

Compact I/O Expansion Power Supplies

Catalog Numbers 1769-PA2, 1769-PA2K, 1769-PB2, 1769-PB2K, 1769-PA4, 1769-PA4K, 1769-PB4, 1769-PB4K

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Compact I/O™ power supplies provide 120/240V AC and 24V DC power to modules, which you can place to the left or the right side of the 1769 power supply. As many as eight I/O modules can be placed on each side of the power supply.

Summary of Changes

This publication contains new and updated information as indicated in this table.

Topic	Page
Updated document with current specifications and certifications	Throughout
Updated document with new catalog numbers: 1769-PA2K, 1769-PB2K, 1769-PA4K, 1769-PB4K	Throughout

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations.	Informations sur l'utilisation de cet équipement en environnements dangereux.
<p>Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, 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.</p>	<p>Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à 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 système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>
<div style="display: flex; align-items: center;">  <div> <p>WARNING: Explosion Hazard –</p> <ul style="list-style-type: none"> 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. </div> </div>	<div style="display: flex; align-items: center;">  <div> <p>AVERTISSEMENT: Risque d'Explosion –</p> <ul style="list-style-type: none"> 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 I, Division 2. S'assurer que l'environnement est classé non dangereux avant de changer les piles. </div> </div>

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 EN/IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is not intended for use in residential environments and may not provide adequate protection to radio communication services in such environments.

This equipment is supplied as open-type equipment for indoor use. 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 enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain more information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

- Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#), for more installation requirements.
- NEMA Standard 250 and EN/IEC 60529, as applicable, for explanations of the degrees of protection provided by enclosures.

Prevent Electrostatic Discharge



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 when not in use.



WARNING: EXPLOSION HAZARD

Do not connect or disconnect connectors while circuit is live.

Waste Electrical and Electronic Equipment (WEEE)



At the end of its life, this equipment should be collected separately from any unsorted municipal waste.

Always hard-wire circuits that are installed on the machine for safety reasons directly to the master control relay. Examples include overtravel limit switches, stop push buttons, and interlocks. These devices must be wired in series so that when any one device opens, the master control relay is de-energized, which removes power from the machine.



ATTENTION: Never alter these circuits to defeat their function. Serious injury or machine damage could result.

Hazardous Location Approval

Only 1769-PB2, 1768-PB2K, 1769-PB4, and 1769-PB4K power supplies.

European Hazardous Location Approval

The following applies to products marked  . Such modules:

- Are Equipment Group II, Equipment Category 3, and comply with the Essential Health and Safety Requirements relating to the design and construction of such equipment given in Annex II to Directive 2014/34/EU. See the EC Declaration of Conformity at <http://www.rockwellautomation.com/products/certification> for details.
 - The type of protection used is 'Ex nA IIC T4 Gc' according to EN 60079-15.
 - Comply to Standards EN 60079-0:2012+A11:2013, EN 60079-15:2010, reference certificate number DEMKO 18 ATEX 2140X.
 - Modules are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air or dust mixtures are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification according to ATEX directive 2014/34/EU.
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IEC Hazardous Location Approval

The following applies to products with IECEx certification. Such modules:

- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification to IEC 60079-0.
 - The type of protection is 'Ex nA IIC T4 Gc' according to IEC 60079-15.
 - Comply to Standards: IEC 60079-0:6th edition, IEC-60079-15:4th Edition, reference IECEx certificate number IECEx UL 20.0078X.
-

**WARNING:** Special Conditions for Safe Use:

- This equipment is not resistant to sunlight or other sources of UV radiation.
 - This equipment shall be mounted in an ATEX/IECEx Zone 2 certified enclosure with a minimum ingress protection rating of at least IP54 (as defined in EN/IEC 60529) and used in an environment of not more than Pollution Degree 2 (as defined in EN/IEC 60664-1) when applied in Zone 2 environments. The enclosure must be accessible only by the use of a tool.
 - This equipment shall be used within its specified ratings defined by Rockwell Automation.
 - Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 140% of the rated voltage when applied in Zone 2 environments.
 - This equipment must be used only with ATEX/IECEx certified Rockwell Automation backplanes.
 - Do not disconnect 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.
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**ATTENTION:** This equipment is not resistant to sunlight or other sources of UV radiation.

Before You Begin

There are some points about power distribution that you must know.

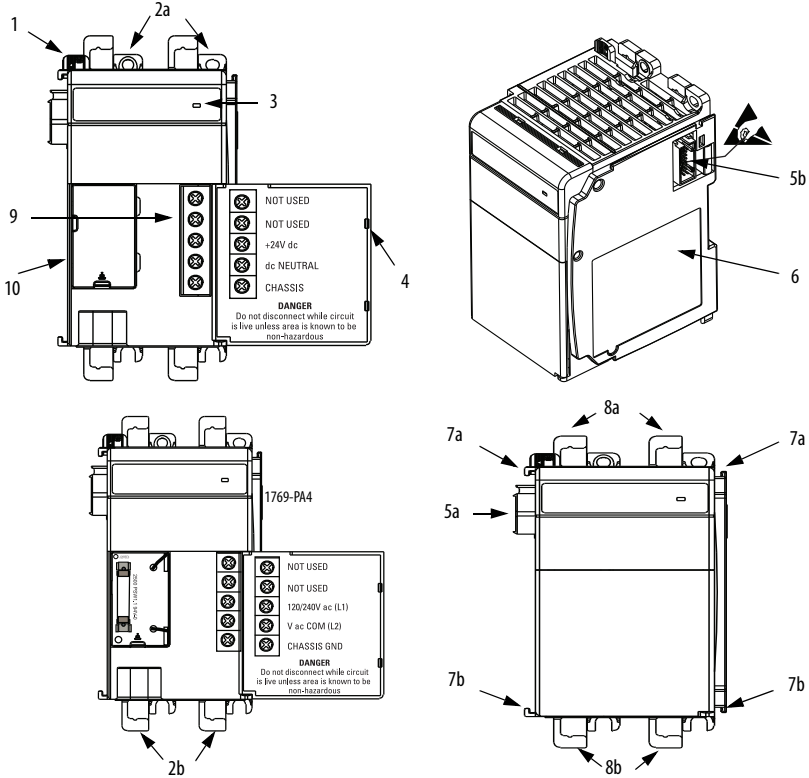
- The master control relay must be able to inhibit all machine motion by removing power to the machine I/O devices when the relay is de-energized. We recommend that the controller remains powered even when the master control relay is de-energized.
- If you are using a DC power supply, interrupt the load side rather than the AC line power. This operation avoids the additional delay of power supply turn-off. The DC power supply must be powered directly from the fused secondary of the transformer. Power to the DC input and output circuits must be connected through a set of master control relay contacts.

Perform Periodic Tests of Master Control Relay Circuit

Any part can fail, including the switches in a master control relay circuit. The failure of one of these switches would most likely cause an open circuit, which would be a safe power-off failure. However, if one of these switches shorts out, it no longer provides any safety protection. These switches must be tested periodically to make sure they stop machine motion when needed.

Parts Illustration of a Power Supply

The sample illustrations of a 1769-PA4 power supply let you review the various components that comprise a power supply, which is attached to a DIN rail.



Power Supply Components

Item	Description
1	Bus lever (with locking function)
2a	Upper panel mounting tabs
2b	Lower panel mounting tabs
3	Status Indicator
4	Power supply door with terminal identification label
5a	Movable bus connector with female pins
5b	Stationary bus connector with male pins

Power Supply Components (Continued)

Item	Description
6	Nameplate label
7a	Upper tongue-and-groove slots
7b	Lower tongue-and-groove slots
8a	Upper DIN rail latches
8b	Lower DIN rail latches
9	Terminal block with fingersafe cover
10	Fuse housing cover for replaceable fuse

Install an I/O Expansion Power Supply

Compact I/O Expansion Power Supplies are 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 that do not exceed Over Voltage Category II⁽²⁾ (IEC 60664-1).⁽³⁾

Disconnect the Power



WARNING: Remove power before removing or inserting this power supply from the 1769 I/O system. When you remove or insert a power supply 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.

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

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity that is caused by condensation can 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 insulation of the product.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Assemble the System

1769 Compact I/O power supplies distribute power from either side of the power supply.

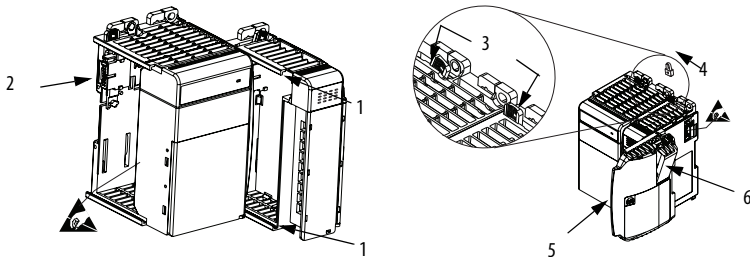
EXAMPLE A 2 amp at 5V DC power supply (1769-PA2, 1769-PA2K, 1769-PB2, 1769-PB2K) can provide 1 amp to the right side of the power supply and 1 amp to the left. A 4 amp at 5V DC power supply (1769-PA4, 1769-PA4K, 1769-PB4, and 1769-PB4K) can provide 2 amps to the right side of the power supply and 2 amps to the left.

The maximum amount of current the system supports in both directions is:

- 1769-PA2, 1769-PA2K, 1769-PB2, 1769-PB2K: 2 amps at 5V DC; 1 amp at 24V DC
- 1769-PA4, 1769-PA4K, 1769-PB4, 1769-PB4K: 4 amps at 5V DC; 2 amps at 24V DC

IMPORTANT The maximum amount of current that can be distributed from either side of any 1769 power supply is 2 amps at 5V DC and 1 amp at 24V DC.
This condition is a limit of the 1769 Compact I/O Bus.

The power supply can be attached to an adjacent I/O module before or after mounting.



Power Supply and Adjacent Module Components

Item	Description
1	Upper and lower tongue-and-groove slots
2	Bus connectors
3	Positioning tab
4	Direction of the bus lever of the power supply to the I/O modules
5	End cap terminator
6	End cap bus terminator

Follow these steps to assemble the Compact I/O system.

1. Disconnect your line power.

The power supply does not support removal or insertion of modules under power.



WARNING: If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

2. Check that the bus lever of the power supply to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots to secure the power supply to an I/O module.
4. Move the power supply back along the tongue-and-groove slots until the bus connectors align with each other.
5. Push the bus lever back slightly to clear the positioning tab.
Use your fingers or a small screwdriver.
6. To allow communication between the controller and the I/O, move the bus lever of the power supply and its adjacent I/O modules fully to the left until it clicks.
Make sure it is locked firmly in place.



ATTENTION: When attaching expansion I/O power supplies, it is very important that the bus connectors are securely locked together to ensure proper electrical connection.

7. Attach an end cap terminator to the last I/O module in the system by using the tongue-and-groove slots as before.
8. Lock the end cap bus terminator.

IMPORTANT A 1769-ECR or 1769-ECL right or left end cap (respectively) must be used to terminate the end of the serial communication bus.

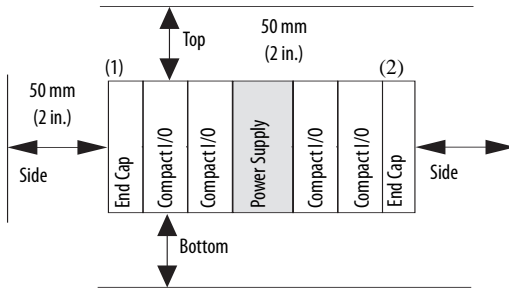
Mount an I/O Expansion Power Supply



ATTENTION: During panel or DIN rail mounting of all devices, be sure that all debris (for example, metal chips, wire strands) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

Minimum Spacing

Maintain spacing from enclosure walls, wireways, adjacent equipment, and so forth. Allow 50 mm (2 in.) of space on all sides for adequate ventilation.



Item	Description
1	This device could be an end cap, controller, adapter, or expansion cable depending on your system configuration.
2	This device could be an end cap or expansion cable depending on your system configuration.

Prevent Excessive Heat

For most applications, normal convective cooling keeps the system within the specified operating range. Verify that the specified temperature range is maintained. Proper spacing of components within an enclosure is sufficient for heat dissipation.

In some applications, other equipment inside or outside the enclosure can produce a substantial amount of heat. In this case, place blower fans inside the enclosure to help with air circulation and to reduce hot spots near the system

Additional cooling provisions can be necessary when high ambient temperatures are encountered.

TIP Do not bring in unfiltered outside air. Place the Compact I/O system in an enclosure to protect it from a corrosive atmosphere. Harmful contaminants or dirt can cause improper operation or damage components. In extreme cases, you can need to use air conditioning to protect against heat build-up within the enclosure.

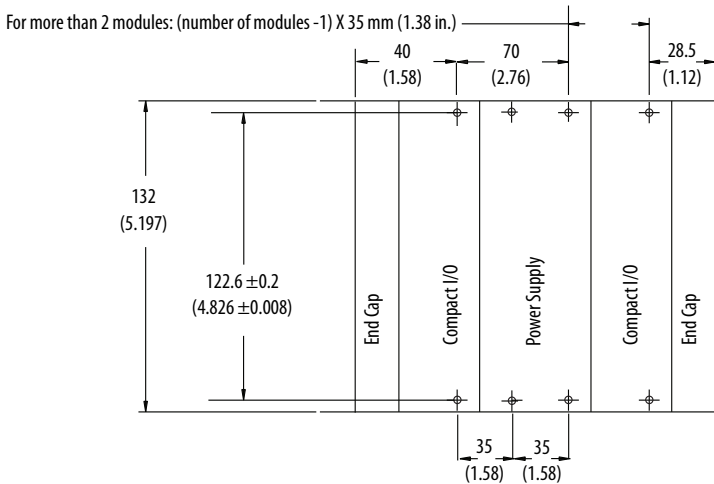
Mount the Panel

Mount the power supply to a panel by using four screws per module. Use M4 or #8 panhead screws. Mounting screws are required on each power supply panel mounting tab.



ATTENTION: This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the power supply's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication [1770-4.1](#), for additional information.

Panel Mounting Using the Dimensional Template



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

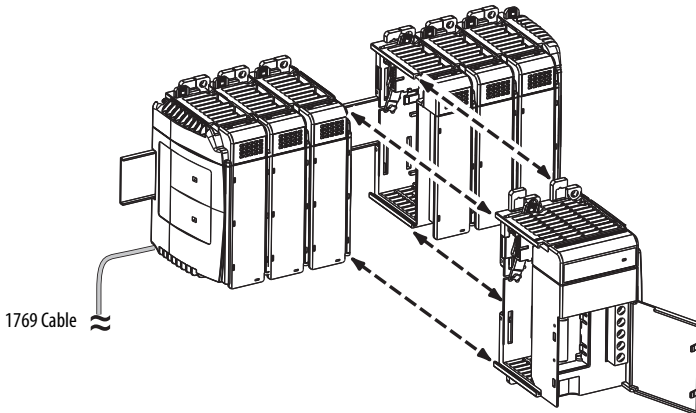
Mount a Power Supply on a DIN Rail

The power supply can be mounted using the following DIN rails:

- 35 x 7.5 mm (EN 50 022 - 35 x 7.5)
- 35 x 15 mm (EN 50 022 - 35 x 15)

1. Before mounting a power supply or module on a DIN rail, close the DIN rail latches.
2. Press the DIN rail mounting area of the module against the DIN rail.

The latches momentarily open and lock into place. The following illustration shows a power supply being attached to the I/O modules in a DIN rail mounted Compact I/O system.



Verify Your System Power

Your system power budget is a consideration when using 1769 power supplies. This budget determines the power that is being provided to the I/O modules. See Power Supply Distance Ratings in the CompactLogix™ System Selection Guide, publication [1769-SG001](#), for the power requirements.

TIP The total number of I/O modules cannot exceed 16 on one bank with a maximum of 8 I/O modules on either side of the power supply.

You system can be used in a maximum of two banks of I/O modules. This condition occurs when you configure your system with a MicroLogix™ 1500 controller, one expansion cable, one expansion power supply, and a total of eight I/O modules. The expansion power supply cannot be directly connected to the MicroLogix 1500 controller.

1. After you have reviewed the amount of current consumed by your system, verify that your power supply has adequate capacity for its bank of I/O modules.
See [Temperature Derating on page 24](#) for graphs.
2. To do so, compare the current graphs to your totals for the following:
 - Total 5V DC
 - Total 24V DC
 - Total 24V DC sensor power (1769-PA2, 1769-PA2K only)
3. If your power supply load is at or above the limits of the allowable ranges that are shown in the graphs, you must add an additional I/O bank.

See [Connect the Power Supplies on page 18](#) for additional information.

IMPORTANT An additional I/O bank must include its own power supply.

An end cap/terminator (1769-ECR or 1769-ECL) must also be used if the I/O bank is the last in the system.

Power Considerations

The following sections explain power considerations for the Compact I/O system.

Disconnect the Main Power



WARNING: EXPLOSION HAZARD

Do not replace components or disconnect equipment unless power has been switched off.

If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur.

This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Install the main power disconnect switch where operators and maintenance personnel have quick and easy access to it. Besides disconnecting electrical power, de-energize all other sources of power (pneumatic and hydraulic) before you begin working on a machine or process that is controlled by a controller.

Isolation Transformer Usage

You can use an isolation transformer in the AC line. This type of transformer provides isolation from your power distribution system to reduce electrical noise and is often used as a step down transformer to reduce line voltage. Any transformer that is used with the Compact I/O system must have a sufficient power rating for its load. The power rating is expressed in volt-amperes (VA). See [Schematic \(Using IEC Symbols\) on page 17](#) for an example of circuits using isolation transformers.

Power Supply Inrush

During powerup, the power supply allows a brief inrush current to charge internal capacitors. Many power lines and control transformers can supply inrush current for a brief time. If the power source cannot supply this inrush current, the source voltage can sag momentarily.

The only effect of limited inrush current and voltage sag on the system is that the power supply capacitors charge more slowly. However, the effect of a voltage sag on other equipment must be considered. For example, a deep voltage sag can reset a computer that is connected to the same power source. The following considerations determine whether the power source must be required to supply high inrush current:

- Power-up sequence of devices in a system
- Amount of the power source voltage sag if the inrush current cannot be supplied
- Effect of voltage sag on other equipment in the system

If the entire system is powered up simultaneously, a brief sag in the power source voltage typically does not affect any equipment.

Loss of Power Source

The power supply is designed to withstand brief power losses without affecting the operation of the system. The time the system is operational during power loss is called “program scan hold-up time after loss of power.” The duration of the power supply hold-up time depends on the type and state of the I/O, but is typically between 5 milliseconds...10 seconds. When the duration of power loss reaches this limit, the power supply signals the processor that it can no longer provide adequate DC power to the system. This condition is referred to as a power supply shutdown. The processor then performs an orderly shutdown of the controller.

Input States on Power Down

The power supply hold-up time is longer than the turn-on and turn-off times of the inputs. Because of this, the processor can record the input state change from ‘On’ to ‘Off’ that occurs when power is removed before the power supply shuts down the system. Comprehension of this concept is important. Write the program to compensate for this effect.

Other Types of Line Conditions

Occasionally the power source to the system can be temporarily interrupted. It is also possible that the voltage level can drop substantially below the normal line voltage range for a time. Both of these conditions are considered to be a loss of power for the system.

User Power Overcurrent Condition

The power supply shuts down if there is an overcurrent condition. All outputs latch off and remain off until you remove the overcurrent and cycle power. Reload the user program following a power supply shutdown.



ATTENTION: To avoid unexpected operation due to 24V DC user power shutdown (1769-PA2 and 1769-PA2K only), monitor the 24V DC user output with a 24V DC input channel.

Use a Master Control Relay

A hard-wired master control relay (MCR) provides a reliable means for emergency machine shutdown. Since the master control relay allows the placement of several emergency stop switches in different locations, its installation is important from a safety standpoint. Overtravel limit switches or mushroom-head push buttons are wired in series so that when any of them opens, the master control relay is de-energized. This configuration removes power to input and output device circuits.



ATTENTION: Never alter these circuits to defeat their function since serious injury and/or machine damage could result.

TIP If you are using an external DC power supply, interrupt the DC output side rather than the AC line side of the supply. This process avoids the additional delay of power supply turn off.

Fuse the AC line of the DC output power supply.

Connect a set of master control relays in series with the DC power supplying the input and output circuits.

Place the main power disconnect switch where operators and maintenance personnel have quick and easy access to it. If you mount a disconnect switch inside the enclosure, place the switch operating handle on the outside of the enclosure, so that you can disconnect power without opening the enclosure.

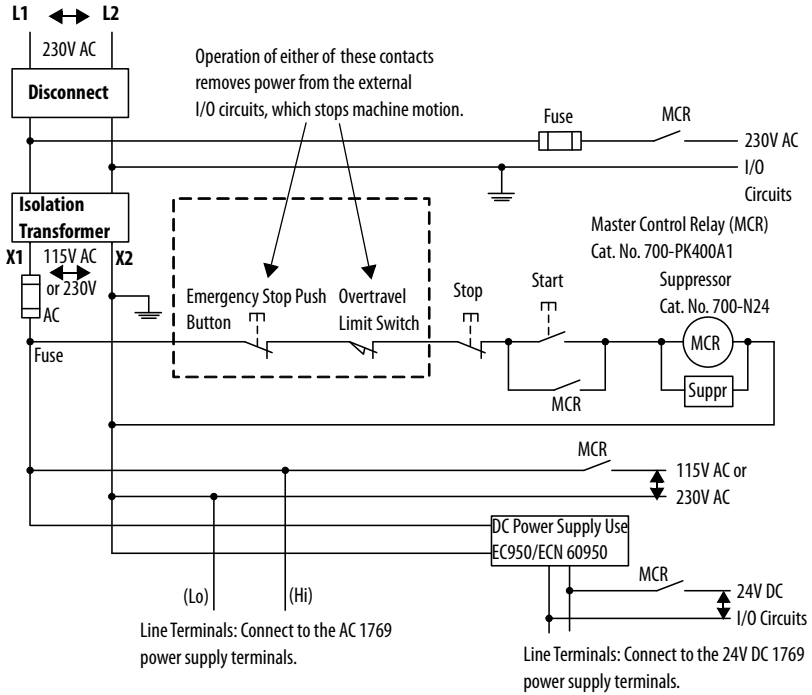
Whenever any of the emergency stop switches are opened, remove power to input and output devices.

When you use the master control relay to remove power from the external I/O circuits, power continues to be provided to the power supply of the system. This condition is so that you can still observe the diagnostic indicators on the processor.

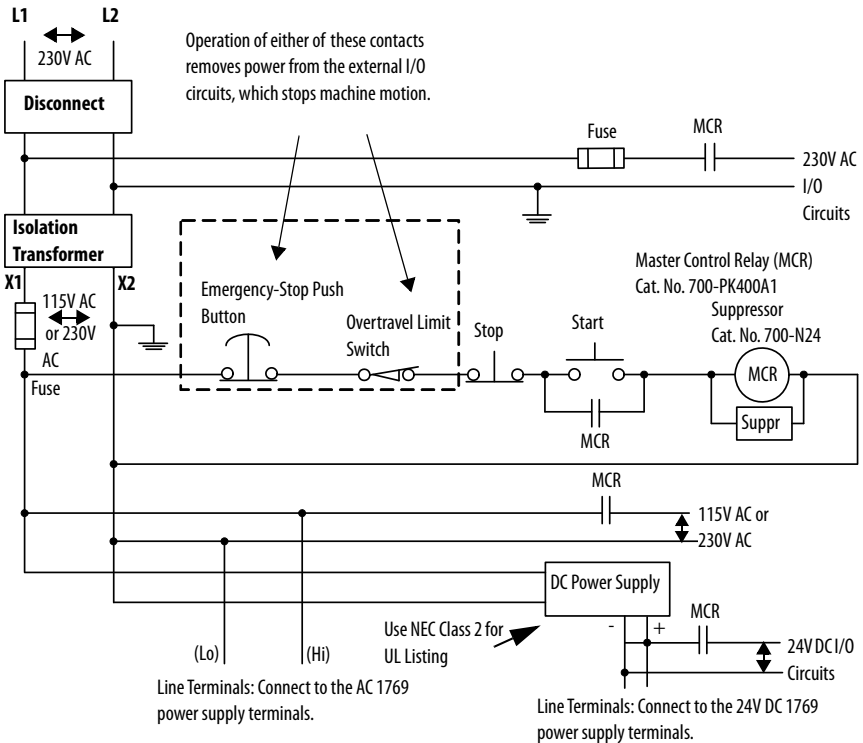
The master control relay is not a substitute for a disconnect to the system. It is intended for any situation where the operator must quickly de-energize only I/O devices. When you inspect or install terminal connections, replacing output fuses, or working on equipment within the enclosure, use the disconnect to shut off power to the rest of the system.

TIP Do not control the master control relay with the Compact I/O system. Provide the operator with the safety of a direct connection between an emergency stop switch and the master control relay.

Schematic (Using IEC Symbols)



Schematic (Using ANSI/CSA Symbols)



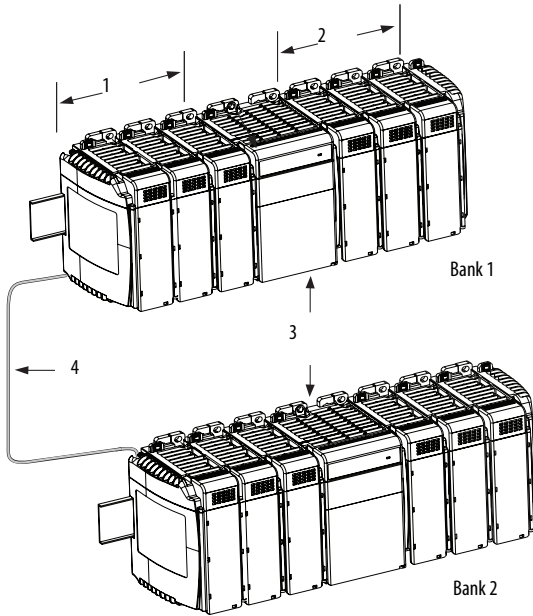
Connect the Power Supplies

Compact I/O system architecture and the power supply design support connection of I/O on either side of the power supply. Each I/O bank requires its own power supply.

To connect 2 I/O banks, attach a 1769 expansion I/O cable to a power supply or I/O module as shown in the [Power Supply Connection](#) illustration on [page 19](#). Up to 8 I/O modules can be connected on either side (A or B in the illustration) of the power supply for a maximum of 16 modules per bank.

Each 1769 I/O module has a power supply distance rating, with a maximum value of eight. See the specific installation instructions for the specific 1769 I/O module for more information.

Power Supply Connection



Item	Description
1, 2	The maximum amount of bus current that can be distributed on the 1769 bus (on either side of the power supply, A or B) is: <ul style="list-style-type: none"> • 2 amps at 5V DC (assume supported by power supply) • 1 amp at 24V DC (assume supported by power supply)
3	Expansion I/O power supplies
4	I/O communication expansion cable

IMPORTANT To use a 1769 expansion I/O power supply with a controller that has an embedded power supply (for example, MicroLogix 1500), you must use a 1769 expansion I/O cable. Do not directly attach the expansion power supply to a controller that has an embedded power supply.

Connect Field Wires

The following instructions explain how to wire your power supply.

Ground the Power Supply

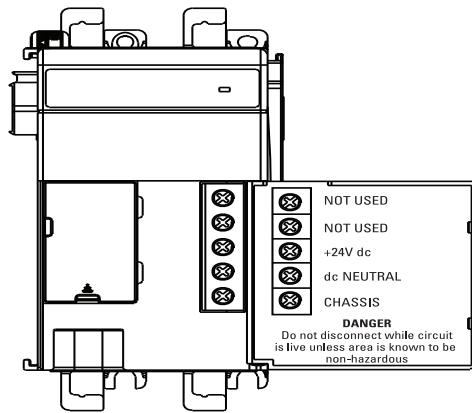



ATTENTION: This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the power supply's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication [1770-4.1](#), for additional information.

Wire the Power Supply

Connect the ground screw of the power supply to the nearest ground or ground bus.

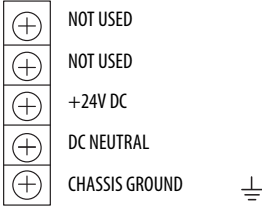
Use a 2.5 mm² (14 AWG) wire and keep the leads as short as possible.



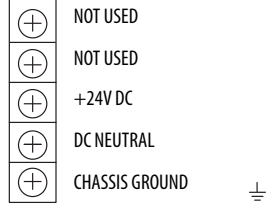
ATTENTION: This  symbol denotes protective earth ground and earth ground terminals that provide a low impedance path between electrical circuits and earth for safety purposes and provides noise immunity improvements. You must make these connections for safety purposes.

1. Connect incoming power to the power supply terminals as indicated in this graphic.

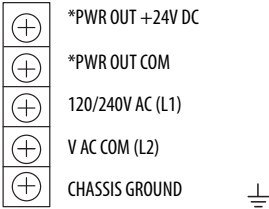
Catalog Number 1769-PB2, 1769-PB2K



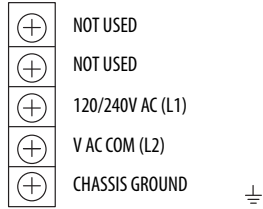
Catalog Number 1769-PB4, 1769-PB4K



Catalog Number 1769-PA2, 1769-PA2K



Catalog Number 1769-PA4, 1769-PA4K



*24V DC user power for sensors or other special 24V DC I/O devices

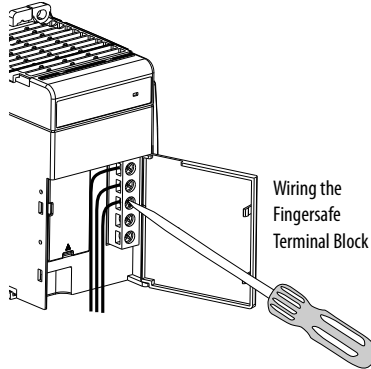


ATTENTION: Turn off incoming power before connecting or disconnecting wires. Failure to do so could cause injury to personnel and/or damage to equipment.

Wire the Fingersafe Terminal Block

When wiring the terminal block, keep the fingersafe cover in place.

1. Loosen the terminal screws to be wired.



2. Route the wire under the terminal pressure plate.

You can use the bare wire or a spade lug. The terminals accept a 6.35 mm (0.25 in.) spade lug.

TIP The terminal screws are non-captive. Therefore, it is possible to use a ring lug [maximum 1/4-inch o.d. with a 0.139-inch minimum i.d. (M3.5)] with the module.

3. Tighten the terminal screw, making sure that the pressure plate secures the wire.

Recommended torque when you tighten terminal screws is 1.27 N•m (11.24 lb•in).

TIP If you must remove the fingersafe cover, insert a screwdriver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the fingersafe cover removed, you cannot put it back on the terminal block because the wires are in the way.

Wire Size and Terminal Screw Torque

Each terminal accepts as many as two wires with the following restrictions.

Wire Type	Wire Size	Terminal Screw Torque
Solid	Cu-90 °C (194 °F) 2.5 mm ² (14 AWG)	1.27 N•m (11.24 lb•in)

Replace the Fuse

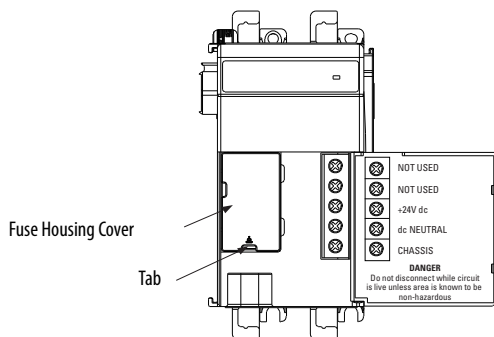


ATTENTION: Never install, remove, or wire power supplies unless power has been switched off.

Follow these steps to replace a blown fuse.

1. Remove Compact I/O system power to correct conditions that are causing the short circuit.
2. To remove the fuse housing cover, place a slotted screwdriver under the tab.
3. Use a fuse puller or similar device to remove the fuse.

Use care so that the printed circuit board and surrounding electronics are not damaged.



4. Replace the front access fuse by centering the replacement fuse over the fuse clip and pressing down.

See [Specifications on page 29](#) for information on the front access fuse.

If you use a tool to press the fuse in place, apply pressure to only the metal end caps, not to the center of the fuse.

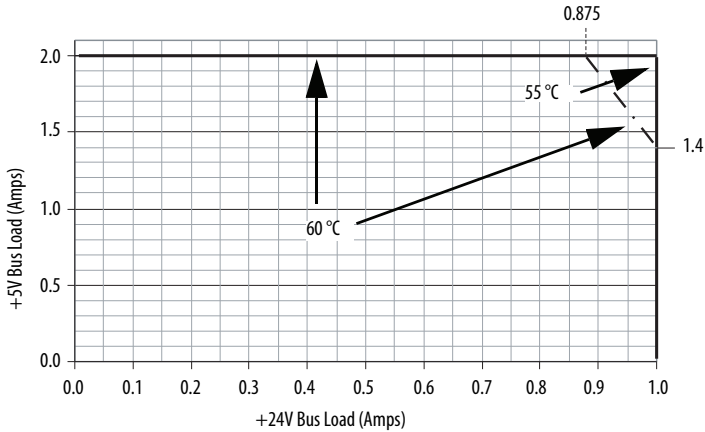
5. Replace the fuse housing cover.
6. Restore Compact I/O system power.

Temperature Derating

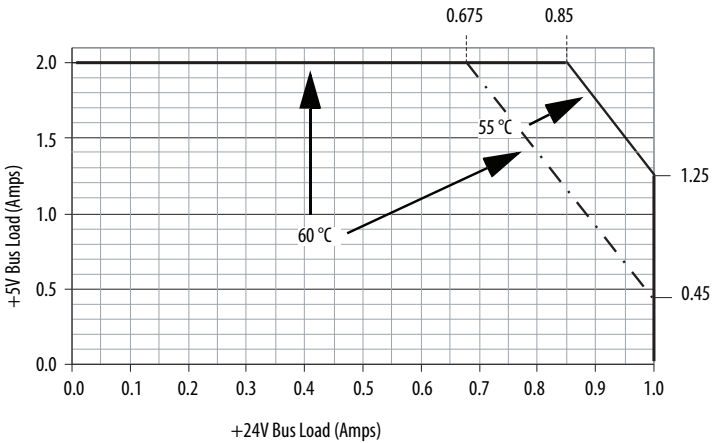
The following graphs indicate how much current can be drawn from the power supply at the indicated case temperature without damaging it.

1769-PA2, 1769-PA2K Output Derating

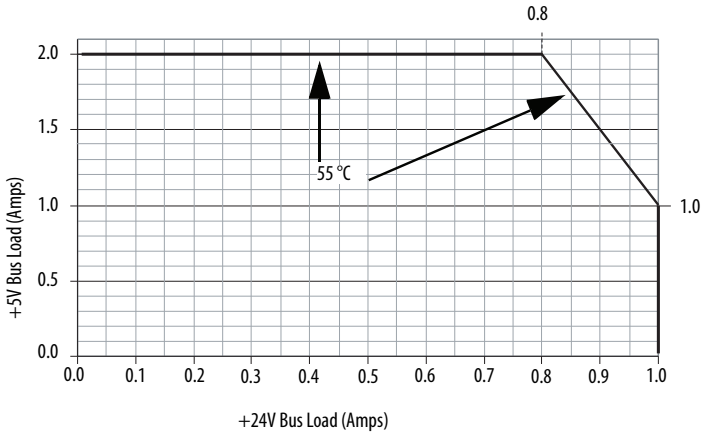
With User +24V Current Draw at 0 Amps



With User +24V Current Draw at 0.2 Amps

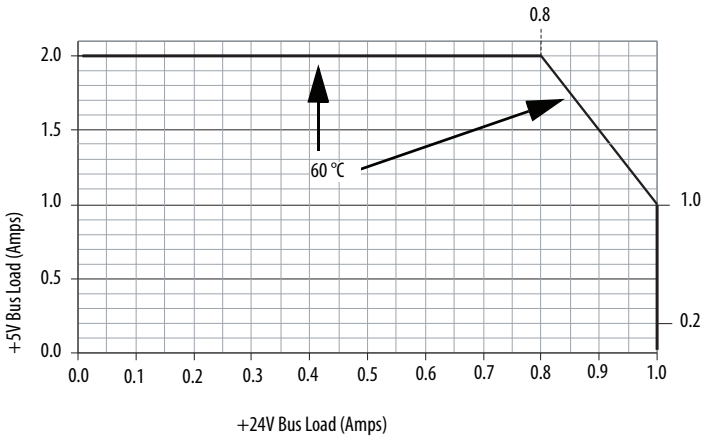


With User +24V Current Draw at 0.25 Amps



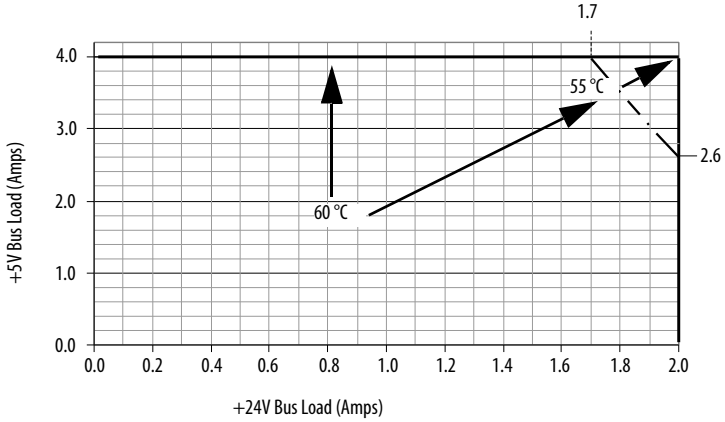
1769-PB2, 1769-PB2K Output Derating

Total Output: 29 W at 60 °C (140 °F) or below



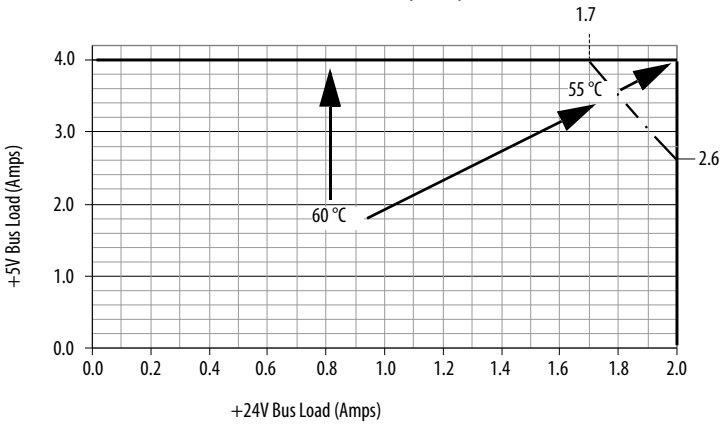
1769-PA4, 1769-PA4K Output Derating

**Total Output: 68 W at 55 °C (131 °F) or below
61 W at 60 °C (140 °F) or below**



1769-PB4, 1769-PB4K Output Derating

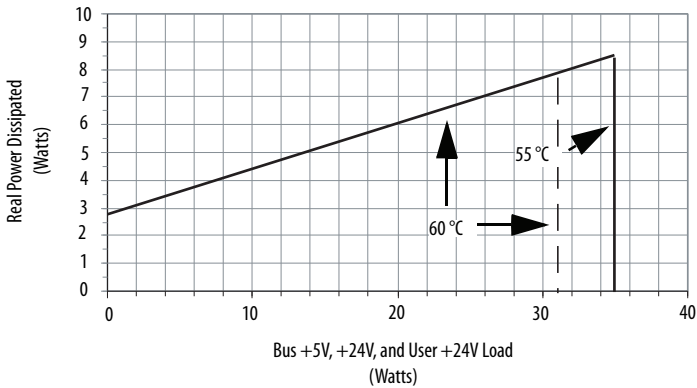
**Total Output: 68 W at 55 °C (131 °F) or below
61 W at 60 °C (140 °F) or below**



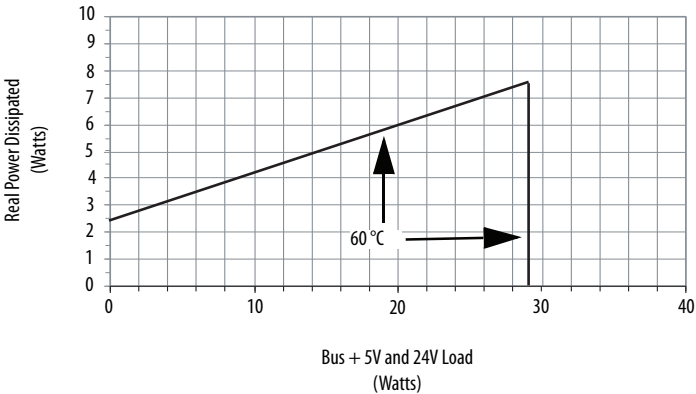
Power Dissipation

The following graphs indicate the real electrical power dissipation of the power supply in function of the electrical load.

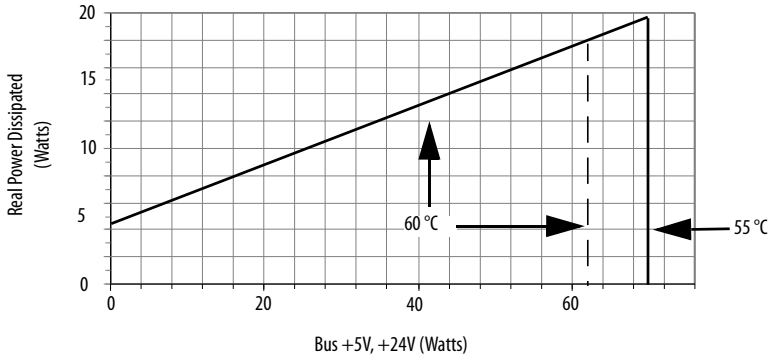
1769-PA2, 1769-PA2K Real Power Dissipation



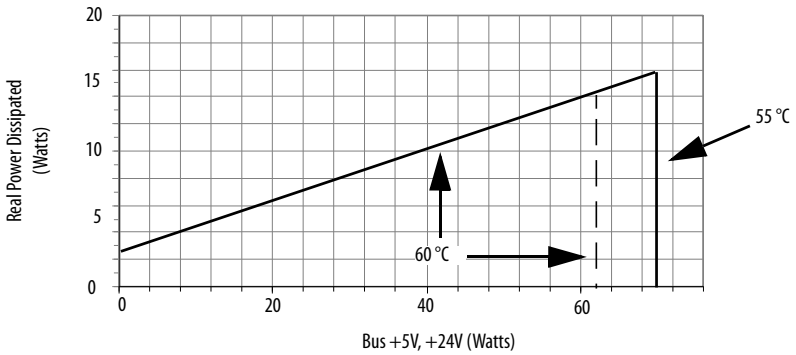
1769-PB2, 1769-PB2K Real Power Dissipation



1769-PA4, 1769-PA4K Real Power Dissipation



1769-PB4, 1769-PB4K Real Power Dissipation



Specifications

Technical Specifications

Attribute	1769-PA2, 1769-PA2K ⁽³⁾	1769-PB2, 1769-PB2K	1769-PA4, 1769-PA4K	1769-PB4, 1769-PB4K
Input voltage range	85...265V AC	19.2...31.2V DC	85...265V AC	19.2...32V DC
Input frequency range	47...63 Hz	N/A	47...63 Hz	N/A
Power supply distance rating ⁽¹⁾	8 8 I/O modules can be connected on either side of the power supply for a maximum of 16 modules			
Operating altitude	2000 m (6562 ft)			
Isolation voltage	265V (continuous), Reinforced Insulation Type Routine tested at 2596V DC for 1s, AC Power Input to System and AC Power Input to 24V DC User Power	75V (continuous), Reinforced Insulation Type Routine tested at 1697V DC for 1s, DC Power Input to System	265V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required) Routine tested at 2596V DC for 1s, AC Power Input to System	75V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1s, DC Power Input to System
Power consumption	100VA @ 120V AC 130VA @ 240V AC	50VA @ 24V DC	200VA @ 120V AC 240VA @ 240V AC	100VA @ 24V DC
Power dissipation	8 W @ 60 °C (140 °F)	7.5 W @ 60 °C (140 °F)	18 W @ 60 °C (140 °F)	14.5 W @ 60 °C (140 °F)
Current capacity @ 5V DC	2.0 A	2.0 A	4.0 A	4.0 A
Current capacity @ 24V DC	0.8 A	0.8 A	2.0 A	2.0 A
Inrush current, max	25 A @ 132V AC	30 A @ 31.2V DC	25 A @ 132V AC	30 A @ 31.2V DC
Fuse type	Littelfuse 02153.15MXP	Littelfuse 021706.3MXP	Littelfuse 02183.15MXP	Littelfuse 0217008.MXP
Dimensions (HxWxD), approx	118 x 70 x 87 mm (4.65 x 2.76 x 3.43 in.) height including mounting tabs is 138 mm (5.43 in.)			
Weight, approx	485 g (1.07 lb)		500 g (1.10 lb)	
Wiring category ⁽²⁾	1 on power ports	2 on power ports	1 on power ports	2 on power ports
Wire size	2.5 mm ² (14 AWG) solid copper wire rated at 90 °C (194 °F), or greater, 1.2 mm (3/64 in.) insulation max			
North American temp code	T3C			
ATEX/IEC temp code	N/A	T4	N/A	T4
Enclosure type rating	None (open-style)			

- (1) You can use a maximum of two banks of I/O modules. This condition occurs when configuring your system with a MicroLogix 1500 controller, one expansion cable, one expansion power supply, and a total of eight I/O modules. The expansion power supply cannot be directly connected to the MicroLogix 1500 controller.
- (2) Use this Conductor Category information for to plan conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).
- (3) Catalog numbers followed by a "K" indicate a conformal coating option.

Environmental Specifications

Attribute	1769-PA2, 1769-PA2K ⁽¹⁾	1769-PB2, 1769-PB2K	1769-PA4, 1769-PA4K	1769-PB4, 1769-PB4K
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)	0 °C < Ta < 60 °C (32 °F < Ta < 140 °F)			
Temperature, non-operating IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold) IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat) IEC 60068-2-14 (Test Na, Unpackaged Thermal Shock)	-40 < Ta < +85 °C (-40 < Ta < +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)	DIN rail mount: 20 g Panel mount: 30 g			
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	DIN rail mount: 30 g Panel mount: 40 g			
Emissions CISPR 11	Group 1, Class A			
ESD immunity IEC61000-4-2	6 kV contact 8 kV air discharges			
Radiated RF immunity IEC61000-4-3	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
EFT/B immunity IEC 61000-4-4	±2 kV at 5 kHz on AC power ports ±2 kV at 5 kHz on 24V DC PWR OUT ports	±2 kV at 5 kHz on DC power ports	±2 kV at 5 kHz on AC power ports	±2 kV at 5 kHz on DC power ports

Environmental Specifications (Continued)

Attribute	1769-PA2, 1769-PA2K ⁽¹⁾	1769-PB2, 1769-PB2K	1769-PA4, 1769-PA4K	1769-PB4, 1769-PB4K
Surge transient immunity IEC61000-4-5	±2 kV line-line (DM) and ±4 kV line-earth (CM) on AC power ports ±500V line-line (DM) and ±500V line-earth (CM) on 24V DC PWR OUT ports	±500 V line-line (DM) and ±1 kV line-earth (CM) on DC power ports	±2 kV line-line (DM) and ±4 kV line-earth (CM) on AC power ports	±500 V line-line (DM) and ±1 kV line-earth (CM) on DC power ports
Conducted RF Immunity IEC61000-4-6	10V rms with 1 kHz sine-wave 80% AM from 150 kHz-.80 MHz			
Voltage variation IEC 61000-4-11	30% dips for 1 period at 0° and 180° on AC supply ports 60% dips for 5 and 50 periods on AC supply ports ±10% fluctuations for 15 min on AC supply ports >95% interruptions for 250 periods on AC supply ports	N/A	30% dips for 1 period at 0° and 180° on AC supply ports 60% dips for 5 and 50 periods on AC supply ports ±10% fluctuations for 15 min on AC supply ports >95% interruptions for 250 periods on AC supply ports	N/A
Voltage variation IEC 61000-4-29	N/A	10 ms interruption on DC supply ports	N/A	10 ms interruption on DC supply ports

(1) Catalog numbers followed by a "K" indicate a conformal coating option.

Certifications

Certifications ⁽¹⁾	1769-PA2, 1769-PA2K, 1769-PA4, 1769-PA4K	1769-PB2, 1769-PB2K, 1769-PB4, 1769-PB4K
c-UL-us	UL Listed for Class 1, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E334470.	
CE	European Union 2014/30/EU EMC Directive, compliant with: <ul style="list-style-type: none"> EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions European Union 2014/35/EU LVD, compliant with: <ul style="list-style-type: none"> EN 61131-2; Programmable Controllers (Clause 11) 	European Union 2014/30/EU EMC Directive, compliant with: <ul style="list-style-type: none"> EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions
RCM	Australian Radio Communications Act, compliant with: <ul style="list-style-type: none"> AS/NZS CISPR 11; Industrial Emissions 	
Ex	N/A	European Union 2014/34/EU ATEX Directive, compliant with: <ul style="list-style-type: none"> EN 60079-15; Potentially Explosive Atmospheres, Protection "n" (II 3 G Ex nA IIC T4 Gc) EN 60079-0; General Requirements (Zone 2) IECEx: Correspond to Zone 2 classification to IEC 60079-0. <ul style="list-style-type: none"> The type of protection is 'Ex nA IIC T4 Gc' according to IEC 60079-15. Reference IECEx certificate number IECEx UL 20.0078X.
EAC	Russian Customs Union TR CU 020/2011 EMC Technical Regulation Russian Customs Union TR CU 004/2011 LV Technical Regulation	

(1) See the Production Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

Certifications Compatibility with MicroLogix 1500

To use the 1769 expansion I/O power supply with the MicroLogix 1500 processor, the processor (catalog number 1764-LSP or 1764-LRP) must be series A, revision C, Firmware Revision Number (FRN) 3 or later. Look at the processor nameplate to check the firmware revision.

Status file bit S:59 (Operating System Firmware Revision Number)

If your processor is at an older revision, you must upgrade the operating system. Go to <http://compatibility.rockwellautomation.com/Pages/home.aspx> to download the firmware update.

Additional Resources

Resource	Description
CompactLogix Power Supplies Specifications Technical Data, publication 1769-TD008	Provides a detailed description of the 1769 CompactLogix power supplies.
Compact I/O 1769-ADN DeviceNet Adapter User Manual, publication 1769-UM001	Provides information on how to install and use a 1769-ADN DeviceNet adapter.
Compact I/O Analog Modules User Manual, publication 1769-UM002	Provides information on how to install and use Compact Analog I/O modules.
CompactLogix System User Manual, publication 1769-UM007	Provides information on how to install and use your CompactLogix controller.
MicroLogix 1500 Programmable Controllers User Manual, publication 1764-UM001	Provides information on how to install and use your Compact I/O with the MicroLogix 1500 programmable controller.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

Notes:

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

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