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AC (12-120V) Output Module

Cat. No. 1771-OAD Series C

To The Installer

This document provides information on:

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Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Publication 1771-IN024B–EN–P – November 2002

Allen–Bradley publication SGI–1.1, Safety Guidelines for Application, Installation, and Maintenance of Solid–State Control (available from your local Rockwell Automation office), describes some important differences between solid–state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or part, without written permission of Rockwell Automation, is prohibited.

Throughout this publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard, avoid a potential hazard, and recognize the consequences of a potential hazard.

WARNING



Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION



Identifies information about practices or circumstances that may lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION



Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664–1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as “open type” equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present, and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosures. Also, see the appropriate sections in this publication, as well as the Allen–Bradley publication 1770–4.1, (“Industrial Automation Wiring and Grounding Guidelines”), for additional installation requirements pertaining to this equipment.

ATTENTION



Preventing Electrostatic Discharge
This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static–safe workstation.
- When not in use, keep modules in appropriate static–safe packaging.

Pre-installation Considerations

The 1771-OAD Series C module is compatible with all chassis except 1771-A1, 1771-A2 and 1771-A4 chassis. Make sure no other output module or single card block transfer module is placed in the same module group when using 2-slot addressing. Any discrete input module may be used within the same module group.

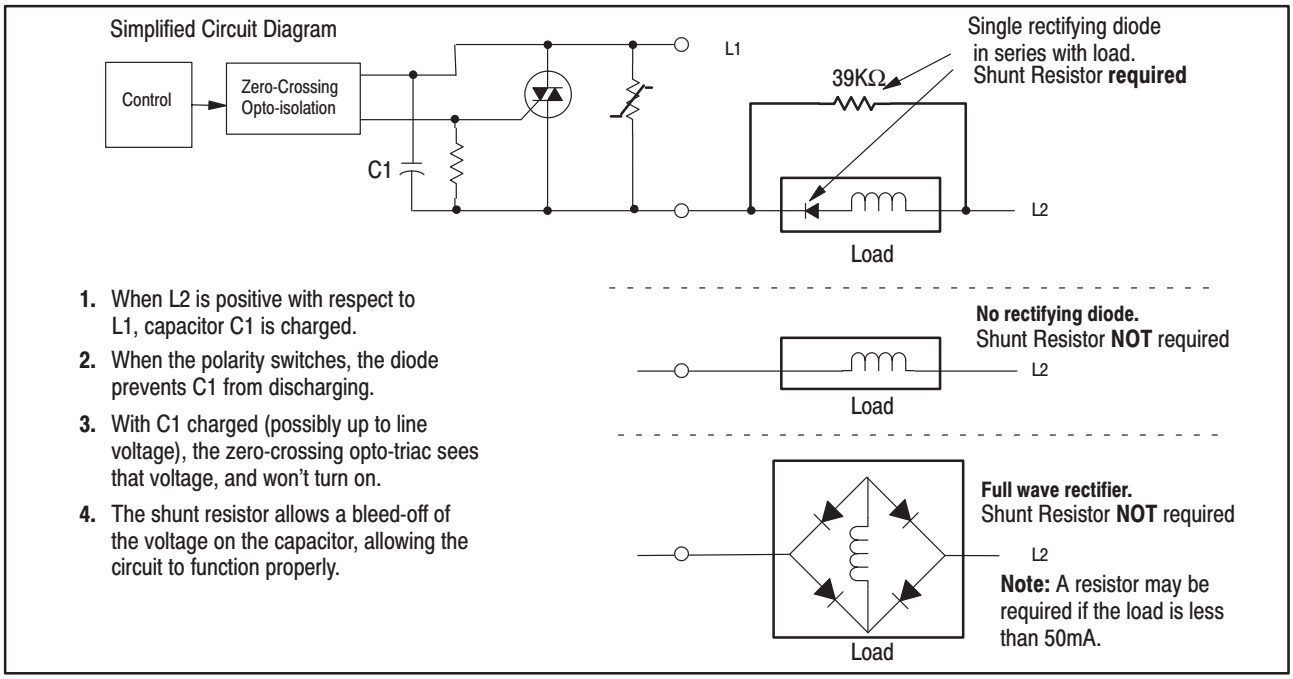
Using the 1771-OAD Series C Module with Half-wave Rectifying Load Devices (single diode) and Indicator Lights

This module uses zero-crossing technology to allow turn-on when the output voltage is less than a specified voltage (typically 40 to 50V). This greatly reduces the stress on contacts and other devices that are sensitive to current surges.

- When using this output module with a device that includes a single diode in series with the load, place a shunt resistor (39K ohm, 1W) across the load. This resistor allows proper output operation.

  The shunt resistor may cause LED indicators to glow when the output is turned off. In this case, use an incandescent lamp in place of the LED.

- When using a full-wave rectified device, the device may not turn off when the output is deenergized. Add a 2.5K ohm, 10W resistor in parallel with the device to provide proper operation.
- If 24V ac incandescent indicator lights appear dim when used with the Series C module, place a 2.5K ohm, 10W resistor in parallel with the indicator. This will restore full brightness.



Calculate Power Requirements

Your module receives its power through the 1771 I/O chassis backplane from the chassis power supply. The module requires 295mA from the output of this supply. Add this to the requirements of all other modules in the I/O chassis to prevent overloading the chassis backplane and/or chassis power supply.

Select the Mode of the Fuse–Blown Jumper

The fuse-blown jumper has two modes:

- the preset, **standard (STD) mode** – displays the fuse status on the red fuse-blown status indicator
- the **customer side indication (CSI) mode** – displays the fuse status in the input image table **and** on the red fuse-blown status indicator.

  This mode configures the module as a 16 point output module that uses **both the output and input image data tables** of your controller. When a fuse blows, all 16 bits in the associated input image table will turn on (1).

  For example, if you install the module in a PLC-5 system and address the module as O:012, then the fuse status bits are in I:012.

To monitor the status of the module fuse, make certain that your user program monitors the module's input image table for ‘‘on” bits.

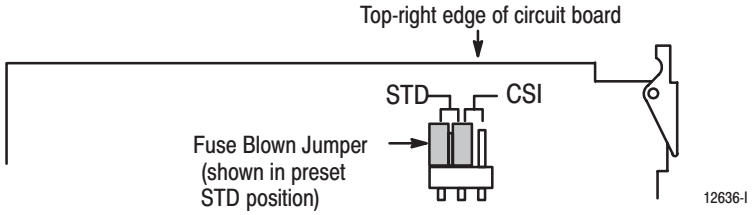
ATTENTION



Do not put the module jumper in CSI mode when you use this module in a complementary mode. Your system will not operate properly.

To change the fuse blown jumper to the CSI mode:

1. Locate the fuse-blown jumper at the top-right edge of the module circuit board, as shown.



2. Use your finger to slide the jumper off the STD position (the middle post and the left post).
3. Carefully reposition the jumper by sliding it onto the CSI position (the middle post and the right post).

Key the Backplane Connector

ATTENTION



A module inserted into a wrong slot could be damaged by improper voltages connected through the wiring arm. Use keying bands to prevent damage to the module.

Place your module in any slot in the chassis except the leftmost slot, which is reserved for processors or adapters.

ATTENTION



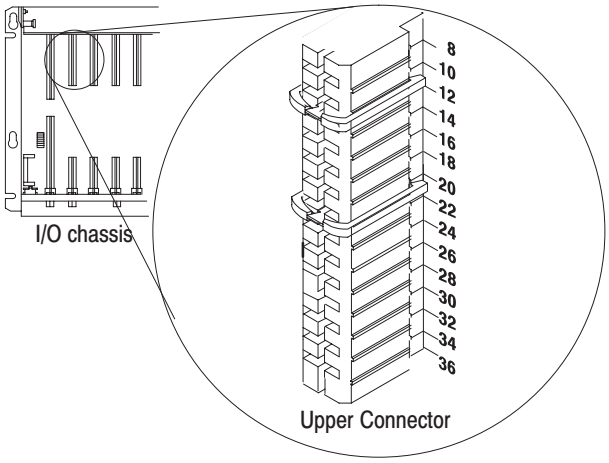
Observe the following precautions when inserting or removing keys:

- insert or remove keys with your fingers
- make sure that key placement is correct

  Incorrect keying or the use of a tool can result in damage to the backplane connector and possible system faults.

Position the keying bands in the backplane connectors to correspond to the key slots on the module.

Place the keying bands:
- between **10** and **12**
- between **20** and **22**



You can change the position of these bands if subsequent system design and rewiring makes insertion of a different type of module necessary.

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Install the Module and Field Wiring Arm

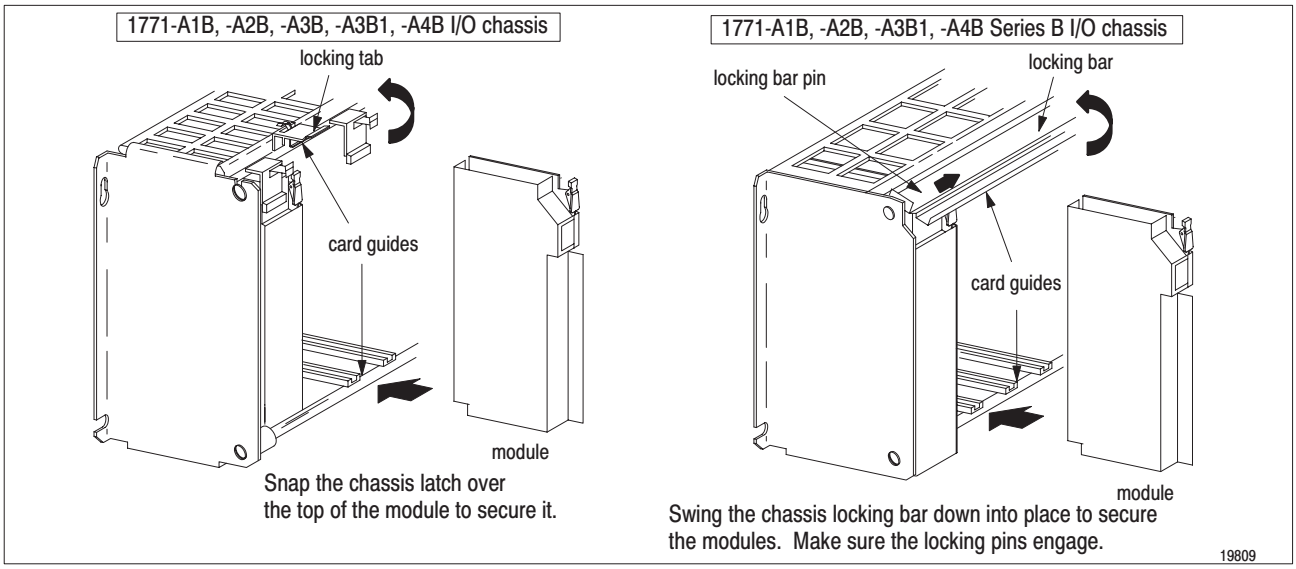
WARNING

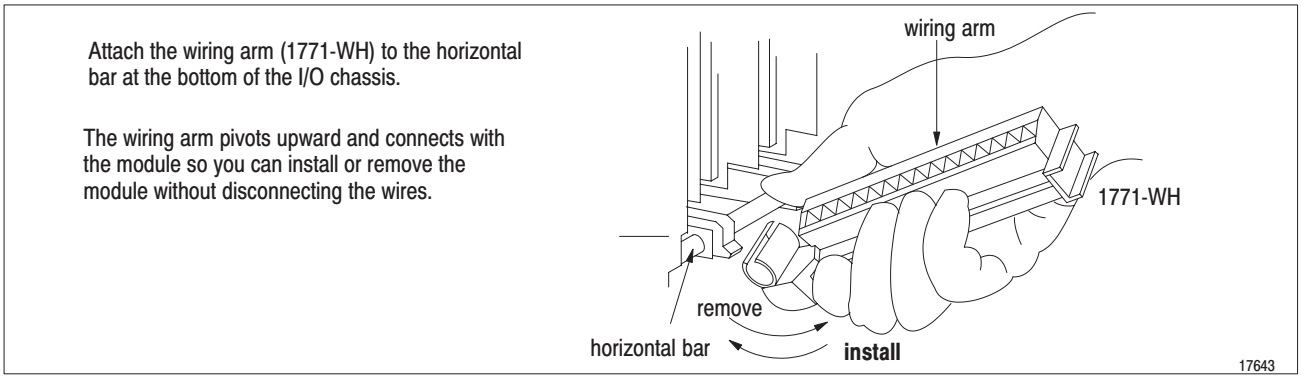
When you insert or remove the module while backplane power is on, or you connect or disconnect the wiring arm with field power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure power is removed or the area is nonhazardous before proceeding.

ATTENTION

Remove power from the 1771 I/O chassis backplane and field wiring arm before removing or installing an I/O module.

- Failure to remove power from the backplane or wiring arm could cause module damage, degradation of performance, or injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.



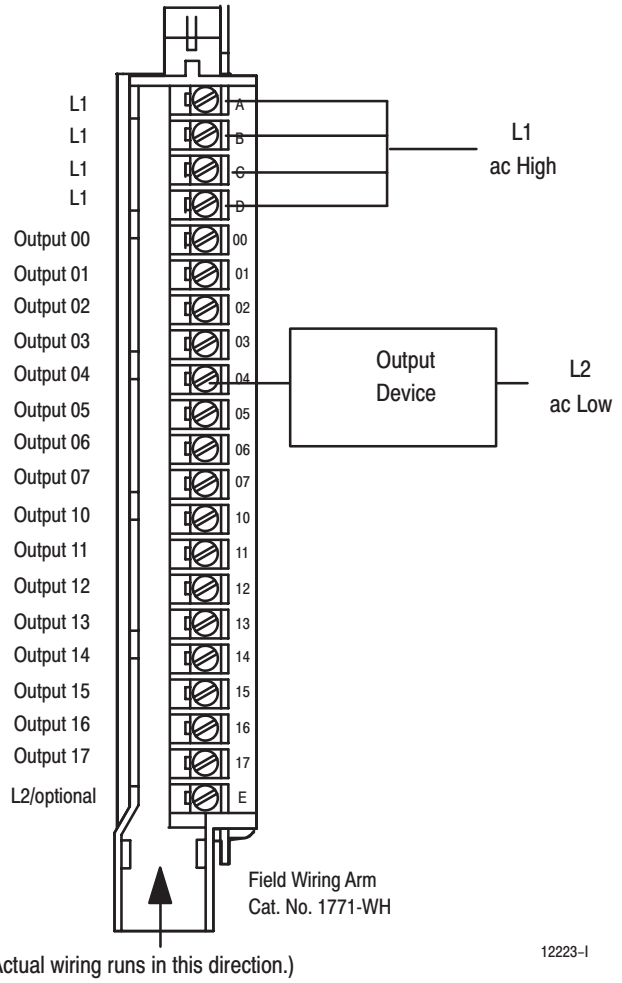


The 1771–OAD series C module is a modular component of the 1771 I/O system requiring a properly installed system chassis. Refer to publication 1771–IN075 for detailed information on acceptable chassis, proper installation and grounding requirements. Limit the maximum adjacent slot power dissipation to 10W maximum.

Connect Wiring to the Output Module

Make wiring connections to the 21 terminal field wiring arm (cat. no. 1771-WH) shipped with the module.

You must supply ac (L1) at terminals A through D on the field wiring arm, as shown. You need four ac connections to accommodate the total required surge rating on the module without overstressing any single connection on the field wiring arm. Jumper all ac (L1) connections together to prevent module damage.



You must supply ac at terminals A through D on the wiring arm. You need four ac connections to accommodate the total required surge rating on the module without overstressing any single connection on the field wiring arm. Jumper all ac connections together to prevent module damage. Connect terminal E to ac Low.

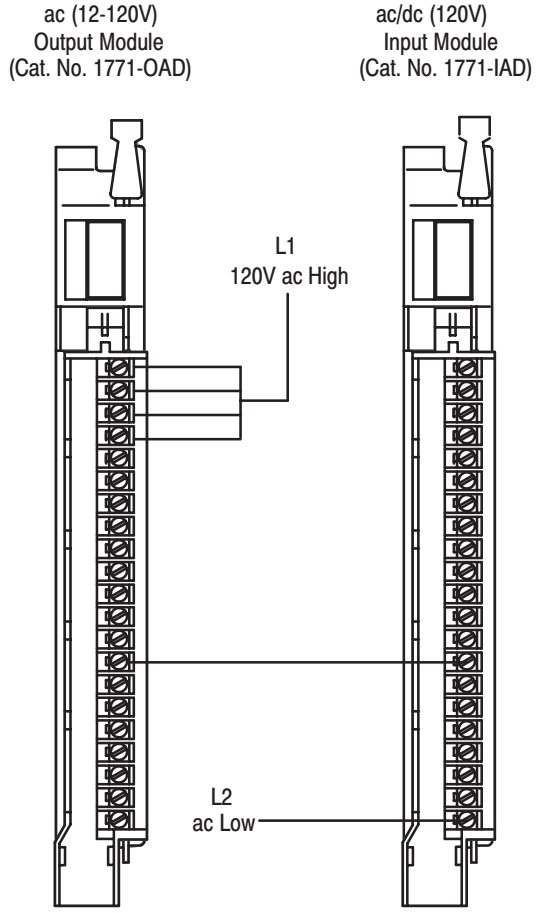
ATTENTION



Observe proper polarity, as indicated in the connection diagram with dc power connections. Reverse polarity, or application of ac voltage, could damage the module.

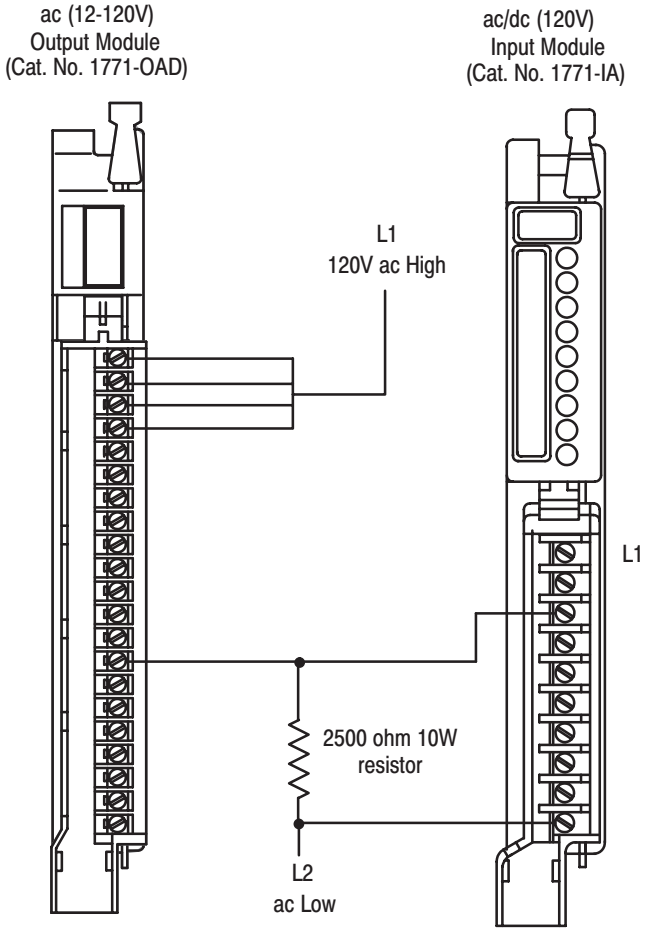
Driving an Input Module with an Output Module

You can use an AC (120V) Output Module (cat. no. 1771-OAD) to directly drive terminals on an AC/DC (120V) Input Module (cat. no. 1771-IAD) as shown below.



You can also use a 1771-OAD Output module to drive an AC/DC (120V) Input Module (cat. no. 1771-IA) but you must connect one of the following between the output terminal and L2 (common) as shown below.

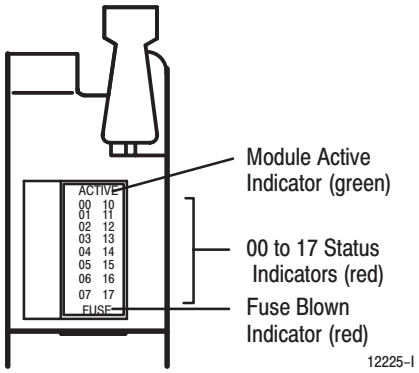
- 2500 ohm, 10W resistor
- RG-1676-1 Electrocube (San Gabriel, California)



Use the same ac power source to power both modules to ensure proper phasing and prevent module damage. 12224–I

Interpreting the Status Indicators

The front panel has one green module active indicator, 16 red status indicators, and one red fuse-blown indicator.



Indicator	Mode	Description
Active	Standard Mode (STD)	The active indicator lights when the rack power supply has properly established 5V dc and the processor is in RUN mode.
	Customer Side Indication (CSI)	The active indicator lights when the rack power supply has properly established 5V dc.
Status	STD or CSI	The status indicators light when voltage is present at the respective output terminal.
Fuse		The fuse indicator lights when the fuse has blown or been cleared.

Troubleshooting

Use this table to help you interpret the 1771-OAD status indicators and to troubleshoot module and system faults.

Indicator Status	Description of Fault or System Status	Action to Take
Module active ON (green)	Normal Indication.	None.
Module active ON (green) and Output status ON (red)	Check voltage at output point on the swing arm.	If voltage is present, take no action. If no voltage is present, check the fuse. If the fuse is OK, replace the module.
Module active ON (green) and Output status OFF	No voltage.	None.
	Voltage on the terminal.	Replace the module.
Module active OFF and Output status ON (red) or OFF	1. The processor is in program mode.	1. If module is in normal mode, take no action. If module is in CSI mode replace module.
	2. Module not functioning properly.	2. Check the chassis power supply and processor. If they are OK, replace the module.
Fuse blown (red)	Outputs will not turn on.	Replace the fuse. If fuse replacement does not correct the problem, replace the module.

Replacing the Fuse

The module's output circuitry is protected from overload or shorts by a fuse. You can replace the fuse as outlined below.

1. Turn off all power to the I/O chassis and all output device power to the field wiring arm.

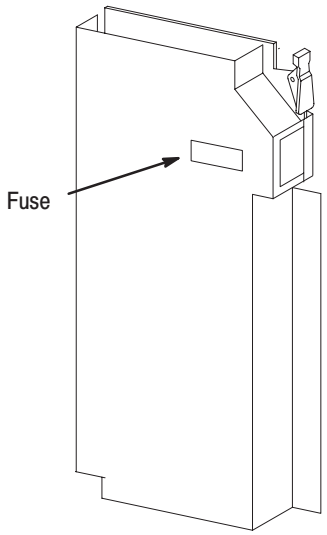
ATTENTION



Remove power from the 1771 I/O chassis backplane and field wiring arm before removing or installing an I/O module.

- Failure to remove power from the backplane or wiring arm could cause module damage, degradation of performance, or injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.

2. Remove the module from the chassis. Replace the blown fuse with a 12A, 250V rectifier fuse (1/4 x 1-1/4 inch), Bussman pt. no. GBB12.



3. Replace the module in the chassis and attach the field wiring arm.
4. Turn OFF all outputs to the module.
5. Turn ON power to the I/O chassis only.
6. Check that the red status indicators on the front of the module are off (no outputs on).
7. Turn on output device power to the field wiring arm.
8. Start with bit 00 and turn on individual outputs one at a time. Turn off the previous output before turning on the next output.

9. If the red fuse blown indicator turns on, note which output is faulty and trace the output wiring to the faulty device.

After correcting the fault problem, return to step 1 and begin again. If you cannot locate a faulty output, return to step 8 and turn on 2 or more outputs at the same time. Total output current should not exceed 2A per output, or 8A total per module.

Hazardous Locations

The following information applies when operating this equipment in hazardous locations:

Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, and D Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.

WARNING



EXPLOSION HAZARD –

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
- Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Substitution of components may impair suitability for Class I, Division 2.
- If this product contains batteries, they must only be changed in an area known to be nonhazardous.

Informations sur l'utilisation de cet équipement en environnements dangereux:

Les produits marqués CL I, DIV 2, GP A, B, C, D ne conviennent que une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un systéme, le code de température le plus défavorable (code de température le plus faible) peut eatre utilisé pour déterminer le code de température global du systéme. Les combinaisons d'equipements dans le systéme sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.

AVERTISSEMENT



RISQUE D'EXPLOSION –

- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à
  l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.
- La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Specifications

Outputs per Module	16
Module Location	1771-A1B through -A4B or later I/O chassis, 1771-AM1, -AM2 chassis
Output Voltage Range	10 to 138V ac @ 47 - 63Hz
Output Current Rating	2A per output – not to exceed 8A per module
Surge Current (maximum)	25A per output for 100ms, repeatable every 1 second 25A per module for 100ms, repeatable every 1 second
Minimum Load Current	5mA per output
On State Voltage Drop (max.)	1.5V at load current > 50mA 5.8V at load current < 50mA
Off State Leakage Current (max.)	3.0mA per output @ 138V ac
Signal Delay (max.) Off to On On to Off	Zero crossing 8.3ms @ 60Hz, 10.0ms @ 50Hz Zero crossing 8.3ms @ 60Hz, 10.0ms @ 50Hz
Power Dissipation	13 Watts (max.), 1.5 Watts (min.)
Thermal Dissipation	48.0 BTU/hr (max.), 5.13 BTU/hr (min.)
Backplane Current	295mA
Isolation Voltage	Tested to 2500V dc for 1s
Conductors Wire Size	14–22AWG (2.5–0.25mm^2) stranded copper wire rated at 75°C or greater[1] 3/64 inch (1.2mm) insulation (max)
Category	2[2]
Environmental Conditions	
Operating Temperature	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) 32 to 140°F (0° to 60°C)
Storage Temperature	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 to 185°F (–40 to 85°C)
Relative Humidity	IEC 60068–2–30 (Test Db, Unpackaged, Nonoperating Damp Heat) 5 to 95%, noncondensing
Shock Operating Nonoperating	IEC 60068–2–27 (Test Ea, Unpackaged Shock) 30g 50g
Vibration	IEC 60068–2–6 (Test Fc, Operating) 2g @ 10–500Hz
ESD Immunity	IEC 61000–4–2 4kV indirect discharges
Radiated RF Immunity	IEC 61000–4–3 10V/m, with 1kHz sine–wave 80% AM from 30MHz to 1000MHz
EFT/B Immunity	IEC 61000–4–4 ±1kV @ 5kHz on signal ports
Surge Transient Immunity	IEC 61000–4–5 ±1kV line–line (DM) and ±2kV line–earth (CM) on signal ports
Conducted RF Immunity	IEC 61000–4–6 10V rms with 1kHz sine wave 80% AM from 150kHz to 30MHz
Emissions	CISPR 11 Group 1, Class A (with appropriate enclosure)

Specifications continued on next page.

Enclosure Type Rating		None (open–style)
Keying		Between 10 and 12 Between 20 and 22
Fuse		12A, 250V rectifier fuse (1/4 x 1-1/4 inch), Bussman GBB12, IEC 127 Type F (black)
Field Wiring Arm	Standard Optional	Catalog Number 1771-WH Catalog Number 1771-WHF (fused)
Wiring Arm Screw Torque		9 pound–inches (1.02Nm)
Relay Compatibility		700–CL110A1 700–HB32A1 700–HC14A1 700–HC14A1–4 700–HF32A1 700–HT12AA1 100–A09 100–A18 100–A30
Certifications (when product is marked)	UL	UL Listed Industrial Control Equipment
	CSA	CSA Certified Process Control Equipment
	CSA	CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, D Hazardous Locations
	CE[2]	European Union 89/336/EEC EMC Directive, compliant with: EN 50082–2, Industrial Immunity EN 61236, Meas./Control/Lab., Industrial Requirements EN 61000–6–2, Industrial Immunity EN 61000–6–4, Industrial Emissions
	CE[2]	European Union 73/23/EEC LVD Directive, compliant with: EN 61131–2, Programmable Controllers
	C–Tick[2]	Australian Radiocommunications Act, compliant with: AS/NZS 2064, Industrial Emissions

[1] You use this conductor category information for planning conductor routing as described in publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.
[2] See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates and other certification details

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