Allen-Bradley 1769-PB4

01 Scope and system boundary

Installed function

Allen-Bradley 1769-PB4 is a 24 V DC Compact I/O power supply that delivers regulated 5 V and 24 V backplane power to a 1769 module bank. Backplane power is separate from externally supplied field-load power. A bank with an acceptable module count can still overload one rail; both electrical consumption and physical placement therefore govern selection.

Functional sequence

01	A nominal 24 V DC source feeds the supply input.
02	The power supply establishes regulated 5 V and 24 V bus rails.
03	Adjacent modules receive power through the locked Compact I/O bus.
04	The controller or adapter exchanges I/O data while field circuits retain their own required power paths.

Before work starts

Check	Technical purpose
Define the bank	List the controller or adapter and every I/O position. Count modules on both sides and identify any distance restriction shorter than eight modules.
Calculate consumption	Sum each module’s 5 V and 24 V draw independently. Convert both totals to power and apply the 55 °C or 60 °C combined rating appropriate to the enclosure.

Isolation and handling

Budget the 5 V and 24 V rails separately, then verify their combined load against the temperature-dependent power curve. Protective earth must remain continuous through the mounted assembly.

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02 Connections and readiness

Interface preparation

Interface	Function	Check
DC input	Source energy for conversion	Check polarity and voltage under load, not only at open circuit.
5 V rail	Backplane electronics	Add the 5 V demand of every connected module.
24 V rail	Backplane module circuitry	Apply the ambient-temperature derating.
Bus connectors	Electrical connection between modules	Lock every lever before applying power.
Protective earth	Class I grounding	Use the designated earth connection and grounded mounting system.

Engineering considerations

A 4 A demand on the 5 V rail represents 20 W. At 60 °C, adding 1.7 A on the 24 V rail gives 40.8 W, bringing the combined load close to the 61 W ceiling. Using 2 A on the 24 V rail instead leaves 13 W, or 2.6 A, available on the 5 V rail. This is a load-budget illustration, not permission to exceed any individual module or conductor rating.

Relevant setup data

Item	Value or condition
Input conductor	14 AWG (2.5 mm²) solid copper, 90 °C or greater
Panel screw torque	1.16 N·m
Operating vibration	5 g, 10–500 Hz
Operating shock	20 g DIN rail; 30 g panel

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03 Installation and replacement

Execution details

Stage	Action and reason
Define the bank	List the controller or adapter and every I/O position. Count modules on both sides and identify any distance restriction shorter than eight modules.
Calculate consumption	Sum each module’s 5 V and 24 V draw independently. Convert both totals to power and apply the 55 °C or 60 °C combined rating appropriate to the enclosure.
Prepare the mounting	Use a grounded panel or suitable conductive DIN rail. Keep the ventilation clearances required by the assembly and preserve access to the bus levers.
Assemble the bus	With all power isolated, engage adjacent modules fully and lock the bus connectors. Fit the correct end termination before completing the mechanical attachment.
Wire the input	Identify positive, negative and protective-earth connections. Route and secure copper wiring so it cannot load the terminals mechanically.
Check before power	Measure polarity and voltage at the supply input. Inspect the external protection and confirm that the source can tolerate the startup transient.
Apply the load	Energize under controlled conditions and inspect the power indication. Verify that the controller or adapter recognizes every intended I/O module.
Release the bank	Exercise representative input and output functions, check for voltage dips during load changes and retain the completed rail-current calculation.

Before energization

Isolate and verify the upstream DC supply before touching the terminals. Check DC polarity and confirm the input remains within 19.2–31.2 V. Keep protective earth connected to the grounded mounting system. Position every I/O module within its own power-supply distance rating.

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04 Commissioning and fault isolation

Functional acceptance

Test	Action	Expected result
Input stability	Observe DC input while the bank starts	Voltage remains inside the permitted range.
Bank recognition	Compare detected modules with the intended positions	All positions are recognized without a bus connection fault.
Thermal loading	Review the maximum enclosure ambient and dissipation	Rail and combined limits remain satisfied.

Interpret the symptom

Observation	Investigation	Decision boundary
Power indication absent	Check upstream source, polarity and protection	Do not condemn the supply before verifying its input.
Dropout during startup	Compare inrush capability with source and protection	Correct source coordination before repeating startup.
Only distant modules unavailable	Review bus locks, end termination and distance ratings	Correct the physical bus arrangement before changing software.

Acceptance limits

Parameter	Required condition
Nominal input	24 V DC
Input voltage range	19.2–31.2 V DC
5 V output current	4 A maximum
24 V output current	2 A maximum; at 60 °C, 1.7 A with a 4 A load on the 5 V rail

Controlled return to service

Retain the two rail totals, combined watts, ambient-temperature assumption and final I/O position list. A changed bank configuration requires a new load calculation.

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05 Technical checks and handover

Questions that affect the work

Where can I/O modules be positioned relative to 1769-PB4?
Up to eight modules may be installed on each side, with no more than sixteen total. An individual module with a shorter power-supply distance rating must remain within that shorter distance.

Which DC input limits must the upstream supply meet for 1769-PB4?
The input must remain between 19.2 and 31.2 V DC. A nominal 24 V source must also accommodate the connected bank load and startup demand.

Final checks

Check	Requirement
1	Lock the bus levers and fit the required bank end cap.
2	Calculate rail currents and combined power at the maximum ambient temperature.
3	Use the specified copper conductors and tighten connections to their designated torque.
4	Check supply indication and I/O operation under normal bank load before release.

Related catalogue pages

Allen-Bradley 1769-OF4VI

Allen-Bradley 1769-ECR

Allen-Bradley 1769-OB16

Technical basis

1769-TD008C-EN-P, November 2023; 1769-IN028J-EN-P, August 2022.