

5406 and 5407 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

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..

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.

 **CAUTION****UNINTENDED EQUIPMENT OPERATION**

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

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

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

At a Glance

Document Scope

This manual describes the operation and maintenance of the 5406 and 5407 Relay Digital Output modules.

Validity Notes

This document is valid for all versions of the 5406 and 5407 Relay Digital Output modules.

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.

Overview

The Model 5406 Relay Digital Output module adds sixteen, dry contact, Form A (normally open) mechanical relay outputs to a 5000 input/output system. Up to sixteen Model 5406 modules may be installed on the I/O bus, for a total of 256 discrete outputs per bus.

The Model 5407 Relay Digital Output module adds eight, dry contact, Form A (normally open) mechanical relay outputs to a 5000 input/output system. Up to eight Model 5407 modules may be installed on the I/O bus, for a total of 64 discrete outputs per bus.

The relay outputs can be used to control panel lamps, relays, 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. Each relay is isolated and has two poles on the field wiring terminal block.

Light emitting diodes on the Models 5406 and 5407 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.

Throughout this manual references to the 5406 apply to the 5406 and 5406A. Differences between the 5406 and the 5406A are indicated when they occur.

Installation

The installation of the 5406 and 5407 modules require mounting the module on the 7.5mm by 35mm DIN rail and connecting the modules to the system I/O Bus. Refer to the *System Configuration Guide*, at the beginning of this manual, for complete information on system layout, I/O Bus cable routing and module installation.

Field Wiring

The 5406 and 5407 modules are factory configured with normally open (NO) contacts. Each I/O point is isolated. There are two poles on the field termination block for each point. Loads can be connected to either output terminal and to either the high or the low side of the power source. Isolation between I/O points allows multiple power sources to be used within in the same module. **Figure 1: 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 must be used in these situations.

The 5407 can be modified for normally closed (NC) contacts. Please contact Control Microsystems for a Technical Bulletin describing this modification.

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.

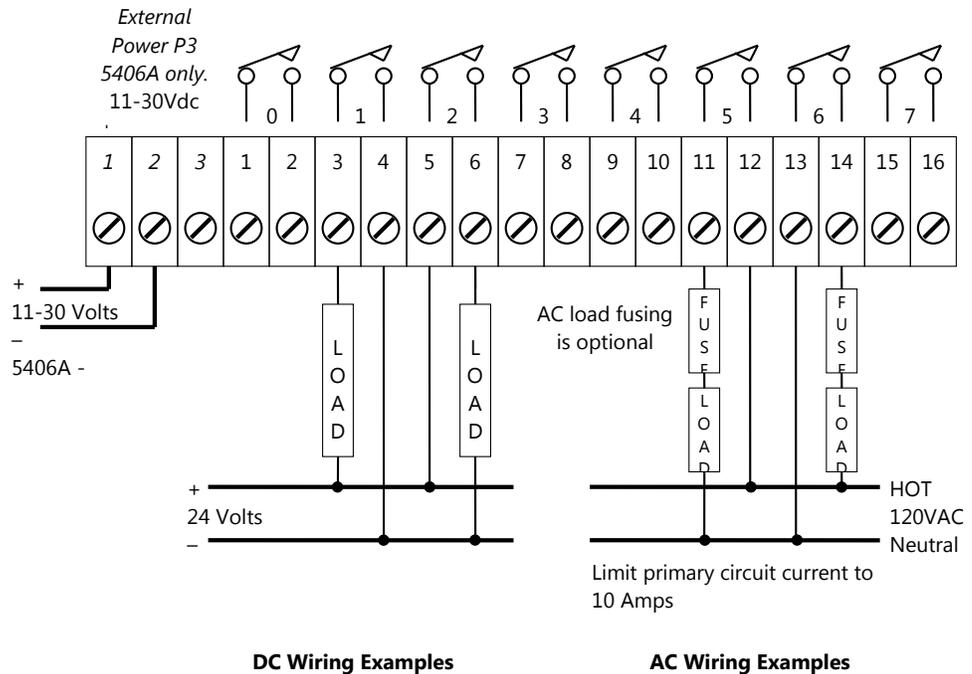
To install the connector:

- 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 5407 module uses a two piece connector. Positions 1 to 8 are on the first connector. Positions 9 to 16 are on the second connector. The 5406 module has an additional two piece connector. Positions 17 to 24 are on the third connector. Positions 25 to 32 are on the fourth connector.

The 5406A module has an additional three pins on the first half on P3 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.



These are typical wiring examples.
Only four outputs are shown.

Figure 1: 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 required in these situations.

Address Selection

The 5000 I/O bus will support a maximum of twenty 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 SCADAPack controller module may restrict the I/O module address range. Refer to the controller manual for the maximum address supported.

5407 Address Selection

The three address switches labeled 1, 2, and 4 set the module address. To set the address:

- Open the three switches by pressing down the left side of the switch.
- Close the switches that total to the desired address.

Figure 2: Model 5407 Module Address Switches shows the switch settings for each of the 8 module addresses.

5406 Address Selection

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

- Open the four switches by pressing down the left side of the switch.
- Close the switches that total to the desired address.

Figure 3: Model 5406 Module Address Switches shows the switch settings for each of the 16 module addresses.

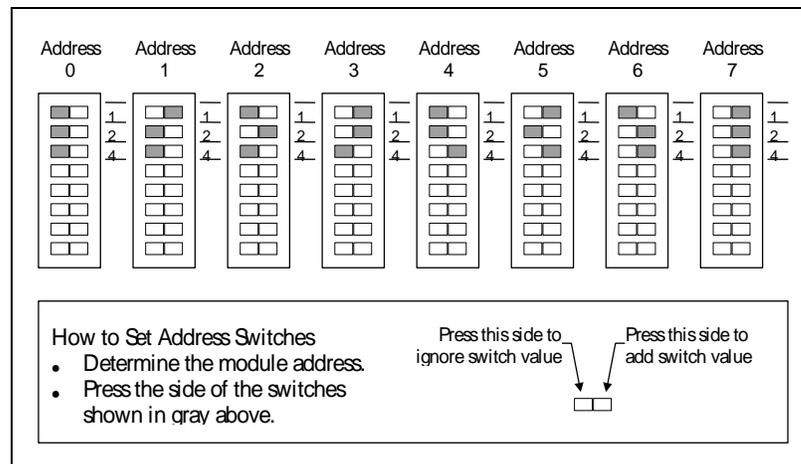


Figure 2: Model 5407 Module Address Switches

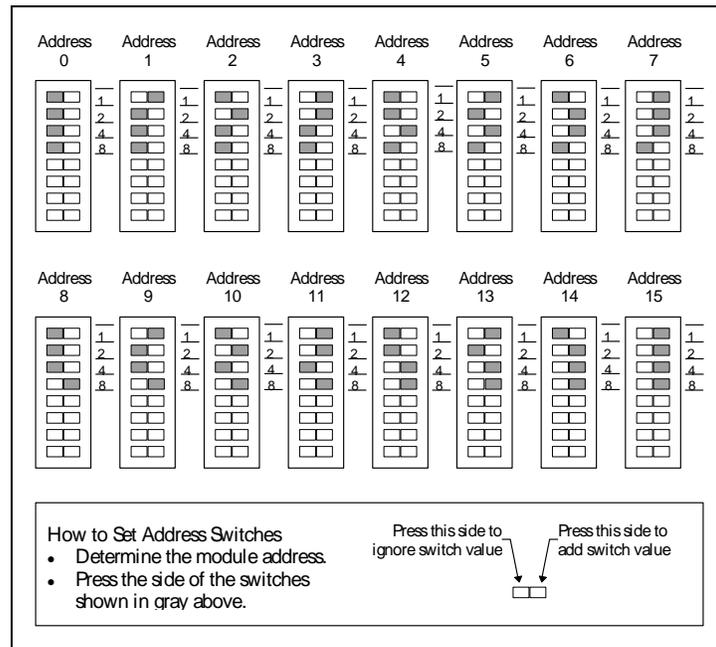


Figure 3: Model 5406 Module Address Switches

Operation and Maintenance

The 5406 and 5407 modules require no routine maintenance or calibration. If a module is not functioning correctly, contact Control Microsystems Technical Support for more information and instructions for returning the module for repair.

LED Indicators

The model 5406 and 5407 digital output modules have one red status LED per I/O point. LEDs are on when the corresponding output is turned on.

The SCADAPack controller module, through the I/O bus, powers the LEDs. The LEDs can be disabled to conserve power. Refer to the controller manual for more information.

Troubleshooting

Condition	Action
Output LED does not come on when output is turned on	Check the LED POWER from the controller module.
Output LED is off, but the output is closed. Output LED is on, but the output is open	The relay has been modified for normally closed operation.
Output LED comes on but the output does not close.	Check if the relay has been modified for normally closed operation. 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.
5406A module does not respond when powered externally.	Check for the presence of 11-30Vdc on pins 1 and 2 of P3 and check jumper link J17 is in the lower or "External Power" position.

Specifications

Disclaimer: Control Microsystems reserves the right to change product specifications. For more information visit www.controlmicrosystems.com.

Outputs	8 relays on 5407 16 relays on 5406/A
Type	sealed mechanical relay Form A (normally open) contacts. Can be modified for Form B (normally closed) contacts.
Contact Ratings	6 amperes at 250VAC resistive loads 6 amperes at 30VDC resistive loads 3.5 amperes at 30VDC/250VAC inductive load with pf=0.4, L/R=7ms, 1/4 HP 125 VAC 3 amperes maximum in Class 1, Div, 2 hazardous locations.
Operating Frequency	18,000 operations/hour mechanically, 1,800 electrically at rated load
Service Life	1,500,000 operations at 0 to 250mA load 600,000 operations at 1A resistive load 100,000 operations at 6A resistive load 300,000 operations at 1A inductive loads with pf =0.4 100,000 operations at 3.5A inductive loads with pf=0.4
Operate Time	10ms maximum, 5ms typical
Release Time	10ms maximum, 2ms typical
Bounce Time	3ms typical
Contact Isolation	1000 VAC
Logic Isolation	1500 VAC
Addressing	DIP switch configurable
5407 Power Requirements	5V at 300mA with all LEDs and all relays energized 5V at 270mA with LEDs disabled and all relays energized
5406/A Power Requirements	5V at 600mA with all LEDs and all relays energized 5V at 540mA with LEDs disabled and all relays energized
5V Bus power	
5406A Power Requirements	5V at 65mA with all LEDs and all relays energized 5V at 30mA with LEDs disabled and all relays energized
External power	4W max. at 11-30Vdc external power

Visual Indicators	5407 - 8 red LEDs 5406/A - 16 red LEDs controlled by the controller for power reduction
Terminations	5407 - two 8 pole, removable terminal blocks 5406 - four 8 pole, removable terminal blocks 5406A has an additional three pins on connector P3 to support external power. 12 to 22 AWG 15 amp contacts
Dimensions	5406/A - 8.37 inch (215mm) wide 5407 - 4.25 inch (108mm) wide 4.625 inch (118mm) high 1.75 inch (44mm) deep
Mounting	7.5 x 35 DIN rail
Packaging	corrosion resistant zinc plated steel with black enamel paint
Environment	5% RH to 95% RH, non-condensing 5406, 5407 -40°C to 60°C 5406A -40°C to 70°C

Approvals and Certifications

5406/7

Safety	<p>Non-Incendive Electrical Equipment for Use in Class I, Division 2 Groups A, B, C and D Hazardous Locations.</p> <p>The 5606 and 5607 are UL Listed to the following standards:</p> <ul style="list-style-type: none"> • CSA Std. C22.2 No. 213-M1987 - Hazardous Locations. • CSA Std. C22.2 No. 142-M1987 - Process Control Equipment. • UL Std. No. 1604 - Hazardous (Classified) Locations. • UL Std. No. 508 - Industrial Control Equipment. <p>The 5606 is CSA certified to the requirements of:</p> <ul style="list-style-type: none"> • CSA Std. C22.2 No. 213-M1987 - Hazardous Locations. • CSA Std. C22.2 No. 142-M1987 - Process Control Equipment. • UL Std. No. 1604 - Hazardous (Classified) Locations. • UL Std. No. 916 – Energy Management Equipment.
Digital Emissions	<p>FCC 47 CFR 15, Subpart B, Class A Verification</p> <p>EN61000-6-4: Electromagnetic Compatibility Generic Emission Standard Part2: Industrial Environment</p> <p>C-Tick compliance. Registration number N15744.</p>
Immunity	<p>EN61000-6-2: Electromagnetic Compatibility Generic Standards Immunity for Industrial Environments</p>
Transient Protection	<p>2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989</p>
Declaration	<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 is not applicable to this product in applications below 30Vdc/60Vac.</p>

5406A

Safety	<p>Non-Incendive Electrical Equipment for Use in Class I, Division 2 Groups A, B, C and D Hazardous Locations.</p> <p>Temperature Code T5 at 70°C ambient</p>
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	<p>UL Listed to the following standards:</p> <ul style="list-style-type: none"> • CSA Std. C22.2 No. 213-M1987 - Hazardous Locations. • CSA Std. C22.2 No. 142-M1987 - Process Control Equipment. • UL Std. No. 1604 - Hazardous (Classified) Locations. • UL Std. No. 508 - Industrial Control Equipment. <p>CSA certified to the requirements of:</p> <ul style="list-style-type: none"> • CSA Std. C22.2 No. 213-M1987 - Hazardous Locations. • CSA Std. C22.2 No. 142-M1987 - Process Control Equipment. • UL Std. No. 1604 - Hazardous (Classified) Locations. • UL Std. No. 916 – Energy Management Equipment.
Digital Emissions	<p>FCC 47 CFR 15, Subpart B, Class A Verification EN61000-6-4: Electromagnetic Compatibility Generic Emission Standard Part2: Industrial Environment C-Tick compliance. Registration number N15744.</p>
Immunity	<p>EN61000-6-2: Electromagnetic Compatibility Generic Standards Immunity for Industrial Environments</p>
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