Chapter 1 Introduction

1.1 Guide to Use This Manual

This manual includes specifications, functions, and handling instructions for the XGB series PLC and is divided up into chapters as follows.

No.	Title	Contents
Chapter 1	Introduction	Describes the configuration of this manual, PLC features, and Product Listing
Chapter 2	Quick Start Guide	Guide for quickly getting a new LSIS PLC up and running with a basic program.
Chapter 3	Installation and Wiring	Dimensions, Wiring Guidelines, and I/O Schematics
Chapter 4	CPU Specifications	Scan Time, Program Execution, Memory Mapping, and Environmental Specifications
Chapter 5	Communication Configuration	Main Unit Communication Protocols, Network Examples, Modbus Setup
Chapter 6	Instructions and Flag List	Programming Instructions and System Flags
Chapter 7	Programming Concepts	Program Execution, CPU Modes, Timer and Counter Processing, Interrupt Function
Chapter 8	Built-in PID Control	PID Setup and Operation
Chapter 9	Built-in High Speed Counter	High Speed Counter Setup and Operation
Chapter 10	Option Boards and Memory Module	CPU Option Boards and Program Backup to Memory Module
Chapter 11	I/O Expansion Modules	I/O Expansion Modules and Smart Link Boards
Chapter 12	Compatibility with MASTER-K	Functions compatible with MASTER-K PLC
Chapter 13	Maintenance	Inspections, Troubleshooting, and Communication Diagnostics
Chapter 14	Warranty	Warranty Information

1.2 Features

The features of XGB system are as follows.

1. High performance hardware.
    a. High Processing Speed
    b. Max. 284 I/O control supporting small & mid-sized system implementation

Item	Type
	XBM-DN32H
Operation processing speed	83ns / Step
Max IO contact point	256 points
Program capacity	20kstep
Max. no. of expanded stage	7 stages

    c. Large program capacity
    d. Expanded applications with the support of floating point.
2. Compact: the smallest size compared to competitors.

Item	Type	Size (W * H * D) (mm)	Remarks
Main Unit	XBM-DN32H	42 * 90 * 64	
Extension module	XBE-,XBF-,XBL-	20 * 90 * 60	Based off minimum size

3. Easily expandable system for improved user convenience.
    a. Removable terminal block connectors for convenient wiring.
    b. Expansion modules are easily connected and separated.
4. Improved programming ability with multiple kinds of register, RTC, comment backup, and more.
    a. Convenient programming environment by providing analog register and index register.
    b. Improved programming ability by operating plural and task programs through module program.
    c. Built-in Flash ROM enabling permanent backup of program without any separate battery.
    d. Detailed comments for devices aid in programming.
    e. Built-in RTC function enabling convenient history and schedule management
5. Optimized communication environment.
    a. With 2 channels built-in serial COM and 1 faster ethernet COM, communication is available without any expansion module.
    b. Supporting various protocols for added convenience. Modbus, user-defined, and dedicated (XGT server) protocols.

c. Communication module may be additionally increased by adding modules (up to 2 stages such as Cnet, Ethernet, and etc).

d. Convenient network-diagnostic function through network & communication frame monitoring.

e. Convenient networking to other systems through Ethernet or Cnet.

6. Applications expanded with a variety of I/O modules.

   a. 8, 16, 32 point modules provided (if relay output, 8/16 point module).

   b. Single input, single output, and combined I/O modules supported.

7. Applications expanded through analog-dedicated register design and full attachable mechanism.

   a. Up to 10 analog option modules can be attached to base.

   b. With analog dedicated register (U) and dedicated monitoring function, I/O use is maximized. Able to designate operations using easy programming of U area and monitoring function.

8. Integrated programming environment

   a. XG5000: an all-in-one program for convenient application development, monitoring, diagnosis, and editing.

9. Built-in high-speed counter function

   a. 1-Phase and 2-Phase high-speed-counter built-in.

   b. Parameter setting, diverse monitoring, and diagnosis function using XG5000.

   c. Monitoring function in XG5000 can inspect without a program, inspect external wiring, data setting, and more.

10. Built-in position control function (XBC-DN32UP/ DP32UP/DR28UP type only)

    a. Supporting max 2Mpps and 4 axes.

    b. Parameter setting, operation data collection, diverse monitoring, and diagnosis by using XG5000.

    c. Monitoring function in XG5000 can inspect without a program, inspect external wiring, data setting, and more.

11. Built-in PID

    a. Supports a maximum of 16 loops.

    b. Set parameters by using XG5000 which supports loop status monitoring conveniently with trend monitor.

    c. Control constant setting through the improved Auto-tuning function.

    d. With many other additional functions including: PWM output, ΔMV, ΔPV, and SV Ramp, improving control preciseness.

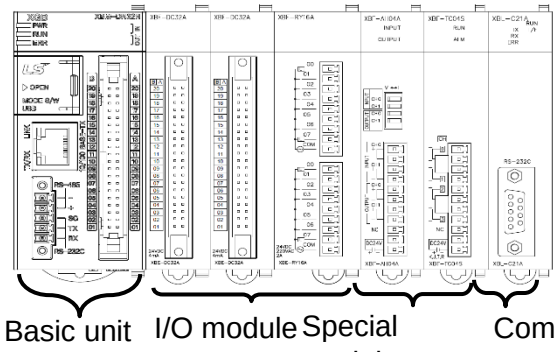
    e. Supports types of control modes such as forward/backward mixed operation, 2-stage SV PID control, cascade control, and etc.

    f. A variety of warning functions such as PV MAX and PV variation for safety.

12. Built-in Analog control function (XBC-DN32UA/DN32UA/DR28UA type only)
    a. 4 channel (voltage/current) analog input
    b. 4 channel (2 voltage, 2 current) analog output
    c. 14bit resolution

1.3 XGB System Configuration

XGB series System Configuration is as follows.
Up to 7 expansion modules are available. (Only up to two communication modules supported per PLC)



Item		Description
Total I/O points		•XBM-DN32H: up to 256 points
Maximum number of expansion modules	Digital I/O module	• Max. 7
	Special module	• Max. 7
	Comm I/F module	• Max. 2
	Option module	• N/A
Main unit	"U" type	• XBC-DN32U(/DC) • XBC-DN32UP(/DC) • XBC-DP32U(/DC) • XBC-DP32UP(/DC) • XBC-DR28U(/DC) • XBC-DR28UP(/DC) • XBC-DN32UA(/DC) • XBC-DP32UA(/DC) • XBC-DR28UA(/DC)
Expansion module	Digital I/O module	• XBE-DC08/16A/B/32A • XBE-TN08/16/32A • XBE-TP08/16/32A • XBE-RY08A/B/16A • XBE-DR16A • XBE-DN32A
	Special module	• XBF-AD04A • XBF-DV04A • XBF-TC04RT • XBF-AD08A • XBF-DV04C • XBF-TC04TT • XBF-AD04C • XBF-AH04A • XBF-PD02A • XBF-DC04A • XBF-RD04A • XBF-HD02A • XBF-DC04C • XBF-TC04S • XBF-HO02A
	Communication I/F module	• XBL-C41A • XBL-C21A • XBL-EIPT • XBL-EMTA • XBL-EIMT • XBL-CMEA • XBL-CSEA • XBL-PMEC • XBL-PSEA • XBL-DSEA

1.4 Product List

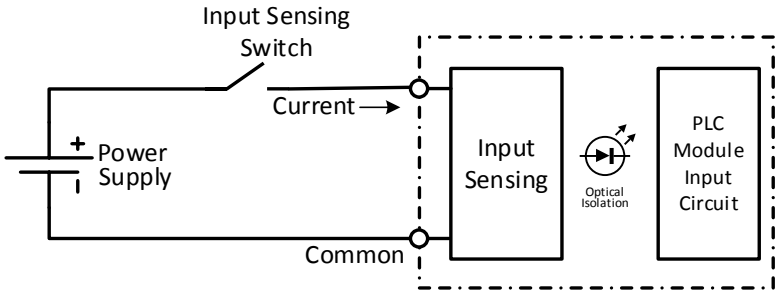
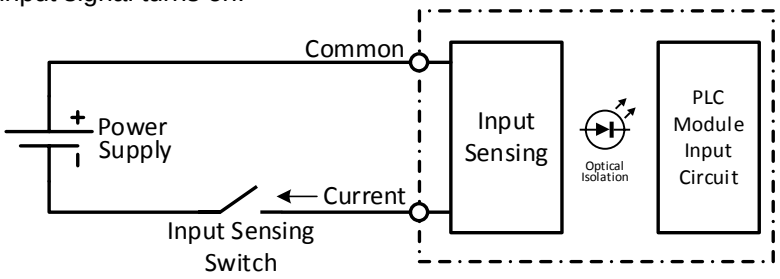
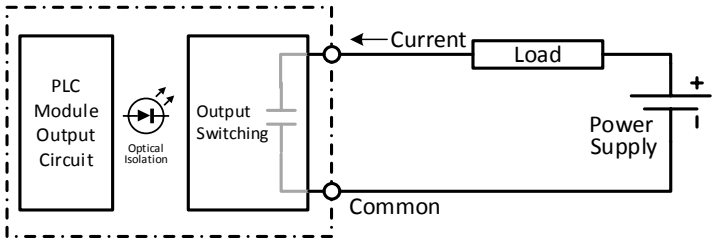
Types	Model	Description	Remark
Main Unit	XBM-DN32H	AC110-220V power supply, DC24V input 16 point, Transistor output 16 point(sink)	Basic type
Expansion Unit	XBE-DC08A	DC24V Input 8 point	Input
	XBE-DC16A/B	DC24V Input 16 point	
	XBE-DC32A	DC24V Input 32 point	
	XBE-RY08A	Relay output 8 point	Output
	XBE-RY08B	Relay output 8 point(isolated output)	
	XBE-RY16A	Relay output 16 point	
	XBE-TN08A	Transistor output 8 point (sink type)	
	XBE-TN16A	Transistor output 16 point (sink type)	
	XBE-TN32A	Transistor output 32 point (sink type)	
	XBE-TP08A	Transistor output 8 point (source type)	
	XBE-TP16A	Transistor output 16 point (source type)	
	XBE-TP32A	Transistor output 32 point (source type)	
	XBE-DR16A	DC24V Input 8 point, Relay output 8 point	In/Output
	XBE-DN32A	DC24V Input 16 point, Transistor output 16 point (sink type)	
Special Module	XBF-AD04A	Current/Voltage input 4 channel, 1/4000 resolution	Analog In/Out
	XBF-AD04C	Current/Voltage input 4 channell, 1/16000 resolution	
	XBF-AD08A	Current/Voltage input 8 channel, 1/4000 resolution	
	XBF-DC04A	Current output 4 channell, 1/4000 resolution	
	XBF-DC04C	Current output 4 channel, High resolutionl, 1/16000 resolution	
	XBF-DV04A	Voltage output 4 channell, 1/4000 resolution	
	XBF-DV04C	Voltage output 4 channel, 1/16000 resolution	
	XBF-AH04A	Current/Voltage input 2 channel, Current/Voltage output 2 channel, 1/4000 resolution	
Special Module	XBF-RD04A	RTD (Resistance Temperature Detector) input 4 channel, Pt100, Jpt100	Temperature
	XBF-RD01A	RTD (Resistance Temperature Detector) input 1 channel, Pt100, Jpt100	
	XBF-TC04S	TC (Thermocouple) input 4 channel	
	XBF-PD02A	Position 2Axis, Line Drive type, Max 2Mpps	Positioning
	XBF-HD02A	High Speed Counter 2 channel, Line Drive Type	Counter
	XBF-HO02A	High Speed Counter 2 channel, Open Collector Type	
	XBF-TC04RT	Temperature controller module (RTD input, 4 roof)	-
	XBF-TC04TT	Temperature controller module (TC input, 4 roof)	-
	XBF-PN08B	Network position (Open type Ethercat) 8 Axis	-

Types	Model	Description	Remark
Communication Module	XBL-C21A	Cnet (RS-232C/Modem) I/F	-
	XBL-C41A	Cnet (RS-422/485) I/F	-
	XBL-EMTA	Enet I/F	-
	XBL-EIMT/F/H	RAPIEnet I/F 2 UTP cable	-
	XBL-EIPT	EtherNet I/P Module	-
	XBL-CMEA	CANopen MasterI/F	-
	XBL-CSEA	CANopen Slave I/F	-
	XBL-PMEC	Profibus-DP, Master	-
	XBL-PSEA	Profibus-DP, Slave	-
	XBL-DSEA	DeviceNet, Slave	-
	USB-301A	Connection cable (PC to PLC), USB	-

1.5 Terminology

The following table gives definition of terms used in this manual.

Terms	Definition	Remark
Module	A standard component that has a specified function which configures the system. Devices such as I/O board, which is inserted onto the mother board.	Example: Expansion module, Special module, Communication module
Unit	A single module or group of modules that perform an independent operation as a part of a PLC system.	Example: Main unit, Expansion unit
PLC System	A system which consists of the PLC and peripheral devices. A user program can control the system.	-
XG5000	A program and debugging tool for the PLC. It executes program creation, editing, compiling, and debugging. (PADT: Programming Added Debugging Tool)	-
I/O image area	Internal memory area of the CPU module which used to hold I/O status.	
Cnet	Serial Communication Network	-
FEnet	Fast Ethernet Network	-
Pnet	Profibus-DP Network	-
Dnet	DeviceNet Network	-
RTC	Abbreviation of 'Real Time Clock'.	-
Watchdog Timer	Monitors pre-set execution times of programs and warns if a program is not competed within the pre-set time.	-

Terms	Definition
Sink Input	Current flows from the switch to the PLC input terminal if an input signal turns on. 
Source Input	Current flows from the PLC input terminal to the switch after an input signal turns on. 
Sink Output	Current flows from the load to the output terminal and the PLC output turns on. 
Source Output	Current flows from the output terminal to the load and the PLC output turns on.