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

Catalog Numbers: 2085-OB32-SC/2085-OV32-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

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.

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

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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.
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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 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.

<table>
<thead>
<tr>
<th>For</th>
<th>Refer to this Document</th>
<th>Allen-Bradley Pub. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product outline</td>
<td>Micro850 Programmable Logic Controller Product Profile</td>
<td>2080-PP003</td>
</tr>
<tr>
<td>Selection information</td>
<td>Micro800 Programmable Controllers Family Selection Guide</td>
<td>2080-SG001</td>
</tr>
<tr>
<td>General instructions for using</td>
<td>Micro800 Programmable Controllers General Instructions</td>
<td>2080-RM001</td>
</tr>
<tr>
<td>Installing an external power supply</td>
<td>Micro800 External AC Power Supply Installation Instructions</td>
<td>2080-IN001</td>
</tr>
<tr>
<td></td>
<td>Micro870 24V DC Expansion Power Supply Installation Instructions</td>
<td>2085-IN008</td>
</tr>
<tr>
<td>For</td>
<td>Refer to this Document</td>
<td>Allen-Bradley Pub. No.</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Installing 24-point PLC</td>
<td>Micro850 24-Point Programmable Controllers Installation Instructions</td>
<td>2080-IN007</td>
</tr>
<tr>
<td>Installing 48-point PLC</td>
<td>Micro850 48-Point Programmable Controllers Installation Instructions</td>
<td>2080-IN008</td>
</tr>
<tr>
<td>Installing 24-point PLC</td>
<td>Micro870 24-Point Programmable Controllers Installation Instructions</td>
<td>2080-IN012</td>
</tr>
<tr>
<td>User manual information</td>
<td>Micro830, Micro850, and Micro870 Programmable Controllers User Manual</td>
<td>2080-UM002</td>
</tr>
<tr>
<td>Environment and Enclosure Information</td>
<td>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.</td>
<td>1770-4.1 NEMA 250-2014 IEC 60529</td>
</tr>
<tr>
<td>Declarations of conformity, certificates, and other certification details.</td>
<td>Product Certification website: <a href="https://spectrumcontrols.com">https://spectrumcontrols.com</a></td>
<td></td>
</tr>
</tbody>
</table>

**Technical Support**

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

- **USA** 440-646-6900
- **United Kingdom** 01908 635230
- **Australia** 1800-809-929
- **Mexico** 001-888-365-8677
- **Brazil** (55) 11 3618 8800
- **Europe** +49 211 41553 63

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-OX32-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 usable 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>
<thead>
<tr>
<th>Table 1-1. Output/Performance/Environmental Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Description</strong></td>
</tr>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>Storage/Non-Operating Temperature</td>
</tr>
<tr>
<td>Operating Humidity</td>
</tr>
<tr>
<td>Storage/Non-Operating Humidity</td>
</tr>
<tr>
<td>Vibration/Operating</td>
</tr>
<tr>
<td>Operating Shock</td>
</tr>
<tr>
<td>Storage/Non-Operating Shock</td>
</tr>
<tr>
<td>Pollution Level</td>
</tr>
<tr>
<td>Outputs per module</td>
</tr>
<tr>
<td>12/24 VDC customer supply voltage</td>
</tr>
<tr>
<td>ON-state voltage</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ON-State Voltage Drop</td>
</tr>
<tr>
<td>ON-state current</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Table 1-2. EMC Specification Table

<table>
<thead>
<tr>
<th>Environmental Tests</th>
<th>Test Level Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiated Emissions</td>
<td>(Enclosure) Class A, 30 MHz – 1 GHz</td>
</tr>
<tr>
<td>Conducted Emissions</td>
<td>Group 1, Class A (AC Mains), 150 kHz – 30 MHz</td>
</tr>
<tr>
<td>Environmental Tests</td>
<td>Test Level Limits</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>ESD immunity (Performance Criteria B)</strong></td>
<td>6 kV Indirect (Coupling Plate)</td>
</tr>
<tr>
<td></td>
<td>6 kV Contact Discharge (to points of initial contact)</td>
</tr>
<tr>
<td></td>
<td>8 kV Air Discharge (to points of initial contact)</td>
</tr>
<tr>
<td><strong>Radiated RF immunity (Performance Criteria A)</strong></td>
<td>10 V/M with 200 Hz sine-wave 50% Pulse 100% AM at 900 and 1890 MHz</td>
</tr>
<tr>
<td></td>
<td>10 V/M with 1 kHz sine-wave 80% AM from 80…2000 MHz</td>
</tr>
<tr>
<td></td>
<td>10 V/M with 1 kHz sine-wave 80% AM from 2000…6000 MHz</td>
</tr>
<tr>
<td><strong>EFT/B immunity (Performance Criteria B)</strong></td>
<td>Signal Ports:</td>
</tr>
<tr>
<td></td>
<td>± 2 kV at 5 kHz for 5 minutes, Criteria B</td>
</tr>
<tr>
<td></td>
<td>Power Ports</td>
</tr>
<tr>
<td></td>
<td>± 2 kV at 5 kHz for 5 minutes, Criteria B</td>
</tr>
<tr>
<td><strong>Surge transient immunity (Performance Criteria B)</strong></td>
<td>Signal Ports:</td>
</tr>
<tr>
<td></td>
<td>± 2 kV line-earth {CM} at 42 Ω</td>
</tr>
<tr>
<td></td>
<td>Power Ports</td>
</tr>
<tr>
<td></td>
<td>±2 kV CM at 12 Ω</td>
</tr>
<tr>
<td></td>
<td>±1 kV DM at 2 Ω</td>
</tr>
<tr>
<td><strong>Conducted RF immunity (Performance Criteria A)</strong></td>
<td>10 V RMS with 1 kHz sine wave 80% AM from 150 kHz…80 MHz on signal and power ports</td>
</tr>
<tr>
<td><strong>Magnetic Field (Performance Criteria A)</strong></td>
<td>30 Arms/m</td>
</tr>
<tr>
<td>**AC Mains Voltage Dips, Interruptions and Variations</td>
<td>Follow the 61000-4-11.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1-3. Safety Test Specification Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety Tests</strong></td>
</tr>
<tr>
<td><strong>UL Safety</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>UL Hazardous Locations</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Chapter 1: Module Overview

#### Safety Tests

<table>
<thead>
<tr>
<th>Industry Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE EMC Directive</td>
</tr>
<tr>
<td>IEC 61000-6-2: Generic Industrial Immunity</td>
</tr>
<tr>
<td>IEC 61000-6-4: Generic Industrial Emissions</td>
</tr>
</tbody>
</table>

#### 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

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Name and Description</th>
<th>Resolution</th>
</tr>
</thead>
</table>
| OFF       | Power-up, Major Hardware Fault, or the channel is commanded to OFF. 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. | There are three likely conditions when the channel LED is OFF:  
- 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.  
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. |
### Indicator

<table>
<thead>
<tr>
<th>Name and Description</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sweeping</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Program/Offline Mode**  
Each LED is turned on and off sequentially in a sweeping pattern indicating that the module is in Program mode. Outputs are disabled. | Set the controller to RUN mode. This will also be seen during power-on while it is initializing. |
| **Run Mode**         |            |
| Channel LED will be solid yellow if the corresponding channel is commanded to be ON. | Module is initialized, and no hardware fault has been detected. Module is in Run mode and channel is ON. |
| **Serial Number Invalid or Corrupted**  
The MCU flash memory may be corrupted. | Serial number must be programmed. Please return the module to Spectrum Controls, Inc. for reprogramming |
| **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 1: Module Overview

Module Power Supply

Backplane
ASIC

Communication

x16 channels

50VAC Working Reinforced Isolation

Channel Group 0

Status Indicators

Processor

FPGA

Isolation x16

Output Circuitry x16

Inductive Kickback Suppression x16

Transient and Reverse Voltage Protection

RTB pins

2085 Backplane

5V DC (used by backplane circuitry)

24V DC

Module Power Supply

5V DC

24V DC (used by backplane circuitry)

50VAC Working Basic Isolation Between Channel Groups

Channel Group 1

Transient and Reverse Voltage Protection

Inductive Kickback Suppression x16

OUTPUT-x

POWER 0

GND 0

POWER 1

GND 1

Inductive Kickback Suppression x16

Transient and Reverse Voltage Protection

OUTPUT-x

x16 channels

x16 channels

FPGA Processor
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

The 2085-OX32-SC modules are 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 Programable 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

**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):

<table>
<thead>
<tr>
<th>5 VDC</th>
<th>24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 mA</td>
<td>55 mA</td>
</tr>
</tbody>
</table>

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 2\(^2\)).

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.

<table>
<thead>
<tr>
<th>WARNING</th>
<th>EXPLOSION HAZARD</th>
</tr>
</thead>
</table>
| ![Warning Icon] | • 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. |

2.2.2 Prevent Electrostatic Discharge

<table>
<thead>
<tr>
<th>WARNING</th>
<th>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:</th>
</tr>
</thead>
</table>
| ![Warning Icon] | • 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 work station.  
• When it is not in use, keep the module(s) in a static-shield bag. |

\(^2\) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.
2.2.3 Remove Power

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>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. 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:</td>
</tr>
<tr>
<td>• Sending an erroneous signal to your system’s field devices, causing unintended machine motion.</td>
</tr>
<tr>
<td>• Causing an explosion in a hazardous environment.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping module free of debris and avoiding overheating:</td>
</tr>
<tr>
<td>• Do not remove protective debris strip until after the module and all other equipment near the module is mounted and the wiring is complete.</td>
</tr>
<tr>
<td>• Once wiring is complete, and the module is free of debris, carefully remove protective strip.</td>
</tr>
<tr>
<td>• Failure to remove strip before operating can cause overheating.</td>
</tr>
</tbody>
</table>
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:

![Diagram showing minimum spacing requirements.]

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

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

| NOTE | • 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:

| NOTE | The module expansion may only be mounted horizontally. |

| NOTE | For environments with greater vibration and shock concerns, use the panel mounting method, instead of DIN rail mounting. |
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.

**WARNING**

**Hazard of intermittent grounding.**

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.

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.

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 **not** 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.
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:

![Module Profile Tool 2.0](image)

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:

![View Module Profile](image)

2085-OB32-SC:
2085-OV32-SC

![View Module Profile](image)

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:

![View Module Profile](image)

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.
5. 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
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.

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:

   ![Image of CCW project with expansion modules]

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.
3. 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:
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 in 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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>OV32-SC</th>
<th>OB32-SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor ID</td>
<td>58 (Spectrum Controls)</td>
<td>58 (Spectrum Controls)</td>
</tr>
<tr>
<td>Product Type</td>
<td>7 (Discrete)</td>
<td>7 (Discrete)</td>
</tr>
<tr>
<td>Product Code</td>
<td>116</td>
<td>115</td>
</tr>
<tr>
<td>Series Rev</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Module Catalog String</td>
<td>2085-OV32-SC</td>
<td>2085-OB32-SC</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Table</th>
<th>Size (words)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>0</td>
<td>Module does not require a configuration</td>
</tr>
<tr>
<td>Input</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

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:

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

<table>
<thead>
<tr>
<th>CCW Var Index</th>
<th>Bit</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_IO_Xx_ST_40</td>
<td>8</td>
<td>SN</td>
<td>Invalid Serial Number Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The stored serial number checksum is corrupt or invalid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The module must be factory calibrated before it will operate normally.</td>
</tr>
<tr>
<td>_IO_Xx_ST_46:41</td>
<td>14:9</td>
<td>Not Used</td>
<td>Variables marked as Not Used remain disabled.</td>
</tr>
<tr>
<td>_IO_Xx_ST_47</td>
<td>15</td>
<td>MF</td>
<td>Module Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Extended Fault Code</th>
<th>Error Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xF29z*³</td>
<td>0x301</td>
<td>MCU board power brownout</td>
</tr>
<tr>
<td>0xF29z*³</td>
<td>0x302</td>
<td>FPGA communications error</td>
</tr>
</tbody>
</table>

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 0x0000 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.
Chapter 3: Configuring the Micro800 Expansion I/O 2085-OX32-SC Using CCW

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:

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Extended Fault Code</th>
<th>Error Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0×400</td>
<td>General Channel Configuration Error</td>
<td>No additional information</td>
</tr>
<tr>
<td>0×410 – 0×417</td>
<td>Configuration error on Invalid Connection Method</td>
<td>Connection Method selection error. Valid selections are 2-wire, 3-wire with compensation, and 4-wire.</td>
</tr>
<tr>
<td>0×430 – 0×437</td>
<td>Invalid Process Alarm and Latching</td>
<td>The selected Process Alarm option is out of the valid selectable range.</td>
</tr>
<tr>
<td>0xF2Bz4</td>
<td>Invalid Process Alarm Value</td>
<td>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</td>
</tr>
</tbody>
</table>

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.

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Fault Code</th>
<th>Fault Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0xF291</td>
<td>N/A</td>
<td>Expansion IO Module Fault. The extended fault code is 0x0304.</td>
</tr>
<tr>
<td>2</td>
<td>0xF291</td>
<td>N/A</td>
<td>Expansion IO Module Fault. The extended fault code is 0x0000.</td>
</tr>
</tbody>
</table>
Chapter 3: Configuring the Micro800 Expansion I/O 2085-OX32-SC Using CCW

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

### 3.6.3 Communication Errors

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

<table>
<thead>
<tr>
<th>Index</th>
<th>Fault Code</th>
<th>Fault Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0xF2B1</td>
<td>N/A</td>
<td>Expansion I/O Configuration Fault. The extended fault code is 0x0000.</td>
</tr>
</tbody>
</table>

**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
  - 440-646-6900
- United Kingdom
  - 01908 635230
- Australia
  - 1800-809-929
- Mexico
  - 001-888-365-8677
- Brazil
  - (55) 11 3618 8800
- Europe
  - +49 211 41553 63

or send an email to support@spectrumcontrols.com

**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.
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