Allen-Bradley

by ROCKWELL AUTOMATION

Compact 5000 I/O Modules and EtherNet/IP Adapters

Catalog Numbers

Digital I/O Modules	5069-IA16, 5069-IB16, 5069-IB16F, 5069-IB16K, 5069-IB6F-3W, 5069-OA16, 5069-OB8, 5069-OB16, 5069-OB16F, 5069-OB16K, 5069-OW4I, 5069-OW16, 5069-OX4I
Analog I/O Modules	5069-IF8, 5069-IY4, 5069-IY4K, 5069-OF4, 5069-OF4K, 5069-OF8
High-speed Counter Module	5069-HSC2xOB4
Safety I/O Modules	5069-IB8S, 5069-IB8SK, 5069-OBV8S, 5069-OBV8SK
Serial Module	5069-SERIAL
Field Potential Distributor	5069-FPD
Address Reserve Module	5069-ARM
EtherNet/IP Adapters	5069-AENTR, 5069-AENTRK, 5069-AEN2TR

The Compact 5000™ I/O architecture provides a wide range of input and output modules to span many applications, from high-speed digital to process control. The architecture uses Producer/Consumer technology that allows input information and output status to be shared among multiple Logix 5000™ controllers.

Compact 5000 I/O modules are used as local I/O modules in CompactLogix™ 5380 and Compact GuardLogix® 5380 controller systems. The modules are also used as remote I/O modules with CompactLogix 5380, Compact GuardLogix 5380 controllers, and some other Logix 5000 controllers. You use the Studio 5000 Logix Designer® application to configure the modules.

The I/O modules require a removable terminal block (RTB) to connect field-side wiring. RTBs are not included with the I/O modules. You must order RTBs separately.

Rockwell Automation

Summary of Changes

The publication was revised for the following changes.

Topic	Pages
Changed the 5069-OB16, 5069-OB16F, and 5069-OB16K module specifications to indicate that only the Series B hardware supports Field Power Loss Detection.	30
Changed the 5069-IY4 and 5069-IY4K module wiring diagrams with different devices that are connected to the module.	59, 60, 64, and 65
Changed the 5069-IB8S and 5069-IB8SK module wiring diagrams to show normally closed contacts, instead of normally open contacts, which are connected to the module.	82…84

Power Compact 5000 I/O Modules

There are different types of power that are used with Compact 5000 I/O modules.

Power Type	Description	Related Specifications		
		Name	Description	
Module (MOD) Power	System-side power that is used to operate a local or remote system. Power passes across a MOD Power bus. Modules draw current from the bus and pass the remaining current to the next module.	MOD Power	Level of MOD Power current that the module draws from the MOD Power bus	
		MOD Power Passthrough max	Maximum level of MOD Power current that the module can pass to the next module.	
Sensor/ Actuator (SA) Power	Field-side power that some modules use to power field-side devices. Power passes across an SA Power bus. Some modules draw current from the bus and pass the remaining current to the next module. Other modules do not draw current from the bus but do pass the current to the next module. You use 5069-FPD field potential distributors to establish new SA Power buses in a system. **IMPORTANT**: Remember the following: • If the system includes DC type modules and AC type modules, you must use a field potential distributor to install them on separate SA Power buses. • You cannot install AC type modules directly next to a Compact GuardLogix 5380 controller. You must first install a field potential distributor.	SA Power	Level of SA Power current that the module draws from the SA Power bus	
		SA Power Passthrough max	Maximum level of SA Power current that the module can pass to the next module.	
Local Actuator (LA) Power	Field-side power that some Compact 5000 I/O modules use instead of SA power. Modules that use LA power **do not use SA power**. They only pass SA power to the next to the next I/O module in the system. You must install modules that use LA Power on an SA Power bus with the same module type. For example, you must install a 5069-OB8 module on an SA Power bus that includes DC type modules.	LA Power	Maximum level of LA Power current that you can apply to the module, by channel, group, or module.	

For more information on MOD power, SA power, and LA power, see the user manuals that are listed in <u>Additional Resources on page 137</u>.

Digital I/O Modules

I/O Type	Cat. No.	Description	Pages
AC digital input	5069-IA16	79…264V AC 16-point, input module	4
DC digital input	5069-IB16	10…32V DC 16-point, sinking input module	9
	5069-IB16K	10…32V DC 16-point, conformal coated sinking input module	
	5069-IB16F	10…32V DC 16-point, sinking fast input module	
	5069-IB6F-3W	10…32V DC 6-point, 3-wire, sinking fast input module	14
AC digital output	5069-OA16	85…264V AC 16-point, output module	19
DC digital output	5069-OB8	10…32V DC 8-point, sourcing high-current output module	24
	O69-OB16	10…32V DC 16-point, sourcing high-current output module	29
	5069-OB16K	10…32V DC 16-point, conformal coated sourcing output module	
	5069-OB16F	10…32V DC 16-point, sourcing fast output module	
Relay output	5069-OW4I	5…264V AC /125V DC 4-point, isolated normally open relay output module	35
	5069-OW16	5…264V AC/125V DC 16-point, normally open relay output module	40
	5069-OX4I	5…264V AC /125V DC 4-point, isolated normally open/normally closed relay output module	45

5069-IA16 Digital 16-point 120/240V AC Input Module

The following figure shows a wiring diagram for the 5069-IA16 module.

5069-IA16 Wiring Diagram

Channel Connections

The diagram shows devices that are connected to channels 0, 2, 4, 6, 8, and 10. You are not restricted to using only those channels.

You can connect devices to any channel or combination of channels as needed.

SA Power

Connections to an external power supply that provides SA Power via the SA Power RTB on one of the following:
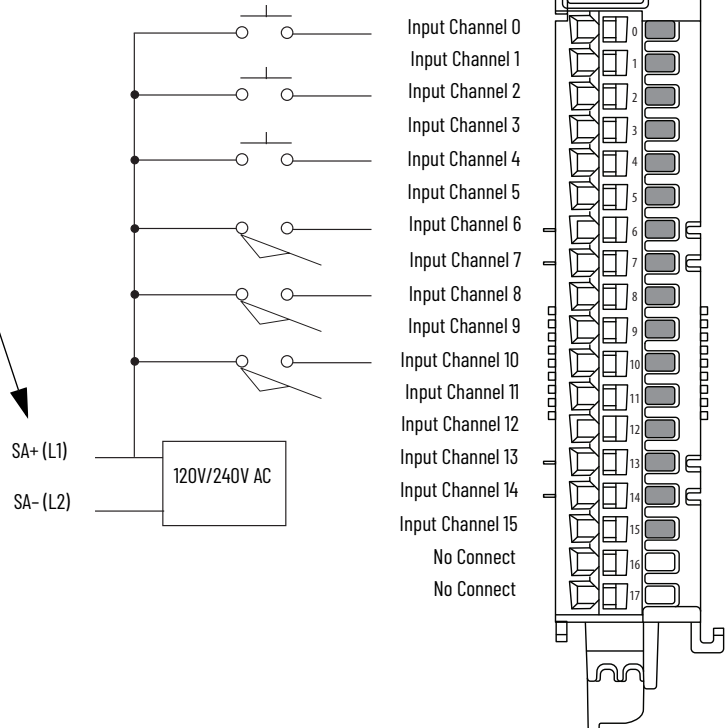
- CompactLogix 5380 controller
- CompactLogix 5480 controller
- 5069-AENTR or 5069-AEN2TR EtherNet/IP™ adapter
- 5069-FPD field potential distributor

IMPORTANT: Remember the following:

- The 5069-IA16 module uses AC SA power. You must connect AC power to the component, that is, CompactLogix 5380 controller, adapter, or field potential distributor, that provides SA Power to the module.
- If you install a **5069-IA16 module as a local I/O module in a Compact GuardLogix 5380 controller system**, you must install a field potential distributor that has AC power that is connected to it and install the 5069-IA16 module next to the field potential distributor.

You cannot install modules that draw AC SA power next to a Compact GuardLogix 5380 controller. Compact GuardLogix 5380 controllers do not support AC power on their SA Power RTBs.

- The 5069-IA16 module inputs use a shared common. The inputs have a return through internal module circuitry to the SA (–) terminal on the SA Power RTB.
- If you install modules in a system that use AC SA power and DC SA power, you must install them on separate SA Power buses.
- You use a 5069-FPD field potential distributor to establish a new SA Power bus in a system. SA Power buses are isolated from each other. To keep the modules on separate SA Power buses, complete these steps.
  1. Install the modules that use one type of SA power, for example DC, to the right of the adapter or controller, that is, the first SA Power bus.
  2. Install the 5069-FPD field potential distributor to establish a second SA Power bus.
  3. Install the modules that use the other type of SA power, for example AC, on the second SA Power bus.

SA+ (L1)

SA– (L2)

120V/240V AC

Input Channel 0
Input Channel 1
Input Channel 2
Input Channel 3
Input Channel 4
Input Channel 5
Input Channel 6
Input Channel 7
Input Channel 8
Input Channel 9
Input Channel 10
Input Channel 11
Input Channel 12
Input Channel 13
Input Channel 14
Input Channel 15
No Connect
No Connect

AC INPUT
STATUS
5069-IA16

The following figure shows a functional block diagram for the 5069-IA16 module.

5069-IA16 Functional Block Diagram
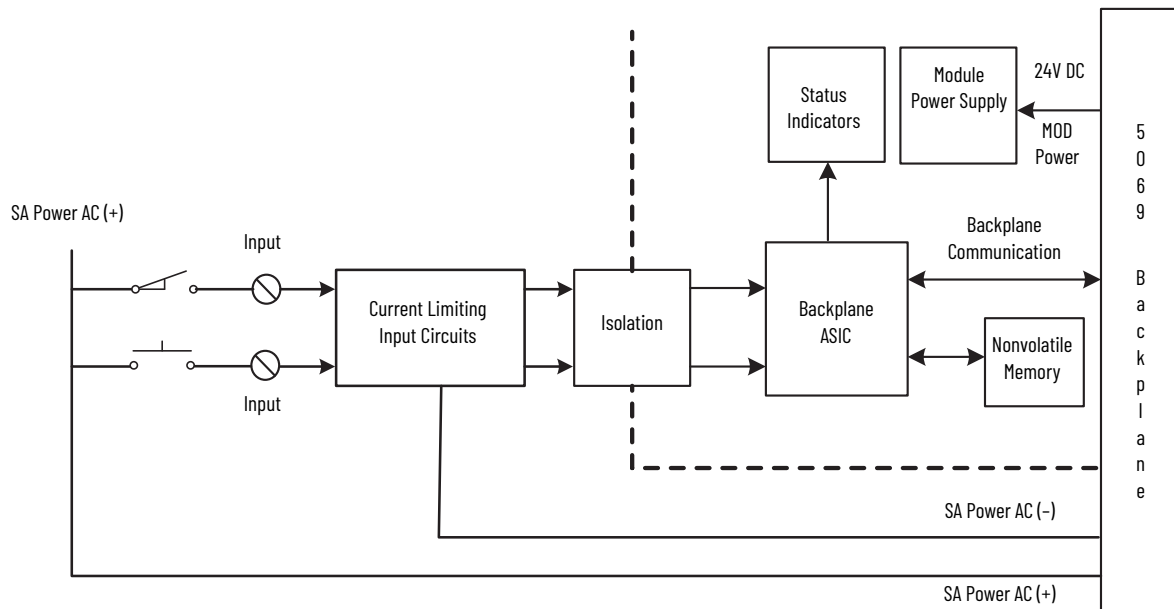
Technical Specifications - 5069-IA16

Attribute	5069-IA16
On-state voltage, min	79V AC
On-state voltage, nom	120/240V AC
On-state voltage, max	264V AC
Off-state voltage, max	40V AC
Input current per channel, max	15 mA @ 264V AC
On-state current, min	2 mA @ 79V AC 3 mA @ 164V AC
On-state current, nom	5 mA @ 120V AC/50 Hz 6 mA @ 120V AC/60 Hz 9 mA @ 240V AC/50 Hz 11 mA @ 240V AC/60 Hz
On-state current, max	15 mA @ 264V AC
Off-state current, max	2 mA
Input impedance, nom	24 kΩ @ 120V AC/50 Hz 20 kΩ @ 120V AC/60 Hz 27 kΩ @ 240V AC/50 Hz 22 kΩ @ 240V AC/60 Hz
Input impedance, min	17.6 kΩ @ 264V AC/63 Hz
Inrush current, max	600 mA
Input delay time	
Off to On	10 ms (typ) @ 0…60 °C (32…140 °F)
On to Off	10 ms (typ) @ 0…60 °C (32…140 °F)

Technical Specifications - 5069-IA16

Attribute	5069-IA16
Input filter times	
Off to On	Hardware delay: 10 ms (typ) + filter time User-selectable filter times: • 120V AC input - 1 ms • 240V AC input - 1 ms, 2 ms, 5 ms
On to Off	Hardware delay: 10 ms (typ) + filter time User-selectable filter times: • 120V AC input - 10 ms, 20 ms • 240V AC input - 5 ms, 10 ms, 20 ms

With the 5069-IA16 module, the Logix Designer application lets you choose multiple filter values, including values that are invalid for some input signals. For example, the only valid Off to On filter value when a 120V AC signal is connected to the module is 1 ms. However, you can choose 1 ms, 2 ms, or 5 ms. If you select an invalid input filter value, the module can read signal levels incorrectly. For more information, see the Compact 5000 I/O Digital Modules User Manual, publication 5069-UM004.

General Specifications - 5069-IA16

Attribute	5069-IA16
Number of inputs	16 (One group of 16)
Voltage category	120/240V AC
Voltage and current ratings	
Input voltage range	79...264V AC
Input voltage frequency	47...63 Hz
MOD Power	75 mA @ 18...32V DC
MOD Power Passthrough, max[1]	9.55 A @ 18...32V DC
SA Power	240 mA @ 79...264V AC
SA Power Passthrough, max[2]	9.975 A @ 79...264V AC
Do not exceed 10 A MOD or SA Power (Passthrough) current draw. The 5069-IA16 module complies to ATEX/IECEx when used at or below 125V AC.	
Power dissipation, max	3.5 W
Thermal dissipation, max	11.9 BTU/hr
Isolation voltage	250V (continuous), Basic Insulation Type Type tested at 1800V AC for 60 s No isolation between individual channels
Module keying	Electronic keying via programming software
Indicators	1 green/red module status indicator 16 yellow/red I/O status indicators
Slot width	1
Dimensions (HxWxD)	144.57 x 22 x 105.42 mm (5.69 x 0.87 x 4.15 in.)
DIN rail	Compatible zinc-plated chromate-passivated steel DIN rail. You can use the EN50022 - 35 x 7.5 mm (1.38 x 0.30 in.) DIN rail.
RTB	One of these RTB types. • 5069-RTB18-SPRING RTB • 5069-RTB18-SCREW RTB **IMPORTANT**: You must order RTBs separately. RTBs do not ship with Compact 5000™ I/O modules. We recommend that you order only the RTB type that your system requires.
RTB torque (5069-RTB18-SCREW RTB only)	0.4 N·m (3.5 lb·in)
RTB keying	None
Wire category	2 - input ports 2 - power ports 1 wire per terminal for each signal port

General Specifications - 5069-IA16

Attribute	5069-IA16
Wire size	
5069-RTB18-SPRING connections	0.5…1.5 mm^2 (22…16 AWG) solid or stranded shielded copper wire rated at 105 °C (221 °F), or greater, 2.9 mm (0.11 in.) max diameter including insulation, single wire connection only.
5069-RTB18-SCREW connections	0.5…1.5 mm^2 (22…16 AWG) solid or stranded shielded copper wire rated at 105 °C (221 °F), or greater, 3.5 mm (0.14 in.) max diameter including insulation, single wire connection only.
Insulation stripping length	
5069-RTB18-SPRING connections	10 mm (0.39 in.)
5069-RTB18-SCREW connections	12 mm (0.47 in.)
Weight, approx	175 g (0.39 lb)
Enclosure type rating	None (open-style)
North American temp code	T4
ATEX temp code	T4
IECEx temp code	T4
IEC Input Compatibility	Type 1

(1) Level of MOD Power current that passes through the module depends on the system configuration, such as, module slot location and the other module types that are used in the system. For more information, see the CompactLogix 5380 and Compact GuardLogix 5380 Controllers User Manual, 5069-UM001, CompactLogix 5480 Controllers User Manual, 5069-UM002, and Compact 5000 EtherNet/IP Adapters User Manual, 5069-UM004.

(2) Level of SA Power current that passes through the module depends on the system configuration, such as, module slot location and the other module types that are used in the system. For more information, see the CompactLogix 5380 and Compact GuardLogix 5380 Controllers User Manual, 5069-UM001, CompactLogix 5480 Controllers User Manual, 5069-UM002, and Compact 5000 EtherNet/IP Adapters User Manual, 5069-UM004.

Environmental Specifications - 5069-IA16

Attribute	5069-IA16
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, surrounding air, max	60 °C (140 °F)
Temperature, nonoperating 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…+85 °C (-40…+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)	30 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g
Emissions	IEC 61000-6-4

Environmental Specifications - 5069-IA16

Attribute	5069-IA16
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	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 3V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity IEC 61000-4-4	±4 kV @ 5 kHz on power ports ±4 kV @ 5 kHz on signal ports
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz
Corrosion resistance classification	ISA S71.04 G2

Certifications - 5069-IA16

Certification[1]	5069-IA16
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
CE	European Union 2014/30/EU EMC Directive, compliant with: • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) European Union 2014/35/EU LVD, compliant with: • EN 61010-2-201; Control Equipment Safety Requirements European Union 2011/65/EU RoHS, compliant with: • EN 50581; Technical documentation
RCM	Australian Radiocommunications Act, compliant with: • EN 61000-6-4; Industrial Emissions
Ex	European Union 2014/34/EU ATEX Directive, compliant with: • EN 60079-0; General Requirements • EN 60079-15; Potentially Explosive Atmospheres, Protection "n" • II 3 G Ex nA IIC T4 Gc • DEMKO 15 ATEX 1484X
IECEx	IECEx System, compliant with: • IEC 60079-0; General Requirements • IEC 60079-15; Potentially Explosive Atmospheres, Protection "n" • II 3 G Ex nA IIC T4 Gc • IECEx UL 15.0055X
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3
EAC	Russian Customs Union TR CU 020/2011 EMC Technical Regulation Russian Customs Union TR CU 004/2011 LV Technical Regulation

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

5069-IB16, 5069-IB16K, and 5069-IB16F Digital 16-point Sinking Input Modules

The following figure shows a wiring diagram for the 5069-IB16, 5069-IB16K, and 5069-IB16F modules.

5069-IB16, 5069-IB16K, and 5069-IB16F Wiring Diagram

Channel Connections

The example shows devices that are connected to channels 0, 3, and 6.
You are not restricted to using only those channels.
You can connect devices to any channel or combination of channels
as needed.

SA Power

Connections to an external power supply that provides SA power via the
SA Power RTB on one of the following:
- CompactLogix 5380 controller
- Compact GuardLogix 5380 controller
- CompactLogix 5480 controller
- 5069-AENTR or 5069-AEN2TR EtherNet/IP Adapter
- 5069-FPD field potential distributor

IMPORTANT: Remember the following:
- The 5069-IB16, 5069-IB16K, and 5069-IB16F modules use DC SA power.
  You must connect DC power to the component, that is, controller,
  adapter, or field potential distributor, that provides SA Power to the
  modules.
- The 5069-IB16, 5069-IB16K, and 5069-IB16F module inputs use a shared
  common. The inputs have a return through internal module circuitry to
  the SA (–) terminal on the SA Power RTB.
- If you install modules in a system that use AC SA power and DC SA
  power, you must install them on separate SA power buses.
- You use a 5069-FPD field potential distributor to establish a new SA
  Power bus in a system. SA Power buses are isolated from each other.
  To keep the modules on separate SA Power buses, complete these
  steps.
  1. Install the modules that use one type of SA power, for example DC,
     to the right of the adapter or controller, that is, the first SA
     Power bus.
  2. Install the 5069-FPD field potential distributor to establish a second
     SA Power bus.
  3. Install the modules that use the other type of SA power, for example
     AC, on the second SA Power bus.

IMPORTANT: The 5069-IB16K and 5069-IB16K modules are wired
the same as the wiring diagram that is shown for the 5069-IB16
module.
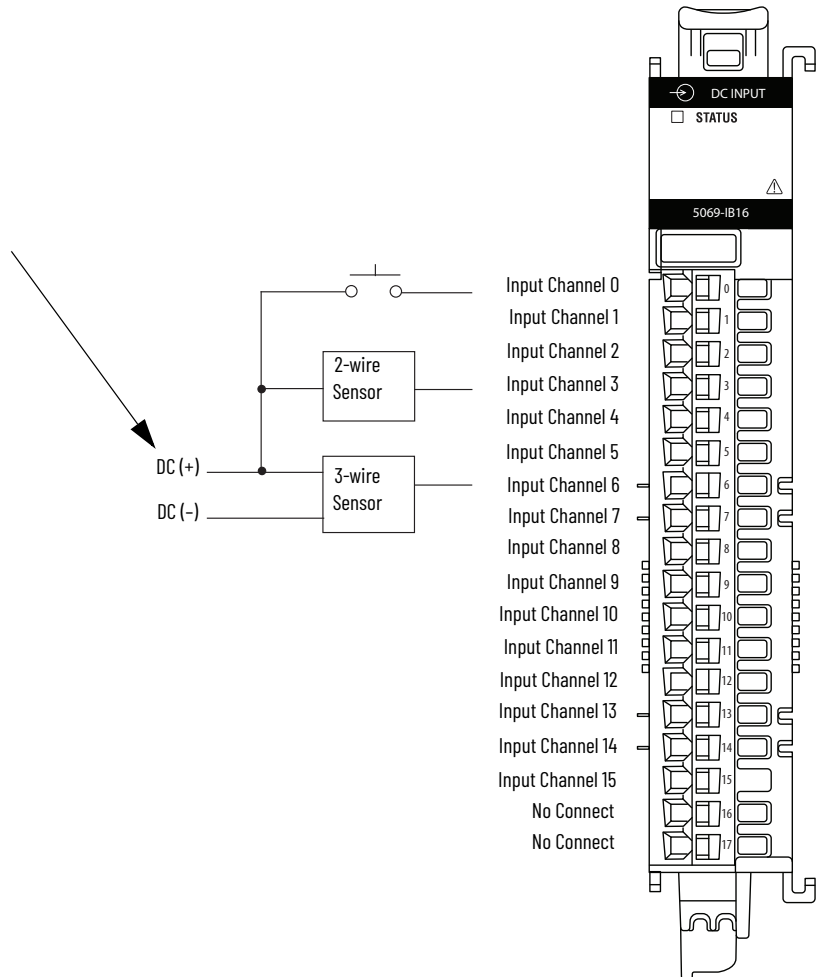
The following figure shows a functional block diagram for the 5069-IB16, 5069-IB16K, and 5069-IB16F modules.

5069-IB16, 5069-IB16K, and 5069-IB16F Functional Block Diagram
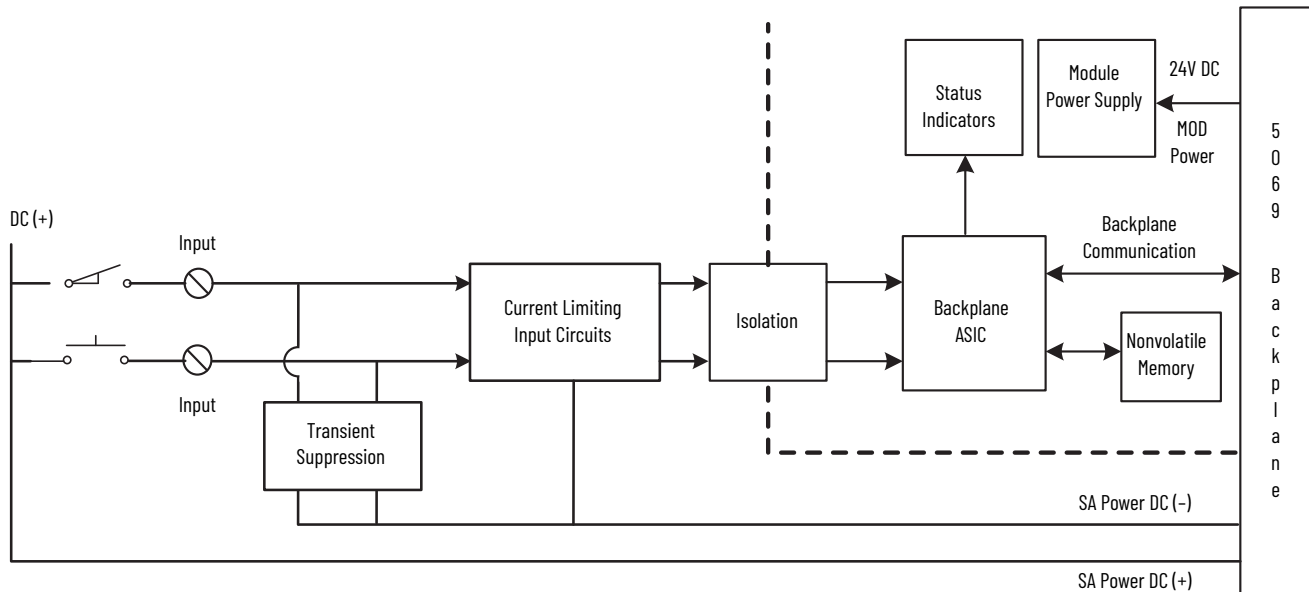
Technical Specifications - 5069-IB16, 5069-IB16K, and 5069-IB16F

Attribute	5069-IB16, 5069-IB16K	5069-IB16F
On-state voltage, min	10V DC	
On-state voltage, nom	24V DC	
On-state voltage, max	32V DC	
On-state current, min	4 mA @ 10V	
On-state current, nom	6 mA @ 24V DC	
On-state current, max	7.4 mA @ 32V DC	
Off-state voltage, max	5V DC	
Off-state current, max	1.5 mA	
Input impedance, min	1.33 kΩ	
Input impedance, nom	4.1 kΩ	
Input impedance, max	7.0 kΩ	
Inrush current, max	< 250 mA peak (decaying to, 37% in 22 ms, without activation)	
Input delay time (screw to backplane)		
Off to On	≤ 100 μs, ±10 μs @ 25 $^\circ$C (77 $^\circ$F)	≤ 10 μs, ±1 μs @ 25 $^\circ$C (77 $^\circ$F)
On to Off	≤ 100 μs, ±10 μs @ 25 $^\circ$C (77 $^\circ$F)	≤ 10 μs, ±1 μs @ 25 $^\circ$C (77 $^\circ$F)
Input drift over temperature span	±100 ns/$^\circ$C (55.6 ns/$^\circ$F) from 0...60 $^\circ$C (32...140 $^\circ$F)	< 10 ns/$^\circ$C (5.56 ns/$^\circ$F) from 0...60 $^\circ$C (32...140 $^\circ$F)
Input On to Off minimum pulse width	60 μs	6 μs
Input Off to On minimum pulse width	60 μs	6 μs