



SPECTRUM
C O N T R O L S

*An **Allient** Company*

User's Manual Pub. 0300309-02 Rev. A0

Micro800™ Expansion I/O 32-Point 24 V Sink/Source Discrete Output Modules

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

The products and services described in this owner's guide are useful in a wide variety of applications. Therefore, the user and others responsible for applying the products and services described herein are responsible for determining their acceptability for each application. While efforts have been made to provide accurate information within this owner's guide, Spectrum Controls, Inc. assumes no responsibility for the accuracy, completeness, or usefulness of the information herein.

Under no circumstances will Spectrum Controls, Inc. be responsible or liable for any damages or losses, including indirect or consequential damages or losses, arising out of either the use of any information within this owner's guide or the use of any product or service referenced herein.

No patent liability is assumed by Spectrum Controls, Inc. with respect to the use of any of the information, products, circuits, programming, or services referenced herein.

The information in this owner's guide is subject to change without notice.

Limited Warranty

Spectrum Controls, Inc. warrants that its products are free from defects in material and workmanship under normal use and service, as described in Spectrum Controls, Inc.'s literature covering this product, for a period of 1 year. The obligations of Spectrum Controls, Inc. under this warranty are limited to replacing or repairing, at its option, at its factory or facility, any product which shall, in the applicable period after shipment, be returned to the Spectrum Controls, Inc. facility, transportation charges prepaid, and which after examination is determined, to the satisfaction of Spectrum Controls, Inc. to be thus defective.

This warranty shall not apply to any such equipment which shall have been repaired or altered except by Spectrum Controls, Inc. or which shall have been subject to misuse, neglect, or accident. In no case shall the liability of Spectrum Controls, Inc. exceed the purchase price. The aforementioned provisions do not extend the original warranty period of any product which has either been repaired or replaced by Spectrum Controls, Inc.

Table of Contents

IMPORTANT NOTES	II
CHAPTER 1 MODULE OVERVIEW	1-1
SECTION 1.1 GENERAL DESCRIPTION	1-1
SECTION 1.2 OUTPUT SPECIFICATIONS	1-2
SECTION 1.3 HARDWARE FEATURES	1-5
1.3.1 LED Blink Codes	1-6
1.3.2 1.1 LED Operation	1-6
SECTION 1.4 SYSTEM OVERVIEW AND MODULE OPERATION	1-7
CHAPTER 2 INSTALLATION AND WIRING.....	2-1
SECTION 2.1 COMPLIANCE TO EUROPEAN UNION DIRECTIVES	2-1
2.1.1 EMC Directive	2-1
SECTION 2.2 GENERAL CONSIDERATIONS	2-2
2.2.1 Hazardous Location Considerations	2-2
2.2.2 Prevent Electrostatic Discharge	2-3
2.2.3 Remove Power	2-3
2.2.4 Selecting a Location	2-3
SECTION 2.3 MOUNTING	2-4
2.3.1 Minimum Spacing	2-4
2.3.2 Parts List	2-4
2.3.3 Module Description	2-4
2.3.4 Insert Module Next to the Controller	2-5
CHAPTER 3 CONFIGURING THE 2085-OX32-SC USING CCW	3-1
SECTION 3.1 SYSTEM INTRODUCTION	3-1
SECTION 3.2 2085-OX32-SC AOP	3-2
SECTION 3.3 2085-OX32-SC TAB ON CCW	3-5
SECTION 3.4 SOFTWARE VERSIONING	3-8
3.4.1 Software Updates.....	3-8
3.4.2 Startup and Factory Default Conditions.....	3-8
SECTION 3.5 PLC INTERFACES	3-9
3.5.1 Connection Types and Assembly Sizes	3-9
3.5.2 Output Variable Table	3-9
SECTION 3.6 MODULE ERROR	3-10
3.6.1 Module Specific Hardware Errors.....	3-10
3.6.2 Module Specific Configuration Errors.....	3-11
3.6.3 Communication Errors.....	3-12
SECTION 3.7 TECHNICAL ASSISTANCE.....	3-12
SECTION 3.8 DECLARATION OF CONFORMITY	3-13
APPENDIX A MANUALLY IMPORTING AN AOP	A-1
INDEX	I-1

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 control systems that use the Micro800™ 32-Point 24 V Sink/Source Discrete Output Modules.

NOTE



Before you access any equipment or begin to install any IO modules, review all safety material and warnings in the Micro830, Micro850, and Micro870 Programmable Controllers User Manual. Be sure to review the warnings provided in this document before you start installing a module in a system.

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 Micro800™ 32-Point 24 V Sink/Source Discrete Output Modules.

Related Documentation

The table below provides a listing of publications that contain important information about Allen-Bradley Micro800™ Expansion I/O Module systems.

For	Refer to this Document	Allen-Bradley Pub. No.
Product outline	Micro850 Programmable Logic Controller Product Profile	2080-PP003
Selection information	Micro800 Programmable Controllers Family Selection Guide	2080-SG001
General instructions for using	Micro800 Programmable Controllers General Instructions	2080-RM001
Installing an external power supply	Micro800 External AC Power Supply Installation Instructions	2080-IN001

For	Refer to this Document	Allen-Bradley Pub. No.
	Micro870 24V DC Expansion Power Supply Installation Instructions	2085-IN008
Installing 24-point PLC	Micro850 24-Point Programmable Controllers Installation Instructions	2080-IN007
Installing 48-point PLC	Micro850 48-Point Programmable Controllers Installation Instructions	2080-IN008
Installing 24-point PLC	Micro870 24-Point Programmable Controllers Installation Instructions	2080-IN012
User manual information	Micro830, Micro850, and Micro870 Programmable Controllers User Manual	2080-UM002
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: https://spectrumcontrols.com	

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
- United Kingdom 01-908-635-230
- Australia 1-800-809-929
- Mexico 001-888-365-8677
- Brazil 55-11-3618-8800
- Europe +49-211- 41553-630

or send an email to support@spectrumcontrols.com




Documentation

If you would like a manual, you can download a free electronic version from the Internet at 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.

WARNING 	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.
ATTENTION 	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.
NOTE 	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
- Output specifications
- Data formats
- Hardware features
- System overview and module operation

The Micro800™ 2085-OX¹32-SC is a 32-Point, 12/24 VDC digital source or sink output module designed to expand the local I/O capability of Rockwell Automation Micro850 and Micro870 Systems over its Expansion I/O buses. The minimum system requirement in which an Expansion I/O Module can be installed is a Micro850 or Micro870 Controller and a controller power supply. The number of 2085-OX32-SC modules that can be installed with a Micro850/870 PLC is based on the current controller firmware revision and CCW software revision.

Section 1.1

General Description



¹ X refers to the 2085-OB32-SC (source) or a 2085-OV32-SC (sink) I/O module where information covers both modules. Where differentiation is needed, the modules are referred to by name.



The discrete module supports:

- 32 Discrete Sink Output Channels (applies to 2085-OV32-SC)
- 32 Discrete Source Output Channels (applies to 2085-OB32-SC).

Both discrete modules control discrete outputs based on commanded outputs from a controller. The controller monitors to see if any of the 32 output channels is to be activated:

- If a channel is determined to be commanded to be ON, the 2085-OB32-SC module provides for an electronic switch to close between the channel output control pin and the +24 VDC POWER pin on the terminal block.
- For the 2085-OV32-SC, the switch close is between the channel output pin and the GROUND return pin on the terminal block.

The state of each output channel is displayed on the front panel LEDs.

All outputs have fault tolerance and ESD protection to avoid damage to circuitry on the board. The modules use 50 VAC working Reinforced Insulation between the output channels and the backplane, and between the output and the Chassis GND. 50 V working Basic Insulation is provided for group-to-group isolation.

Each output channel can be directly controlled via Rockwell-provided Connected Component Workbench (CCW) software for Micro850 and Micro870 family controllers once the controller is in run mode. Pre-channel configuration is not required.

The module is tested before shipping. After installation, during startup, devices begin operation in a useable condition without a requirement for pre-channel configuration. The module begins operation with all outputs off. The module normally requires no further user intervention. However, if the module experiences a hard fault condition, you may need to cycle power or pull the module from the rack.

Section 1.2

Output Specifications

The 2085-OX32-SC modules have the following output specifications:

Table 1-1. Output/Performance/Environmental Requirements

Output Description	Value
Operating Temperature	-20 °C to 65 °C (-4 °F to 149 °F)
Storage/Non-Operating Temperature	-40 °C to 85 °C (-40 °F to 185 °F)
Operating Humidity	5% to 95%, non-condensing
Storage/Non-Operating Humidity	5% to 85%, non-condensing
Vibration/Operating	10 Hz to 500 Hz, 2 G, 0.030 max peak-to-peak
Operating Shock	25 G, peak acceleration, 11 ms pulse, half sine
Storage/Non-Operating Shock	25 G peak acceleration, (35 G for panel mount), 11 ms pulse, half sine
Pollution Level	Meets Pollution Degree 2 requirements.
Outputs per module	32
12/24 VDC customer supply voltage	10.5 VDC minimum, 30 VDC maximum
ON-state voltage	10 VDC minimum ON under all conditions
	24 VDC nominal under all conditions
	30 VDC maximum
ON-State Voltage Drop	Less than 0.5 VDC maximum
ON-state current	1 mA minimum at 10 VDC
	0.5 A maximum steady state (8 A per channel group)
Off-state leakage current	Less than 0.5 mA per channel.
Turn on/off time, maximum (backplane to screw)	3 ms
Surge current	2 A for 25 ms, repeatable every 2 seconds
	10 A maximum per channel group
Reverse voltage protection	Yes, group protection
Inductive kickback protection	Yes. Diode across load to protect against load coil back EMF.
Output to backplane isolation	50 VAC working Reinforced isolation tested at 2 kVDC for 1 minute
Group-to-Group isolation	50 VAC working Basic isolation tested at 1300 VDC for 1 minute.
Output to Chasis GND isolation	50 V working Reinforced isolation tested at 2 kVDC for 1 minute.
Power Requirements	
Bus +5 VDC (4.75 V to 5.4 V)	70 mA maximum
Bus +24 VDC (19.9 V to 26.4 V)	55 mA maximum

Output Description	Value
Heat Dissipation	OB32: 5.5 W maximum (at full load) OV32: 4 W maximum (at full load)
Inrush current	Less than 150 mA at 5 V Less than 400 mA at 24 V
RoHS	Meets European RoHS component standards (January 2015 and earlier).
REACH	Meets European REACH 7 requirements.
Wire Installation	
Wire size	#16 to #28 AWG
Wire Strip Length	0.375 in.
Recommended Tightening Torque:	0.25 N-m (2.2 lb-in) (Use hand tool to tighten; see warning on page 2-7 regarding risk of over-tightening.)
Module Dimensions H×D×W (With RTBs installed, RTB extends the total depth approximately 2 mm from 87 mm to 89 mm.)	110 mm × 89 mm × 51 mm. (4.33 in × 3.54 in × 2.00 in) 90 mm × 89 mm × 44.5 mm (excluding mounting feet, DIN rail latches, or the plastic that extends into the adjacent module once installed). (3.54 in × 3.5 in × 1.75 in)

Table 1-2. EMC Specification Table

Environmental Tests	Test Level Limits
Radiated Emissions	(Enclosure) Class A, 30 MHz – 1 GHz
Conducted Emissions	Group 1, Class A (AC Mains), 150 kHz – 30 MHz
ESD immunity (Performance Criteria B)	6 kV Indirect (Coupling Plate) 6 kV Contact Discharge (to points of initial contact) 8 kV Air Discharge (to points of initial contact)
Radiated RF immunity (Performance Criteria A)	10 V/M with 200 Hz sine-wave 50% Pulse 100% AM at 900 and at 1890 MHz 10 V/M with 1 kHz sine-wave 80% AM from 80...2000 MHz 10 V/M with 1 kHz sine-wave 80% AM from 2000...6000 MHz
EFT/B immunity (Performance Criteria B)	Signal Ports: ± 2 kV at 5 kHz for 5 minutes, Criteria B Power Ports: ± 2 kV at 5 kHz for 5 minutes, Criteria B

Environmental Tests	Test Level Limits
Surge transient immunity (Performance Criteria B)	Signal Ports: ± 2 kV line-earth {CM} at 42 Ω Power Ports ± 2 kV CM at 12 Ω ± 1 kV DM at 2 Ω
Conducted RF immunity (Performance Criteria A)	10 V RMS with 1 kHz sine wave 80% AM from 150 kHz...80 MHz on signal and power ports
Magnetic Field (Performance Criteria A)	30 Arms/m
AC Mains Voltage Dips, Interruptions and Variations	Follow the 61000-4-11.

Table 1-3. Safety Test Specification Table

Safety Tests	Industry Standards
UL Safety	UL 61010-2-201 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-201: Particular Requirements for Control Equipment (NRAQ, NRAQ7) CAN/CSA C22.2 No. 61010-1-12 (Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements)
UL Hazardous Locations	ANSI/ISA-12.12.01 Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous (Classified) Locations (NRAG) CSA C22.2 No. 213-M1987 - Non-incendive Electrical Equipment for use in Class I Division 2 Hazardous Locations - March 1987 (NRAG7) Temp code T4 or better, Pollution degree 2, gas groups a,b,c, & d
CE EMC Directive	EN 61131-2 Programmable Controllers: Third Edition 2007-02, Clause 8, Zones A&B EN 61000-6-2: Generic Industrial Immunity EN 61000-6-4: Generic Industrial Emissions
UKCA	Electromagnetic Compatibility Regulations 2016 BS EN 61131-2, BS EN 61000-6-4, BS EN 61000-6-2
FCC	27 CFR Part 15, Class A
CMIM	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

Section 1.3

Hardware Features

Channels are all outputs. To actively control the state of the outputs, you must set up a program within the PLC and transition the Controller to **Run** mode.

1.3.1 LED Blink Codes

The firmware uses the following LED blink codes to show the state of the outputs. All 32 LEDs are yellow.

1.3.2 1.1 LED Operation

Once the PLC is in **Run** mode, any module channel that is set to the ON state, shows a solid yellow LED for that channel. If the output is set to the OFF state, the LED for that channel will be off.

Table 1-4 LED Blink Codes

Indicator	Name and Description	Resolution
OFF	<p>Power-up, Major Hardware Fault, or the channel is commanded to OFF.</p> <p>The module is just powering up and not initialized yet or there is a major hardware fault causing the module to be held in reset by the PLC. LED control is not possible for this condition and will remain off. If the module has already successfully entered run mode than the channel may just be OFF.</p>	<p>There are three likely conditions when the channel LED is OFF:</p> <ul style="list-style-type: none"> • The module is just powering up and not initialized yet. • The output channel is set to disabled (off) by the user when the controller is in Run mode with no fault occurring. • There is a major hardware fault that is causing the module to be held in reset by the controller. LED control is not possible for this condition and will remain off. Once this happens, the controller transitions to Program mode and the module is not transmitting output(s) as a device protection. <p>If a fault occurs, try to power cycle the entire system to clear the fault indications shown on the controller and CCW program. If you cannot clear the fault, the module will have to be replaced.</p>
Sweeping	<p>Program/Offline Mode</p> <p>Each LED is turned on and off sequentially in a sweeping pattern indicating that the module is in Program mode. Outputs are disabled.</p>	<p>Set the controller to RUN mode. This will also be seen during power-on while it is initializing.</p>
ON	<p>Run Mode</p> <p>Channel LED will be solid yellow if the corresponding channel is commanded to be ON.</p>	<p>Module is initialized, and no hardware fault has been detected. Module is in Run mode and channel is ON.</p>
2	<p>Serial Number Invalid or Corrupted</p> <p>The MCU flash memory may be corrupted.</p>	<p>Serial number must be programmed. Please return the module to Spectrum Controls, Inc. for reprogramming</p>

Indicator	Name and Description	Resolution
3	Hardware Fault Blinking all channel LEDs for three times. You see this when the CCW program is trying to connect to the module but the 2085-ECR is not installed properly.	Power off to reinstall the 2085-ECR properly. Try to power-cycle the whole system and clear the fault indications on PLC and CCW. If unsuccessful, the module must be replaced.

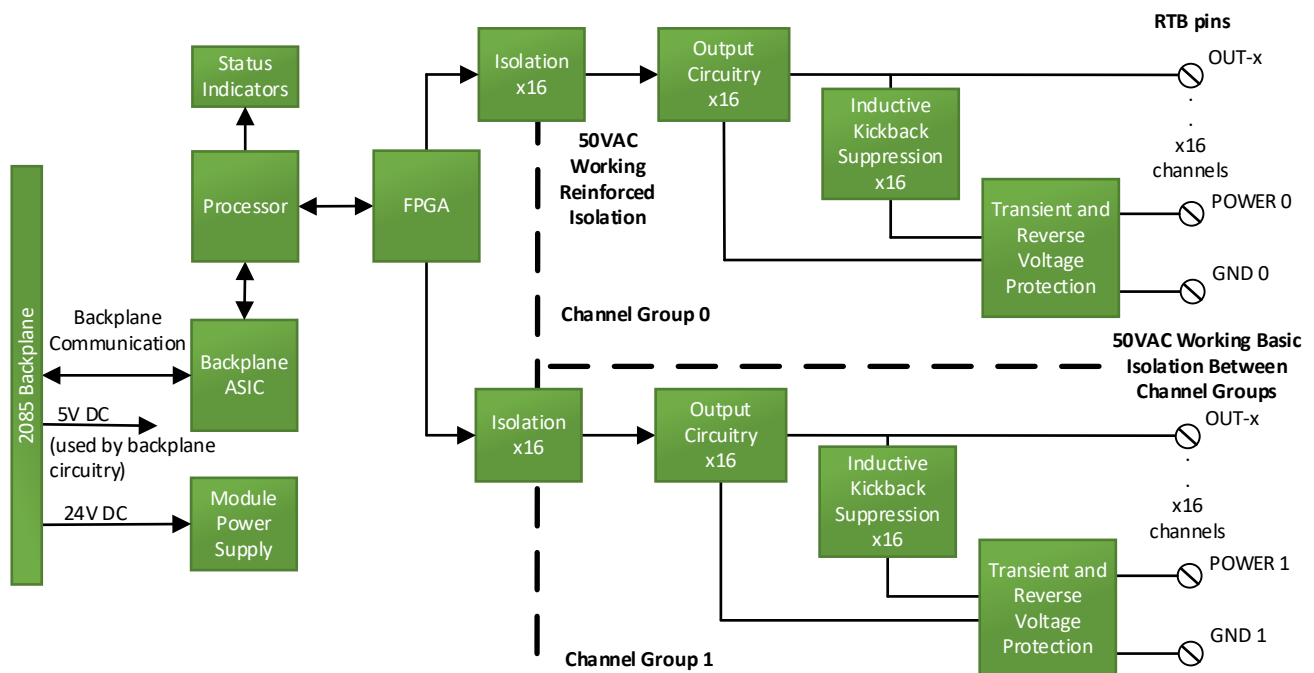
Section 1.4

System Overview and Module Operation

The 2085-OX32-SC modules are expected to operate indefinitely. They do not require periodic maintenance or calibration. The 24 VDC field power supply must be present to allow for outputs from the module channels.

The module communicates to the controller through the bus interface. The module also receives 5 and 24 VDC through the bus interface.

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.


2.1.1 EMC Directive

This product 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 61000-6-4 Electromagnetic compatibility (EMC)–Part 6-4: Generic standards–Emission standard for industrial environments.
- EN 61000-6-2 Electromagnetic compatibility (EMC)–Part 6-2: Generic standards–Immunity 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.

WARNING 	The backplane power and each field power of the device shall only be supplied by Isolated Secondary Limited Energy Low Voltage sources.
---	---

The module receives power through the bus interface from the +5 VDC (4.75 V to 5.4 V)/±24 VDC (19.9 V to 26.4 V) system power supply, and a 24 VDC field power supply. Both must be present for the module to operate.

Backplane current ratings: + 5 V rail is 70 mA maximum at 5 VDC; +24 V rail is 55 mA maximum at 24 VDC. Power rating for OB32 is 5.5 Watts maximum (at full load); for OV32 is 4 Watts max. (at full load):

5 VDC	24 VDC
70 mA	55 mA

The maximum voltage to be provided by the user power supply is 30 VDC. The minimum voltage provided by the user power supply is 10.5 VDC. 12/24 VDC from the user is provided to the module on terminal block pins marked PWR0 and PWR1, and GND0 and GND1. Two pins for each power line are provided. These pins are not connected, they are isolated from each other for group isolation.


Section 2.2

General Considerations

The 2085-OX32-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 2²).


2.2.1 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.


WARNING	EXPLOSION HAZARD
	<ul style="list-style-type: none">• 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.• Do not connect or disconnect components unless power has been switched off or the area is known to be non-hazardous.• This product must be installed in an enclosure.• 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.

² Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

2.2.2 Prevent Electrostatic Discharge

<p>WARNING</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"> • Touch a grounded object to discharge static potential. • Wear an approved wrist-strap grounding device. • Do not touch the bus connector or connector pins. • Do not touch circuit components inside the module. • If available, use a static-safe workstation. • When it is not in use, keep the module(s) in a static-shield bag.
---	--

2.2.3 Remove Power

<p>WARNING</p> 	<p>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.</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"> • Sending an erroneous signal to your system's field devices, causing unintended machine motion. • Causing an explosion in a hazardous environment. • 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.
---	---

2.2.4 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.

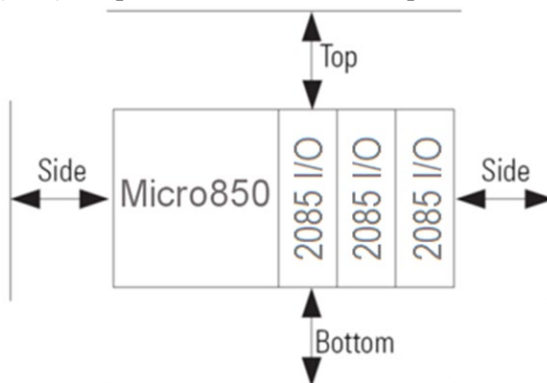
In addition, route wiring away from any high-voltage I/O wiring.

Section 2.3 Mounting

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

2.3.1 Minimum Spacing

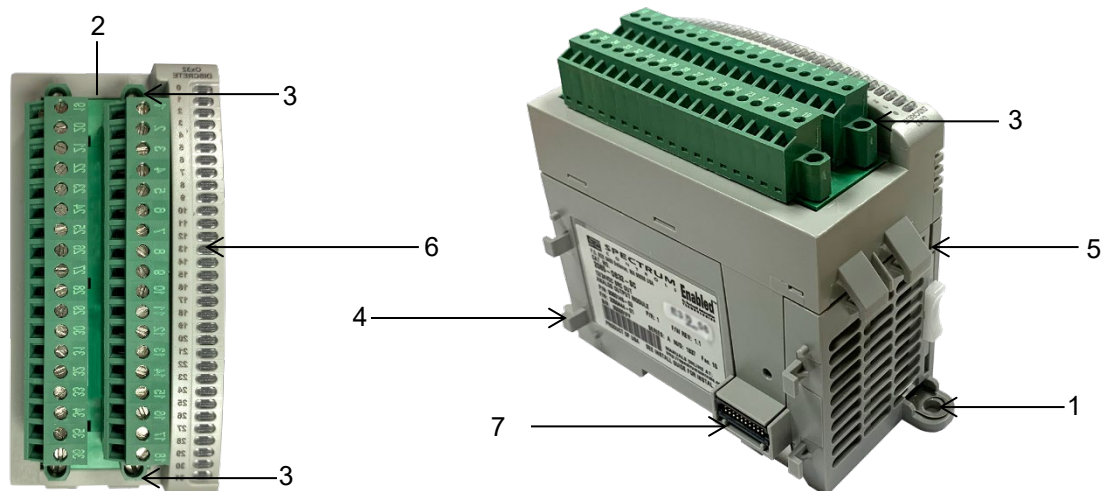
Maintain spacing from enclosure walls, wire ways, adjacent equipment, etc. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown:



2.3.2 Parts List

Your package contains one Micro800 Expansion I/O 2085-OX32-SC Module and one Quick Start Guide.


2.3.3 Module Description



	Description		Description
1	Mounting screw hole/mounting foot	5	DIN rail mounting latch
2	Removable Terminal Block (RTB)	6	I/O Status LEDs
3	RTB hold down screws	7	Bus Connector (2, Right and Left)
4	Module interconnect latch		


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>NOTE</p> 	<ul style="list-style-type: none"> • 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. • 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. • Do not wire more than 2 conductors on any single terminal. • 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.
--	---

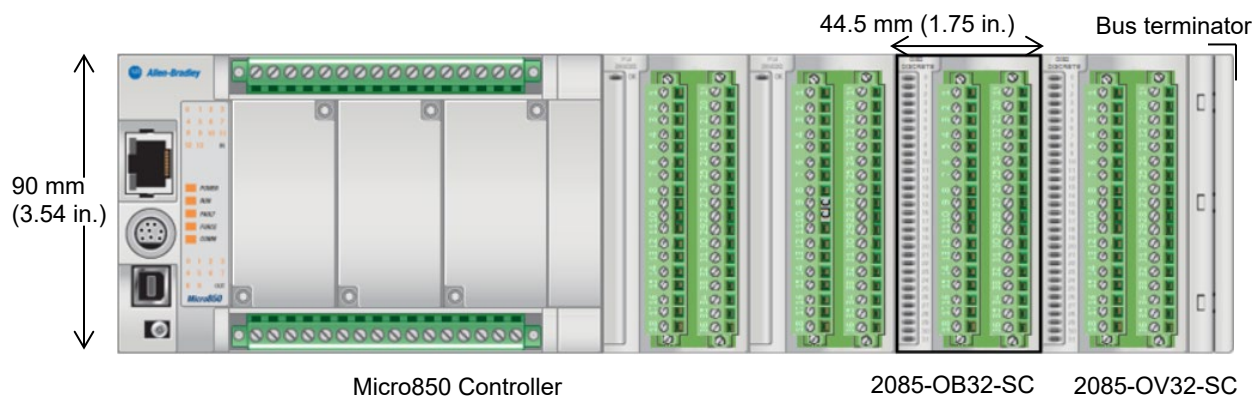
2.3.4 Insert Module Next to the Controller

Follow the instructions to insert and secure the expansion I/O module to the controller:


<p>NOTE</p> 	<p>The module expansion may only be mounted horizontally.</p>
--	---

<p>NOTE</p> 	<p>For environments with greater vibration and shock concerns, use the panel mounting method, instead of DIN rail mounting.</p>
--	---

Mounting Dimensions and DIN Rail Mounting



You can install the module on DIN rails of dimension 35 mm × 7.5 mm × 1 mm (EN 50 022-35×7.5), or on a panel.

<p>WARNING</p> 	<p>Hazard of intermittent grounding.</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>
---	--

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.


Panel Mounting

The preferred mounting method is to use two M4 (#8) screws per module. Hole spacing tolerance is ± 0.4 mm (0.016 in.). For mounting dimensions, refer to the Micro830, Micro850, and Micro870 Programmable Controllers User Manual 2080-UM002:

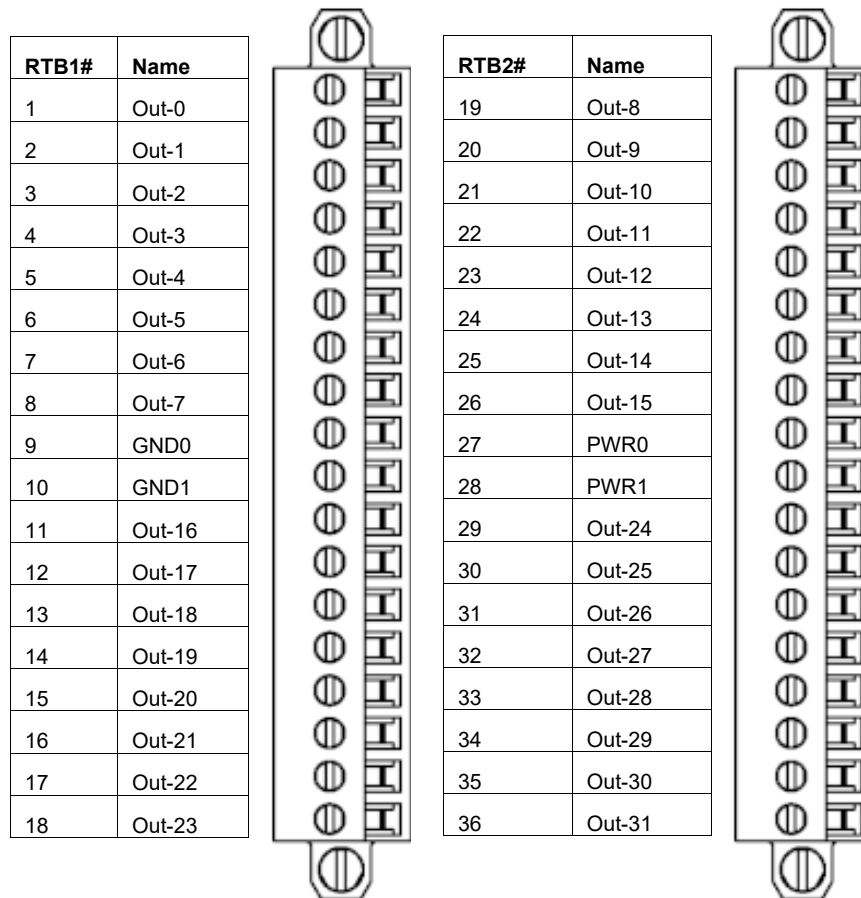
1. Place the module next to the controller against the panel where you are mounting the module.
2. Marking drilling holes through the mounting screw holes and mounting feet, and then remove the module.
3. Drill the holes at the markings.

4. Replace the module and mount it. Leave the protective debris strip in place until you are finished wiring the module, and any other devices.

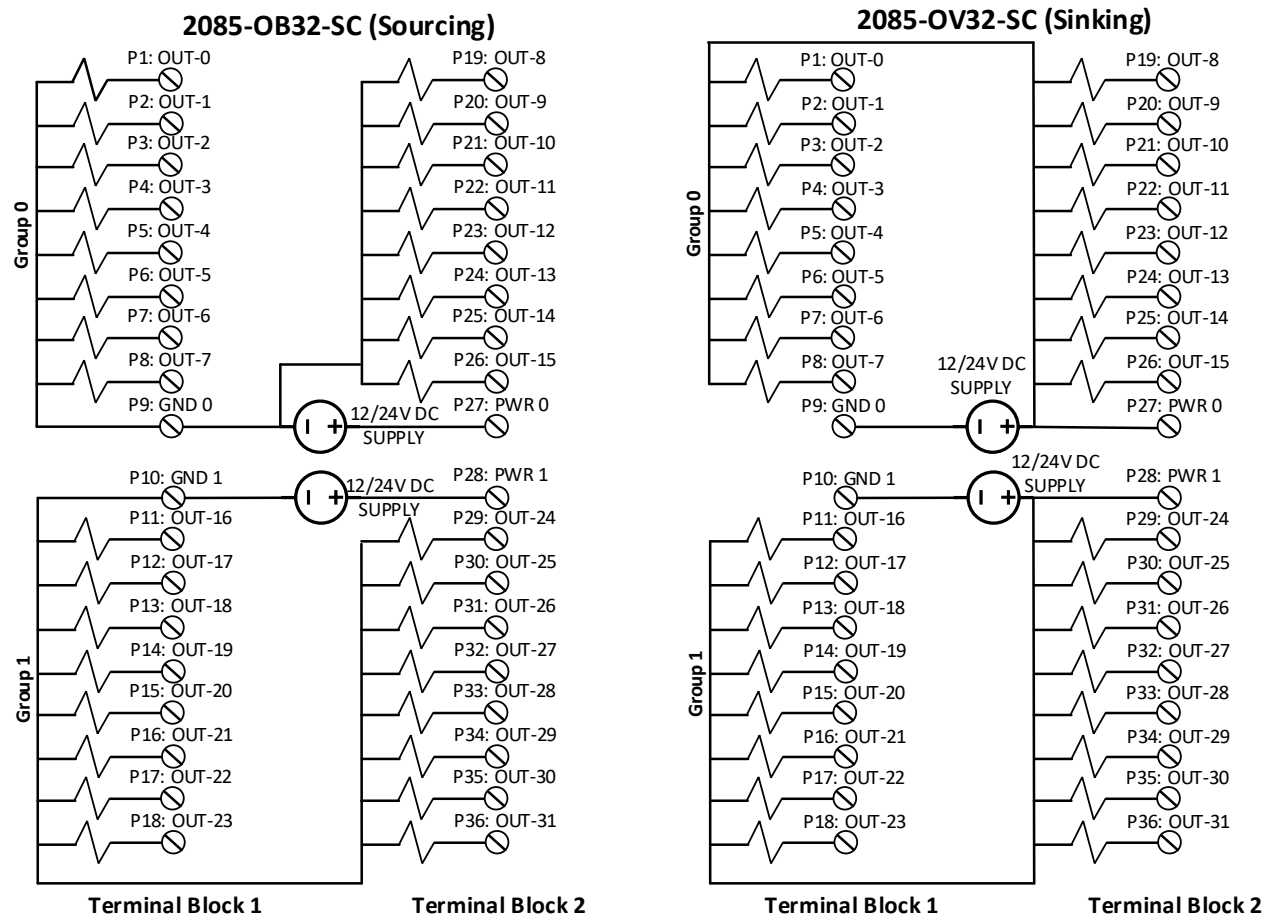
Wiring Diagram

WARNING 	Hazard of damage to the terminal connector. The Spectrum Controls RTB hold down and terminal screws must be tightened by hand using the guidelines. They must <u>not</u> be tightened using a power tool. Use a screwdriver of 0.8×2 mm and tighten to no more than 0.25 N-m (2.2 lb-in) torque. Failure to follow these guidelines may result in damage to your connector.
---	---

Wire the module using the following images, which explain the layout of the double-row, 36-pin terminal block, and the two, 24 VDC field power terminal pins for the Micro800 Expansion I/O 2085-OX32-SC modules:



Example wiring diagrams showing the channel loads are shown below.



Chapter 3

Configuring the 2085-OX32-SC Using CCW

This chapter covers the following subjects:

- How to use Connected Components Workbench (CCW) and, optionally, ModuleConfigConverter.exe software to configure the Module.
- Analog Data and Status settings.
- Data Links settings.
- Setting configuration parameters and associated values.

Section 3.1 System Introduction

You use CCW software (v 9.00.00 and above) to configure the 2085-OX32-SC Expansion I/O Modules. Your controller firmware must be at v. 9.011 and above as well. Starting from CCW version 11.00.00 and later, the software provides a module-specific Add-On Profile (AOP) to operate the module. The process for manually importing AOP to CCW is no longer required.

The Micro800 Controller (Bus master) subsystem is located at the left end of the bus. This subsystem is comprised of:

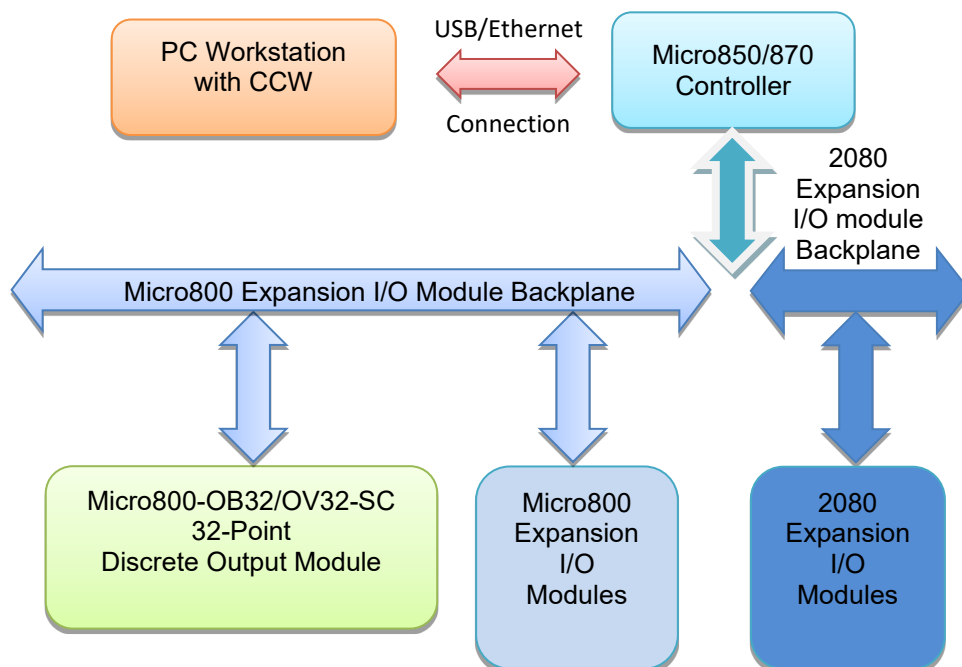
- Micro800 Controller.
- Micro800 Expansion I/O Modules.
- 2085-ECR Bus Terminator.

Optional:

- 2080-PS120-240VAC Power Supply (separate module or built-in the main controller).
- 2080 Expansion Modules.
- 2085-EP24VDC Expansion Power Supply for Micro870 Controller with more than four Micro800 Expansion I/O Modules installed.

Section 3.2

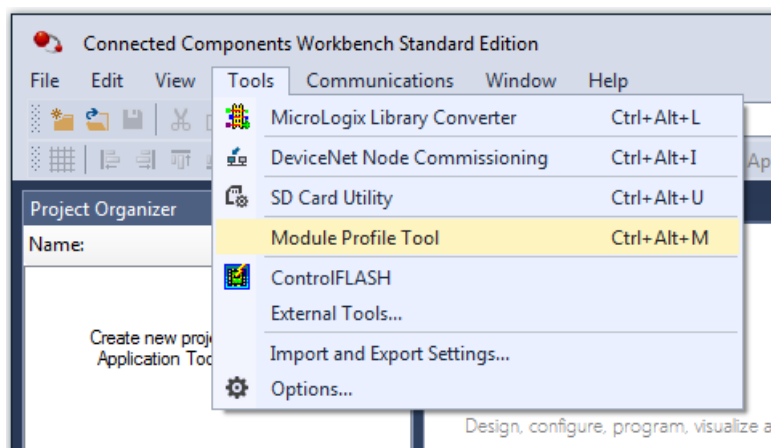
2085-OX32-SC AOP



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

To view information about the AOP:

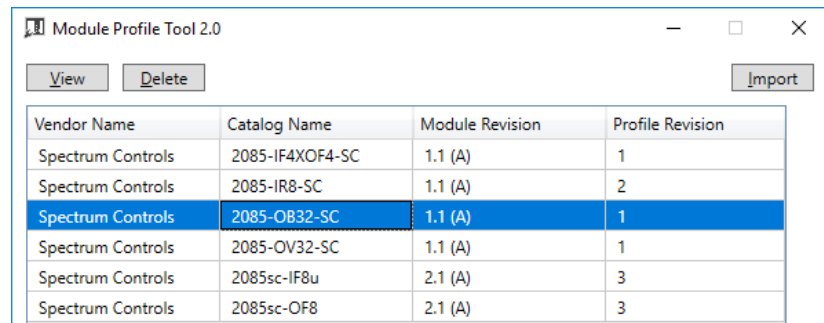
1. Use RA's Module Profile Tool 2.0. This tool may be launched from within CCW by selecting the **Module Profile Tool** option from the CCW Tools menu:



2. When prompted by Windows User Account Control, to confirm that you wish to run the program, click **Yes** button.

If necessary, confirm with the Windows operating system that you wish to run the software.

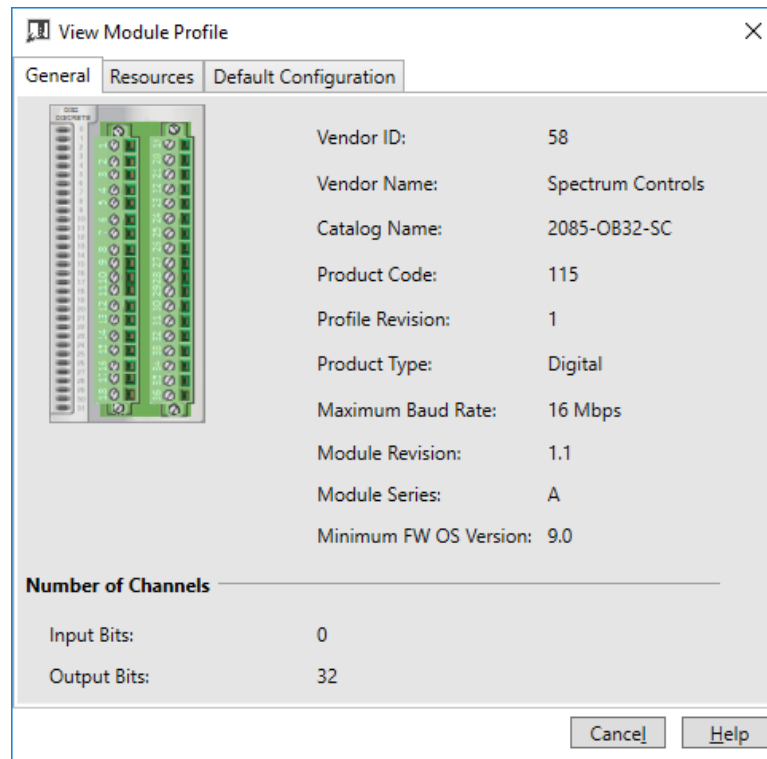
The Module Profile Tool dialog appears:



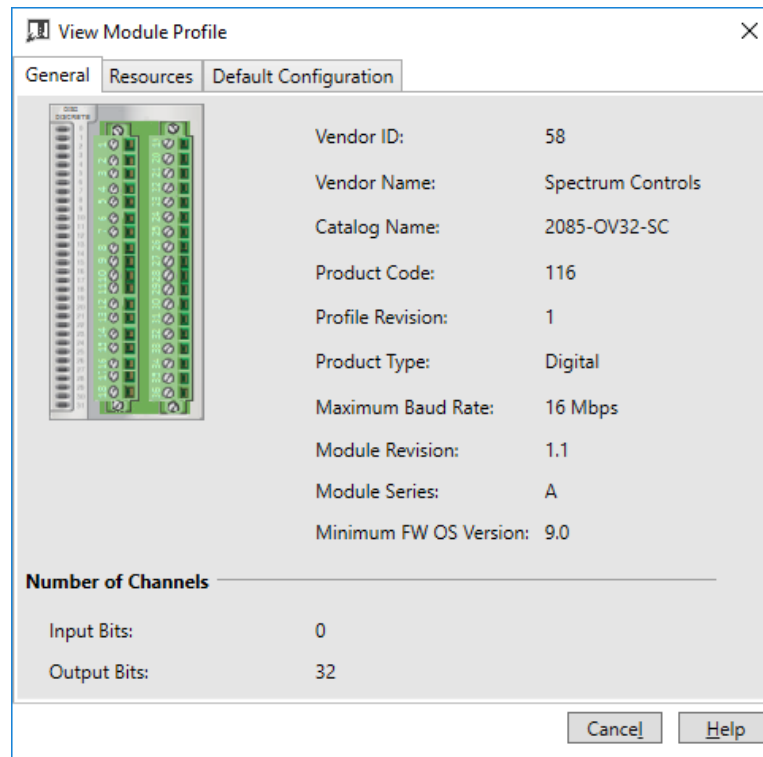
3. Select the row showing the module catalog name (either 2085-OB32-SC or 2085-OV32-SC), and then click the **View** button.

The View Module Profile window appears:

2085-OB32-SC:



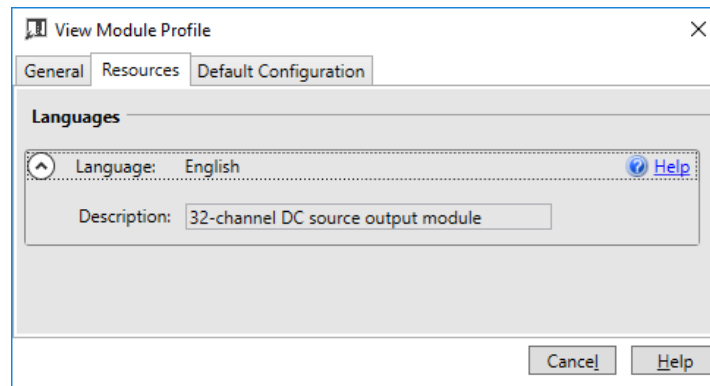
2085-OV32-SC



The first tab of the window provides the module identity information. This information is described in greater detail in **Module Identity**, later in this section.

4. To view software language availability, module description, and a help file for the module, click the **Resources** tab.

The Resources tab appears:

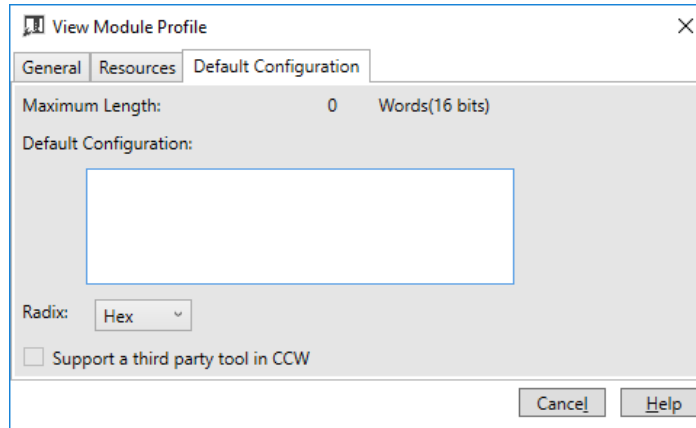


The window lists the language chosen for the module, and the module description. You may also use this tab to access the help file provided for the module.

NOTE

You can directly control channel output through the CCW output variable or your own ladder program. No default configuration is required. The modules do NOT use the third-party, MCC tool for configuration.

- To view default configuration information, click the **Default Configuration** tab:



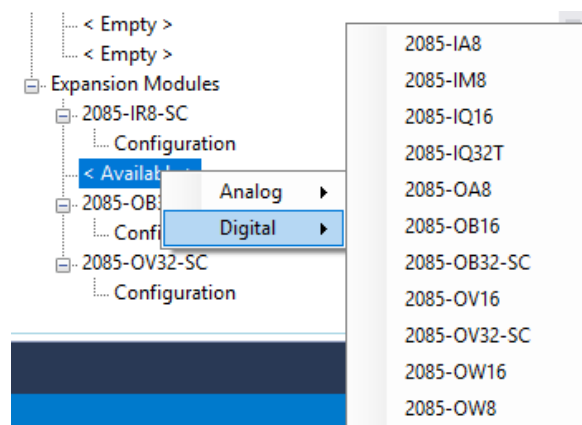
The modules do not use the third-party, MCC tool for configuration.

Section 3.3 2085-OX32-SC Tab on CCW

Before you start, if needed, install the latest version of Rockwell Automation's Connected Components Workbench (CCW) Standard Edition.

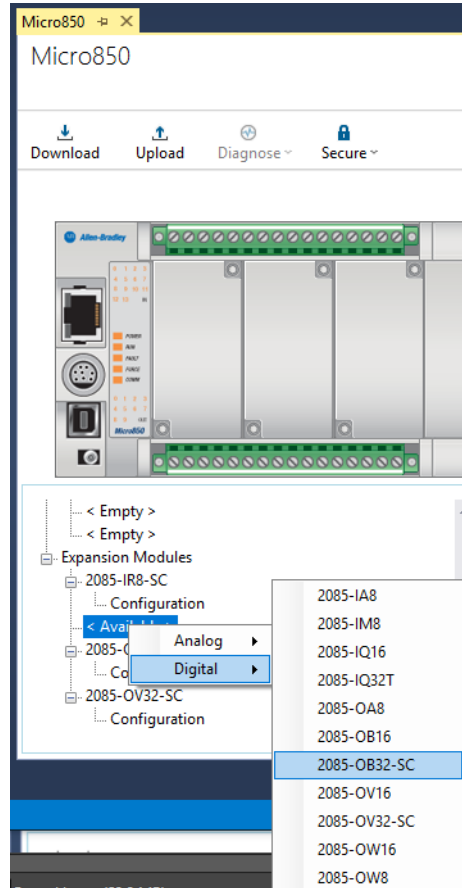
NOTE

Using the Module Profile Tool to import the 2085-OX32-SC AOP into CCW software is necessary only if you are using a CCW version earlier than 11.00.00. For information on manually importing an AOP file, see Appendix A. For Version 11.00.00 and later, the modules are already available as a selection from the CCW Expansion Modules drop-down menu:



To add the module(s) to your project, and see the module variables on the CCW tab:

1. From your CCW project, load the module AOP to a first **Available** slot from the Expansion Modules drop-down list:



2. Once the module AOP is loaded, to view the associated variables, click the **Module Catalog Name** option.

The same variables can also be found on the CCW Global Variables Tab.

NOTE



Discrete output states can be written to Global Variables `_IO_Xx_DO_yy`, where `x` represents the expansion slot number 1...3 for Micro850 controller and slot number 1...8 for Micro870 controller and `yy` represents the channel number 00...31.

Discrete output states can be read from Global Variables `_IO_Xx_ST_yy`, where `x` represents the expansion slot number 1...3 for Micro850 controller and slot number 1...8 for Micro870 controller and `yy` represents the channel number 00...31. Additional information is provided in the next section of this manual.

Expansion Modules - 2085-OB32-SC

Vendor Name: Spectrum Controls [Help](#)

Description: 32-channel DC source output module

Product Type: Discrete I/O

Revision: 1

Input	Output
	Output 0: IO_X3_DO_00
	Output 1: IO_X3_DO_01
	Output 2: IO_X3_DO_02
	Output 3: IO_X3_DO_03
	Output 4: IO_X3_DO_04
	Output 5: IO_X3_DO_05
	Output 6: IO_X3_DO_06
	Output 7: IO_X3_DO_07
	Output 8: IO_X3_DO_08
	Output 9: IO_X3_DO_09
	Output 10: IO_X3_DO_10
	Output 11: IO_X3_DO_11
	Output 12: IO_X3_DO_12
	Output 13: IO_X3_DO_13
	Output 14: IO_X3_DO_14
	Output 15: IO_X3_DO_15
	Output 16: IO_X3_DO_16
	Output 17: IO_X3_DO_17
	Output 18: IO_X3_DO_18
	Output 19: IO_X3_DO_19
	Output 20: IO_X3_DO_20
	Output 21: IO_X3_DO_21
	Output 22: IO_X3_DO_22
	Output 23: IO_X3_DO_23
	Output 24: IO_X3_DO_24
	Output 25: IO_X3_DO_25
	Output 26: IO_X3_DO_26
	Output 27: IO_X3_DO_27
	Output 28: IO_X3_DO_28
	Output 29: IO_X3_DO_29
	Output 30: IO_X3_DO_30
	Output 31: IO_X3_DO_31

- To view the configuration tab, click the **Configuration** option. This option is NOT editable for discrete modules. If you try to enter information, the frame turns red to indicate an error:

2085-OB32-SC - Configuration [Help](#)

Maximum Length: 0 Words (16 bit)

Configuration:

Radix: Hex

Section 3.4 Software Versioning

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

The shipped software version begins at version 1.1.

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

3.4.1 Software Updates

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

3.4.2 Startup and Factory Default Conditions

During startup, all outputs are OFF until valid communications with the Controller has been established and the Controller has been placed in Run mode.

There is no input data communication and no signal outputting before the controller goes into Run mode. All channels are OFF if the module is not in Run mode. User output controls are only loaded or re-loaded when Run mode is detected. With the controller in Run mode, and no-fault state in the module, the module sets the appropriate output channel to the state specified in the output variables where 1=ON, and 0=OFF as Boolean data type control. If a hardware fault is detected, all outputs are turned OFF, and the status variables indicate the last module and channel status.

Section 3.5 PLC Interfaces

The 2085 platform stores the following values in the Vendor ID, Product_Type, Product_Code, Series_Rev, and Mod_Features arrays:

Parameter	OV32-SC	OB32-SC
Vendor ID	58 (Spectrum Controls)	58 (Spectrum Controls)
Product Type	7 (Discrete)	7 (Discrete)
Product Code	116	115
Series Rev	A	A
Module Catalog String	2085-OV32-SC	2085-OB32-SC

3.5.1 Connection Types and Assembly Sizes

The size of each assembly is listed in the table below. Each word takes 2 bytes:

Table	Size (words)	Notes
Configuration	0	Module does not require a configuration
Input	3	
Output	2	

3.5.2 Output Variable Table

The read-only status variable is located on the CCW Global Variables tab in visual checkbox format, and in `_IO_Xx_ST_yy` string format, where:

- *x* represents the expansion slot number 1...3 for the Micro850 controller and slot number 1...8 for the Micro870 controller
- *yy* represents the generic number from 00 to 47.

Channel Status (CCW Var: `_IO_Xx_ST_31:00`)

Channel status variable is a replica of the reading from FPGA responses. Whenever any channel control is enabled by the user during RUN mode, the corresponding channel status variable is also checked as enabled.

Module Status (CCW Var: `_IO_Xx_ST_47:32`)

The module status variables used in this range are reserved for indicating different module behaviors as listed below:

CCW Var Index	Bit	Name	Description
<code>_IO_Xx_ST_32</code>	0	FPGA	FPGA Fault When enabled, indicates there is a module communication failure over to the FPGA chip. This is a hardware fault.
<code>_IO_Xx_ST_33</code>	1	BO	Module Power Brownout When enabled, indicates there is a power supply failure to the module microprocessor and FPGA. This is a hardware fault.
<code>_IO_Xx_ST_39:34</code>	7:2	Not Used	Variables marked as Not Used remain disabled.

CCW Var Index	Bit	Name	Description
_IO_Xx_ST_40	8	SN	Invalid Serial Number Data The stored serial number checksum is corrupt or invalid. The module must be factory calibrated before it will operate normally.
_IO_Xx_ST_46:41	14:9	Not Used	Variables marked as Not Used remain disabled.
_IO_Xx_ST_47	15	MF	Module Fault If one of the above three status variables is set to enabled, this variable will be enabled as a global Module Fault. All channel outputs will be turned off for safety.

Channel Control (CCW Var: **_IO_Xx_DO_31:00**)

You use the Channel control variable to enable or disable each channel output.

The variable is located on the CCW Global Variables tab in visual checkbox format and in **_IO_Xx_DO_yy** string format, where:

- *x* represents the expansion slot number 1...3 for Micro850 controller and slot number 1...8 for Micro870 controller
- *yy* represents the channel number 00...31.

Section 3.6 Module Error

The module notifies the host PLC of critical and non-critical errors. The Micro850 or Micro870 PLCs can generate a series of 0xF2xy errors specifically for the installed module.

If any of the following faults occur, refer to the Configuration table to use appropriate values:

3.6.1 Module Specific Hardware Errors

If you attempt to trigger or cause a hardware error, the CCW software generates a high-level hardware fault with an extended code for details. The connection status is faulted and disconnected. The follow table contains some examples of module-specific hardware faults that can be detected and shown in CCW:

Fault Code	Extended Fault Code	Error Description
0xF29z* ³	0×301	MCU board power brownout
	0×302	FPGA communications error

The extended fault code is only available when connecting with the Micro850 Series A & B PLCs and Micro870 Series A PLC with its PLC firmware revision 11.011 and above. The extended fault code will show as 0×0000 if connecting with the Micro850 Series A PLC and its PLC firmware revision 10.011 and under.

³ z indicates the slot number of the expansion I/O. If z=0, then the slot number cannot be identified

The following example shows module hardware errors in CCW version 12:

Recoverable Fault

Index	Fault Code	Fault Location	Description
1	0xF291	N/A	Expansion IO Module Fault.The extended fault code is 0x0304.
2	0xF291	N/A	Expansion IO Module Fault.The extended fault code is 0x0000.

Non-recoverable Fault

Index	Fault Code	Fault Location	Description
-------	------------	----------------	-------------

3.6.2 Module Specific Configuration Errors

If you attempt to set the fields in the configuration file to invalid (unsupported) values, the module generates a non-critical error:

- The CCW connection status is faulted
- The module is disconnected as Offline mode

If any of the following faults has happened, look up the Configuration Table to use appropriate values:

Fault Code	Extended Fault Code	Error Description
0xF2Bz⁴	0x400	General Channel Configuration Error No additional information
	0x410 – 0x417	Configuration error on Invalid Connection Method Connection Method selection error. Valid selections are 2-wire, 3-wire with compensation, and 4-wire.
	0x430 – 0x437	Invalid Process Alarm and Latching The selected Process Alarm option is out of the valid selectable range.
	0x440 – 0x447	Invalid Process Alarm Value Check the Process Alarm Low Value and Process Alarm High Value for legal ranges. If the module receives any of the following illegal data, this error is detected: PALV greater than or equal to PAHV PAHV greater than Input Type High Limit PALV less than Input Type Low Limit PALV is the Process Alarm Low Value PAHV is the Process Alarm High Value

The extended configuration fault code is not available and will be displayed as

⁴ z indicates the slot number of the expansion I/O. If z=0, then the slot number cannot be identified.

0x0000 in Micro850 Series A & B PLCs and Micro870 Series A PLC.

Get Fault Log

Clear Fault

Recoverable Fault

Index	Fault Code	Fault Location	Description
1	0xF2B1	N/A	Expansion IO Configuration Fault.The extended fault code is 0x0000.

Non-recoverable Fault

Index	Fault Code	Fault Location	Description
-------	------------	----------------	-------------

3.6.3 Communication Errors

If there is communication error between PLC and module, the following error will be displayed in CCW:

Get Fault Log

Clear Fault

Recoverable Fault

Index	Fault Code	Fault Location	Description
1	0xF250	N/A	Expansion IO Detection Error.The extended fault code is 0x0000.
2	0xF250	N/A	Expansion IO Detection Error.The extended fault code is 0x0004.

Section 3.7 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:

For Rockwell Automation Compatible I/O Products:

- USA 1-440-646-6900
- United Kingdom 01-908-635-230
- Australia 1-800-809-929
- Mexico 001-888-365-8677
- Brazil 55-11-3618-8800
- Europe +49-211- 41553-630

or send an email to support@spectrumcontrols.com

Section 3.8

Declaration of Conformity

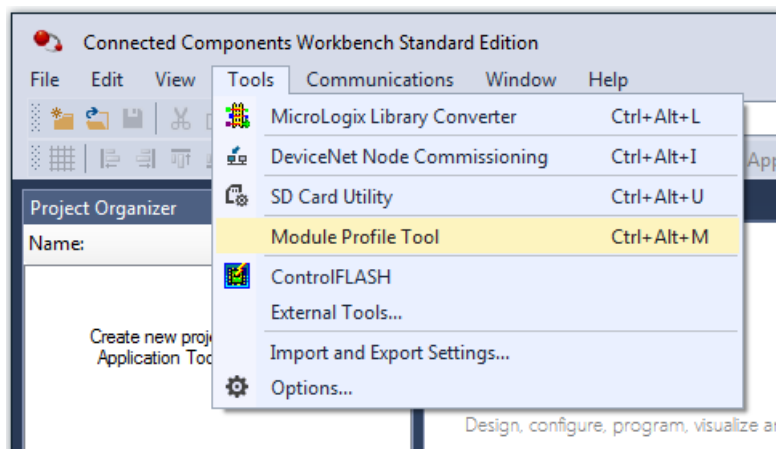
Available upon request.

Appendix A

Manually Importing an AOP

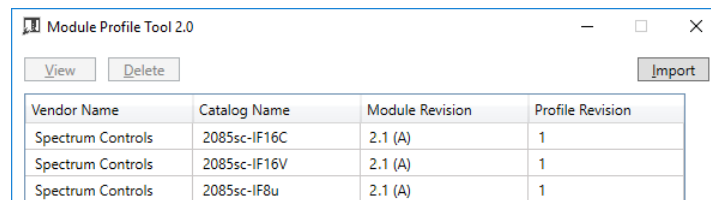
This appendix explains how to manually import an AOP rampp file into CCW software.

1. Download the latest 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. Run CCW.
3. From the Tools menu, select the **Module Profile Tool** option:

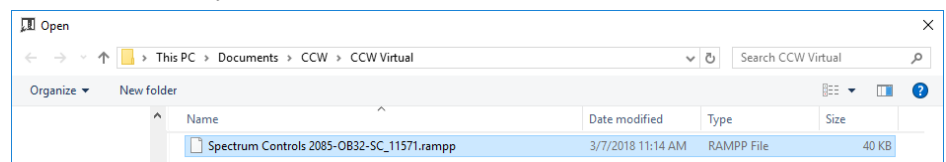


4. When prompted by Windows User Account Control, to confirm that you wish to run the program, click **Yes** button.

The Module Profile Tool 2.0 window appears:

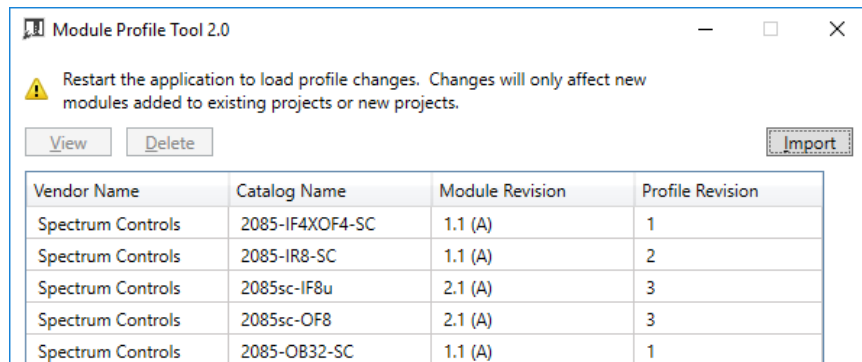


5. Click the **Import** button.
6. An Open dialog appears. Navigate to the provided .rampp file location, and click the file you downloaded:

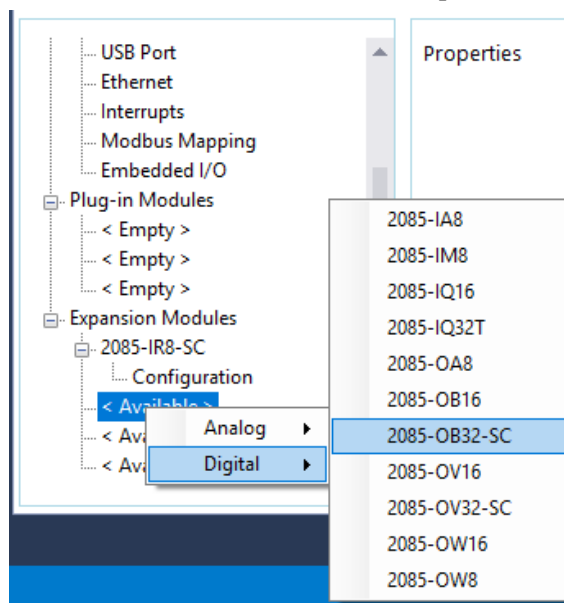


7. Click **Open** to import the file.

8. The program loads the .rampp file and informs you that you need to restart the CCW program.



9. After the program restarts, create a new project or reload your project. Select an **Available** slot from the Expansion Modules drop-down list:



The newly imported module is now available as a selection from the Expansion Modules list.

Index

- 2085-OX32-SC AOP
 - import 3-5
- Add On Profile (AOP) 3-2
- AOP
 - manual importation A-1
- Assembly sizes 3-9
- Block diagram 1-7
- CCW tab 3-5
- Configuration option 3-7
- Connection types 3-9
- Declaration of Conformity 3-13
- Default Configuration tab 3-5
- Electrostatic Discharge
 - prevent 2-3
- EMC Directive, 2-1
- Environmental
 - specifications 1-4
- Expansion Modules
 - drop-down list 3-6
- Factory default
 - on startup 3-8
- Hardware
 - specifications 1-2
- Hardware Features 1-5
- Hazardous Location 2-2
- Installation and Wiring 2-1
- LED
 - indicator information 1-6
- Minimum spacing 2-4
- Module
 - configuration errors 3-10
 - description 2-4
 - mounting 2-4
- Overview 1-1
- Module Catalog Name 3-6
- Mounting
 - DIN rail 2-6
 - module 2-4
 - panel 2-6
- Noise 2-3
- Parts List 2-4
- PLC
 - interfaces 3-9
- Power
 - remove 2-3
- Power Requirements 2-1
- Remove Power 2-3
- Safety Test
 - specifications 1-5
- Software
 - updating 3-8
- Specifications
 - environmental 1-4
 - hardware 1-2
 - safety test 1-5
- System
 - description 1-1
- Technical Assistance 3-12
- Technical support
 - contact information, v
- Version
 - Software 3-8
- View Module Profile window 3-3
- Wiring Diagram 2-7



Technology Partner

A ROCKWELL AUTOMATION PARTNER

©2016-2025, Spectrum Controls, Inc. All rights reserved. Specifications subject to change without notice. All product names, logos, brands, trademarks and registered trademarks are property of their respective owners.

Corporate Headquarters

Spectrum Controls Inc.

1705 132nd Ave NE, Bellevue, WA 98005

Fax: 425-641-9473

Tel: 425-746-9481

Web Site: www.spectrumcontrols.com
E-mail: spectrum@spectrumcontrols.com

