F13	F9C	OFF during first one scan

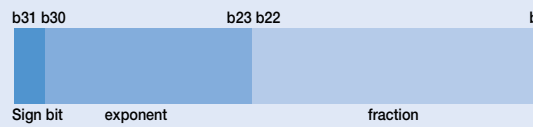
For more detailed information, refer to user's manual.

## Data type

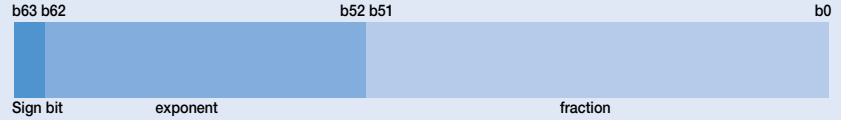


- Nibble: 4-bit unit data
- Byte: 8-bit unit data
- Real Data: 32-bit/64-bit floating point data

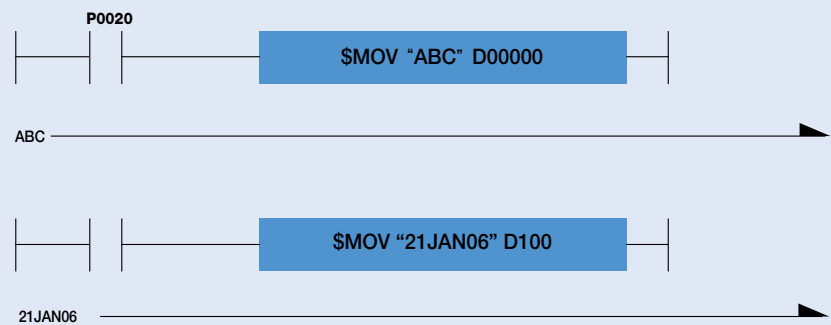
### Real Number



### Long Real Number



- Character Data: Saving numbers, alphabets, symbols as a type of ASCII code



D100	0x31	0x32
D101	0x41	0x4A
D102	0x30	0x4E
D103	0x00	0x36
D104	0x00	0x36

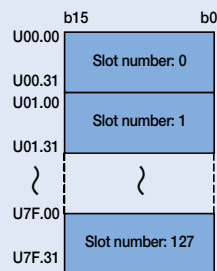
## Device Type

Device	Size	Bit Contact	Word Data	Name
P	32768 points	P00000 ~ P2047F	P0000 ~ P2047	I/O Relay
M	32768 points	M00000 ~ M2047F	M0000 ~ M2047	Assistant Relay
L	180224 points	L00000 ~ L11263F	L0000 ~ L11263	Link Relay
N *1)	21K words	N/A	N00000 ~ N21503	Comm. data register
K	32768 points	K00000 ~ K2047F	K0000 ~ K2047	Keep Relay
F	32768 points	F00000 ~ F2047F	F0000 ~ F2047	Special Relay
T *2)	2048 points	T0000 ~ T2047	T0000 ~ T2047	Timer
C *3)	2048 points	C0000 ~ C2047	C0000 ~ C2047	Counter
U	3072 words	U00.00.0 ~ U7F.31.F	U00.00 ~ U7F.31	Special Module Counter
Z	128 words	N/A	Z0 ~ Z127	Index Register
S	128 groups	S00.00 ~ S127.99	N/A	Step Control Relay
D	32K words	D00000.0 ~ D32767.F	D00000 ~ D32767	Data Register
R (Internal RAM) *4)	32K words	R00000.0 ~ R32767.F	R00000 ~ R32767	File Register
ZR (Internal RAM) *5)	32K words	N/A	ZR00000 ~ ZR65535	File Register
R (Expanded)	1M words	N/A	Available as much as extension size	File Register
ZR (Expanded)	1M words	N/A	Available as much as extension size	File Register

Note 1. When communication module is not used, it can be used as internal data area.  
 2. Word data in timer shows a current value of relevant bit contact.  
 3. Word data in counter shows a current value of relevant bit contact.  
 4. Even when using more than 32K words internal RAM, bit contact available to display is R00000.0~R32767.F Also word data enable to be displayed in the range of R00000.0~R32767.F  
 5. When internal RAM is more than 32K words, bit contact can be in the range of ZR00000.0~ZR32767.F and word data can be displayed as much as the size of internal RAM

## Special module register U

Register for reading data from special module mounted in slot



- Assigning 32 words per slot in U area
- Bit type display available  
Ex) U93.12.x (x: Bit location, Hexadecimal display)
- Available to read/write internal memory value of special module without using PUT (P), GET (P), PUTS (P), GETS (P)
- Basic display in U area  
Ex) Uxy.z  
x: Base number (0~7)  
y: Slot number (0~F)  
z: Word number of special module internal memory

## File register R, ZR

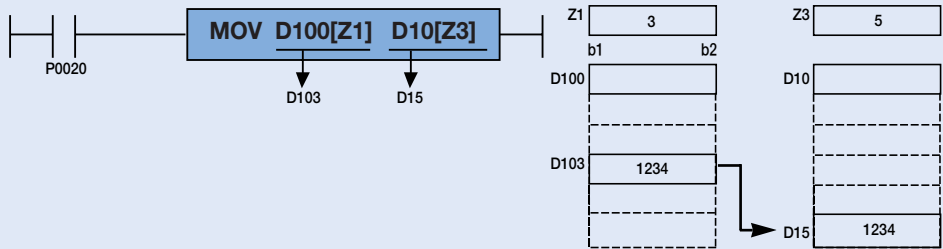
Register that a recorded value is not deleted when power failure is occurred. File register is used for data backup or data storage.



- R: Block unit access
- ZR: Entire file register access
- Internal RAM (Temporary preservation): 32K words
- FLASH (Permanent preservation): 1M words

**Index register**

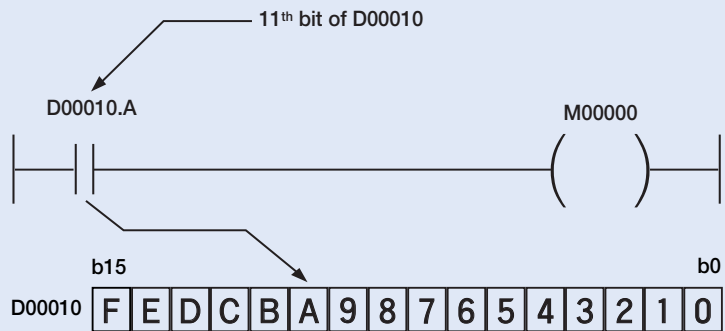
Index register sets up devices using index function.  
 The sum of index register value and directly specified device number is real device number.



**Available Device**

- Bit Device: P, M, L, K, F, T, C
  - Word Device: U, D, R, ZR, N, present value of T and present value of C
- Ex) MOV T1[Z1] D10 : If Z1 is 5, present value of T(1+5)=T6 is transmitted to D10.  
 Ex) LOAD D10[Z1].5 : If Z1 is 5, LOAD(10+5).5 => LOAD D15.5 is set.

**Bit specifying method of word device**



By assigning bit number to word device, bit data is available to use.

**Word device number** . **Bit number**

In this case, word device number should be addressed as decimal and bit number should be addressed as hexadecimal.

Relevant Device: U, D, R



**Instructions**

Classification	Designations	Symbol	Description	No. of step
16 Bits transfer	MOV	MOV S D	(S) → (D)	2
	MOVP	MOVP S D	(S) → (D)	3
32 Bits	DMOV	DMOV S D	(S+1, S) → (D+1, D)	2
	DMOVP	DMOVP S D	(S+3, S+2, S+1, S)	

① **Classification: Classifies instructions into applications.**

② **Designations: Displays instruction names to be used in program.**

- Display rules: Instructions shall be basically displayed in word unit. According to data size, operation characteristics, real number data process, text process, the rules are as follows;
- Based on Data Size & Type
  - D: Double Word related instruction.
  - R: Real Number related instruction.
  - L: Long Real Number related instruction.
  - However, LMOV is 64 Bits transfer instruction.
  - \$: String related instruction.
  - G: Group calculation.
  - 4: Nibble related instruction, used only at the back of instruction.
  - 8: Byte related instruction, used only at the back of instruction.
  - 3: Instruction that process 3 operands, used only at the back of instruction.
- Based on Operation Characteristics
  - P: Instruction that is executed for 1 scan when input signal is changed OFF ⇒ ON

③ **Symbol: Displays symbols used in program, showing the number of used operands and the type of Source or Destination. Operand display rules are as follows;**

- S: Source, with data value not changed after calculated.
- D: Destination, with data value changeable after calculated.
- N, n: The number to process.
- St, En: Start and End, used only in BSFT & WSFT.
- Sb: Source in case Bit position is specified, mostly used in Nibble/Byte instruction.
- Db: Destination in case Bit position is specified.
- Z: Control word, which means previously specified format as based on each instruction.

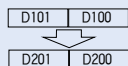
④ **Description: Describes general functions of instruction.**

⑤ **No. of step: The number of basic steps of instruction, which means the number of steps in case indirect specification, index formula and direct variable input were not used.**

Basic Instruction

Item	Name	Symbol	No. of step	Remark
Contact	LOAD		1	
	LOAD NOT		1	
	AND		1	
	AND NOT		1	
	OR		1	
	OR NOT		1	
	LOADP		2	
	LOADN		2	
	ANDP		2	
	ANDN		2	
	ORP		2	
	ORN		2	
Combination	LOAD LOAD		1	
	OR LOAD		1	
	MPUSH		1	
	MLOAD		1	
	MPOP		1	
Reverse	NOT		1	
Master control	MCS		1	
	MCSCLR		1	
Output	OUT		1	
	OUT NOT		1	
	OUTP		2	
	OUTN		2	
	SET		1	
	RST		1	
	FF		1	
Step control	SES S		1	
	OUT S		1	
End	END		1	
No-Process	NOP	No ladder	1	
Timer	TON		2	
	TOFF		2	
	TMR		2	
	TMON		2	
	TRTG		2	
	Counter	CTD		2
CTU			2	
CTR			2	
CTUD			4	

Note) D: Double word related commands  
It is located at the first of command.  
Ex) [DMOV D100 D200]



P: It indicates the commands executed one time when input signal is change from OFF to ON.  
It is located at the last of command.  
Ex) [DMOVP D100 D200]

Applied instruction

Item	Name	Symbol	No. of step	Remark	
Data Transfer	1 word	MOV		2	D/P
	Real Number	RMOV		2	P
	Long Real Number	LMOV		2	P
	4 bits	MOV4		3	P
	8 bits	MOV8		3	P
	1's complement	CMOV		2	D/P
	16 bits group	GMOV		4	P
	Multiple	FMOV		4	P
	Specified bit	BMOV		4	P
	Specified bit group	GBMOV		4	P
	String	\$MOV		2	P
	Data Conversion	BCD	BCD		2
BIN		BIN		2	D/P
Group		GBCD		4	P
BCD, BIN		GBIN		4	P
16 bits		I2R		2	P
integer-to-real		I2L		2	P
32 bits		D2R		2	P
integer-to-real		D2L		2	P
Real-interger		R2I		2	P
		R2D		2	P
Long Real-interger		L2I		2	P
		L2D		2	P
Data Comparison	Unsigned comparison with special flag	CMP		2	D/P
	4/8 bits comparison	CMP4		3	P
	comparison	CMP8		3	P
	Table comparison	TCMP		4	D/P
	Group comparison	GEQ		4	P
		GGT		4	P
		GLT		4	P
		GGE		4	P
		GLE		4	P
		GNE		4	P
	16 bits data comparison (LOAD)	LOAD=		2	
		LOAD>		2	
LOAD<			2		
LOAD>=			2		
LOAD<=			2		
LOAD<>			2		
16 bit data comparison (AND)	AND=		2		
	AND>		2		
	AND<		2		
	AND>=		2		
	AND<=		2		
	AND<>		2		
16 bit data comparison (OR)	OR=		2		
	OR>		2		
	OR<		2		
	OR>=		2		

**Applied instruction**

Item	Name	Symbol	No. of step	Remark
16 bits data comparison (OR)	OR<=		2	
	OR<>		2	
32 bits data comparison (LOAD)	LOADD>=		2	
	LOADD>		2	
	LOADD<		2	
	LOADD>=		2	
	LOADD<=		2	
	LOADD<>		2	
32 bits data comparison (AND)	ANDD>=		2	
	ANDD>		2	
	ANDD<		2	
	ANDD>=		2	
	ANDD<=		2	
	ANDD<>		2	
32 bits data comparison (OR)	ORD>=		2	
	ORD>		2	
	ORD<		2	
	ORD>=		2	
	ORD<=		2	
	ORD<>		2	
Real number comparison (LOAD)	LOADR>=		2	
	LOADR>		2	
	LOADR<		2	
	LOADR>=		2	
	LOADR<=		2	
	LOADR<>		2	
Real number comparison (AND)	ANDR>=		2	
	ANDR>		2	
	ANDR<		2	
	ANDR>=		2	
	ANDR<=		2	
	ANDR<>		2	
Real number comparison (OR)	ORR>=		2	
	ORR>		2	
	ORR<		2	
	ORR>=		2	
	ORR<=		2	
	ORR<>		2	
Long real number comparison (LOAD)	LOADL>=		2	
	LOADL>		2	
	LOADL<		2	
	LOADL>=		2	
	LOADL<=		2	
	LOADL<>		2	
Long real number comparison (AND)	ANDL>=		2	
	ANDL>		2	
	ANDL<		2	
	ANDL>=		2	
	ANDL<=		2	
	ANDL<>		2	

Item	Name	Symbol	No. of step	Remark
Long real number comparison (OR)	ORL>=		2	
	ORL>		2	
	ORL<		2	
	ORL>=		2	
	ORL<=		2	
	ORL<>		2	
String comparison (LOAD)	LOAD\$>=		2	
	LOAD\$>		2	
	LOAD\$<		2	
	LOAD\$>=		2	
	LOAD\$<=		2	
	LOAD\$<>		2	
String comparison (AND)	AND\$>=		2	
	AND\$>		2	
	AND\$<		2	
	AND\$>=		2	
	AND\$<=		2	
	AND\$<>		2	
String comparison (OR)	OR\$>=		2	
	OR\$>		2	
	OR\$<		2	
	OR\$>=		2	
	OR\$<=		2	
	OR\$<>		2	
16 bits data group comparison (LOAD)	LOADG>=		4	
	LOADG>		4	
	LOADG<		4	
	LOADG>=		4	
	LOADG<=		4	
	LOADG<>		4	
16 bits data group comparison (AND)	ANDG>=		4	
	ANDG>		4	
	ANDG<		4	
	ANDG>=		4	
	ANDG<=		4	
	ANDG<>		4	
16 bits data group comparison (OR)	ORG>=		4	
	ORG>		4	
	ORG<		4	
	ORG>=		4	
	ORG<=		4	
	ORG<>		4	
Three 16 bits data group comparison (LOAD)	LOAD3>=		4	
	LOAD3>		4	
	LOAD3<		4	
	LOAD3>=		4	
	LOAD3<=		4	
	LOAD3<>		4	
Three 16 bits data group comparison (AND)	AND3>=		2	
	AND3>		2	

Applied instruction

Item	Name	Symbol	No. of step	Remark	
Data comparison	Three 16 bits data group comparison (AND)	AND3<	$\overline{16} \text{ } \overline{3} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	2	
		AND3>=	$\overline{16} \text{ } \overline{3} \text{ } = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	2	
		AND3<=	$\overline{16} \text{ } \overline{3} \text{ } < = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	2	
		AND3< >	$\overline{16} \text{ } \overline{3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	2	
	Three 16 bits data group comparison (OR)	OR3=	$\overline{16} \text{ } \overline{3} \text{ } = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		OR3>	$\overline{16} \text{ } \overline{3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		OR3<	$\overline{16} \text{ } \overline{3} \text{ } < \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		OR3>=	$\overline{16} \text{ } \overline{3} \text{ } > = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		OR3<=	$\overline{16} \text{ } \overline{3} \text{ } < = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		OR3< >	$\overline{16} \text{ } \overline{3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
	Three 32 bits data group comparison (LOAD)	LOADD3=	$\overline{D3} \text{ } = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
		LOADD3>	$\overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4	
LOADD3<		$\overline{D3} \text{ } < \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
LOADD3>=		$\overline{D3} \text{ } > = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
LOADD3<=		$\overline{D3} \text{ } < = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
LOADD3< >		$\overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
Three 32 bits data group comparison (AND)	ANDD3=	$\overline{16} \text{ } \overline{D3} \text{ } = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ANDD3>	$\overline{16} \text{ } \overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ANDD3<	$\overline{16} \text{ } \overline{D3} \text{ } < \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ANDD3>=	$\overline{16} \text{ } \overline{D3} \text{ } > = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ANDD3<=	$\overline{16} \text{ } \overline{D3} \text{ } < = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ANDD3< >	$\overline{16} \text{ } \overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
Three 32 bits data group comparison (OR)	ORD3=	$\overline{16} \text{ } \overline{D3} \text{ } = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ORD3>	$\overline{16} \text{ } \overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ORD3<	$\overline{16} \text{ } \overline{D3} \text{ } < \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ORD3>=	$\overline{16} \text{ } \overline{D3} \text{ } > = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ORD3<=	$\overline{16} \text{ } \overline{D3} \text{ } < = \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
	ORD3< >	$\overline{16} \text{ } \overline{D3} \text{ } > \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{S3}$	4		
Data increase/decrease	Data increase/decrease (signed)	INC	$\overline{16} \text{ } \overline{INC} \text{ } \overline{D}$	2	D/P
		DEC	$\overline{16} \text{ } \overline{DEC} \text{ } \overline{D}$	2	D/P
	4/8 bits data increase/decrease (Signed)	INC4	$\overline{16} \text{ } \overline{INC4} \text{ } \overline{Db} \text{ } \overline{n}$	2	P
		INC8	$\overline{16} \text{ } \overline{INC8} \text{ } \overline{Db} \text{ } \overline{n}$	2	P
		DEC4	$\overline{16} \text{ } \overline{DEC4} \text{ } \overline{Db} \text{ } \overline{n}$	2	P
		DEC8	$\overline{16} \text{ } \overline{DEC8} \text{ } \overline{Db} \text{ } \overline{n}$	2	P
Data increase/decrease (Unsigned)	INC4	$\overline{16} \text{ } \overline{INC4} \text{ } \overline{D}$	2	D/P	
	DEC4	$\overline{16} \text{ } \overline{DEC4} \text{ } \overline{D}$	2	D/P	
Location	Left rotation	ROL	$\overline{16} \text{ } \overline{ROL} \text{ } \overline{D} \text{ } \overline{n}$	2	D/P
		ROL4	$\overline{16} \text{ } \overline{ROL4} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
	4/8 bits left rotation	ROL8	$\overline{16} \text{ } \overline{ROL8} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
		ROR	$\overline{16} \text{ } \overline{ROR} \text{ } \overline{D} \text{ } \overline{n}$	2	D/P
	Right rotation	ROR4	$\overline{16} \text{ } \overline{ROR4} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
		ROR8	$\overline{16} \text{ } \overline{ROR8} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
	Left rotation (Including carry)	RCL	$\overline{16} \text{ } \overline{RCL} \text{ } \overline{D} \text{ } \overline{n}$	2	P
		RCL4	$\overline{16} \text{ } \overline{RCL4} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
	4/8 bits left rotation (Including carry)	RCL8	$\overline{16} \text{ } \overline{RCL8} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
		ROR	$\overline{16} \text{ } \overline{ROR} \text{ } \overline{D} \text{ } \overline{n}$	2	P
	Right rotation (Including carry)	RCR	$\overline{16} \text{ } \overline{RCR} \text{ } \overline{D} \text{ } \overline{n}$	2	P
		RCR4	$\overline{16} \text{ } \overline{RCR4} \text{ } \overline{Db} \text{ } \overline{n}$	3	P
4/8 bits right rotation (Including carry)	RCR8	$\overline{16} \text{ } \overline{RCR8} \text{ } \overline{Db} \text{ } \overline{n}$	3	P	
	Shift	Bit shift	$\overline{16} \text{ } \overline{BSFT} \text{ } \overline{St} \text{ } \overline{Ed}$	3	P

Item	Name	Symbol	No. of step	Remark	
Shift	Shift	Bit shift to left	$\overline{16} \text{ } \overline{BSFL} \text{ } \overline{D} \text{ } \overline{n}$	2	
		4 Bits shift to left	$\overline{16} \text{ } \overline{BSFL4} \text{ } \overline{Db} \text{ } \overline{n}$	3	
		8 Bits shift to left	$\overline{16} \text{ } \overline{BSFL8} \text{ } \overline{Db} \text{ } \overline{n}$	3	
		Bit shift to right	$\overline{16} \text{ } \overline{BSFR} \text{ } \overline{D} \text{ } \overline{n}$	2	
		4 Bit shift to right	$\overline{16} \text{ } \overline{BSFR4} \text{ } \overline{Db} \text{ } \overline{n}$	3	
		8 Bit shift to right	$\overline{16} \text{ } \overline{BSFR8} \text{ } \overline{Db} \text{ } \overline{n}$	3	
		Word shift	$\overline{16} \text{ } \overline{WSFT} \text{ } \overline{Et} \text{ } \overline{Ed}$	2	P
		Word shift to left	$\overline{16} \text{ } \overline{WSFL} \text{ } \overline{D1} \text{ } \overline{D2} \text{ } \overline{N}$	3	
	Word shift to right	$\overline{16} \text{ } \overline{WSFR} \text{ } \overline{D1} \text{ } \overline{D2} \text{ } \overline{N}$	3		
	Exchange	Bit movement	$\overline{16} \text{ } \overline{SR} \text{ } \overline{Db} \text{ } \overline{1} \text{ } \overline{D} \text{ } \overline{N}$	2	
		Data exchange	$\overline{16} \text{ } \overline{XCHG} \text{ } \overline{D1} \text{ } \overline{D2}$	2	D/P
		Group data exchange	$\overline{16} \text{ } \overline{GXCHG} \text{ } \overline{D1} \text{ } \overline{D2} \text{ } \overline{N}$	4	P
Byte swap		$\overline{16} \text{ } \overline{SWAP} \text{ } \overline{D}$	2	P	
Integer calculation	Integer addition	Group byte swap	$\overline{16} \text{ } \overline{GSWAP} \text{ } \overline{D} \text{ } \overline{N}$	2	P
		Integer addition (signed)	$\overline{16} \text{ } \overline{ADD} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
		Integer subtraction (signed)	$\overline{16} \text{ } \overline{SUB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
		Integer multiplication (signed)	$\overline{16} \text{ } \overline{MUL} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
	Integer division	Integer division (signed)	$\overline{16} \text{ } \overline{DIV} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
		Integer addition (unsigned)	$\overline{16} \text{ } \overline{ADDU} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
		Integer subtraction (unsigned)	$\overline{16} \text{ } \overline{SUBU} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
		Integer multiplication (unsigned)	$\overline{16} \text{ } \overline{MULU} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P
	Real number calculation	Integer division (unsigned)	$\overline{16} \text{ } \overline{DIVU} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	
		Real number addition	$\overline{16} \text{ } \overline{RADD} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P
		Real number subtraction	$\overline{16} \text{ } \overline{RSUB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P
		Real number multiplication	$\overline{16} \text{ } \overline{RMUL} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P
String	Real number division	$\overline{16} \text{ } \overline{RDIV} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P	
	Real number division	$\overline{16} \text{ } \overline{LDIV} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P	
	String addition	$\overline{16} \text{ } \overline{\$ADD} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	P	
	Group addition	$\overline{16} \text{ } \overline{GADD} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D} \text{ } \overline{N}$	4	P	
Group calculation	Group subtraction	$\overline{16} \text{ } \overline{GSUB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D} \text{ } \overline{N}$	4	P	
	BCD addition	$\overline{16} \text{ } \overline{ADDB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	BCD subtraction	$\overline{16} \text{ } \overline{SUBB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	BCD multiplication	$\overline{16} \text{ } \overline{MULB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
Logical calculation	BCD division	$\overline{16} \text{ } \overline{DIVB} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	Logical AND	$\overline{16} \text{ } \overline{WAND} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	Logical OR	$\overline{16} \text{ } \overline{WOR} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	Exclusive OR	$\overline{16} \text{ } \overline{WXOR} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
Group logical calculation	Exclusive AND	$\overline{16} \text{ } \overline{WXNR} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D}$	4	D/P	
	Group logical calculation	$\overline{16} \text{ } \overline{GWAND} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D} \text{ } \overline{N}$	4	P	
	Group logical calculation	$\overline{16} \text{ } \overline{GWOR} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D} \text{ } \overline{N}$	4	P	
	Group logical calculation	$\overline{16} \text{ } \overline{GWXOR} \text{ } \overline{S1} \text{ } \overline{S2} \text{ } \overline{D} \text{ } \overline{N}$	4	P	

### Applied instruction

Item	Name	Symbol	No. of step	Remark
Group logical calculation	GWXNR	$\overline{\text{GWXNR}} \text{ [S1] [S2] [D] [N]}$	4	P
Time clock	TFLK	$\overline{\text{TFLK}} \text{ [D1] [S1] [S2] [D2]}$	5	
Emergency stop	ESTOP	$\overline{\text{ESTOP}}$	1	
Fault indication	FALS	$\overline{\text{FALS}} \text{ [n]}$	2	
Scan clock	DUTY	$\overline{\text{DUTY}} \text{ [D] [n1] [n2]}$	4	
WDT initialization	WDT	$\overline{\text{WDT}}$	1	P
Output control	OUTOFF	$\overline{\text{OUTOFF}}$	1	
Operation stop	STOP	$\overline{\text{STOP}}$	1	
I/O refresh	IORF	$\overline{\text{IORF}} \text{ [S] [D] [n]}$	2	P
Bit check	BSUM	$\overline{\text{BSUM}} \text{ [S] [D]}$	2	D/P
Encoding	ENCO	$\overline{\text{ENCO}} \text{ [S] [D] [n]}$	4	P
Decoding	DECO	$\overline{\text{DECO}} \text{ [S] [D] [n]}$	4	P
Data disconnection	DIS	$\overline{\text{DIS}} \text{ [S] [D] [n]}$	4	P
Data union	UNI	$\overline{\text{UNI}} \text{ [S] [D] [n]}$	4	P
Data search	SCH	$\overline{\text{SCH}} \text{ [S1] [S2] [D] [N]}$	4	D/P
Max. value search	MAX	$\overline{\text{MAX}} \text{ [S] [D] [n]}$	4	D/P
Min. value search	MIN	$\overline{\text{MIN}} \text{ [S] [D] [n]}$	4	D/P
Sum	SUM	$\overline{\text{SUM}} \text{ [S] [D] [n]}$	4	D/P
Average	AVE	$\overline{\text{AVE}} \text{ [S] [D] [n]}$	4	D/P
MUX	MUX	$\overline{\text{MUX}} \text{ [S1] [S2] [D] [N]}$	4	D/P
Data detection	DETECT	$\overline{\text{DETECT}} \text{ [S1] [S2] [D] [N]}$	4	P
Ramp signal output	RAMP	$\overline{\text{RAMP}} \text{ [n1] [n2] [D1] [n3] [D2]}$	5	
Data sorting	SORT	$\overline{\text{SORT}} \text{ [s] [n1] [n2] [D1] [D2]}$	5	P
Data writing	FIWR	$\overline{\text{FIWR}} \text{ [S] [D]}$	2	P
First-input, first-read	FIFRD	$\overline{\text{FIFRD}} \text{ [S] [D]}$	2	P
First-input, later-read	FILRD	$\overline{\text{FILRD}} \text{ [S] [D]}$	2	P
Data inserting	FIINS	$\overline{\text{FIINS}} \text{ [S] [D] [n]}$	4	P
Data pulling	FIDEL	$\overline{\text{FIDEL}} \text{ [S] [D] [n]}$	4	P
Word/ Byte conversion	WTOB	$\overline{\text{WTOB}} \text{ [S] [D] [n]}$	4	P
	BTOW	$\overline{\text{BTOW}} \text{ [S] [D] [n]}$	4	P
7 segment display	SEG	$\overline{\text{SEG}} \text{ [S] [D] [Z]}$	4	P
Message display	MSG	$\overline{\text{MSG}} \text{ [S] [D] [Z]}$	4	p
Conversion to decimal ASCII code	BINDA	$\overline{\text{BINDA}} \text{ [S] [D]}$	2/3	D/P
Conversion to hexadecimal ASCII code	BINHA	$\overline{\text{BINHA}} \text{ [S] [D]}$	2/3	D/P
BCD-to-Decimal ASCII conversion	BCDDA	$\overline{\text{BCDDA}} \text{ [S] [D]}$	2/3	D/P
Decimal ASCII-to-BIN conversion	DABIN	$\overline{\text{DABIN}} \text{ [S] [D]}$	2/3	D/P
Hexadecimal ASCII-to-BIN conversion	HABIN	$\overline{\text{HABIN}} \text{ [S] [D]}$	2/3	D/P
Decimal ASCII-to-BCD conversion	DABCD	$\overline{\text{DABCD}} \text{ [S] [D]}$	2/3	D/P
BIN 16/32-to-String conversion	STR	$\overline{\text{STR}} \text{ [S1] [S2] [D]}$	4	D/P
String-to-BIN 16/32 conversion	VAL	$\overline{\text{VAL}} \text{ [S] [D1] [D2]}$	4	D/P
Real-to-String conversion	RSTR	$\overline{\text{RSTR}} \text{ [S1] [S2] [D]}$	4	P
Long real-to-String conversion	LSTR	$\overline{\text{LSTR}} \text{ [S1] [S2] [D]}$	4	P
String-to-Real conversion	STRR	$\overline{\text{STRR}} \text{ [S] [D]}$	2	P

Item	Name	Symbol	No. of step	Remark
String length	STRL	$\overline{\text{STRL}} \text{ [S] [D]}$	2	P
	LEN	$\overline{\text{LEN}} \text{ [S] [D]}$	2/3	P
ASCII conversion	ASC	$\overline{\text{ASC}} \text{ [S] [D] [cw]}$	4	P
Hexadecimal conversion	HEX	$\overline{\text{HEX}} \text{ [S] [D] [N]}$	4	P
String extraction from right	RIGHT	$\overline{\text{RIGHT}} \text{ [S] [D] [N]}$	4	P
String extraction from left	LEFT	$\overline{\text{LEFT}} \text{ [S] [D] [N]}$	4	P
String random extraction	MID	$\overline{\text{MID}} \text{ [S1] [S2] [D]}$	4	P
String random replacement	REPLACE	$\overline{\text{REPLACE}} \text{ [S1] [D] [S2]}$	4	P
String search	FIND	$\overline{\text{FIND}} \text{ [S1] [S2] [D] [N]}$	4	P
Real-to-BCD conversion	RBCD	$\overline{\text{RBCD}} \text{ [S1] [S2] [D]}$	4	P
Long real-to-BCD conversion	LBCD	$\overline{\text{LBCD}} \text{ [S1] [S2] [D]}$	4	P
BCD-to-Real conversion	BCDR	$\overline{\text{BCDR}} \text{ [S1] [S2] [D]}$	4	P
BCD-to-Long real conversion	BCDL	$\overline{\text{BCDL}} \text{ [S1] [S2] [D]}$	4	P
Read comment	CMTRD	$\overline{\text{CMTRD}} \text{ [S] [D]}$	2	D/P
String length	LEN	$\overline{\text{LEN}} \text{ [S] [D]}$	2	P
SIN	SIN	$\overline{\text{SIN}} \text{ [S] [D]}$	2	P
COS	COS	$\overline{\text{COS}} \text{ [S] [D]}$	2	P
TAN	TAN	$\overline{\text{TAN}} \text{ [S] [D]}$	2	P
SIN-1	ASIN*	$\overline{\text{ASIN}} \text{ [S] [D]}$	2	P
COS-1	ACOS*	$\overline{\text{ACOS}} \text{ [S] [D]}$	2	P
TAN-1	ATAN*	$\overline{\text{ATAN}} \text{ [S] [D]}$	2	P
RAD conversion	RAD	$\overline{\text{RAD}} \text{ [S] [D]}$	2	P
Degree conversion	DEG	$\overline{\text{DEG}} \text{ [S] [D]}$	2	P
Square root	SQRT	$\overline{\text{SQRT}} \text{ [S] [D]}$	2	P
Natural exponential	EXP*	$\overline{\text{EXP}} \text{ [S] [D]}$	2	P
Exponential	EXPT*	$\overline{\text{EXPT}} \text{ [S1] [S2] [D]}$	4	P
Common Logarithm	LOG*	$\overline{\text{LOG}} \text{ [S] [D]}$	2	P
Natural Logarithm	LN*	$\overline{\text{LN}} \text{ [S] [D]}$	2	P
Limit control	LIMIT	$\overline{\text{LIMIT}} \text{ [S1] [S2] [S3] [D]}$	4	D/P
Band control	BAND	$\overline{\text{BAND}} \text{ [S1] [S2] [S3] [D]}$	4	D/P
Zone control	ZONE	$\overline{\text{ZONE}} \text{ [S1] [S2] [S3] [D]}$	4	D/P
Date/Time data read	DATERD	$\overline{\text{DATERD}} \text{ [S]}$	2	P
Date/Time data write	DATEWR	$\overline{\text{DATEWR}} \text{ [S]}$	2	P
Time data addition	ADDCLK	$\overline{\text{ADDCLK}} \text{ [S1] [S2] [D]}$	4	P
Time data subtraction	SUBCLK	$\overline{\text{SUBCLK}} \text{ [S1] [S2] [D]}$	4	P
Time data format conversion	SECOND	$\overline{\text{SECOND}} \text{ [S] [D]}$	2	P
	HOUR	$\overline{\text{HOUR}} \text{ [S] [D]}$	2	P
Branching instruction	JMP	$\overline{\text{JMP}} \text{ [LABEL]}$	1	
	LABEL	$\overline{\text{LABEL}} \text{ [---] (---)}$	5	
Subroutine call function	CALL	$\overline{\text{CALL}} \text{ [LABEL]}$	1	P
	SBRT	$\overline{\text{SBRT}} \text{ [LABEL]}$	1	
	RET	$\overline{\text{RET}}$	1	
Loop instruction	FOR	$\overline{\text{FOR}} \text{ [---] [N]}$	2	
	NEXT	$\overline{\text{NEXT}} \text{ [---]}$	1	
	BREAK	$\overline{\text{BREAK}}$	1	
Carry flag set	STC	$\overline{\text{STC}}$	1	
Carry flag reset	CLC	$\overline{\text{CLC}}$	1	
Error flag clear	CLE	$\overline{\text{CLE}}$	1	
Interrupt setting for all channels	EI	$\overline{\text{EI}}$	1	
	DI	$\overline{\text{DI}}$	1	
Interrupt setting for each channel	EIN	$\overline{\text{EIN}} \text{ [N]}$	2	
	DIN	$\overline{\text{DIN}} \text{ [N]}$	2	

Product

**Applied instruction**

	Item	Name	Symbol	No. of step	Remark
Sign inversion	2's complement	NEG	[NEG] [D]	2	D/P
	Real number data	RNEG	[RNEG] [D]	2	P
	sign inversion	LNEG	[LNEG] [D]	2	P
	Absolute value inversion	ABS	[ABS] [D]	2	D/P
File related	Block change	RSET	[RSET] [S]	2	P
	Transmission of flash word data	EMOV	[EMOV] [S1] [S2] [D]	4	P
	Transmission of flash double word data	EDMOV	[EDMOV] [S1] [S2] [D]	4	P
	Block reading	EBREAD	[EBREAD] [S1] [S2] [D]	2	
	Block writing	EBWRITE	[EBWRITE] [S1] [S2] [D]	2	
	Block comparison	EBCMP	[EBCMP] [S1] [S2] [D1] [D2]	4	

**PID control instruction**

	Item	Name	Symbol	No. of step	Remark
Built-in PID	Run	PIDRUN	[PIDRUN] [N]	2	
	Pause	PIDPAUSE	[PIDPAUSE] [N]	2	
	Parameter change	PIDPRMT	[PIDPRMT] [S] [N]	2	
	Stop	PIDSTOP	[PIDSTOP]	2	

**Special module control instruction**

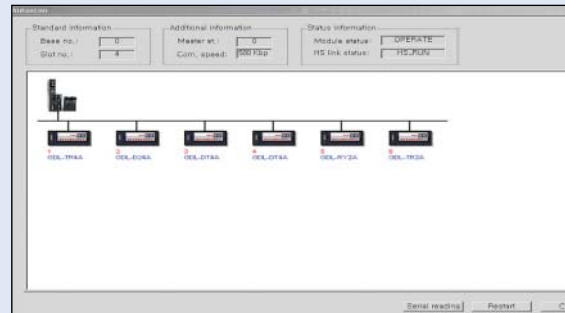
	Item	Name	Symbol	No. of step	Remark
Special module control instruction	Internal memory reading	GET	[GET] [sl] [S] [D] [N]	4	P
	Internal memory writing	PUT	[PUT] [sl] [S1] [S2] [N]	4	P
	P2P writing	P2PWR	[P2PWR] [N1] [N2] [N3] [S]	4	P
	Return to origin point	ORG	[ORG] [sl] [ax]	2	
	Fixed origin point setting	FLT	[FLT] [sl] [ax]	2	
	Direct start	DST	[DST] [sl] [ax] [n1] [n2] [n3] [n4] [n5]	8	
	Indirect start	IST	[IST] [sl] [ax] [n]	4	
	Linear interpolation	LIN	[LIN] [sl] [ax] [n1] [n2]	4	
	Circular arc interpolation	CIN	[CIN] [sl] [ax] [n1] [n2]	4	
	Simultaneous start	SST	[SST] [sl] [ax] [n1] [n2] [n3] [n4]	5	
	Speed-to-position transformation	VTP	[VTP] [sl] [ax]	2	
	Position-to-speed transformation	PTV	[PTV] [sl] [ax]	2	
	Skip operation	SKP	[SKP] [sl] [ax]	2	
	Position synchronization	SSP	[SSP] [sl] [ax] [n1] [n2] [n3]	5	
	Speed synchronization	SSS	[SSS] [sl] [ax] [n1] [n2] [n3]	5	
	Position override	VTP	[VTP] [sl] [ax] [n]	2	
	Speed Override	SOR	[SOR] [sl] [ax] [n]	4	
	Position specified speed override	PSO	[PSO] [sl] [ax] [n]	4	
	Continuous operation	NMV	[NMV] [sl] [ax] [n]	2	
	Inching	INC	[INCH] [sl] [ax] [n]	4	
	Return to previous position of manual operation	RTP	[RTP] [sl] [ax]	2	
	Start-step no. change	SNS	[SNS] [sl] [ax] [n]	4	
	Repeated step no. change	SRS	[SRS] [sl] [ax] [n]	4	
	M code Off	MOF	[MOF] [sl] [ax]	2	
Present position change	PRS	[PRS] [sl] [ax] [n]	4		
Zone enable	ZOE	[ZOE] [sl] [ax]	2		
Zone disable	ZOD	[ZOD] [sl] [ax]	2		
Encoder preset	EPRS	[EPRS] [sl] [ax] [n]	4		
Teaching	TEA	[TEA] [sl] [ax] [n1] [n2] [n3] [n4]	5		
Teaching array	TEAA	[TEAA] [sl] [ax] [n1] [n2] [n3] [n4]	5		
Emergency stop	EMG	[EMG] [sl] [ax]	2		
Error reset	CLR	[CLR] [sl] [ax] [n]	4		
Error history reset	ECLR	[ECLR] [sl] [ax]	2		
Point operation	PST	[PST] [sl] [ax] [n]	4		
Basic parameter setting	TBP	[TBP] [sl] [ax] [n1] [n2]	4		
Extension parameter setting	TEP	[TEP] [sl] [ax] [n1] [n2]	4		
Return to origin parameter setting	THP	[THP] [sl] [ax] [n1] [n2]	4		
Manual operation parameter setting	TMP	[TMP] [sl] [ax] [n1] [n2]	4		
Input signal parameter setting	TSP	[TSP] [sl] [ax] [n]	4		
Common parameter setting	TCP	[TCP] [sl] [ax] [n1] [n2]	4		
Decelerated stop	STP	[STP] [sl] [ax] [n]	4		
Parameter/data saving	WRT	[WRT] [sl] [ax] [n]	4		
Multi teaching data saving	TWR	[TWR] [sl] [ax] [n1] [n2]	4		
Point operation step saving	PWR	[PWR] [sl] [ax] [n1] [n2]	4		
Present status reading	SRD	[SRD] [sl] [ax] [n]	4		



# XG-PD programming

## Features

- Convenient user-program, network initial basic setting
- Providing extended monitoring, control function of network system and communication module
- Fast interface with CPU by efficient network management
- Unification of instruction system
- Simple and easy connection using dedicated driver (XGT) and other driver (MODBUS)
- Various built-in Diagnosis functions (Link, Auto-scan, Frame, etc.)



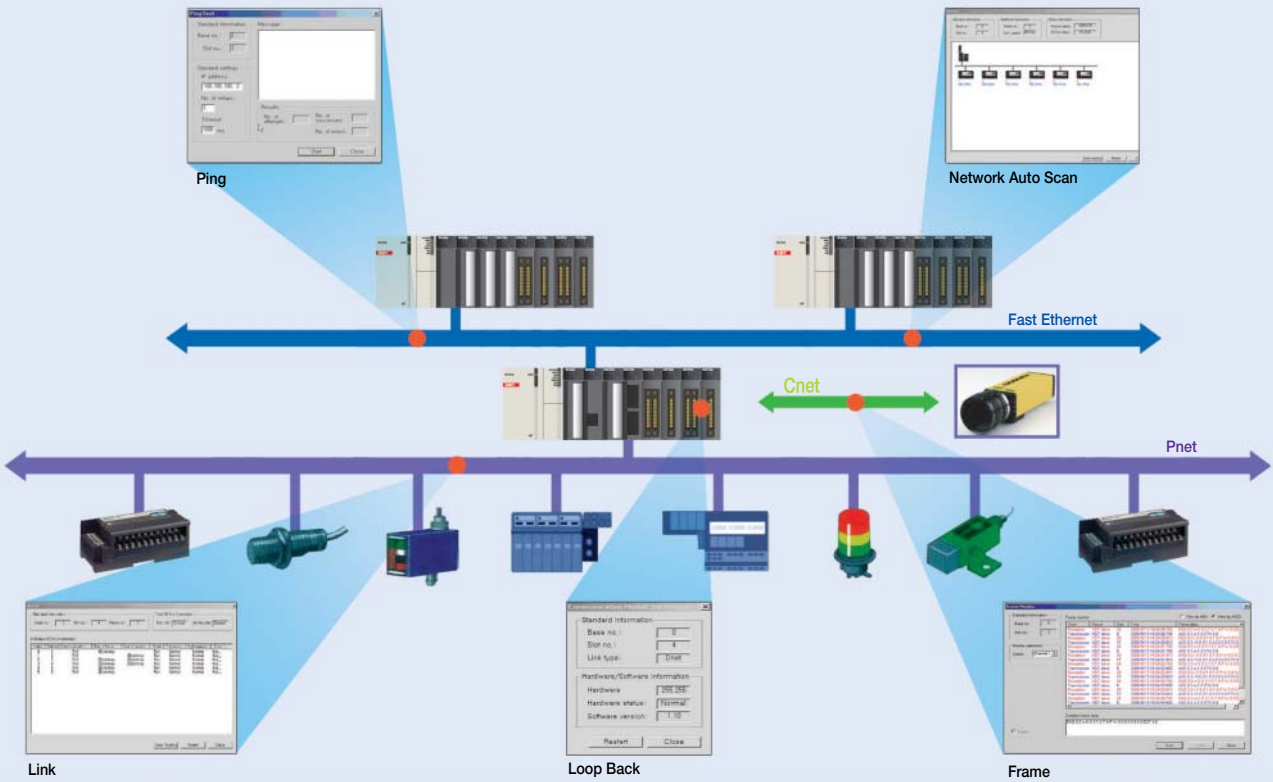
Item	FEnet	Cnet	FDEnet	Rnet	Dnet	Pnet
<b>High-speed link</b>	Max. 64 stations (Max. transmission block=64x200 words) Transmission period collective setting High-speedlink flag	N/A	Max. 64 stations (Max. transmission block=64x200 words) Transmission period collective setting High-speed link flag	60 words per block Transmission period collective setting High-speed link flag	Max. 64 stations Supports POLL, COS, CYCLIC, STROBE Transmission period collective setting Flag	Max. 128 stations Token Passing & Poll High-speed flag
<b>XG5000</b>	1,2-stage connection	1,2-stage connection	1,2-stage connection	1 stage connection	1,2-stage connection	1,2-stage connection
<b>Dedicated service P2P service</b>	XGT MODBUS	XGT MODBUS		Max. 64 parameters expandable		
<b>System diagnosis</b>	Providing connection status of LS communication module Network information (Display status of connected station)	Providing connection status of LS communication module Network information (Display status of connected station)	Providing connection status of LS communication module Network information (Display status of connected station)	Providing connection status of LS communication module Network information (Display status of connected station)	Providing connection status of LS communication module Network information (Display status of connected station)	Providing connection status of LS communication module Network information (Display status of connected station)
<b>Self-diagnosis</b>	Error-check	Error-check	Error-check	Error-check	Error-check	Error-check
<b>Configuration tool</b>	XG-PD	XG-PD	XG-PD	XG-PD	XG-PD/SyCon	XG-PD/SyCon
<b>Media</b>	10/100 BASE-TX 100 BASE-FX IEEE 802.3	900-115.2Kbps RS-232 * 2 RS-232 * 1+RS	10/100 BASE-TX 100 BASE-FX Toke Bus & CSMA/CD mixed type	1Mbps	125/250/500Kbps CSMA/NBA Trunk/Drop line Power signal line in	9.6k~12Mbps RS-485 (Electricity)

**Various network diagnosis and monitoring**

- Auto Scan: Searching and displaying each node connected to network
- Link Monitor: Monitoring status of high-speed link communication of each station
- Frame Monitor: Collecting and displaying sending/receiving frame in real time



Item	FNet	FDEnet	Cnet	Pnet	Dnet
	Fast Ethernet	Dedicated Ethernet			
Auto Scan	●	●	●	●	●
Link Monitor	●	●	●	●	●
Frame Monitor	—	—	●	—	—

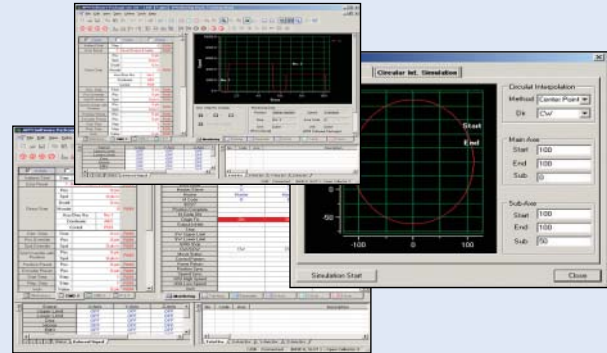


Product

# APM[Positioning module] Software Package

## Features

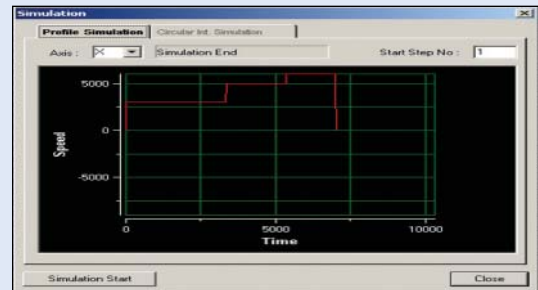
- Windows-based easy operation
- Supporting all types of LS APM module
- Improved parameter editing (Copy, Paste, Initialization, etc.)
- Various monitoring (Operation type of each axis, etc.)
- Profile trace and operation monitoring
- Profile graph and simulation of circular interpolation
- Available to edit operation parameter in EXCEL



Step	Cond	Control	Pattern	Method	Address [pulse]	Sub-Address [pulse]	M Code	A/D No.	Speed [pulse/s]	Dwell [ms]	Cr/In Dir
1	ABS	POS	END	SIN	10000	0	0	No.1	1000	0	Cw/
2	ABS	POS	END	SIN	0	0	0	No.1	0	0	Cw/
3	ABS	POS	END	SIN	0	0	0	No.1	0	0	Cw/
4	ABS	POS	END	SIN	0	0	0	No.1	0	0	Cw/
5	ABS	POS	KEEP	SIN	100000	0	0	No.1	0	0	Cw/
6	ABS	POS	END	SIN	0	0	0	No.1	10000	0	Cw/
7	ABS	POS	END	SIN	0	0	0	No.1	10000	0	Cw/
8	ABS	POS	END	SIN	0	0	0	No.1	0	0	Cw/
9	ABS	POS	END	SIN	0	0	0	No.1	0	0	Cw/
10	ABS	POS	CONT	SIN	100000	0	0	No.1	0	0	Cw/
11	ABS	POS	END	SIN	1000	0	0	No.1	10000	0	Cw/
12	ABS	POS	END	SIN	0	0	0	No.1	500	0	Cw/

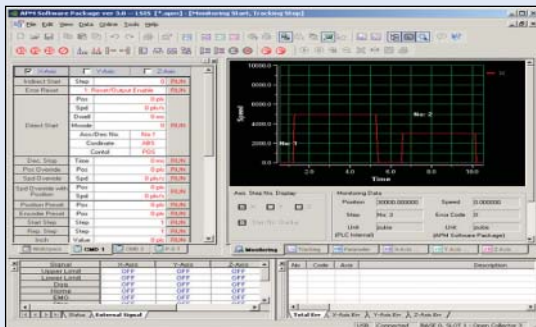
### Operation Data

Define operation method, target location, operation speed of each axis.



### Profile simulation (Off-line)

Monitoring operation speed of each axis with graph type and saving result as image file.



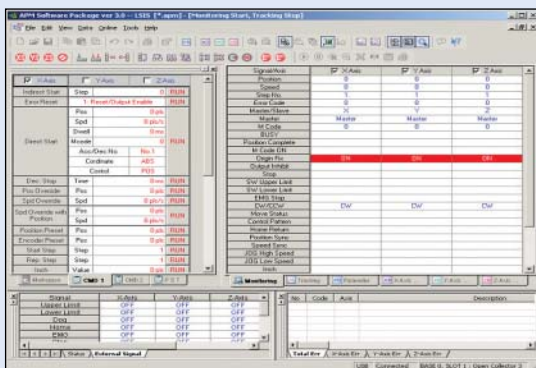
### Profile Trace (On-line)

Monitoring operation speed of each axis with graph type and saving result as image file.

Basic Parameter	Unit	Value	Unit	Value	Unit	Value	Unit	Value
Profile per rotation		30000.00		30000.00		30000.00		30000.00
Feed rate override		20000.00		20000.00		20000.00		20000.00
Feed rate enable		0.1		0.1		0.1		0.1
Profile change mode		0		0		0		0
Speed	mm/min	10000.00	mm/min	10000.00	mm/min	10000.00	mm/min	10000.00
Blue Speed	mm/min	10000.00	mm/min	10000.00	mm/min	10000.00	mm/min	10000.00
Acceleration	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00
DEC-ACC-ACC.1	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00
DEC-ACC-ACC.2	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00
DEC-ACC-ACC.3	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00
DEC-ACC-ACC.4	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00	mm/s <sup>2</sup>	1000.00
SPUR Upper Limit	mm	200000.00	mm	200000.00	mm	200000.00	mm	200000.00
SPUR Lower Limit	mm	-200000.00	mm	-200000.00	mm	-200000.00	mm	-200000.00
Position Control Mode		0		0		0		0
Position Control Gain		1.00		1.00		1.00		1.00
Position Control Filter		0.00		0.00		0.00		0.00
External Command Selection		0		0		0		0
Velocity Control Selection		0		0		0		0
SPUR Control Mode		0		0		0		0
SPUR Control Gain		1.00		1.00		1.00		1.00
SPUR Control Filter		0.00		0.00		0.00		0.00
External Command		0		0		0		0
External Mode		0		0		0		0

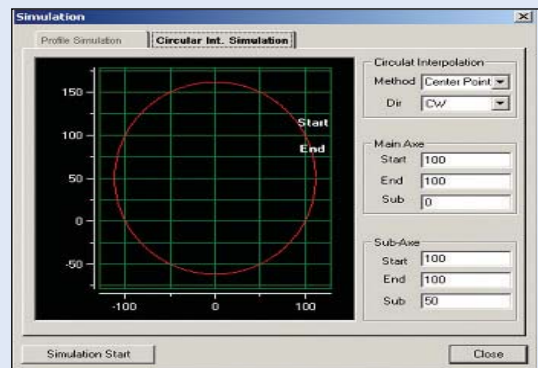
### Operation parameter

Setting basic operation characteristics and limit value.



### Monitoring (On-line)

Checking basic operation characteristics about each axis and monitoring operation condition.



### Circular interpolation simulation (Off-line)



**CPU, Power, Base**

Product	Type	Specifications			
CPU	XGK-CPUH	No. of input/output points: 6,144 points Program capacity: 64K steps	No. of input/output device points: 32,000 points Processing speed (LD instruction): 0.028 $\mu$ s		
	XGK-CPUS	No. of input/output points: 3,072 points Program capacity: 32K steps	No. of input/output device points: 32,000 points Processing speed (LD instruction): 0.084 $\mu$ s		
Power	XGP-ACF1	Input voltage range: Free voltage	Output voltage: DC5V/DC24V	Output current: 3A/0.6A	
	XGP-ACF2	Input voltage range: Free voltage	Output voltage: DC5V	Output current: 6A	
	XGP-AC23	Input voltage range: AC220V	Output voltage: DC5V	Output current: 8.5A	
	XGP-DC42	Input voltage range: DC24V	Output voltage: DC5V	Output current: 6A	
Base	Main Base	XGB-M04A	4 slots main base board		
		XGB-M06A	6 slots main base board		
		XGB-M08A	8 slots main base board		
		XGB-M12A	12 slots main base board		
	Expansion Base	XGB-E04A	4 slots expansion base board		
		XGB-E06A	6 slots expansion base board		
		XGB-E08A	8 slots expansion base board		
	Expansion Cable	XGB-E12A	12 slots expansion base board		
		XGC-E041	0.4m expansion cable		
		XGC-E061	0.6m expansion cable		
		XGC-E121	1.2m expansion cable		
		XGC-E301	3.0m expansion cable		
		XGC-E501	5.0m expansion cable		
	Expansion terminator	XGC-E102	10m expansion cable		
XGC-E152		15m expansion cable			
	XGT-TERA	Expansion terminator			

**Input/Output module**

Product		Type	Specifications					
Input	DC	XGI-D21A	8 points	DC24V	4mA	Response time: 1/5/10/20/70ms	8 points/COM	Sink/Source type
		XGI-D22A	16 points	DC24V	4mA	Response time: 1/5/10/20/70ms	16 points/COM	Sink/Source type
		XGI-D22B	16 points	DC24V	4mA	Response time: 1/5/10/20/70ms	16 points/COM	Source type
		XGI-D24A	32 points	DC24V	4mA	Response time: 1/5/10/20/70ms	32 points/COM	Sink/Source type
		XGI-D24B	32 points	DC24V	4mA	Response time: 1/5/10/20/70ms	32 points/COM	Source type
		XGI-D28A	64 points	DC24V	4mA	Response time: 1/5/10/20/70ms	32 points/COM	Sink/Source type
		XGI-D28B	64 points	DC24V	4mA	Response time: 1/5/10/20/70ms	32 points/COM	Source type
	AC	XGI-A12A	16 points	AC110V	4mA	Response time: 15ms or less(Off→On), 25ms or less(On→Off)	8 points/COM	
		XGI-A21A	8 points	Free voltage	4mA	Response time: 15ms or less(Off→On), 25ms or less(On→Off)	8 points/COM	
	Output	Relay	XGQ-RY1A	8 points	DC12/24V, AC110/220V	2A/point	5A/COM	Response time: 10ms or less(Off→On), 12ms or less(On→Off)
XGQ-RY2A			16 points	DC12/24V, AC110/220V	2A/point	5A/COM	Response time: 10ms or less(Off→On), 12ms or less(On→Off)	16 points/COM
XGQ-RY2B			16 points	DC12/24V, AC110/220V	2A/point	5A/COM	Response time: 10ms or less(Off→On), 12ms or less(On→Off)	16 points/COM
Transistor		XGQ-TR2A	16 points	DC12/24V	0.5A/point	4A/COM	Response time: 1ms or less	32 points/COM
		XGQ-TR2B	16 points	DC12/24V	0.5A/point	4A/COM	Response time: 1ms or less	32 points/COM
		XGQ-TR4A	32 points	DC12/24V	0.1A/point	2A/COM	Response time: 1ms or less	32 points/COM
		XGQ-TR4B	32 points	DC12/24V	0.1A/point	2A/COM	Response time: 1ms or less	32 points/COM
		XGQ-TR8A	64 points	DC12/24V	0.1A/point	2A/COM	Response time: 1ms or less	32 points/COM
		XGQ-TR8B	64 points	DC12/24V	0.1A/point	2A/COM	Response time: 1ms or less	32 points/COM
Triac		XGQ-SS2A	16 points	AC110/220V	0.6A/point	4A/COM	Response time: 1ms or less(Off→On), 0.5Cycle+1ms or less(On→Off)	Surge killer: Varistor

## Network module

Product		Type	Specifications	
Cnet		XGL-CH2A	RS-232C/422 (Each 1 channel)	
		XGL-C22A	RS-232C 2 channels	
		XGL-C42A	RS-422 2 channels	
Fast Ethernet	FEnet (Open Ethernet)	XGL-EFMF	10/100 BASE-FX optical cable Transmission speed: 100Mbps	Protocol: TCP/IP, UDP/IP Max. protocol size: 1500 bytes
		XGL-EFMT	10/100 BASE-TX coaxial cable Transmission speed: 10/100Mbps	Protocol: TCP/IP, UDP/IP Max. protocol size: 1500 bytes
	FDEnet (Dedicated Ethernet)	XGL-EDMF	100 BASE-FX optical cable Transmission speed: 100Mbps	Protocol: Dedicated protocol Max. protocol size: 1500 bytes
		XGL-EDMT	10/100 BASE-TX coaxial cable Transmission speed: 10/100Mbps	Protocol: Dedicated protocol Max. protocol size: 1500 bytes
Rnet	XGL-RMEA	Transmission speed: 1Mbps Transmission distance: Max. 750m Protocol size: Max. 256 bytes	Encoding: Manchester Biphase-L Twisted shield cable	
Dnet	XGL-DMEA	DeviceNet Transmission speed: Max. 500Kbps No. of connection station: Max. 64(1 Master+63 Slave) Configuration port: RS-232C	Transmission distance: Max. 500m	
Pnet	XGL-PMEA	Profibus-DP Interface: RS-485 Transmission speed: Max. 12Mbps No. of slave: Max. 126 stations/network,	Media access: Token passing & Poll Transmission distance: 1200m Max. 32 stations/segment	

## Special module

Product		Type	Specifications	
Analog input	Voltage input	XGF-AV8A	8 channels Output(resolution): 0~16000, -8000~8000, 1000~5000, 0~5000, 0~10000, -10000~10000 Conversion speed: 250 μs/channel	Input: DC1~5V, 0~5V, 0~10V, -10~10V 18-point terminal block
	Current input	XGF-AC8A	8 channels Output(resolution): 0~16000, -8000~8000, 4000~20000, 0~20000, 0~10000 Conversion speed: 250 μs/channel	Input: 4~20mA, 0~20mA 18-point terminal block
	Voltage/current input	XGF-AD4S	4 channels Output(resolution): -32000~32000, 1000~5000, 0~5000, 0~10000, -10000~10000, 4000~20000, 0~20000 Conversion speed: 250 μs/channel	Input: DC1~5V, 0~5V, 0~10V, -10~10V, 4~20mA, 0~20mA 18-point terminal block
Analog output	Voltage output	XGF-DV4A	4 channels Input(resolution): 0~16000, -8000~8000, 1000~5000, 0~5000, 0~10000, -10000~10000 Output: DC1~5V, 0~5V, 0~10V, -10~10V Conversion speed: 250 μs/channel	18-point terminal block
		XGF-DV4S	4 channels Input(resolution): 0~16000, -8000~8000, 1000~5000, 0~5000, 0~10000, -10000~10000 Output: DC1~5V, 0~5V, 0~10V, -10~10V Conversion speed: 250 μs/channel	18-point terminal block insulation
	Current output	XGF-DC4A	4 channels Input(resolution): 0~16000, -8000~8000, 4000~20000, 0~20000, 0~10000 Output: DC4~20mA, 0~20mA Conversion speed: 250 μs/channel	18-point terminal block
		XGF-DC4S	4 channels Input(resolution): 0~16000, -8000~8000, 4000~20000, 0~20000, 0~10000 Output: DC4~20mA, 0~20mA Conversion speed: 250 μs/channel	18-point terminal block insulation



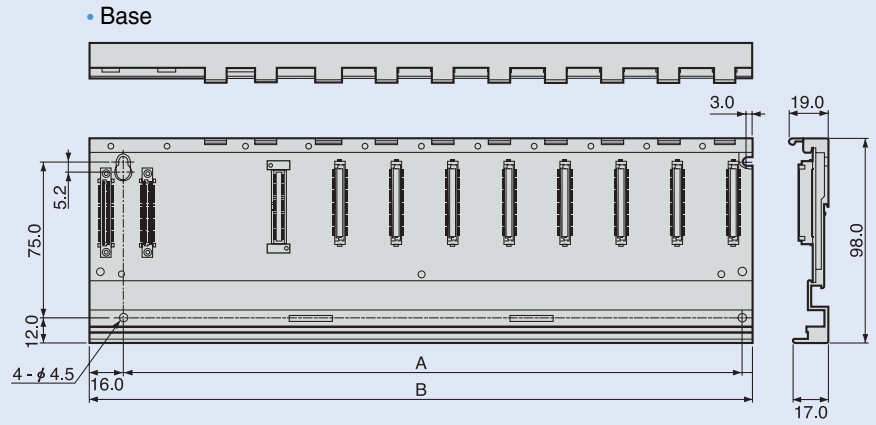
**Special module**

	Product	Type	Specifications
High-speed counter	Open collector input	XGF-HO2A	2 channels Input signal: DC5/12/24V, 7~11mA Count range: Signed 32bit (-2147483648~2147483647) 40-pin connector Max. count speed: 200Kpps external input: DC5/12/24V
	Line Driver input	XGF-HD2A	2 channels Input signal: RS-422, HTL Level Line driver Count range: Signed 32bit (-2147483648~2147483647) 40-pin connector Max. count speed: 500Kpps external input: DC5/12/24V
Positioning	Open collector output	XGF-PO1A	1-axis No. of positioning data item: 400 data item/axis 40-pin connector Control unit: pulse, mm, inch, degree max. output pulse: 200kpps
		XGF-PO2A	2-axis Control unit: pulse, mm, inch, degree max. output pulse: 200kpps 2-axis linear interpolation, 2-axis circular interpolation No. of positioning data item: 400 data item/axis 40-pin connector
		XGF-PO3A	3-axis Control unit: pulse, mm, inch, degree max. output pulse: 200kpps 2/3-axis linear interpolation, 2-axis circular interpolation No. of positioning data item: 400 data item/axis 40-pin connector
	Line Driver output	XGF-PD1A	1-axis No. of positioning data item: 400 data item/axis 40-pin connector Control unit: pulse, mm, inch, degree max. output pulse: 1Mpps
		XGF-PD2A	2-axis Control unit: pulse, mm, inch, degree max. output pulse: 1Mpps 2-axis linear interpolation, 2-axis circular interpolation No. of positioning data item: 400 data item/axis 40-pin connector
		XGF-PD3A	3-axis Control unit: pulse, mm, inch, degree max. output pulse: 1Mpps 2/3-axis linear interpolation, 2-axis circular interpolation No. of positioning data item: 400 data item/axis 40-pin connector
Motion control	XGF-M16M	Mechatrolink-II 16-axis Transmission period: 1/1.5/2ms Memory backup: FLASH Transmission speed: 10Mbps Memory capacity: 32MB/ 512KB(SDRAM)	
Temperature input	Thermocouple	XGF-TC4S	4 channels Conversion speed: 40ms/channel Thermocouple(K,J,E,T,B,R,S,N,C) input 18-point terminal block Insulation
	Resistance thermometer device	XGF-RD4A	4 channels Platinum temperature-measuring resistor: Pt100(JIS C1604-1997), JPt100(JIS C1604-1981, KS C1603-1991) Conversion speed: 40ms/channel 18-point terminal block
		XGF-RD4S	4 channels Platinum temperature-measuring resistor: Pt100(JIS C1604-1997), JPt100(JIS C1604-1981, KS C1603-1991) Conversion speed: 40ms/channel 18-point terminal block Insulation

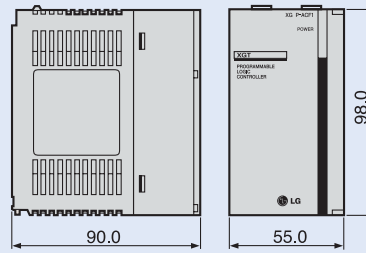
**Software**

Product	Specifications
XG5000	Program editing & Engineering software
XG-PD	Network setting & monitoring & diagnosis tool
APM Software Package	Positioning parameter/data setting & monitoring tool

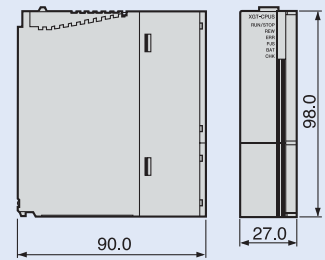
## Dimensions



• Power module



• CPU and I/O module



## Base Dimensions (W)

Item	XGB-M04A/E04A	XGB-M06A/E06A	XGB-M08A/E08A	XGB-M12A/E12A
A	190	244	298	406
B	210	264	318	426

**Memo**

## Leader in Electrics & Automation



### Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact a qualified service technician when you need maintenance. Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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