

# 5415 Relay Digital Output Module

Installation, Operation and Maintenance  
Setup Manual

5/19/2011



The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed. Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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## Safety Information

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Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### **DANGER**

**DANGER** indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

### **WARNING**

**WARNING** indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

### **CAUTION**

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate.

### **CAUTION**

**CAUTION** used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage..

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## PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

## BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

 <b>CAUTION</b>
<b>EQUIPMENT OPERATION HAZARD</b>
Verify that all installation and set up procedures have been completed.
Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
Remove tools, meters, and debris from equipment.
<b>Failure to follow these instructions can result in injury or equipment damage.</b>

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

### **Software testing must be done in both simulated and real environments.**

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

## OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- 
- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
  - It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
  - Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

## About The Book

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### At a Glance

#### Document Scope

This manual describes the operation and maintenance of the 5415 Relay Digital Output module.

#### Validity Notes

This document is valid for all versions of the 5415 Relay Digital Output module.

#### Product Related Information

### **WARNING**

#### **UNINTENDED EQUIPMENT OPERATION**

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter and apply this product.

Follow all local and national safety codes and standards.

Failure to follow these instructions can result in death, serious injury or equipment damage.

#### User Comments

We welcome your comments about this document. You can reach us by e-mail at [technicalsupport@controlmicrosystems.com](mailto:technicalsupport@controlmicrosystems.com).

## Overview

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The Model 5415 Relay Digital Output module adds twelve, dry contact, Form A (normally open) mechanical relays to a 5000 input/output system. Up to sixteen Model 5415 modules may be installed on the I/O bus, for a total of 192 discrete outputs per bus.

The relay outputs can be used to control panel lamps, relays, motor starters, solenoid valves, and other on/off devices. The relay outputs are well suited to applications that cannot tolerate any off-state leakage current, that require high load currents, or that involve non-standard voltages or current ranges.

The relays are factory installed and wired for normally open contacts. Loads can be connected to either output terminal and to either the high or the low side of the power source.

Light Emitting Diodes (LEDs) on the digital outputs show the status of each of the outputs. The SCADAPack controller module enables or disables the LEDs to control power consumption in solar powered or unattended applications.

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## Installation

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The installation of the 5415 module requires mounting the modules on the 7.5mm by 35mm DIN rail and connecting the module to the system I/O Bus. Refer to the **System Configuration Guide** for complete information on system layout, I/O Bus cable routing and module installation.

**For ATEX and IECx applications only:**

This equipment is to be installed in an enclosure certified for use, providing a degree of protection of IP54 or better. The free internal volume of the enclosure must be dimensioned in order to keep the temperature rating. A T4 rating is acceptable.

For products using Solid State Relays (5415, 5606 and 5607 modules and SCADAPack using 5606 and 5607 modules) A T4 rating is acceptable for maximum loads of 2A. When 3A loads are connected to the Solid State Relays, the maximum ambient rating is lowered to 50°C in order to maintain the T4 rating.

## Field Wiring

The 5415 modules are factory configured with normally open (NO) contacts. The outputs are grouped with four inputs sharing a single common return. The groups are isolated from each other. Loads can be connected to either output terminal and to either the high or the low side of the power source. **Figure 1: 5415 Field Wiring** shows typical field wiring practices.

Incandescent lamps and other loads may have inrush currents that will exceed the rated maximum current of the relay contacts. This inrush current may damage the relay contacts. Interposing relays are recommended in these situations.

Controller, modem and I/O modules use screw termination style connectors for termination of field wiring. They accommodate solid or stranded wires from 22 to 12 AWG.

The connectors are removable. This allows module replacement without disturbing the field wiring. Leave enough slack in the wiring for the connector to be removed.

Remove power before servicing unit.

To remove the connector:

- Pull the connector upward from the board. Apply even pressure to both ends of the connector.

To install the connector:

- Line up the pins on the module with the holes in the connector.

- Push the connector onto the pins. Apply even pressure to both ends on the connector.

The 5415 module uses a two piece connector. Digital outputs 0 to 7 are on connector P1. Digital outputs 8 to 11 are on connector P2.

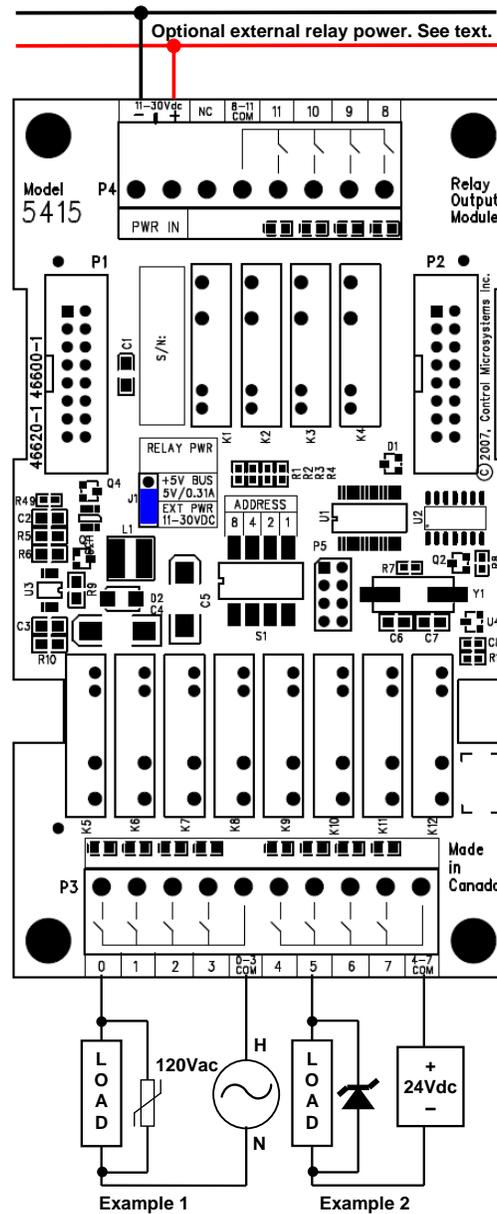
The 5415 module has two pins on the first half of P2 for an optional external power input.

Take care when controlling inductive loads with digital outputs. The energy stored in the coil is capable of generating significant electrical noise when the relay contacts are opened. This noise can be suppressed using a diode across the coil in DC circuits or using a MOV (varistor) or across the coil in AC circuits.

In **Figure 1: 5415 Field Wiring** below there are two examples of digital output wiring.

**Example 1:** An AC load powered from a 120V AC power source is shown connected to output 0. In this example the Hot side of the AC power source is switched to the load and the load return current is connected to the Neutral side of the AC power source. The loads on outputs 0 through 3 will share the Neutral side of the AC power source.

**Example 2:** A DC load powered from a 24V DC power supply is shown connected to output 5. In this example the positive side of the DC power source is switched to the load and the load return current is connected to the negative side of the power supply. The loads on outputs 4 through 7 will share the same DC power supply return.



**Figure 1: 5415 Field Wiring**

Incandescent lamps and other loads may have inrush currents that will exceed the rated maximum current of the relay contacts. This inrush current may damage the relay contacts. Interposing relays are recommended in these situations.

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## External Relay Power

5000 IO modules are generally power from 5V supplied by the controller. To power the relays from the controller's 5V supply, install a jumper link on header J1 in the position "+5V BUS".

If desired, and to minimize the loading on the controller's 5V power supply, it is possible to power the relays from the system power. To power the relays from external power install a jumper link on header J1 in the position "EXT PWR" as shown in **Figure 1: 5415 Field Wiring**. Refer to the **Specifications** section for voltage and current requirements for the external relay power input.

## Solid State Relay Version

The Model 5415 is optionally available with solid state relays (SSR). Refer to the **Specifications** section for limitation associated with using solid state relays.

Check the polarity of the load voltages when using the SSR version of the 5415. The loads are connected to the -ve side of the power supply and the +ve side of the power is switch through the COM terminal as shown in Example 2.

## Address Selection

The 5000 I/O bus will support a maximum of 20 I/O (input/output) modules. 5000 I/O module types may be combined in any manner to the maximum supported by the controller used. The types of input and output modules available are:

- Digital Input modules
- Digital Output modules
- Analog Input modules
- Analog Output modules
- Counter Input modules

Each type of I/O module connected to the I/O bus, has a unique I/O module address. Different types of I/O modules may have the same module address.

The address range supported by the controller module may restrict the I/O module address range. Refer to the controller manual for the maximum address supported.

The four address switches labeled 8, 4, 2, and 1 set the address. To set the address:

- Open the four switches by sliding the actuators to the "OFF" position.
- Close the switches that total to the desired address by sliding the actuators to "ON".

Switch settings for each of the 16 module addresses are shown in **Figure 2: 5415 Digital Output Module Address Switches**.

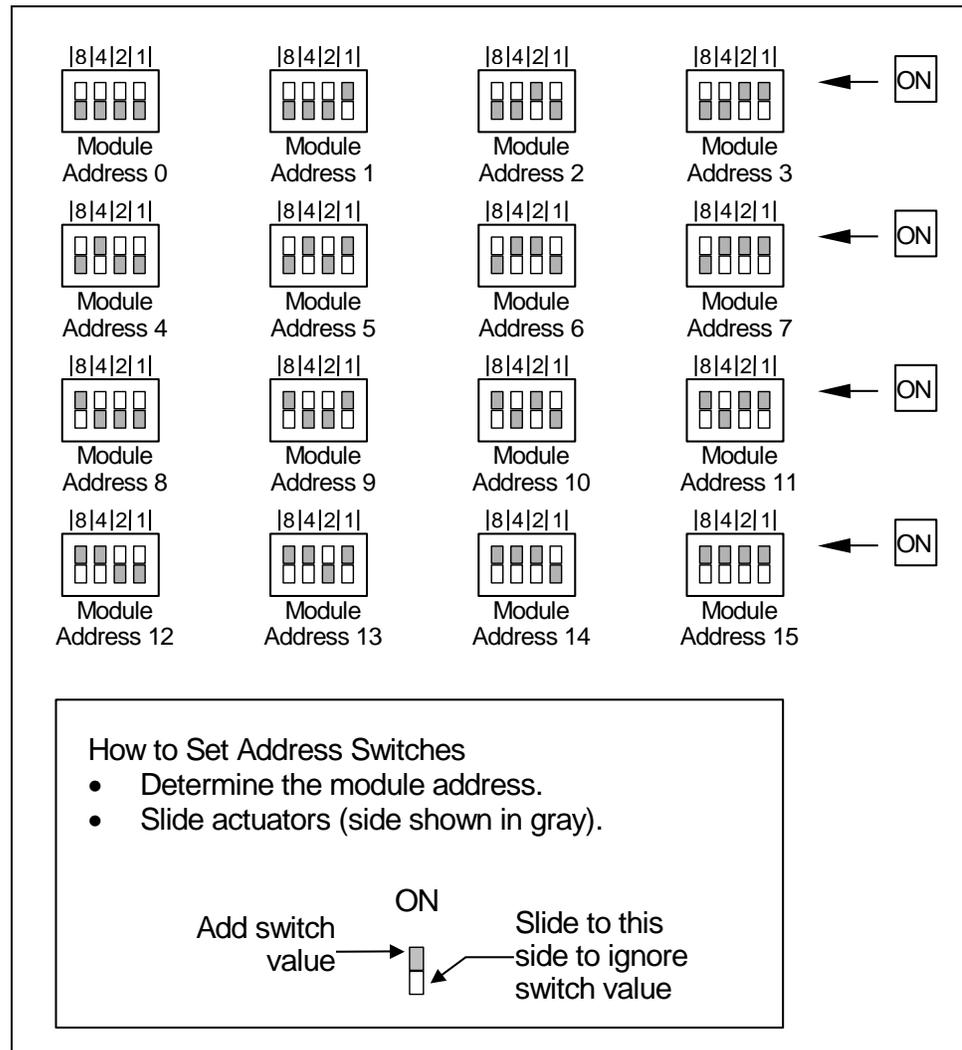


Figure 2: 5415 Digital Output Module Address Switches

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## Operation and Maintenance

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The Model 5415 Digital Output Module has one red status LED per I/O point. This LED is on when the corresponding output is turned on.

The digital output status LED is located between the field wiring terminal connector and the module cover.

The LEDs can be disabled by the controller board to conserve power. Refer to the manual of your controller board for details on disabling the LEDs.

### Maintenance

The 5415 module requires no routine maintenance or calibration. If a module is not functioning correctly, contact Control Microsystems Technical Support for more information and instructions on returning the module for repair.

### Troubleshooting

Condition	Action
Output LED does not come on when output is turned on.	Check the LED POWER from the SCADAPack controller.
Output LED comes on but the output does not close.	Check if the relay is stuck. If so, return the board for repair.
Output LED comes on and output is closed, but the field device is not activated.	Check the field wiring. Check the external device.
Output LED and relay are on when they should be off.	Check that the output is not forced on.
Output LED and relay are off when they should be on.	Check that the output is not forced off.
5415 module does not respond when powered externally.	Check for the presence of 11-30Vdc on pins 1 and 2 of P4 and check jumper link J1 is in the lower or "EXT PWR" position.

## Specifications

**Disclaimer:** Control Microsystems reserves the right to change product specifications. For more information visit [www.controlmicrosystems.com](http://www.controlmicrosystems.com).

### General

<b>I/O Terminations</b>	12 to 22 AWG 15A contacts Screw termination - 6 lb.-in. (0.68 Nm) torque
<b>Dimensions</b>	2.90 inch (74mm) wide 4.90 inch (124mm) high 1.80 inch (45mm) deep
<b>Packaging</b>	Corrosion resistant zinc plated steel with black enamel paint
<b>Environment</b>	5% RH to 95% RH, non-condensing -40°C to 70°C (-40°F to 158°F) operation -40°C to 85°C (-40°F to 185°F) storage
<b>Addressing</b>	16 modules. DIP switch selectable.

### Power Supply

<b>5V power requirements</b>	Quiescent - 5mA Dry Contact version Relays on, LEDs on - 150mA Relays on, LEDs off - 130mA Peak current during off-to-on transition of any, or all relays - 280mA total for 15ms duration
	Solid State Relay version Relays on, LEDs on - 144mA Relays on, LEDs off - 120mA
<b>10-30Vdc power requirements</b>	UL508 rated 13.75-28Vdc. Class 2. Dry Contact version 1.0W maximum with 1.65W peak for 15ms durations.
	Solid State Relay version 1.0W maximum

## Digital Outputs

<b>Quantity</b>	12
<b>Connectors</b>	2 removable connectors. 10 position and 8 position.
<b>Type</b>	Form A Contacts (Normally open) 4 contacts share one common
<b>Indicators</b>	LEDs powered from the same source as the relays: either the 5V bus or external power. Can be disabled to conserve power.
<b>Voltages</b>	Maximum permitted voltage in Canada or North America is 240Vac. Maximum permitted voltage outside of Canada or North America is 30Vac/42.4Vpk/60Vdc.
<b>Inductive Loads</b>	Inductive loads must be suitably protected to protect the relay contacts. See manual for recommended inductive load protection circuits.
<b>Isolation</b>	Isolated in 3 groups of 4. Logic to contact: 1500Vac (1 min.) Chassis to contact: 1500Vac (1 min.) Output group to output group: 1500Vac (1 min.)
<b>Operate Time</b>	25ms maximum, 20ms typical
<b>Release Time</b>	30ms maximum, 25ms typical
<b>Dry Contact Relay Version</b>	
<b>Contact rating</b>	3A, 30Vdc or 250Vac (Resistive) 1000Vac between open contacts 12A maximum per common
<b>Switching Capacity</b>	5A, 30Vdc (150W Resistive) 5A X 250Vac (1250VA Resistive)
<b>Service Life</b>	2 X 10 <sup>7</sup> mechanical 1 X 10 <sup>5</sup> at 5A, 30Vdc or 250Vac
<b>Bounce Time</b>	1ms typical
<b>DC Solid State Relay Version</b>	
<b>Load voltage</b>	60Vdc maximum
<b>Load current</b>	3A continuous maximum at 50°C ambient TBC 2A continuous maximum at 70°C ambient TBC 9A peak, 100ms UL508 rated 2A at 50°C and 1.33A at 70°C.

<b>On resistance</b>	0.09 ohms
<b>Off state leakage current</b>	10uA
<b>Service Life</b>	Unlimited
<b>Bounce Time</b>	None

## Approvals and Certifications

<b>Hazardous Locations - North America</b>	<p>Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations. Temperature Code T4</p> <p>CSA certified to the requirements of:</p> <ul style="list-style-type: none"> <li>• CSA Std. C22.2 No. 213-M1987 - Hazardous Locations.</li> <li>• UL Std. No. 1604 - Hazardous (Classified) Locations.</li> </ul>
<b>Hazardous Locations - Europe</b>	<p>Model "5415 SSR version only"</p> <p>ATEX II 3G, Ex nA IIC T4</p> <p>per EN 60079-15, protection type n (Zone 2)</p>
<b>Hazardous Locations</b>	<p>Model "5415 SSR version only"</p> <p>IECEX, Ex nA IIC T4</p> <p>per IEC 60079-15, protection type n (Zone 2)</p>
<b>Safety</b>	<p>CSA (cCSAus) certified to the requirements of: CSA C22.2 No. 142-M1987 and UL916. (Process Control Equipment, Industrial Control Equipment) in Canada and USA.</p> <p>UL (cULus) listed: UL508 (Industrial Control Equipment)</p>
<b>Digital Emissions</b>	<p>FCC Part 15, Subpart B, Class A Verification</p> <p>EN61000-6-4: 2007 Electromagnetic Compatibility Generic Emission Standard Part2: Industrial Environment</p> <p>C-Tick compliance. Registration number N15744.</p>
<b>Immunity</b>	<p>EN61000-6-2: 2005 Electromagnetic Compatibility Generic Standards Immunity for Industrial Environments</p>
<b>Declaration</b>	<p>This product conforms to the above Emissions and Immunity Standards and therefore conforms with the requirements of Council Directive 2004/108/EEC (as amended) relating to electromagnetic compatibility and is eligible to bear the CE mark.</p> <p>The Low Voltage Directive 2006/95/EC applies to devices operating within 75 to 1500 VDC and/or 50 to 1000 VAC. This Directive is not applicable to this product when installed according to our specifications.</p>