Allen-Bradley 1769-IQ16K

01 Scope and system boundary

Installed function

Allen-Bradley 1769-IQ16K is a conformally coated Compact I/O module with sixteen 24 V DC sinking/sourcing inputs arranged in two groups of eight. A discrete input module interprets field voltage; it does not provide the field sensor’s power source or replace a safety input device. The circuit designer must arrange the proper common and signal polarity for the selected sinking or sourcing connection.

Functional sequence

01	A field contact or electronic sensor establishes a DC input level.
02	The corresponding group common completes the field current path.
03	Input circuitry qualifies the transition with the module’s delay.
04	The Compact I/O bus transfers the resulting input state to the controller.

Before work starts

Check	Technical purpose
Map the channels	Create a position list for all sixteen inputs and both commons. Identify which field devices source or sink current before reconnecting their circuits.
Check the electrical range	Measure the actual field supply and review its highest tolerance. Apply the 26.4 V ceiling when designing for a 60 °C ambient.

Isolation and handling

Include the module’s input delay in the complete field-to-controller response calculation. Check off-state leakage and the high-temperature voltage ceiling before accepting the sensor circuit.

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02 Connections and readiness

Interface preparation

Interface	Function	Check
Inputs 0–7	First eight discrete channels	Use the associated common for the first group.
Inputs 8–15	Second eight discrete channels	Keep its common assignment distinct.
Removable terminal block	Field-wire connection	Retain wiring identity during replacement.
Compact I/O bus	Input data and module power	Seat the bus connectors before energization.

Engineering considerations

An 8 ms module transition delay is only one part of response time. A controller can observe a change later because of its I/O update and task execution. Test the shortest required field event with the final program and network configuration rather than treating a steady-state indicator check as a timing test.

Relevant setup data

Item	Value or condition
Compatible supply family	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Replacement terminal block	1769-RTBN18
Solid copper conductor	22–14 AWG
Stranded copper conductor	22–16 AWG

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03 Installation and replacement

Execution details

Stage	Action and reason
Map the channels	Create a position list for all sixteen inputs and both commons. Identify which field devices source or sink current before reconnecting their circuits.
Check the electrical range	Measure the actual field supply and review its highest tolerance. Apply the 26.4 V ceiling when designing for a 60 °C ambient.
Assess leakage	Evaluate the sensor’s off-state voltage and current in the installed circuit. A device can appear off mechanically while leakage still produces an unwanted electrical input.
Prepare conductors	Use 22–14 AWG solid or 22–16 AWG stranded copper conductors rated 90 °C or higher. Avoid loose strands and excessive exposed conductor.
Seat and retain	Install the module on the assembled bus with the supply isolated. Keep the module inside its eight-module supply-distance rating and secure the removable terminal block.
Tighten connections	Use 0.68 N·m on wiring terminals and 0.46 N·m on retaining screws. Do not substitute the larger value for the retaining screw requirement.
Test transitions	Operate each device individually while observing the input indication and controller data. Check both the energized and de-energized state, including leakage-sensitive circuits.
Validate timing	Confirm that input delay, network update and controller execution together satisfy the process requirement. Do not approve short pulses solely from a static on/off test.

Before energization

Isolate backplane and field power before removing the terminal block. Identify both input commons and preserve their group assignments. Check the maximum field voltage at the highest expected ambient temperature. Keep sensor leakage within both off-state limits.

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04 Commissioning and fault isolation

Functional acceptance

Test	Action	Expected result
Channel identity	Operate one field device at a time	Only its intended controller input changes.
Off-state immunity	Return the sensor to its inactive state	Residual voltage and current remain below the off limits.
Timing	Apply the shortest required event	The final controller logic detects it consistently.

Interpret the symptom

Observation	Investigation	Decision boundary
Input remains active	Measure off-state voltage and current	Investigate leakage or common wiring before replacing the module.
Entire group incorrect	Inspect that group’s common and supply polarity	Treat a shared circuit issue before separate channel faults.
Short event missed	Review pulse duration against the complete response path	Use a suitable faster input arrangement when required.

Acceptance limits

Parameter	Required condition
Input channels	16
Input grouping	2 groups of 8
Nominal input voltage	24 V DC
Operating input voltage	10–30 V DC at 30 °C; 10–26.4 V DC at 60 °C

Controlled return to service

Retain the channel-to-device map, common assignments, field-supply tolerance and timing-test result. Where a device was replaced, compare the new device’s leakage characteristics with the original circuit.

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05 Technical checks and handover

Questions that affect the work

Will a 30 V field signal remain within the 1769-IQ16K rating at 60 °C?
No. The permitted input range is 10–30 V DC at 30 °C but 10–26.4 V DC at 60 °C, so 30 V exceeds the upper-temperature limit.

Which sensor leakage limits prevent a false on-state at 1769-IQ16K?
The off-state input must remain at or below 5 V DC and 1.5 mA. Compare the sensor's leakage and the complete wiring circuit with both limits.

Final checks

Check	Requirement
1	Use copper conductors of the permitted gauge and temperature rating.
2	Apply the separate terminal and retaining-screw torque values.
3	Keep the module within eight positions of its Compact I/O power supply.
4	Exercise all sixteen channels and confirm their controller indications.

Related catalogue pages

Allen-Bradley 1769-L35E/A

Allen-Bradley 1769-ADN

Allen-Bradley 1769-L33ER

Technical basis

1769-TD006H-EN-P, November 2023, page 12; 1769-IQ16K product specification.