

MicroLogix 1200 Programmable Controllers

Bulletin 1762 Controllers and Expansion I/O Modules

Allen-Bradley
by ROCKWELL AUTOMATION

User Manual

Original Instructions

About This Publication

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use MicroLogix™ 1200 controllers.

You should have a basic understanding of electrical circuitry and familiarity with relay logic. If you do not, obtain the proper training before using this product.

Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

Purpose of this Manual

This manual is a reference guide for MicroLogix 1200 controllers and expansion I/O. It describes the procedures that you use to install, wire, and troubleshoot your controller. This manual:

- Explains how to install and wire your controllers
- Gives you an overview of the MicroLogix 1200 controller system

See MicroLogix 1200 and MicroLogix 1500 Programmable Controllers Instruction Set Reference Manual, publication 1762-RM001, for the MicroLogix 1200 and MicroLogix 1500 instruction set and for application examples to show the instruction set in use. See your RSLogix 500® programming software user documentation for more information on programming your MicroLogix 1200 controller.

Download Firmware, AOP, EDS, and Other Files

Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes from the Product Compatibility and Download Center at rok.auto/pcdc.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated template	throughout
Added inclusive language acknowledgment	7
Updated Input Specifications – 1762-IA8, 1762-IQ8, 1762-IQ16, 1762-IQ32T, 1762-IQ8OW6	77
Updated Output Specifications – 1762-OW8, 1762-OW16, 1762-OX6I, 1762-IQ8OW6	79
Updated Environmental Specifications	77, 81, 86
Updated Certifications	82, 86

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

Additional Resources

Resource	Description
MicroLogix 1200 and MicroLogix 1500 Programmable Controllers Instruction Set Reference Manual, publication 1762-RM001	Information on the MicroLogix 1200 and MicroLogix 1500 controllers instruction set.
AIC+ Advanced Interface Converter User Manual, publication 1761-UM004	A description on how to install and connect an AIC+. This manual also contains information on network wiring.
DeviceNet Interface User Manual, publication 1761-UM005	Information on how to install, configure, and commission a DeviceNet™ Interface (DNI).
DF1 Protocol and Command Set Reference Manual, publication 1770-6.5.16	Information on DF1 open protocol.
Modbus Protocol Specifications, available from www.modbus.org	Information about the Modbus protocol.
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Describes how to configure and use EtherNet/IP™ devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, publication ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.

Additional Resources (Continued)

Resource	Description
System Security Design Guidelines Reference Manual, publication SECURE-RM001	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
UL Standards Listing for Industrial Control Products, publication CMPNTS-SR002	Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

Expansion I/O Modules

Catalog Number	Description
Digital	
1762-IA8	8-point 120V AC input module
1762-IQ8	8-point sinking/sourcing 24V DC input module
1762-IQ16	16-point sinking/sourcing 24V DC input module
1762-IQ32T	32-point sinking/sourcing 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 sinking/sourcing 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 1200 controllers:

- 1761-CBL-PM02, series C or later
- 1761-CBL-HM02, series C or later
- 1761-CBL-AM00, series C or later
- 1761-CBL-AP00, series C or later
- 1761-CBL-PH02, series A or later
- 1761-CBL-AH02, series A or later
- 2707-NC8, series A or later
- 2702-NC9, series B or later
- 2707-NC10, series B or later
- 2707-NC11, series B or later

Programming

Program the MicroLogix 1200 controller using RSLogix 500 software, version 4.00.00 or later. To use the new features of the series B MicroLogix 1200 controllers, including the full ASCII instruction set, you must use RSLogix 500 software, version 4.50.00 or later. Communication cables for programming are available separately from the controller and software.

Communication Options

The MicroLogix 1200 can be connected to a personal computer. It can also be connected to a DH-485 network, or a Modbus network as an RTU master or RTU slave with an Advanced Interface Converter (1761-NET-AIC). The controller can also be connected to DF1 Half-duplex networks as an RTU master or RTU slave. Series B controllers may also be connected to serial devices using ASCII.

See Communication Connections on page 53 for more information on connecting to the available communication options.

The 1762-LxxxxxR controllers provide an additional communication port called the Programmer/HMI Port. This port supports DF1 Full-duplex protocol only. The controller cannot

initiate messages through this port. It can only respond to messages sent to it. All communication parameters are fixed and cannot be changed by a user.

See Default Communication Configuration on page 53 for the configuration settings.

Controller I/O Wiring

Minimize Electrical Noise

Because of the variety of applications and environments where controllers are installed and operating, it is impossible to ensure that all environmental noise will be removed by input filters. To help reduce the effects of environmental noise, install the MicroLogix 1200 system in a properly rated (for example, NEMA) enclosure. Make sure that the MicroLogix 1200 system is properly grounded.

A system may malfunction due to a change in the operating environment after a period of time. We recommend periodically checking system operation, particularly when new machinery or other noise sources are installed near the Micrologix 1200 system.

Expansion I/O Wiring

Figure 35 to Figure 47 show the discrete and analog expansion I/O wiring diagrams.

Discrete Wiring Diagrams

Figure 35 - 1762-IA8 Wiring Diagram

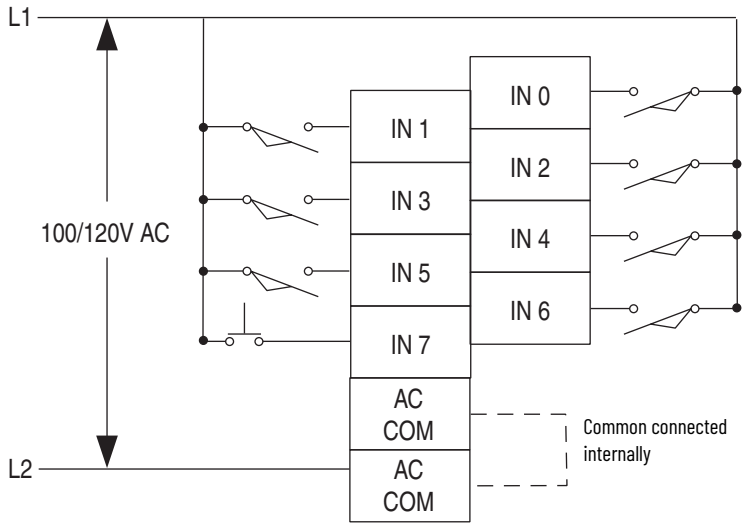


Figure 36 - 1762-IQ8 Wiring Diagram

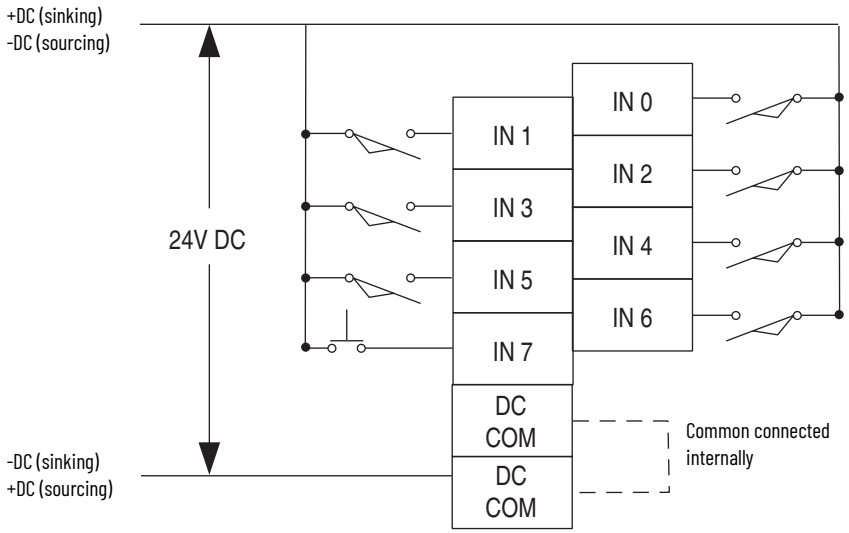


Figure 37 - 1762-IQ16 Wiring Diagram

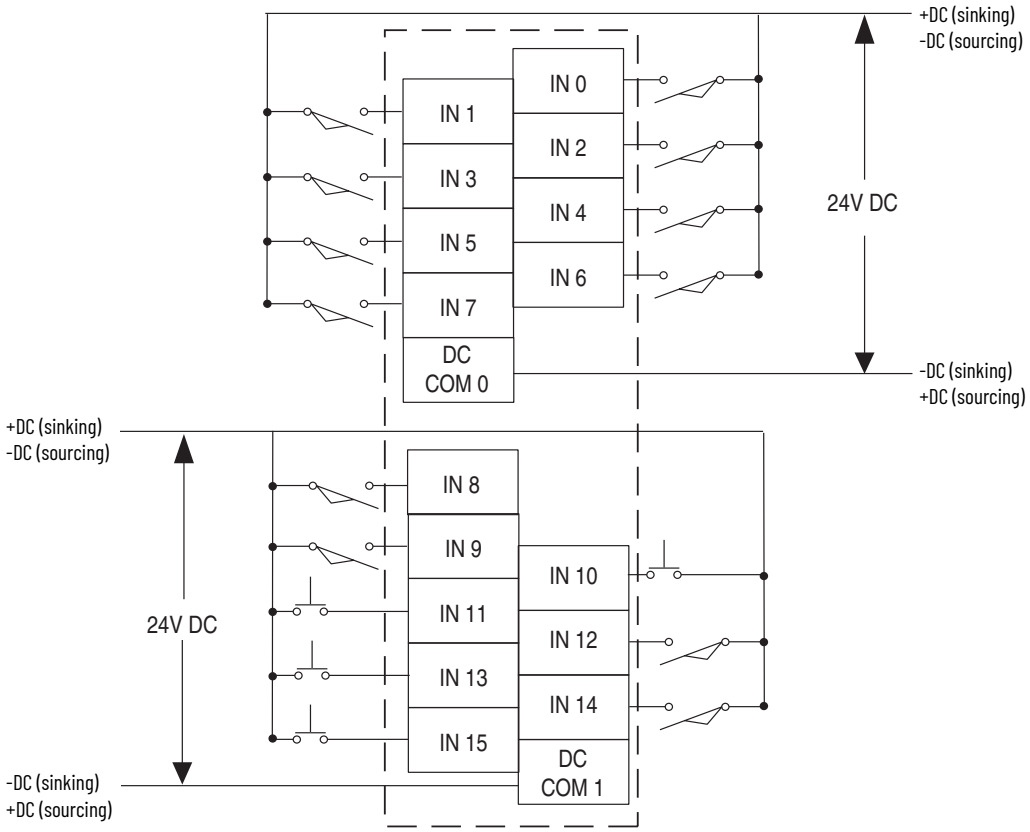


Figure 46 - 1762-0X6I Wiring Diagram

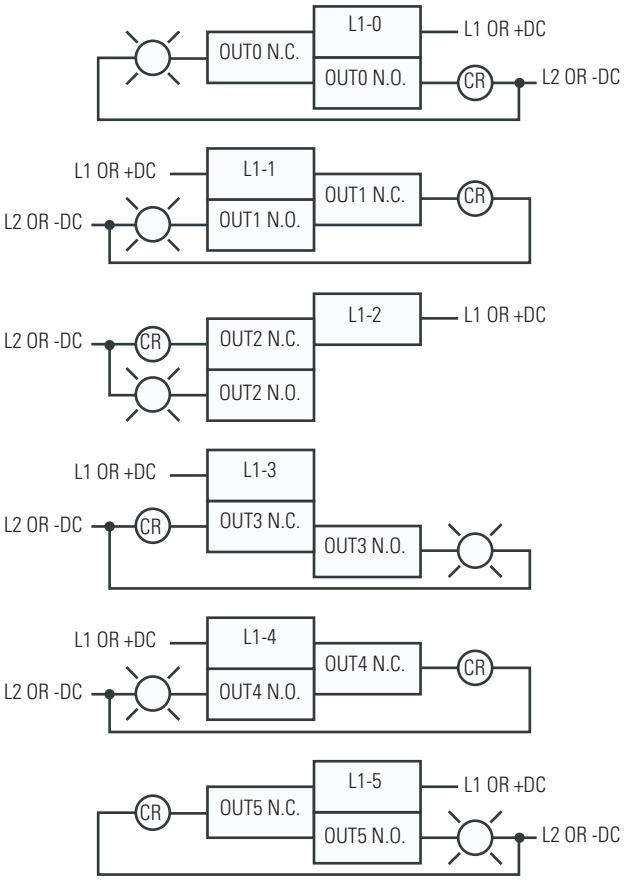
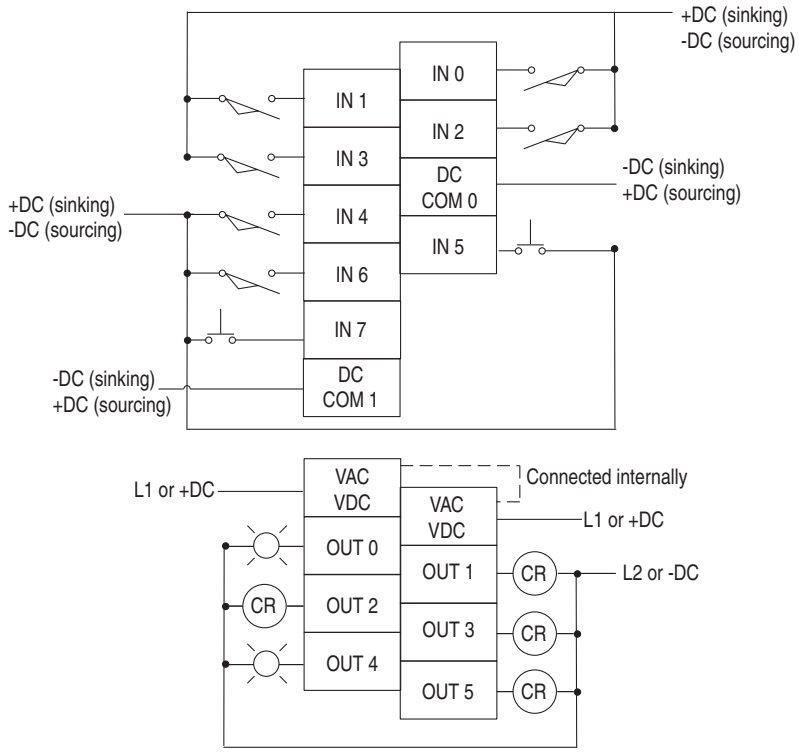


Figure 47 - 1762-IQ8OW6 Wiring Diagram



Analog Wiring

System Wiring Guidelines

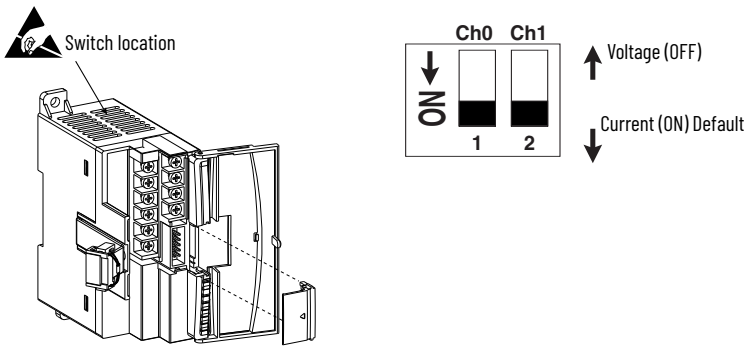
Consider the following when wiring your analog modules:

- The analog common (COM) is not connected to earth ground inside the module. All terminals are electrically isolated from the system.
- Channels are not isolated from each other.
- Use Belden 8761 or equivalent shielded wire.
- Under normal conditions, the drain wire (shield) should be connected to the metal mounting panel (earth ground). Keep the shield connection to earth ground as short as possible.
- To ensure optimum accuracy for voltage type inputs, limit overall cable impedance by keeping all analog cables as short as possible. Locate the I/O system as close to your voltage type sensors or actuators as possible.
- The module does not provide loop power for analog inputs. Use a power supply that matches the input transmitter specifications.

1762-IF2OF2 Input Type Selection

Select the input type, current or voltage, using the switches located on the module's circuit board *and* the input type/range selection bits in the Configuration Data File. See the MicroLogix 1200 and MicroLogix 1500 Programmable Controllers Instruction Set Reference Manual, publication 1762-RM001. You can access the switches through the ventilation slots on the top of the module. Switch 1 controls channel 0; switch 2 controls channel 1. The factory default setting for both switch 1 and switch 2 is Current. Switch positions are shown in Figure 48.

Figure 48 - 1762-IF2OF2 Switch Positions



1762-IF2OF2 Output Type Selection

The output type selection, current or voltage, is made by wiring to the appropriate terminals, Iout or Vout, *and* by the type/range selection bits in the Configuration Data File. See the MicroLogix 1200 and MicroLogix 1500 Programmable Controllers Instruction Set Reference Manual, publication 1762-RM001.

ATTENTION: Analog outputs may fluctuate for less than a second when power is applied or removed. This characteristic is common to most analog outputs. While the majority of loads will not recognize this short signal, it is recommended that preventive measures be taken to ensure that connected equipment is not affected.

Working Voltage – 1762-L24BXB, 1762-L40BXB, 1762-L24BXBR, 1762-L40BXBR (Continued)

Attribute	Value
Relay output group to backplane isolation	Verified by one of the following dielectric tests: 1836V AC for 1 second or 2596V DC for 1 second
	265V AC Working Voltage (IEC Class 2 reinforced insulation).
Relay output group to relay output group and FET output group isolation	Verified by one of the following dielectric tests: 1836V AC for 1 second or 2596V DC for 1 second
	265V AC Working Voltage (basic insulation) 150V Working Voltage (IEC Class 2 reinforced insulation)

Environmental Specifications

Attribute	1762-L24AWA 1762-L24AWAR	1762-L24BWA 1762-L24BWAR	1762-L24BXB 1762-L24BXBR	1762-L40AWA 1762-L40AWAR	1762-L40BWA 1762-L40BWAR	1762-L40BXB 1762-L40BXBR
Temperature, operating	0…55 °C (32…131 °F) ambient					
Temperature, storage	-40…+85 °C (-40…+185 °F) ambient					
Operating humidity	5…95% relative humidity (non-condensing)					
Vibration	Operating: 10…500 Hz, 5 G, 0.030 in. max. peak-to-peak, 2 hours each axis Relay Operation: 1.5 G					
Shock	Operating: 30 G; 3 pulses each direction, each axis Relay Operation: 7 G Non-Operating: 50 G panel mounted (40 G DIN Rail mounted); 3 pulses each direction, each axis					
Agency certification	UL 508 C-UL under CSA C22.2 no. 142 Class I Div. 2, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 no. 213) CE/RCM compliant for all applicable directives					
Electrical/EMC	The controller has passed testing at the following levels: EN 61000-4-2: 4 kV contact, 8 kV air, 4 kV indirect EN 61000-4-3: 10V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier EN 61000-4-4: 2 kV, 5 kHz; communications cable: 1 kV, 5 kHz 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) EN 61000-4-6: 10V, communications cable 3V					

Expansion I/O Specifications — Discrete I/O Modules

General Specifications – Discrete I/O Modules

Attribute	Value
Dimensions	Height: 90 mm (3.54 in.), 110 mm (4.33 in.) (including mounting tabs) Width: 87 mm (3.43 in.) Depth: 40.4 mm (1.59 in.)
Enclosure type rating	None (open-style)

Input Specifications – 1762-IA8, 1762-IQ8, 1762-IQ16, 1762-IQ32T, 1762-IQ80W6

Attribute	1762-IA8	1762-IQ8	1762-IQ16	1762-IQ32T	1762-IQ80W6
Shipping weight, approx. (with carton)	209 g (0.46 lbs.)	200 g (0.44 lbs.)	230 g (0.51 lbs.)	200g (0.44 lbs.)	280g (0.62 lbs.)
Voltage category	100/120V AC	24V DC (sinking/sourcing)(1)	24V DC (sinking/sourcing)(1)	24V DC (sinking/sourcing)(1)	24V DC (sinking/sourcing)(1)
Operating voltage range	79…132V AC at 47…63 Hz	10…30V DC at 30 °C (86 °F) 10…26.4V DC at 55 °C (131 °F)	10…30V DC 10…26.4V DC(2)(3)	10…30V DC (24 points) at 30 °C (86 °F) 10…26.4V DC (23 points) at 60 °C (140 °F)	10…30V DC at 30 °C (86 °F) 10…26.4V DC at 65 °C (149 °F)
Number of inputs	8	8	16	32	8
Bus current draw, max	50 mA at 5V DC (0.25 W)	50 mA at 5V DC (0.25 W)	70 mA at 5V DC (0.35 W)(3)	170 mA at 5V DC 0 mA at 24V DC	110 mA at 5V DC 80 mA at 24V DC

Input Specifications – 1762-IA8, 1762-IQ8, 1762-IQ16, 1762-IQ32T, 1762-IQ8OW6 (Continued)

Attribute	1762-IA8	1762-IQ8	1762-IQ16	1762-IQ32T	1762-IQ8OW6
Heat dissipation, max	2.0 W	3.7 W	4.3 W at 26.4V DC 5.4 W at 30V DC(3)	5.4 W at 26.4V DC 6.8 W at 30V DC	5.0 W at 30V DC 4.4 W at 26.4V DC (The Watts per point, plus the min W, with all points energized)
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	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	5V DC	5V DC
Off-state current, max	2.5 mA	1.5 mA	1.5 mA	1.0 mA	1.5 mA
On-state voltage, min	79V AC (min) 132V AC (max)	10V DC	10V DC	10V DC	10V DC
On-state current	5.0 mA min at 79V AC 47 Hz 12.0 mA nom. at 120V AC 60 Hz 16.0 mA max at 132V AC 63 Hz	2.0 mA min at 10V DC 8.0 mA nom. at 24V DC 12.0 mA max at 30V DC	2.0 mA min at 10V DC 8.0 mA nom. at 24V DC 12.0 mA max at 30V DC	1.6 mA min at 10V DC 2.0 mA min at 15V DC 5.7 mA max at 26.4V DC 6.5 mA max at 30.0V DC	10 mA at 5V DC
Inrush current, max	250 mA	Not applicable	Not applicable	Not applicable	250 mA
Nominal impedance	12 kΩ at 50 Hz 10 kΩ at 60 Hz	3 kΩ	3 kΩ	4.7 kΩ	3 kΩ
IEC input compatibility	Type 1+	Type 1+	Type 1+	Type 1	Type 1+
Isolated groups	Group 1: inputs 0…7 (internally connected commons)	Group 1: inputs 0…7 (internally connected commons)	Group 1: inputs 0…7; Group 2: inputs 8…15	Group 1: Inputs 0…7; Group 2: Inputs 8…15; Group 3: Inputs 16…23; Group 4: Inputs 24…31	Group 1: inputs 0…3; Group 2: inputs 4…7
Input group to backplane isolation	Verified by one of the following dielectric tests: 1517V AC for 1 s or 2145V DC for 1 s 132V AC working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V ACAC for 1 s or 1697V DC for 1 s 75V DC working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V AC for 1 s or 1697V DC for 1 s 75V DC working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V AC for 2 s or 1697V DC for 2 s 75V DC working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V AC for 1 s or 1697V DC for 1 s 75V DC working voltage (IEC Class 2 reinforced insulation)
Vendor ID code	1				
Product type code	7				
Product code	114	96	97	99	98

(1) Sinking/Sourcing Inputs – Sinking/sourcing 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.
(2) For derating chart, see MicroLogix 1762-IQ16 DC Input Module Installation Instructions, publication 1762-IN010.
(3) Only applicable for series B and series C I/O modules.

Output Specifications – 1762-OA8, 1762-OB8, 1762-OB16, 1762-OB32T, 1762-OV32T

Attribute	1762-OA8	1762-OB8	1762-OB16	1762-OB32T	1762-OV32T
Shipping weight, approx. (with carton)	215 g (7.58 oz.)	210 g (7.41 oz.)	235 g (8.29 oz.)	200 g (7.05 oz.)	200 g (7.05 oz.)
Voltage category	100…240V AC	24V DC	24V DC	24V DC sourcing	24V DC sinking
Operating voltage range	85…265V AC at 47…63 Hz	20.4…26.4V DC	20.4…26.4V DC	10.2…26.4V DC	10.2…26.4V DC
Number of outputs	8	8	16	32	32
Bus current draw, max	115 mA at 5V DC (0.575 W)	115 mA at 5V DC (0.575 W)	175 mA at 5V DC (0.88 W)	175 mA at 5V DC 0 mA at 24V DC	175 mA at 5V DC 0 mA at 24V DC
Heat dissipation, max	2.9 W	1.61 W	2.9 W at 30 °C (86 °F) 2.1 W at 55 °C (131 °F)	3.4 W at 26.4 DC	2.7 W at 26.4V DC
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: 0.5 ms Off delay: 4.0 ms	On delay: 0.5 ms Off delay: 4.0 ms
Off-state leakage current, max	2 mA at 132V 2.5 mA at 265V	1.0 mA	1.0 mA	0.1 mA at 26.4V DC	0.1 mA at 26.4V DC
On-state current, min	10 mA	1.0 mA	1.0 mA	1.0 mA	1.0 mA
On-state voltage drop, max	1.5V at 0.5 A	1.0V DC	1.0V DC	0.3V DC at 0.5 A	0.3V DC at 0.5 A
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)	0.5 A at 60 °C (140 °F)	0.5 A at 60 °C (140 °F)
Continuous current per common, max	1.0 A at 55 °C (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)	2.0 A at 60 °C (140 °F)	2.0 A at 60 °C (140 °F)

Output Specifications – 1762-0A8, 1762-0B8, 1762-0B16, 1762-0B32T, 1762-0V32T (Continued)

Attribute	1762-0A8	1762-0B8	1762-0B16	1762-0B32T	1762-0V32T
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)	4.0 A at 60 °C (140 °F)	4.0 A at 60 °C (140 °F)
Surge current, max	5.0 A (Repeatability is once every 2 s for a duration of 25 ms.	2.0 A (Repeatability is once every 2 s at 55 °C (131 °F), once every second at 30 °C (86 °F) for a duration of 10 ms.)	2.0 A (Repeatability is once every 2 s at 55 °C (131 °F), once every second at 30 °C (86 °F) for a duration of 10 ms.)	2.0 A (Repeatability is once every 2 s at 60 °C (140 °F) for 10 ms)	2.0 A (Repeatability is once every 2 s at 60 °C (140 °F) for 10 ms)
Isolated groups	Group 1: Outputs 0…3 Group 2: Outputs 4…7	Group 1: Outputs 0…7	Group 1: Outputs 0…15	Group 1: Outputs 0…15 Group 2: Outputs 16…31 (internally connected to common)	
Output group to backplane isolation	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s 265V AC working voltage (IEC Class 2 reinforced insulation)	Verified by one of the following dielectric tests: 1200V AC for 1 s or 1697V DC for 1 s 75V DC working voltage (IEC Class 2 reinforced insulation)		Verified by one of the following dielectric tests: 1200V AC for 2 s or 1697V DC for 2 s 75V DC working voltage (IEC Class 2 reinforced insulation)	
Output group to output group isolation	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s 265V AC working voltage (IEC Class 2 reinforced insulation)	Not applicable		Verified by one of the following dielectric tests: 1200V AC for 2 s or 1697V DC for 2 s 75V DC working voltage (IEC Class 2 reinforced insulation)	
Vendor ID code	1				
Product type code	7				
Product code	119	101	103	100	102

Output Specifications – 1762-0W8, 1762-0W16, 1762-0X6I, 1762-IQ80W6

Attribute	1762-0W8	1762-0W16	1762-0X6I	1762-IQ80W6
Shipping weight, approx. (with carton)	228 g (0.50 lbs.)	285 g (0.63 lbs.)	220 g (0.485 lbs)	280 g (0.62 lbs.)
Voltage category	AC/DC normally open relay	AC/DC normally open relay	AC/DC Type C Relay	AC/DC normally open relay
Operating voltage range	5…265V AC 5…125V DC	5…265V AC 5…125V DC	5…265V AC 5…125V DC	5…265V AC 5…125V DC
Number of outputs	8	16	6	6
Bus current draw, max	80 mA at 5V DC (0.40 W) 90 mA at 24V DC (2.16 W)	140 mA at 5V DC (0.70 W)(1) 180 mA at 24V DC (4.32 W)(1)	110 mA at 5V DC (0.55 W) 110 mA at 24V DC (2.64 W)	110 mA at 5V DC 80 mA at 24V DC
Heat dissipation, max	2.9 W	6.1 W(1)	2.8 W	5.0 W at 30V DC 4.4 W at 26.4V DC (The Watts per point, plus the min W, with all points energized)
Signal delay, max – resistive load	On Delay: 10 ms Off Delay: 10 ms	On Delay: 10 ms Off Delay: 10 ms	On Delay: 10 ms (max) 6 ms (typical) Off Delay: 20 ms (max) 12 ms (typical)	On-delay: 10 ms (max) Off-delay: 10 ms (max)
Off-state leakage, max	0 mA	0 mA	0 mA	0 mA
On-state current, min	10 mA	10 mA	100 mA	10 mA
On-state voltage drop, max	Not Applicable			
Continuous current per point, max	2.5 A. See Table 14		7 A See Table 15.	2.5 A See Table 14.
Continuous current per common, max	8 A	8 A	7 A See Table 15.	8 A
Continuous current per module, max	16 A	16 A	30 A See Table 16.	8 A
Surge current, max	See Table 14.		See Table 15.	See Table 14.
Isolated groups	Group 1: Outputs 0…3 Group 2: Outputs 4…7	Group 1: Outputs 0…7 Group 2: Outputs 8…15	All 6 Outputs Individually Isolated.	Group 3: Outputs 0…5
Output group to backplane isolation	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s 265V AC working voltage (IEC Class 2 reinforced insulation)			

Output Specifications – 1762-0W8, 1762-0W16, 1762-0X6I, 1762-IQ80W6 (Continued)

Attribute	1762-0W8	1762-0W16	1762-0X6I	1762-IQ80W6
Output group to output group isolation	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s 265V AC working voltage (basic insulation) 150V AC working voltage (IEC Class 2 reinforced insulation)			
Vendor ID code	1			
Product type code	7			
Product code	120	121	124	98

(1) Only applicable for series B and series C I/O modules.

Table 14 - Relay Contact Ratings – 1762-0W8, 1762-0W16, and 1762-IQ80W6

Maximum Volts	Amperes Continuous	Amperes		Voltamperes	
		Make	Break	Make	Break
240V AC	2.5 A(1)	7.5 A	0.75 A	1800VA	180VA
120V AC	2.5 A(1)	15 A	1.5 A	1800VA	180VA
125V DC	1.0 A	0.22 A(2)		28VA	
24V DC	2.0 A	1.2 A(2)			

(1) 1.5 A above 40 °C (104 °F).
(2) For DC voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28VA by the applied DC voltage. For example, 28VA/48V DC = 0.58 A. For DC voltage applications less than 14V, the make/break ratings for relay contacts cannot exceed 2 A.

Table 15 - Relay Contact Ratings – 1762-0X6I

Maximum Volts	Continuous Amps per Point (Max)(1)	Amperes(2)		Voltamperes	
		Make	Break	Make	Break
240V AC	5.0 A	15 A	1.5 A	3600VA	360VA
120V AC	7.0 A(3)	30 A	3.0 A		
125V DC	2.5 A	0.4 A		50VA(4)	
24V DC	7.0 A(3)	7.0 A		168VA(4)	

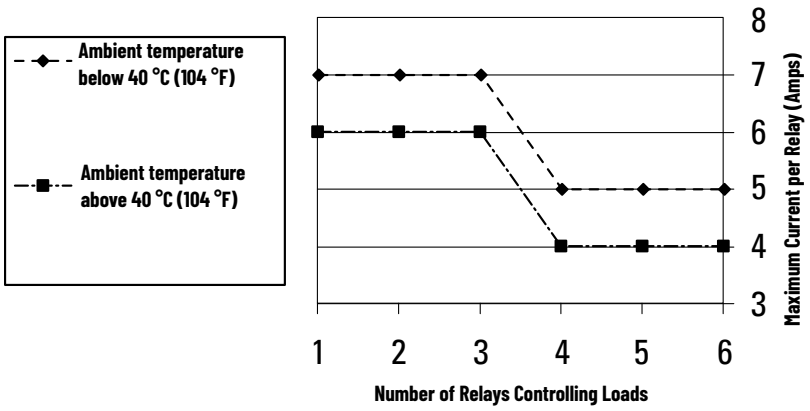
(1) The continuous current per module must be limited so the module power does not exceed 1440VA.
(2) Surge Suppression – Connecting surge suppressors across your external inductive load will extend the life of the relay contacts. For additional details, see Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.
(3) 6 A in ambient temperatures above 40 °C (104 °F)
(4) DC make/break voltamperes must be limited to 50VA for DC voltages between 28V DC and 125V DC.
DC make/beak voltamperes below 28V DC are limited by the 7 A make/break current limit.

Table 16 - Module Load Ratings – 1762-0X6I

Volts (Max)	Controlled Load (Current) per Module (Max)
240V AC	6 A
120V AC	12 A(1)
125V DC	11.5 A
24V DC	30 A(2)

(1) Current per relay limited to 6 A at ambient temperatures above 40 °C (104 °F).
(2) 24 A in ambient temperatures above 40 °C (104 °F). Limited by ambient temperature and the number of relays controlling loads. See Figure 74.

Figure 74 - Relays Used vs. Maximum Current per Relay (24V DC) 1762-0X6I



Environmental Specifications

Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 °C ≤ Ta ≤ +65 °C (-4 °F ≤ Ta ≤ +149 °F)
Temperature, ambient, max	65 °C (140 °F)
Temperature, surrounding air, max	65 °C (140 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40...+85 °C (-40...+185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...95% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5 g @ 10...500 Hz
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30 g - Panel mounted
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30 g - Panel mounted 40 g - DIN rail mounted
Emissions	IEC 61000-6-4
ESD immunity	EC 61000-4-2: 4 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine wave 80% AM from 80...6000 MHz
EFT/B immunity	IEC 61000-4-4: ±2 kV @ 5 kHz on power ports ±2 kV @ 5 kHz on signal ports ±1 kV @ 5 kHz on communication ports
Surge transient immunity	IEC 61000-4-5: ±2 kV line-line(DM) and ±4 kV line-earth(CM) on AC power ports ±500V line-line(DM) and ±1 kV line-earth(CM) on signal ports ±1 kV line-earth(CM) on shielded ports ±2 kV line-earth(CM) on communication ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz

System Loading and Heat Dissipation

System Loading Calculations

When you connect MicroLogix accessories and expansion I/O, an electrical load is placed on the controller power supply. This section shows how to calculate the load of your control system.

The following example is provided to illustrate system loading calculation. The system calculation procedure accounts for the amount of 5V DC and 24V DC current that is consumed by the controller, expansion I/O, and user-supplied equipment.

Use the System Loading Worksheet for 24-point Controllers on page 107 to calculate your specific 24-point controller configuration.

Use the System Loading Worksheet for 40-point Controllers on page 109 to calculate your specific 40-point controller.

Current consumed by the processor, memory modules, and the real-time clock modules has already been factored into the calculations. A system is valid if the current and power requirements are satisfied.

System Loading Example Calculations (24-point Controller)

Current Loading

Table 30 - Calculating the Current for MicroLogix Accessories

Catalog Number	Device Current Requirements		Calculated Current	
	@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1761-NET-AIC[1] when powered by the base unit communications port, selector switch in the up position	0	120	0	120
Subtotal 1:			**0**	**120**

(1) This is an optional accessory. Current is consumed only if the accessory is installed.

Table 31 - Calculating the Current for Expansion I/O

Catalog Number[1]	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-IA8	2	50	0	100	0
1762-IF4		40	50		
1762-IF2OF2		40	105		
1762-IQ8		50	0		
1762-IQ16		70[2]	0		
1762-IQ32T		170	0		
1762-IR4		40	50		
1762-IT4		40	50		
1762-OA8		115	0		
1762-OB8		115	0		
1762-OB16		175	0		
1762-OB32T		175	0		
1762-OF4		40	165		
1762-OV32T		175	0		
1762-OW8	2	80	90	160	180

Table 31 - Calculating the Current for Expansion I/O (Continued)

Catalog Number[1]	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-OW16		140[2]	180[2]		
1762-OX6I		110	110		
1762-IQ8OW6		110	80		
Total Modules (6 maximum):	**4**	**Subtotal 2:**		**260**	**180**

(1) See your expansion I/O Installation Instructions for Current Requirements not listed in this table.
(2) Only applicable for series B and series C I/O modules.

Validate the System

The example systems that are shown in Table 32 and Table 33 are verified to be acceptable configurations. The systems are valid because:

- Calculated Current Values < Maximum Allowable Current Values
- Calculated System Loading < Maximum Allowable System Loading

Table 32 - Validating Systems Using 1762-L24AWA, 1762-L24BXB, 1762-L24AWAR or 1762-L24BXBR

Maximum Allowable Values		Calculated Values	
Current		Current (Subtotal 1 from Table 30 + Subtotal 2 from Table 31)	
400 mA @ 5V DC	350 mA @ 24V DC	0 mA + 260 mA = 260 mA @ 5V DC	120 mA + 180 mA = 300 mA @ 24V DC
System Loading		System Loading	
10.4 W		= (260 mA x 5V) + (300 mA x 24 V) = (1300 mW) + (7200 mW) = 8500 mW = 8.50 W	

Table 33 - Validating Systems using 1762-L24BWA or 1762-L24BWAR

Maximum Allowable Values		Calculated Values	
Current for Devices Connected to the +24V DC Sensor Supply		Sum of all sensor currents	
250 mA @ 24V DC		140 mA @ 24V DC (example sensor value)	
Current for MicroLogix Accessories and Expansion I/O		Current Values (Subtotal 1 from Table 30 + Subtotal 2 from Table 31)	
400 mA @ 5V DC	350 mA @ 24V DC	0 mA + 260 mA = 260 mA @ 5V DC	120 mA + 180 mA = 300 mA @ 24V DC
System Loading		System Loading	
12 W		= (140 mA x 24 V) + (260 mA x 5 V) + (300 mA x 24 V) = (3360 mW) + (1300 mW) + (7200 mW) = 11,860 mW = 11.9 W	

System Loading Example Calculations (40-point Controller)

Current Loading

Table 34 - Calculating the Current for MicroLogix Accessories

Catalog Number	Device Current Requirements		Calculated Current	
	@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1761-NET-AIC[1] when powered by the base unit communications port, selector switch in the up position	0	120	0	120
Subtotal 1:			**0**	**120**

(1) This is an optional accessory. Current is consumed only if the accessory is installed.

Table 35 - Calculating the Current for Expansion I/O

Catalog Number[1]	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-IA8		50	0		
1762-IF4		40	50		
1762-IF2OF2	1	40	105	40	105
1762-IQ8		50	0		
1762-IQ16	2	70[2]	0	140[2]	0
1762-IQ32T		170	0		
1762-IR4		40	50		
1762-IT4		40	50		
1762-OA8	1	115	0	115	0
1762-OB8		115	0		
1762-OB16		175	0		
1762-OB32T		175	0		
1762-OF4		40	165		
1762-OV32T		175	0		
1762-OW8		80	90		
1762-OW16	1	140[2]	180[2]	140[2]	180[2]
1762-OX6I		110	110		
1762-IQ8OW6		110	80		
Total Modules (6 maximum):	**5**	**Subtotal 2:**		**435**	**285**

(1) See your expansion I/O Installation Instructions for Current Requirements not listed in this table.
(2) Only applicable for series B and series C I/O modules.

Validate the System

The example systems that are shown in Table 36 and Table 41 are verified to be acceptable configurations. The systems are valid because:

- Calculated Current Values < Maximum Allowable Current Values
- Calculated System Loading < Maximum Allowable System Loading

Table 36 - Validating Systems using 1762-L40AWA, 1762-L40BXB, 1762-L40AWAR or 1762-L40BXBR

Maximum Allowable Values		Calculated Values	
Current		Current (Subtotal 1 from Table 34 + Subtotal 2 from Table 35)	
600 mA @ 5V DC	500 mA @ 24V DC	0 mA + 435 mA = 435 mA @ 5V DC	120 mA + 285 mA = 405 mA @ 24V DC
System Loading		System Loading	
15 W		= (4.5 mA x 5V) + (405 mA x 24V) = (2175 mW) + (9720 mW) = 11,895 mW = 11.90 W	

System Loading Worksheet for 24-point Controllers

Table 37, Table 38, Table 39, and Table 40 are provided for system loading validation for 24-point controllers. See System Loading Example Calculations (24-point Controller) on page 105.

Current Loading

Table 37 - Calculating the Current for MicroLogix Accessories

Catalog Number	Device Current Requirements		Calculated Current	
	@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1761-NET-AIC[1] when powered by the base unit communications port, selector switch in the up position	0	120		
Subtotal 1:				

(1) This is an optional accessory. Current is consumed only if the accessory is installed.

Table 38 - Calculating the Current for Expansion I/O

Catalog Number[1]	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-IA8		50	0		
1762-IF4		40	50		
1762-IF2OF2		40	105		
1762-IQ8		50	0		
1762-IQ16		70[2]	0		
1762-IQ32T		170	0		
1762-IR4		40	50		
1762-IT4		40	50		
1762-OA8		115	0		
1762-OB8		115	0		
1762-OB16		175	0		
1762-OB32T		175	0		
1762-OF4		40	165		
1762-OV32T		175	0		
1762-OW8		80	90		
1762-OW16		140[2]	180[2]		
1762-OX6I		110	110		
1762-IQ8OW6		110	80		
Total Modules (6 maximum):		**Subtotal 2:**			

(1) See your expansion I/O Installation Instructions for Current Requirements not listed in this table.
(2) Only applicable for series B and series C I/O modules.

Table 39 - Validating Systems using 1762-L24AWA, 1762-L24BXB, 1762-L24AWAR or 1762-L24BXBR

Maximum Allowable Values		Calculated Values	
Current		Current (Subtotal 1 from Table 37 + Subtotal 2 from Table 38)	
400 mA @ 5V DC	350 mA @ 24V DC	mA @ 5V DC	mA @ 24V DC
System Loading		System Loading	
10.4 W		= (_____ mA x 5V) + (_____ mA x 24V) = _____ mW + _____ mW = _____ mW = _____ W	

Table 40 - Validating Systems using 1762-L24BWA or 1762-L24BWAR

Maximum Allowable Values		Calculated Values	
Current for Devices Connected to the +24V DC Sensor Supply		Sum of all sensor currents Include 1761-NET-AIC here rather than in Table 37, if it is powered externally by the sensor supply.	
250 mA @ 24V DC		mA @ 24V DC	
Current for MicroLogix Accessories and Expansion I/O		Current (Subtotal 1 from Table 37 + Subtotal 2 from Table 38)	
400 mA @ 5V DC	350 mA @ 24V DC	mA @ 5V DC	mA @ 24V DC
System Loading		System Loading	
12 W		= (_____ mA x 24 V) + (_____ mA x 5V) + (_____ mA x 24 V) = _____ mW + _____ mW + _____ mW = _____ mW = _____ W	

Table 41 - Validating Systems using 1762-L40BWA or 1762-L40BWAR

Maximum Allowable Values		Calculated Values	
Current for Devices Connected to the +24V DC Sensor Supply		Sum of all current sensors	
400 mA @ 24V DC		150 mA @ 24V DC (example sensor value)	
Current for MicroLogix Accessories and Expansion I/O		Current (Subtotal 1 from Table 34 + Subtotal 2 from Table 35)	
600 mA @ 5V DC	500 mA @ 24V DC	0 mA + 435 mA = 435 mA @ 5V DC	120 mA + 285 mA = 405 mA @ 24V DC
System Loading		System Loading	
16 W		= (150 mA x 24V) + (435 mA x 5V) + (405 mA x 24V) = (3600 mW) + (2175 mW) + (9720 mW) = 15,495 W = 15.50 W	

System Loading Worksheet for 40-point Controllers

Table 42, Table 43, Table 44, and Table 45 are provided for system loading validation for 40-point Controllers. See System Loading Example Calculations (40-point Controller) on page 106.

Current Loading

Table 42 - Calculating the Current for MicroLogix Accessories

Catalog Number	Device Current Requirements		Calculated Current	
	@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1761-NET-AIC(1) when powered by the base unit communications port, selector switch in the up position	0	120		
Subtotal 1:				

(1) This is an optional accessory. Current is consumed only if the accessory is installed.

Table 43 - Calculating the Current for Expansion I/O

Catalog Number(1)	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-IA8		50	0		
1762-IF4		40	50		
1762-IF2OF2		40	105		
1762-IQ8		50	0		
1762-IQ16		70(2)	0		
1762-IQ32T		170	0		
1762-IR4		40	50		
1762-IT4		40	50		
1762-OA8		115	0		
1762-OB8		115	0		
1762-OB16		175	0		

Table 43 - Calculating the Current for Expansion I/O (Continued)

Catalog Number[1]	n	A	B	n x A	n x B
	Number of Modules	Device Current Requirements (max)		Calculated Current	
		@ 5V DC (mA)	@ 24V DC (mA)	@ 5V DC (mA)	@ 24V DC (mA)
1762-OB32T		175	0		
1762-OF4		40	165		
1762-OV32T		175	0		
1762-OW8		80	90		
1762-OW16		140[2]	180[2]		
1762-OX6I		110	110		
1762-IQ8OW6		110	80		
Total Modules (6 maximum):		**Subtotal 2:**			

(1) See your expansion I/O Installation Instructions for Current Requirements not listed in this table.
(2) Only applicable for series B and series C I/O modules.

Table 44 - Validating Systems using 1762-L40AWA, 1762-L40BXB, 1762-L40AWAR or 1762-L40BXBR

Maximum Allowable Values		Calculated Values	
Current		Current (Subtotal 1 from Table 42 + Subtotal 2 from Table 43)	
600 mA @ 5V DC	500 mA @ 24V DC	mA @ 5V DC	mA @ 24V DC
System Loading		System Loading	
15 W		= (_____ mA x 5V) + (_____ mA x 24V) = _____ mW + _____ mW = _____ mW = _____ W	

Table 45 - Validating Systems using 1762-L40BWA or 1762-L40BWAR

Maximum Allowable Values		Calculated Values	
Current for Devices Connected to the +24V DC Sensor Supply		Sum of all sensor currents Include 1761-NET-AIC here rather than in Table 42, if it is powered externally by the sensor supply.	
400 mA @ 24V DC		mA @ 24V DC	
Current for MicroLogix Accessories and Expansion I/O		Current (Subtotal 1 from Table 42 + Subtotal 2 from Table 43)	
600 mA @ 5V DC	500 mA @ 24V DC	mA @ 5 V DC	mA @ 24V DC
System Loading		System Loading	
16 Watts		= (_____ mA x 24V) + (_____ mA x 5V) + (_____ mA x 24V) = _____ mW + _____ mW + _____ mW = _____ mW = _____ W	

Calculating Heat Dissipation

Use Table 46 when you must determine the heat dissipation of your system for installation in an enclosure. For System Loading, take the value from the appropriate System Loading Worksheet for 24-point Controllers on page 107 or System Loading Worksheet for 40-point Controllers on page 109.

Table 46 - Heat Dissipation

Catalog Number	Heat Dissipation		
	Equation or Constant	Calculation	Sub-Total
1762-L24AWA, 1762-L24AWAR	15.2 W + (0.4 x System Loading)	15.2 W + (0.4 x _____ W)	_____ W
1762-L24BWA, 1762-L24BWAR	15.7 W + (0.4 x System Loading)	15.7 W + (0.4 x _____ W)	_____ W
1762-L24BXB, 1762-L24BXBR	17.0 W + (0.3 x System Loading)	17.0 W + (0.3 x _____ W)	_____ W
1762-L40AWA, 1762-L40AWAR	21.0 W + (0.4 x System Loading)	21.0 W + (0.4 x _____ W)	_____ W
1762-L40BWA, 1762-L40BWAR	22.0 W + (0.4 x System Loading)	22.0 W + (0.4 x _____ W)	_____ W
1762-L40BXB, 1762-L40BXBR	27.9 W + (0.3 x System Loading)	27.9 W + (0.3 x _____ W)	_____ W
1762-IA8	2.0 W x number of modules	2.0 W x _____	_____ W
1762-IF4	2.0 W x number of modules	2.0 W x _____	_____ W
1762-IF2OF2	2.6 W x number of modules	2.6 W x _____	_____ W

Table 46 - Heat Dissipation (Continued)

Catalog Number	Heat Dissipation		
	Equation or Constant	Calculation	Sub-Total
1762-IQ8	3.7 W x number of modules	3.7 W x _____	_____ W
1762-IQ16	5.1 W[1] x number of modules	5.1 W[1] x _____	_____ W
1762-IQ32T	6.8 W x number of modules (@ 30V DC) 5.4 W x number of modules (@ 26.4V DC)	6.8 W x _____ (@ 30V DC) 5.4 W x _____ (@ 26.4V DC)	_____ W _____ W
1762-IR4	1.5 W x number of modules	1.5 W x _____	_____ W
1762-IT4	1.5 W x number of modules	1.5 W x _____	_____ W
1762-OA8	2.9 W x number of modules	2.9 W x _____	_____ W
1762-OB8	1.6 W x number of modules	1.6 W x _____	_____ W
1762-OB16	2.9 W x number of modules	2.9 W x _____	_____ W
1762-OB32T	3.4 W x number of modules	3.4 W x _____	_____ W
1762-OF4	2.8 W x number of modules	2.8 W x _____	_____ W
1762-OV32T	2.7 W x number of modules	2.7 W x _____	_____ W
1762-OW8	2.9 W x number of modules	2.9 W x _____	_____ W
1762-OW16	6.1 W[1] x number of modules	6.1 W[1] x _____	_____ W
1762-OX6I	2.8 W x number of modules	2.8 W x _____	_____ W
1762-IQ8OW6	5.0 W x number of modules (@ 30V DC) 4.4 W x number of modules (@ 26.4V DC)	5.0 W x _____ 4.4 W x _____	_____ W _____ W
Add Subtotals to Determine Heat Dissipation			**_____ W**

(1) Only applicable for series B and series C I/O modules.

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