

USER MANUAL



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# Compact 5000™ 16-Point 12/24 V Discrete High-Speed Sinking Output Module

Catalog Numbers: 5069-OV16F-SC/5069-OV16FK-SC

## Important Notes

1. Please read all the information in this owner's guide before installing the product.
2. The information in this owner's guide applies to hardware Series A and firmware version 1.1 or later.
3. This guide assumes that the reader has a full working knowledge of the relevant processor.

### Notice

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## Preface

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- Who should use this manual
- How to use this manual
- Related documentation
- Technical support
- Documentation
- Conventions used in this manual

## Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting Compact 5000™ and Logix 5000™ control systems that use the Compact 5000™ 16-Point 12/24 V Sink Discrete Output Module.

<p><b>NOTE</b></p> 	<p>Before you access any equipment or begin to install any IO modules, review all safety material and warnings in the associated . Be sure to review the warnings provided in this document before you start installing a module in a system.</p>
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## How to Use This Manual

As much as possible, we organized this manual to explain, in a task-by-task manner, how to install, configure, program, operate, and troubleshoot a control system using the Compact 5000™ 16-Point 12/24 V Sink Discrete Output Module. Make sure you are familiar with the following:

- Use of a controller in a Logix 5000 control system.
- Use of an EtherNet/IP™ network, if the digital I/O modules are used remotely.
- Use of safety systems.
- Use Studio 5000 Logix Designer® environment.

## Related Documentation

The table below provides a listing of publications that contain important information about the Compact 5000™ 16-Point 12/24 V Sink Discrete Output Module:

For	Refer to this Document	Allen-Bradley Pub. No.
Describes how to install and wire the 5069-FPD field potential distributor.	Compact 5000 I/O Field Potential Distributor Installation Instructions	5069-IN001

<b>For</b>	<b>Refer to this Document</b>	<b>Allen-Bradley Pub. No.</b>
Describes how to install the 5069-ARM address reserve module.	Compact 5000 I/O Address Reserve Module Installation Instructions	5069-IN002
Describes how to install and wire the Compact 5000 I/O EtherNet/IP adapters.	Compact 5000 I/O EtherNet/IP Adapter Installation Instructions	5069-IN003
Provides specifications, wiring diagrams, and module block diagrams for Compact 5000 I/O modules and EtherNet/IP adapters.	Compact 5000 I/O Modules and EtherNet/IP Adapter Technical Data, publication	5069-TD001
Describes how to configure, operate, and troubleshoot Compact 5000 I/O analog modules.	Compact 5000 I/O Analog Modules User Manual	5069-UM005
Describes how to configure, operate, and troubleshoot the Compact 5000 I/O EtherNet/IP adapters.	Compact 5000 EtherNet/IP Adapters User Manual	5069-UM007
Describes how to configure, operate, and troubleshoot CompactLogix™ 5380 and Compact GuardLogix <sup>R</sup> 5380 controllers.	CompactLogix 5380 and Compact GuardLogix 5380 Controllers User Manual	5069-UM001
Describes how to configure, operate, and troubleshoot CompactLogix 5480 controllers.	CompactLogix 5480 Controllers User Manual	5069-UM002
Describes how to configure, operate, and troubleshoot ControlLogix <sup>R</sup> 5580 and GuardLogix 5580 controllers.	ControlLogix 5580 and GuardLogix 5580 Controllers User Manual	1756-UM543
Provides more information on event tasks and event task configuration.	Logix5000 Controllers Tasks, Programs, and Routines Programming Manual, publication	1756-PM005
User manual information	Logix5000 Controllers Tasks, Programs, and Routines Programming Manual, publication	1756-PM005
Application examples for motion control	Position-based Output Control with the MAOC Instruction	1756-at017
Environment and Enclosure Information	Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1, for additional installation requirements. NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.	1770-4.1 NEMA 250-2014 IEC 60529
Declarations of conformity, certificates, and other certification details.	Product Certification website: <a href="https://spectrumcontrols.com">https://spectrumcontrols.com</a>	

## Technical Support

For technical support, please contact your local Rockwell Automation TechConnect Office for all Spectrum products. Contact numbers are as follows:

- USA 1-440-646-6900 (US/global, English only)
- United Kingdom +44 0 1908 635 230 (EU phone, UK local)
- Australia, China, India, 1-800-722-778 or +61 39757 1502  
and other East Asia  
locations:
- Mexico 001-888-365-8677
- Brazil 55-11-5189-9500 (general support)
- Europe +49-211-41553-630 (Germany/general support)

or send an email to [support@spectrumcontrols.com](mailto:support@spectrumcontrols.com)

## Documentation

If you would like a manual, you can download a free electronic version from the Internet at [www.spectrumcontrols.com](http://www.spectrumcontrols.com).

## Conventions Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists (like this one) provide information not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for emphasis.
- **Bold** type identifies headings and sub-headings.

<p><b>WARNING</b></p> 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. These messages help you to identify a hazard, avoid a hazard, and recognize the consequences.
<p><b>ATTENTION</b></p> 	Actions ou situations risquant d'entraîner des blessures pouvant être mortelles, des dégâts matériels ou des pertes financières. Les messages « Attention » vous aident à identifier un danger, à éviter ce danger et en discerner les conséquences.
<p><b>NOTE</b></p> 	Identifies information that is critical for successful application and understanding of the product.



# Chapter 1

## Module Overview

This chapter covers the following topics:

- General description.
- Controller ownership of I/O modules.
- Output specifications.
- Hardware features.
- System overview and module operation.

### Section 1.1 General Description

The Compact 5000™ 5069-OV16F-SC and 5069-OV16FK-SC are 16-Point, 12/24 VDC fast digital sinking output modules designed to expand the local I/O capability of Rockwell Automation Compact 5000™ Systems. Other than the conformal coating, both 5069 modules are identical so all information applicable to the 5069sc-OV16F-SC also applies to the K version.

Compact 5000 I/O modules such as the 5069-OV16F-SC may be used as local I/O modules in CompactLogix™ 5380 and Compact GuardLogix® 5380 controllers, CompactLogix 5480, ControlLogix 5580, and GuardLogix 5580 controllers.

The module may also be used as a remote I/O module with CompactLogix 5380 and Compact GuardLogix 5380 controllers, and Logix 5000 controllers such as the CompactLogix (or GuardLogix) 5380 and 5580 controllers via 5069-AEN(2)TR over an EtherNet/IP network.

You use the Studio 5000 Logix Designer® application to configure the modules. The 5069-OV16F-SC module is compatible with Logix Designer application, version 28 or later.

Compact 5000 I/O digital modules use the Producer/Consumer network communication model. This communication is an intelligent data exchange between modules and other system devices in which each module produces data without first being polled. That is, the owner-controller and controllers with a Listen Only connection to the module can consume it. Refer to the Allen-Bradley Compact 5000 I/O Analog Modules User Manual, 5069-UM005, for further information.

All data exchanged between a controller and the modules is through the backplane bus that these modules share with other modules. The bus is created when the controller, its modules, and/or a communications adapter are assembled. There is no dedicated bus that is part of the controller itself.

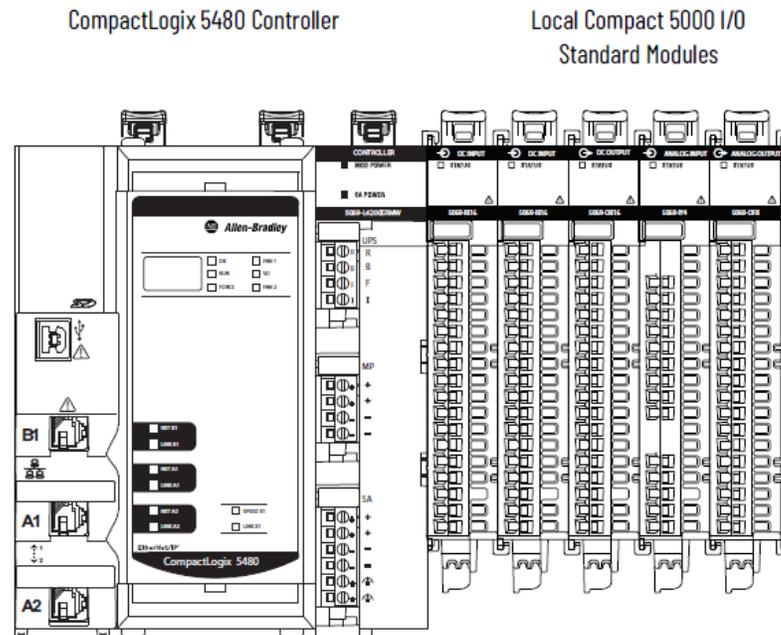
The 5069-OV16F-SC module has a left and a right side set of connectors. The left-side connector has 13 pins. The right-side connector has 13 pins plus an additional “tab” of metal on the bottom of all 5069 modules where the module attaches to the DIN rail for FGND purposes.

The module requires an 18-pin removable terminal block (RTB) to connect field-side wiring. RTBs are not included with the I/O modules. You must order RTBs separately. Either of the following RTBs may be used with the 5069 modules:

- 5069-RTB18-SPRING RTB
- 5069-RTB18-SCREW RTB

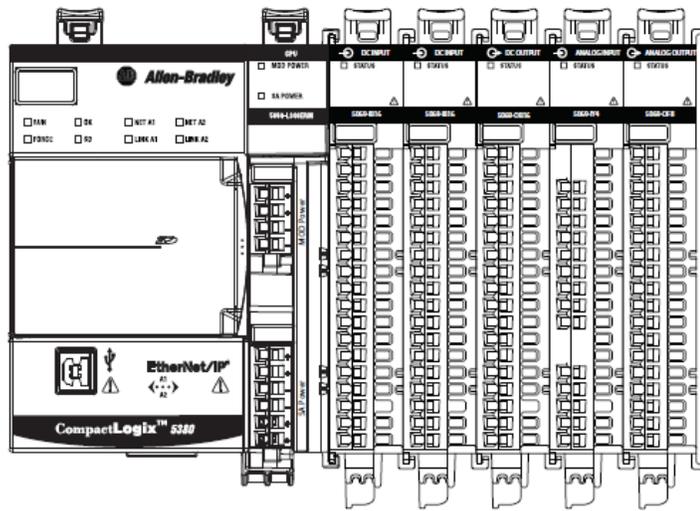
### 1.1.1 Field Side Circuitry Power

The 5069-OV16F-SC module uses power supplied directly to the terminal block. This is termed Local Actuator (LA) power. This is required due to the high, 8 A requirements of the module. The module does not use the SA power coming through the backplane.



Local Compact 5000 I/O  
Digital Modules

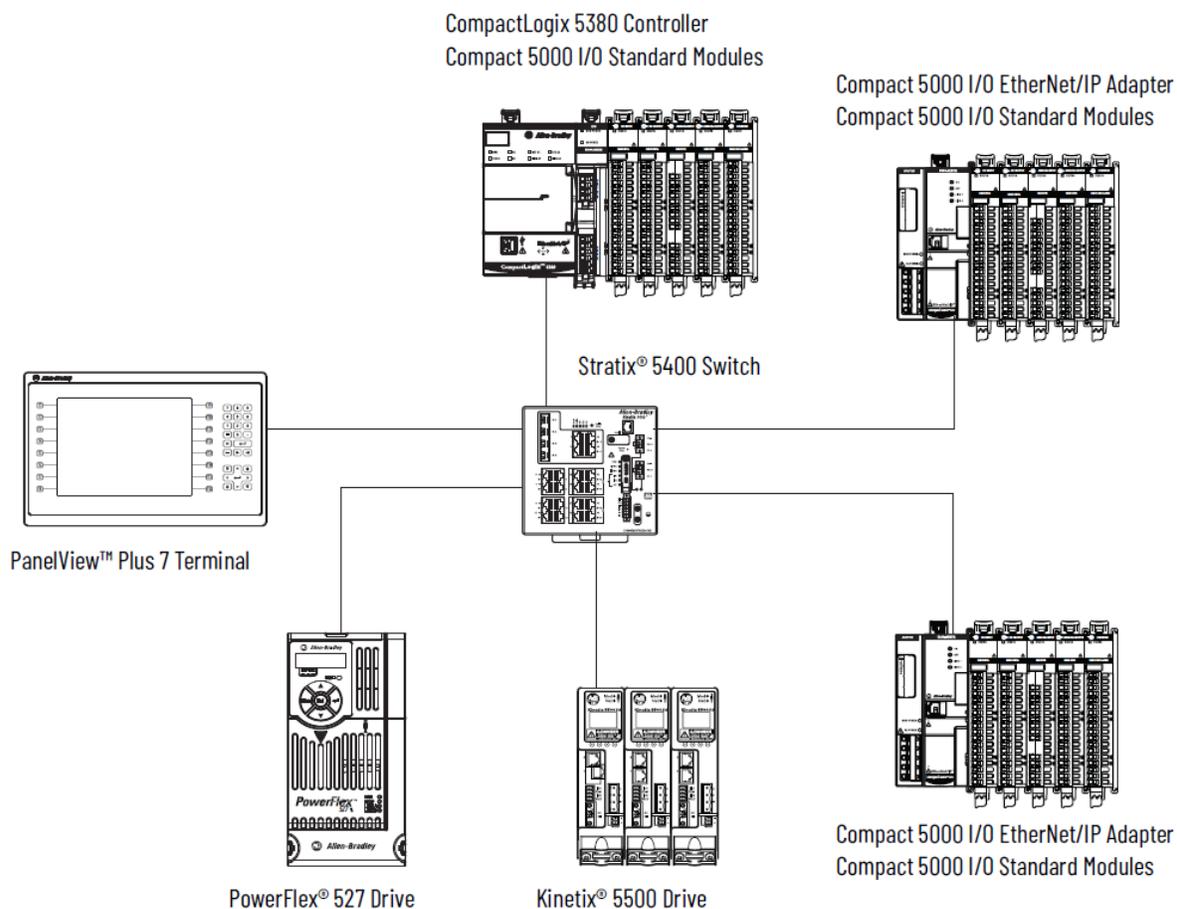
CompactLogix 5380 Controller

Local Compact 5000  
I/O Standard Modules

Compact GuardLogix 5380 Controller

Local I/O modules are those modules that reside in the same system as the controller. They are installed to the right of the controller and exchange data with the controller over the system backplane.

Remote I/O modules reside in a separate location from Logix 5000 controller.



The 5069-OV16F-SC monitors control information and determines if the controller is commanding a channel to be turned “on”. If a channel is determined to be commanded to be “on,” the 5069-OV16F-SC module provides for an electronic switch to close between the channel output control pin and the LA-pin on the terminal block. The LED display provides an indication of any channel that is commanded to be “on”. The output control signals are current limited. Diagnostics will provide open-load (while in off-state) and short (while in on state) detection.

The Rockwell Automation Logix Designer software also contains an add-on-profile (AOP) that provides a graphical user interface to the module’s features. Before you can use the module, you will need to set up a program within the PLC that configures the module before it is able to be used.

## Section 1.2 Controller Ownership of I/O Modules

For the 5069-OV16F-SC to function In a Logix 5000 control system, a controller must own the module. The controller that owns the output module performs the following functions:

- Stores configuration data for every module that it owns.
- May reside in a location that differs from the module.

- Sends the I/O module configuration data to define module behavior and begin operation in the control system.

You can connect multiple Logix 5000 controllers to the output module.

Conditions for multiple connections are:

<b>NOTE</b> 	<p>If the controller that owns the module configuration changes the configuration, the other controllers are not notified of the changes.</p>
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- The controllers maintain the same configuration.
- The configuration in each controller uses a Data connection to the output module.
- The first controller to make a connection to the output module is the only controller that can change the connection. Therefore, it ‘owns’ the module configuration.
- The controllers that do maintain, but do not ‘own’, the module configurations are similar to Listen-only controllers.
- The difference between the controllers is that the controllers that maintain, but do not own, the module configuration can use a Multicast or Unicast connection over the EtherNet/IP network.

## Section 1.3 Output Specifications

The 5069-OV16F-SC modules have the following output specifications:

### 1.3.1 General Specifications

Parameter	Specification
Outputs	16 Channels (1 group of 16), sinking
Voltage category	12/24 VDC sink
Voltage and current ratings	
MOD Power	75 mA at 18...32 VDC
MOD Power Passthrough, maximum <sup>1</sup>	9.55 A at 18...32 VDC
LA Power	Less than 50 mA quiescent current per module

<sup>1</sup> 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, and EtherNet/IP Communication Modules in Logix 5000 Control Systems User Manual, ENET-UM004.

Parameter	Specification
SA Power Passthrough, maximum <sup>2</sup>	9.95 A at 10...32 VDC
Do not exceed 10 A MOD or SA Power (Passthrough) current draw	
Power dissipation, maximum	4 W (16 channels at 0.5 A)
Thermal dissipation, maximum	13.65 BTU/Hr.
Isolation voltage	250 V (continuous), Basic Insulation Type backplane system to field, tested at 1500 VAC for 60 seconds. No isolation between LA power and output ports No isolation between individual output ports
Module keying	Electronic, module keying, software configurable
Indicators	1 green/red module status indicator 16 yellow/red I/O status indicators
Slot width	1
Dimensions (H×W×D), approx.	144.57 × 22.00 × 105.42 mm (5.69 × 0.87 × 4.15 in.)
DIN rail	Compatible zinc-plated chromate-passivated steel DIN rail. You can use the following DIN rail sizes: EN50022 - 35 × 7.5 mm (1.38 × 0.30 in.) EN50022 - 35 × 15 mm (1.38 × 0.59 in.)
RTB	One of these RTB types: <ul style="list-style-type: none"> <li>• 5069-RTB18-SPRING RTB</li> <li>• 5069-RTB18-SCREW RTB</li> </ul> <p>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.</p>
RTB torque (5069-RTB18-SCREW RTB only)	0.4 N•m (3.5 lb•in)
RTB keying	None
Wire category <sup>3</sup>	2 – output ports 2 – power ports 1 wire per terminal for each signal port
Wire size	

<sup>2</sup> 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, and EtherNet/IP Communication Modules in Logix 5000 Control Systems User Manual, ENET-UM004.

<sup>3</sup> Use this Conductor Category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Parameter	Specification
5069-RTB18-SPRING removable terminal block	0.5...1.5 mm <sup>2</sup> (22...16 AWG) solid or stranded copper wire rated at 105 °C (221 °F), or greater, 2.9 mm (0.11 in.) maximum diameter including insulation
5069-RTB18-SCREW removable terminal block	0.5...1.5 mm <sup>2</sup> (22...16 AWG) solid or stranded copper wire rated at 105 °C (221 °F), or greater, 3.5 mm (0.14 in.) maximum diameter including insulation
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	None (open-style)
North American temp code	T4
ATEX temp code	T4
IECEX temp code	T4

### 1.3.2 Electrical Specifications

Parameter	Specification
On-state voltage, minimum <sup>4</sup>	10 VDC
On-state voltage, nominal <sup>4</sup>	24 VDC
On-state voltage, maximum <sup>4</sup>	32 VDC
On-state voltage drop, maximum <sup>4</sup>	Less than 0.25 VDC
On-state current per channel, min <sup>4</sup>	1 mA
Off-state voltage drop, maximum <sup>4</sup>	5 VDC with 1 mA min load
Off-state leakage current per point, maximum <sup>5</sup>	Less than 0.5 mA per point
Output current rating	0.5 A resistive per point at 10...32 VDC 8 A resistive per module at 10...32 VDC, max
Surge current per point	0.7 A max for 10 ms per point, repeatable every 2 seconds at 60 °C

<sup>4</sup> Local Actuator (LA) Field Power related attributes.

<sup>5</sup> Recommended Loading Resistor - To limit the effects of leakage current through solid-state outputs, you can connect a loading resistor in parallel with your load. For 24 VDC operation, use a 5.6 K $\Omega$ , 0.5 W resistor for transistor operation.

Parameter	Specification								
Load Capacitance, max	<p>1 <math>\mu\text{F}</math> (including 1 nF already internal to module)</p> <p>Load capacitance can increase internal heat dissipation at fast switching speeds. Please derate maximum capacitive load during continuous fast switching periods (time on + time off during PWM type switching) as shown in the following graph:</p> <table border="1"> <caption>Data points from the graph: Load Capacitance derating with fast cycling outputs</caption> <thead> <tr> <th>Maximum Switching Period (ms)</th> <th>Load Capacitance (nF)</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>100</td> </tr> <tr> <td>12</td> <td>450</td> </tr> <tr> <td>24</td> <td>950</td> </tr> </tbody> </table>	Maximum Switching Period (ms)	Load Capacitance (nF)	2	100	12	450	24	950
Maximum Switching Period (ms)	Load Capacitance (nF)								
2	100								
12	450								
24	950								
Output delay time (backplane to screw) <sup>6</sup>									
Time: Off-to-On	Less than or equal to 10 $\mu\text{s}$ , $\pm 3 \mu\text{s}$ at 25 °C at 0.5 A								
Time, On-to-Off	Less than or equal to 10 $\mu\text{s}$ , $\pm 3 \mu\text{s}$ at 25 °C at 0.5 A								
Pulse Width Minimum	20 $\mu\text{s}$ at 0.5 A at 25 °C								
Open load detection diagnostics	Yes (per channel diagnostics) with channel in “off” state								
Output short circuit/overload/over temperature detection	Yes (per channel diagnostics) with channel in “on” state								
LA Field Power Detection	<p>Yes</p> <p>NOTE: Due to the module’s output protection circuitry, if just the LA+ wire is broken at the RTB once the module field power is already powered up, and the loads remain powered, then the module could remain powered through any load resistors of “off” channels.</p>								
Output short circuit/overload protection	Yes (Outputs not fused; electronically protected from over-currents; 1.15 A typical threshold)								

<sup>6</sup> Using 24 V Supply with resistive load.

Parameter	Specification
Reverse voltage protection	Yes
Overvoltage protection	36 V
Fusing	4 A fuse-protected on LA+; This is a non-replaceable fuse
Intended use (per UL61010-2-201)	DC Pilot Duty (0.7 A inrush or DC-13 equivalent), DC general, and DC resistive, 0.5 A steady state per channel at 10 . . 32 VDC

### 1.3.3 Environmental Specifications

Environmental Tests	Test Level
Temperature, operating IEC 60068-2-1 (Test Ab, Operating Cold), IEC 60068-2-2 (TestBb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Operating Thermal Shock)	0°C ...60 °C (32°F ...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°C ...+85 °C (-40°F ...+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 at 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
Operating Altitude (max)	2000 meters (6561 feet)
Pollution Degree	2

### 1.3.4 EMC Specification Table

EMC Tests	Test Level
Emissions	IEC 61000-6-4
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges

EMC Tests	Test Level
Radiated RF immunity IEC 61000-4-3	10 V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10 V/m with 200 Hz 50% pulse 100% AM at 900 MHz 10 V/m with 200 Hz 50% pulse 100% AM at 1890 MHz 3 V/m with 1 kHz sine-wave 80% AM from 2000...6000 MHz
EFT/B immunity IEC 61000-4-4	±4 kV at 5 kHz on power ports ±3 kV at 5 kHz on output 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 output ports
Conducted RF immunity IEC 61000-4-6	10 VRMS with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz
Voltage variation IEC 61000-4-29	10 ms interruption on MOD power port
Emissions	IEC 61000-6-4

### 1.3.5 Regulatory Table

Certification <sup>7</sup>	Industry Standard
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada.
CE	European Union 2014/30/EU EMC Directive, compliant with: <ul style="list-style-type: none"> <li>• EN 61326-1; Meas./Control/Lab., Industrial Requirements</li> <li>• EN 61000-6-2; Industrial Immunity</li> <li>• EN 61000-6-4; Industrial Emissions</li> <li>• EN 61131-2; Programmable Controllers (Clause 8, Zone A &amp; B)</li> </ul> European Union 2014/35/EU, compliant with: <ul style="list-style-type: none"> <li>• EN 61010-2-201; Control Equipment Safety Requirements</li> </ul>

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<sup>7</sup> When marked.

Certification <sup>7</sup>	Industry Standard
UKCA	EMC Regulations 2016, compliant with: <ul style="list-style-type: none"> <li>• BS EN 61326-1; Meas./Control/Lab., Industrial Requirements</li> <li>• BS EN 61000-6-2; Industrial Immunity</li> <li>• BS EN 61000-6-4; Industrial Emissions</li> <li>• BS EN 61131-2; Programmable Controllers (Clause 8, Zone A &amp; B)</li> </ul> Electrical Equipment (Safety) Regulations 2016, compliant with: <ul style="list-style-type: none"> <li>• BS EN 61010-2-201; Control Equipment Safety Requirements</li> </ul> Equipment and Protective systems Intended for use in Potentially Explosive Atmospheres Regulations 2016, compliant with: <ul style="list-style-type: none"> <li>• BS EN 60079-0; General Requirements</li> <li>• BS EN 60079-7; Potentially Explosive Atmospheres, Protection "ec" II 3 G Ex ec IIC T4 Gc</li> </ul>
ROROC	Arrêté ministériel n° 6404-15 du 29 ramadan 1436 (16 juillet 2015) NM EN 61131-2, NM EN 61000-6-4, NM EN 61000-6-2
Ex (ATEX)	European Union 2014/34/EU ATEX Directive, compliant with: <ul style="list-style-type: none"> <li>• EN 60079-0; General Requirements</li> <li>• EN 60079-7; Potentially Explosive Atmospheres, Protection "ec"</li> <li>• II 3 G Ex ec IIC T4 Gc</li> </ul>
IECEX	IECEX System, compliant with: <ul style="list-style-type: none"> <li>• IEC 60079-0; General Requirements</li> <li>• IEC 60079-7; Potentially Explosive Atmospheres, Protection "ec"</li> <li>• II 3 G Ex ec IIC T4 Gc</li> </ul>

## Section 1.4 Hardware Features

The module has 16 LEDs for indicating the output status for each of the channels, and an LED that indicates module status.

### 1.4.1 LED Operation

The circuit board contains a bicolor red/green module status LED. The bicolor LED is forced Red on power-up until it is controlled by the firmware. It is used to indicate the health of the product.

In addition, there are 16 bicolor red/yellow LEDs that indicate the output status for each of the 16 channels:

- When the channel LED is steady yellow, it means the channel is turned on.
- When the channel LED is off, it means the channel is turned off or no module power is applied.
- The Red LED is driven on by the MCU to indicate a fault, if defined, for that output. It may not be steady on. When the LED is flashing red, it means there is a no load, short circuit condition, or a field power loss condition.

The module uses the top, bicolor red/green Module Status LED to indicate the status of the module.

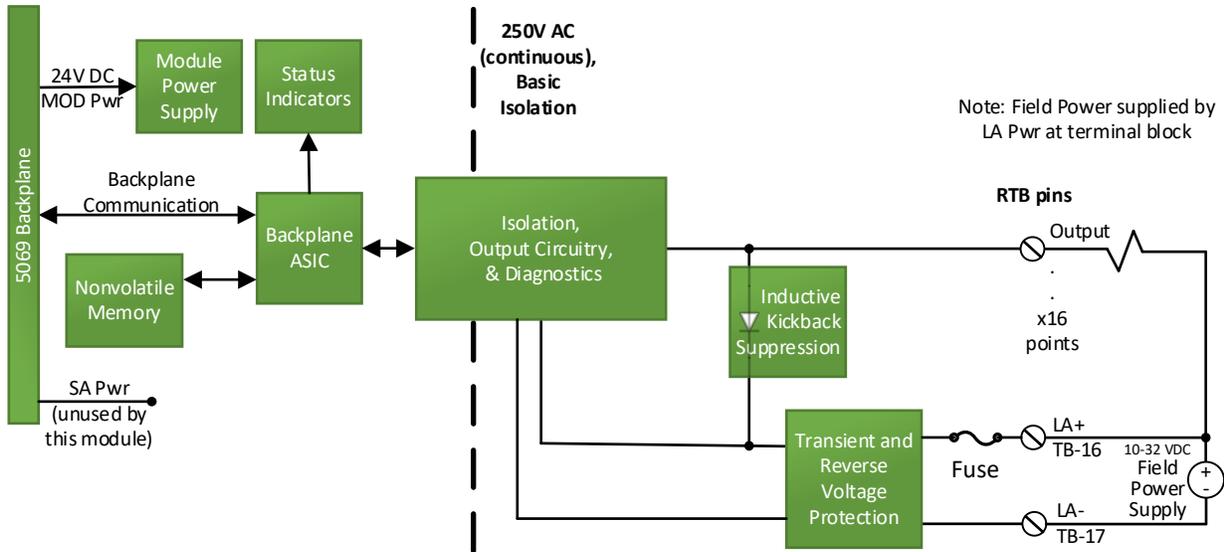
The table below summarizes the Module Status LED states:

<b>Module State:</b>	<b>Module Status LED State:</b>	<b>Comments:</b>
The module is not powered.	Off	Confirm that the system is powered.
The module has a connection to the owner controller and is operating normally.	Steady Green	None.
The module does not have a connection to the controller. A connection can result from missing, incomplete, or incorrect module configuration.	Flashing Green	Troubleshoot your Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.
The module experienced a nonrecoverable fault.	Steady Red	Cycle power to the module.
One of the following conditions exists: <ul style="list-style-type: none"> <li>• A module firmware update is in progress.</li> <li>• A module firmware update attempt failed.</li> <li>• The device has experienced a recoverable fault.</li> <li>• A connection to the module has timed out.</li> </ul>	Flashing Red	<ul style="list-style-type: none"> <li>• Let the firmware update progress complete.</li> <li>• Re-attempt a firmware update after one fails.</li> <li>• Use the Logix Designer application to determine the cause of the module fault.</li> </ul> The Connection and Module Info categories of the module's configuration indicate the fault type.

### Section 1.5 System Overview and Module Operation

The 5069-OV16F-SC modules are expected to operate indefinitely with periodic shut-downs for maintenance. The module may operate attended or unattended. There are no backup or recovery operations requiring data storage and/or remote programming of the product.

Block diagram:





# Chapter 2

## Installation and Wiring

This chapter will cover:

- Compliance to European union directives
- Power requirements
- General considerations
- Mounting

### Section 2.1 Compliance to European Union Directives

This product is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

The 5069-OV16F-SC module is tested to meet Council Directive 2014/30/EU Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 61131-2 Programmable controllers, Part 2 – Equipment requirements and tests.
- EN 61000-6-2 Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments.
- EN 61000-6-4 Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments.

UKCA Electromagnetic Compatibility Regulations 2016

- BS EN 61131-2, BS EN 61000-6-4, BS EN 61000-6-2

This product is intended for use in an industrial environment.

#### 2.1.1 ATEX Directive

This product is tested to meet Council Directive 2014/30/U/ATEX, and the following standards, in whole or in part, documented in a technical construction file:

- EN 60079-0 Explosive atmospheres – Part 0: Equipment – General requirements.
- EN 60079-7 Explosive atmospheres – Part 7: Equipment protection by increased safety "e".

This module also meets the standards for the United Kingdom Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016:

- BS EN 60079-0
- BS EN 60079-7

### 2.1.2 Conformal Coating Standard

The conformally coated versions of the module meet or exceed the ANSI/ISA 71.04.2013 G3 Environment standard.

## Section 2.2 Power Requirements

### 2.2.1 External power supply limitations

MOD Power, the power supply voltage, is 24 VDC nominal. It is required by the controller and passed down the line. The maximum amount of power that can be supplied from the controller is a maximum of 150 VA, or a current maximum of around 5 A. Surge/Inrush current requirements are that the 24 V surge current will not exceed 500 mA.

A second 24 VDC power supply is provided via the backplane to run the field side circuitry on some modules, referred to as the Sensor/Actuator Power Supply (SA Power). The field side circuitry on this OV16F module does not draw from that supply.

Field side, Local Actuator (LA) power must be provided by the customer. Customers are not limited to Class 2 power. However, the customer must take into account that the module is designed to limit inrush current to 2.5 A, repeatable once a second.

A single row, 18-pin, removable terminal block is used to connect between the edge fingers of the 5069-OV16F-SC PCB and the 5069 backplane. The available RTB connection types are screw terminal or spring cage clamp.

MP: 75 mA at 18 to 32 VDC.

LA: 8 A at 10 to 32 VDC.

OUT: 10 to 32 VDC, 0.5 A.

## Section 2.3 Removable Terminal Block and Housing

The module mounts in a Compact 5000 chassis and uses a Removable Terminal Block (RTB) to connect all field-side wiring. RTBs are not included with your purchase.

When ordering RTBs, specify Allen Bradley Part Number:

- 5069-RTB-18 Spring RTB
- 5069-RTB-18 Screw RTB

You receive the following components with your RTB:

- The specified RTB housing.
- A generic RTB door label.

Use these components in all module applications.

## Section 2.4 General Considerations

The 5069-OV16F-SC modules 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<sup>8</sup>).

### 2.4.1 Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following **WARNING** statement applies to use in hazardous locations.

<p><b>WARNING</b></p> 	<p><b>EXPLOSION HAZARD</b></p> <ul style="list-style-type: none"> <li>• Substitution of components may impair suitability for Class I, Division 2; Class II, Division 2. Do not replace components or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.</li> <li>• Do not connect or disconnect components unless power has been switched off or the area is known to be non-hazardous.</li> <li>• This product must be installed in an enclosure.</li> <li>• All wiring must comply with N.E.C. article 501-4(b), 502-4(b), or 503-3(b), as appropriate for Class I, Class II, and Class III equipment.</li> <li>• These DC-type modules <b>MUST</b> be installed on an SA power bus that is separated from an SA power bus containing AC-type modules.</li> </ul>
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### 2.4.2 Prevent Electrostatic Discharge

<p><b>WARNING</b></p> 	<p>Electrostatic discharge can damage integrated circuits or semiconductors if you touch the module card bus connector pins or the terminal block on the output module. Follow these guidelines when you handle the module:</p> <ul style="list-style-type: none"> <li>• Touch a grounded object to discharge static potential.</li> <li>• Wear an approved wrist-strap grounding device.</li> <li>• Do not touch the bus connector or connector pins.</li> <li>• Do not touch circuit components inside the module.</li> <li>• If available, use a static-safe workstation.</li> <li>• When it is not in use, keep the module(s) in a static-shield bag.</li> </ul>
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<sup>8</sup> Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

### 2.4.3 Remove Power

<p><b>WARNING</b></p> 	<p><b>This module is NOT designed to be hot-swapped and may be damaged if added or removed while power is applied. Remove power before removing or inserting this module.</b></p> <p>When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:</p> <ul style="list-style-type: none"><li>• Sending an erroneous signal to your system's field devices, causing unintended machine motion.</li><li>• Causing an explosion in a hazardous environment.</li><li>• Causing an electrical arc. Electrical arcing causes excessive wear to contacts on both the module and its mating connector and may lead to premature failure.</li></ul>
---	---

### 2.4.4 Selecting a Location

#### Reducing Noise

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference. Group your modules to minimize adverse effects from radiated electrical noise and heat. Consider the following conditions when selecting a location for the analog module. Position the module:

- Away from sources of electrical noise such as hard-contact switches, relays, and AC motor drives.

In addition, route wiring away from any high-voltage I/O wiring.

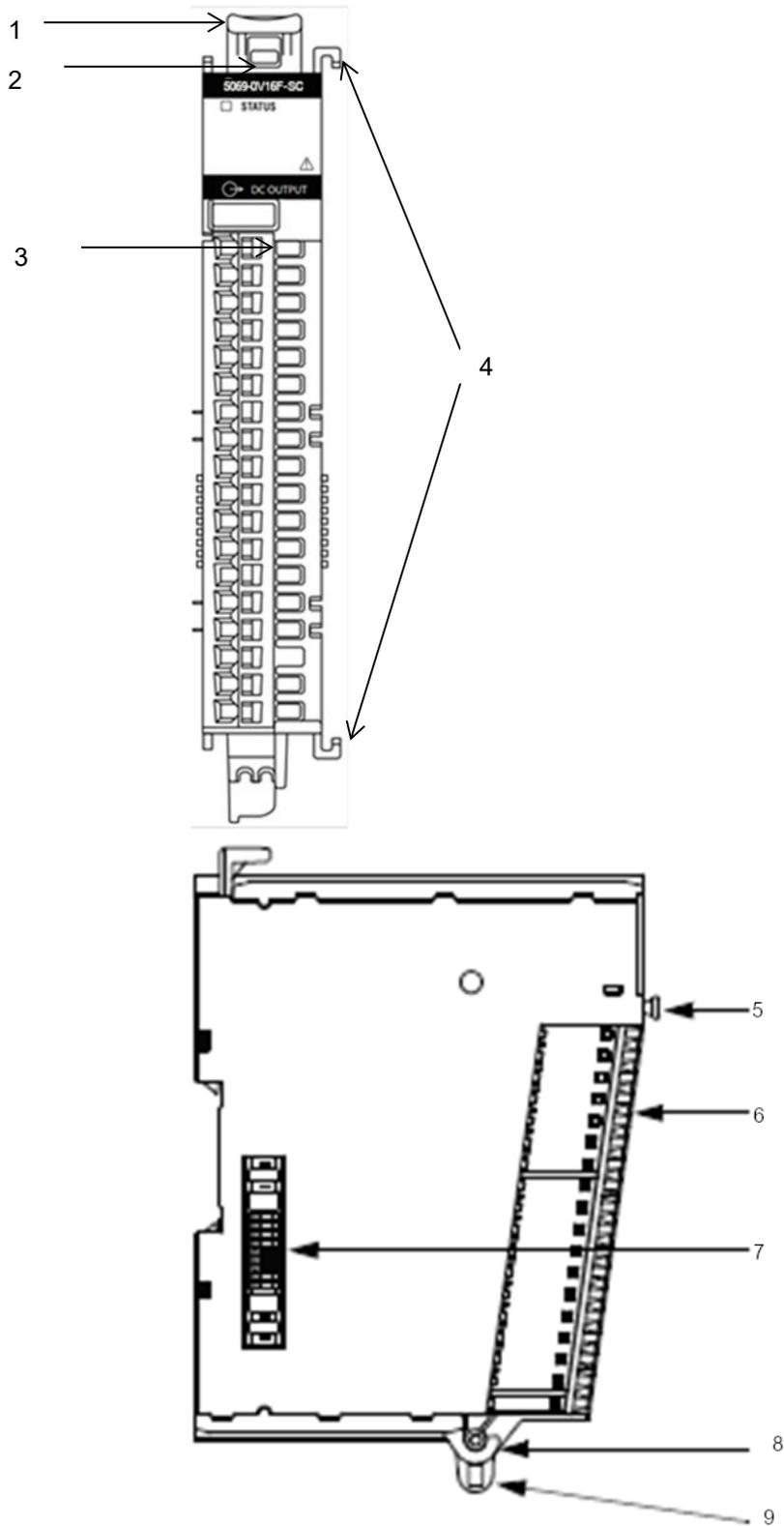
## Section 2.5 Mounting

<p><b>WARNING</b></p> 	<p>Keeping module free of debris and avoiding overheating:</p> <ul style="list-style-type: none"><li>• Do not remove protective debris strip until after the module and all other equipment near the module is mounted and the wiring is complete.</li><li>• Once wiring is complete, and the module is free of debris, carefully remove protective strip.</li><li>• Failure to remove strip before operating can cause overheating.</li></ul>
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### 2.5.1 Parts List

Your package contains one Compact 5000 I/O 5069-OV16F-SC Module and one Quick Start Guide.

### 2.5.2 Module Description



	Item	Description
1	DIN rail mounting latch	Locks the module on the DIN rail.
2	Module and power status indicators	Standard modules: <ul style="list-style-type: none"> <li>• STATUS - Displays the status of communication and module health.</li> <li>• LA Field Power is shown by the I/O status indicators blinking.</li> <li>• SA - Displays whether SA power is applied to the module.</li> </ul>
3	I/O status indicators	Displays the status of the input/output point and LA Field Power.
4	Interlocking pieces	Securely installs Compact 5000 I/O digital modules in the system.
5	RTB handle	Anchors the RTB on the module.
6	RTB	Provides a wiring interface for the module.
7	MOD power bus and SA power bus connectors	Pass system-side and field-side power across the internal circuitry of the module in a Compact 5000 I/O system. The connectors are isolated from each other.
8	RTB lower tab	Hooks RTB onto the module to begin installation.
9	Lower hook	Used with cable tie after you wire the module.

You can choose to wire the expansion I/O module before installing it next to the controller or wire it once the module is secured in place.

Place the module next to the controller against the panel where you are mounting it. Make sure the controller and module are spaced properly.

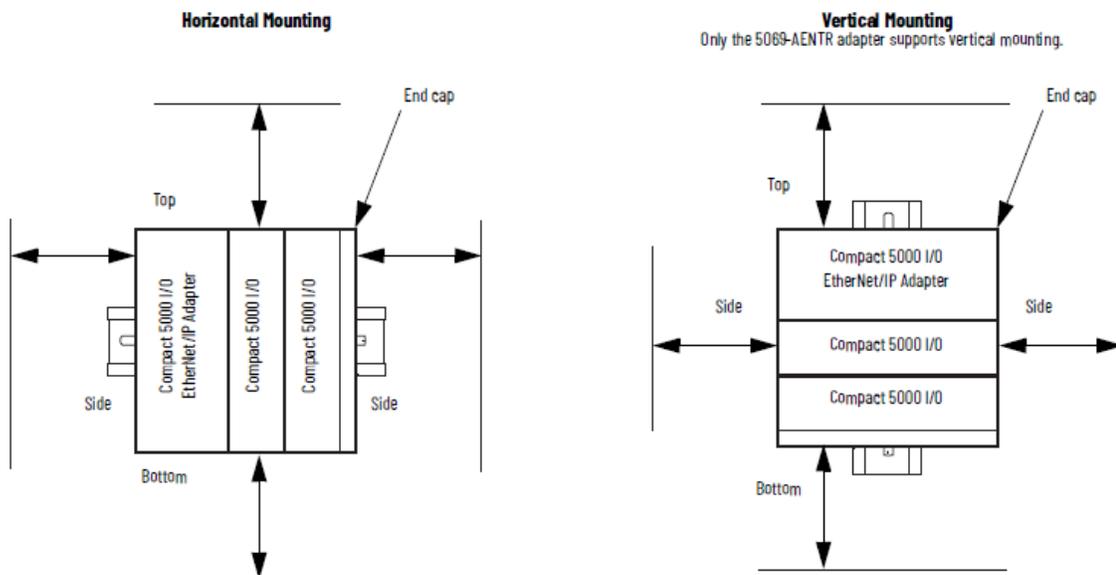
<p><b>WARNING</b></p> 	<ul style="list-style-type: none"> <li>• This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbance.</li> <li>• Be careful when stripping wires. Wire fragments that fall into the controller could cause damage. Once wiring is complete, make sure the controller is free of all metal fragments before removing the protective debris strip.</li> <li>• Do not wire more than 2 conductors on any single terminal.</li> <li>• If you insert or remove the expansion I/O module while 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.</li> </ul>
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<p><b>NOTE</b></p> 	<p>The module expansion may only be mounted horizontally and vertically. To mount vertically you need to use a 5069-AENTR adapter. When mounting this module vertically, the operating ambient temperature in the AENTR document states the temperature must be derated to 42 °C (108 °F).</p>
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### Mounting Dimensions and DIN Rail Mounting

The minimum distances on all sides of the adapter system are as follows:

- 25.40 mm (1.00 in) - If the system uses only Compact 5000 I/O standard modules.
- 50.80 mm (2.00 in) - If the system uses at least one Compact 5000 I/O safety module.



You can install the module on DIN rails of dimension 35 mm × 7.5 mm × 1 mm (EN 50 022-35 × 7.5) or EN50022 - 35 × 15 mm (1.38 × 0.59 in.)

<p><b>WARNING</b></p> 	<p><b>Hazard of intermittent grounding.</b></p> <p>This product is grounded through the DIN rail to chassis ground. To assure proper grounding, use zinc-plated, yellow-chromate steel DIN rail. Using other DIN rail materials such as aluminum or plastic, that can corrode, oxidize, or are poor conductors, may result in improper or intermittent grounding.</p> <p>Use the correct DIN rail type, and secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.</p>
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1. Before mounting the module on a DIN rail, use a flat-bladed screwdriver in the DIN rail latch and pry it downwards until it is in the unlatched position.

2. Hook the top of the DIN rail mounting area of the module onto the DIN rail, and then press the bottom until the module snaps onto the DIN rail.
3. Push the DIN rail latch back into the latched position. Use DIN rail end anchors for vibration or shock environments.

### 2.5.3 Installing a Local I/O Module

To install a local module:

<p><b>WARNING</b></p> 	<p>The end cap in a CompactLogix 5380, CompactLogix 5480, or Compact GuardLogix 5380 control system covers the exposed interconnection on the last module on the DIN rail.</p> <p>If you do not install an end cap on the last module on the DIN rail, injury to personnel or damage to equipment may occur.</p>
---	--

1. Install a Compact GuardLogix 5380 controller.
2. Install the digital I/O module(s) to the right of the controller.
3. Install the end cap on the last module in the local system.

### 2.5.4 Remote I/O Modules

To install a remote module:

<p><b>WARNING</b></p> 	<p>The end cap in a CompactLogix 5380, CompactLogix 5480, or Compact GuardLogix 5380 control system covers the exposed interconnection on the last module on the DIN rail.</p> <p>If you do not install an end cap on the last module on the DIN rail, injury to personnel or damage to equipment may occur.</p>
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1. Install a controller that is compatible with the remote Compact 5000 I/O digital modules to be used in the application via an EtherNet/IP network.
2. Install an EtherNet/IP network.
3. Connect the controller to the network.
4. Install a Compact 5000 I/O EtherNet/IP adapter.
5. Connect the adapter to the network.
6. Install the 5069 module to the right of the adapter.
7. Install the end cap on the last module in the local system.
8. For information on how to install compatible controllers, adapters, and Compact 5000 I/O modules, see the publications that are listed earlier in this manual.

### 2.5.5 How Power Flows Through the Modules

Compact 5000 I/O digital modules receive the following power types from first component in the system, that is, the controller or adapter.

- LA power is external to the module.

- SA is internally routed field-side power.
- MOD power is for the module and communications through the backplane.

#### System-side Versus Field-side Power:

- System-side Power. Powers the system and lets modules transfer data and execute logic.

System-side power is provided through the Module (MOD) Power connector and is passed to each module as it is added to the system. System-side power is also known as **MOD power**.

- Field-side Power. Powers field-side devices that are connected to some Compact 5000 I/O digital modules.

Field-side power is provided through the Sensor/Actuator (SA) Power connector and is passed to each module as it is added to the system.

Field-side power is also known as **SA power**.

Power begins at the leftmost device in the system and passes across the I/O module internal circuitry via power buses. The MOD power bus and SA power buses are isolated from each other. The leftmost device is either a controller or an EtherNet/IP adapter.

Remember the following:

- A system has only one MOD power bus.
- A system can have multiple SA power buses. The first SA power bus typically starts at the controller or adapter, and 5069-FPD field potential distributors let you establish new SA power buses in the same system.
- Compact GuardLogix 5380 controllers only:
  - You must use an SELV/PELV-listed power supply to provide MOD power and SA power to the controller.

### 2.5.6 Wiring Diagram

The RTB pins are identified by numbers that are raised above the surface of the RTB adjacent the screw or slot.

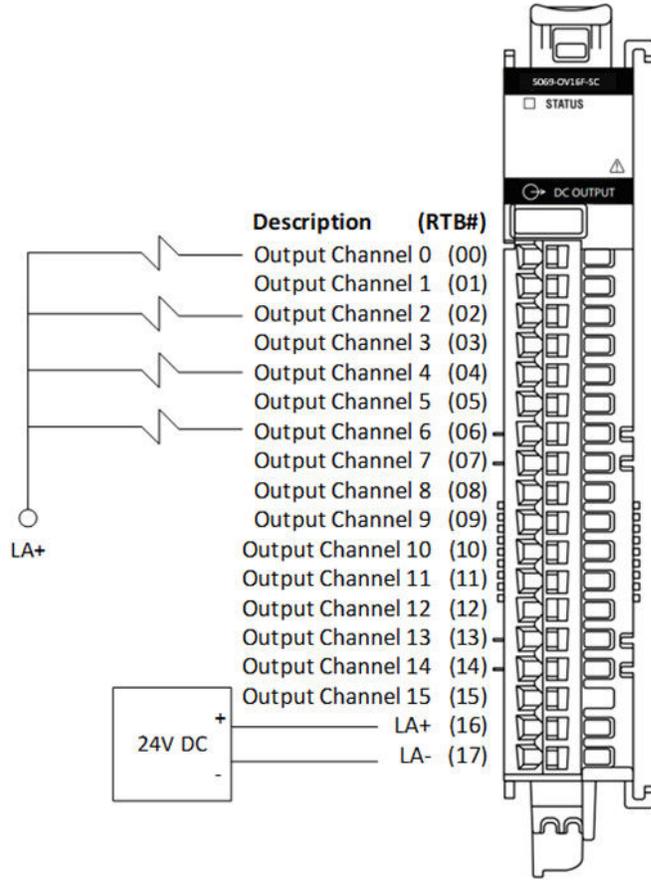
The RTB allows the connection of the digital sinking outputs and the field power.

**Channel Connections**

The diagram shows devices that are connected to channels 0, 2, 4, and 6. You are not restricted to using only those channels. You can connect devices to any channel or combination of channels as needed.

**Important**

The Local Actuator (LA+ and LA-) connections are used to supply field-side power to the module. The module does not draw current from the SA power that is internal to the system.



Wire the module using the images, which explain the layout of the 18-pin terminal block, and the two, 24 VDC LA Power field power terminal pins for the 5069-OV16F-SC module:

RTB#	Name	Description
0	Output Channel 0	Channel 0 Output
1	Output Channel 1	Channel 1 Output
2	Output Channel 2	Channel 2 Output
3	Output Channel 3	Channel 3 Output
4	Output Channel 4	Channel 4 Output
5	Output Channel 5	Channel 5 Output
6	Output Channel 6	Channel 6 Output
7	Output Channel 7	Channel 7 Output
8	Output Channel 8	Channel 8 Output
9	Output Channel 9	Channel 9 Output
10	Output Channel 10	Channel 10 Output
11	Output Channel 11	Channel 11 Output
12	Output Channel 12	Channel 12 Output

<b>RTB#</b>	<b>Name</b>	<b>Description</b>
13	Output Channel 13	Channel 13 Output
14	Output Channel 14	Channel 14 Output
15	Output Channel 15	Channel 15 Output
16	LA+ (16)	LA 24 VDC Positive
17	LA- (17)	LA 24 VDC Negative

# Chapter 3

## Configuring the 5069-OV16F-SC Using Studio 5000

This chapter covers the following subjects:

- System Introduction.
- Controller Ownership of I/O Modules.
- Configuration Changes in a Standard Input Module with Multiple Owners.
- How to use Studio 5000 to configure the Module.
- Software Versioning.
- System Updates.
- System Functions.

### Section 3.1 System Introduction

You use Studio 5000 software (v. 28 and above) to configure the 5069-OV16F-SC Modules. Your controller firmware must be at v.28 and above as well. The software provides a module-specific Add-On Profile (AOP) to operate the module. Before you begin installing your module, you need to have completed the system installation steps in Chapter 2 so that you have a working system with either a local I/O module or a remote I/O installed. Other conditions must also be met, as explained in the following sections.

### Section 3.2 Controller Ownership of I/O Modules

For the 5069-OV16F-SC to function in a Studio 5000 control system, a controller must own the module. The controller may reside in a different location from the module. The controller that owns the output module performs the following functions:

- Stores configuration data for every module that it owns.
- Sends the I/O module configuration data to define module behavior and begin operation in the control system.

You can connect multiple Logix 5000 controllers to the output module.

Conditions for multiple connections are:

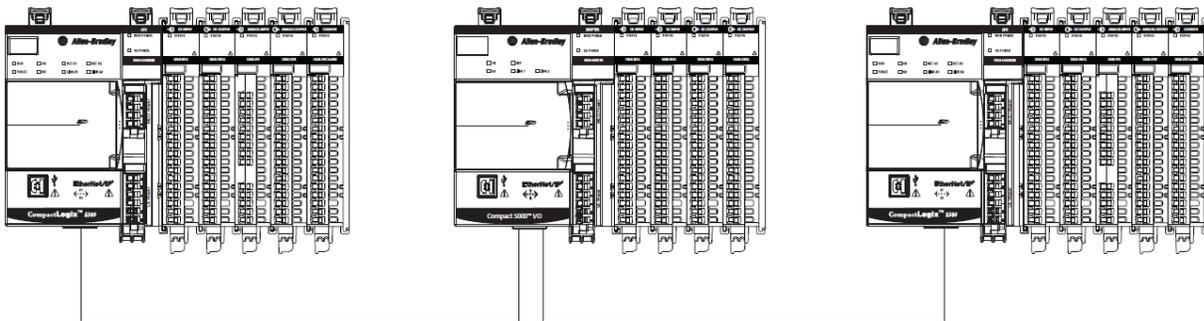
<p><b>NOTE</b></p> 	<p>If the controller that owns the module configuration changes the configuration, the other controllers are not notified of the changes.</p>
--	---

- The controllers maintain the same configuration.
- The configuration in each controller uses a **Data** or a **Data with Events** connection to the output module.
- The first controller to make a connection to the output module is the only controller that can change the connection. Therefore, it ‘owns’ the module configuration.
- The controllers that do maintain, but do not ‘own’, the module configuration are similar to Listen-only controllers.
- The difference between the controllers is that the controllers that maintain, but do not own, the module configuration can use a Multicast or Unicast connection over the EtherNet/IP network.

### Section 3.3 Configuration Changes in a Standard Output Module with Multiple Owners

Exercise caution when changing the configuration data of an output module in a multiple-owner scenario. If the configuration data is changed in owner A and sent to the module, the changed configuration data is accepted as the new configuration for the module. Owner B continues to listen unaware that any changes have been made in the behavior of the output module, as illustrated.

#### Module Configuration Changes with Multiple Owners



Controller A sends new configuration to the module.

Controller B is unaware of any configuration changes.

**NOTE**

A message in the Logix Designer application alerts you to the possibility of a multiple owner-controller situation and lets you inhibit the connection before changing the module configuration. When changing the configuration for a module with multiple owners, we recommend that you inhibit the connection.

To help prevent other owner-controllers from receiving potentially erroneous data, use the following steps when changing the configuration of a module in a multiple owner scenario while online.

1. For each owner-controller, inhibit the connection to the module either in the software on the Connection tab or the message dialog box warning you of the multiple owner condition.
2. Make the appropriate configuration data changes in the software.  
For more information on how to use the Logix Designer application to change the configuration, refer to the Compact 5000 I/O Analog Modules User Manual, PN 5069-UM005.
3. Repeat step 1 and step 2 for all owner-controllers, to make the exact same changes in each.
4. Clear the Inhibit checkbox in each owner-controller configuration.

### **Section 3.4 Before You Configure the Module**

You must create a Logix Designer application project for the controller that owns the Compact 5000 I/O digital modules. The project includes module configuration data for the module.

The Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the I/O modules either across the backplane or over an EtherNet/IP network.

The I/O modules can operate immediately after receiving the configuration data.

#### **3.4.1 Connections with Compact 5000 I/O Digital Modules**

During module configuration, you must define the module. Among the Module Definition parameters with Compact 5000 I/O digital modules, you must choose a connection type for the module. A connection is a real-time data transfer link between the owner-controller and the module that occupies the slot that the configuration references. When you download the module configuration to a controller, the controller attempts to establish a connection to each module in the configuration. Because part of module configuration includes a slot number in the local or remote system, the owner-controller checks for the presence of a module there. If a module is detected, the owner-controller sends the configuration.

One of the following occurs:

- If the configuration is appropriate to the module detected, a connection is made, and operation begins.

- If the configuration is not appropriate to the module detected, the data is rejected, and the Logix Designer application indicates that an error occurred.
- The configuration can be inappropriate for many reasons. For example, a mismatch in electronic keying that helps prevent normal operation.

The owner-controller monitors its connection with a module. Any break in the connection, for example, the loss of power to the system, causes a fault. The Logix Designer application monitors the fault status tags to indicate when a fault occurs on a module.

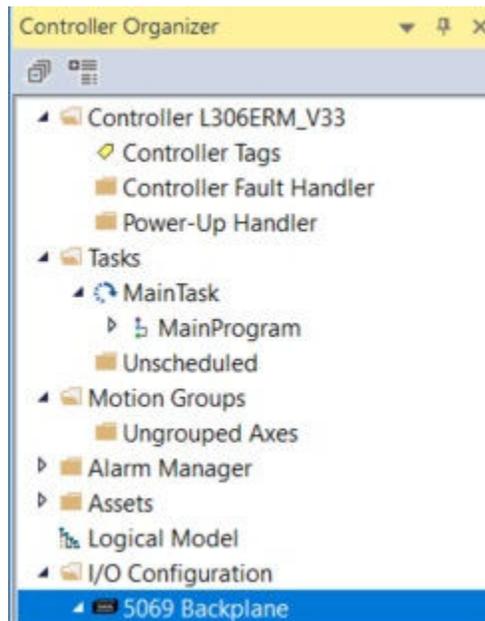
### Section 3.5 Configuring the Module with Studio 5000

Before you start, if needed, install the latest version of Rockwell Automation's Studio 5000.

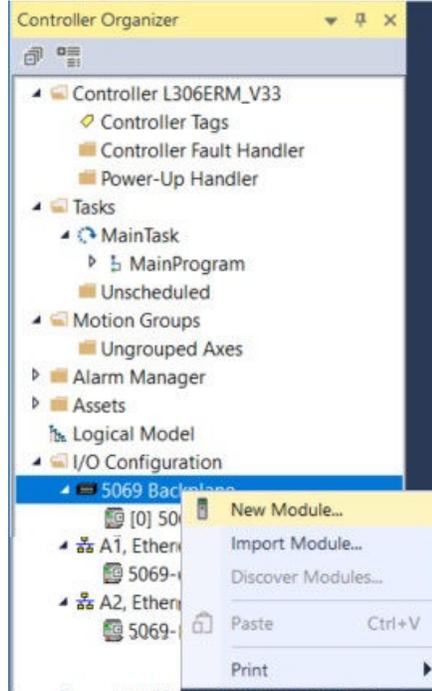
You use the module's AOP to operate your module. The AOP is available in the Studio 5000 software from version 28. If the AOP is not available, or a newer revision is released, see Appendix A about how to manually import the module AOP to Studio 5000.

To install a local module, that is, one that is installed on the same DIN rail as the controller:

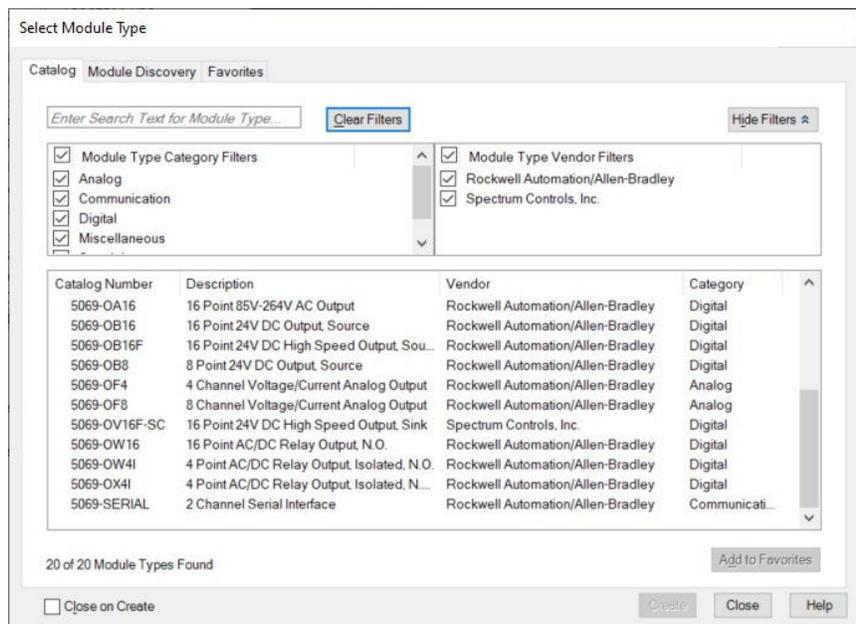
1. If needed, install a current copy of the correct AOP software. If this is not available, install a generic module and modify it instead.
2. Start up your Studio 5000 software.
3. In the Controller Organizer panel, select the **5069 Backplane** in which you have already physically installed the new module:



- Right click on the selected backplane or controller, and from the popup menu, select **New Module**:



The Select Module Type dialog appears:



- You can filter to reduce the number of modules in the Catalog Number list by selecting the **Digital** category.

You can also just scroll down the list of Catalog Numbers to locate the 5069-OV16F-SC type of module:

Catalog Number	Description	Vendor	Category
5069-OA16	16 Point 85V-264V AC Output	Rockwell Automation/Allen-Bradley	Digital
5069-OB16	16 Point 24V DC Output, Source	Rockwell Automation/Allen-Bradley	Digital
5069-OB16F	16 Point 24V DC High Speed Output, Sou...	Rockwell Automation/Allen-Bradley	Digital
5069-OB8	8 Point 24V DC Output, Source	Rockwell Automation/Allen-Bradley	Digital
5069-OF4	4 Channel Voltage/Current Analog Output	Rockwell Automation/Allen-Bradley	Analog
5069-OF8	8 Channel Voltage/Current Analog Output	Rockwell Automation/Allen-Bradley	Analog
5069-OV16F-SC	16 Point 24V DC High Speed Output, Sink	Spectrum Controls, Inc.	Digital
5069-OW16	16 Point AC/DC Relay Output, N.O.	Rockwell Automation/Allen-Bradley	Digital
5069-OW4I	4 Point AC/DC Relay Output, Isolated, N.O.	Rockwell Automation/Allen-Bradley	Digital
5069-OX4I	4 Point AC/DC Relay Output, Isolated, N...	Rockwell Automation/Allen-Bradley	Digital
5069-SERIAL	2 Channel Serial Interface	Rockwell Automation/Allen-Bradley	Communicati...

- To configure the module for addition to the 5069 backplane, select the entry and click **Create**.

A listing for the selected module appears in the Controller Organizer tree and the following New Module dialog appears:

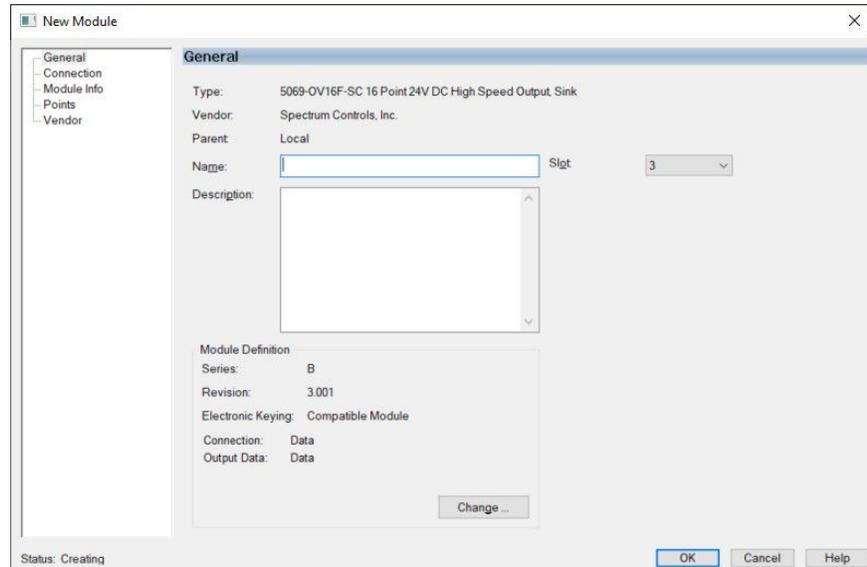
There are five categories to review and/or configure:

- **General.** Provides module identity information.
- **Connection.** Lists options for specifying data connection speeds and related settings.
- **Module Info.** Displays module and status information about the module when the project is online.
- **Points.** Lists the configuration options available for each point so that you can configure the associated point parameters.
- **Vendor.** Identifies the device manufacturer.

### 3.5.1 Specifying General Options

The General option provides the module identity information.

1. To define, access the General dialog:



2. View or specify the following options:

- **Type:** Identifies the general type of the product. Example: **5069-OV16F-SC 16 Point 24V DC High Speed Output, Sink**. Not editable.
- **Vendor.** Lists the device manufacturer. Example: **Spectrum Controls, Inc.** Not editable.
- **Parent.** Displays the name of the parent module. If the module is in the local chassis, Local displays. Example: **Local**.
- **Name.** The name of the controller. The name must be IEC\_61131 compliant. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character. You cannot change the name when online. Example: **OV16F**.
- **Description.** Provides a text box for you to enter descriptive information about the module and/or system.
- **Slot.** Specifies the slot number where the module resides. Only slots between 1 and the maximum number of I/O modules are valid depending on the platform. When the module is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.
- **Module Definition.** Provides the following information:
  - **Series.** List series of module.
  - **Revision.** A value that represents the functional capabilities (Major) and behavior changes (Minor) to a device. Example: **3.001**.

- **Electronic keying.** This option prevents the inadvertent connection to a module of the wrong type. The following fields are checked for either an exact match, or a compatible match:

- ✦ Vendor.
- ✦ Product Type.
- ✦ Catalog Number.
- ✦ Major Revision.
- ✦ Minor Revision.

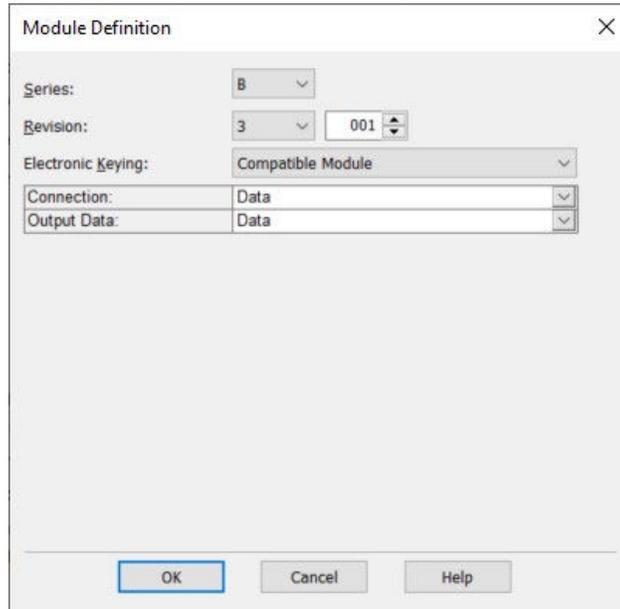
During initial module configuration, select one of the following keying options:

- ✦ *Exact Match.* All of the listed parameters must exactly match, or the newly installed module will reject the connection.
- ✦ *Compatible Module.* The following fields may match as follows:
  - Major revision. Field does not need to match as long as the module in the chassis is greater than, or equal to, the software's configuration's major revision.
  - Minor revision. Field of the physical module must be equal to, or greater than, the one specified in the software.

<p><b>DANGER</b></p> 	<p>Hazard of personnel death or injury, damage to property, or economic loss if keying is disabled.</p> <p>Disabling keying could lead to a module being incorrectly connected to a programmable logic controller, resulting in loss of connection and/or improper controller function.</p> <p>When using this feature, exercise extreme caution.</p>
--	---

- ✦ *Disable Keying.* When selected, the controller employs no keying to check whether it is connected to a compatible module.
- **Connection.** The **Data** option determines that only data is transferred between the module and the controller. Not editable.
- **Output Data.** Specifies the connection type which creates all controller tags specific to the module type being used. Options are:
  - ✦ *Data.* Data with individual Boolean member.
  - ✦ *Scheduled Data.* Specifies time-scheduled data. For information about how this works, see Use a MAOC Instruction with Standard, later in this chapter.
  - ✦ *Packed Data.* Concise data format for integer access.

To change any of the data selections in the Module Definition options, click **Change** and make new selections from the Module Definition dialog:



When finished, to save your changes and return to the previous dialog, click **OK**.

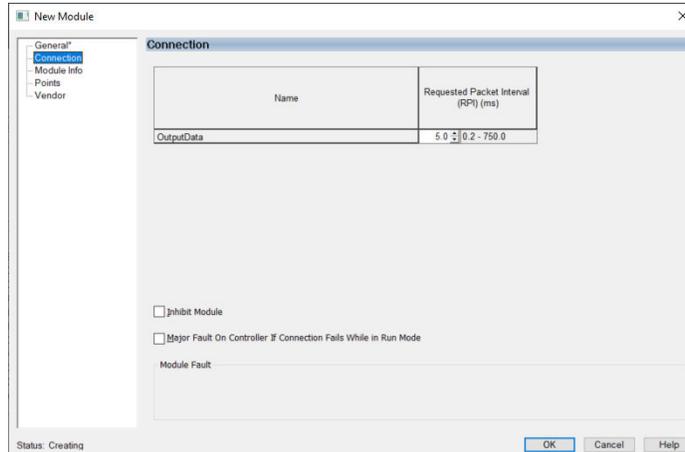
- **Status.** Displays the status of the module:
  - Standby. A transient state that occurs when shutting down the connection to the module.
  - Faulted. The controller is unable to communicate with the module. When the status is Faulted, the Connection tab displays the fault.
  - Validating. A transient state that occurs before connecting to the module.
  - Connecting. A state that occurs when establishing a connection with the module.
  - Running. The module is communicating, and everything is working as expected.
  - Shutting down. The connections to the module are closing.
  - Inhibited. The connection to the module is inhibited.
  - Waiting. A connection to this module was not made because:
    - ✦ Its parent has not yet made a connection to it.
    - ✦ Its parent is inhibited.
    - ✦ Its parent is faulted.
  - Offline. You are not online with the controller.
- **OK.** Selects dialog choices and/or changes.
- **Cancel.** Cancels changes made to the dialog.
- **Apply.** Applies changes made to the dialog to the selected module.

- **Help.** Opens the module's online help.

### 3.5.2 Specifying Connection Options

Connection options set up connection parameters.

1. Access the Connection dialog:



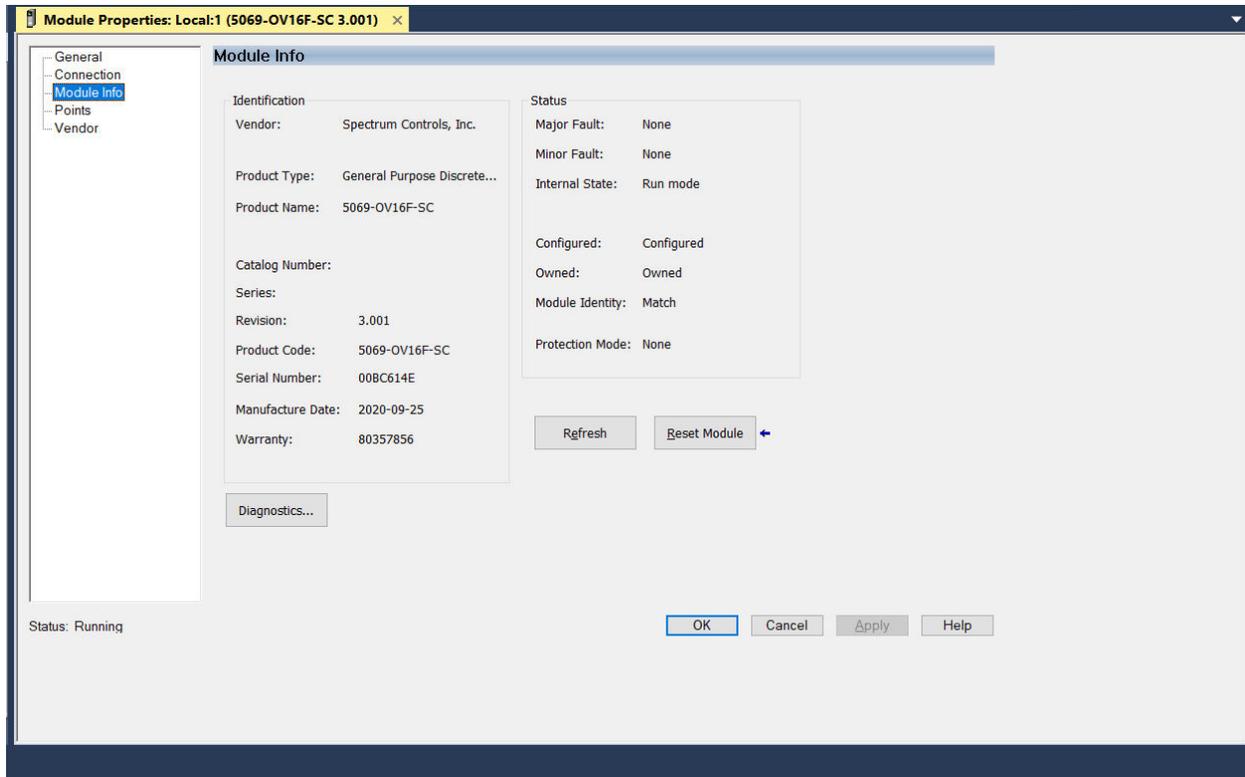
2. View or specify the following options:

- **Requested Packet Interval (RPI) (ms).** Sets the RPI rate. This is the rate at which the owner-controller and the module exchange data. For more information about RPI and valid settings, refer to Compact 5000 I/O Digital Modules documentation, PN 5069-UM004.
- **Number (0.2 – 750.0).** Sets RPI interval in milliseconds according to the listed range.
- **Inhibit Module.** When selected, allows you to indefinitely suspends a connection between an owner-controller and the module without removing the module from the configuration. Inhibiting the module temporarily disables a module so you can perform an operation such as servicing it. For more information about inhibiting a module, refer to Compact 5000 I/O Digital Modules documentation, PN 5069-UM004.
- **Major Fault on Controller if Connection Fails While in Run Mode.** Sets whether a connection failure while the controller is in Run mode causes a major of minor fault.
- **Module Fault.** Displays information about a module fault that has occurred to aid you in troubleshooting the issue.

### 3.5.3 Viewing Module Info Options

Module Info options display module and status information. You use this information to determine the identity of the module, to access module diagnostics, refresh data on the screen, and to reset the module.

1. Access the Module Info dialog:



2. View the following options. All fields are for information only. (**Refresh**, **Reset Module**, and **Diagnostics** and other button functions are listed below the information fields):

- **Identification.** Displays information that identifies the module such as vendor, product type, product name, catalog number, series, revision, product code, serial number, manufacturer and warranty code.  
The product name is read from the module.
- **Status.** Major/Minor Fault Status. Displays whether there is a major and minor fault.  
For a digital module, these options are available:
  - EEPROM fault.
  - Backplane fault.
  - None.
- **Internal State Status.** Displays the module's current operational state.
- **Configured.** Displays **Yes** or **No** indicating whether the module was configured by the owner controller connected to it.  
Once a module is configured, it stays configured until the module is reset or power is cycled, even if the owner drops connection to the module.  
This applies only to I/O modules.
- **Owned.** Displays **Yes** or **No** indicating whether an owner controller is currently connected to the module.

This applies only to I/O modules.

- **Module Identity.** Displays whether the physical module matches or mismatches with the configuration on General.
- **Protection Mode.** Displays the protection mode of the module when online. The protection mode depends on the module and may include:
  - Explicit protection.
  - Implicit protection.

When the module is offline or if a communication failure to the module occurs, the field is blank.

- **Refresh.** Retrieves and displays the latest values from the module.
- **Reset Module.** Initiates a reset operation on the module, which returns the module to its power-up state by emulating the cycling of power.

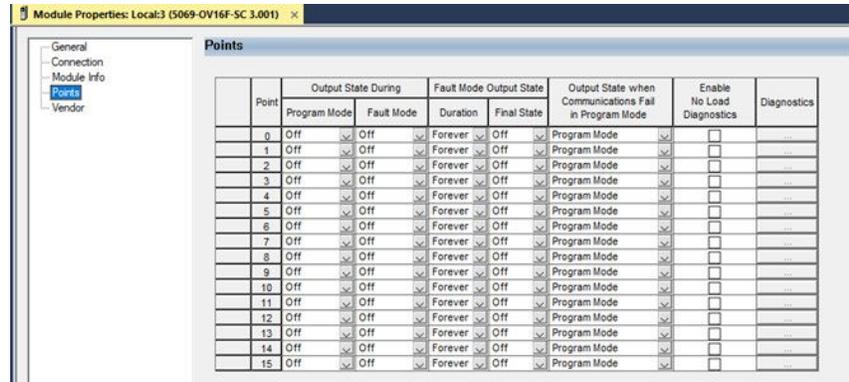
<p><b>NOTE</b></p> 	<p><b>IMPORTANT.</b> Resetting a module causes all connections to, or through, the module to be closed, which may result in loss of control. You cannot reset the module if either of the following conditions exist:</p> <ul style="list-style-type: none"> <li>• There are pending edits to the module properties.</li> <li>• When a safety signature exists in the controller project.</li> </ul>
--	--

- **Diagnostics.** Module diagnostics provide information on a module-wide basis. For example, the Module Diagnostics dialog box indicates the mode within which a module is operating, that is, **Run**, **Remote Run**, **Remote Program**, or **Program**. For more information about diagnostics, refer to Compact 5000 I/O Digital Modules documentation, PN 5069-UM004.
- **OK.** Selects dialog choices and/or changes.
- **Cancel.** Cancels changes made to the dialog.
- **Apply.** Applies changes made to the dialog to the selected module.
- **Help.** Opens the module's online help.
- **Status.** Lists current module status. The digital output module multicasts fault and status data with point data to the owner and listening controllers. The data is returned via modules that you can monitor in your Studio 5000 application. More information about fault status is provided in the Standard Output Modules - Fault and Data Status section later in this chapter.

### 3.5.4 Specifying Points Options

The Points category show the available input filter time values for the module point. You can configure individual output points to specific states when the module is in Program mode or Communications Fault mode. The following output states are available:

- Off.
  - On.
  - Hold last state.
1. Access the Points dialog:



2. Select one of the above options for each point in the list.

For more information about specifying point options, refer to Configurable Point-level Output State in Program Mode or Communications Fault Mode later in this chapter.

### 3.5.5 Vendor Information

The Vendor options list Name, Address, Contact, and Technical Support information for the module manufacturer:



### 3.5.6 Software Versioning

The software version tracks major and minor revisions for end users.

The shipped software version begins at version 2.*n*.

Once released, the major revision is typically incremented if new features are introduced to the product. Otherwise only the minor revision is incremented.

### 3.5.7 Software Updates

In-field updating of the software by the end user is not supported.

## Section 3.6 System Functions

### 3.6.1 Configurable Point-level Output State in Program Mode or Communications Fault Mode

You can configure individual output points to specific states when the module is in Program mode or Communications Fault mode.

The following output states are available:

- Off.
- On.
- Hold last state.

	Point	Output State During		Fault M
		Program Mode	Fault Mode	
	0	Off	Off	Forever
	1	On	Off	Forever
	2	Off	Off	Forever
	3	Hold	Off	Forever
	4	Off	Off	Forever
	5	Off	Off	Forever
	6	Off	Off	Forever

### 3.6.2 Output Behavior Immediately After a Connection Fault

When the connection between an owner-controller and output module breaks, the output can behave in the following ways, depending on how the Fault Mode parameter is configured:

- Turn off – Default.
- Transition to a specific, user-defined value.
- Hold its last state.

If you configure the output to hold its last state, the output remains at that state value until the following occurs:

- The connection to the owner-controller is re-established.
- The output returns to normal operation, as defined in the module configuration.

The output state remains as commanded if Fault State Duration is set to Forever.

If the Fault State Duration is set to a value other than Forever, the output state changes to a user-configurable Final Fault State after the specified time period elapses.

	Point	Output State During		Fault Mod
		Program Mode	Fault Mode	Duration
	0	Off	Off	Forever
	1	Off	On	Forever
	2	Off	Off	Forever
	3	Off	Hold	Forever
	4	Off	Off	Forever
	5	Off	Off	Forever

**Fault State Duration After Connection Fault**

If you configure the output to transition to a specific value after the connection breaks, you must define how long the output remains at the specified value before it transitions to a Final Fault State.

You can configure the output to remain at the specific value for the following times:

- Forever
- 1 second
- 2 seconds
- 5 seconds
- 10 seconds

After the Fault State Duration time expires, the output transitions to user-defined Final Fault State Value.

	Point	Output State During		Fault Mode Output State		Output State Communicatio in Program I
		Program Mode	Fault Mode	Duration	Final State	
	0	Off	Off	Forever	Off	Program Mode
	1	Off	Off	Forever	Off	Program Mode
	2	Off	Off	1 s	Off	Program Mode
	3	Off	Off	2 s	Off	Program Mode
	4	Off	Off	5 s	Off	Program Mode
	5	Off	Off	10 s	Off	Program Mode
	6	Off	Off	Forever	Off	Program Mode
	7	Off	Off	Forever	Off	Program Mode

**Final Fault State Value**

The Final Fault State value defines the value to which the output goes after the Fault State Duration time expires.

You set the value in the C.Ptxx.FaultFinalState tag. For more information on modules, see Appendix B, Module Tag Tables.

Fault Mode Output State			
	Duration	Final State	
✓	Forever	Off	Pr...
✓	Forever	Off	Pr...
✓	Forever	On	Pr...
✓	Forever	Off	Pr...
✓	Forever	Off	Pr...
✓	Forever	Off	Pr...

**Output State Once Connection Is Re-established**

Once the connection between the owner-controller and output module is reestablished, the output resumes normal operation.

To see where to configure the Connection Fault Handling parameters, see the following:

g	Fault Mode Output State			Output State when Communications Fail in Program Mode	Enable No Load Diagnostics	Diagnostics
ode	Duration	Final State				
	Forever	Off		Program Mode	<input type="checkbox"/>	...
	Forever	Off		Program Mode	<input type="checkbox"/>	...
	Forever	Off		Fault Mode	<input type="checkbox"/>	...
	Forever	Off		Program Mode	<input type="checkbox"/>	...
	Forever	Off		Program Mode	<input type="checkbox"/>	...
	Forever	Off		Program Mode	<input type="checkbox"/>	...
	Forever	Off		Program Mode	<input type="checkbox"/>	...

Points									
	Point	Output State During		Fault Mode Output State		Output State when Communications Fail in Program Mode	Enable No Load Diagnostics	Diagnostics	
		Program Mode	Fault Mode	Duration	Final State				
	0	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	1	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	2	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	3	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	4	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	5	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	6	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	7	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	8	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	9	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	10	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	11	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	12	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	13	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	14	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	
	15	Off	Off	Forever	Off	Program Mode	<input type="checkbox"/>	...	

**Forcing**

Use a force to override data that your logic either uses or produces:

- Test and debug your logic.
- Temporarily maintain normal system operations when an input or output device has failed.

Use forces only as a temporary measure. They are not intended to be a permanent part of your application.

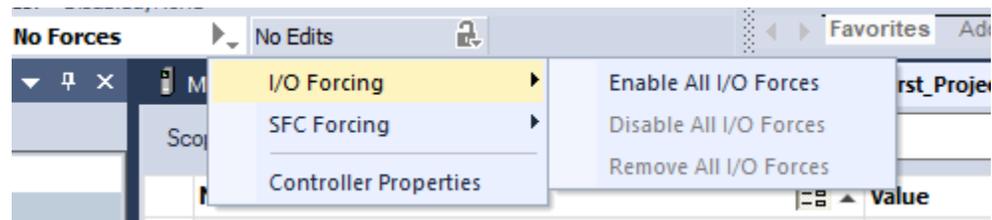
### Enable Forces

For a force to take effect, you enable forces. You can only enable and disable forces at the controller level.

- You can enable I/O forces and SFC forces separately or simultaneously.
- You cannot enable or disable forces for a specific module, tag collection, or tag element.

<p><b>WARNING</b></p> 	<p><b>HAZARD OF INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.</b></p> <p>Forcing can cause unexpected machine motion that could injure personnel. Before you use a force, determine how the force affects your machine or process and keep personnel away from the machine area.</p>
---	--

- Enabling I/O or SFC forces causes your machine or process to go to another state or phase.
- Removing forces can still leave forces in the enabled state.
- If forces are enabled and you install a force, the new force immediately takes effect.



### Disable or Remove a Force

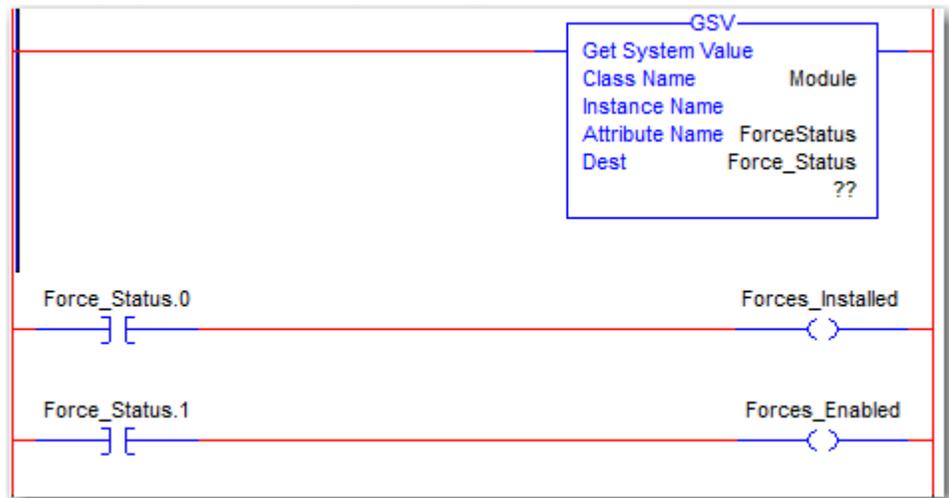
To stop the effect of a force and let your project execute as programmed, disable or remove the force:

- You can disable or remove I/O and SFC forces simultaneously or separately.
- When you remove a force on an alias tag, you also remove the force on the base tag.

### GSV Instruction

This example shows how to use a GSV instruction to get the status of forces.

For the purposes of this example, Force\_Status is a DINT tag.



### Data Echo

Data Echo automatically multicasts point data values that match the digital value that was sent to the screw terminals of the module then.

### Standard Output Modules - Fault and Data Status

Fault	Description
ConnectionFaulted <sup>9</sup>	The owner-controller loses its connection to the module.
Pttx.Fault	The point data quality is bad.
Pttx.NoLoad	A no-load condition exists on the point.
Pttx.ShortCircuit	A short-circuit condition exists on the point.
Pttx.FieldPowerOff	A field power lost condition exists on the point.
<b>Status</b>	
RunMode	The module is in Run Mode.
DiagnosticActive	Indicates if any diagnostics are active or if the prognostics threshold is reached.
DiagnosticSequenceCount	The count increments each time that a diagnostic condition is detected or removed.
Pttx.Data	The point input status is 0 or 1.
Pttx.Uncertain	The point data can be imperfect.
Uncertain <sup>9</sup>	The module is operating outside its designed operating range if data is under manual or override control.

<sup>9</sup> This tag provides module-wide data and affects all channels simultaneously.

Local:1:I	{...}
Local:1:I.ConnectionFaulted	0
Local:1:I.DiagnosticActive	0
Local:1:I.DiagnosticSequenceCount	0
Local:1:I.Pt00	{...}
Local:1:I.Pt00.Data	0
Local:1:I.Pt00.Fault	0
Local:1:I.Pt00.NoLoad	0
Local:1:I.Pt00.ShortCircuit	0
Local:1:I.Pt00.Uncertain	0
Local:1:I.Pt01	{...}

### Field Power Loss Detection

The Field Power Loss Detection feature monitors for the loss of power at an output module point. When field power to the module is lost, a point-level fault is sent to the controller to identify the exact point faulted.

Field Power Loss Detection has a corresponding tag that can be examined in the user program if a fault occurs.

### Fault and Status Reporting

The digital output modules multicast fault and status data with point data to the owner and listening controllers. The data is returned via modules that you can monitor in your Logix Designer application.

### No Load Detection

No Load Detection detects when a wire is disconnected from the output or a missing load for each output point.

For standard modules, No Load Detection occurs only when the output point is in the Off state.

### Short-Circuit Protection

Short-Circuit Protection helps prevent damage to the output that can result when more current is present at the output than it can handle.

I.Ptx.ShortCircuit tag is used for short-to-high or channel-to-channel shorts, which do not occur over current.

When a short-circuit occurs, the output is immediately turned off.

### Thermal Shutoff

Thermal Shutoff helps prevent damage to the output that can result when an output gets hotter than it can handle.

### Output Driver Communication Error

When communication is lost between module and output driver, all outputs are turned off.

### Time-scheduled Output Control

You can schedule times for module outputs to turn On or Off. The time schedules use units in nanoseconds.

The timing of scheduled outputs modules are as follows:

- $\pm 10$  microseconds accuracy.
- 1 ns resolution.

The module must be time synced or schedules are not applied.

Time-scheduled output control is used with the Motion Arm Output Cam (MAOC) instruction. The MAOC instruction enables position-based output control in these ways:

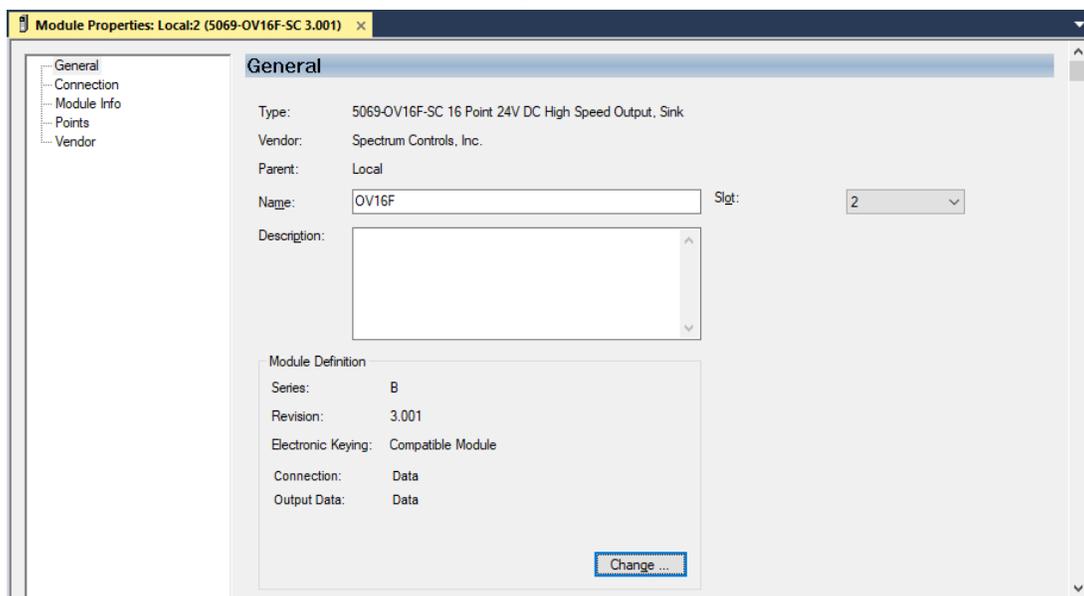
- Uses the position of any motion axis in a Logix 5000™ control system as the position reference.
- Updates the outputs based on the motion axis position at the motion group coarse update rate, typically 1...32 ms.

The instruction can update standard digital output modules at the coarse update rate. However, some high-speed applications require a higher degree of accuracy. The scheduled output modules improve the accuracy of the MAOC instruction by supporting the ability to schedule output On and Off times. All scheduling configuration for the On and Off times of an output is completed through the MAOC instruction. The instruction then updates values in the outputs of the module that define the scheduled output behavior.

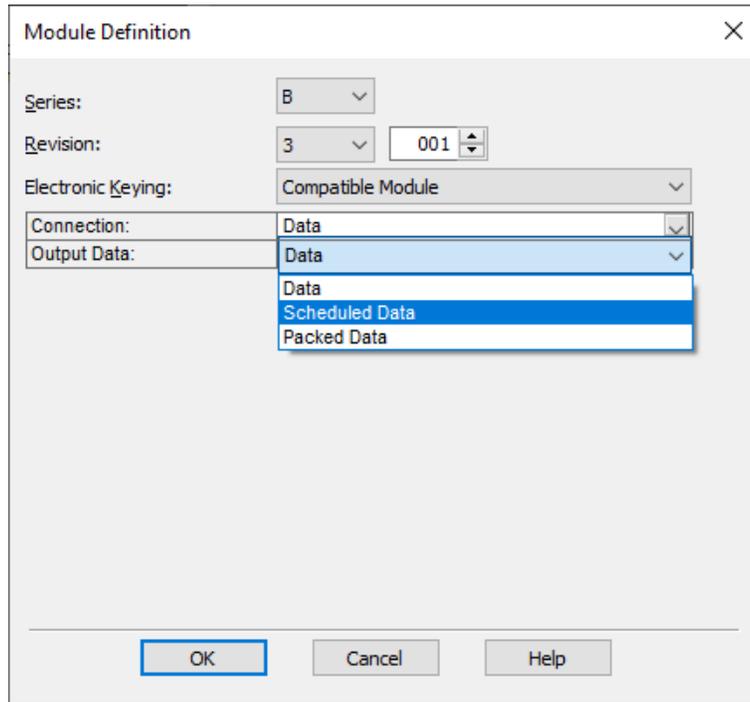
### 3.6.3 Use a MAOC Instruction with Standard Output Module

To use a MAOC instruction with schedule outputs on an output module, complete the following steps.

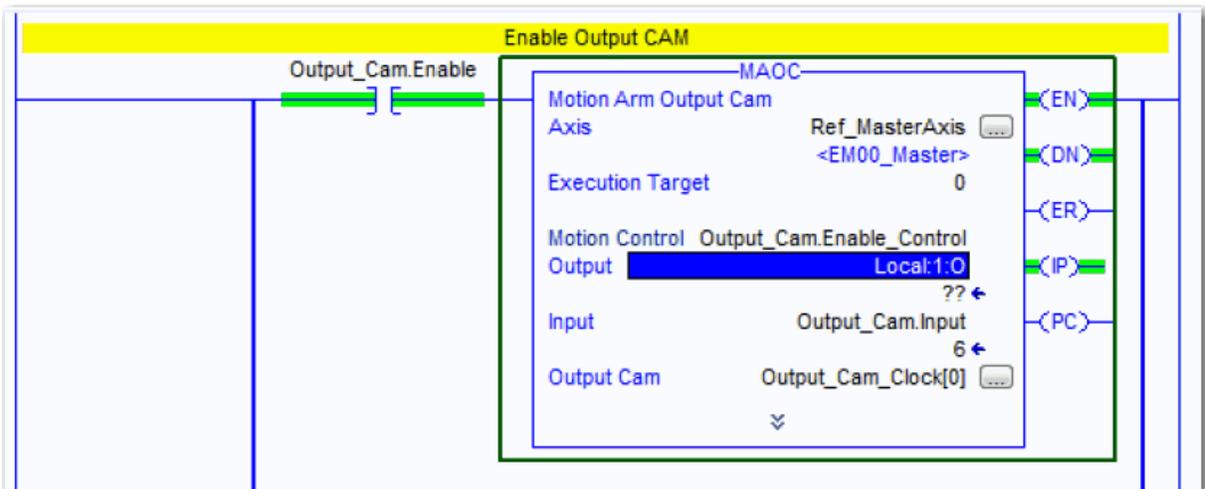
1. If necessary, add an output module to your Logix Designer application project.
2. From the Module Properties dialog box, click **Change** to access the Module Definition parameters:



- From the Module Definition dialog box, from the **Output Data** field, select **Scheduled Data** and click **OK**:



- Click **OK** to close the Module Properties dialog box.
- Add an MAOC instruction to your logic.
- In the MAOC instruction, use the module output tag in the Output operand, for example **Adapter:1:O** for the output module and shown below.



For more information on how to use an MAOC instruction in general, see the following:

- Logix5000 Controllers Motion Instructions Reference Manual, publication MOTION-RM002.
- Position-based Output Control with the MAOC Instruction Application Technique, publication 1756-AT017.

## Technical Assistance

Note that your module contains electronic components which are susceptible to damage from electrostatic discharge (ESD). An electrostatic charge can accumulate on the surface of ordinary plastic wrapping or cushioning material. **In the unlikely event that the module should need to be returned to Spectrum Controls, please ensure that the unit is enclosed in approved ESD packaging (such as static-shielding / metalized bag or black conductive container).** Spectrum Controls reserves the right to void the warranty on any unit that is improperly packaged for shipment.

RMA (Return Merchandise Authorization) form required for all product returns.

For further information or assistance, please contact your local distributor, or call the Spectrum Controls Technical Support at +1 (425) 746-9481:

For Rockwell Automation Compatible I/O Products:

- USA 1-440-646-6900 (US/global, English only)
- United Kingdom +44 0 1908 635 230 (EU phone, UK local)
- Australia, China, India, 1-800-722-778 or +61 39757 1502  
and other East Asia  
locations:
- Mexico 001-888-365-8677
- Brazil 55-11-5189-9500 (general support)
- Europe +49-211-41553-630 (Germany/general support)

or send an email to [support@spectrumcontrols.com](mailto:support@spectrumcontrols.com).

## Declaration of Conformity

Available upon request.

# Appendix A

## Manually Importing an AOP

This appendix explains how to manually import an AOP .ACD file into Studio 5000 software:

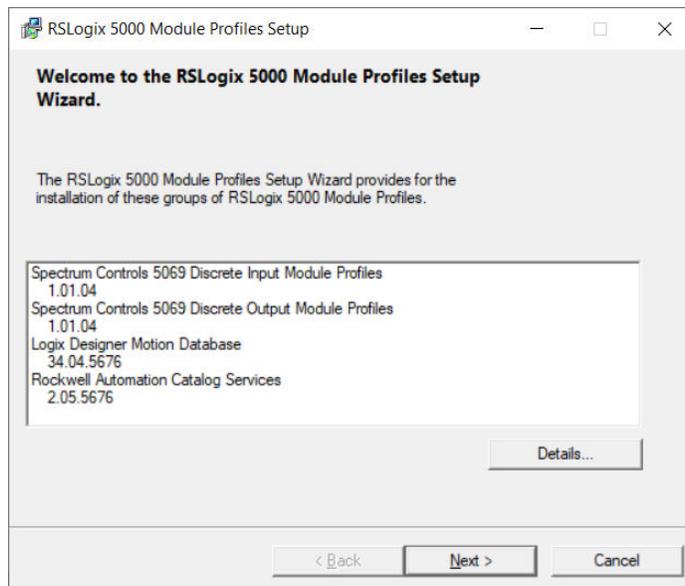
1. Download the latest, zipped, module AOP from Spectrum Controls website, <https://www.spectrumcontrols.com>, and save the file to a local folder on your computer (normally the Downloads folder).
2. Extract the contents of the zipped folder using the default folder name and location.

<input type="checkbox"/> Name	Date modified	Type	Size
 Spectrum_5069_Discrete_AOP_Rel_1.0...	6/17/2021 10:38 AM	File folder	

3. Open the folder and run MPSetup.exe:



4. Confirm that you wish to run this software when asked if you wish to do so by your Windows operating system.
5. Follow the prompts provided by the RSLogix5000 Module Profiles Setup Wizard:



These prompts include accepting the license agreement, choosing to install the module profiles, and selecting which module profiles you wish to install.

6. Click **Finish** to complete the installation.

The newly imported module(s) are now available as a selection from the Expansion Modules list.



# Appendix B

## Module Tag Tables

This section provides data type, definition, and valid value information for System Tags.

Module tags are created when you add a module to the Logix Designer application project.

The set of tags that are associated with the 5069-OV16F-SC module are listed below. However, the choices that you make in the Module Definition dialog box define the connection and the tags. For example, if you use a Listen Only Connection, the Logix Designer application creates only Input tags for that module.

The following types of tags are described in this Appendix.

- Configuration
- Output
- Input

### Module Configuration Tags

Name	Size	Definition	Valid Values
Ptxx.FaultMode	BOOL	Selects the behavior the output channel takes if a communication fault occurs. FaultValue defines the value to go to when set to user-defined value.	0 = Hold last state 1 = Go to a user-defined value
Ptxx.FaultValue	BOOL	Defines the value that the output assumes if a communication fault occurs when FaultMode = 0.	0 = Off 1 = On
Ptxx.ProgMode	BOOL	Selects the behavior that the output takes when transitioned into Program mode. ProgValue defines the value to go to when set to user-defined value.	0 = Hold last state 1 = Go to a user-defined value
Ptxx.ProgValue	BOOL	Defines the value that the output takes when the connection transitions to Program mode if the ProgModebit is set to "User-Defined Value".	0 = The output state is Off during Program mode. 1 = The output state is On during Program mode.
Ptxx.FaultFinalState	BOOL	If FaultValueStateDuration is nonzero, determines the final Output state after the configured FaultValueStateDurationtime-out occurs.	0 = The output state is Off after the FaultValueStateDuration time expires. 1 = The output state is On after the FaultValueStateDuration time expires.
Ptxx.ProgramToFaultEn	BOOL	Determines if an output transitions to the Fault Mode if the connection faults while in Program Mode.	0 = Stay in Program Mode 1 = Go to Fault mode
Ptxx.NoLoadEn	BOOL	Enables no load detection for output channels.	0 = Disable 1 = Enable
Ptxx.FaultValueStateDuration	SINT	This value determines the length of time the Fault Modestate is held before the FaultFinalState being applied.	0 = Hold forever (default). 1, 2, 5, or 10 seconds

### Output Table

Name	Size	Definition	Valid Values
TimeBase	LINT	Indicates the TimeBase for all schedule times in a scheduled output consumed assembly or channel. The TimeBase + The Schedule[n].TimeOffset determines the time for the schedule. Base/Offset scheme that is used to fit enough schedules into the assembly.	Any positive value.

Name	Size	Definition	Valid Values
txx.Data	BOOL	Current input value.	0 = Off 1 = On
Ptxx.ScheduleEn	BOOL	Specifies the use of normal output data or scheduled data.	0 = Normal output data 1 = Scheduled data
Schedulex	SINT	Indicates which schedule to load from 32 available schedules.	1...32 = Valid schedule 0, 129...255 = No schedule
Schedulex.ID	SINT	There are 32 schedules available (for Neo R1 products). Indicates which schedule to load.	1...32 = Valid schedule 0 or 129...255 = No schedule
Schedulex.SequenceNumber	SINT	Indicates that the schedule information is valid and to process this schedule.	All values.
Schedulex.OutputPointSelect	SINT	Selects the output point that this schedule applies to. 0xFF means no output point selected.	0...15
Schedulex.Data	BOOL	Output data to be applied at time that is specified in schedule.	0 or 1
Schedulex.TimeOffset	DINT	Offset from schedule base time. Used for scheduled output consumed tags. Base/Offset scheme that is used to fit enough schedules in the assembly.	All values.

### Input Table

Name	Size	Definition	Valid Values
Ptxx.NoLoad	BOOL	Indicates that the signal wire has been disconnected from one of its terminals or the RTB has been removed. Used with Output channels.	0 = No fault 1 = Fault
Ptxx.ShortCircuit	BOOL	Indicates an output short circuit or overcurrent.	0 = No short circuit 1 = Short circuit or overcurrent
Schedulex	SINT	Indicates which schedule to load from 32 available schedules.	1...32 = Valid schedule 0, 129...255 = No schedule
Schedulex.State	SINT	Current state of the Tagschedule at index x.	0 = Inactive 1 = Active – schedule is next to be applied to any of the outputs. 2 = Current – schedule is not the next to be applied one of the outputs. 3 = Expired – schedule has been applied. 4 = Discarded – scheduled but mask was off, or the requested schedule was late (received after its scheduled application time), and a more recent schedule has already been applied to that output point. 5 = Late – received schedule after the time it is to be applied.
Schedulex.ScheduleNumber	SINT	Echo of ScheduleNumber from the output image.	0...3
LateScheduleCount	INT	Count of schedules that arrive late. That is, the arrival time is after scheduled time. Counter rolls over every 65535 late updates. The output is still be driven to new state if this is the most recent schedule for that point. Useful in indicating that network delays/losses are causing scheduling issues.	All values.

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Name	Size	Definition	Valid Values
LostScheduleCount	INT	Increments whenever the schedule sequence number in the output tag skips a value, which can indicate a lost schedule. Counter rolls over every 65535 lost updates.	All values.



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