# Hardware Overview

Hardware Features

The MicroLogix 1400 programmable controller contains a power supply, input and output circuits, a processor, an isolated combination RS-232/RS-485 communication port, an Ethernet port, and a non-isolated RS-232 communication port. Each controller supports 32 discrete I/O points (20 digital inputs, 12 discrete outputs) and 6 analog I/O points (4 analog inputs and 2 analog outputs: 1766-L32BWAA, 1766-L32AWAA, and 1766-L32BXBA only).

Figure 1 shows the hardware features of the controller.

Figure 1 - Controller Hardware Features

Left side view   Top view
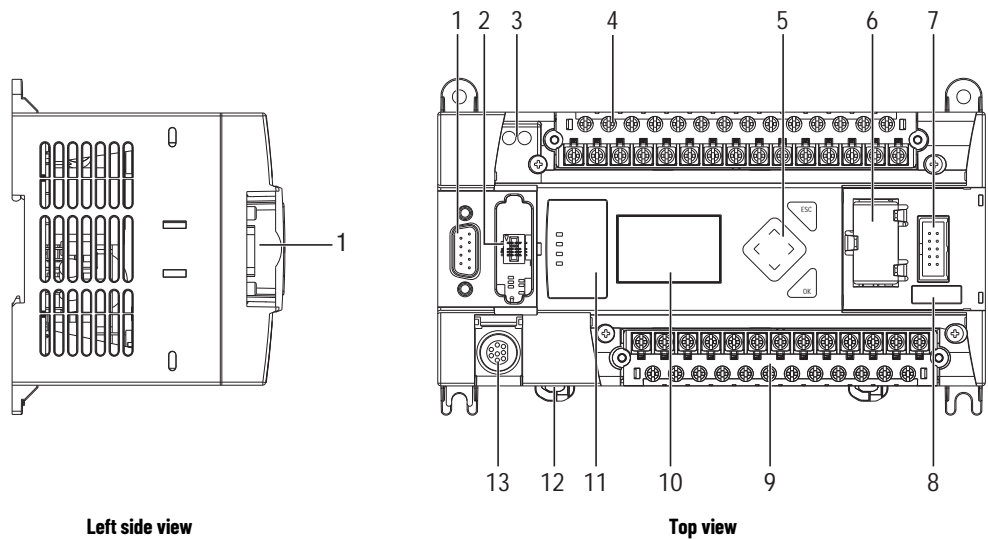
Controller Description

	Description		Description
1	Comm port 2 – 9-pin D-shell RS-232C connector	8	Battery connector
2	Memory module	9	Output terminal block
3	User 24V (for 1766-BWA and 1766-BWAA only)	10	LCD display
4	Input terminal block	11	Status indicator panel
5	LCD display keypad (ESC, OK, Up, Down, Left, Right)	12	Comm port 1 – RJ45 connector
6	Battery compartment	13	Comm port 0 – 8-pin mini DIN RS-232C/RS-485 connector
7	1762 expansion bus connector		

Controller Input and Output Description

Catalog Number	Description				
	Input Power	**User Power**	**Embedded Discrete I/O**	**Embedded Analog I/O**	**Comm. Ports**
1766-L32BWA	100/240V AC	24V DC	12 fast 24V DC inputs 8 normal 24V DC inputs 12 relay outputs	None	1 RS-232/RS-485[1] 1 Ethernet 1 RS-232[2]
1766-L32AWA		None	20 120V AC inputs 12 relay outputs		
1766-L32BXB	24V DC		12 fast 24V DC inputs 8 normal 24V DC inputs 6 relay outputs 3 fast DC outputs 3 normal DC outputs		
1766-L32BWAA	100/240V AC	24V DC	12 fast 24V DC inputs 8 normal 24V DC inputs 12 relay outputs	4 voltage inputs 2 voltage outputs	
1766-L32AWAA		None	20 120V AC inputs 12 relay outputs		
1766-L32BXBA	24V DC		12 fast 24V DC inputs 8 normal 24V DC inputs 6 relay outputs 3 fast DC outputs 3 normal DC outputs		

(1)   Isolated RS-232/RS-485 combo port.
(2)   Non-isolated RS-232. Standard D-sub connector

Component Descriptions

MicroLogix 1400 Memory Module and Built-in Real-time Clock

The controller has a built-in real-time clock to provide a reference for applications that need time-based control.

The controller is shipped with a memory module port cover in place. You can order a memory module, 1766-MM1, as an accessory. The memory module provides optional backup of your user program and data, and is a means to transport your programs between controllers.

The program and data in your MicroLogix 1400 is non-volatile and is stored when the power is lost to the controller. The memory module provides additional backup that can be stored separately. The memory module does not increase the available memory of the controller.

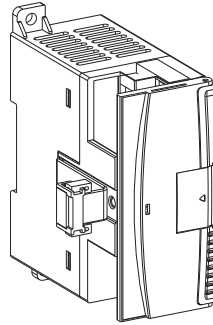**Figure 2 - 1766-MM1 Memory Module**
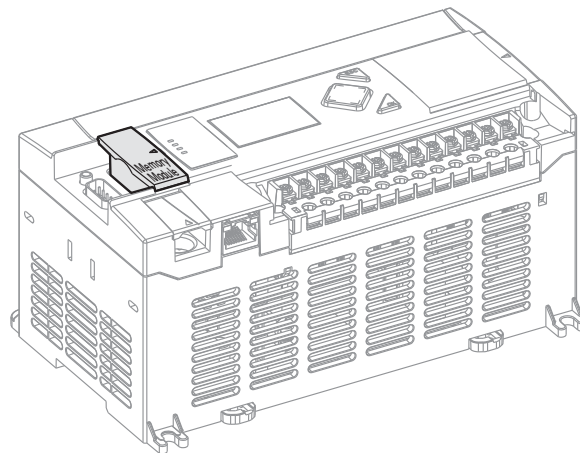
1762 Expansion I/O Modules

1762 expansion I/O modules can be connected to the MicroLogix 1400 controller, as shown in Figure 3.

> A maximum of seven I/O modules, in any combination, can be connected to a controller. See Appendix H to determine how much heat a certain combination generates.

Figure 3 - 1762 Expansion I/O Modules

1762 expansion I/O module   1762 expansion I/O modules connected to a MicroLogix 1400 controller
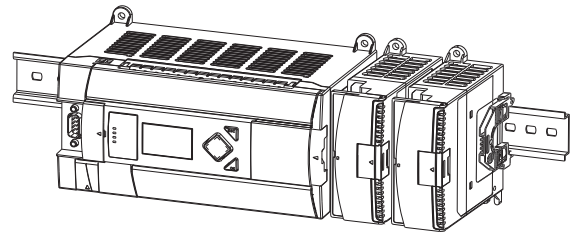
Expansion I/O Modules

Catalog Number	Description
Digital	
1762-IA8	8-point 120V AC input module
1762-IQ8	8-point sink/source 24V DC input module
1762-IQ16	16-point sink/source 24V DC input module
1762-IQ32T	32-point sink/source 24V DC input module
1762-OA8	8-point 120/240V AC Triac output module
1762-OB8	8-point sourcing 24V DC output module
1762-OB16	16-point sourcing 24V DC output module
1762-OB32T	32-point sourcing 24V DC output module
1762-OV32T	32-point sinking 24V DC output module
1762-OW8	8-point AC/DC relay output module
1762-OW16	16-point AC/DC relay output module
1762-OX6I	6-point isolated AC/DC relay output module
1762-IQ8OW6	8-point sink/source 24V DC input and 6-point AC/DC relay output module
Analog	
1762-IF4	4-channel voltage/current analog input module
1762-OF4	4-channel voltage/current analog output module
1762-IF2OF2	Combination 2-channel input 2-channel output voltage/current analog module
Temperature	
1762-IR4	4-channel RTD/resistance input module
1762-IT4	4-channel thermocouple/mV input module

Communication Cables

Use only the following communication cables with the MicroLogix 1400 controllers. These cables are required for Class I Div. 2 applications.

- 1761-CBL-AM00, Series C or later
- 1761-CBL-AP00, Series C or later
- 1761-CBL-PM02, Series C or later
- 1761-CBL-HM02, Series C or later
- 1763-NC01, Series A or later
- 1747-CP3, Series A or later

ATTENTION: UNSUPPORTED CONNECTION
Do not connect a MicroLogix 1400 controller to another MicroLogix family controller such as MicroLogix 1000, MicroLogix 1200, MicroLogix 1500, or the network port of a 1747-DPS1 port splitter with a 1761-CBL-AM00 (8-pin mini-DIN to 8-pin mini-DIN) cable or equivalent.
This type of connection damages the RS-232/RS-485 communication port (Channel 0) of the MicroLogix 1400 and/or the controller itself. The communication pins that are used for RS-485 communications on the MicroLogix 1400 are alternately used for 24V power on the other MicroLogix controllers and the network port of the 1747-DPS1 port splitter.

Programming

Program the MicroLogix 1400 controller using RSLogix 500/RSLogix Micro software, version 8.10.00 or later for Series A controllers and version 8.30.00 or later for Series B and Series C controllers. Communication cables for programming are available separately from the controller and software.

Firmware Revision History

Features are added to the controllers through firmware updates. Use the listing in to be sure that your controller's firmware is at the level you need. Firmware updates are not required, but they allow you to access to the new features.

Table 1 - MicroLogix 1400 Controllers

Catalog Number	OS[1] Series Letter	OS Revision Letter	OS Firmware Release Number	Release Date	Enhancement
1766-L32AWA 1766-L32BWA 1766-L32BBB	A	A	FRN1	August 2005	Initial product release
	A	B	FRN2	October 2005	According to the SRAM component, MicroLogix 1400 could cause Hard-fault at the start of the Operating System in a very high temperature environment. Corrected.
	A	C	FRN3	February 2006	Added Data file write feature through web server.
1766-L32AWA 1766-L32BWA 1766-L32BBB	B	A	FRN4	February 2007	• Direct connection to RS-485 Network for DF1 half-duplex master driver • Direct connection to RS-485 Network for DF1 half-duplex slave driver • Direct connection to RS-485 Network for ASCII driver • Selectable Stop/Data Bits for Modbus master RTU driver • Selectable Stop/Data Bits for Modbus slave RTU driver • Selectable Stop/Data Bits for ASCII driver • Settable Inactivity Timeout feature for Ethernet driver • Unsolicited Ethernet messaging to RSLinx® OPC topic • CIP™ Generic messaging through the Ethernet port • Unconnected EtherNet/IP protocol for Ethernet driver • IP conflict detection mechanism • Email feature • Ethernet MSG break bit • DNS functionality when the email feature is used • Change IP address with Ethernet MSG instruction • ST file type for all PCCC commands • HSC (High-Speed Counter) up to 40 KHz • PTO/PWM up to 40 KHz • 2-channel Analog Input Filter • Web View Disable for Data Files
1766-L32AWA 1766-L32BWA 1766-L32BBB	B	B	FRN5	May 2007	• Fixed anomaly for CIP Messaging Error when CIP Service Code is 4Bh or 4Ch. • Fixed anomaly for the EtherNet/IP List Identity reply. • Fixed anomaly for window size error in TCP/IP stack. • Improved system interrupt delay time.
1766-L32DWD	B	B	FRN5	May 2007	• Initial Product release. Supports the features that are listed above for the 1766-L32AWA, 1766-L32BWA, and 1766-L32BBB controllers.

(1)   OS = Operating system

Communication Options

MicroLogix 1400 controllers provide three communications ports: an isolated combination RS-232/RS-485 communication port (Channel 0), an Ethernet port (Channel 1), and a non-isolated RS-232 communication port (Channel 2).

You can connect Channel 0 and Channel 2 ports on the MicroLogix 1400 controller to the following:

- Operator interfaces, personal computers, and so on, with DF1 full-duplex point-to-point
- A DH-485 network
- A DF1 Radio Modem network
- A DF1 half-duplex network as an RTU master or RTU slave
- A Modbus network as an RTU master or RTU slave
- An ASCII network
- An Ethernet network using the Ethernet Interface module (catalog number 1761-NET-ENI, or 1761-NET-ENIW)
- A DNP3 network as a slave

When connecting to an RS-485 network with DH-485, DF1 half-duplex master/slave, Modbus RTU master/slave, or DNP3 slave protocols, you can connect the MicroLogix 1400 controller directly via Channel 0 without an Advanced Interface Converter, catalog number 1761-NET-AIC. The Channel 0 combo port provides both RS-232 and RS-485 isolated connections. The appropriate electrical interface is selected through your choice of communication cable. The existing MicroLogix 1761 communication cables provide an interface to the RS-232 drivers. The 1763-NC01 cable provides an interface to the RS-485 drivers.

You can also connect the controller to serial devices, such as barcode readers, weigh scales, serial printers, and other intelligent devices, using ASCII. **See Default Communication Configuration on page 57** for the configuration settings for Channel 0. MicroLogix 1400 controller can be connected directly to the RS-485 network via channel 0, using ASCII.

The MicroLogix 1400 supports EtherNet/IP™ communication via the Ethernet communication Channel 1. In addition, either Modbus TCP or DNP3 over IP can be enabled for Channel 1. You can connect your controller to a local area network that provides communication between various devices at 10 Mbps or 100 Mbps. This port supports CIP explicit messaging (message exchange) only. The controller cannot be used for CIP implicit messaging (real-time I/O messaging). The controller also includes an embedded web server that allows viewing of not only module information, TCP/IP configuration, and diagnostic information, but also includes the data table memory map and data table monitor screen using a standard web browser.

See Chapter 4 for more information on how to connect to the available communication options.