Installation Instructions

Digital ac/dc (24V) Input Module

Catalog Number 1771-IND, Series C

Publication 1771-IN052B-EN-P - April 2006

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
SHOCK HAZARD 	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that surfaces may be dangerous temperatures.

Environment and Enclosure

ATTENTION

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 enclosure. Also, see the appropriate sections in Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1, for additional installation requirements pertaining to this equipment.

Before You Begin

This module must be used with a 1771 Series B I/O chassis. If you are using a 1771-ASB remote I/O adapter, you may use any combination of I/O modules. Otherwise, make sure no other input module or single-card block-transfer module is placed in the same I/O group.

This module contains input filtering to limit the effects of voltage transients caused by contact bounce, or radiated electrical noise, or both.

Power Requirements

Your module receives its power through the 1771 I/O chassis backplane from the chassis power supply. The module requires 250 mA 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 or the backplane power supply.

Prevent Electrostatic Discharge

The ac/dc input module is shipped in a static-shielded bag to guard against electrostatic discharge damage. Observe the following precautions when handling the module.

ATTENTION

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.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging, if available.

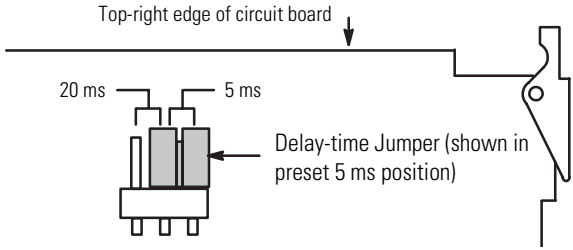
Set the Delay-time Jumper

Your module is equipped with an adjustable delay-time jumper. Use the jumper to select between two input-channel delay times. The delay time you choose applies to all 16 of the module's channels.

Use This Delay Time	If You Want To
5 ms	Detect typical input readings
20 ms	Prevent detection of false inputs in high-noise environments

The module is shipped with the delay-time jumper preset to 5 ms. To change the delay-time jumper to 20 ms, do the following.

1. Locate the delay-time jumper-selection plug at the top-right edge of the module circuit board.

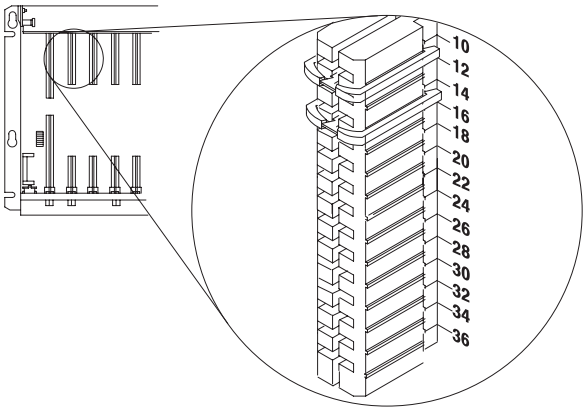


2. Use your finger to slide the jumper off the 5 ms position (the middle post and the right post).

3. Carefully position the jumper by sliding it onto the 20 ms position (the middle post and the left post).

Key the Backplane

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



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

2. Place the keying bands:
   - between 10 and 12
   - between 14 and 16

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

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.

This module has the same keying band positions as the 1771-IAD Series D input module.

- Make certain that this module is not inserted into a 1771-IAD/D input module slot.

Install the Module

ATTENTION

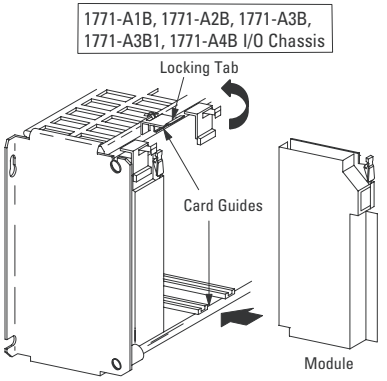
Make certain that you do not install this module into a chassis slot keyed for a 1771-IAD/D input module.

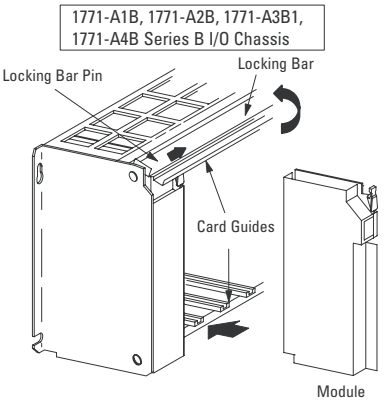
Install the module and secure it in the chassis.

1. Position the module in the card guides for the chosen slot
2. Slide the module into the chassis and press firmly to seat the module into the backplane connector.
3. **Series A chassis:** Snap the chassis latch lever over the top of the module to secure the module in the chassis.

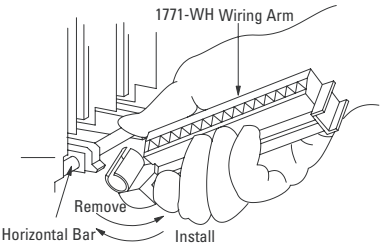
   Series B chassis: Swing the locking bar down into place and make sure the locking bar pins are engaged to secure the module in the chassis.
4. Attach the field wiring arm to the horizonal bar at the bottom of the chassis.

   The wiring arm pivots upward so you can install or remove the module without disconnecting the wires.





The 1771-IND is a modular component of the 1771 I/O system requiring a properly installed system chassis. Refer to the Universal I/O Chassis, publication 1771-IN075, for detailed information on acceptable chassis, along with proper installation and grounding requirements. Limit the adjacent slot power dissipation to 15 W maximum.



Connect Wiring

Connect your I/O devices to the field wiring arm, cat. no. 1771-WH, shipped with the module.

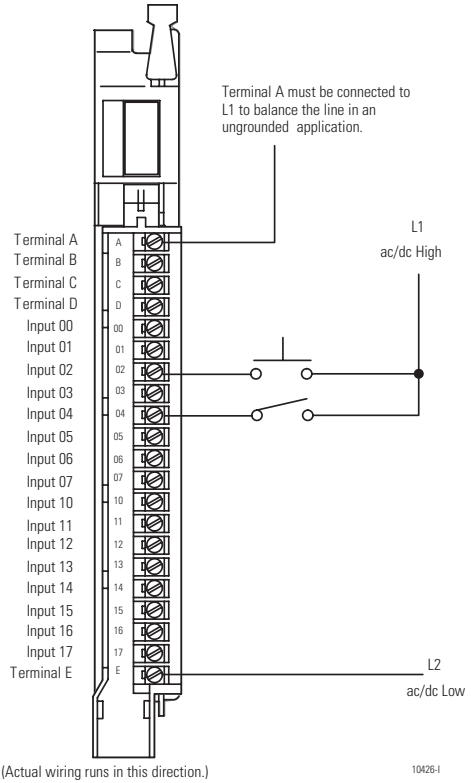
ATTENTION

Remove power from the 1771 I/O chassis backplane before you install this module. Failure to remove power from the backplane could cause:

- module damage or degradation of performance.
- injury or equipment damage due to possible unexpected operation.

You can use an ac (24V) output module (cat. no. 1771-OND/B) to directly drive terminals on an ac/dc (24V) input module (cat. no. 1771-IND/C) as shown below.

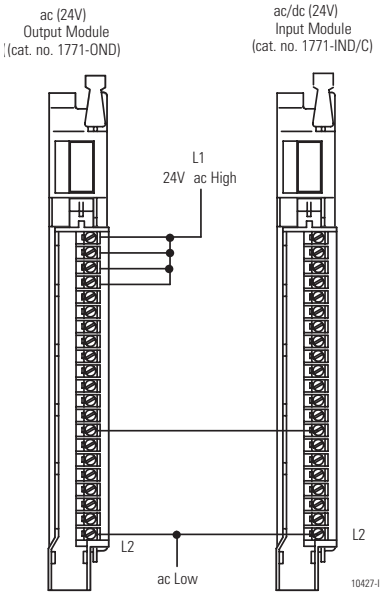
1. Connect one terminal of your 2-wire input devices to terminals 00 through 17.
2. Connect terminal E to the L2 (low) ac return. Terminals A through D are not used. (Note: In ungrounded applications, connect terminal A to L1 to balance the line.) Connect the L1 (high) ac line to the other terminal of your input devices. Use maximum 2.5 mm^2 (14 AWG) stranded copper wire to minimize the voltage over long cable distances.



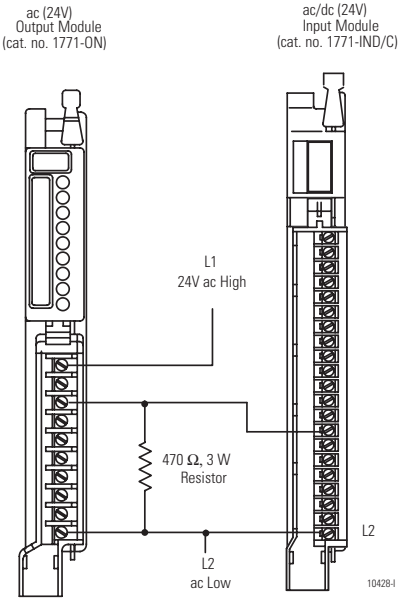
You can also use an output module (cat. no. 1771-ON) to directly drive terminals on an ac/dc (24V) input module (cat. no. 1771-IND/C), but you must use a 470 Ω, 3 W resistor between the output terminal and L2 (common) as shown below.

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

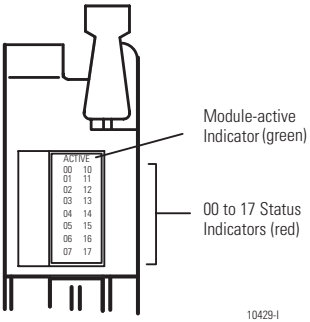
Driving a 1771-IND/C Module with a 1771-OND Module



Driving an Input Module with an Output Module



Troubleshoot with the Status Indicators



The front panel of your module contains 1 green module-active indicator, and 16 red status indicators. The 1771-IND/C input module performs diagnostics in a handshaking mode when first powered up. Upon successful completion of the diagnostics, the green module-active indicator lights. It turns off if a fault occurs in the data paths or the opto-isolators.

If a module-fault occurs, the module resets its inputs or sets them to last state, depending on the fault mode selection. The module-active indicator must be on to properly interpret the red status indicators.

The red status indicators are provided for system logic-side indication of individual inputs. When a red indicator lights, voltage is present on the terminal. The module transfers this information to the backplane for the processor to read.

Use this table to help you interpret the 1771-IND/C input module-status indicators and to troubleshoot module and system faults.

Indicator Status (Color)	Description of Fault or System Status	Action to Take
Module Active On (Green)	Normal indication	None
Module Active On (Green) and Input Status ON (Red)	Check for voltage on terminal	If no voltage, replace module.
Module Active On (Green) and Input Status Off	Input devices not functioning properly or faulty input circuitry on module	1. Check input devices. 2. If power supplies are OK, replace module.
	No voltage on terminal	None
Module Active Off	Module is not powered or fault in opto-isolators, data paths or both; module resets inputs or goes to last state	1. Check chassis power supply and module input power. 2. If power supplies are OK, replace module.
Module Active Off and Input Status On (Red) or Off	Not valid unless module active indicator is on; when active is off, indicators do not represent processor status	1. Check chassis power supply and module input power. 2. If power supplies are OK, replace module.

Specifications

ac/dc (24V) Input Module Catalog Number 1771-IND/C

Attribute	Value
Module Location	1771-A1B, 1771-A2B, 1771-A3B, 1771-A3B1, 1771-A4B or later I/O chassis 1771-AM1, 1771-AM2 I/O chassis
Input Voltage, Nom	Input voltage: 24V ac, 50…60 Hz; 24V dc
Input Current, Nom	9.1 mA @ 24V ac, 60 Hz; 8.1 mA @ 24V ac, 50 Hz; 3.2 mA @ 24V dc
On-state Voltage Range	16…30V ac; 12…30V dc
On-state Current, Min	6 mA @ 60 Hz; 1.5 mA @ 12V dc
Off-state Voltage, Max	5V ac @ 50…60 Hz
Off-state Current, Max	0.39 mA @ 5V ac, 60 Hz; 0.39 mA @ 5V dc
Input Impedance	0.68 mF in parallel with 6.6 K (3.9 kΩ at 60 Hz); in series with 100 Ω
Peak Inrush Current	V_{ps}/100 Ω, where V_{ps} = customer supply peak voltage
Input Signal Delay Off to On	5 ms (±3 ms) or 20 ms (±5 ms) @ 24V ac 60 Hz selectable 3 ms (±0.1 ms) or 10 ms (±1 ms) @ 24V dc selectable
On to Off	25 ms (±5 ms) @ 24V ac or dc
Power Dissipation	8.3 W max, 1.3 W min
Thermal Dissipation	28.4 BTU/hr max, 4.4 BTU/hr min
Backplane Current	250 mA @ 5V dc ±5%
Isolation (Continuous Voltage Rating)	30V, basic Tested at 500V ac rms for 60 s input to system No isolation between individual channels
Enclosure Type Rating	None (open-style)
Conductors Wire Size	2.5 mm^2 (14 AWG) stranded or solid copper wire max 1.2 mm (3/64 in.) insulation max
Category[1]	1 - on signal ports
Keying Band Location	Between 10 and 12 Between 14 and 16
Field Wiring Arm	Catalog number 1771-WH
Wiring Arm Screw Torque	1.0 Nm (9 lb-in.)

[1] Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1.

Environmental Specifications

Attribute	Value
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) 0…60 °C (32…140 °F)
Nonoperating Temperature	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, UnpackagedNonoperating Dry Heat) IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock) -40…85 °C (-40…185 °F)
Relative Humidity	IEC 60068-2-30 (TestDb, Unpackaged Damp Heat): 5…95% without condensation

Certifications

Certification (when product is marked)[1]	**Value**
CSA	CSA certified Process Control Equipment. See CSA File LR54689.
UL	UL Listed Industrial Control Equipment. See UL File E65584.

(1) See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

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Publication 1771-IN052B-EN-P - April 2006 PN 953002-42

Supersedes Publication 1771-5.52 - January 1987