SPECTRUM
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MicroLogix™
Universal Analog Input Module

(Catalog Number 1762sc-IF8U)

Contents

For Technical Support

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For More Information

For	Refer to this Document	Allen-Bradley Pub. No.
An overview of the MicroLogix 1200 system, including information on controllers and expansion I/O.	MicroLogix™ 1200 System Overview	1762-SO001A-US-P
Information on installing, wiring, and operating a MicroLogix 1200 Programmable Controller	MicroLogix 1200 Programmable Controllers User Manual	1762-UM001B-US-P
Installation guide for the MicroLogix 1200 Programmable Controller.	MicroLogix 1200 Programmable Controllers Installation Instructions	1762-IN006C-MU-P
More information on proper wiring and grounding techniques.	Industrial Automation Wiring and Grounding Guidelines	1770-4.1

If you would like a manual, you can download a free electronic version from the internet: **www.spectrumcontrols.com**

Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.
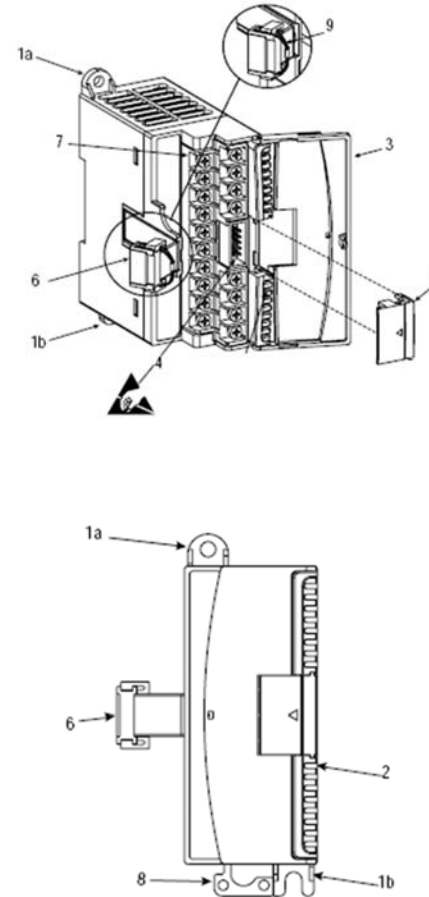
MISE EN GARDE ⚠	DANGER D'EXPLOSION

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
- Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée.
- Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée.
- Ce produit doit être installé dans une armoire.
- Pour les applications de Classe I, Division 2, le connecteur de bus doit être correctement installé et son couvercle enclenché.
- Pour les applications de Classe 1, Division 2, tous les modules doivent être installés en contact direct les uns avec les autres, comme indiqué page6. Si on utilise le montage sur rail DIN, une butée doit être placée à l'avant de l'automate et après la dernière unité d'E/S 1762.

Description

Item	Description
1a	upper panel mounting tab
1b	lower panel mounting tab
2	I/O diagnostic LEDs
3	module door with terminal identification label
4	bus connector with male pins
5	bus connector cover
6	flat ribbon cable with bus connector (female pins)
7	terminal block
8	DIN rail latch
9	pull loop

Installation

1762 I/O is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[1]) and to circuits not exceeding Over Voltage Category II[2] (IEC 60664-1).[3]

Prevent Electrostatic Discharge

ATTENTION

Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
- Wear an approved wrist-strap grounding device.
- Do not touch the bus connector or connector pins.
- Do not touch circuit components inside the module.
- If available, use a static-safe work station.
- When not in use, keep the module in its static-shield box.

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.
(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.
(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

WARNING

EXPLOSION HAZARD

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components or disconnect equipment or change the current switch selection switch position unless power has been switched off.
- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.
- This product must be installed in an enclosure.
- In Class I, Division 2 applications, the bus connector must be fully seated and the bus connector cover must be snapped in place.
- In Class I, Division 2 applications, all modules must be mounted in direct contact with each other as shown on page 6. If DIN rail mounting is used, an end stop must be installed ahead of the controller and after the last 1762 I/O module.
- All wiring must comply with N.E.C. article 501-4(b).

Current Inputs	System accuracy at 25° C (4 and 17 Hz filters): ± 20 uA maximum for 0-20 mA inputs ± 20 uA maximum for 4-20 mA inputs System accuracy at -20-60°C (4 and 17 Hz filters): ± 50 uA maximum for 0-20 mA inputs ± 50 uA maximum for 4-20 mA inputs
RTD Inputs	System accuracy at 25° C (4 and 17 Hz filters): ± 0.5°C for Platinum 385 ± 0.5°C for Platinum 3916 ± 0.6°C for Nickel ± 0.3°C for Nickel-Iron ± 1.0°C for Copper measured in 3-wire mode wire with compensation ± 0.6°C for Copper measured in 4-wire mode System accuracy at -20-60° C (4 and 17 Hz filters): ± 0.9 °C for Platinum 385 ± 0.8 °C for Platinum 3916 ± 0.8 °C for Nickel ± 0.5 °C for Nickel-Iron ± 1.5°C for Copper measured in 3-wire mode wire with compensation ± 1.1°C for Copper measured in 4-wire mode TOLERANCES DO NOT INCLUDE LEAD WIRE RESISTANCE ERRORS ON 2 AND 3 WIRE.
Resistance Inputs	System accuracy at 25° C (4 and 17 Hz filters): ± 0.5 ohms for 150 ohm range ± 1.0 ohms for 1000 ohm range ± 3.0 ohms for 3000 ohm range System accuracy at -20-60° C (4 and 17 Hz filters): ± 1.0 ohms for 150 ohm range ± 1.5 ohms for 1000 ohm range ± 4.5 ohms for 3000 ohm range
	Note: Accuracy is dependent on the ADC output rate selection, data format, and input noise.

Remove Power

ATTENTION

Remove power before removing or installing this module. When you remove or install a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment
- causing permanent damage to the module's circuitry

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.
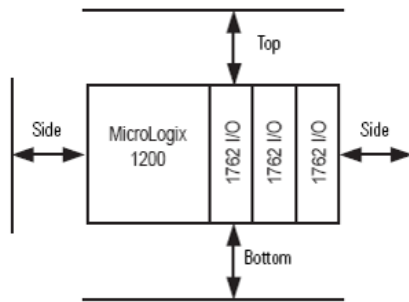
Mounting

The 1762sc-IF8U is to be used with the MicroLogix™ 1100, 1200, or 1400 processor.

ATTENTION

Do not remove protective debris strip until after the module and all other equipment near the module is mounted and wiring is complete. Once wiring is complete and the module is free of debris, carefully remove protective debris strip. Failure to remove strip before operating can cause overheating.

Minimum Spacing

Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown

NOTE 1762 expansion I/O may be mounted horizontally only.
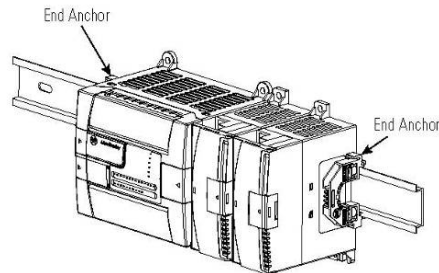
ATTENTION During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage when power is applied to the module.

DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting the module on a DIN rail, close the DIN rail latch. Press the DIN rail mounting area of the module against the DIN rail. The latch will momentarily open and lock into place.

Use DIN rail end anchors (Allen-Bradley part number 1492-EA35 or 1492-EAH35) for environments with vibration or shock concerns.

Accuracy Specifications

Specification	Value
Thermocouple Inputs	Linearization per ITS-90 System accuracy at 25°C (4 and 17 Hz filters): Type J (-180°C to 1200°C): ± 0.6 degrees C maximum Type J (-210°C to -180°C): ± 0.8 degrees C maximum Type N (-160°C to 1300°C): ± 1 degrees C maximum Type N (-210°C to -160°C): ± 1.8 degrees C maximum Type T (-190°C to 400°C): ± 1 degrees C maximum Type T (-270°C to -190°C): ± 7 degrees C maximum Type K (-200°C to 1370°C): ± 1 degrees C maximum Type K (-270°C to -200°C): ± 10 degrees C maximum Type E (-200°C to 1000°C): ± 0.6 degrees C maximum Type E (-270°C to -200°C): ± 5 degrees C maximum Type S and R: ± 2.8 degrees C maximum Type C: ± 1.8 degrees C maximum Type B: ± 3.3 degrees C maximum System accuracy at -20-60° C (4 and 17 Hz filters): Type J (-180°C to 1200°C): ± 1.2 degrees C maximum Type J (-210°C to -180°C): ± 1.6 degrees C maximum Type N (-200°C to 1300°C): ± 2 degrees C maximum Type N (-210°C to -200°C): ± 3.6 degrees C maximum Type T (-230°C to 400°C): ± 2 degrees C maximum Type T (-270°C to -230°C): ± 14 degrees C maximum Type K (-225°C to 1370°C): ± 2 degrees C maximum Type K (-270°C to -225°C): ± 20 degrees C maximum Type E (-210°C to 1000°C): ± 1.2 degrees C maximum Type E (-270°C to -210°C): ± 10 degrees C maximum Type S and R: ± 6 degrees C maximum Type C: ± 4 degrees C maximum Type B: ± 7 degrees C maximum The above limits do not include the cold junction compensation or thermocouple sensor errors.
CJC accuracy	± 3.0 degrees C maximum Correlation between reading and target terminal
CJC Sensor resolution	± 0.2 degrees C max for 0-60C, ± 0.4 degrees C max for full range
CJC Sensor accuracy	± 1.0 degrees C maximum Reading/Conversion of the sensor
Voltage Inputs	System accuracy at 25° C (4 and 17 Hz filters): ± 20 uV maximum for ± 50 mV inputs ± 20 uV maximum for ± 100 mV inputs ± 3 mV maximum for 0-5V inputs ± 3 mV maximum for 1-5V inputs ± 10 mV maximum for 0-10V inputs ± 10 mV maximum for ±10V inputs System accuracy at -20-60° C (4 and 17 Hz filters): ± 40 uV maximum for ± 50 mV inputs ± 40 uV maximum for ± 100 mV inputs ± 6 mV maximum for 0-5V inputs ± 6 mV maximum for 1-5V inputs ± 20 mV maximum for 0-10V inputs ± 20 mV maximum for ±10V inputs

Specification	Value
Vendor I.D.	58
Product Type	10
Product Code	20
Agency Certification	C-UL listed (under CSA C22.2 No. 142) UL 508 listed CE compliant for all applicable directives
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (ISA 12.12.01, C-UL under CSA C22.2 No. 213) Operating Temperature Code T5
Radiated and Conducted Emissions	EN55011
Electrical /EMC:	The module has passed testing at the following levels:
ESD Immunity (IEC61000-4-2)	4 kV contact, 8 kV air, 4 kV indirect
Radiated Immunity (IEC61000-4-3)	10 V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier
Fast Transient Burst (IEC61000-4-4)	2 kV, 5 kHz
Surge Immunity (IEC61000-4-5)	1 kV galvanic gun
Conducted Immunity (IEC61000-4-6)	10V, 0.15 to 80 MHz[4]

Input Specifications

Specification	Value
Number of Inputs	8 Current/Voltage or 4 Resistance
A/D Converter Type	Delta Sigma
Common Mode Rejection	100 dB for 4 Hz & 17 Hz Filters
Non-linearity (in percent full scale)	±0.1%
Input Impedance	Current Terminal: 249Ω
Current Input Protection	±42 mA
Voltage Input Protection	±28 V[5]

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[4] Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 2700 MHz.
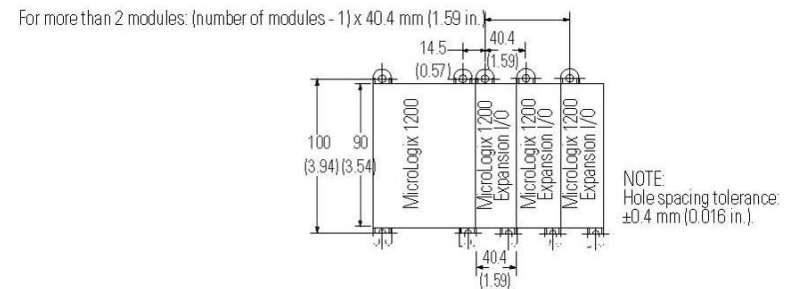
[5] The maximum allowable voltage difference between any two input pins is 28V.

NOTE   For environments with extreme vibration and shock concerns, use the panel mounting method described below, instead of DIN rail mounting.

Panel Mounting

Use the dimensional template shown below to mount the module. The preferred mounting method is to use two M4 or #8 panhead screws per module. M3.5 or #6 panhead screws may also be used, but a washer may be needed to ensure a good mechanical contact. Mounting screws are required on every module.

Power Requirements

The maximum number of IF8U modules that can be installed in a system depends on the maximum bus current draw of the module and the maximum bus current provided by the PLC. The IF8U module has the following power requirements.
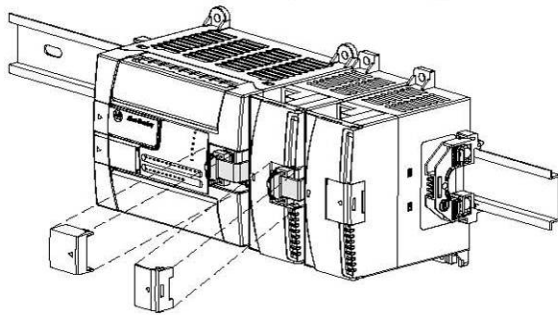
5 VDC	24 VDC
175 mA	21 mA

Use the table below to determine the maximum number of IF8U modules that can be installed in a MicroLogix system.

Controller	Max 5V Bus Current	Max 24V Bus Current	Max # of IF8U Modules
ML1100	800	700	4
ML1200 (24pt.)	400	350	2
ML1200 (40pt.)	600	500	3
ML1400 (All)	1500	1500	7

System Assembly

The expansion I/O module is attached to the controller or another I/O module by means of a ribbon cable *after* mounting as shown below.

NOTE

Use the pull loop on the connector to disconnect modules.
Do not pull on the ribbon cable.

ATTENTION

EXPLOSION HAZARD

• In Class I, Division 2 applications, the bus connector must be fully seated and the bus connector cover must be snapped in place.

• In Class I, Division 2 applications, all modules must be mounted in direct contact with each other as shown on page 6. If DIN rail mounting is used, an end stop must be installed ahead of the controller and after the last 1762 I/O module.

Specifications

General Specifications

Specification	Value		
Dimensions	90 mm (height) x 87 mm (depth) x 40 mm (width) height including mounting tabs is 110 mm 3.54 in. (height) x 3.43 in. (depth) x 1.58 in. (width) height including mounting tabs is 4.33 in.		
Approximate Shipping Weight (with carton)	268g (0.591 lbs.)		
Storage Temperature	-40°C to +85°C (-40°F to +185°F)		
Operating Temperature	-20°C to +60°C (-4°F to +140°F)		
Operating Humidity	5% to 95% non-condensing		
Operating Altitude	2000 meters (6561 feet)		
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. max. peak-to-peak		
Shock	Operating: 30G		
Bus Current Draw (max.)	175 mA at 5V dc Max 21 mA at 24V dc Max		
Heat Dissipation	1.4W Total Max		
Analog Normal Operating Range	Voltage: -10.5V to +10.5V dc Current: 0 to +21 mA Resistance: 0 to 3000 Ω		
Resolution	16 bits (Integer Format)		
Repeatability[2]	±0.1% (With 4Hz or 17Hz ADC Filter)		
Channel Update Time	Filter Setting	Conversion Time	Step Response/Module Update[3]
	470 Hz	20 ms	= Conversion time * (1+ number of enabled channels)
	62 Hz	45 ms	
	17 Hz	135 ms	
	4 Hz	495 ms	
Input Group to System Isolation	**Channel to Rack:** 707 VDC for 1 minute Optical & magnetic **Channel to Channel:** 10VDC		
Module Power LED	On: indicates power is applied and module not faulted.		
Recommended Cable	Belden™ 8761 (shielded)		

[2] Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.

[3] The module update time is purely the sum of conversion times for each enabled channels. The extra addition of 1 is not necessary.

To Select		Make these bit settings																
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	500 Pt 385						1	0	0	1	1						
	1000 Pt 385						1	0	1	0	0						
	100 Pt 3916						1	0	1	0	1						
	200 Pt 3916						1	0	1	1	0						
	500 Pt 3916						1	0	1	1	1						
	1000 Pt 3916						1	1	0	0	0						
	10 Cu 426						1	1	0	0	1						
	100 Ni 618						1	1	0	1	0						
	120 Ni 672						1	1	0	1	1						
	604 NiFe 518						1	1	1	0	0						
	150 ohm						1	1	1	0	1						
	1000 ohm						1	1	1	1	0						
	3000 ohm						1	1	1	1	1						
Data Format	Engineering Units X1				0	0											
	Engineering Units X10				0	1											
	Raw/ Proportional Data				1	0											
	Scaled for PID				1	1											
CJC Temp Type (Only when bit 3 is set)	Raw CJC Temp		x[1]	0													
	Adjusted CJC Temp		x1	1													
2/3/4 Wire RTD (Only valid for RTD/R ranges)	2 Wire			0	0												
	3 Wire w/ Comp			0	1												
	3 Wire w/o Comp			1	0												
	4 Wire			1	1												
Temperature Scale (Only valid for temperature ranges)	Deg C	0															
	Deg F	1															

[1] X = don't care

Wiring

Grounding the Module

Grounding for this product is provided by the MicroLogix™ 1100 or 1200 CPU via the bus ribbon cable. Refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1, for additional information.

Input Type Selection

Select the input type, current or voltage, using the switch located on the module's circuit board *and* the input type/range selection bits in the Configuration Data File (see page 15). You can access the switch through the ventilation slots on the top of the module. The factory default setting for all switches is Current. Switch positions are shown below.

Switch Location

Non-Current

1 2 3 4 5 6 7 8   Current

Channel #

System Wiring Guidelines

Consider the following when wiring your system:

- The analog common (COM) is not connected to earth ground inside the module. All terminals are electrically isolated from the system.

- Channel to channel isolation is limited to 10 VDC.
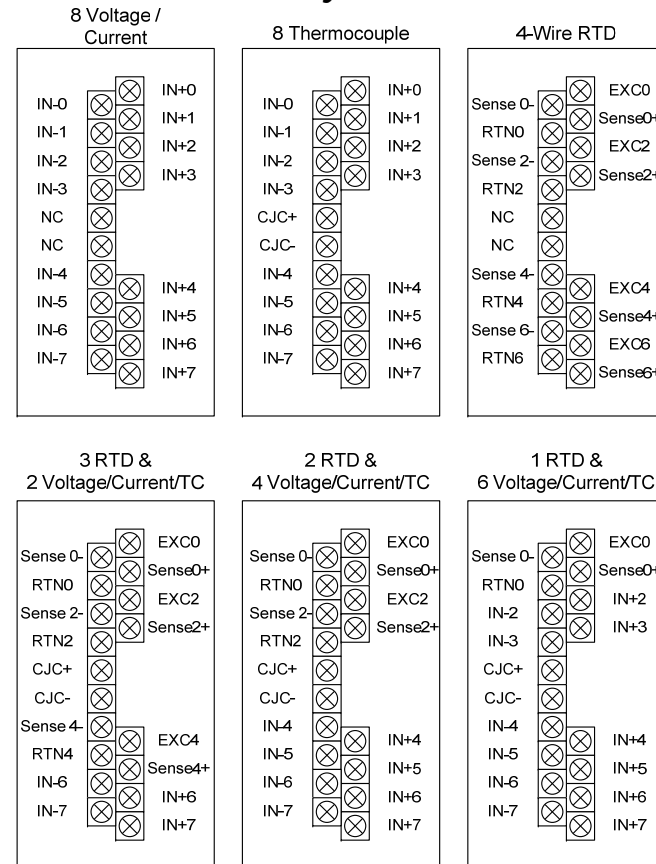

Input Data File

For each module, slot x, words 0 through 7 contain the analog values of the inputs. The module can be configured to use either raw/proportional data, engineering units X1, engineering units X10 or scaled-for-PID data. The input data file for either configuration is shown below.

Configuration, Input and Output Register Format

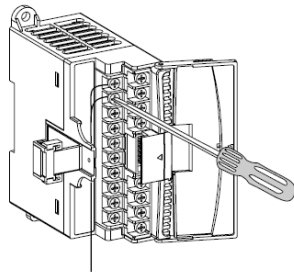| Register	Function
Configuration Registers (NOT USED)	
C:e.0	Ignore
C:e.1	Ignore
C:e.2	Ignore
C:e.3	Ignore
C:e.4	Ignore
C:e.5	Ignore
C:e.6	Ignore
C:e.7	Ignore
Input File (Module Data)	
I:e.0	Channel 0 Data Word
I:e.1	Channel 1 Data Word
I:e.2	Channel 2 Data Word
I:e.3	Channel 3 Data Word
I:e.4	Channel 4 Data Word
I:e.5	Channel 5 Data Word
I:e.6	Channel 6 Data Word
I:e.7	Channel 7 Data Word
Output File (Used for Module Configuration)	
O:e.0	Channel 0 Configuration Word
O:e.1	Channel 1 Configuration Word
O:e.2	Channel 2 Configuration Word
O:e.3	Channel 3 Configuration Word
O:e.4	Channel 4 Configuration Word
O:e.5	Channel 5 Configuration Word
O:e.6	Channel 6 Configuration Word
O:e.7	Channel 7 Configuration Word

Terminal Block Layout

NOTE Grounding the cable shield at the module end only usually provides sufficient noise immunity. However, for best cable shield performance, earth ground the shield at both ends, using a 0.01µF capacitor at one end to block AC power ground currents, if necessary.

Labeling the Terminals

A write-on label is provided with the module. Remove the label from the door, mark the identification of each terminal with permanent ink, and slide the label back into the door.

Wiring the Finger-Safe Terminal Block

ATTENTION Be careful when stripping wires. Wire fragments that fall into a module could cause damage when power is applied. Once wiring is complete, ensure the module is free of all metal fragments.

When wiring the terminal block, keep the finger-safe cover in place.

1. Route the wire under the terminal pressure plate. You can use the stripped end of the wire or a spade lug. The terminals will accept a 6.35 mm (0.25 in.) spade lug.

2. Tighten the terminal screw making sure the pressure plate secures the wire. Recommended torque when tightening

terminal screws is 0.904 Nm (8 in-lbs).

3. After wiring is complete, remove the debris shield.

NOTE If you need to remove the finger-safe cover, insert a screw driver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way
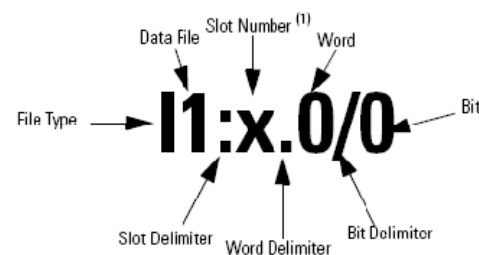
Wire Size and Terminal Screw Torque

Each terminal accepts up to two wires with the following restrictions:

Wire Type		Wire Size	Terminal Screw Torque
Solid	Cu-90°C (194°F)	#14 to #22 AWG	0.904 Nm (8 in-lbs)
Stranded	Cu-90°C (194°F)	#16 to #22 AWG	0.904 Nm (8 in-lbs)

I/O Memory Mapping

Addressing

The addressing scheme for 1762 Expansion I/O is shown below.

(1) I/O located on the controller (embedded I/O) is slot 0. I/O added to the controller (expansion I/O) begins with slot 1.