# LS ELECTRIC

# XGB CPU Modules

**LS XGB PLC**

**EtherCAT®**
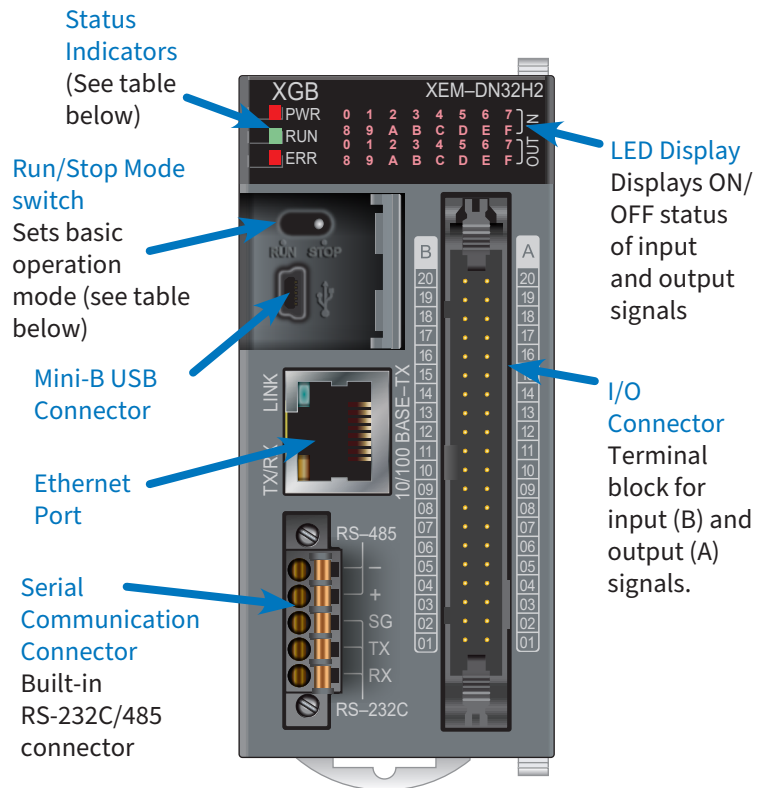
## CPU Module (with embedded I/O)

- **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. It requires one Smart Link cable and terminal block for wiring the embedded 16 input points and 16 output points. The systems 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. Over 700 advanced Function block instructions, including 80+ motion specific, are available for use in both Ladder and Structured Text programming.

**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.

## Features

- 16 DC inputs, 16 DC outputs
- (4) 200kHz high speed counters
- 2- or 6-axis motion control (high speed pulse outputs)
- Module expansion supports up to 7 slots
- 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

| 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. |

## PLC (CPU with I/O) Feature Breakdown

| Part Number | Price | Built-in I/O | | | Max Option Cards | USB | Ethernet | RS-232C | RS-485 | Memory Backup | Online Editing | Drawing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Motion Axis | Inputs | Outputs | | | | | | | | |
| XEM-DN32H2 | $299.00 | 2 | 16 sink/source | 16 sink | 7 | Yes (mini-B) | Yes (10/100Base-T) | Yes | Yes | Memory: Non-Volitale RAM RTC: 6 month backup (No battery) | Yes | PDF |
| XEM-DP32H2 | $299.00 | 2 | | 16 source | | | | | | | | PDF |
| XEM-DN32HP | $349.00 | 6 | | 16 sink | | | | | | | | PDF |
| XEM-DP32HP | $349.00 | 6 | | 16 source | | | | | | | | PDF |

# LS ELECTRIC

# XGB CPU Modules

## 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. You can also access several quick start video guides here: Building and Powering the LS PLC Rack

**1** Select your XEM CPU module, Smart Link cable, and Smart Link terminal block. The Smart Link cable and terminal block are only required if using on board I/O.

See "Smart Link I/O System" on page tLSE-83 for cable and terminal block part numbers.

*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.

Use the Product Selector to help configure the PLC at automationdirect.com/ls/config.

| CPU Slots 0 & 1 | I/O Slot 2 | I/O Slot 3 | I/O Slot 4 | I/O Slot 5 | I/O Slot 6 | I/O Slot 7 | I/O Slot 8 |
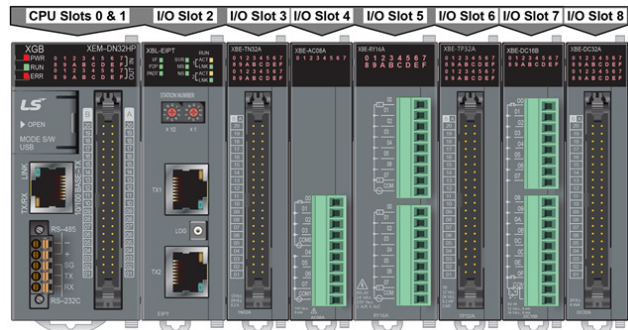
*Note: Screwdriver size 2.5 mm*

**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.

Gnd
0VDC
24VDC
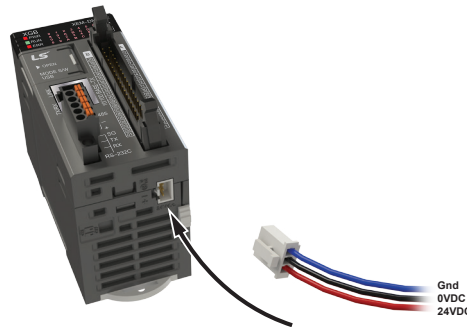
USB Connection
MOSAIC-CSU

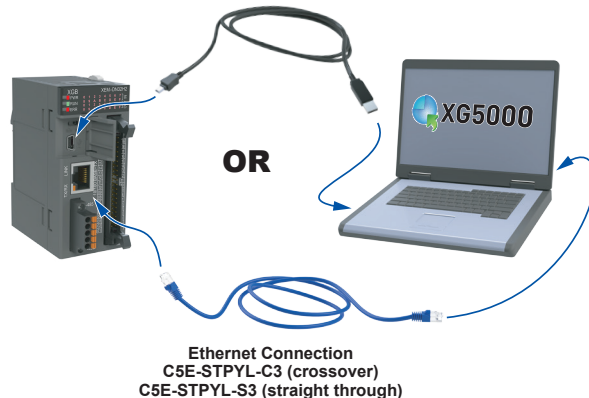**4** Choose programming cable, either a USB connection cable or Ethernet cable.

To connect via USB:
    USB Connection to XEM CPU
To connect via Ethernet:
    Ethernet Connection to XEM CPU

OR

Ethernet Connection
C5E-STPYL-C3 (crossover)
C5E-STPYL-S3 (straight through)

## Performance Specifications, *XEM-DN32H2/HP and XEM-DP32H2/HP*

| Specification | | | 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: 32(PLC built in) + 224 (32 point IO x 7 slots) = 256 Total Analog: 56 (8 point AI x 7 slots) = 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 | | | |
| **Weight** | | | 134g (4.73 oz) | | | |

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# XGB CPU Modules
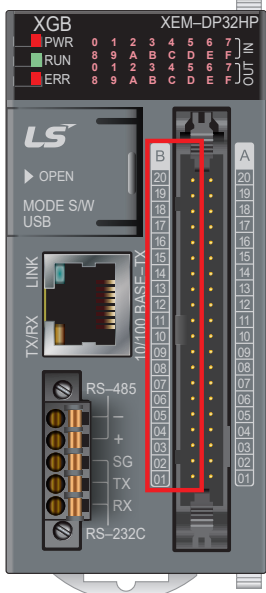
## Built-in Functions, *XEM-DN32H2/HP and XEM-DP32H2/HP*

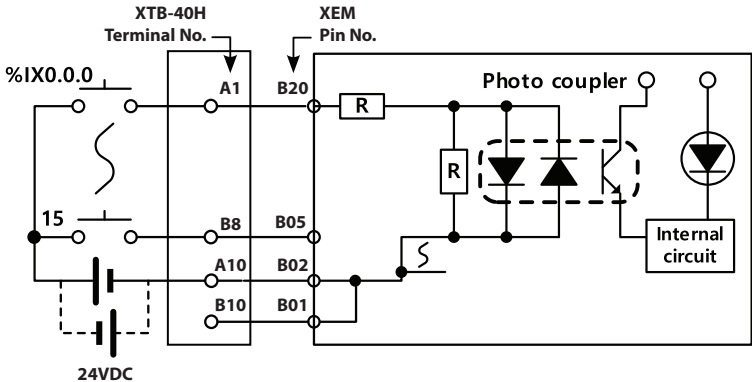| Specification | | | Part Number | | | |
|---|---|---|---|---|---|---|
| | | | **XEM-DN32H2** | **XEM-DP32H2** | **XEM-DN32HP** | **XEM-DP32HP** |
| **Number of Motion Control Axis** | | | 2-axis | | 6-axis | |
| **Interpolation Function** | | | • 2-axis linear interpolation<br>• 2-axis circular interpolation | | • 2/3/4/5/6 axis linear interpolation<br>• 2-axis circular interpolation<br>• 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:<br>• Single pulse counter mode with 1 pulse input<br>• Pulse and direction counter mode with 2 pulse inputs<br>• CW/CCW counter mode with 2 pulse inputs<br>• 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** | 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** | | | 10$\mu$s 4-point (%IX0.0.0–%IX0.0.3), 50$\mu$s 4-point (%IX0.0.4–%IX0.0.7) | | | |
| **External Point Interrupt** | | | 10$\mu$s 4-point (%IX0.0.0–%IX0.0.3), 50$\mu$s 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 | | | |

**1 - Auto-MDIX (Automation medium-dependent interface crossover) automatically detects whether the cable connected to the Ethernet port is peer-to-peer (straight) or crossover cable.**

## 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

| 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

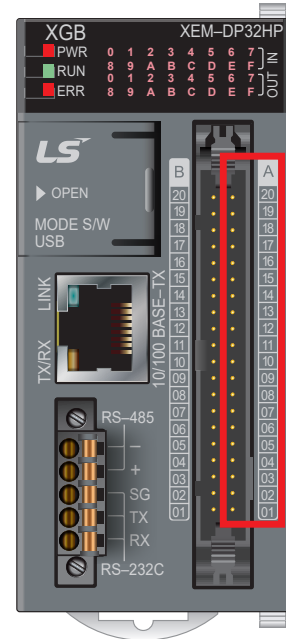| Model | XEM-DN32H2 | XEM-DN32HP | |
|---|---|---|---|
| **Input Point** | 16 point | | |
| **Insulation Method** | Photocoupler Insulation | | |
| **Rated Load Volage** | 12VDC / 24VDC | | |
| **Operation Load Voltage Range** | 10.2–26.4 VDC | | |
| **Max. Load Current** | **%QX0.0.0–11:** 0.1A / 1-point,<br>**%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 | | |
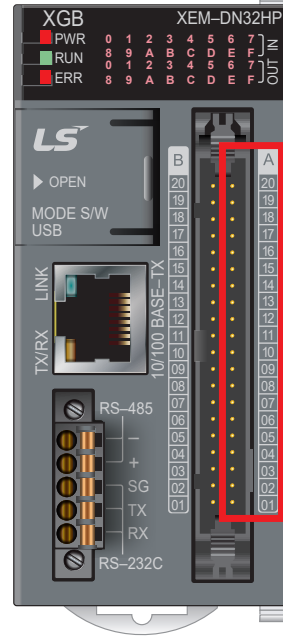


### 16-point Transistor Output (Sink Type) Circuit Configuration

| 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) |
| | B19 | A03 | – | P (24VDC) |
| | A20 | A02 | – | OUT_COM |
| | B20 | A01 | – | OUT_COM |

2.0A/common



**\* Note: DN32HP module only**

## 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<br>**%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 |
| | | B19 | A03 | – | OUT_COM |
| | | A20 | A02 | – | N (0VDC) |
| | | B20 | A01 | – | N (0VDC) |

2.0A/common

***Note: DP32HP module only**

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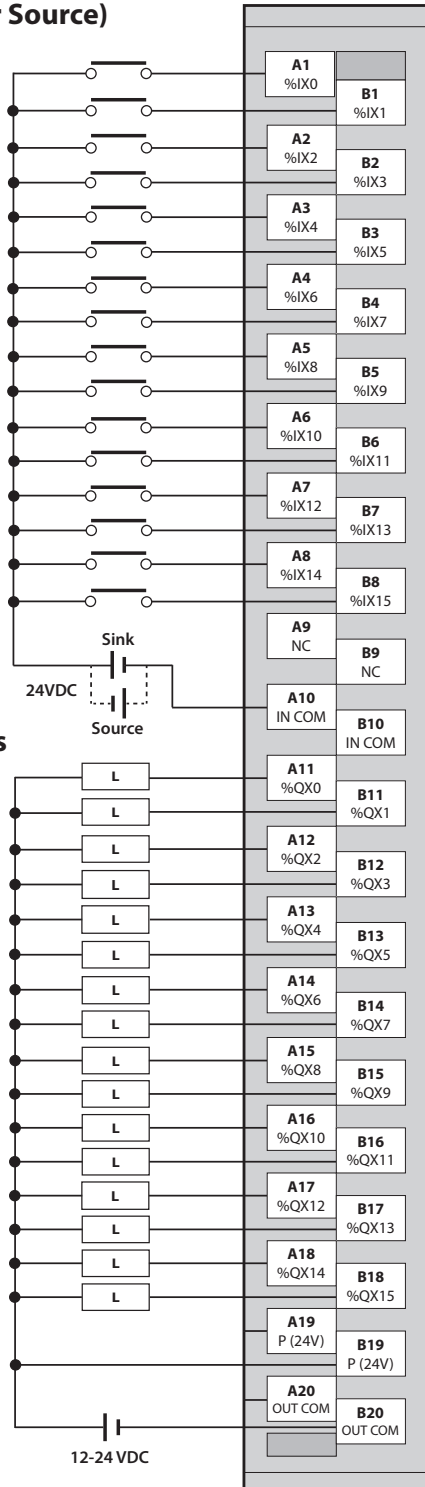# XGB CPU Modules

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

Download module specific XTB-40H Terminal Label Printouts here: Download Printouts
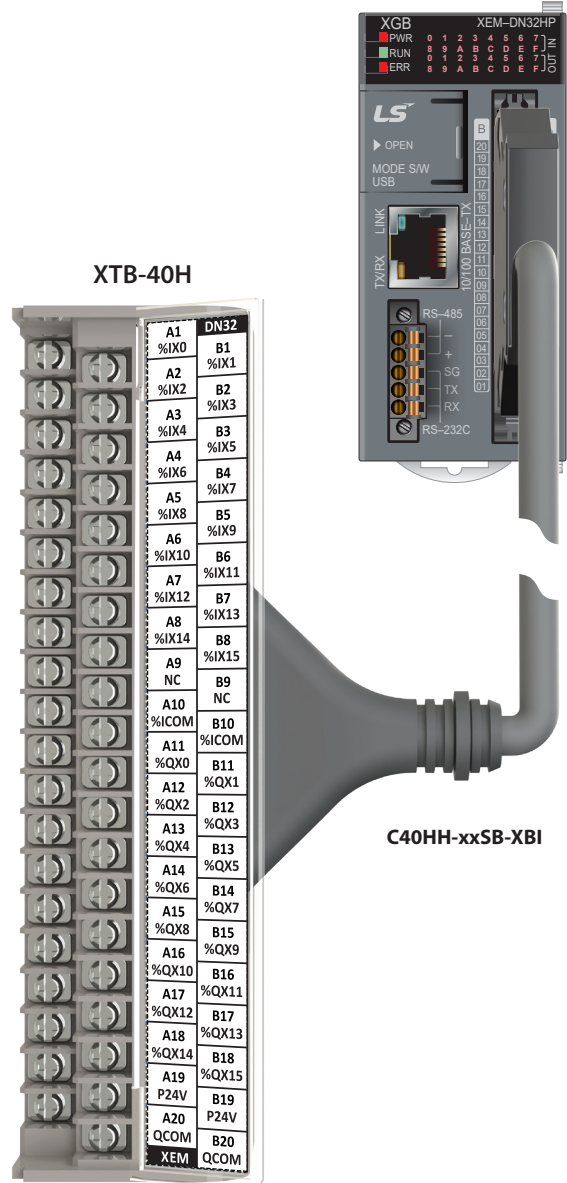
### Terminal Wiring

**Inputs (Sink or Source)**

**XTB-40H**

| A1 %IX0 | |
| B1 %IX1 | |
| A2 %IX2 | B2 %IX3 |
| A3 %IX4 | B3 %IX5 |
| A4 %IX6 | B4 %IX7 |
| A5 %IX8 | B5 %IX9 |
| A6 %IX10 | B6 %IX11 |
| A7 %IX12 | B7 %IX13 |
| A8 %IX14 | B8 %IX15 |
| A9 NC | B9 NC |
| A10 IN COM | B10 IN COM |

Sink

24VDC

Source

**Outputs (Sink)**

| A11 %QX0 | B11 %QX1 |
| A12 %QX2 | B12 %QX3 |
| A13 %QX4 | B13 %QX5 |
| A14 %QX6 | B14 %QX7 |
| A15 %QX8 | B15 %QX9 |
| A16 %QX10 | B16 %QX11 |
| A17 %QX12 | B17 %QX13 |
| A18 %QX14 | B18 %QX15 |
| A19 P (24V) | B19 P (24V) |
| A20 OUT COM | B20 OUT COM |

12-24 VDC

### PLC Connection

**XEM PLC**

**XTB-40H**

| DN32 | |
| A1 %IX0 | B1 %IX1 |
| A2 %IX2 | B2 %IX3 |
| A3 %IX4 | B3 %IX5 |
| A4 %IX6 | B4 %IX7 |
| A5 %IX8 | B5 %IX9 |
| A6 %IX10 | B6 %IX11 |
| A7 %IX12 | B7 %IX13 |
| A8 %IX14 | B8 %IX15 |
| A9 NC | B9 NC |
| A10 %ICOM | B10 %ICOM |
| A11 %QX0 | B11 %QX1 |
| A12 %QX2 | B12 %QX3 |
| A13 %QX4 | B13 %QX5 |
| A14 %QX6 | B14 %QX7 |
| A15 %QX8 | B15 %QX9 |
| A16 %QX10 | B16 %QX11 |
| A17 %QX12 | B17 %QX13 |
| A18 %QX14 | B18 %QX15 |
| A19 P24V | B19 P24V |
| A20 QCOM | B20 QCOM |
| XEM | |

**C40HH-xxSB-XBI**

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

# LS ELECTRIC

# XGB CPU Modules

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

Download module specific XTB-40H Terminal Label Printouts here: Download Printouts
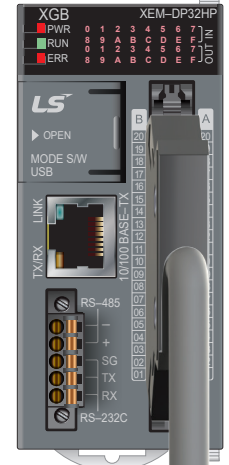
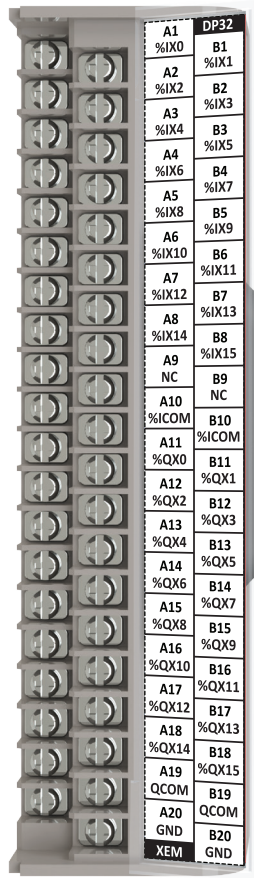### Terminal Wiring

### PLC Connection

**Inputs
(Sink or Source)**
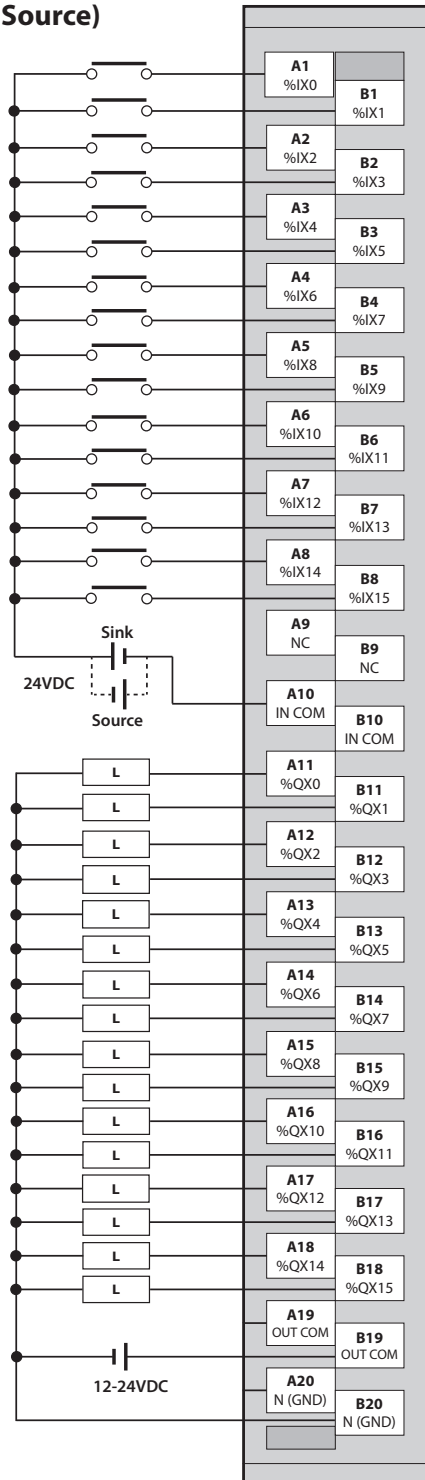
**XTB-40H**

**Outputs
(Source)**

**XEM PLC**

**XTB-40H**

**C40HH-xxSB-XBI**

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

**LS ELECTRIC**

# XGB Series PLC Family

## 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. Use the online Product Selector to help configure the PLC at automationdirect.com/ls/config.
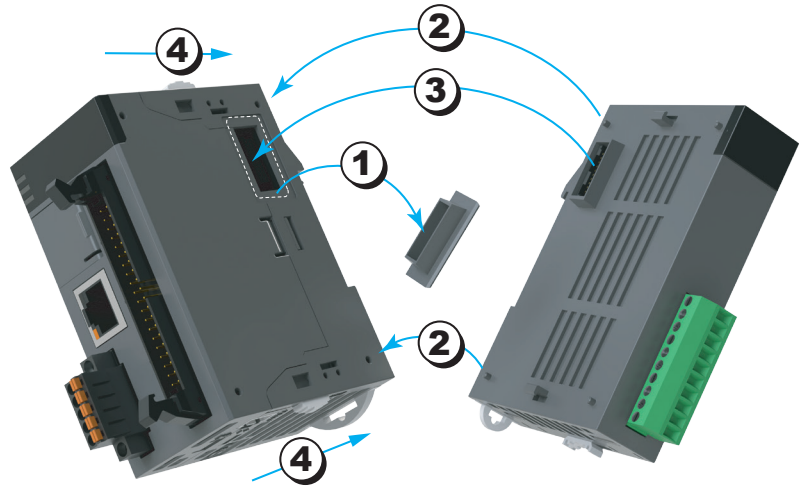
**1. Remove expansion port cover.**
**2. Align tabs with corresponding holes.**
**3. Seat the expansion port connector.**
**4. Secure modules with top and bottom sliding lock.**

## 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.

30 mm or more

30 mm or more

20 mm or more

Bend Radius = 80 mm.
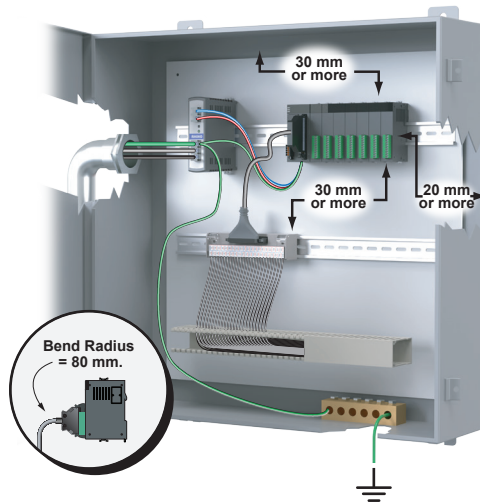
### Additional Clearance Distances:

• 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.

OK

AIRFLOW
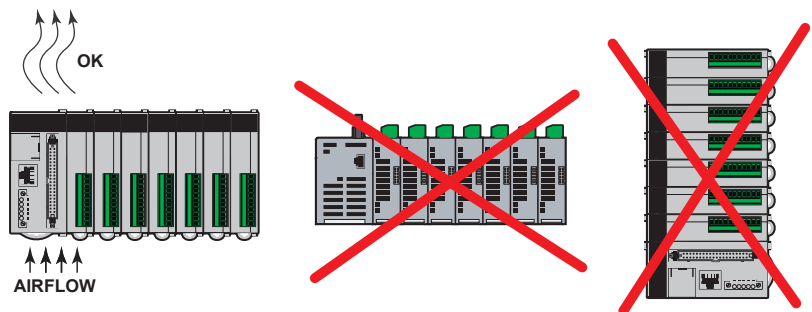
## Environmental Specifications, all XGB Series Modules

| 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 | $5 \leq f < 8.4$ Hz | 3.5 mm pulse width | IEC61131-3-2 |
| | | | $8.4 \leq f < 150Hz$ | 9.8 m/s$^2$ (1G) | |
| | Continuous Vibration | | $5 \leq f < 8.4$ Hz | 1.75 mm pulse width | |
| | | | $8.4 \leq f < 150Hz$ | 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.

# LS ELECTRIC

# XGB Series PLC Family

## Available I/O Modules

### XGB Series I/O Modules

| Part Number | Price | Description | Digital Input | Digital Output | Analog Input | Analog Output | Motion | Smart Link Cable and Terminal Required |
|---|---|---|---|---|---|---|---|---|
| *Digital* | | | | | | | | |
| XBE-DC16A | $70.00 | 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 | $78.00 | 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 | $97.00 | 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 | $88.00 | LS Electric XGB discrete input module, 8-point, 120 VAC, 2 common(s), 4 point(s) per common. Removable terminal blocks included. | ✓ | | | | | |
| XBE-RY08B | $95.00 | 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 | $110.00 | 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-TN16A | $78.00 | 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 | $109.00 | 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-TP16A | $88.00 | 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 | $93.00 | 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 | $172.00 | 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. | ✓ | ✓ | | | | ✓ |
| *Analog* | | | | | | | | |
| XBF-AD04A | $160.00 | 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 | $242.00 | 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 | $231.00 | 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 | $152.00 | 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 | $209.00 | 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 | $162.00 | 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 | $209.00 | 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 | $216.00 | 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. | | | ✓ | ✓ | | |
| *Motion* | | | | | | | | |
| XBF-PN04B | $350.00 | LS Electric XGB 4-axis positioning module, EtherCAT protocol, 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-Dx32Hx PLCs. | | | | | ✓ | |
| XBF-PN08B | $395.00 | LS Electric XGB 8-axis positioning module, EtherCAT protocol, 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-Dx32Hx PLCs. | | | | | ✓ | |
| XBF-HO02A | $176.00 | 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 | $253.00 | 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. | | | | | ✓ | ✓ |
| *Communication* | | | | | | | | |
| XBL-EIPT | $199.00 | 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. | | | | | | |

Note: See "Smart Link I/O System" on page tLSE-83 for the XTB-40H terminal block and cables. See "XGB PLC Replacement Terminals" on page tLSE-82 for replacement removable terminal blocks.

# LS ELECTRIC

# XGB Accessories

## XGB PLC Replacement Terminals

| Part Number | Price | Function | Description | Compatible With |
|---|---|---|---|---|
| XGB-CON-3PX | $4.00 | 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-Dx32Hx PLCs. | XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP |
| XGB-CON-5PX | $4.00 | 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-Dx32Hx PLCs. | XEM-DN32H2, XEM-DN32HP, XEM-DP32H2, XEM-DP32HP |
| XGB-CON-8P | $5.00 | 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 | $6.00 | 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 | $6.00 | 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 | $6.00 | 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 | $7.00 | 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 |
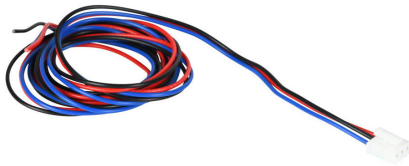


XGB-CON-3PX



XGB-CON-9P



XGB-CON-15P

# LS ELECTRIC

# XGB Accessories

## 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.

Download module specific XTB-40H Terminal Label Printouts here: Terminal Printouts

| Part Number | Price | Description | Length | Compatible With |
|---|---|---|---|---|
| XTB-40H | $20.00 | LS Electric XGB terminal block, 40-pin screw type. For use with LS Electric XGB series high-density modules. | n/a | |
| C40HH-05SB-XBI | $22.00 | 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 | $25.00 | 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 | $29.00 | 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 | All LS XGB series PLCs and modules with 40-pin connectors |
| C40HH-20SB-XBI | $36.00 | 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 | $42.00 | 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 |

# LS ELECTRIC

# XGB Accessories

## 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 | | A4 |
| B13 | HIROSE HIF3BA-40D-2.54R | 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 |

Center diagram — HIROSE HIF3BA-40D-2.54R connectors, FRONT VIEW. Cable pinout mapping:

| Left | Right |
|---|---|
| 1 | 1 |
| 2 | 21 |
| 3 | 2 |
| 4 | 22 |
| 5 | 3 |
| 6 | 23 |
| 7 | 4 |
| 8 | 24 |
| 9 | 5 |
| 10 | 25 |
| 11 | 6 |
| 12 | 26 |
| 13 | 7 |
| 14 | 27 |
| 15 | 8 |
| 16 | 28 |
| 17 | 9 |
| 18 | 29 |
| 19 | 10 |
| 20 | 30 |
| 21 | 11 |
| 22 | 31 |
| 23 | 12 |
| 24 | 32 |
| 25 | 13 |
| 26 | 33 |
| 27 | 14 |
| 28 | 34 |
| 29 | 15 |
| 30 | 35 |
| 31 | 16 |
| 32 | 36 |
| 33 | 17 |
| 34 | 37 |
| 35 | 18 |
| 36 | 38 |
| 37 | 19 |
| 38 | 39 |
| 39 | 20 |
| 40 | 40 |