XGB CPU Modules

CPU Module (with embedded I/O)

- ***XEM-DR14H2***
- *XEM-DN16H2*
- *XEM-DP16H2*
- *XEM-DN32H2*
- *XEM-DN32HP*
- ***XEM-DP32H2***
- ***XEM-DP32HP***

The XEM CPU module from LS Electric is the anchor of the XGB PLC series. It is a high performance motion-capable PLC in a small package. The CPU module is equipped with a high performance microprocessor that controls up to 6 axis of position control, high speed I/O, and built in ethernet communications. Optional EtherCAT® motion modules allow control of up to 16 EtherCAT® servo drives.

The XEM CPU is a stand-alone block style PLC. Different CPU models provide options for low density 16-point I/O wired directly at the CPU terminal blocks, or high density 32-point I/O which requires one smart link cable and terminal block remotely mounted. The system supports 16 built-in PID loops and can be expanded with up to 7 modules.

I/O and memory are assigned direct variables. User-defined symbolic variables can be created for easy reference in the programming.

The PLC offers an advanced level of programming, featuring the IEC61131-3 standard capable of Ladder, Structured Text, Sequential Function Chart and Instruction List. Many advanced Function block instructions, including motion specific ones, are available for use in both Ladder and Structured Text programming.

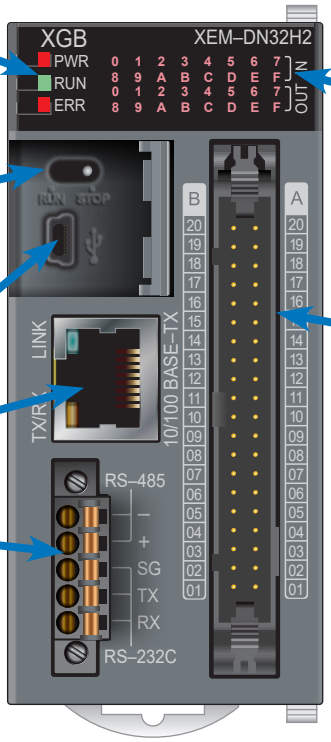
Features

- 8 DC inputs, 6 relay outputs (XEM-DR14H2)
- 8 DC inputs, 8 DC outputs (XEM-Dx16H2 series)
- 16 DC inputs, 16 DC outputs (XEM-Dx32Hx series)
- (4) 200kHz high speed counters
- 2- or 6-axis motion control (high speed pulse outputs)
- Control up to 16 PID loops with auto tuning capabilities
- Expand I/O capability with up to 7 add-on modules
- 22 different option modules available to handle digital, analog, counter input, and communications
- EtherCAT® motion modules offer position control for up to 16 EtherCAT® servo drives
- XG5000 software with IEC 61131 programming languages: Ladder, Structured Text, SFC, and IL. Includes XG-PM software for table-based motion configuration and testing

PLC (CPU with I/O) Feature Breakdown

Part Number	Built-in I/O			Max Option Cards	USB	Ethernet	RS-232C	RS-485	Memory Backup	Online Editing
	Motion Axis	Inputs	Outputs							
XEM-DR14H2	–	8 sink/source	6 relay	7	Yes (mini-B)	Yes (10/100Base-T)	Yes	Yes	Memory: Non-Volitale RAM RTC: 6 month backup (No battery)	Yes
XEM-DN16H2	2		8 sink							
XEM-DP16H2	2		8 source							
XEM-DN32H2	2	16 sink/ source	16 sink							
XEM-DP32H2	2		16 source							
XEM-DN32HP	6		16 sink							
XEM-DP32HP	6		16 source							

XEM 32-series Configuration



Status Indicators (See table below)

Run/Stop Mode switch Sets basic operation mode (see table below)

Mini-B USB Connector

Ethernet Port

Serial Communication Connector Built-in RS-232C/485 connector

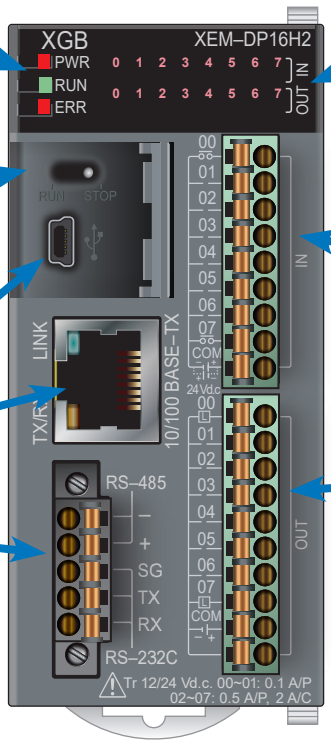
LED Display Displays ON/OFF status of input and output signals

I/O Connector Terminal block for input (B) and output (A) signals.

CPU Status Indicators	
PWR	Red LED is illuminated when power is on.
RUN	Green LED is illuminated when PLC is in RUN mode.
ERR	Red LED is illuminated to indicate program error(s).

CPU RUN/STOP Switch	
RUN position	Executes user program.
STOP position	Normal program load position. Allows for Remote Run from XG5000.

XEM 14/16-series Configuration



Status Indicators (See table below)

Run/Stop Mode switch Sets basic operation mode (see table below)

Mini-B USB Connector

Ethernet Port

Serial Communication Connector Built-in RS-232C/485 connector

LED Display Displays ON/OFF status of input and output signals

Input Connector Terminal block for input signals.

Output Connector Terminal block for output signals.

XGB Series PLC - Basic System Setup

Follow the steps below to select and configure the fundamental components needed to get your XEM CPU module up and running.

1 Select your XEM CPU module, and Smart Link cable/terminal block (for 32-series CPUs).

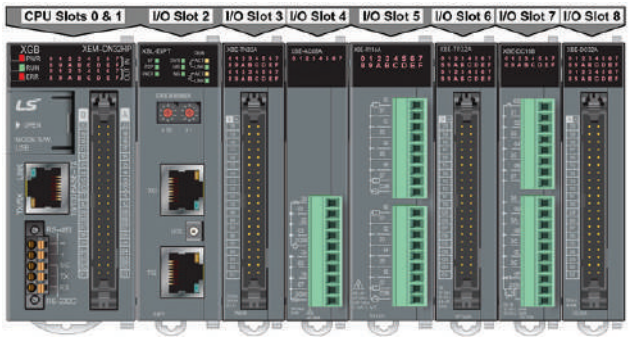
See “Smart Link I/O System” on page <?> for cable and terminal block part numbers.

Note: Cable and terminal block only required for XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, and XEM-DP32HP.

Note: Screwdriver size 04/2.5

2 Select and install up to seven option modules. 32-point I/O and counter input modules will require a Smart Link cable and terminal block.

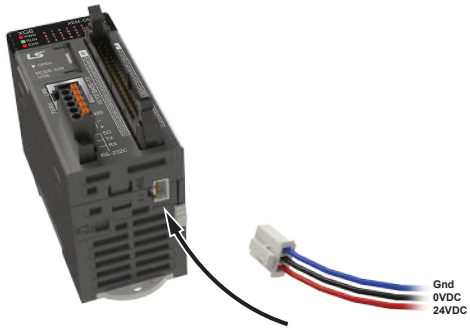
EtherCAT modules must be added to Slot 2 and 3 only.



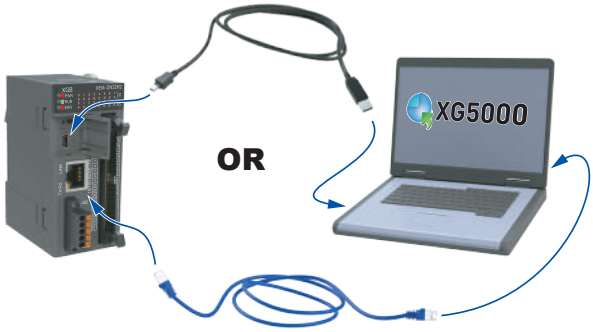
Note: Screwdriver size 2.5 mm

3 Connect user-supplied 24VDC power. Connect power to the XEM module, then connect power to the XTB-40H terminal block and any installed I/O modules.

Note: XGB-CON-3PX cable pigtail is included with the CPU.



4 Choose programming cable, either a USB connection cable or Ethernet cable.



Performance Specifications

Specification			Part Number						
			XEM-DR14H2	XEM-DN16H2	XEM-DP16H2	XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Power Specifications	Input	Input Voltage Range	20.4–28.8 VDC (-15% to +20%)						
		Rated Input Voltage	24VDC						
		Input Current	1A or less						
		Efficiency	60% or more						
		Permitted Momentary Power Failure	1ms or less						
	Output	Rated Output Voltage	5VDC (±2%)						
		Output Current	2.0 A						
	Power Supply Status Indication		LED On when power supply is normal						
	Cable Specification		0.75–2 mm^2						
Program Control Method			Cyclic execution of stored program, time-driven interrupt, process-driven interrupt						
I/O Control Method			Batch processing by simultaneous scan (refresh method), directed by program instruction						
Programming Languages			LD (Ladder Diagram), ST (Structured Text), SFC (Sequential Function Chart), IL (Instruction List)						
Programming Instructions	Operator (LD only)		11						
	Extension (LD, ST, IL)		9 (Break, Call, End, For, Jmp, Next, Ret, Sbrt, Init_Done)						
	Function (LD, ST, IL)		400+ (295+ for Data Tpe Conversion)						
	Function Block (LD & ST)		300+ (80+ motion specific)						
	Sequential Function Chart		7						
Special Features/Instructions			User Defined Data Type, User Defined Functions/Function Blocks						
Processing Speed (Basic Instruction)			40ns/step						
Program Capacity			384kb						
Maximum Base Rack I/O Points			(PLC + 7 option cards), Digital=(PLC Built-in) + (32 point I/O x 7 slots), Analog=(8 point AI x 7 slots)						
			Digital: 238 total Analog: 56 total	Digital: 240 total Analog: 56 total		Digital: 256 total Analog: 56 total			
Data Area (User Assigned)	Symbolic Variable		64KB (retain selectable by individual variable)						
	Direct Variables	M	32KB (retain configurable - by block)						
		W	64KB (retain)						
Data Area (PLC Reserved)	Input Variables	I	2KB (%IX0.0.0–%IX15.15.63)						
	Output Variables	Q	2KB (%QX0.0.0–%QX15.15.63)						
	Flag Variables	F	4KB						
		K	8KB						
		L	8KB						
		U	0.5 KB						
	P2P Service Variables	N	20KB						
Total Program			256						
Task	Initialization Task		1						
	Cycle Time Task		Max 16						
	I/O Task		Max 8						
	Internal Device Task		Max 16						
	High Speed Counter Task		Max 4						
	Position Control Task		1						
Operation Mode			RUN, STOP, DEBUG						
Self-diagnosis Function			Detects errors of scan time, memory, I/O and power supply						
Program Port			USB Mini-B type, USB 1 channel						
Retain Area Setup			Retain area setting in basic parameter						
Internal Consumption Current			540mA						
Max Number of Comm. Modules			2						
Weight			150g (5.29 oz)	140g (4.94 oz)	140g (4.94 oz)	134g (4.73 oz)	140g (4.94 oz)	134g (4.73 oz)	140g (4.94 oz)

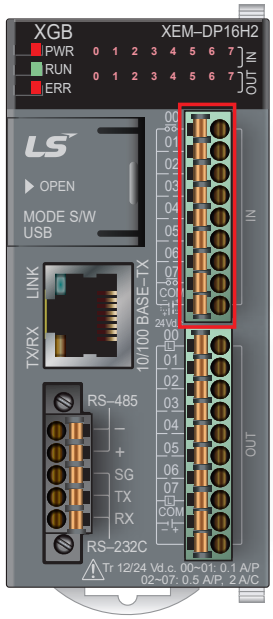
Built-in Functions

Specification			Part Number						
			XEM-DR14H2	XEM-DN16H2	XEM-DP16H2	XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Number of Motion Control Axis			–	2-axis				6-axis	
Interpolation Function			–	• 2-axis linear interpolation • 2-axis circular interpolation				• 2/3/4/5/6 axis linear interpolation • 2-axis circular interpolation • 3-axis helical interpolation	
High Speed Counter	Performance	1 phase	200kHz						
		2 phase	100kHz						
	Channels	1 phase	4 channels						
		2 phase	2 channels						
	Counter Mode		4 counter modes are supported: • Single pulse counter mode with 1 pulse input • Pulse and direction counter mode with 2 pulse inputs • CW/CCW counter mode with 2 pulse inputs • Quadrature (Phase A/B) counter mode with 2 pulse inputs						
	Function		Internal/external preset, Latch counter, Compare output, Number of rotations per unit time						
High Speed Pulse Output Motion Control	Basic Function	Control Method	n/a XEM-DR14H2 does not support motion control	Position control, Speed control, Speed/Position control, Position/Speed control					
		Control Unit		Pulse, mm, inch, degree					
		Position Data		400 steps for each axis (1–400)					
		Operation Mode		End, Keep, Continuous					
		Operation Method		Single, Repeat					
	Position	Control		Absolute method/Incremental method					
		Address Range		-2,147,483,648 – 2,147,483,647 (Pulse)					
		Speed		200kHz max					
		Acc/Dec Processing		Trapezoid-shaped, S-curve					
	Homing Method			DOG+HOME (Off), DOG+HOME (On), Upper/Lower limit + HOME, DOG, High speed, Upper/Lower limit, HOME					
	Jog Operation			Jog operation, Inching operation, Manual Pulse Generator operation					
Pulse Catch			10μs 4-point (%IX0.0.0–%IX0.0.3), 50μs 4-point (%IX0.0.4–%IX0.0.7)						
External Point Interrupt			10μs 4-point (%IX0.0.0–%IX0.0.3), 50μs 4-point (%IX0.0.4–%IX0.0.7)						
Input Filter			1,3,5,10,20,70,100 ms						
PID Control			Max. 16 PID loops, Control by instruction, Auto-tuning, PWM output, Forced output, Operation scan time setting, Antiwindup, Delta MV, SV lamp, Hybrid operation, Cascade operation						
Serial (Cnet)	Protocol		Modbus RTU/ASCII, XGT Dedicated, User-defined						
	Channel		1 RS-232C port, 1 RS-485 port						
Ethernet (FEnet)	Transfer Spec		Cable: 100Base-TX, Speed: 100Mpbs, Auto-MDIX[1], IEEE 802.3						
	Topology		Star						
	Diagnosis		Module information, Service condition						
	Protocol/Usage		Modbus TCP/IP Client and Server, Email (SMTP client), XGT dedicated, User Define frame, Programming/Online Monitoring						
	Channel		1 port 10/100MB Ethernet						
	Service		P2P, High Speed link, Remote connection, SMTP, SNTP, Auto scan						

Digital Input Specifications, *XEM-DR14H2, XEM-DN/DP16H2*

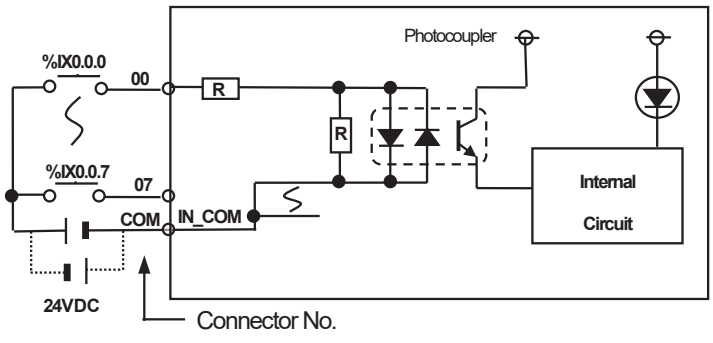
8-point 24VDC Input (Sink/Source Type) Specifications

Model		XEM-DR14H2	XEM-DN16H2	XEM-DP16H2
Input Point		8 point		
Insulation Method		Photocoupler Insulation		
Rated Input Volage		24VDC		
Rated Input Current		~4mA (Inputs 0–3 about 5mA)		
Operation Voltage Range		20.4–28.8 VDC (within ripple rate 5%)		
On Voltage		19VDC or higher		
On Current		3mA or higher (Inputs 0–3 about 3.5 mA or higher)		
Off Voltage		6VDC or less		
Off Current		1mA or less		
Input Resistance		About 5.6 kΩ (Inputs 0–3 about 4.7 kΩ)		
Response Time	Off → On	1/3/5/10/20/70/100 ms (set by I/O parameter) Default: 3ms		
	On → Off			
Insulation Pressure		AC850Vrms / 3 cycle (altitude 2000m)		
Insulation Resistance		10MΩ or more by MegOhmMeter		
Common Method		8 point / COM		
Proper Cable Size		0.3 mm^2		
Operation Indicator		LED On when Input On		
External Connection Method		9 point terminal block connector		



Note: Red box highlights pins of the CPU inputs.

8-point 24VDC Input (Sink/Source Type) Circuit Configuration

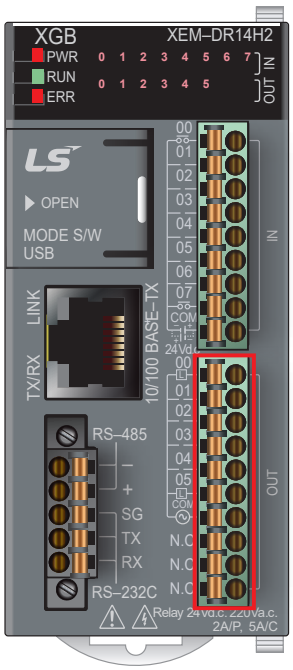


XEM Pin#	I/O Direct Variable	Description
00	%IX0.0.0	High Speed Counter Inputs 1 phase- 200kpps 4 channel 2 phase- 100kpps 2 channel or General Input
01	%IX0.0.1	
02	%IX0.0.2	
03	%IX0.0.3	
04	%IX0.0.4	Preset Input or General Input
05	%IX0.0.5	
06	%IX0.0.6	
07	%IX0.0.7	
COM	IN_COM	Common

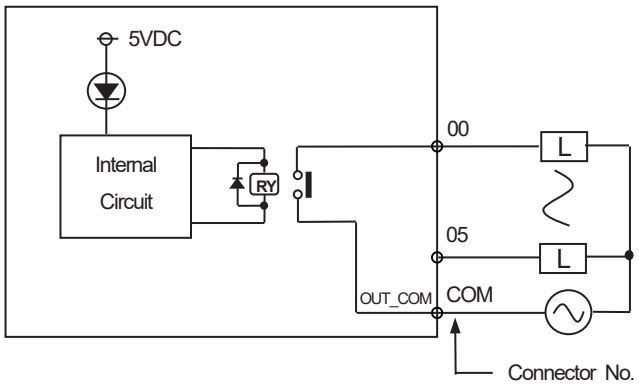
Digital Output Specifications, *XEM-DR14H2*

6-point Relay Output Specifications

Model		XEM-DR14H2
Input Point		6 point
Insulation Method		Relay Insulation
Rated Load Voltage		24VDC 2A (resistive load) / 220VAC 2A (COSθ =1), 5A/COM
Minimum Load Voltage/ Current		5VDC / 1mA
Max Load Voltage		250VAC, 125VDC
Off Leakage Current		0.1 mA or less (220VAC, 60Hz)
Max. On/Off Frequency		3,600 times/hr
Over Voltage Protection		None
Service Life	Mechanical	20 million times or more
	Electrical	Rated load voltage / current: 100,000 times or more
		200VAC/1.5 A, 240VAC/1A (COSθ=0.7): 100,000 times or more
		200VAC/1A, 240VAC/0.5 A (COSθ=0.35): 100,000 times or more
		24VDC/1A, 100VDC/0.1A (L/R=7ms): 100,000 times or more
Response Time	Off → On	10ms or less
	On → Off	12ms or less
Common Method		6 points / COM
Proper Wire Size		Stranded wire, 0.3–0.75 mm^2 (external diameter 2.8 mm or less)
Current Consumption		385mA (when all points ON)
Operation Indicator		LED On when Output On
External Connection Method		10 point terminal block connector



6-point Relay Output Circuit Configuration

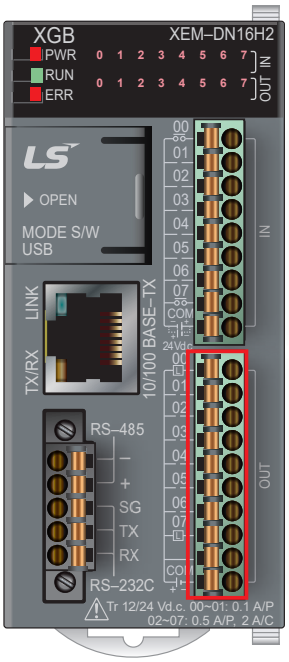


XEM Pin#	I/O Direct Variable	Description
00	%QX0.0.0	Relay Output 2A/pt
01	%QX0.0.1	
02	%QX0.0.2	
03	%QX0.0.3	
04	%QX0.0.4	
05	%QX0.0.5	
COM	OUT_COM	Common
N.C	N.C.	Not used
N.C	N.C.	
N.C	N.C.	

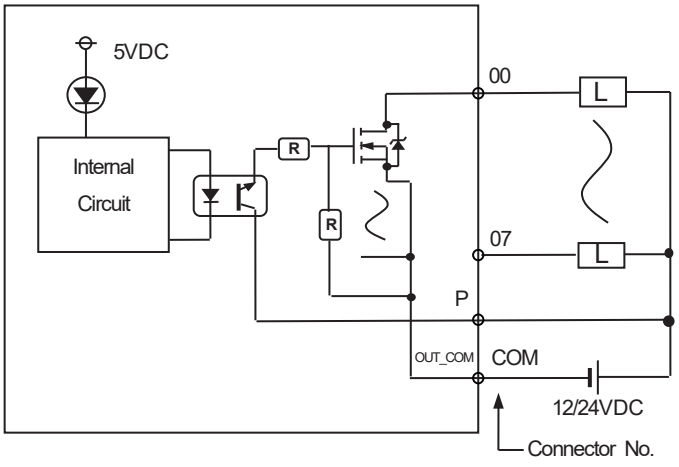
Digital Output Specifications, *XEM-DN16H2*

8-point Transistor Output (Sink Type)Specifications

Model		XEM-DN16H2
Input Point		8 point
Insulation Method		Photocoupler Insulation
Rated Load Volage		12VDC / 24VDC
Operation Load Voltage Range		10.2–26.4 VDC
Max. Load Current		**%QX0.0.0,1:** 0.1A / 1-point, **%QX0.0.2–7:** 0.5 A/ 1-point, 2A / 1COM
Off Leakage Current		0.1 mA or less
Max. Inrush Current		4A / 10ms or less
Max. Voltage Drop when On		0.4 VDC or less
Over Voltage Protection		TVS diode
Response Time	Off → On	1ms or less
	On → Off	1ms or less (rated load, resistive load)
Common Method		8 point / COM
Proper Wire Size		Stranded wire, 0.3–0.75 mm^2 (external diameter 2.8 mm or less)
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)
	Current	35mA or less (when connecting 24VDC)
Operation Indicator		LED On when Output On
External Connection Method		10 point terminal block connector



8-point Transistor Output (Sink Type) Circuit Configuration

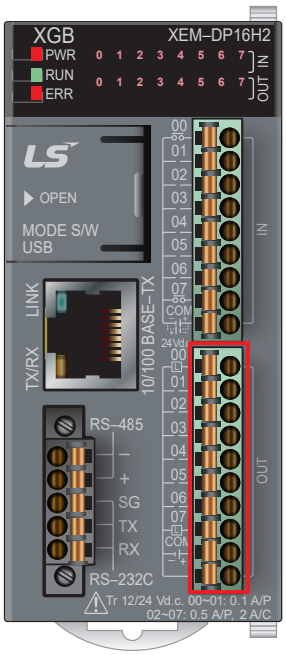


XEM Pin#	I/O Direct Variable	Description
00	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt
01	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt
02	%QX0.0.2	General Output 0.5A/pt
03	%QX0.0.3	
04	%QX0.0.4	
05	%QX0.0.5	
06	%QX0.0.6	Direction- Axis 1 or General Output 0.5A/pt
07	%QX0.0.7	Direction- Axis 2 or General Output 0.5A/pt
–	–	+24VDC from supply
COM	OUT_COM	0VDC from supply

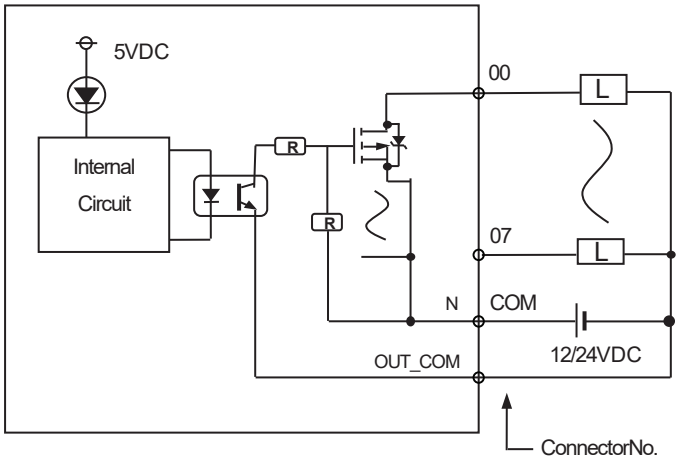
Digital Output Specifications, *XEM-DP16H2*

8-point Transistor Output (Source Type)Specifications

Model		XEM-DP16H2
Input Point		8 point
Insulation Method		Photocoupler Insulation
Rated Load Volage		12VDC / 24VDC
Operation Load Voltage Range		10.2–26.4 VDC
Max. Load Current		**%QX0.0.0,1:** 0.1A / 1-point, **%QX0.0.2–7:** 0.5 A/ 1-point, 2A / 1COM
Off Leakage Current		0.1 mA or less
Max. Inrush Current		4A / 10ms or less
Max. Voltage Drop when On		0.4 VDC or less
Over Voltage Protection		TVS diode
Response Time	Off → On	1ms or less
	On → Off	1ms or less (rated load, resistive load)
Common Method		8 point / COM
Proper Wire Size		Stranded wire, 0.3–0.75 mm^2 (external diameter 2.8 mm or less)
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)
	Current	30mA or less (when connecting 24VDC)
Operation Indicator		LED On when Output On
External Connection Method		10 point terminal block connector



8-point Transistor Output (Source Type) Circuit Configuration

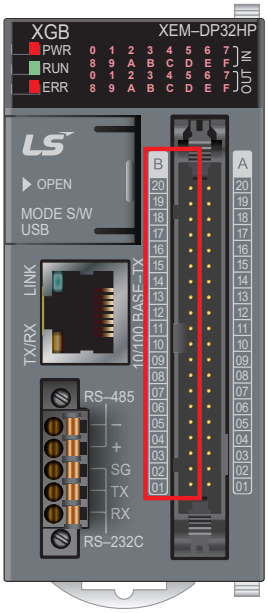


XEM Pin#	I/O Direct Variable	Description
00	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt
01	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt
02	%QX0.0.2	General Output 0.5A/pt
03	%QX0.0.3	
04	%QX0.0.4	
05	%QX0.0.5	
06	%QX0.0.6	Direction- Axis 1 or General Output 0.5A/pt
07	%QX0.0.7	Direction- Axis 2 or General Output 0.5A/pt
COM	OUT_COM	+24VDC from supply
–	–	0VDC from supply

Digital Input Specifications, *XEM-DN32H2/HP and XEM-DP32H2/HP*

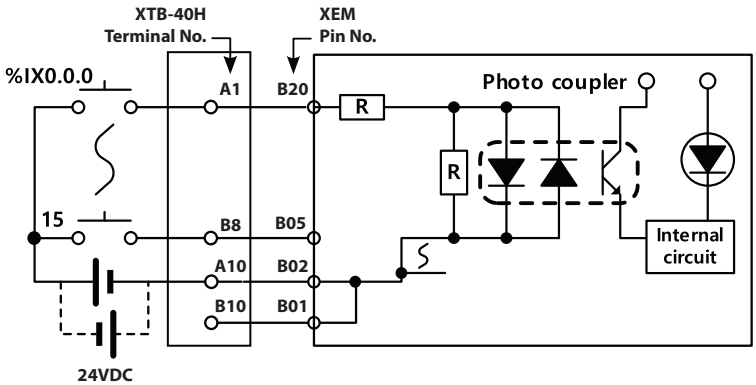
16-point 24VDC Input (Sink/Source Type) Specifications

Model	XEM-DN32H2	XEM-DP32H2	XEM-DN32HP	XEM-DP32HP
Input Point	16 point			
Insulation Method	Photocoupler Insulation			
Rated Input Volage	24VDC			
Rated Input Current	~4mA (Inputs 0–3 about 7mA)			
Operation Voltage Range	20.4–28.8 VDC (within ripple rate 5%)			
On Voltage	19VDC or higher			
On Current	3mA or higher			
Off Voltage	6VDC or less			
Off Current	1mA or less			
Input Resistance	About 5.6 kΩ (Inputs 0–7 about 4.7 kΩ)			
Response Time (Off → On / On → Off)	1/3/4/10/20/70/100 ms (set by I/O parameter) Default: 3ms			
Insulation Pressure	AC560Vrms / 3 cycle (altitude 2000m)			
Insulation Resistance	100MΩ or more by MegOhmMeter			
Common Method	16 point / COM			
Proper Cable Size	0.3 mm^2			
Operation Indicator	LED On when Input On			
External Connection Method	40 point connector			



Note: Red box highlights pins of the CPU inputs.

16-point 24VDC Input (Sink/Source Type) Circuit Configuration

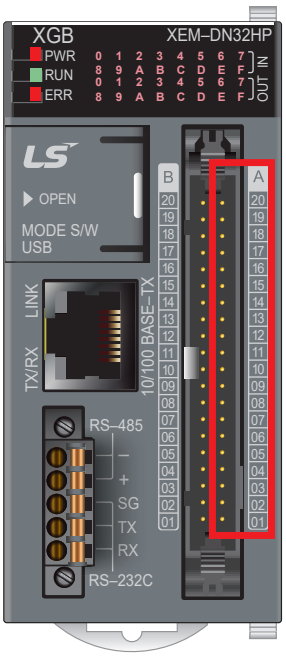


XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description
A1	B20	%IX0.0.0	High Speed Counter Inputs 1 phase- 200kpps 4 channel 2 phase- 100kpps 2 channel or General Input
B1	B19	%IX0.0.1	
A2	B18	%IX0.0.2	
B2	B17	%IX0.0.3	
A3	B16	%IX0.0.4	Preset Input or General Input
B3	B15	%IX0.0.5	
A4	B14	%IX0.0.6	
B4	B13	%IX0.0.7	
A5	B12	%IX0.0.8	General Input
B5	B11	%IX0.0.9	General Input
A6	B10	%IX0.0.10	General Input
B6	B09	%IX0.0.11	General Input
A7	B08	%IX0.0.12	General Input
B7	B07	%IX0.0.13	General Input
A8	B06	%IX0.0.14	General Input
B8	B05	%IX0.0.15	General Input
A9	B04	–	Not used (NC)
B9	B03	–	Not used (NC)
A10	B02	–	Common
B10	B01	–	Common

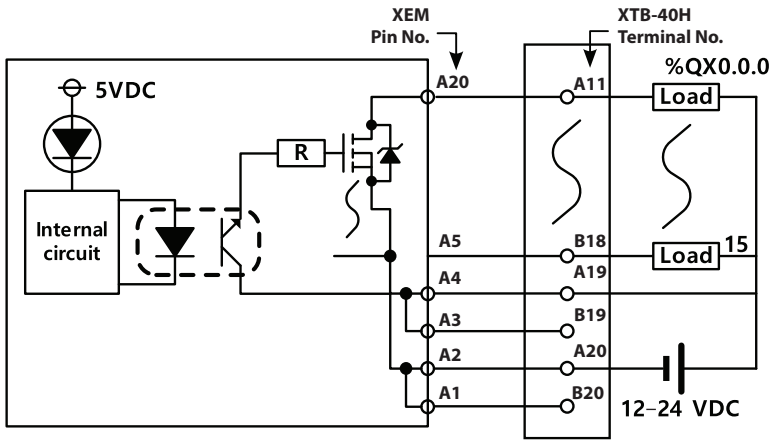
Digital Output Specifications, *XEM-DN32H2 and XEM-DN32HP*

16-point Transistor Output (Sink Type)Specifications

Model		XEM-DN32H2	XEM-DN32HP
Input Point		16 point	
Insulation Method		Photocoupler Insulation	
Rated Load Volage		12VDC / 24VDC	
Operation Load Voltage Range		10.2–26.4 VDC	
Max. Load Current		%QX0.0.0–11: 0.1A / 1-point, %QX0.0.12–15: 0.5 A/ 1-point, 2A / 1COM	
Off Leakage Current		0.1 mA or less	
Max. Inrush Current		4A / 10ms or less	
Max. Voltage Drop when On		0.4 VDC or less	
Over Voltage Protection		TVS diode	
Response Time	Off → On	1ms or less	
	On → Off	1ms or less (rated load, resistive load)	
Common Method		16-point / COM	
Proper Wire Size		Stranded wire, 0.3–0.75 mm^2 (external diameter 2.8 mm or less)	
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)	
	Current	80mA or less (when connecting 24VDC)	
Operation Indicator		LED On when Output On	
External Connection Method		40-point connector	



16-point Transistor Output (Sink Type) Circuit Configuration

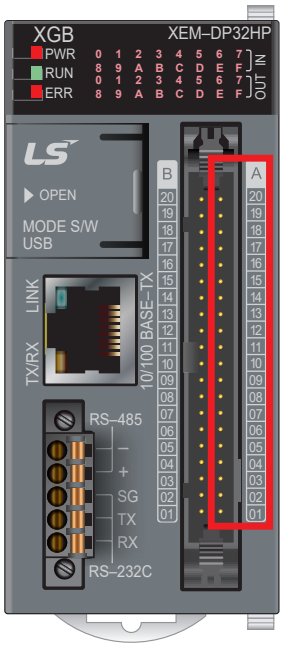


XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description	
A11	A20	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt	
B11	A19	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt	
A12	A18	%QX0.0.2	Pulse- Axis3* or General Output 0.1A/pt	
B12	A17	%QX0.0.3	Pulse- Axis4* or General Output 0.1A/pt	
A13	A16	%QX0.0.4	Pulse- Axis5* or General Output 0.1A/pt	
B13	A15	%QX0.0.5	Pulse- Axis6* or General Output 0.1A/pt	
A14	A14	%QX0.0.6	Direction- Axis 1 or General Output 0.1A/pt	
B14	A13	%QX0.0.7	Direction- Axis 2 or General Output 0.1A/pt	
A15	A12	%QX0.0.8	Direction- Axis 3* or General Output 0.1A/pt	
B15	A11	%QX0.0.9	Direction- Axis 4* or General Output 0.1A/pt	
A16	A10	%QX0.0.10	Direction- Axis 5* or General Output 0.1A/pt	
B16	A09	%QX0.0.11	Direction- Axis 6* or General Output 0.1A/pt	
A17	A08	%QX0.0.12	General Outputs - 0.5A/pt	
B17	A07	%QX0.0.13	General Outputs - 0.5A/pt	
A18	A06	%QX0.0.14	General Outputs - 0.5A/pt	
B18	A05	%QX0.0.15	General Outputs - 0.5A/pt	
A19	A04	–	P (24VDC)	2.0A/common
B19	A03	–	P (24VDC)	
A20	A02	–	OUT_COM	
B20	A01	–	OUT_COM	

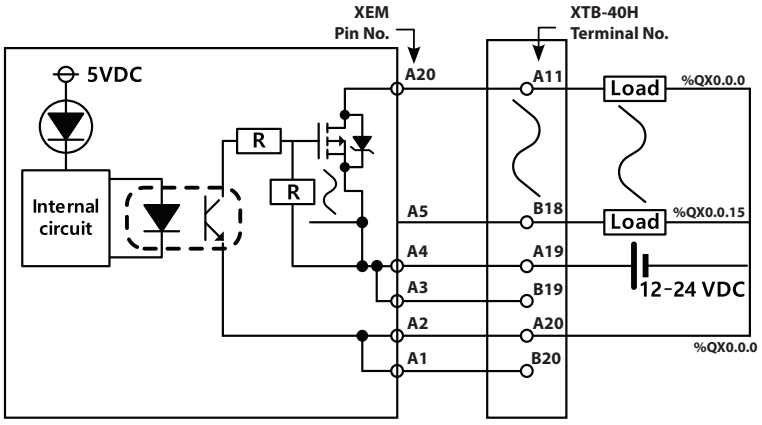
Digital Output Specifications, *XEM-DP32H2 and XEM-DP32HP*

16-point Transistor Output (Source Type) Specifications

Model		XEM-DP32H2	XEM-DP32HP
Input Point		16 point	
Insulation Method		Photocoupler Insulation	
Rated Load Volage		12VDC / 24VDC	
Operation Load Voltage Range		10.2–26.4 VDC	
Max. Load Current		**%QX0.0.0–11:** 0.1A / 1-point **%QX0.0.12–15:** 0.5 A/ 1-point, 2A / 1COM	
Off Leakage Current		0.1 mA or less	
Max. Inrush Current		4A / 10ms or less	
Max. Voltage Drop when On		0.4 VDC or less	
Over Voltage Protection		TVS diode	
Response Time	Off → On	1ms or less	
	On → Off	1ms or less (rated load, resistive load)	
Common Method		16-point / COM	
Proper Wire Size		Stranded wire, 0.3–0.75 mm^2 (external diameter 2.8 mm or less)	
External Power	Voltage	12VDC / 24VDC ± 10% (ripple voltage 4 Vp-p or less)	
	Current	50mA or less (when connecting 24VDC)	
Operation Indicator		LED On when Output On	
External Connection Method		40-point connector	



16-point Transistor Output (Source Type) Circuit Configuration

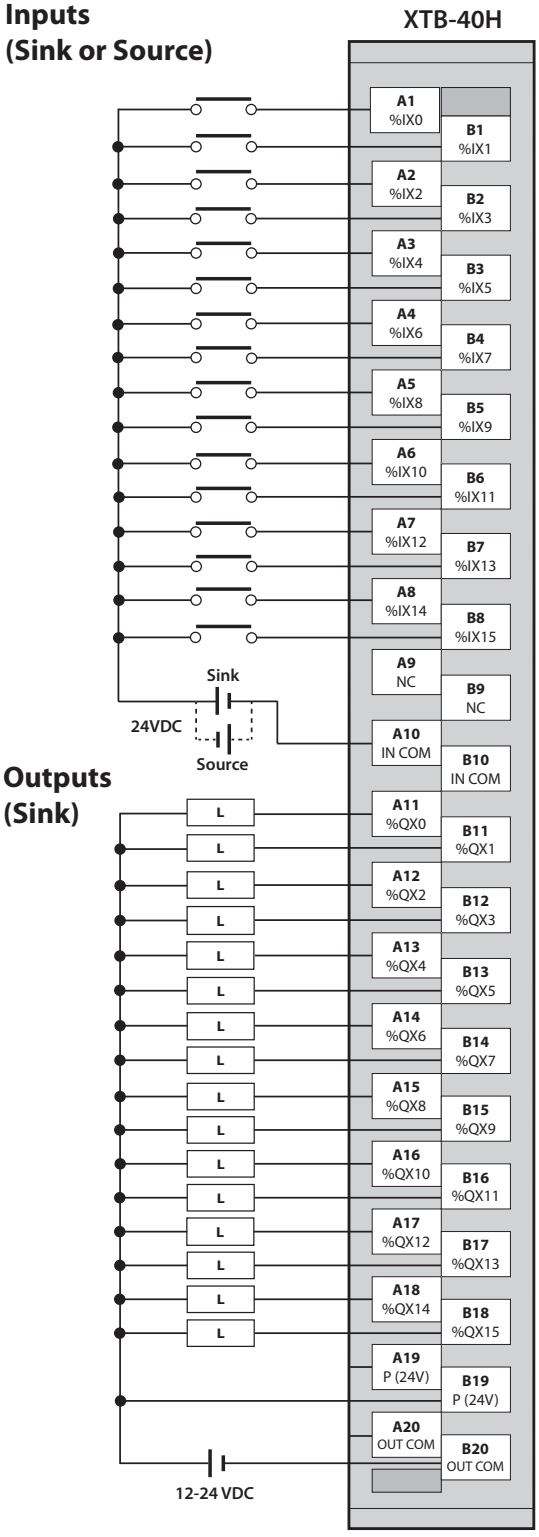


Circuit Configuration	XTB-40H Terminal	XEM Pin#	I/O Direct Variable	Description	
	A11	A20	%QX0.0.0	Pulse- Axis1 or General Output 0.1A/pt	
	B11	A19	%QX0.0.1	Pulse- Axis2 or General Output 0.1A/pt	
	A12	A18	%QX0.0.2	Pulse- Axis3* or General Output 0.1A/pt	
	B12	A17	%QX0.0.3	Pulse- Axis4* or General Output 0.1A/pt	
	A13	A16	%QX0.0.4	Pulse- Axis5* or General Output 0.1A/pt	
	B13	A15	%QX0.0.5	Pulse- Axis6* or General Output 0.1A/pt	
	A14	A14	%QX0.0.6	Direction- Axis 1 or General Output 0.1A/pt	
	B14	A13	%QX0.0.7	Direction- Axis 2 or General Output 0.1A/pt	
	A15	A12	%QX0.0.8	Direction- Axis 3* or General Output 0.1A/pt	
	B15	A11	%QX0.0.9	Direction- Axis 4* or General Output 0.1A/pt	
	A16	A10	%QX0.0.10	Direction- Axis 5* or General Output 0.1A/pt	
	B16	A09	%QX0.0.11	Direction- Axis 6* or General Output 0.1A/pt	
	A17	A08	%QX0.0.12	General Outputs - 0.5A/pt	
	B17	A07	%QX0.0.13	General Outputs - 0.5A/pt	
	A18	A06	%QX0.0.14	General Outputs - 0.5A/pt	
	B18	A05	%QX0.0.15	General Outputs - 0.5A/pt	
	A19	A04	–	OUT_COM	2.0A/common
	B19	A03	–	OUT_COM	
	A20	A02	–	N (0VDC)	
	B20	A01	–	N (0VDC)	

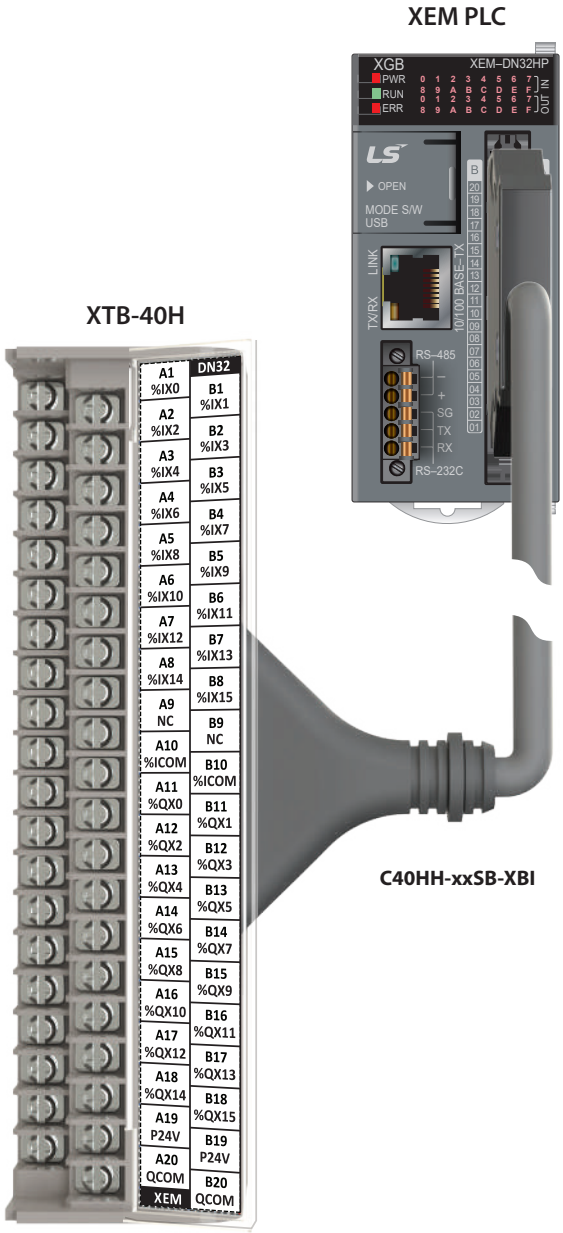
* Note: DP32HP module only

PLC I/O Wiring (Sinking Outputs), *XEM-DN32H2/HP*

Terminal Wiring



PLC Connection

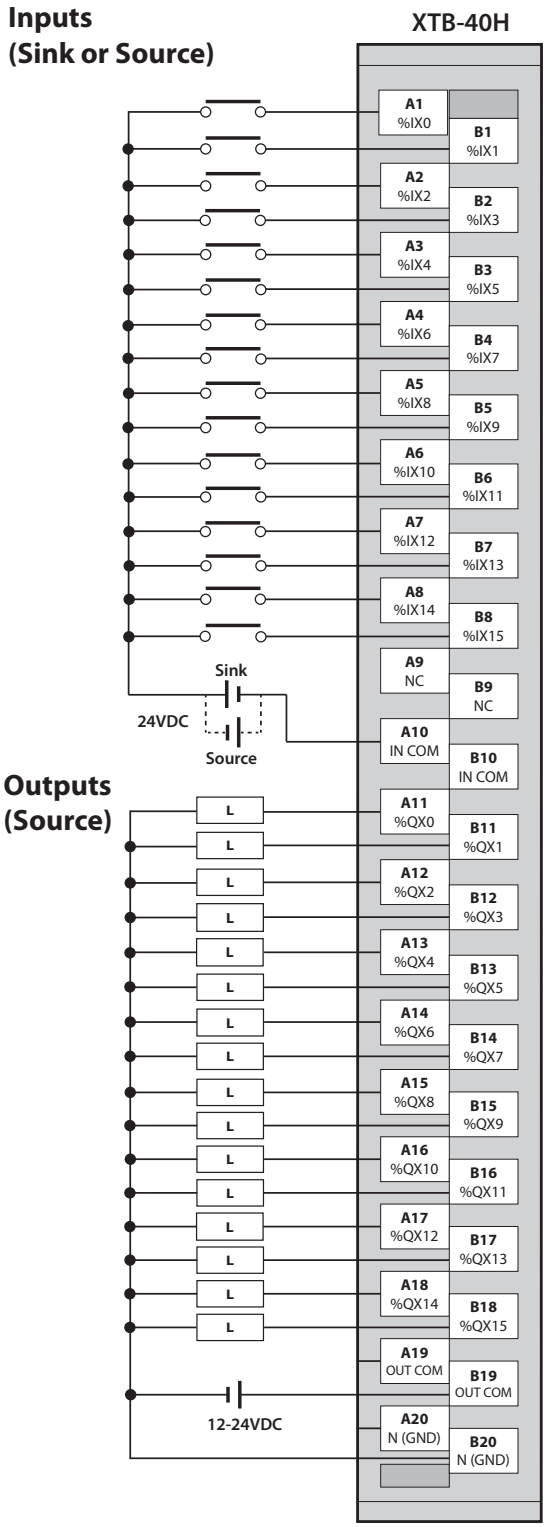


Note:

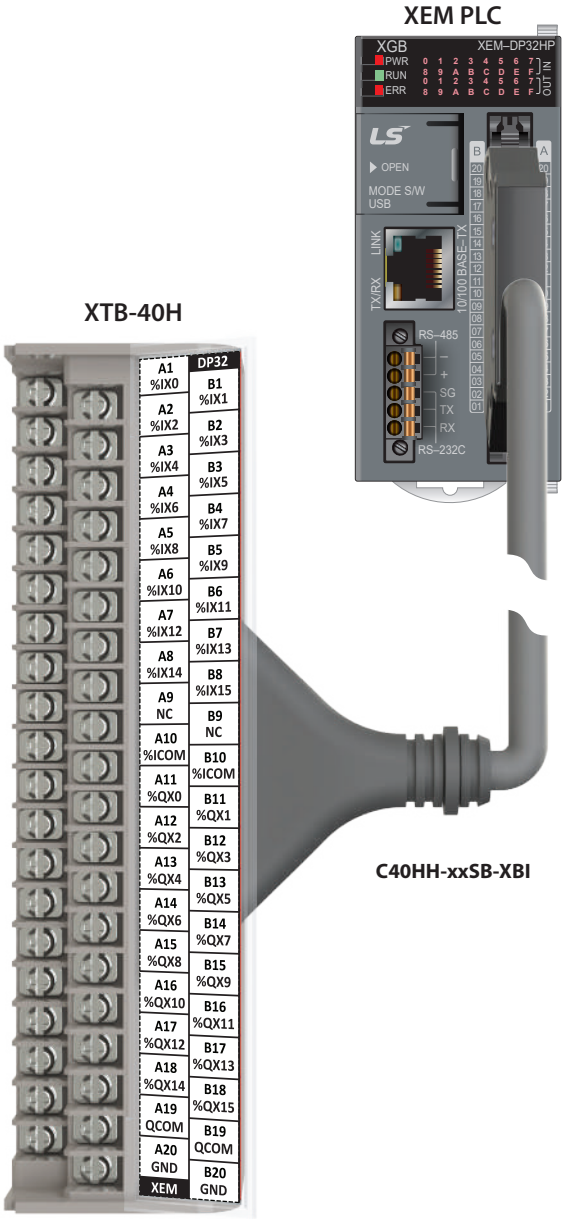
- Wiring: AWG22-16 (1.5mm^2/MAX)
- Screw: M3 X 8L
- Screw Torque: 1.2 N·m (12kgf·cm)

PLC I/O Wiring (Sourcing Outputs), *XEM-DP32H2/HP*

Terminal Wiring



PLC Connection

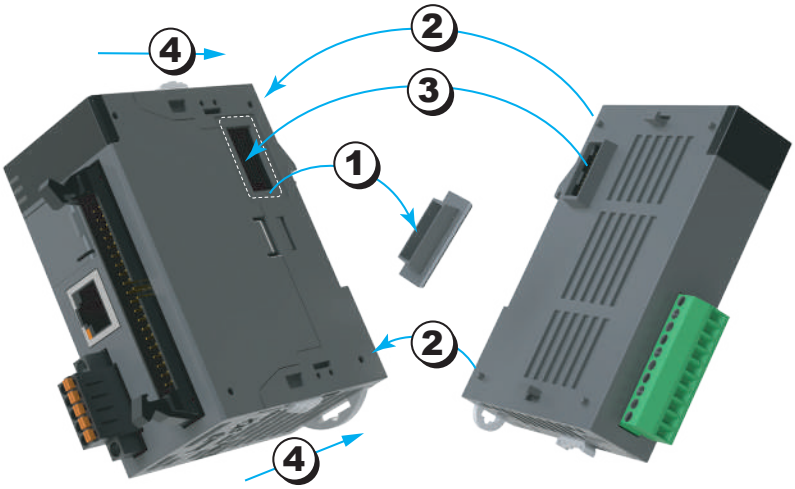


Note:

- Wiring: AWG22-16 (1.5mm^2/MAX)
- Screw: M3 X 8L
- Screw Torque: 1.2 N·m (12kgf·cm)

I/O Module Installation

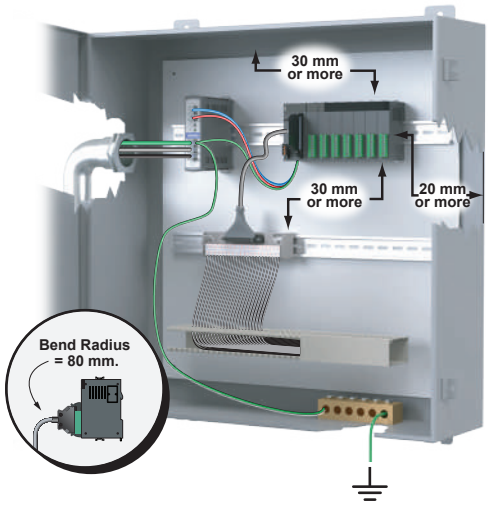
Attach each I/O module to the PLC per the diagram to the right. Up to seven modules can be attached by hooking in to each expansion module in the same manner. Any 32-point I/O and counter input module will require a Smart Link cable and terminal block.



1. Remove expansion port cover.
2. Align tabs with corresponding holes.
3. Seat the expansion port connector.
4. Secure modules with top and bottom sliding lock.

Mounting the PLC

When mounting the completed PLC module to your structure, keep the distances shown in the diagram below to maintain proper ventilation and allow easy detachment and attachment.



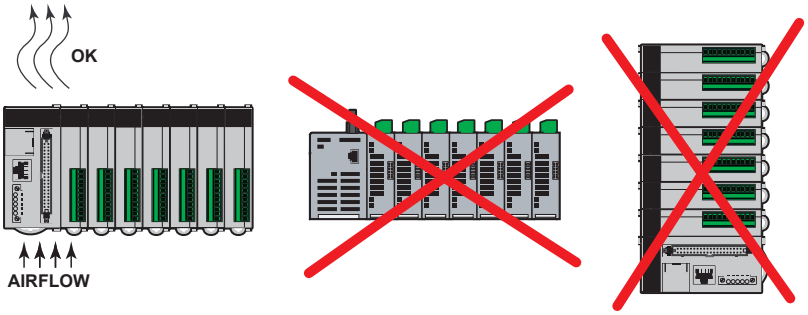
Additional Clearance Distances:

- Wire duct on the side requires 5mm or more
- Panel wall on the side requires 20mm or more
- Another device on the side requires 50mm or more

DIN Rail Mounting

The PLC has a hook for DIN rail mounting (35mm). To mount to DIN rail:

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



Environmental Specifications, all XGB Series Modules

Item				Specification	Reference
Ambient Operating Temperature				0–55°C (32–131°F)	–
Storage Temperature				-25–70°C (-13–158°F)	
Ambient Operating Humidity				5–95% relative humidity (non-condensing)	
Storage Humidity				5–95% relative humidity (non-condensing)	
Vibration[1]	Occasional Vibration	Frequency	5 ≤ f < 8.4 Hz	3.5 mm pulse width	IEC61131-3-2
			8.4 ≤ f < 150Hz	9.8 m/s^2 (1G)	
	Continuous Vibration		5 ≤ f < 8.4 Hz	1.75 mm pulse width	
			8.4 ≤ f < 150Hz	4.9 m/s^2 (0.5G)	
Shocks			Peak Acceleration	147 m/s^2 (15G)	
			Duration	11ms	
			Pulse Wave Type	Half-sine (3 times each direction per each axis)	
Noise Resistance	Square Wave Impulse Noise			1,500VAC 900VDC	LS Electric standard
	Electrostatic Discharge			Voltage: 4kV (contact discharge)	IEC61131-3-2 IEC61000-4-2
	Radiated Electromagnetic Field Noise			80–1,000 MHz, 10 V/m	IEC61131-3-2 IEC61000-4-3
	Fast Transient / Burst Noise		Classification	Voltage	IEC61131-3-2 IEC61000-4-4
			Power Supply	2kV	
			Digital/Analog Input/Output Communication Interface	1kV	
Environment				Free from corrosive gases and excessive dust	–
Attitude				Less than 2,000m	
Pollution Degree				Less than 2 (see note 2)	
Cooling Method				Air-cooling	

1 - Vibration of 10 times each direction (X, Y, and Z)
2 - Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected.

Available I/O Modules

XGB Series I/O Modules								
Part Number	**Description**	**Digital Input**	**Digital Output**	**Analog Input**	**Analog Output**	**Motion**	**Bus Coupler Compatible**	**Smart Link Required**
	Digital							
XBE-DC08A	LS Electric XGB discrete input module, 8-point, 24 VDC, sinking/sourcing, 1 common(s), 8 point(s) per common. Removable terminal block included.	✓					✓	
XBE-DC16A	LS Electric XGB discrete input module, 16-point, 24 VDC, sinking/sourcing, 1 common(s), 16 point(s) per common. Removable terminal blocks included.	✓					✓	
XBE-DC16B	LS Electric XGB discrete input module, 16-point, 12-24 VDC, sinking/sourcing, 1 common(s), 16 point(s) per common. Removable terminal blocks included.	✓					✓	
XBE-DC32A	LS Electric XGB discrete input module, 32-point, 24 VDC, sinking/sourcing, 1 common(s), 32 point(s) per common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.	✓					✓	✓
XBE-AC08A	LS Electric XGB discrete input module, 8-point, 120 VAC, 2 common(s), 4 point(s) per common. Removable terminal blocks included.	✓					✓	
XBE-RY08A	LS Electric XGB relay output module, 8-point, 125 VDC/250 VAC, (8) Form A, 1 common(s), 8 point(s) per common, 2A/point, 5A/common. Removable terminal block included.		✓				✓	
XBE-RY08B	LS Electric XGB relay output module, 8-point, 125 VDC/250 VAC, (8) Form A, 8 isolated common(s), 1 point(s) per common, 2A/point. Removable terminal blocks included.		✓				✓	
XBE-RY16A	LS Electric XGB relay output module, 16-point, 125 VDC/250 VAC, (16) Form A, 2 isolated common(s), 8 point(s) per common, 2A/point, 5A/common. Removable terminal blocks included.		✓				✓	
XBE-TN08A	LS Electric XGB discrete output module, 8-point, 12-24 VDC, sinking, 1 common(s), 8 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
XBE-TN16A	LS Electric XGB discrete output module, 16-point, 12-24 VDC, sinking, 1 common(s), 16 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
XBE-TN32A	LS Electric XGB discrete output module, 32-point, 12-24 VDC, sinking, 1 common(s), 32 point(s) per common, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.		✓				✓	✓
XBE-TP08A	LS Electric XGB discrete output module, 8-point, 12-24 VDC, sourcing, 1 common(s), 8 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
XBE-TP16A	LS Electric XGB discrete output module, 16-point, 12-24 VDC, sourcing, 1 common(s), 16 point(s) per common, 0.5A/point, 2A/common. Removable terminal blocks included.		✓				✓	
XBE-TP32A	LS Electric XGB discrete output module, 32-point, 12-24 VDC, sourcing, 1 common(s), 32 point(s) per common, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.		✓				✓	✓
XBE-DN32A	LS Electric XGB discrete combo module, Input: 16-point, 24 VDC, sinking/sourcing, Output: 16-point, 12-24 VDC, sinking, 0.2A/point, 2A/common. Requires XTB-40H terminal block and C40HH-xxSB-XBI cable.	✓	✓				✓	✓
XBE-DR16A	LS Electric XGB discrete combo module, Input: 8-point, 24 VDC, sinking/sourcing, Output: 8-point, 125 VDC/250 VAC, relay, (8) Form A (SPST) relays, 2A/point, 5A/common. Removable terminal blocks included.	✓	✓				✓	
	Motion							
XBF-PN04B	LS Electric XGB 4-axis positioning module, EtherCAT Master, 1 high-speed input point(s), sinking/line driver (differential), 1-channel, differential and single-ended encoder input(s), (1) Ethernet 100Base-TX (RJ45) port(s). For use with LS Electric XEM-DxxxHx PLCs.					✓		
XBF-PN08B	LS Electric XGB 8-axis positioning module, EtherCAT Master, 1 high-speed input point(s), sinking/line driver (differential), 1-channel, differential and single-ended encoder input(s), (1) Ethernet 100Base-TX (RJ45) port(s). For use with LS Electric XEM-DxxxHx PLCs.					✓		
XBF-HO02A	LS Electric XGB counter input module, 200 kHz maximum switching frequency, 2 high-speed input point(s), 5-24 VDC, sinking, 2-channel, single-ended encoder input(s), 2 high-speed output point(s), 5-24 VDC, sinking, external 24 VDC required.					✓	✓	✓
XBF-HD02A	LS Electric XGB counter input module, 500 kHz maximum switching frequency, 2 high-speed input point(s), 5-24 VDC, sinking, 2-channel, differential encoder input(s), 2 high-speed output point(s), 5-24 VDC, sinking, external 24 VDC required.					✓	✓	✓

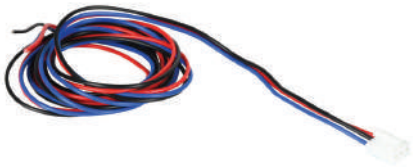
Continued on next page

Available I/O Modules, *continued*

XGB Series I/O Modules								
Part Number	**Description**	**Digital Input**	**Digital Output**	**Analog Input**	**Analog Output**	**Motion**	**Bus Coupler Compatible**	**Smart Link Required**
	Analog							
XBF-AD04A	LS Electric XGB analog input module, 4-channel, current/voltage, 12-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-10 VDC, external 24 VDC required.			✓			✓	
XBF-AD08A	LS Electric XGB analog input module, 8-channel, current/voltage, 12-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC, external 24 VDC required.			✓			✓	
XBF-AD04C	LS Electric XGB analog input module, 4-channel, current/voltage, 14-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC, +/- 10 VDC, external 24 VDC required.			✓			✓	
XBF-DV04A	LS Electric XGB analog output module, 4-channel, voltage, 12-bit, output voltage signal range(s) of 0-10 VDC, external 24 VDC required.				✓		✓	
XBF-DV04C	LS Electric XGB analog output module, 4-channel, voltage, 14-bit, output voltage signal range(s) of 0-5 VDC, 1-5 VDC, 0-10 VDC and +/- 10 VDC, external 24 VDC required.				✓		✓	
XBF-DC04A	LS Electric XGB analog output module, 4-channel, current, 12-bit, output current signal range(s) of 0-20 mA and 4-20 mA, external 24 VDC required.				✓		✓	
XBF-DC04C	LS Electric XGB analog output module, 4-channel, current, 14-bit, output current signal range(s) of 0-20 mA and 4-20 mA, external 24 VDC required.				✓		✓	
XBF-AH04A	LS Electric XGB analog combo module, Input: 2-channel, current/voltage, 0-20 mA and 4-20 mA, 0-5 VDC, 1-5 VDC and 0-10 VDC, Output: 2-channel, current/voltage, 0-20 mA and 4-20 mA, 0-5 VDC, 1-5 VDC and 0-10 VDC.			✓	✓		✓	
XBF-LD02S	LS Electric XGB load cell input module, 2-channel, voltage, 15-bit resolution, input voltage signal range(s) of 0-6 mV/VDC. For use with 5 VDC four- or six-wire load cells. Removable terminal blocks included.			✓			✓	
XBF-RD04A	LS Electric XGB temperature input module, RTD, 4-channel, 14-bit resolution, input RTD type(s): Pt100 and JPt100. Removable terminal block included.			✓			✓	
XBF-TC04S	LS Electric XGB temperature input module, thermocouple, 4-channel, 16-bit resolution, input thermocouple type(s): J, K, R, T. Removable terminal block included.			✓			✓	
	Communication							
XBL-EIPT	LS Electric XGB communication module, EtherNet/IP, 2 ports, (2) Ethernet 10/100Base-T (RJ45) port(s). For use with LS Electric XGB series PLCs.							
XBL-EMTA	LS Electric XGB communication module, Modbus TCP and LS XGT protocol, 1 port, (1) Ethernet 10/100Base-T (RJ45) port(s). For use with LS Electric XGB series PLCs.							
XBL-C21A	LS Electric XGB communication module, Modbus RTU, Modbus ASCII and LS XGT protocol, 1 port, (1) RS-232 (DB9 female) port(s). For use with LS Electric XGB series PLCs.							
XBL-C41A	LS Electric XGB communication module, Modbus RTU, Modbus ASCII and LS XGT protocol, 1 port, (1) RS-422/RS-485 (5-pin terminal) port(s). For use with LS Electric XGB series PLCs. (1) 5-pin serial communication terminal block included.							
	Bus Coupler							
XEL-BSSRT	LS Electric XGB bus coupler, 24 VDC, (2) Ethernet (RJ45) and (1) USB B port(s), EtherNet/IP and Modbus TCP, 100/1000 Mbps. For use with LS Electric XGB series I/O modules.							
XEL-BSSCT	LS Electric XGB bus coupler, 24 VDC, (2) Ethernet (RJ45) and (1) USB B port(s), EtherCAT Slave, 100 Mbps. For use with LS Electric XGB series I/O modules.							

XGB PLC Replacement Terminals

Part Number	Function	Description	Compatible With
XGB-CON-3PBC	LS Bus coupler power connector, 3 pole	LS Electric XGB terminal block, 3-pin screw type, replacement. For use with LS Electric XGB series bus coupler.	XEL-BSSCT XEL-BSSRT
XGB-CON-3PX	LS XEM Processor Power 3 pole , Tab Lock, Assembly Connector & Wire	LS Electric XGB terminal block, 3-pin with cable pigtail, replacement. For use with LS Electric XEM-DxxxHx PLCs.	XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP
XGB-CON-5PX	LS XEM Processor Serial Communication 5 Pole, Screw Lock	LS Electric XGB terminal block, 5-pin spring clamp, replacement. For use with LS Electric XEM-DxxxHx PLCs.	XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP
XGB-CON-8P	LS XGB PLC IO Connector 8 Pole	LS Electric XGB terminal block, 8-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-DC16A, XBE-DC16B, XBE-TN16A, XBE-TP16A, XBF-AD08A
XGB-CON-9P	LS XGB PLC IO Connector 9 Pole	LS Electric XGB terminal block, 9-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-RY08B, XBE-RY16A
XGB-CON-10P	LS XGB PLC IO Connector 10 Pole	LS Electric XGB terminal block, 10-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBE-DC16A, XBE-DC16B, XBE-TN16A, XBE-TP16A, XBF-AD08A, XBE-AC08A
XGB-CON-11P	LS XGB PLC IO Connector 11 Pole	LS Electric XGB terminal block, 11-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBF-AD04A , XBF-AH04A, XBF-DV04A, XBF-DV04C, XBF-DC04A, XBF-DC04C
XGB-CON-15P	LS XGB PLC IO Connector 15 Pole	LS Electric XGB terminal block, 15-pin screw type, replacement. For use with LS Electric XGB series I/O modules.	XBF-AD04C



XGB-CON-3PX

XGB-CON-9P

XGB-CON-15P

XGB-CON-3PBC

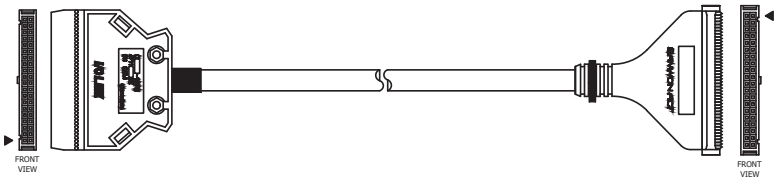
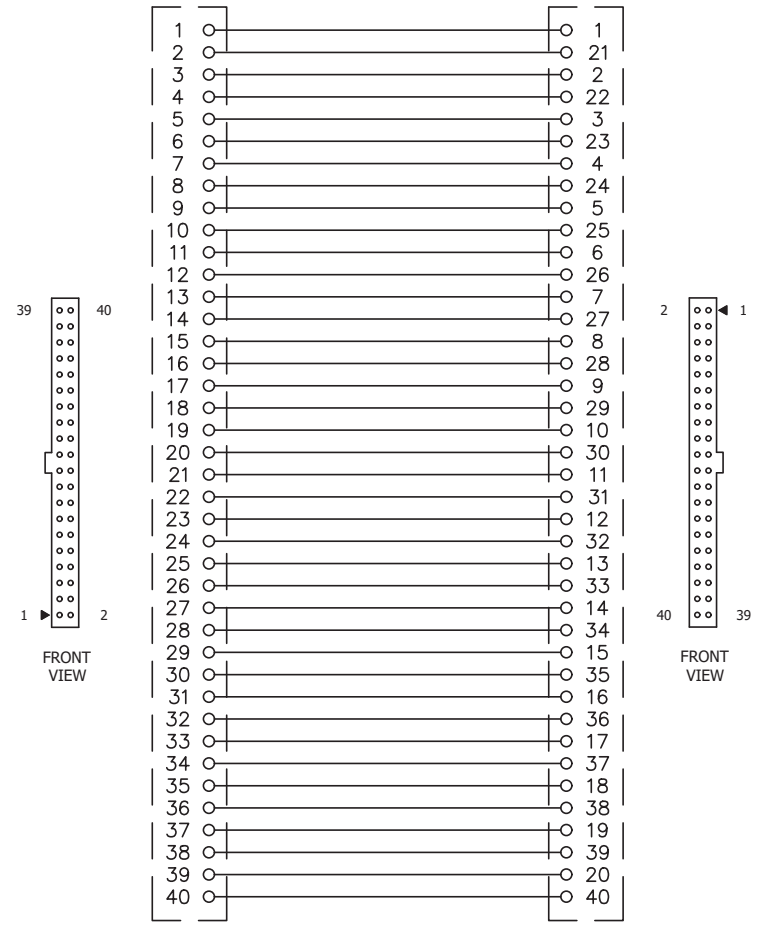
Smart Link I/O System

The Smart Link I/O system is a breakout wiring system used for high density I/O modules in the LS Electric XGB PLC series. The system is required for all modules with a 40-pin connection, and consists of a Smart Link cable with an XTB-40H terminal block.

Part Number	Description	Length	Compatible With
XTB-40H	LS Electric XGB terminal block, 40-pin screw type. For use with LS Electric XGB series high-density modules.	n/a	All LS XGB series PLCs and modules with 40-pin connectors
XTB-40H-LABEL	AutomationDirect terminal label sheet, printed with terminal names for LS Electric XGB series modules. Package of 8. For use with XTB-40H terminal block.	n/a	
C40HH-05SB-XBI	LS Electric XGB PLC I/O cable, 1.6ft/0.5m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	0.5 m	
C40HH-10SB-XBI	LS Electric XGB PLC I/O cable, 3.2ft/1m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	1m	
C40HH-15SB-XBI	LS Electric XGB PLC I/O cable, 4.9ft/1.5m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	1.5 m	
C40HH-20SB-XBI	LS Electric XGB PLC I/O cable, 6.5ft/2m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	2m	
C40HH-30SB-XBI	LS Electric XGB PLC I/O cable, 9.8ft/3m cable length, 40-pin connector to 40-pin connector. For use with LS Electric XGB series high-density modules.	3m	

XTB-40H Specifications		
Number of Pins		40 pin
Terminal Pitch		7.0 mm
Connector Type		MIL-C-83503 (50P polarity guide: 2EA)
Applicable Wires		AWG22–16 (1.5mm^2/MAX)
Insulation Resistance		100MΩ (500VDC)
Dielectric Strength		500VAC 1 minute
Screw		M3 x 8L
Screw Torque		1.2N•m (12kgf•cm)
Ambient Temperature		-10ºC to +50ºC (no freezing)
Material	***Case***	Modified PPO
	Protective Cover	Polycarbonate
	PCB	Epoxy 1.6t

Smart Link I/O System, Terminals and Cable Connections

Module to Cable to Terminal Pinouts		
Module Pins	**C40HH-xxSB-XBI**	**XTB-40H Terminal**
B20		A1
B19		B1
B18		A2
B17		B2
B16		A3
B15		B3
B14	HIROSE HIF3BA-40D-2.54R HIROSE HIF3BA-40D-2.54R	A4
B13		B4
B12		A5
B11		B5
B10		A6
B09		B6
B08		A7
B07		B7
B06		A8
B05		B8
B04		A9
B03		B9
B02		A10
B01		B10
A20		A11
A19		B11
A18		A12
A17		B12
A16		A13
A15		B13
A14		A14
A13		B14
A12		A15
A11		B15
A10		A16
A09		B16
A08		A17
A07		B17
A06		A18
A05		B18
A04		A19
A03		B19
A02		A20
A01		B20