

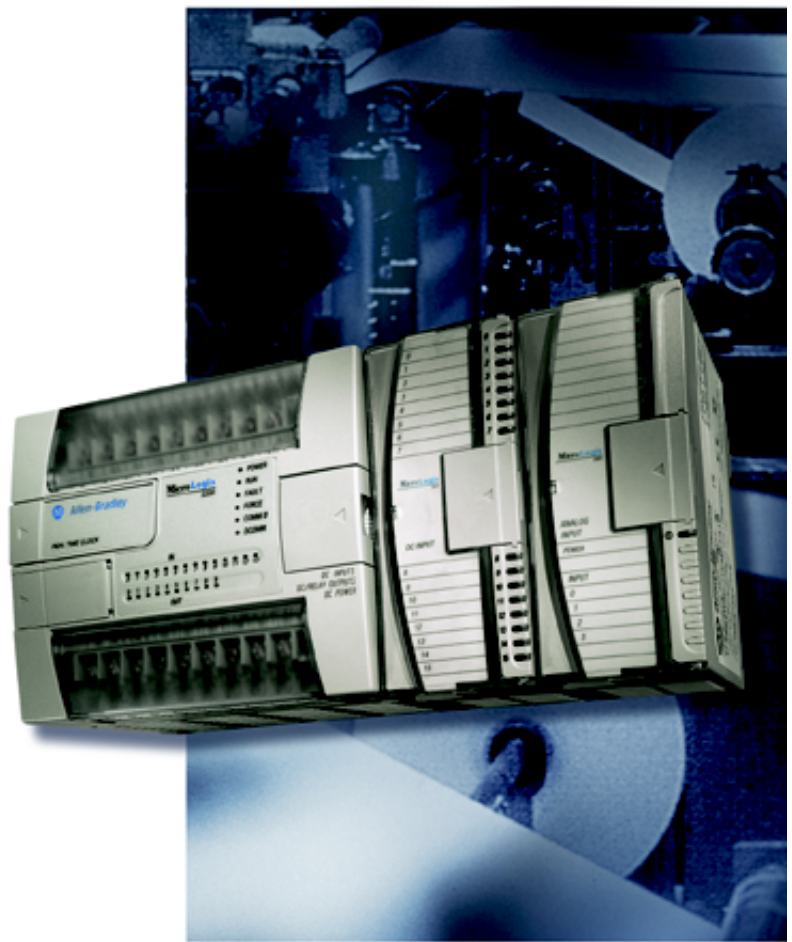


**Allen-Bradley**

*Technical Data*

# MicroLogix™ 1200 Programmable Controllers

Bulletin 1762



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## MicroLogix 1200 System



MicroLogix 1200 controllers provide the computing power and flexibility to solve a variety of applications utilizing the proven MicroLogix and SLC 500 family architecture.

Available in 24 and 40-point versions, the I/O count can be expanded using rackless I/O modules. This results in lower system cost and reduced parts inventory.

A field-upgradable flash operating system ensures you will always be up-to-date with the latest features, without having to replace hardware. The controller can be easily updated with the latest firmware via a web site download.

The MicroLogix 1200 controller utilizes Rockwell Software RSLogix 500 programming software and shares a common instruction set with the MicroLogix 1000, MicroLogix 1500 and SLC 500 families of controllers.

MicroLogix 1200 controllers with the additional communications port called the Programmer/HMI Port (1762-LxxxxxR processors only) offer advanced communications options, providing a clean, efficient solution for applications requiring a network connection and HMI.

## Advantages

- Large 6K memory to solve a variety of applications
- Field-upgradable flash operating system
- High performance expansion I/O options (up to 6 modules depending on power budget)
- Advanced communications options including peer-to-peer and SCADA/RTU networks, DH-485, DeviceNet, and EtherNet/IP
  - via the Communications Port (Channel 0) on the Base Unit
- Communications toggle push button
- An additional communication port called the Programmer/HMI Port, providing additional connectivity of a DF1-Full Duplex compatible device such as an operator interface or programming terminal (1762-LxxxxxR processor only)
- Data file download protection prevents critical user data from being altered via communications
- Two built-in analog trim potentiometers
- Optional real-time clock
- Optional memory module
- 20 kHz high-speed counter, featuring 8 modes of operation
- One high-speed output that can be configured as 20 kHz PTO (Pulse Train Output) or as PWM (Pulse Width Modulated) outputs
- Four high-speed latching (pulse-catch) inputs
- 32-bit signed integer math
- High-resolution, 1 ms timers
- Floating-point data file
- Built-in PID capabilities
- ASCII read/write capability
- Four event interrupt inputs (EII)
- One, 1 ms, selectable timed interrupt (STI)
- Finger-safe terminal blocks meet global safety standards
- Removable terminal blocks on 40-point controllers allow pre-wiring
- Regulatory agency certifications for world-wide market (CE, C-Tick, UL, c-UL, including Class I Division 2 Hazardous Location)

## MicroLogix 1200 Controllers

## Controller Specifications

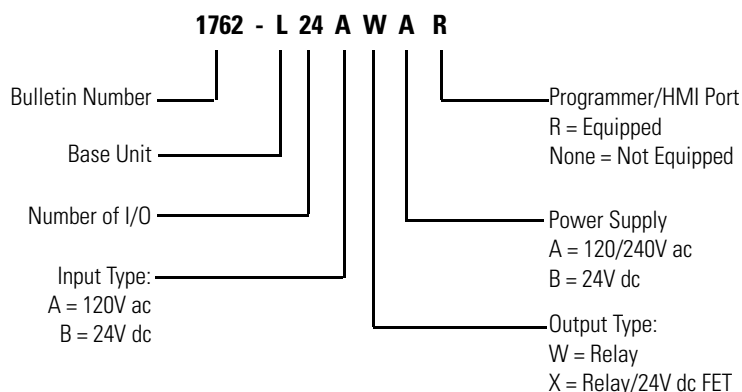
The following tables summarize the specifications for MicroLogix 1200 controllers.

**Table 1 Controller General Specifications**

Specification	All 1762 Controllers
Memory Size and Type	6K flash memory: 4K user program, 2K user data
Data Elements	configurable, user-defined file structure, 2K max. data size
Throughput	2 ms (for a typical 1K word user program) <sup>(1)</sup>

<sup>(1)</sup> A typical user program contains bit, timer, counter, math and file instructions.

**Figure 2 Catalog Number Detail**



**Table 3 Controller Power and I/O Configuration**

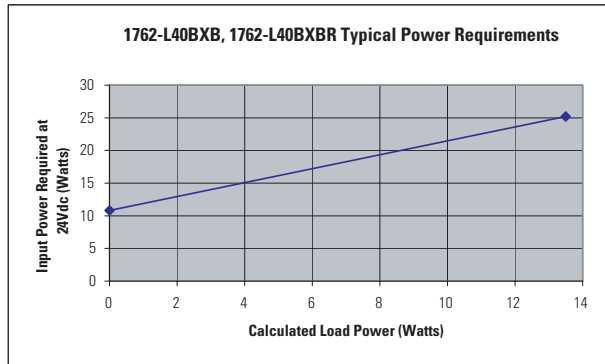
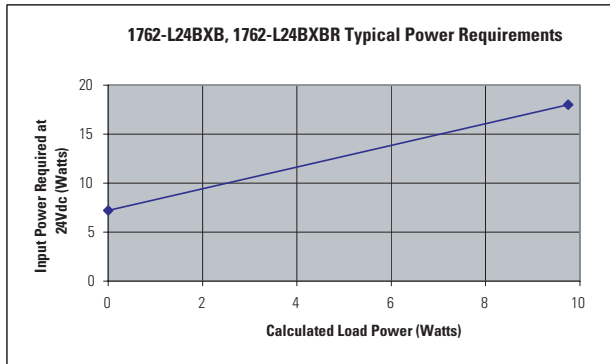
Line Power	Inputs	Outputs	High Speed I/O	Catalog Number
120/240V ac	(14) 120V ac	(10) Relay	n/a	1762-L24AWA, -L24AWAR
120/240V ac	(24) 120V ac	(16) Relay	n/a	1762-L40AWA, -L40AWAR
120/240V ac	(10) Standard 24V dc (4) Fast 24V dc	(10) Relay	(4) 20 kHz input	1762-L24BWA, -L24BWAR
120/240V ac	(20) Standard 24V dc (4) Fast 24V dc	(16) Relay	(4) 20 kHz input	1762-L40BWA, -L40BWAR
24V dc	(10) Standard 24V dc (4) Fast 24V dc	(5) Relay (4) Standard 24V dc FET (1) Fast 24V dc FET	(4) 20 kHz input (1) 20 kHz output	1762-L24BWB, -L24BWBW
24V dc	(20) Standard 24V dc (4) Fast 24V dc	(8) Relay (7) Standard 24V dc FET (1) Fast 24V dc FET	(4) 20 kHz input (1) 20 kHz output	1762-L40BWB, -L40BWBW

**Table 4 Controller Power Supply Specifications**

Specification	1762-						
	L24AWA, L24AWAR	L40AWA, L40AWAR	L24BWA, L24BWAR	L40BWA, L40BWAR	L24BXB, L24BXBR	L40BXB, L40BXBR	
Power Supply Voltage	85 to 265V ac at 47 to 63 Hz				20.4 to 26.4V dc Class 2 SELV		
Power Consumption	68 VA	80 VA	70 VA	82 VA	27W	40W	
Power Supply Inrush Current (max.)	120V ac: 25A for 8 ms 240V ac: 40A for 4 ms				24V dc: 15A for 20 ms	24V dc: 15A for 30 ms	
Maximum Load Current <sup>(1)</sup>	5V dc	400 mA	600 mA	400 mA	600 mA	400 mA	600 mA
	24V dc	350 mA	500 mA	350 mA	500 mA	350 mA	500 mA
Maximum Load Power	10.4W	15W	12W	16W	10.4W	15W	
24V dc Sensor Power	n/a	n/a	250 mA, 400 µF capacitance max.	400 mA, 400 µF capacitance max.	n/a	n/a	

<sup>(1)</sup> See System Expansion Calculations on page 26 for an example system validation worksheet to calculate expansion I/O power usage.

**Figure 5 DC Input Power Requirements for BXB Units**



**Table 6 Controller Input Specifications**

Specification	1762-L24AWA, -L24AWAR 1762-L40AWA, -L40AWAR	1762-L24BWA, -L24BXB, -L40BWA, -L40BXB 1762-L24BWAR, -L24BXHR, -L40BWAR, -L40BXHR	
		Inputs 0 through 3	Inputs 4 and higher
On-State Voltage Range	79 to 132V ac at 47 Hz to 63 Hz	14 to 26.4V dc at 55°C (131°F) 14 to 30.0V dc at 30°C (86°F)	10 to 26.4V dc at 55°C (131°F) 10 to 30.0V dc at 30°C (86°F)
Off-State Voltage Range	0 to 20V ac	0 to 5V dc	
Operating Frequency	n/a	0 Hz to 20 kHz	0 Hz to 1 kHz (scan time dependent)
Signal Delay (max.)	ON Delay = 20 ms OFF Delay = 20 ms	standard inputs: selectable from 0.5 to 16 ms high-speed inputs: selectable from 0.025 to 16 ms	
On-State Current:			
Minimum	5.0 mA at 79V ac	2.5 mA at 14V dc	2.0 mA at 10V dc
Nominal	12 mA at 120V ac	7.3 mA at 24V dc	8.9 mA at 24V dc
Maximum	16.0 mA at 132V ac	12.0 mA at 30V dc	12.0 mA at 30V dc
Off-State Leakage Current (max.)	2.5 mA max.	1.5 mA min.	
Nominal Impedance	12K $\Omega$ at 50 Hz 10K $\Omega$ at 60 Hz	3.3K $\Omega$	2.7K $\Omega$
Maximum Inrush Current	250 mA at 120V ac	n/a	

**Table 7 Controller Digital Output Specifications**

Specification	1762-		
	L24AWA, L24BWA, L24BXB, L40AWA, L40BWA, L40BXB, L24AWAR, L24BWAR, L24BXBR, L40AWAR, L40BWAR, L40BXBR	L24BXB, -L40BXB L24BXBR, -L40BXBR	
	Relay	FET Standard Operation	FET High-Speed Operation (Output 2 only)
Operating Voltage Range	5 to 125V dc 5 to 264V ac	21.6 to 27.6V dc	21.6 to 27.6V dc
Continuous Current per Point (max.)	See Table 8, Relay Contact Rating.	See Figure 9, FET Standard Outputs Continuous Current per Point (max.).	100 mA
Continuous Current per Common (max.)	8.0A	7.5A for L24BXB, L24BXBR 8.0A for L40BXB, L40BXBR	
Continuous Current per Controller (max.)	30A or total of per-point loads, whichever is less at 150V max. 20A or total of per-point loads, whichever is less at 240V max.		
On-State Current (min.)	10.0 mA	1 mA	10.0 mA
Off-State Leakage Current (max.)	0 mA	1 mA	
Signal Delay (max.) - resistive load	ON Delay = 10 ms OFF Delay = 10 ms	ON Delay = 0.1 ms OFF Delay = 1.0 ms	ON Delay = 6 $\mu$ s OFF Delay = 18 $\mu$ s
Surge Current per Point (peak)	n/a	4A for 10 ms <sup>(1)</sup>	

<sup>(1)</sup> Repeatability is once every 2 seconds at +55°C (+131°F), once every 1 second at +30°C (+86°F).

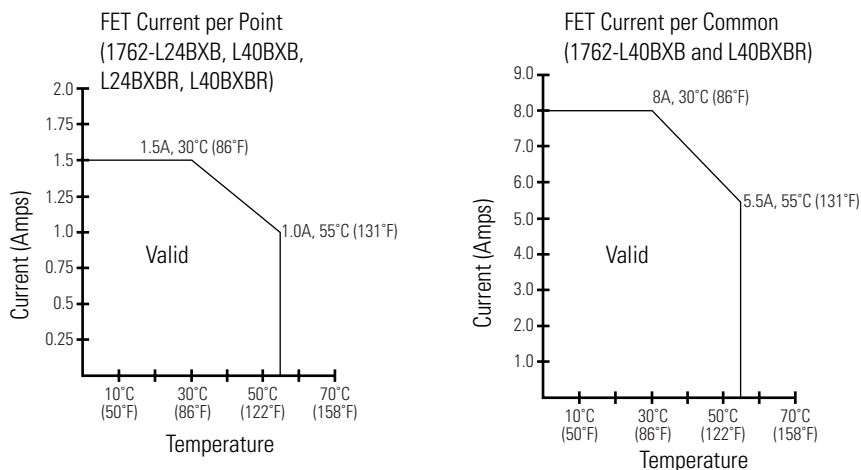
**Table 8 Relay Contact Rating**

Maximum Voltage	Amperes		Amperes Continuous	Voltamperes	
	Make	Break		Make	Break
240V ac	7.5A	0.75A	2.5A	1800 VA	180 VA
120V ac	15A	1.5A			
125V dc	0.22A <sup>(1)</sup>		1.0A	28 VA	
24V dc	1.2A <sup>(1)</sup>		2.0A		





<sup>(1)</sup> For dc voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28 VA by the applied dc voltage. For example, 28 VA/48V dc = 0.58A. For dc voltage applications less than 48V, the make/break ratings for relay contacts cannot exceed 2A. For dc voltage applications greater than 48V, the make/break ratings for relay contact cannot exceed 1A.



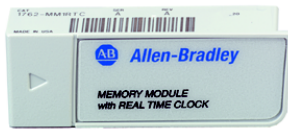
**Figure 9 FET Standard Outputs Continuous Current per Point (max.)**



**Table 10 Environmental Specifications**

Specification	1762 Controllers
Operating Temperature	0°C to +55°C (+32°F to +131°F)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Humidity	5 to 95% non-condensing
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. max. peak-to-peak, 2 hours each axis Relay Operation: 1.5G
Shock	Operating: 30G; 3 pulses each direction, each axis Relay Operation: 7G Non-Operating: 50G panel mounted (40G DIN Rail mounted); 3 pulses each direction, each axis
Agency Certification	<p> UL Listed Industrial Control Equipment   UL Listed Industrial Control Equipment for use in Canada                      UL Listed Industrial Control Equipment for use in Class I, Division 2 Hazardous Locations Groups A, B, C, D</p> <p> Marked for all applicable directives</p> <p> Marked for all applicable acts</p>
Electrical/EMC	<p>The controller has passed testing at the following levels:</p> <ul style="list-style-type: none"> <li>• EN 61000-4-2: 4 kV contact, 8 kV air, 4 kV indirect</li> <li>• EN 61000-4-3: 10V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier</li> <li>• EN 61000-4-4: 2 kV, 5 kHz; communications cable: 1 kV, 5 kHz</li> <li>• EN 61000-4-5: communications cable 1 kV galvanic gun I/O: 2 kV CM (common mode), 1 kV DM (differential mode) AC Power Supply: 4 kV CM (common mode), 2 kV DM (differential mode) DC Power Supply: 500V CM (common mode), 500V DM (differential mode)</li> <li>• EN 61000-4-6: 10V, communications cable 3V</li> </ul>

## Memory and Real-Time Clock Modules



The controller is shipped with a memory module port cover in place. You can order the memory module, real-time clock, or combination module to suit your needs.

### *Real-Time Clock (1762-RTC)*

- Allows for time/date scheduling
- Self-contained battery provides long-term time base

### *Memory Modules (1762-MM1, 1762-MM1RTC)*

- User program and data back-up
- Program compare
- Data file protection
- Memory module write protection
- Removal/insertion under power
- Memory back-up and real-time clock combination module

## Expansion I/O



MicroLogix 1200 I/O expansion modules provide superior functionality at a low cost. With a variety of modules, they complement and extend the capabilities of MicroLogix 1200 controllers by maximizing the flexibility of I/O count and type.

The MicroLogix 1200 system design allows modules to be either DIN rail or panel mounted. The DIN latches and screw mounting holes are an integral part of the package design.

Controller I/O can be expanded using up to 6 expansion modules per controller (depending on power budget).

### Advantages

- Rackless design, eliminating added system costs and inventory
- Small footprint with high density I/O, shrinking panel space requirements
- Integral high-performance I/O bus
- Software keying to prevent incorrect positioning within the system
- Feature-rich I/O functionality addresses a wide range of applications
- AC/DC relay, 24V dc, 120V ac, and 240V ac voltages
- Thermocouple/mV and RTD/Resistance temperature input modules

### Available Modules

**Table 11 1762 Expansion I/O Modules**

Catalog Number	Descriptions
1762-IA8	8-point 120V ac input
1762-IF20F2	2-channel analog voltage/current input 2-channel analog voltage/current output
1762-IF4	4-channel analog voltage/current input
1762-IQ8	8-point sink/source 24V dc input
1762-IQ16	16-point sink/source 24V dc input
1762-IR4	4-channel RTD/resistance input module
1762-IT4	4-channel thermocouple/mV input module
1762-OA8	8-point AC triac output
1762-OB8	8-point sourcing 24V dc output
1762-OB16	16-point sourcing 24V dc output
1762-OF4	4-channel analog voltage/current output

**Table 11 1762 Expansion I/O Modules**

1762-OW8	8-point AC/DC relay output
1762-OW16	16-point AC/DC relay output
1762-OX6I	6-point isolated relay output

*Digital I/O Specifications***Table 12 Digital Expansion Input Modules Specifications**

Specification	1762-IA8	1762-IQ8	1762-IQ16
Voltage Category	100/120V ac	24V dc (sink/source) <sup>(1)</sup>	24V dc (sink/source) <sup>(1)</sup>
Operating Voltage Range	79V ac to 132V ac at 47 Hz to 63 Hz	10 to 26.4V dc at 55°C (131°F) 10 to 30V dc at 30°C (86°F)	10 to 26.4V dc at 55°C (131°F) 10 to 30V dc at 30°C (86°F)
Number of Inputs	8	8	16
Number of Commons	1	1	2
Bus Current Draw (max.)	50 mA at 5V dc (0.25W)	50 mA at 5V dc (0.25W)	60 mA at 5V dc (0.25W)
Heat Dissipation (max.)	2.0 Total Watts	3.7 Total Watts	5.3 Total Watts at 30V 4.2 Total Watts at 26.4V
Signal Delay (max.)	On Delay: 20.0 ms Off Delay: 20.0 ms	On Delay: 8.0 ms Off Delay: 8.0 ms	On Delay: 8.0 ms Off Delay: 8.0 ms
Off-State Voltage (max.)	20V ac	5V dc	5V dc
Off-State Leakage Current (max.)	2.5 mA	1.5 mA	1.5 mA
On-State Voltage (min.)	79V ac (min.) 132V ac (max.)	10V dc	10V dc
On-State Current minimum nominal maximum	5.0 mA at 79V ac 47 Hz 12.0 mA at 120V ac 60 Hz 16.0 mA at 132V ac 63 Hz	2.0 mA at 10V dc 8.0 mA at 24V dc 12.0 mA at 30V dc	2.0 mA at 10V dc 8.0 mA at 24V dc 12.0 mA at 30V dc
Inrush Current (max.)	250 mA	n/a	n/a
Nominal Impedance	12K $\Omega$ at 50 Hz 10K $\Omega$ at 60 Hz	3K $\Omega$	3K $\Omega$
Isolated Groups	Group 1: inputs 0 to 7 (internally connected commons)	Group 1: inputs 0 to 7 (internally connected commons)	Group 1: inputs 0 to 7 Group 2: inputs 8 to 15
Input Group to Backplane Isolation	Verified by one of the following dielectric tests: 1517V ac for 1s or 2145V dc for 1s 132V ac working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V ac for 1s or 1697V dc for 1s 75V dc working voltage (IEC Class 2 reinforced insulation)	

<sup>(1)</sup> Sinking/Sourcing Inputs - Sourcing/sinking describes the current flow between the I/O module and the field device. Sourcing I/O circuits supply (source) current to sinking field devices. Sinking I/O circuits are driven by a current sourcing field device. Field devices connected to the negative side (DC Common) of the field power supply are sinking field devices. Field devices connected to the positive side (+V) of the field supply are sourcing field devices.

**Table 13 Digital Expansion Output Modules Specifications**

Specification	1762-0A8	1762-0B8	1762-0B16	1762-0W8	1762-0W16	1762-0X6I
Voltage Category	100 to 240V ac	24V dc	24V dc	AC/DC normally open relay	AC/DC normally open relay	AC/DC Type C Relay
Operating Voltage Range	85V ac to 265V ac at 47 to 63 Hz	20.4V dc to 26.4V dc	20.4V dc to 26.4V dc	5 to 265V ac 5 to 125V dc	5 to 265V ac 5 to 125V dc	5 to 265V ac 5 to 125V dc
Number of Outputs	8	8	16	8	16	6 (N.C., N.O.)
Number of Commons	2	1	1	2	2	6
Bus Current Draw (max.)	115 mA at 5V dc (0.575W)	115 mA at 5V dc (0.575W)	175 mA at 5V dc (0.88W)	80 mA at 5V dc (0.40W) 90 mA at 24V dc (2.16W)	120 mA at 5V dc (0.60W) 140 mA at 24V dc (3.36W)	110 mA at 5V dc (0.55W) 110 mA at 24V dc (2.64W)
Heat Dissipation (max.)	2.9 Total Watts	1.61 Total Watts	2.9 Total watts at 30°C (86°F) 2.1 Total watts at 55°C (131°F)	2.9 Total Watts	5.6 watts	2.8 watts
Signal Delay (max.) - resistive load	On Delay: 1/2 cycle Off Delay: 1/2 cycle	On Delay: 0.1 ms Off Delay: 1.0 ms	On Delay: 0.1 ms Off Delay: 1.0 ms	On Delay: 10 ms Off Delay: 10 ms	On Delay: 10 ms Off Delay: 10 ms	On Delay: 10 ms Off Delay: 20 ms
Off-State Leakage (max.)	2 mA at 132V 2.5 mA at 265V	1.0 mA	1.0 mA	0 mA	0 mA	0 mA
On-State Current (min.)	10 mA	1.0 mA	1.0 mA	10 mA at 5V dc	10 mA	100 mA
On-State Voltage Drop (max.)	1.5V at 0.5A	1.0V dc	1.0Vdc	n/a	n/a	Not Applicable
Continuous Current per Point (max.)	0.25 A at 55°C (131°F) 0.5 A at 30°C (86°F)	0.5 A at 55°C (131°F) 1.0 A at 30°C (86°F)	0.5 A at 55°C (131°F) 1.0 A at 30°C (86°F)	2.5A (Also see Table 8, Relay Contact Rating on page 8.)		7A (Also see Table 8, Relay Contact Rating on page 8.)
Continuous Current per Common (max.)	1.0 A at 55° (131°F) 2.0 A at 30°C (86°F)	4.0 A at 55°C (131°F) 8.0 A at 30°C (86°F)	4.0 A at 55°C (131°F) 8.0 A at 30°C (86°F)	8A	8A	7A (Also see Table 8, Relay Contact Rating on page 8.)
Continuous Current per Module (max.)	2.0 A at 55°C (131°F) 4.0 A at 30°C (86°F)	4.0 A at 55°C (131°F) 8.0 A at 30°C (86°F)	4.0 A at 55°C (131°F) 8.0 A at 30°C (86°F)	16A	16A	30A
Surge Current (max.)	5.0A <sup>(1)</sup>	2.0A <sup>(2)</sup>	2.0 <sup>(2)</sup>	See Table 8, Relay Contact Rating on page 8.		

<sup>(1)</sup> Repeatability is once every 2 seconds for a durations of 25 ms.

<sup>(2)</sup> Repeatability is once every 2 seconds at 55°C (131°F), once every second at 30°C (86°F) for a duration of 10 ms.

## Analog Modules Specifications

**Table 14 Analog Expansion Modules Common Specifications**

Specification	1762-IF4	1762-IF20F2	1762-OF4
Bus Current Draw (max.)	40 mA at 5V dc 50 mA at 24V dc	40 mA at 5V dc 105 mA at 24V dc	40 mA at 5V dc 165 mA at 24V dc
Analog Normal Operating Range	Voltage: -10 to +10V dc Current: 4 to 20 mA	Voltage: 0 to 10V dc Current: 4 to 20 mA	Voltage 0 to 10V dc Current: 4 to 20 mA
Full Scale <sup>(1)</sup> Analog Ranges	Voltage: -10.5 to +10.5V dc Current: -21 to +21 mA	Voltage: 0 to 10.5V dc Current: 0 to 21 mA	Voltage: 0 to 10.5V dc Current: 0 to 21 mA
Resolution	15 bits	12 bits (unipolar)	12 bits (unipolar)
Repeatability <sup>(2)</sup>	±0.1%	±0.1%	±0.1%
Input and Output Group to System Isolation	30V ac/30V dc rated working voltage <sup>(3)</sup> (N.E.C. Class 2 required) (IEC Class 2 reinforced insulation) type test: 500V ac or 707V dc for 1 minute		30V ac/30V dc rated working voltage (IEC Class 2 reinforced insulation) type test: 500V ac or 707V dc for 1 minute

<sup>(1)</sup> The over- or under-range flag is set when the normal operating range is exceeded. The module continues to convert the analog input up to the maximum full scale range.

<sup>(2)</sup> Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.

<sup>(3)</sup> Rated working voltage is the maximum continuous voltage that can be applied at the terminals with respect to earth ground.

**Table 15 Analog Expansion Input Modules Specifications**

Specification	1762-IF4	1762-IF20F2
Number of Inputs	4 differential (bipolar)	2 differential (unipolar)
Update Time (typical)	130, 250, 290, 450, 530 ms (selectable)	2.5 ms
A/D Converter Type	Successive approximation	Successive approximation
Common Mode Voltage Range <sup>(1)</sup>	±27V	±27V
Common Mode Rejection <sup>(2)</sup>	> 55 dB at 50 and 60 Hz	> 55 dB at 50 and 60 Hz
Non-linearity (in percent full scale)	±0.1%	±0.1%
Typical Overall Accuracy <sup>(3)</sup>	±0.3% full scale at 0 to 55°C (32 to 131°F) ±0.24% full scale at 25°C (77°F)	±0.5% full scale at 0 to 55°C (32 to 131°F) ±0.3% full scale at 25°C (77°F)
Input Impedance	Voltage Terminal: 200K $\Omega$ , Current Terminal: 275 $\Omega$	Voltage Terminal: 200K $\Omega$ , Current Terminal: 250 $\Omega$
Current Input Protection	±32 mA	±32 mA
Voltage Input Protection	±30V	±30V
Channel Diagnostics	Over or under range or open circuit condition by bit reporting for analog inputs.	

<sup>(1)</sup> For proper operation, both the plus and minus input terminals must be within ±27V of analog common.

<sup>(2)</sup>  $V_{cm} = 1 V_{pk-pk} AC$

<sup>(3)</sup>  $V_{cm} = 0$  (includes offset, gain, non-linearity and repeatability error terms)

**Table 16 Analog Expansion Output Module Specifications**

Specification	1762-IF20F2	1762-OF4
Number of Outputs	2 single-ended (unipolar)	4 single-ended (bipolar)
Update Time (typical)	4.5 ms	
D/A Converter Type	Resistor string	R-2R Ladder Voltage Switching
Resistive Load on Current Output	0 to 500 $\Omega$ (includes wire resistance)	0 to 500 $\Omega$ (includes wire resistance)
Load Range on Voltage Output	> 1K $\Omega$	> 1K $\Omega$
Reactive Load, Current Output	< 0.1 mH	< 0.1 mH
Reactive Load, Voltage Output	< 1 $\mu$ F	< 1 $\mu$ F
Typical Overall Accuracy <sup>(1)</sup>	$\pm 1\%$ full scale at 0 to 55°C (32 to 131°F), $\pm 0.5\%$ full scale at 25°C (77°F)	$\pm 1\%$ full scale at 0 to 55°C $\pm 0.5\%$ full scale at 25°C
Output Ripple, range 0 to 500 Hz (referred to output range)	< $\pm 0.1\%$	< $\pm 0.1\%$
Non-linearity (in percent full scale)	< $\pm 0.5\%$	< $\pm 0.5\%$
Open and Short-Circuit Protection	Continuous	Continuous
Output Protection	$\pm 32$ mA	$\pm 32$ mA

<sup>(1)</sup> Includes offset, gain, non-linearity and repeatability error terms.

### *Temperature Input Modules*

Use these modules as a cost effective means of addressing process applications that require temperature measurement and control. Each channel can be individually configured using RSLogix 500 programming software. On-screen configuration allows you to choose the input type, filtering frequency, data format, and status data. On-board scaling is also provided.

**Table 17 Temperature Expansion Input Modules Specifications**

Specification	1762-IT4	1762-IR4
Bus Current Draw (max.)	40 mA at 5V dc 50 mA at 24V dc	40 mA at 5V dc 50 mA at 24V dc
Number of Channels	4 input channels plus a CJC sensor	4 input channels
Accepted Inputs	Thermocouples Types: J, K, T, E, R, S, B, N, C Millivolt Input Ranges: $\pm 50$ mV and $\pm 100$ mV	RTDs: Platinum (385 and 3916), Copper (426), Nickel (672 and 618), Nickel-Iron (518) Resistance Ranges: 0 to 3000 $\Omega$
Filter Frequency	10 Hz to 1k Hz	10 Hz to 1k Hz
Temperature Units	°C or °F	°C or °F
Data Formats	Raw/Proportional, Engineering Units, Engineering Units x 10, Scaled-for-PID, Percent Range	

**Table 17 Temperature Expansion Input Modules Specifications**

Specification	1762-IT4	1762-IR4
Accuracy at 25°C (77°F)	Thermocouple Inputs: $\pm 0.5^{\circ}\text{C}$ to $\pm 3.0^{\circ}\text{C}$ ( $\pm 0.9^{\circ}\text{F}$ to $\pm 5.4^{\circ}\text{F}$ ) depending on thermocouple type Millivolt Inputs: $\pm 15$ mV to $\pm 20$ mV	With Autocalibration enabled... RTD Inputs: $\pm 0.2^{\circ}\text{C}$ to $\pm 0.6^{\circ}\text{C}$ ( $\pm 0.36^{\circ}\text{F}$ to $\pm 1.08^{\circ}\text{F}$ ) depending on RTD type Resistance Inputs: $\pm 0.5\Omega$ to $\pm 1.5\Omega$ depending on resistance value
Accuracy at 0 to 55°C (32 to 131°F)	$\pm 0.8^{\circ}\text{C}$ to $\pm 10^{\circ}\text{C}$ ( $\pm 1.5^{\circ}\text{F}$ to $\pm 18^{\circ}\text{F}$ ) depending on thermocouple type Millivolt Inputs: $\pm 25$ mV to $\pm 30$ mV	With Autocalibration enabled... RTD Inputs: $\pm 0.4^{\circ}\text{C}$ to $\pm 1.1^{\circ}\text{C}$ ( $\pm 0.72^{\circ}\text{F}$ to $\pm 1.98^{\circ}\text{F}$ ) depending on RTD type Resistance Inputs: $\pm 0.25\Omega$ to $\pm 2.5\Omega$ depending on resistance value
Channel Update Time (typical)	7 to 303 ms per enabled channel + CJC update time, depending on filter selection (CJC update time is equal to the largest enabled channel's update time.)	6 to 303 ms per enabled channel, depending on filter selection
Channel Diagnostics	Over- or under-range and open-circuit by bit reporting	Over- or under-range or broken input by bit reporting
Calibration	The module performs autocalibration on channel enable and on a configuration change between channels. You can also program the module to calibrate every five minutes.	
Common Mode Noise Rejection	115 dB minimum at 50 Hz (with 10 Hz or 50 Hz filter) 115 dB minimum at 60 Hz (with 10 Hz or 60 Hz filter)	110 dB minimum at 50 Hz (with 10 or 50 Hz filter) 110 dB minimum at 60 Hz (with 10 or 60 Hz filter)
Normal Mode Noise Rejection	85 dB minimum at 50 Hz (with 10 Hz or 50 Hz filter) 85 dB minimum at 60 Hz (with 10 Hz or 60 Hz filter)	70 dB minimum at 50 Hz (with 10 or 50 Hz filter) 70 dB minimum at 60 Hz (with 10 or 60 Hz filter)
Input Group to System Isolation	720V dc for 1 minute	707V dc for 1 minute
Channel-to-Channel Isolation	$\pm 10$ V dc	$\pm 10$ V dc
Repeatability <sup>(1)</sup>	Thermocouples at 25°C (77°F) and 10 Hz filter selected: $\pm 0.1^{\circ}\text{C}$ to $\pm 2.0^{\circ}\text{C}$ ( $\pm 0.18^{\circ}\text{F}$ to $\pm 3.6^{\circ}\text{F}$ ) depending on thermocouple type  Millivolt Inputs: $\pm 6$ $\mu\text{V}$	$\pm 0.1^{\circ}\text{C}$ ( $\pm 0.18^{\circ}\text{F}$ ) for Nickel and Nickel-Iron $\pm 0.2^{\circ}\text{C}$ ( $\pm 0.36^{\circ}\text{F}$ ) for other RTD inputs $\pm 0.04\Omega$ for 150 $\Omega$ resistances $\pm 0.2\Omega$ for other resistances
Input Impedance	>10M $\Omega$	>10 M $\Omega$

<sup>(1)</sup> Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.



## Communications

## MicroLogix 1200 Communications Advantages

- Enhanced RS-232 port (includes 24V dc power for network interface devices)
- 300; 600; 1200; 4800; 9600; 19,200 and 38,400 baud rates
- RTS/CTS hardware handshake signals
- Connection to DH-485, DeviceNet and EtherNet/IP networks through the 1761-NET-AIC, 1761-NET-DNI and 1761-NET-ENI interface modules
- Connection to modems for remote communications
- ASCII messaging provides dial-out capability

The MicroLogix 1200 allows you to choose the network that best meets your needs.

**Table 18 MicroLogix 1200 Network Options**

<b>If your application requires:</b>	<b>Use this network:</b>
<ul style="list-style-type: none"> <li>• Connection to dial-up modems for remote program maintenance or data collection</li> <li>• Connection to leased-line or radio modems for use in SCADA systems</li> <li>• Remote Terminal Unit (RTU) functions</li> </ul>	DF1 Full-Duplex  DF1 Half-Duplex Slave
<ul style="list-style-type: none"> <li>• Plant-wide and cell-level data sharing with program maintenance</li> <li>• Data sharing between 32 controllers</li> <li>• Program upload, download, and monitoring to all controllers</li> <li>• Compatibility with multiple Allen-Bradley HMI devices</li> </ul>	DH-485 via the 1761-NET-AIC
<ul style="list-style-type: none"> <li>• Connection of low-level multi-vendor devices directly to plant floor controllers</li> <li>• Data sharing between 64 devices</li> <li>• Better diagnostics for improved data collection and fault detection</li> <li>• Less wiring and reduced start-up time than traditional, hard-wired systems</li> </ul>	DeviceNet via the 1761-NET-DNI
<ul style="list-style-type: none"> <li>• Program upload/download</li> <li>• Peer-to-peer communication</li> <li>• E-mail communication</li> <li>• 10 base T-port with embedded LEDs</li> </ul>	EtherNet/IP via the 1761-NET-ENI
<ul style="list-style-type: none"> <li>• Connection to modems for remote data collection in a SCADA system</li> <li>• Remote Terminal Unit (RTU) functions</li> </ul>	Modbus RTU Slave

The following section provides information about the network interface devices:

- AIC+ Advanced Interface Converter (1761-NET-AIC)
- DNI DeviceNet Interface (1761-NET-DNI)
- ENI Ethernet Interface (1761-NET-ENI)

## Network Interface Devices

The network interface devices can be mounted in a panel or on a DIN rail. See Figure 25 on page 22 for device drawings.

### *AIC+ Advanced Interface Converter (1761-NET-AIC)*

The AIC+ provides an interface to DH-485 networks from an RS-232 port. It can be used with all MicroLogix controllers, SLC 5/03 and higher, and a number of PanelView terminals. *All devices communicating on the network must be using DH-485 protocol. Do not use DH-485 protocol to communicate with modems.*

The AIC+ also provides isolation between all ports for a more stable network and protection for connected devices.

**Table 19 DH-485 Network Specifications<sup>(1)</sup>**

<b>Specification</b>	<b>1761-NET-AIC</b>
Maximum Number of Nodes	32 per multidrop network
Maximum Length	1219m (4000 ft) per multidrop network

<sup>(1)</sup> See Table 22, Network Modules Specifications, for more 1761-NET-AIC specifications.

### *DNI DeviceNet Interface (1761-NET-DNI)*

DNI capabilities:

- Peer-to-peer messaging between Allen-Bradley controllers and other devices using the DF1 Full-Duplex protocol
- Programming and on-line monitoring over the DeviceNet network
- With a DNI connected to a modem, you can dial in to any other DNI-controller combination on DeviceNet
- Other DeviceNet products can send explicit (Get or Set) messages with the DNI at any time
- The controller can initiate an explicit message to a UCMM (Unconnected Message Manager) compatible device on DeviceNet

**Table 20 DeviceNet Specifications<sup>(1)</sup>**

<b>Specification</b>	<b>1761-NET-DNI</b>
Maximum Number of Nodes	64
Maximum Length	500m at 125K baud or 100m at 500K baud
DeviceNet Agency Certification	ODVA conformance 2.0-A12

<sup>(1)</sup> See Table 22, Network Modules Specifications, for more 1761-NET-DNI specifications.

### *ENI Ethernet Interface (1761-NET-ENI)*




The ENI provides EtherNet/IP connectivity for all MicroLogix controllers and other DF1 Full-Duplex devices. The ENI allows you to easily connect a MicroLogix controller to a new or existing Ethernet network to update/download programs, communicate between controllers, and generate e-mail messages via SMTP (simple mail transport protocol).

**Table 21 Ethernet Specifications<sup>(1)</sup>**

<b>Specification</b>	<b>1761-NET-ENI</b>
Communication Rate	10 MHz
Connector	10Base-T (RJ45)

<sup>(1)</sup> See Table 22, Network Modules Specifications, for more 1761-NET-ENI specifications.

*AIC+, DNI, and ENI Specifications***Table 22 Network Modules Specifications**

<b>Specification</b>	<b>1761-NET-AIC</b>	<b>1761-NET-DNI</b>	<b>1761-NET-ENI</b>
24V dc Power Source Requirements <sup>(1)</sup>	20.4 to 28.8V dc	11 to 25V dc	20.4 to 26.4V dc
24V dc Current Draw	120 mA	200 mA	100 mA
Inrush Current (max.)	200 mA	400 mA	200 mA
Internal Isolation	500V dc for 1 minute	500V dc for 1 minute	710V dc for 1 minute
Operating Temperature	0°C to +60°C (+32°F to +140°F)		0°C to +55°C (+32°F to +131°F)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)		
Humidity	5% to 95% non-condensing		
Vibration	operating: 10 to 500 Hz, 5.0g, 0.030 in. peak-to-peak, 2 hours each axis	operating: 5 to 2000 Hz, 2.5g, 0.015 in. peak-to-peak, 1 hour each axis non-operating: 5 to 2000 Hz, 5.0g, 0.030 in. peak-to-peak, 1 hour each axis	operating: 10 to 500 Hz, 5.0g, 0.030 in. peak-to-peak, 2 hours each axis
Shock	operating: 30g, ±3 times each axis non-operating: 50g, ±3 times each axis	operating: 30g, ±3 times each axis non-operating: 50g, ±3 times each axis	operating: 30g, ±3 times each axis non-operating: 35g (DIN rail mount) 50g (panel mount) ±3 times each axis
Agency Certification	 UL Listed Industrial Control Equipment UL Listed Industrial Control Equipment for use in Canada UL Listed Industrial Control Equipment for use in Class I, Division 2 Hazardous Locations Groups A, B, C, D   Marked for all applicable   Marked for all applicable acts <small>N223</small>		

<sup>(1)</sup> When the device is connected to a MicroLogix controller, power is provided by the MicroLogix controller's communication port.

## Programming Instructions

The MicroLogix 1200 has the range of functionality necessary to address diverse applications. The controller uses the following types of instructions:

- Basic Instructions
- Comparison Instructions
- Data Instructions
- Communication Instruction, including ASCII
- Math Instructions
- Program Flow Control Instructions
- Application Specific Instructions
- High-Speed Counter Instruction
- High-Speed PTO (Pulse Train Output) and PWM (Pulse Width Modulated) Instructions

## Programming Software

The RSLogix 500 ladder logic programming package helps you maximize performance, save project development time, and improve productivity. This product has been developed to operate on Windows® operating systems. RSLogix 500 can be used for programming both the SLC 500 and MicroLogix controller families.

**Table 23 RSLogix 500 Selection Chart**

Catalog Number	Description
9324-RL0300ENE	RSLogix 500 Standard Edition Programming Software for SLC 500 and MicroLogix controller families. (CD-ROM)
9324-RL0100ENE	RSLogix 500 Starter Edition Programming Software for MicroLogix controller families. (CD-ROM)
9324-RL0700NXENE	RSLogix 500 Professional Edition. CD-ROM also includes RSLogix Emulate 500, RSNetworkx for DeviceNet and RSNetworkx for ControlNet.

## Network and Programming Cables

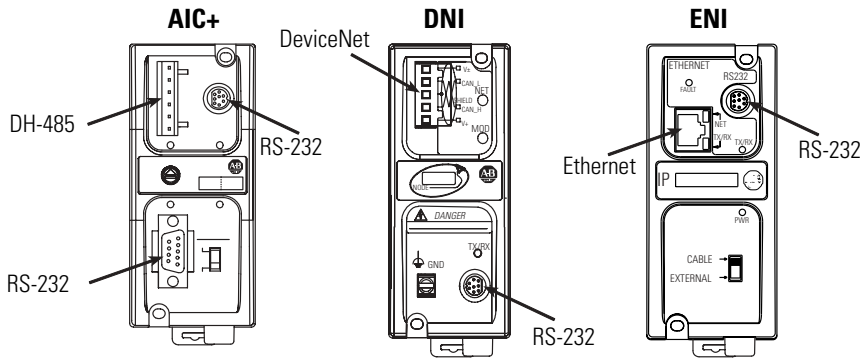
Use the communication cables listed below with MicroLogix 1200 controllers. Cables come in several lengths and connector styles to provide connectivity between MicroLogix controllers and other devices.

*MicroLogix 1200 controllers require Series C versions of all 1761 cables.*

**Table 24 Controller and PC Port Identification**

Device	Port
MicroLogix 1200 Controller Communications Port (Channel 0) with 24V dc power for communication device	8-pin Mini DIN
MicroLogix 1200 Controller Programmer/HMI Port (no 24 V dc power on this port)	8-pin Mini DIN
Personal Computer Communications Port	9-Pin D Shell

**Figure 25 Network Interface Devices Communication Port Identification**



NOTE: The AIC+ is recommended for isolation purposes when the controller and an operator interface device are not using the same power supply.

**Table 26 Network Cable Selection Chart**

Connectors	Length	Catalog Number	Connectors	Length	Catalog Number
8-pin Mini DIN to 8-pin Mini DIN	0.5m (1.5 ft)	1761-CBL-AM00	8-pin Mini DIN to 9-pin D Shell	0.5m (1.5 ft)	1761-CBL-AP00
8-pin Mini DIN to 8-pin Mini DIN	2m (6.5 ft)	1761-CBL-HM02	8-pin Mini DIN to 9-pin D Shell	2m (6.5 ft)	1761-CBL-PM02
8-pin Mini DIN to 8-pin Mini DIN	5m (16 ft)	2711-CBL-HM05	8-pin Mini DIN to 9-pin D Shell	5m (16 ft)	2711-CBL-PM05
8-pin Mini DIN to 8-pin Mini DIN	10m (32 ft)	2711-CBL-HM10	8-pin Mini DIN to 9-pin D Shell	10m (32 ft)	2711-CBL-PM10
9-pin D Shell to 9-pin D Shell	0.5m (1.5 ft)	1761-CBL-AC00	6-pin Phoenix to RJ45 (DH-485)	3m (10 ft)	1761-CBL-AS03
9-pin D Shell to 9-pin D Shell	3m (10 ft)	1747-CP3	6-pin Phoenix to RJ45 (DH-485)	9m (30 ft)	1761-CBL-AS09

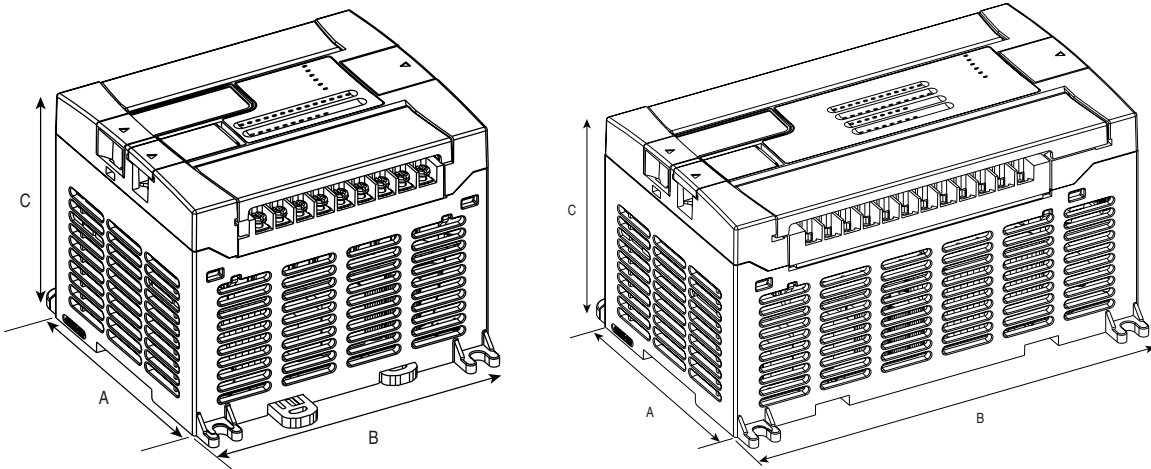
**Table 27 Programming Cable Selection Chart**

<b>MicroLogix 1000, 1200, and 1500 Channel 0 (8-pin Mini DIN) MicroLogix 1200 Programmer/HMI Port (8-pin Mini DIN)</b>		<b>MicroLogix 1500 with 1764-LRP Processor Channel 1 (9-pin RS-232)</b>		<b>Programming Device</b>
<b>Catalog Number</b>	<b>Length</b>	<b>Catalog Number</b>	<b>Length</b>	
1761-CBL-PM02	2m (6.5 ft)	1747-CP3	3m (10 ft)	Personal Computer (9-pin D Shell)
1761-CBL-HM02	2m (6.5 ft)	n/a		Hand-Held Programmer (HHP)

# Dimensions

Dimensions are in millimeters (inches).

**Figure 28 MicroLogix 1200 Controller Dimension Drawing**



1762-L24AWA, 1762-L24BWA, 1762-L24BXB  
 1762-L24AWAR, 1762-L24BWAR, 1762-L24BXBR

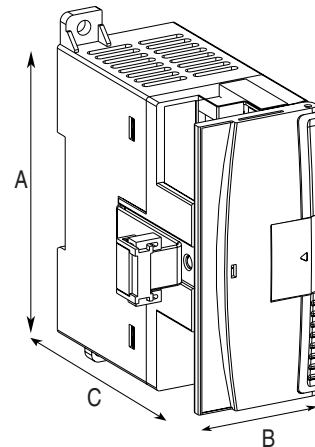
1762-L40AWA, 1762-L40BWA, 1762-L40BXB  
 1762-L24AWAR, 1762-L24BWAR, 1762-L24BXBR

controller spacing = 50 mm (2 in.) on all sides for adequate ventilation

**Table 29 Controller Dimensions**

Dimension	1762-L24AWA 1762-L24AWAR	1762-L24BWA 1762-L24BWAR	1762-L24BXB 1762-L24BXBR	1762-L40AWA 1762-L40AWAR	1762-L40BWA 1762-L40BWAR	1762-L40BXB 1762-L40BXBR
A	90 mm (3.5 in.)			90 mm (3.5 in.)		
B	110 mm (4.33 in.)			160 mm (6.30 in.)		
C	87 mm (3.43 in.)			87 mm (3.43 in.)		

**Figure 30 1762 Expansion I/O Dimensions**

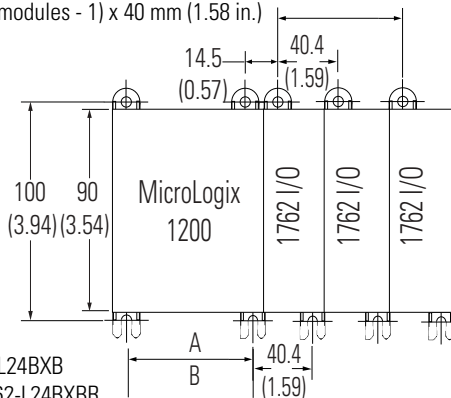


Dimension	Expansion I/O Module
A	90 mm (3.5 in.)
B	40 mm (1.57 in.)
C	87 mm (3.43 in.)



**Figure 31 MicroLogix 1200 System Mounting Dimensions**

For more than 2 modules: (number of modules - 1) x 40 mm (1.58 in.)

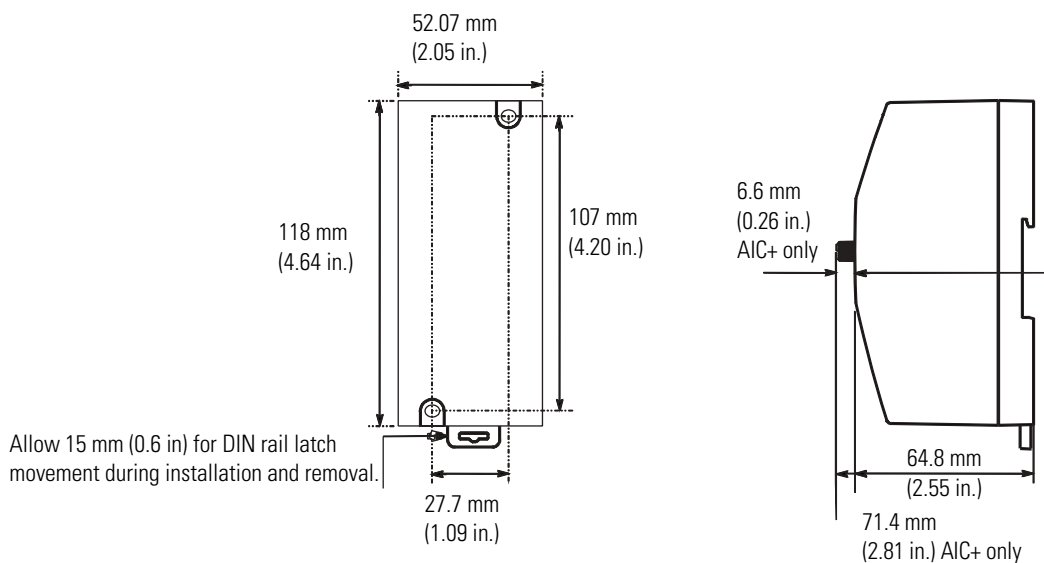


A = 95.86mm (3.774 in.)  
 1762-L24AWA, 1762-L24BWA, 1762-L24BXB  
 1762-L24AWAR, 1762-L24BWAR, 1762-L24BXHR

B = 145.8 mm (5.739 in.)  
 1762-L40AWA, 1762-L40BWA, 1762-L40BXB  
 1762-L40AWAR, 1762-L40BWAR, 1762-L40BXHR

NOTE: All dimensions are in mm (inches). Hole spacing tolerance: ±0.4 mm (0.016 in.).

**Figure 32 Network Interface Devices Dimensions**



## System Expansion Calculations

A download is also available for system validation. On the Internet, go to <http://www.ab.com/plclogic/micrologix/1200/sysqual/start.html>.

To have a valid system, both current and power requirements must be satisfied. Use the following worksheets to make your calculations.

**Table 33 MicroLogix 1200 Power Supply Loading - Calculate System Current**

Catalog Number		Bus Current Draw Specification		Calculated Current for System	
		at 5V dc (mA)	at 24V dc (mA)	at 5V dc (mA)	at 24V dc (mA)
1761-NET-AIC <sup>(1)</sup>		0	120 <sup>(1)</sup>		
1761-NET-ENI <sup>(1)</sup>		0	100 <sup>(1)</sup>		
2707-MVH232 or 2707-MVP232 <sup>(1)</sup>		0	80 <sup>(1)</sup>		
Catalog Number	n = Number of Modules (6 maximum)	A	B	n x A	n x B
1762-IA8		50	0		
1762-OA8		115	0		
1762-OB8		115	0		
1762-OB16		175	0		
1762-OF4		40	165		
1762-OW8		80	90		
1762-OW16		120	140		
1762-OX6I		110	110		
1762-IF2OF2		40	105		
1762-IF4		40	50		
1762-IQ8		50	0		
1762-IQ16		60	0		
1762-IR4		40	50		
1762-IT4		40	50		
<b>TOTAL MODULES:</b>		<b>TOTAL CALCULATED CURRENT:</b>		<b>(C)</b>	<b>(D)</b>
<b>For 1762-L24BWA, 1762-L40BWA, 1762-L24BWAR and 1762-L40BWAR only, add sum of any User 24V dc Sensor Current</b>					<b>(E)</b>

<sup>(1)</sup> Current for the AIC+ may be supplied by the controller's communications port or from an external 24V dc source. No current is consumed from the controller when an external source is used. The current for a 2707-MVH232 or 2707-MVP232 MicroView Operator Interface is supplied from the controller's communication port, if directly connected.

**Table 34 MicroLogix 1200 Maximum Load Current**

<b>Catalog Number</b>	<b>Load Current</b>	<b>5V dc</b>	<b>24V dc</b>	<b>User 24V dc Sensor Current</b>
1762-L24AWA, L24AWAR 1762-L24BXB, L24BXBR	Calculated Value	(C)	(D)	n/a
	<b>MAXIMUM LIMIT</b>	<b>400 mA</b>	<b>350 mA</b>	
1762-L24BWA, L24BWAR	Calculated Value	(C)	(D)	(E)
	<b>MAXIMUM LIMIT</b>	<b>400 mA</b>	<b>350 mA</b>	<b>250 mA</b>
1762-L40AWA, L40AWAR 1762-L40BXB, L40BXBR	Calculated Value	(C)	(D)	n/a
	<b>MAXIMUM LIMIT</b>	<b>600 mA</b>	<b>500 mA</b>	
1762-L40BWA, L40BWAR	Calculated Value	(C)	(D)	(E)
	<b>MAXIMUM LIMIT</b>	<b>600 mA</b>	<b>500 mA</b>	<b>400 mA</b>

To verify the Base Unit power supply loading:

1. Use Table 33 to select the components for your system. Do not exceed the MAXIMUM LIMIT for the number of I/O modules.
2. Fill in the current amounts and add up the TOTAL CALCULATED CURRENT.
3. Using Table 34, verify that (C), (D), and (E) do not exceed the MAXIMUM LIMITS. If the MAXIMUM LIMIT is exceeded, you will need to adjust your selections.
4. Use Table 35 to verify that the system is within the power loading limits of the controller.

To use Table 35, fill in the (C), (D), and (E) values where indicated. Then calculate Watts and add up the Total Watts. Verify that Total Watts does not exceed the MAXIMUM POWER LIMIT. If the MAXIMUM POWER LIMIT is exceeded, you will need to adjust your selections.

**Table 35 MicroLogix 1200 Maximum Load Power**

Catalog Number	5V Power Consumption Calculated Watts			24V Power Consumption Calculated Watts			Calculated Watts (sum of 5V and 24V)	MAXIMUM POWER LIMIT
	(C)	x 5V	= W	(D)	x 24V	= W		
1762-L24AWA, L24AWAR	(C)	x 5V	= W	(D)	x 24V	= W	W	10.4W
1762-L24BXB, L24BXBR	(C)	x 5V	= W	(D)	x 24V	= W	W	10.4W
1762-L24BWA, L24BWAR	(C)	x 5V	= W	(D)+(E)	x 24V	= W	W	12W
1762-L40AWA, L40AWAR	(C)	x 5V	= W	(D)	x 24V	= W	W	15W
1762-L40BXB, L40BXBR	(C)	x 5V	= W	(D)	x 24V	= W	W	15W
1762-L40BWA, L40BWAR	(C)	x 5V	= W	(D)+(E)	x 24V	= W	W	16W

## For More Information

## Available Documentation

MicroLogix 1200 user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on MicroLogix 1200 publications.

**Table 36 Related Publications for MicroLogix 1200 Controllers**

Title	Publication Number
MicroLogix™ 1200 Programmable Controllers User Manual	1762-UM001
1762-IT4 Thermocouple/mV Input Module User Manual	1762-UM002
1762-IR4 RTD/Resistance Input Module User Manual	1762-UM003
MicroLogix™ 1200 and MicroLogix™ 1500 Instruction Set Reference Manual	1762-RM001
AIC+ Advanced Interface Converter User Manual	1761-6.4
DeviceNet™ Interface User Manual	1761-6.5
Ethernet Interface User Manual	1761-UM006
Allen-Bradley Programmable Controller Grounding and Wiring Guidelines	1770-4.1

If you would like a technical data for the MicroLogix 1000 or MicroLogix 1500 controllers, refer to the following table.

**Table 37 MicroLogix 1000 and 1500 Technical Data Publications**

See this Document	Publication Number
MicroLogix™ 1000 Technical Data	1761-TD001
MicroLogix™ 1500 Technical Data	1764-TD001

## MicroLogix Downloads

Visit the MicroLogix web site at <http://www.ab.com/micrologix> to learn more about MicroLogix products and download MicroLogix software utilities and manuals. Software utilities are available for configuring the DNI and ENI network interface devices. System validation worksheets are available to determine I/O power usage.

Manuals are available in PDF format. To purchase a printed manual or download a free electronic version, visit us at <http://www.theautomationbookstore.com>. For fast access to related publications, visit the MicroLogix Internet site <http://www.ab.com/micrologix>. Electronic versions of our manuals are available for you to search and download.

## **Rockwell Software Web Site**

For more information on Rockwell Software products, such as RSLogix 500, please visit their web site at <http://www.rockwellsoftware.com>.



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