USER MANUAL

SPECTRUM CONTROLS

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User's Manual Pub. 0300305-03 Rev. A0

Micro800™ Expansion I/O 8-Channel Universal Analog Input Module

Catalog Number: 2085sc-IF4U

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, 2.1, or later.
3. This guide assumes that the reader has a full working knowledge of the relevant processor.

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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™ 8-Channel Universal Analog Input Module.

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™ 8-Channel Universal Analog Input Module.

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
	Micro870 24V DC Expansion Power Supply Installation Instructions	2085-IN008

For	Refer to this Document	Allen-Bradley Pub. No.
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 (US/global, English only
- United Kingdom +44 0 1908 635 230 (EU phone, UK local)
- Australia, China, India, and other East Asia locations: 1-800-722-778 or +61 39757 1502
- Mexico 001-888-365-8677
- Brazil 55-11-5189-9500 (general support)
- Europe +49-211-41553-630 (Germany/general support)

or send an email to support@spectrumcontrols.com

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

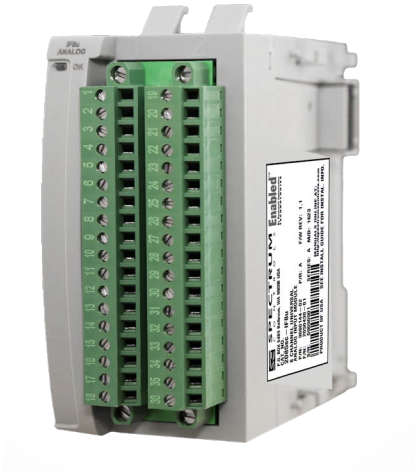
This chapter covers the following topics:

- General description
- Input Specifications
- Data formats
- Hardware features
- System overview

The Micro800™ 8-Channel Universal Analog Input Module (2085sc-IF8u Expansion I/O Module) is an 8-point universal analog 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 2085sc-IF8u 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



NOTE	Module firmware released as revision 1.1 is only compatible with the Micro850 Series A PLC and its PLC firmware revision 10.011 and under. Module firmware released as revision 2.1 is compatible with the Micro850 Series A and B PLCs and Micro870 Series A PLC with its PLC firmware revision 11.011 and under.

The 2085sc-IF8u Expansion I/O module measures current, voltage, thermocouple, and RTD and resistance signals. The module supports:

- Eight input channels. The module measures either voltage or current input signals for each channel.
- Direct current measurements. The module measures the channel input current across a low-drift precision resistor. To measure the current, you install an external jumper between the current and voltage points (CI_*X* and VI_*X*) on the terminal block.
- Direct voltage measurements. The low-drift precision resistor is not used, and the channel accepts the voltage source directly.
- Open-wire detection for current measurement on the 4-20 mA range, voltage, and thermocouple measurements.
- Direct thermocouple. In thermocouple mode, the thermocouple measurements can be compensated with the reading from a single Cold Junction Compensation (CJC) Sensor placed in the center of the terminal block. The module measures thermocouple and Cold Junction Compensation sensor voltages and converts the results to a temperature reading.
- One physical Cold Junction Compensation, and two CJC profiles (averaged and distributed) are supplied.
- Resistance (direct Ohm).
- RTD types. The RTD and resistance measurements use a current injected through the resistive load, measuring the voltage across the resistance, and converting the voltage to a temperature or resistance reading. RTD and resistance input types support 2- or 3-wire resistance measurements.
- Four data formats.
- Four filter frequencies.
- Real-time Terminal Block temperature updating when the channel is enabled.
- Range scaling of input data.
- Over or under range detection (from user-defined values).
- Channel bias adjustments for each channel.
- An option to disable open-wire detection for volt, millivolt, and thermocouple measurements.

All inputs have fault tolerance and ESD protection to avoid damage to circuitry on the board. The modules use 50 VAC working Reinforced Insulation between the inputs and the backplane, and low-level (10 VDC) channel-to-channel isolation.

The 2085sc-IF8u module uses a 20-bit Sigma-Delta analog-to-digital converter to achieve a 16-bit resolution. The module digitally converts and stores analog data from either the current or voltage input type.

Each input channel is individually configurable via Rockwell-provided Connected Component Workbench (CCW) software for the Micro850 and Micro870 family controllers or with the Module Configuration Converter (MCC) utility from Spectrum Controls, Inc.

The module is factory calibrated and tested before shipping. After installation,

the modules begin operation in a default, usable condition. During power startup, all inputs are disabled and off until a valid configuration has been received.

The default configuration for the 2085sc-IF8u is for all channels enabled in the 4 to 20 mA range with the 17 Hz filter in Engineering ×1 units.

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
Input Specifications

The 2085sc-IF8u module has the following input specifications:

Table 1-1. Input/Performance/Environmental Requirements

Input Description	Value	
Operating Temperature	-20 ºC to 65 ºC (-4 ºF to 149 ºF)	
Storage/Non-Operating Temperature	-40 ºC to 85 ºC (-40 ºF to 185 ºF)	
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±1 ms pulse, half sine	
Storage/Non-Operating Shock	25 g peak acceleration, 11±1 ms pulse, half sine; 35 g for panel mount.	
Pollution Level	Meets Pollution Degree 2 requirements.	
ESD	Meets CE requirements for operating ESD category B at 6 kV contact, 8 kV air.	
Inputs per module	8 current, voltage, thermocouple, resistance, or RTD differential input channels.	
Input ranges	**Current:** 0-20 mA, 4-20 mA **Voltage:** ±50 mV, ±100 mV, 0-5 V, 0-10 V, ±10 V **RTD:** 100 Ω, 200 Ω, 500 Ω and 1000 Ω PT385 and Pt3916, 100 Ω Ni618 and 120 Ω Ni672, 10 Ω Cu 426, 604 Ω NiFe 518 **Resistance:** 0-150 Ω, 0-500 Ω, 0-1000 Ω, 0-3000 Ω **Thermocouple:** Type J, N, T, K, E, S, R, C, B	
Input filters	4 Hz, 17 Hz, 60 Hz, 470 Hz	
Current accuracy (4 and 17 Hz filters)	**Error at 25 °C, Max**	**Error over -20 °C to 65 °C, Max**
0-20 mA	±20 µA	±50 µA
4-20 mA	±20 µA	±50 µA

Input Description	Value	
Voltage accuracy (4 and 17 Hz filters)	**Error at 25 °C, Max**	**Error over -20 °C to 65 °C, Max**
±50 mV	±20 µV	±50 µV
±100 mV	±20 µV	±100 µV
0-5 V	±3 mV	±6 mV
0-10 V	±10 mV	±20 mV
±10 V	±10 mV	±20 mV
RTD accuracy	**Error at 25 °C, Max**	**Error over -20 °C to 65 °C, Max**
100 Ω PT385 -200 °C to 850 °C	±0.6	±2.2
200 Ω PT385 -200 °C to 850 °C	±0.5	±1.7
500 Ω PT385 -200 °C to 850 °C	±0.5	±1.6
1000 Ω PT385 -200 °C to 850 °C	±0.5	±1.6
100 Ω PT3916 -200 °C to 630 °C	±0.6	±1.6
200 Ω PT3916, -200 °C to 630 °C	±0.5	±1.3
500 Ω PT3916, -200 °C to 630 °C	±0.5	±1.2
1000 Ω PT3916, -200 °C to 630 °C	±0.5	±1.2
100 Ω Ni618, -100 °C to 260 °C	±0.6	±0.8
120 Ω Ni672, -80 °C to 260 °C	±0.6	±0.8
10 Ω Cu 426, -100 °C to 260 °C	±4.0	±6.0
604 Ω NiFe 518, -100 °C to 200 °C	±0.3	±0.5

Input Description	Value	
Resistance accuracy	**Error at 25 °C, Max**	**Error over -20 °C to 65 °C, Max**
0 to 150 Ω	±0.2	±0.3
0 to 500 Ω	±0.55	±0.8
0 to 1 kΩ	±1.0	±1.3
0 to 3 kΩ	±1.5	±3.5
Thermocouple accuracy These limits do not include the cold junction compensation or sensor error. They must be included (added) to determine overall thermocouple accuracy.	**Error at 25 °C, (Ohms) Typical, Max**	**Error over -20 °C to 65 °C, (Ohms) Typical, Max**
Type J (-210 °C to 1200 °C)	±0.4 °C, ±0.6 °C	±0.5 °C, ±1.6 °C
Type N (-150 °C to 1300 °C)	±0.4 °C, ±0.7 °C	±0.5 °C, ±1.3 °C
Type N (-210 °C to -150 °C)	±0.8 °C, ±1.5 °C	±1.0 °C, ±2.2 °C

Input Description	Value		
Type T (-230 °C to 400 °C)	±0.6 °C, ±1.0 °C	±0.7 °C, ±1.5 °C	
Type T (-270 °C to -230 °C)	±3.5 °C, ±8.0 °C	±3 °C, ±14.0 °C	
Type K (-225 °C to 1370 °C)	±1.1 °C, ±1.5 °C	±1.2 °C, ±2.1 °C	
Type K (-270 °C to -225 °C)	±6.0 °C, ±15.0 °C	±7.0 °C, ±20.0 °C	
Type E (-210 °C to 1000 °C)	±0.4 °C, ±0.6 °C	±0.5 °C, ±1.2 °C	
Type E (-270 °C to -210 °C)	±3.0 °C, ±6.0 °C	±3.5 °C, ±10.0 °C	
Type S (0 °C to 1768.1 °C)	±1.2 °C, ±2.0 °C	±1.0 °C, ±2.6 °C	
Type R (0 °C to 1768.1 °C)	±1.2 °C, ±2.0 °C	±1.0 °C, ±2.6 °C	
Type B (300 °C to 1820 °C)	±2.1 °C, ±4.0 °C	±1.8 °C, ±4.5 °C	
Type C (0 °C to 2315 °C)	±0.8 °C, ±1.8 °C	±1.0 °C, ±4.0 °C	
CJC Sensor Range	-20 °C to 90 °C		
	Error over 0 ºC to 70 ºC CJC values	**Error over -20 ºC to 70 ºC CJC values**	
CJC Profile accuracy	±2.1 ºC maximum (Correlation between reading and target terminal). Accuracy is typically within ±1 ºC.		
CJC Sensor accuracy	±0.2 ºC	±0.4 ºC	
CJC Measurement accuracy	±0.2 ºC	±0.5 ºC	
CJC Total accuracy (Sum of three items above)	±2.5 ºC	±3.0 ºC	
Repeatability (at 25º C)	**4 Hz filter**	**17 Hz filter**	**60 and 470 Hz filters[1]**
Input Description	**Value**		
Thermocouples			
Type J	±0.2 °C	±0.4 °C	±3.0 °C
Type N (-150 °C to 1300 °C)	±0.2 °C	±0.2 °C	±4.0 °C
Type N (-210 °C to -150 °C)	±0.2 °C	±0.3 °C	±7.5 °C
Type T (-170 °C to 400 °C)	±0.2 °C	±0.2 °C	±3.3 °C
Type T (-270 °C to -170 °C)	±0.5 °C	±0.6 °C	±20.0 °C
Type K (-170 °C to 1370 °C)	±0.2 °C	±0.4 °C	±3.8 °C
Type K (-270 °C to -170 °C)	±2.0 °C	±3.5 °C	±20.0 °C
Type E (-220 °C to 1000 °C)	±0.2 °C	±0.4 °C	±2.4 °C
Type E (-270 °C to -220 °C)	±1.0 °C	±1.5 °C	±20.0 °C

[1] These filters do not reject 50/60 Hz. Repeatability for these filters is strongly dependent on how much 50/60 Hz noise is in the system.

Input Description	Value		
Types S and R	±0.4 °C	±0.6 °C	±12.0 °C
Type B	±0.3 °C	±0.4 °C	±20.0 °C
Type C	±0.2 °C	±0.3 °C	±6.7 °C
Millivolt Inputs	±15.0 µV	±20.0 µV	±40.0 µV
Voltage Inputs	±1.0 mV	±2.0 mV	±3.0 mV
Current Inputs	±2.0 µA	±3.0 µA	±10.0 µA
RTD			
Platinum 385	±0.3 °C	±0.4 °C	±2.0 °C
Platinum 3916	±0.3 °C	±0.4 °C	±2.0 °C
Copper	±0.3 °C	±0.3 °C	±2.6 °C
Nickel	±0.1 °C	±0.2 °C	±1.0 °C
Nickel-Iron	±0.1 °C	±0.1 °C	±0.5 °C
Resistance			
0 to 150 Ohm	±0.05 Ω	±0.1 Ω	±0.5 Ω
0 to 500 Ohm	±0.08 Ω	±0.15 Ω	±0.7 Ω
0 to 1 kΩ	±0.1 Ω	±0.2 Ω	±1.5 Ω
0 to 3 kΩ	±0.2 Ω	±0.3 Ω	±2.0 Ω
Filters			
CMRR	84 dB minimum at 50 and 60 Hz for 4 Hz and 17 Hz filters		
NMRR	4 Hz filter	72 dB minimum at 50 and 60 Hz	
	17 Hz filter	62 dB minimum at 50 and 60 Hz	
Crosstalk	-70 dB maximum		
Cable resistance (applies only to 3-wire RTD and resistance measurements)	25 Ω maximum, 10 Ω maximum for 10 Ω Cu 426		
Input and Bias Current Impedance			
Open Wire Detection Current (Voltage and thermocouple range only)	Approximately 28 µA during open wire checks for one channel scan time with 470 Hz filter		
Current input impedance	249.5 Ω ±0.5%		
Voltage input impedance	>30 MΩ (except during open wire checks)		
RES/RTD Current source (excitation current)	Excitation Current*	Range	
	1 mA	10 Ω Copper 426	
	420 µA	150 Ω, 500 Ω, 1000 Ω, 100 Ω Ni 618, 120 Ω Ni 672, 100 Ω PT 385, 200 Ω PT 385, 100 Ω PT 3916, 200 Ω PT 3916	

Input Description	Value	
	210 µA	3000 Ω, 500 Ω PT 385, 1000 Ω PT 385, 500 Ω PT 3916, 1000 Ω PT 3916, 604 Ω NiFe 518
	* typically, ±5% at 25 °C, ±8% from -20 °C to 65 °C	
Input protection:	Voltage Mode ±28 VDC continuous. (Note: maximum voltage between any two pins must be limited to 28 VDC as well.) For proper operation, do not connect any external voltages to the CJC pins. Current mode 32 mA continuous (approximately 8 V).	
Isolation		
Input to backplane isolation	50 VAC RMS working Reinforced isolation tested at 2 k VDC for 1 minute.	
Input to Chassis GND isolation	50 VAC RMS working Reinforced isolation tested at 2 k VDC for 1 minute.	
Channel-to-channel, low-level isolation	10 VDC measured between the IN-leads. Maximum voltage between any two pins must be limited to 28 VDC. CJC input pins are not designed to be attached to external voltages.	
Fault detection	Over/under range for all types. Open Circuit detection is supported on all ranges except the 0-20 mA range. You may disable fault detection for volt, millivolt, and thermocouple measurements. Note: Voltage and Thermocouple open circuit (open wire) is periodically checked to keep input impedance high during normal measurements.	
Power Requirements		
Bus +5 V (4.75 V to 5.4 V)	94 mA max	
Bus +24 V (19.9 V to 26.4 V)	15 mA max	
Peak Inrush Current	Less than 150 mA at 5 V. Less than 400 mA at 24 V.	
Power Dissipation within module	0.9 W maximum in Voltage/TC/Res/RTD modes; 1.8 W maximum in current mode with all inputs at 21 mA.	
Wire size	#16 to #28 AWG	
RoHS	Meets European RoHS component standards (January 2015 and earlier).	
Wire Strip Length	0.375 in.	
Recommended Tightening Torque:	0.25 N-m (2.2 lb-in)	
REACH	Meets European REACH 7 requirements.	

Input Description	Value
Dimensions	110 mm × 87 mm × 51 mm (plastic only). (4.33 in × 3.43 in × 2.00 in) 110 mm × 89 mm × 51 mm (with RTBs installed). (4.33 in × 3.5 in × 2.00 in)

Table 1-2. EMC Specification Table

Environmental Tests	Test 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 square-wave 50% Pulse 100% AM at 900 & at 1890 MHz 10 V/M with 1 kHz sine-wave 80% AM from 80…6000 MHz
EFT/B immunity (Performance Criteria B)	Signal Ports: ±2 kV @ 5 kHz for 5 minutes, Criteria B Power Ports: ±2 kV @ 5 kHz for 5 minutes, Criteria B
Surge transient immunity (Performance Criteria B)	Signal Ports: ±2 kV line-earth {CM} at 2 Ω on shielded ports Power Ports ±2 kV CM at 12 Ω ±1 kV DM at 2 Ω
Conducted RF immunity (Performance Criteria A)	10 VRMS 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

Safety Tests	Industry Standards
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 Data Formats

There are four data input types:

- Engineering units ×1
- Engineering units ×10
- Raw/proportional count
- Percentage Full Scale

Section 1.4 Hardware Features

Channels are wired as differential inputs. Open-circuit detection is available in the form of open circuit inputs going over-range for the current ranges. Inputs are protected from electrostatic discharge up to 6 kV for indirect and contact discharge, 8 kV for air discharge. Inputs are also fault-protected up to 28 VDC for voltage inputs, and up to 32 mA for current inputs.

1.4.1 LED Blink codes

Revision 1.1 and Revision 2.1 of the Module firmware use different LED status states for module status or power indication. Tables for 1.1 and 2.1 LED operation are provided below.

A 2085sc-IF8u module with Version 1.1 firmware uses a single, green **OK** LED to show power or module operational status.

When startup is completed, and all internal tests have passed, the LED is solid GREEN. If the LED remains off, there is an error with the module: it may not have power, or the module failed to pass the self-test.

Table 1-4 LED Blink Codes for Firmware 1.1

Indicator	State	Description
Module OK LED Status	Off	No power applied to device or the module may have failed to pass its self-test.
	Solid Green	RUN mode. Module has power and passed self-test. No action is required.

Indicator	State	Description
	Blinking Green	LED blink status: 1. Internal use only. 2. Internal use only. 3: Internal use only. 4: Internal use only. 5: Indicates ADC communication error. 6: Indicates Watchdog reset.

A 2085sc-IF8u module with Version 2.1 firmware uses a single, green **OK** LED to show power or module operational status:

- When startup is completed, and all internal tests have passed, the LED is solid GREEN. This indicates RUN mode.
- If the LED remains off, there is an error with the module: it may not have power or failed to pass the self-test.
- Any time the system is not in Run mode (and showing no faults), the LED blinks rapidly, indicating the module is Offline. All inputs and outputs are disabled in this instance.

The LED identifies different conditions using specific, numeric, blink patterns. The module blinks a specific number of times, pauses, and then repeats the same blink pattern indefinitely. Blink codes are shown in the following table.

Table 1-5 LED Blink Codes Table for Firmware 2.1

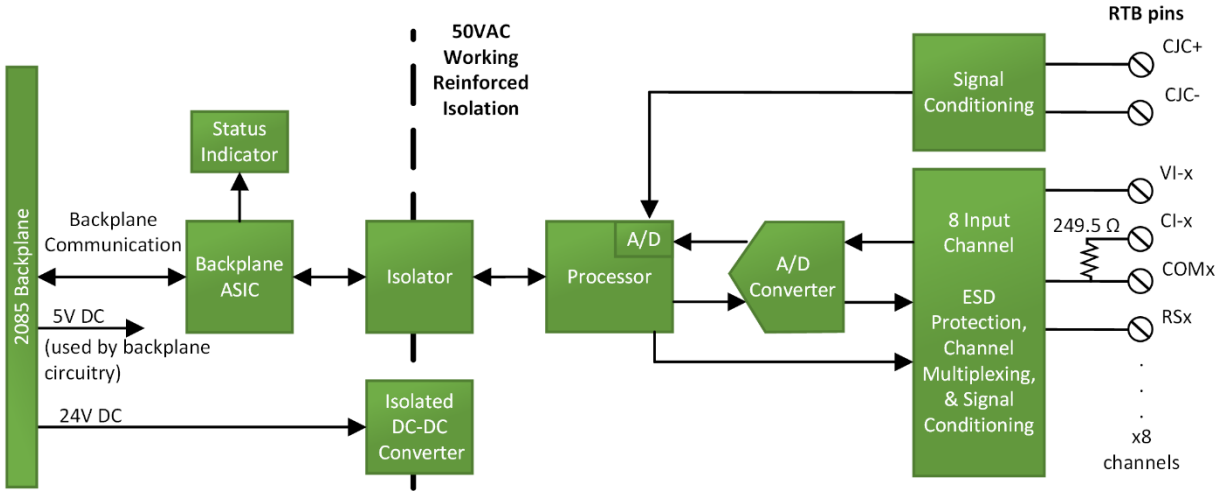
Blink Code	Name and Description	Resolution
rapid	Offline Rapid continuous blinking indicates the module is offline and outputs are disabled.	Set controller to RUN mode. This will also be seen during power-on while it is initializing.
ON	Run Mode The LED is solid green.	Module is initialized with no hardware fault detected. Module is in Run mode.
OFF	Major Fault or Power-up or Power 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 controller. LED control is not possible for this condition and will remain off.	Give plenty of time for power-on. Power-cycle to try and clear the error condition. If unsuccessful, the module must be replaced.
3	Calibration invalid or corrupted This code will be seen for newly manufactured boards that have yet to be calibrated.	Factory calibration must be performed. Return the module to Spectrum Controls, Inc. for recalibration.

Blink Code	Name and Description	Resolution
4	Serial Number Invalid or Corrupted This code will only be seen if the module has been calibrated but the serial number is not programmed, or the flash memory sector is corrupted.	Serial number must be programmed. Return the module to Spectrum Controls, Inc. for recalibration.
5	Analog Communications Error – Input A communications error or connection error took place between the MCU and ADC or PGA circuitry.	Power-cycle to try and clear the error condition. If unsuccessful, the module must be replaced.

Section 1.5 System Overview

The 2085sc-IF8u module is expected to operate indefinitely. It does not require periodic maintenance or calibration. The module communicates to the controller through the bus interface. The module also receives 5 VDC 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
- Field wiring connections

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.

Section 2.2 Power Requirements

WARNING 	The backplane power and the analog inputs of the device shall only be supplied by an Isolated Secondary Limited Energy Low Voltage source.

The module receives power through the bus interface from the +5 VDC/+24 VDC system power supply.

Current rating at + 5 V is 94 mA maximum; for +24 V it is 15 mA maximum:

5 VDC	24 VDC
94 mA	15 mA

Section 2.3 General Considerations

The 2085sc-IF8u module is 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].

2.3.1 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** • Substitution of components may impair suitability for Class I, Division 2; Class II, Division 2; and Class III, 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.

2.3.2 Prevent Electrostatic Discharge

WARNING 	Electrostatic discharge can damage integrated circuits or semiconductors if you touch I/O expansion port connector pins or the terminal block on the module. Follow these guidelines when you handle the module: • Touch a grounded object to discharge static potential. • Wear an approved wrist-strap grounding device. • Do not touch the port 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 in its 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 shall be expected.

2.3.3 Remove Power

WARNING	**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: • 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.

2.3.4 Selecting a Location

Reducing Noise

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference. Analog channels are highly susceptible to electrical noise. Electrical noise coupled to the analog channels will reduce the performance (accuracy) of the module. 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.
- Away from modules which generate significant radiated heat. Refer to the module's heat dissipation specification.

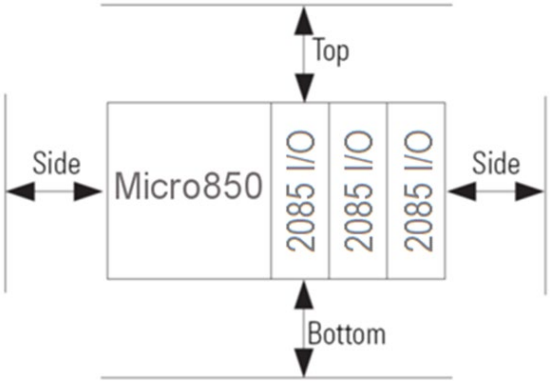
In addition, route shielded, twisted-pair analog input wiring away from any high voltage I/O wiring.

Section 2.4 Mounting

WARNING	Keeping module free of debris and avoiding overheating: • 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.

2.4.1 Minimum Spacing

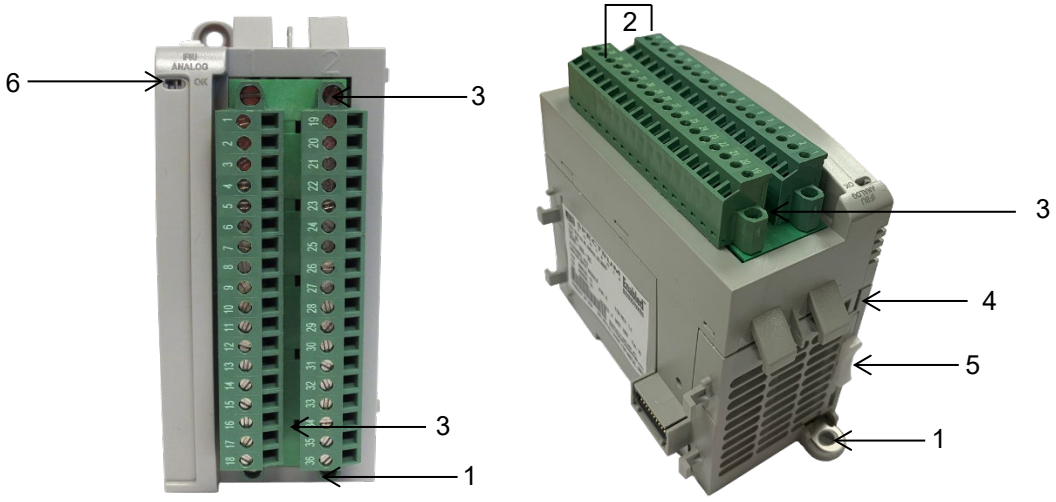
Maintain spacing from enclosure walls, wire ways, adjacent equipment, etc. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown:



2.4.2 Parts List

Your package contains one Micro800 2085sc-IF8u (Universal Analog Input) Plug-in Module and one Quick Start Guide.

2.4.3 Module Description



	Description		Description
1	Mounting screw hole/mounting foot	4	Module interconnect latch
2	Removable Terminal Block (RTB)	5	DIN rail mounting latch
3	RTB hold down screws	6	I/O Status LED

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. • Cable length should be less than 10 meters.

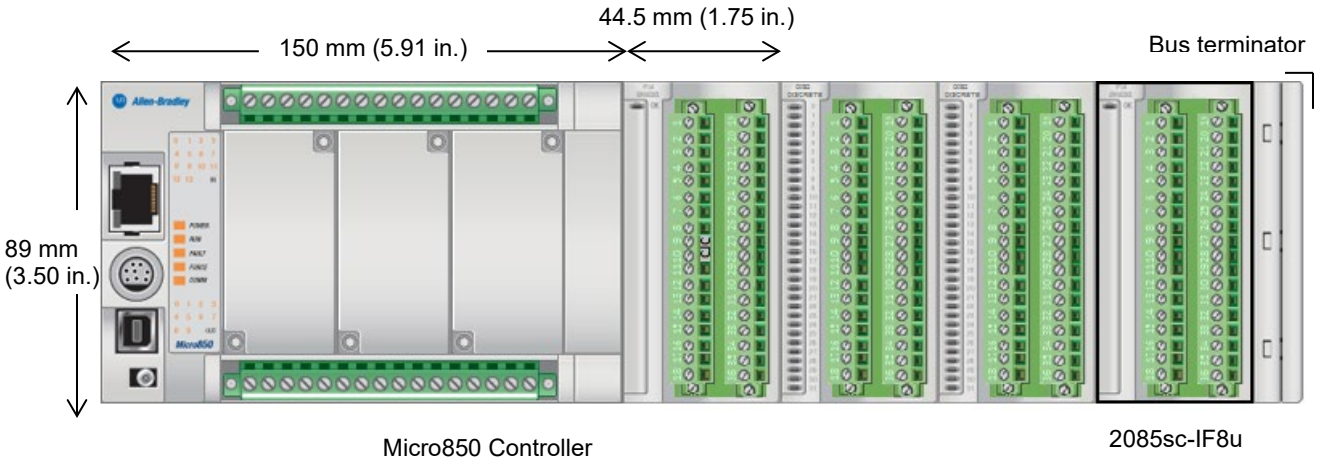
2.4.4 Insert Module Next to the Controller

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 Micro830, Micro850, and Micro870 Programmable Controllers User Manual 2080-UM002.

To install:

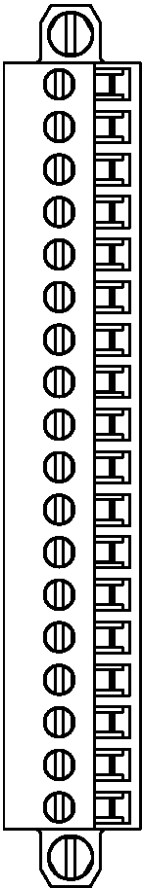
1. Place the module next to the controller against the panel where you are mounting the module.
2. Mark drilling holes through the mounting screw holes and mounting feet, and then remove the module.
3. Drill the holes at the markings.
4. Replace the module and mount it. Leave the protective debris strip in place until you are finished wiring the module, and any other devices.

Wiring Diagram

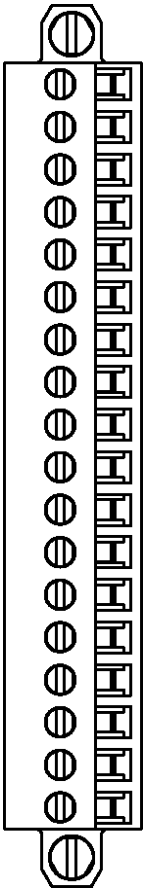
WARNING	**Hazard of damage to the terminal connector.**
	The Spectrum Controls RTB hold down and terminal screws must be tightened by hand using the guidelines. They must not be tightened using a power tool. Use a screwdriver of 0.8 × 2 mm and tighten to no more than 0.25 N-m (2.2 lb-in) torque. Failure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

Wire the module using the following images, which explain the layout of the 2-row, 18-pin terminal block, and the associated wiring diagrams for the various input signals and the 2085sc-IF8u module.

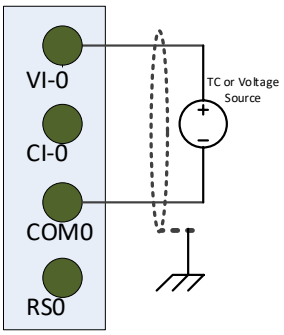
RTB1	Name
1	VI-0
2	CI-0
3	COM0
4	RS0
5	VI-1
6	CI-1
7	COM1
8	RS1
9	CJC1+
10	CJC1-
11	VI-2
12	CI-2
13	COM2
14	RS2
15	VI-3
16	CI-3
17	COM3
18	RS3



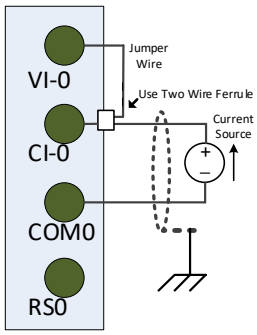
RTB2	Name
19	VI-4
20	CI-4
21	COM4
22	RS4
23	VI-5
24	CI-5
25	COM5
26	RS5
27	VI-6
28	CI-6
29	COM6
30	RS6
31	VI-7
32	CI-7
33	COM7
34	RS7
35	NC
36	NC



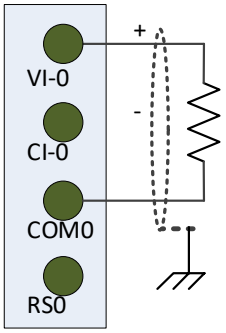
Voltage/TC Input



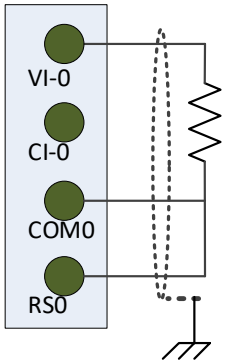
Current Input



2-wire Res./RTD Input



3-wire Res./RTD Input



Terminal block showing CJC installed:

Terminal Block Input signal descriptions are as follows:

RTB1	Name	Description	RTB2	Name	Description
1	VI-0	Ch. 0 Voltage Positive Input	19	VI-4	Ch. 4 Voltage Positive Input
2	CI-0	Ch. 0 Current Positive Input	20	CI-4	Ch. 4 Current Positive Input
3	COM0	Ch. 0 Voltage/Current Return	21	COM4	Ch. 4 Voltage/Current Return
4	RS0	Ch. 0 3rd wire for RES/RTD	22	RS4	Ch. 4 3rd wire for RES/RTD
5	VI-1	Ch. 1 Voltage Positive Input	23	VI-5	Ch. 5 Voltage Positive Input
6	CI-1	Ch. 1 Current Positive Input	24	CI-5	Ch. 5 Current Positive Input
7	COM1	Ch. 1 Voltage/Current Return	25	COM5	Ch. 5 Voltage/Current Return
8	RS1	Ch. 1 3rd wire for RES/RTD	26	RS5	Ch. 5 3rd wire for RES/RTD
9	CJC1+	CJC 1 Positive Input (Potted thermistor on this side)	27	VI-6	Ch. 6 Voltage Positive Input
10	CJC1-	CJC 1 Return	28	CI-6	Ch. 6 Current Positive Input
11	VI-2	Ch. 2 Voltage Positive Input	29	COM6	Ch. 6 Voltage/Current Return
12	CI-2	Ch. 2 Current Positive Input	30	RS6	Ch. 6 3rd wire for RES/RTD
13	COM2	Ch. 2 Voltage/Current Return	31	VI-7	Ch. 7 Voltage Positive Input
14	RS2	Ch. 2 3rd wire for RES/RTD	32	CI-7	Ch. 7 Current Positive Input
15	VI-3	Ch. 3 Voltage Positive Input	33	COM7	Ch. 7 Voltage/Current Return
16	CI-3	Ch. 3 Current Positive Input	34	RS7	Ch. 7 3rd wire for RES/RTD
17	COM3	Ch. 3 Voltage/Current Return	35	NC	No Connect
18	RS3	Ch. 3 3rd wire for RES/RTD	36	NC	No Connect

Chapter 3
Configuring the 2085sc-IF8u 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 Introduction

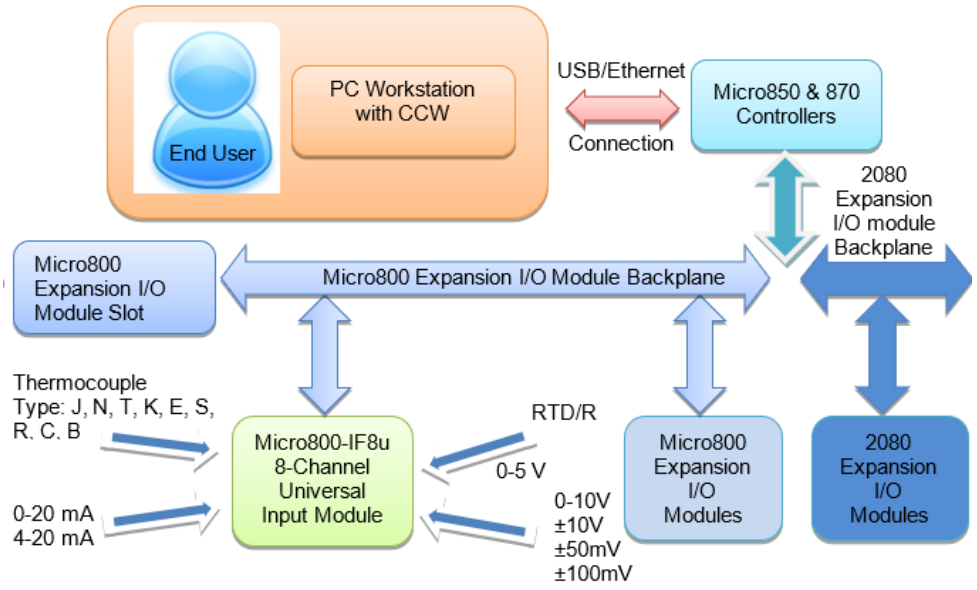
You use CCW software (v 9.00.00 and above) to configure the 2085sc-IF8u Expansion I/O Module. Your controller firmware must be at v. 9.011 and above as well. You then send the configuration setup to the module. Starting from CCW version 11.00.00 and later, the software provides a module-specific Add-On Profile (AOP) to configure the module. The process for manually importing AOP to CCW is no longer required.

The Micro850/870 Controller (Bus master) subsystem is located at the left end of the bus. This subsystem is comprised of:

- Micro850/870 Controller
- 2085 Expansion I/O Modules
- 2085-ECR Bus Terminator

Optional:

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



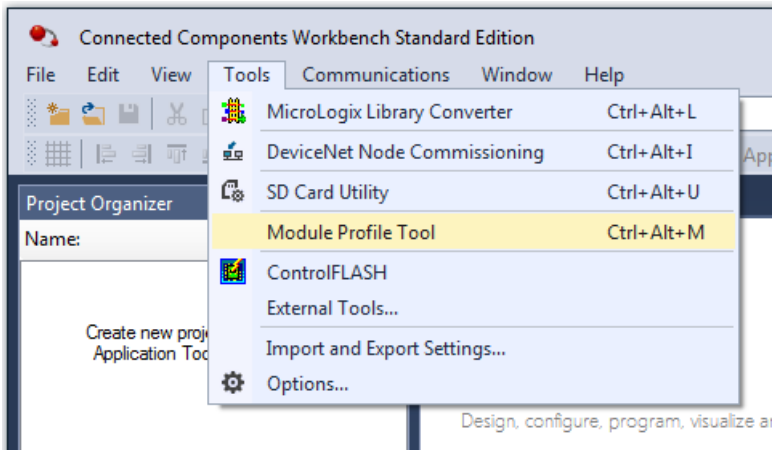
Spectrum Controls, Inc. also provides a custom configuration software utility that you may use to provide configuration settings to the profile.

Section 3.2 2085sc-IF8u AOP

You use the module's AOP to configure 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:

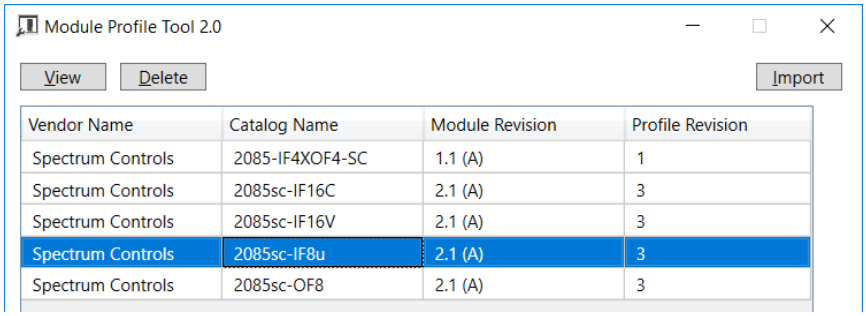


2. When prompted by Windows User Account Control, to confirm that you wish to run the program, click **Yes** button.

   The Module Profile Tool window appears:

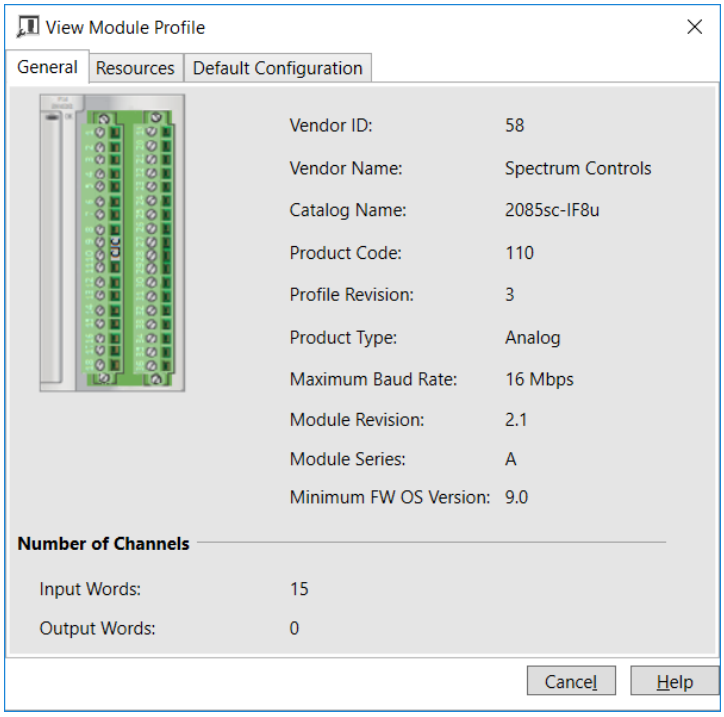
   If necessary, confirm with the Windows operating system that you wish to run the software.

The Module Profile Tool dialog appears.



3. Select the row showing the module catalog name, and then click the **View** button.

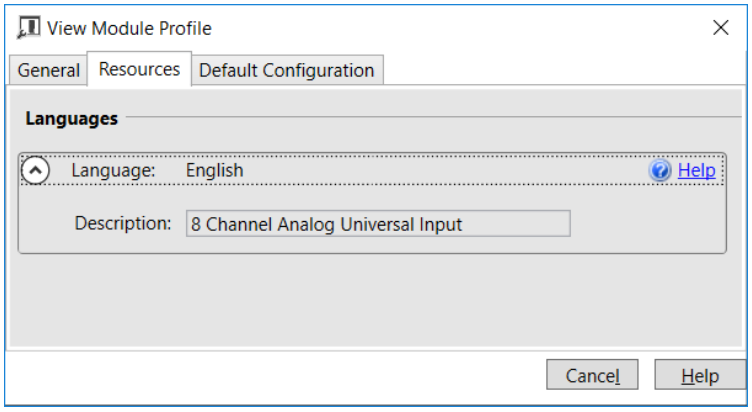
   The View Module Profile window appears:



   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.

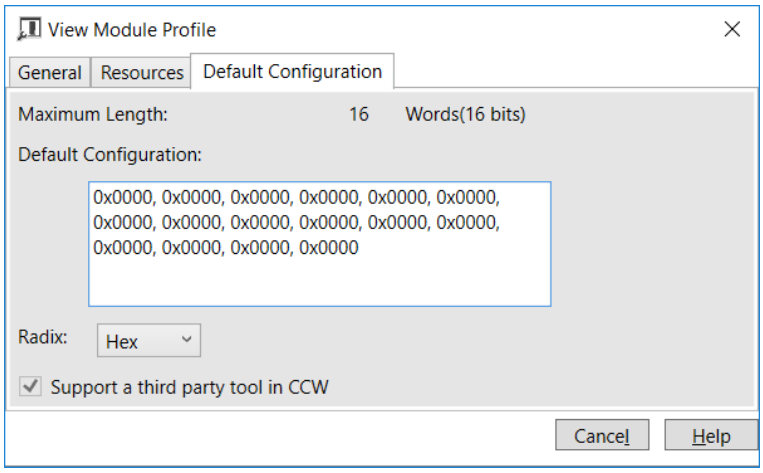
4. To view software language availability, module description, and a help file for the module, click the **Resources** tab.

   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.

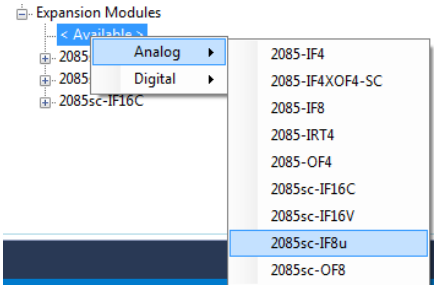
5. To view default configuration information, click the **Default Configuration** tab:



6. The enabled checkbox shown on the bottom of the tab indicates that the module AOP provides the service for launching the MCC utility to help you configure your module. More information is described in Setting Configuration Parameters Using MCC, later in this section.

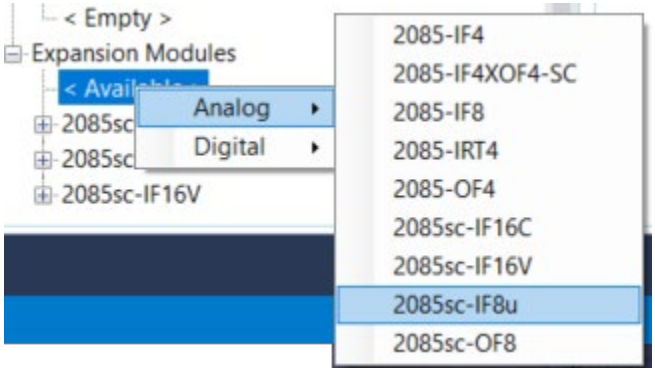
Section 3.3 CCW Configuration Tab

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 2085sc-IF8u 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 module is already available as a selection from the CCW Expansion Modules drop-down menu: 

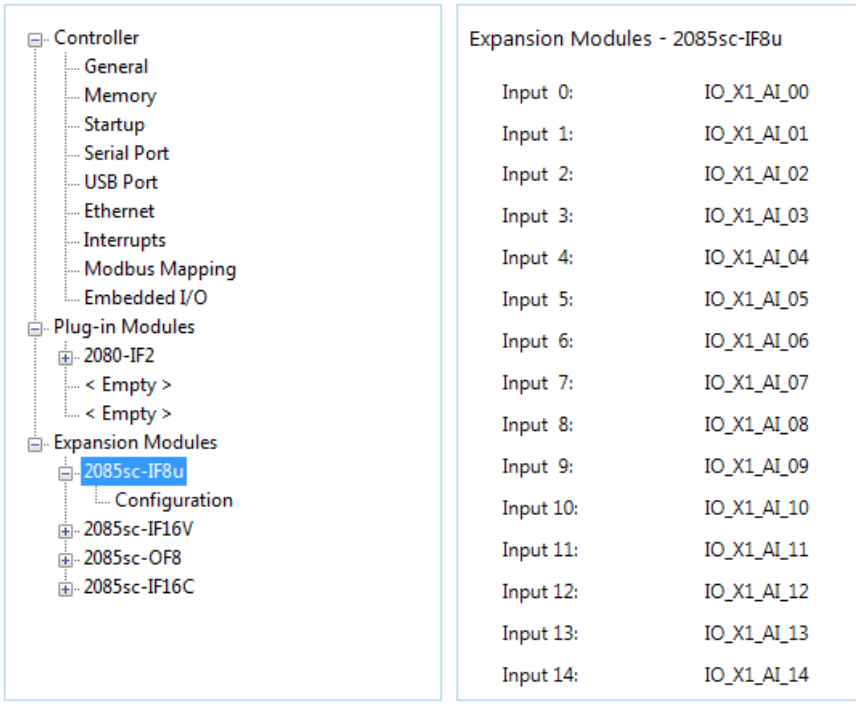
To add the module to your project, and see its configuration parameters on the CCW configuration tab:

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

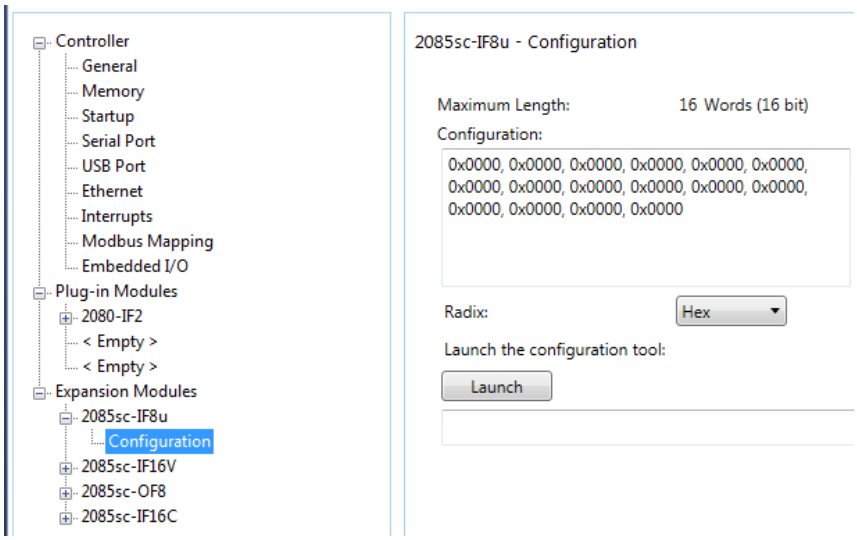


2. Once the module AOP is loaded, to view the associated variables, click the **Module Catalog Name** option.

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



3. To view the configuration tab, click the **Configuration** option:



- **Maximum Length**. Shows maximum number of words available. Each word is 16-bit.
- **Configuration**. The textbox lists out the whole module configuration value.
- **Radix**. The drop-down menu contains the following number formats for indicating module configuration value. Options are:
  - Hex. Default option. Characters represented as hexadecimal. Example: 0×7FFF as 32767 in decimal format.
  - ASCII: Characters represented as ASCII. Example: \7F\FF

- Binary: Characters represented as 0 and 1. Example: 0111111111111111
- Decimal. Characters represented as decimals. Example: 32767[3]

- **Launch.** Use to populate the file path field. The file path lets you enter the file path for opening the MCC utility program to assist you in configuring the module. Use the Browse ellipse to navigate to where the utility is stored. Then click the **Launch** button to start the utility.

Section 3.4 Setting Configuration Parameters Using MCC

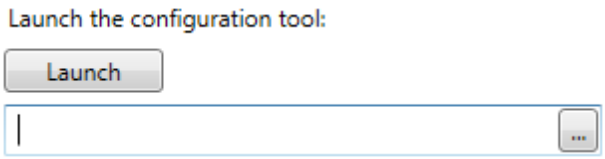
You may create the configuration for each channel using the utility provided by Spectrum Controls, Inc. You download the utility from the Spectrum Controls website at www.spectrumcontrols.com.

NOTE	It is recommended that when you generate your configuration, that you use the **Binary Radix** selection. If you choose the **Decimal Radix**, the utility is unable to work with negative values.

You may create the configuration for each channel using the MCC utility provided by Spectrum Controls, Inc. You download the utility from the Spectrum Controls website at https://www.spectrumcontrols.com.

To use the MCC utility:

1. The first time you configure a Spectrum Controls 2085 analog module, you must provide the file path of the utility to the CCW software. Navigate to the CCW Configuration Tab and click in the file path textbox below the **Launch** button.

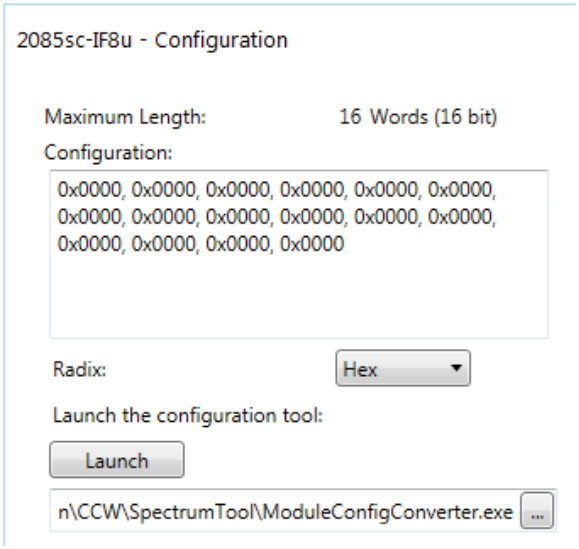


   The **Browse** button appears.

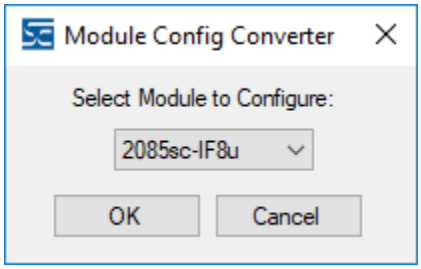
2. Click the button, navigate to the directory where you installed the CCW program, and select the ModuleConfigConverter tool located in the Spectrum Tool directory:

[3] The valid range for the Decimal Radix indication is from 0 to 65535. It does not accept negative values. If you need to receive negative values, select the **Hex Radix** option instead.

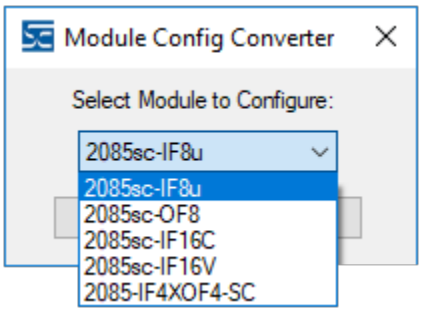
Example. **C:\Program Files (x86)\Rockwell Automation\CCW\SpectrumTool**



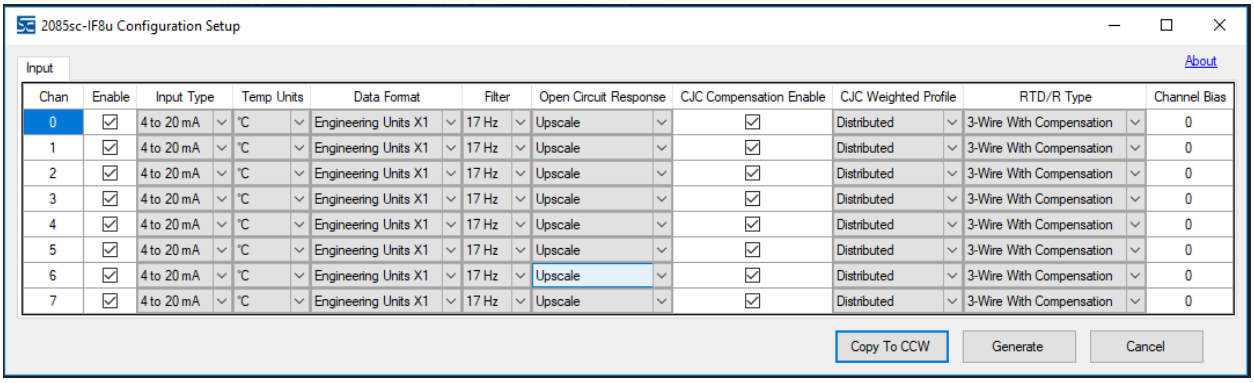
3. To run the tool, click **Launch**. The Module Config Converter dialog appears:



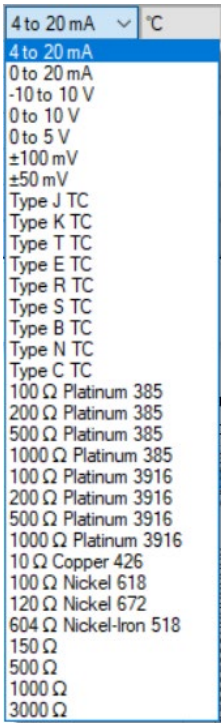
4. Select the 2085sc-IF8u module from the drop-down menu, and click **OK**:



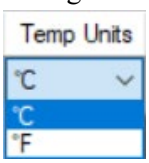
The 2085sc-IF8u Configuration Setup dialog appears:



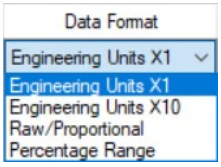
5. View and specify the following options as needed. See Channel Configuration Bit locations listed later in this section for details on the settings for every configuration bit:
   - **Chan**. Lists number of input channel from **0** to **7**.
   - **Enable**. Specifies whether to enable use of this channel. **Enabled** by default (checkbox enabled).
   - **Input Type**. Specifies which input type to use. Select type from drop-down list. **4 to 20 mA** input is default:



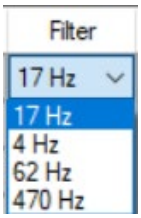
   - **Temp Units**. Specifies the temperature units the module reports in Centigrade or Fahrenheit. Default is **Centigrade**:



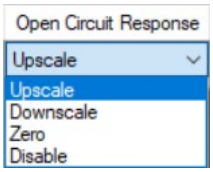
- **Data Format**. Specifies which data format to use for reporting input values. Default is **Engineering Units X1**:



- **Filter**. Specifies which filter to use. Default is **17 Hz**.

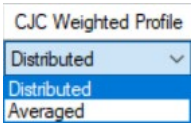


- **Open Circuit Response**. Specifies how to respond to an open circuit condition. Default is **Upscale**[4].

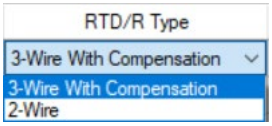


- **CJC Compensation Enable**. Enables or disables CJC Compensation. Default is Compensation is enabled.

- **CJC Weighted Profile**. Defines whether the profile is distributed or averaged. Default is **Distributed**:



- **RTD/R Type**. Defines RTD type. Default is **3-Wire With Compensation**:



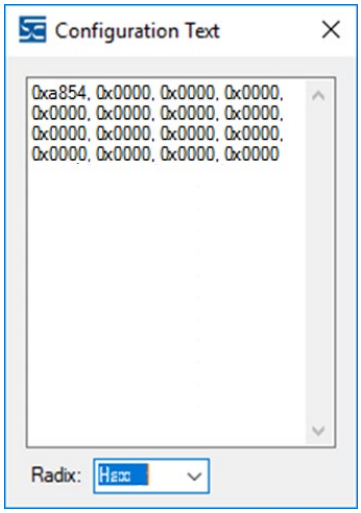
- **Channel Bias**. Specifies individual channel bias values. Default bias is **0**. Range may be **-32768** to **32767**.

6. When finished making selections, click **Generate**.

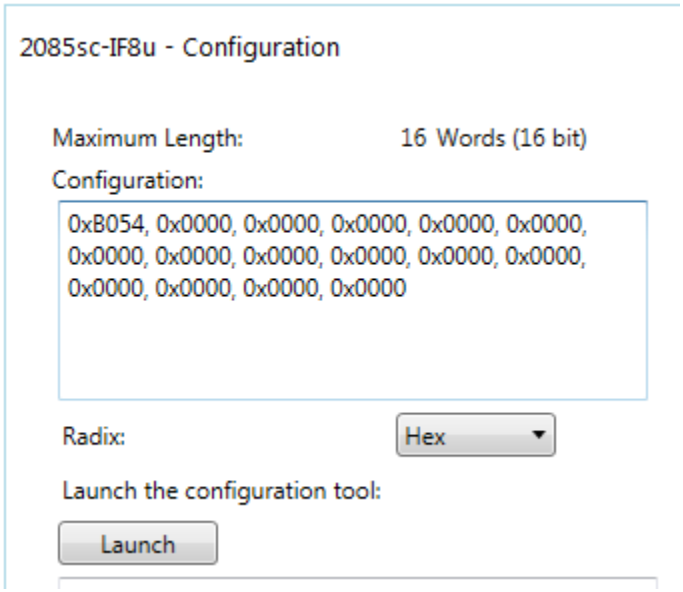
   The Configuration Text dialog appears with your configuration settings for all the channels.

[4] The **Disable** option is only available for voltage measurement.

You can manually copy the settings and paste it to the textbox of the CCW Configuration tab[5].



7. To automatically copy the generated settings into the textbox of the CCW Configuration tab, have the textbox visible on the monitor screen, and then click **Copy to CCW** button[5].
8. The utility copies the configuration settings and shows it inside the textbox.



9. Download the CCW project to controller and start to run the module operation.

[5] It is recommended that before manually or automatically pasting your configuration settings to the textbox of the CCW Configuration tab, be sure to select the **Hex Radix** indication on both software packages. The CCW software is unable to receive negative values under **Decimal Radix** indication.

Section 3.5
Software Information

3.5.1 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.

3.5.2 Software Updates

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

3.5.3 Startup and Factory Default Conditions

After the module boots and before the initial configuration is received, the module holds the default configuration as specified in the Configuration Assembly. There is no input data communication and no signal outputting before the controller goes into run mode. The initial configuration assumes a default configuration of 4 mA to 20 mA and the 17 Hz filter using the Engineering Unit ×1 setup.

Module Identity

The following values will be stored in the Vendor ID, Product_Type, Product_Code, Series_Rev, and Mod_Features arrays:

Parameter	Description
Vendor ID	58 (Spectrum Controls) [0×03A]
Product Type	10 (Analog) [0×0A]
Product Code	110 [0×06E]
Series Rev	50208 [0×C420] (First release revision is 1.1)
Module Catalog String	2085sc-IF8u

3.5.4 Connection Types and Assembly Sizes

The size of each assembly is listed in the table below. Each word takes 2 bytes. These values are stored in the Mod_Size array:

Table	Size (words)
Configuration Assembly	16
Input Assembly	15

3.5.5 Configuration Assembly

Channel	WORD	High Byte								Low Byte					
		Bits													
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ch0 Config Bits	C:0	Temp. Unit	2/3 Wire RTD	CJC Weighted Profile	Data Format		Input Range Type					Open Circuit Detection		CJC Enable	ADC Filter Freq.		Chan. Enable
Ch1 Cfg. Bits	C:1	(See Input Ch0 Config struct)															
Ch2 Cfg. Bits	C:2	(See Input Ch0 Config struct)															
Ch3 Cfg. Bits	C:3	(See Input Ch0 Config struct)															
Ch4 Cfg. Bits	C:4	(See Input Ch0 Config struct)															
Ch5 Cfg. Bits	C:5	(See Input Ch0 Config struct)															
Ch6 Cfg. Bits	C:6	(See Input Ch0 Config struct)															
Ch7 Cfg. Bits	C:7	(See Input Ch0 Config struct)															
Ch0 Ch. Bias	C:8	Signed 16-bit INT (-32768 to +32767)															
Ch1 Ch. Bias	C:9	Signed 16-bit INT (-32768 to +32767)															
Ch2 Ch. Bias	C:10	Signed 16-bit INT (-32768 to +32767)															
Ch3 Ch. Bias	C:11	Signed 16-bit INT (-32768 to +32767)															
Ch4 Ch. Bias	C:12	Signed 16-bit INT (-32768 to +32767)															
Ch5 Ch. Bias	C:13	Signed 16-bit INT (-32768 to +32767)															
Ch6 Ch. Bias	C:14	Signed 16-bit INT (-32768 to +32767)															
Ch7 Ch. Bias	C:15	Signed 16-bit INT (-32768 to +32767)															

3.5.6 Channel Configuration Bit Location Data

Channel Configuration Bit location details are listed below. Descriptions of each section are provided following this table:

To Select		**Make these bit settings**															
Bit Index		**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Channel Enable	Enable																**0**
	Disable																1
ADC Filter Frequency	17 Hz														**0**	**0**	
	4 Hz														0	1	
	62 Hz														1	0	
	470 Hz														1	1	
CJC Enable (For TC type)	Enabled													**0**			
	Disabled													1			
Open Circuit Detection	Upscale											**0**	**0**				
	Downscale											0	1				
	Zero											1	0				
	Disabled											1	1				
Input Range Type	4 to 20 mA						**0**	**0**	**0**	**0**	**0**						
	0 to 20 mA						0	0	0	0	1						
	-10 to 10 V						0	0	0	1	0						
	0 to 10 V						0	0	0	1	1						
	0 to 5 V						0	0	1	0	0						
	±100 mV						0	0	1	0	1						
	±50 mV						0	0	1	1	0						
	Type J TC						0	0	1	1	1						
	Type K TC						0	1	0	0	0						
	Type T TC						0	1	0	0	1						
	Type E TC						0	1	0	1	0						
	Type R TC						0	1	0	1	1						
	Type S TC						0	1	1	0	0						
	Type B TC						0	1	1	0	1						
	Type N TC						0	1	1	1	0						
	Type C TC						0	1	1	1	1						
	100 Pt 385						1	0	0	0	0						
	200 Pt 385						1	0	0	0	1						
	500 Pt 385						1	0	0	1	0						
	1000 Pt 385						1	0	0	1	1						

To Select		Make these bit settings															
Bit Index		**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
	100 Pt 3916						1	0	1	0	0						
	200 Pt 3916						1	0	1	0	1						
	500 Pt 3916						1	0	1	1	0						
	1000 Pt 3916						1	0	1	1	1						
	10 Cu 426						1	1	0	0	0						
	100 Ni 618						1	1	0	0	1						
	120 Ni 672						1	1	0	1	0						
	604 NiFe 518						1	1	0	1	1						
	150 Ω						1	1	1	0	0						
	500 Ω						1	1	1	0	1						
	1000 Ω						1	1	1	1	0						
	3000 Ω						1	1	1	1	1						
Data Format	Engineering Units X1				**0**	**0**											
	Engineering Units X10				0	1											
	Raw/Proportional Data				1	0											
	Percentage Range				1	1											
CJC Weighted Profile	Distributed CJC Temp			**0**													
	Averaged CJC Temp			1													
2/3 Wire RTD (For RTD/R Type)	3 Wire w/ Compensation		**0**														
	2 Wire		1														
Temperature Unit	°C	**0**															
	°F	1															

3.5.7 Configuration Bit Definition

The following table contains Bit Definitions for Input Channels:

Feature Name:	Bit Offset	Note
Channel Enable	0	0: Enable 1: Disable
ADC Filter Frequency	2:1	0: 17 Hz 1: 4 Hz 2: 62 Hz 3: 470 Hz NOTE: Selected channel filter frequency will be mixed with CJC Sensor sampling rate if CJC bit is enabled and the channel is selected as Thermocouple range type.

Feature Name:	Bit Offset	Note
CJC Enable (Functioning only when TC Input Range is selected)	3	0: Enable 1: Disable NOTE: Default to apply CJC weighted profile when the channel is selected as Thermocouple measurement. The setting will be ignored if the channel is not Thermocouple range type.
Open Circuit Detection	5:4	0: Upscale 1: Downscale 2: Zero 3: Disable (Feature enabled for volt, millivolt and thermocouple measurements only).

Feature Name:	Bit Offset	Note
Input Range Type	10:6	0: 4 to 20 mA 1: 0 to 20 mA 2: -10 to 10 V 3: 0 to 10 V 4: 0 to 5 V 5: ±100 mV 6: ±50 mV 7: Type J TC 8: Type K TC 9: Type T TC 10: Type E TC 11: Type R TC 12: Type S TC 13: Type B TC 14: Type N TC 15: Type C TC 16: 100 Ω Platinum 385 17: 200 Ω Platinum 385 18: 500 Ω Platinum 385 19: 1000 Ω Platinum 385 20: 100 Ω Platinum 3916 21: 200 Ω Platinum 3916 22: 500 Ω Platinum 3916 23: 1000 Ω Platinum 3916 24: 10 Ω Copper 426 25: 100 Ω Nickel 618 26: 120 Ω Nickel 672 27: 604 Ω Nickel-Iron 518 28: 150 Ω 29: 500 Ω 30: 1000 Ω 31: 3000 Ω
Data Format	12:11	0: Engineering Unit X1 1: Engineering Unit X10 2: Raw/Proportional Data 3: Percentage Range
CJC Weighted Profile (Functioning only when TC Input Range is selected)	13	0: Distributed temperature for channel 1: Averaged temperature from the CJC Sensor Note: Effective only when CJC bit is enabled and the channel is selected as Thermocouple range type.

Feature Name:	Bit Offset	Note
2/3 Wire RTD (Functioning only when R/RTD Input Range is selected)	14	0: 3 Wire with Compensation 1: 2 Wire NOTE: Effective only when the channel is for RTD/R measurement.
Temperature Unit	15	0: °C 1: °F NOTE: Effective for Temperature range type selections, Thermocouple or RTD/R.

3.5.8 Input Assembly

The module input table is composed by one group of channel data, one CJC Sensor data, one group of channel status, module & CJC status and module firmware information. Below is the layout of the input table.

Channel	Word	Usage															
Ch0 Data	AI_00	Signed 16-bit INT (-32768 to +32767)*															
Ch1 Data	AI_01	Signed 16-bit INT (-32768 to +32767)*															
Ch2 Data	AI_02	Signed 16-bit INT (-32768 to +32767)*															
Ch3 Data	AI_03	Signed 16-bit INT (-32768 to +32767)*															
Ch4 Data	AI_04	Signed 16-bit INT (-32768 to +32767)*															
Ch5 Data	AI_05	Signed 16-bit INT (-32768 to +32767)*															
Ch6 Data	AI_06	Signed 16-bit INT (-32768 to +32767)*															
Ch7 Data	AI_07	Signed 16-bit INT (-32768 to +32767)*															
CJC Data	AI_08	Signed 16-bit INT in Celsius unit (-2000 to +9000)**															
Channel Status	Word Index	High Byte								Low Byte							
		Bits															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ch 1 & 0 Status	AI_09	Unused		ADC 1	DNR 1	OC 1	OR 1	UR 1	CF 1	Unused		ADC 0	DNR 0	OC 0	OR 0	UR 0	CF 0
Ch 3 & 2 Status	AI_10	Unused		ADC 3	DNR 3	OC 3	OR 3	UR 3	CF 3	Unused		ADC 2	DNR 2	OC 2	OR 2	UR 2	CF 2
Ch 5 & 4 Status	AI_11	Unused		ADC 5	DNR 5	OC 5	OR 5	UR 5	CF 5	Unused		ADC 4	DNR 4	OC 4	OR 4	UR 4	CF 4
Ch 7 & 6 Status	AI_12	Unused		ADC 7	DNR 7	OC 7	OR 7	UR 7	CF 7	Unused		ADC 6	DNR 6	OC 6	OR 6	UR 6	CF 6
Module & CJC Status	AI_13	MF	Unused								SN	CAL	CJC Sensor				
													DNR	OC	OR	UR	CJF
Firmware Revision	AI_14	Major								Minor							

*: The data type of the Channel data is a signed 16-bit integer. Any reading outside the data range from -32768 to +32767 will trigger an over range or under

range bit indication. The reading will stay at the range limit. This also applies to temperature conversion when scaling the data from Celsius to higher or lower Fahrenheit value.

**: The data type of the CJC Sensor data is also a signed 16-bit integer but its valid display range is from -2000 to +9000 in Celsius temperature unit. E.g. if the reading is +2587, it represents the measured temperature is 25.87 °C. Any reading value outside the CJC Sensor range will trigger an over range or under range bit indication. The value will stay at the range limit.

If there is a module ADC communication error or an open circuit condition happened on the CJC Sensor, the CJC Sensor data will be set to default room temperature, 25.00 °C for display and the corresponding status bits on CJC Fault bit and CJC open circuit bit will be set. That temperate reading will also be applied into the CJC functionality for any input channel if configured to run thermocouple measurement.

In the case of after the module is powered up or the CJC Sensor is reconnected on the terminal block, the module will start to sample temperature readings on the CJC Sensor channel. During sampling, the corresponding status bits on CJC Fault bit and CJC Data Not ready bit will be set and the reading for display will be 0. Until all samples are collected, the actual reading will be shown and the CJC functionality can start to serve input channels.

3.5.9 Input Table Bit Definition

AI_12:09: Channel Status		
Bit	**Name**	**Description**
8, 0	CF<n>	**Channel Fault** If the channel has the condition happened on Open Circuit, Data Error, Data Not Ready or Under/Over range fault, this bit will be set.
9, 1	UR<n>	**Under Range** Set if the channel input reading is less than or equal to the minimum point of the selected Input Type range or the Data Type low limit, -32768.
10, 2	OR<n>	**Over Range** Set if the channel input reading is greater than or equal to the maximum point of the selected Input Type range or the Data Type high limit, +32767.
11, 3	OC<n>	**Open Circuit** Set if the channel connection on the terminal block is open.
12, 4	DNR<n>	**Data Note Ready** Set if the input channel is configured to “Thermocouple” measurement type and the CJC Sensor is still sampling.
13, 5	ADC<n>	**ADC Communication Failure or PGA Connection Failure** Set if there is a channel ADC communication failure or PGA connection error. This is a hardware fault.
14, 6	Unused	Bits marked as Unused are set to 0.
15, 7	Unused	Bits marked as Unused are set to 0.

3.5.10 Channel Status Bit Definition

AI_13: Module & CJC Status	
AI_13: Module & CJC Status	**Description**
Name	**CJC Sensor Fault** Set if the CJC Sensor has the condition happened on Open Circuit, Data Not Ready or Under/Over range fault.
CJF	**CJC Under Range** Set if the measured value is less than or equal to the minimum point of the CJC Sensor range, -2000.
UR	**CJC Over Range** Set if the measured value is greater than or equal to the maximum of the CJC Sensor range, +9000.
OR	**CJC Open Circuit** Set if the CJC Sensor connection on the terminal block is open.
OC	**CJC Data Not Ready** Set if the module is still sampling on the CJC Sensor channel.
DNR	**Module Invalid Cal Data** The stored calibration data or checksum is corrupt or invalid. The module must be factory calibrated before it will operate normally.
CAL	**Module Invalid Serial Number Data** The stored serial number checksum is corrupt or invalid. The module must be factory calibrated before it will operate normally.
SN	Bits marked as Unused are set to 0.
Unused	**Module Fault** Set as global fault if any channel fault or CJC Sensor fault.

Section 3.6 Product Features

The following sections provide information on user-configurable parameters.

3.6.1 Channel Enable or Disable Description

Specify whether to enable use of each selected channel. Each channel is **Enabled** by default (checkmark selected).

3.6.2 Input ADC Filter Frequencies Description

The modules use an input ADC digital filter that provides high-frequency noise rejection for each input signal. The filter for each channel is programmable, allowing you to select from four different filter frequencies.

Index	Filter (Hz)	Note
0	17	Default

Index	Filter (Hz)	Note
1	4	
2	62	
3	470	

The software uses the following channel scan times. The scan time is based on each channel's Input ADC Filter configuration. The 62 Hz and 470 Hz filters don't provide any 50Hz or 60Hz rejection, select the slowest filter setting possible for your application for best noise performance. The default 17Hz filter is generally a good choice with nearly the performance of the 4Hz with a faster scan rate

Below is the approximate timing for each input filter selection:

ADC Filter Selection	Channel Scan Rate*
17 Hz	139
4 Hz	499
62 Hz	51
470 Hz	23

NOTE	
	• *. All timing units are in ms. • *. Channel configuration setup for 1 measurement only. This applies to all range types. • *. If running V/mV/TC measurements, the second measurement (open circuit detection) happens every 3 seconds which will take 23 ms per enabled channel. • *. If running RTD/R measurements with 3-wire compensation option, the second measurement happens every 60 seconds at the same scan rate based on the end user filter setting.

3.6.3 Cold Junction Compensation Profile Description

A single CJC sensor, placed in the center of the terminal block, is used for cold junction compensation.

You are provided with two CJC weighted profiles for estimating channel junction temperature.

- The Distributed CJC Temp option dynamically provides an estimated temperature based on the channel mounting installation on the terminal block.
- The Averaged CJC Temp applies the CJC Sensor reading to all channels equally.

Specific features to take into account are:

- If all channels are disabled, the CJC sensor reading and state are not reported.

- Each update on the CJC sensor reading and status is tied to each channel's scan rate.

This option may also be treated as a remote CJC feature:

Index	CJC Weighted Profile	Note
0	Distributed CJC Temp	Default
1	Averaged CJC Temp	

3.6.4 Open Circuit Detection Description

The Open Circuit setting of each Channel Configuration Register indicates what action you see when an open circuit condition is detected. When an open circuit condition is detected, Upscale refers to the upper limit of the channel range type. Downscale refers to the lower limit of the channel range type. Zero reports a zero to you.

Settings are:

Index	Open Circuit Detection	Note
0	Upscale	Default
1	Downscale	
2	Zero	
3	Disable[6]*	

Open Circuit conditions may display transitional data until an open circuit value is reached. The reading may transition toward one of the Full Range values until the open circuit value is detected. Once it is detected, the Upscale, Downscale or Zero value is immediately set. Open circuit may also be triggered by applying an input value well beyond the specified Low or High Limit values indicated in the Data Formats table. The values beyond the Low and High Limits are not specified since the function of the Open Circuit Detection only applies to a disconnected input.

Open circuit detection for the Current measurement only applies to the 4-20 mA range. If the signal wire to Ch_CUR+/AN+ opens, the module reports a negative full-scale value in the channel input data tag within 5 seconds. This uses the Open Wire flag since an open wire produces a 0 mA input level. The minimum Normal Range will be exceeded and trigger the Under Range and Open Wire condition.

For the 0-20 mA input range, open circuit conditions result in a measured value of 0 mA which is no different from a measured value of 0 mA when a circuit is present. The appropriate Under Range bit will be floating but the Channel Open Wire bit will not be set.

[6] Disabling open circuit detection is only available for volt, millivolt and thermocouple measurements. When the measurement sensor is equipped with sensitive low-impedance functionality, applying open circuit circuitry may affect the measurement accuracy. When the open circuit detection is disabled, the corresponding open circuit status bit located in the channel status bits will not be updated in the input table.

When the channel is selected to run RTD/R measurement, if the lead resistance compensation is used for 3-wire RTD measurements and the sense lead is opened, the open circuit detect may take up to 60 seconds to get updated based on lead wire compensation timer setup.

When running volt, millivolt or thermocouple measurements without disabling open circuit detection functionality, the open circuit detection circuitry is applied every 3 seconds.

3.6.5 Input Type Description

You may scale input data using the following ranges:

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
B Thermocouple	1820.00 °C	High Limit	18200	1820	32767	10000
	1820.00 °C	High Range	18200	1820	32767	10000
	300.00 °C	Low Range	3000	300	-32768	0
	300.00 °C	Low Limit	3000	300	-32768	0
C Thermocouple	2315.00 °C	High Limit	23150	2315	32767	10000
	2315.00 °C	High Range	23150	2315	32767	10000
	0.00 °C	Low Range	0	0	-32768	0
	0.00 °C	Low Limit	0	0	-32768	0
E Thermocouple	1000.00 °C	High Limit	10000	1000	32767	10000
	1000.00 °C	High Range	10000	1000	32767	10000
	-270.00 °C	Low Range	-2700	-270	-32768	0
	-270.00 °C	Low Limit	-2700	-270	-32768	0
J Thermocouple	1200.00 °C	High Limit	12000	1200	32767	10000
	1200.00 °C	High Range	12000	1200	32767	10000
	-210.00 °C	Low Range	-2100	-210	-32768	0
	-210.00 °C	Low Limit	-2100	-210	-32768	0
K Thermocouple	1370.00 °C	High Limit	13700	1370	32767	10000
	1370.00 °C	High Range	13700	1370	32767	10000
	-270.00 °C	Low Range	-2700	-270	-32768	0
	-270.00 °C	Low Limit	-2700	-270	-32768	0
N Thermocouple	1300.00 °C	High Limit	13000	1300	32767	10000
	1300.00 °C	High Range	13000	1300	32767	10000
	-210.00 °C	Low Range	-2100	-210	-32768	0
	-210.00 °C	Low Limit	-2100	-210	-32768	0
R Thermocouple	1768.00 °C	High Limit	17680	1768	32767	10000
	1768.00 °C	High Range	17680	1768	32767	10000
	0.00 °C	Low Range	0	0	-32768	0
	0.00 °C	Low Limit	0	0	-32768	0

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
S Thermocouple	1768.00 °C	High Limit	17680	1768	32767	10000
	1768.00 °C	High Range	17680	1768	32767	10000
	0.00 °C	Low Range	0	0	-32768	0
	0.00 °C	Low Limit	0	0	-32768	0
T Thermocouple	400.00 °C	High Limit	4000	400	32767	10000
	400.00 °C	High Range	4000	400	32767	10000
	-270.00 °C	Low Range	-2700	-270	-32768	0
	-270.00 °C	Low Limit	-2700	-270	-32768	0
100 Ω Pt 0.385	850.00 °C	High Limit	8500	850	32767	10000
	850.00 °C	High Range	8500	850	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
200 Ω Pt 0.385	850.00 °C	High Limit	8500	850	32767	10000
	850.00 °C	High Range	8500	850	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
500 Ω Pt 0.385	850.00 °C	High Limit	8500	850	32767	10000
	850.00 °C	High Range	8500	850	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
1000 Ω Pt 0.385	850.00 °C	High Limit	8500	850	32767	10000
	850.00 °C	High Range	8500	850	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
100 Ω Pt 0.3916	630.00 °C	High Limit	6300	630	32767	10000
	630.00 °C	High Range	6300	630	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
200 Ω Pt 0.3916	630.00 °C	High Limit	6300	630	32767	10000
	630.00 °C	High Range	6300	630	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
500 Ω Pt 0.3916	630.00 °C	High Limit	6300	630	32767	10000
	630.00 °C	High Range	6300	630	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
1000 Ω Pt 0.3916	630.00 °C	High Limit	6300	630	32767	10000
	630.00 °C	High Range	6300	630	32767	10000
	-200.00 °C	Low Range	-2000	-200	-32768	0
	-200.00 °C	Low Limit	-2000	-200	-32768	0
10 Ω Cu 0.426	260.00 °C	High Limit	2600	260	32767	10000
	260.00 °C	High Range	2600	260	32767	10000
	-100.00 °C	Low Range	-1000	-100	-32768	0
	-100.00 °C	Low Limit	-1000	-100	-32768	0
100 Ω Ni 0.618	260.00 °C	High Limit	2600	260	32767	10000
	260.00 °C	High Range	2600	260	32767	10000
	-100.00 °C	Low Range	-1000	-100	-32768	0
	-100.00 °C	Low Limit	-1000	-100	-32768	0
120 Ω Ni 0.672	260.00 °C	High Limit	2600	260	32767	10000
	260.00 °C	High Range	2600	260	32767	10000
	-80.00 °C	Low Range	-800	-80	-32768	0
	-80.00 °C	Low Limit	-800	-80	-32768	0
604 Ω Ni-Fe 0.518	200.00 °C	High Limit	2000	200	32767	10000
	200.00 °C	High Range	2000	200	32767	10000
	-100.00 °C	Low Range	-1000	-100	-32768	0
	-100.00 °C	Low Limit	-1000	-100	-32768	0
0-150 Ω	150.00 Ω	High Limit	15000	1500	32767	10000
	150.00 Ω	High Range	15000	1500	32767	10000
	0.00 Ω	Low Range	0	0	-32768	0
	0.00 Ω	Low Limit	0	0	-32768	0
0-500 Ω	500.00 Ω	High Limit	5000	500	32767	10000
	500.00 Ω	High Range	5000	500	32767	10000
	0.00 Ω	Low Range	0	0	-32768	0
	0.00 Ω	Low Limit	0	0	-32768	0
0-1000 Ω	1000.00 Ω	High Limit	10000	1000	32767	10000
	1000.00 Ω	High Range	10000	1000	32767	10000
	0.00 Ω	Low Range	0	0	-32768	0
	0.00 Ω	Low Limit	0	0	-32768	0
0-3000 Ω	3000.00 Ω	High Limit	30000	3000	32767	10000
	3000.00 Ω	High Range	30000	3000	32767	10000
	0.00 Ω	Low Range	0	0	-32768	0
	0.00 Ω	Low Limit	0	0	-32768	0

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
±50 mV	52.50 mV dc	High Limit	5250	525	32767	10250
	50.00 mV dc	High Range	5000	500	31207	10000
	-50.00 mV dc	Low Range	-5000	-500	-31208	0
	-52.50 mV dc	Low Limit	-5250	-525	-32768	-250
±100 mV	105.00 mV dc	High Limit	10500	1050	32767	10250
	100.00 mV dc	High Range	10000	1000	31207	10000
	-100.00 mV dc	Low Range	-10000	-1000	-31208	0
	-105.00 mV dc	Low Limit	-10500	-1050	-32768	-250
±10 V	10.50 V dc	High Limit	10500	1050	32767	10250
	10.00 V dc	High Range	10000	1000	31207	10000
	-10.00 V dc	Low Range	-10000	-1000	-31208	0
	-10.50 V dc	Low Limit	-10500	-1050	-32768	-250
0-10 V	10.50 V dc	High Limit	10500	1050	32767	10500
	10.00 V dc	High Range	10000	1000	29788	10000
	0.00 V dc	Low Range	0	0	-29789	0
	-0.50 V dc	Low Limit	-500	-50	-32768	-500
0-5 V	5.25 V dc	High Limit	5250	525	32767	10500
	5.00 V dc	High Range	5000	500	29788	10000
	0.00 V dc	Low Range	0	0	-29789	0
	-0.25 V dc	Low Limit	-250	-25	-32768	-500
4-20 mA	21.00 mA	High Limit	21000	2100	32767	10625
	20.00 mA	High Range	20000	2000	29085	10000
	4.00 mA	Low Range	4000	400	-29823	0
	3.20 mA	Low Limit	3200	320	-32768	-500
0-20 mA	21.00 mA	High Limit	21000	2100	32767	10500
	20.00 mA	High Range	20000	2000	29646	10000
	0.00 mA	Low Range	0	0	-32768	0
	0.00 mA	Low Limit	0	0	-32768	0
CJC	90.00 °C	High Limit	9000			
	90.00 °C	High Range	9000			
	-20.00 °C	Low Range	-2000			
	-20.00 °C	Low Limit	-2000			

3.6.6 Data Format Description

The measurement range is pre-defined, based on your selection of the module data format. The corresponding range limited defined in the following tables:

Index	Data Format	Description
0	Engineering Unit ×1	Default. The module scales analog input data to the actual current/voltage values in mA or mV for the selected input range.
1	Engineering Unit ×10	The module scales analog input data to the actual current/voltage values in mA * 10 or mV * 10 for the selected input range.
2	Raw/Proportional	The value presented to the controller is proportional to the selected input and scaled to the maximum data range allowed by the bit resolution of the ADC.
3	Percentage Full Scale	The value presented to the controller is a percentage of the user range.

3.6.7 CJC Weighted Profile Description

See Cold Junction Compensation Profile Description earlier in this section.

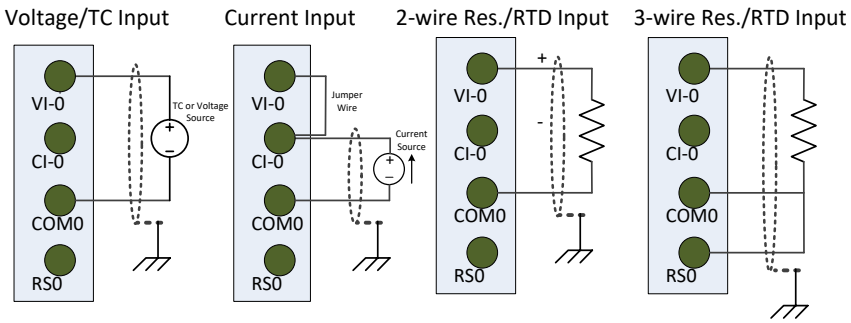
3.6.8 2-/3-Wire RTD

This option is used only for RTD and Resistance measurements. You may specify using a 2-wire or a 3-wire measurement. When running 3-wire measurements, you may also enable lead wire resistance compensation:

Index	2-/3-Wire RTD	Note
0	3-wire with compensation	Default
1	2-wire	

When using 3-wire measurement with lead wire resistance compensation, the lead wire resistance value is measured every 60 seconds using a dynamic channel timer to verify. If the lead wire is detected as open circuit/broken wire, the secondary measurement and the timer functionality is reset. Once the open circuit condition is resolved, the secondary measurement is retriggered immediately instead of waiting for the next period.

The default option is set to use 3-wire measurement with lead wire compensation.



3.6.9 Temperature Scale Description

These bits specify the temperature units the module reports in Centigrade or Fahrenheit. The default setting is Centigrade.

3.6.10 Output Assembly

Tag Name:	Type:	Offset:	Notes:
Calibration command	USINT	0×0000	
Calibration channel	USINT	0×0001	
Reserved	INT	0×0002	
Calibration Key I	INT	0×0004	0×06A9
Calibration Key II	INT	0×0006	0×5C15

3.6.11 Module Specific Hardware Errors

A Micro850 or 870 PLC can generate a series of 0×F2*xy* error codes specific to an Expansion I/O module. The Fault code is 0×F29*z*, where z indicates the slot number of the expansion I/O. If z=0, then the slot number cannot be identified.

Fault Code	Extended Fault Code	Error Description
0×F29z[7]	0×301	MCU Watchdog reset
	0×302	MCU board power brownout
	0×303	Unused
	0×304	A/D Converter Communication Error. Module detects the analog-to-digital converter is not functioning properly during data acquisition.

Example error captured below.

Recoverable Fault

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

3.6.12 Module Specific Configuration Errors

If you set invalid configuration values in the PLC, the CCW will generate a configuration fault.

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

The connection status will be defaulted and disconnected.

Fault Code	Extended Fault Code	Error Description
0×F2Bz[8]	0×410–0×417	Invalid Selection on Input Range Type (Channel 0–7).

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 +1 (425) 746-9481.

For Rockwell Automation Compatible I/O Products:

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

Section 3.8 Declaration of Conformity

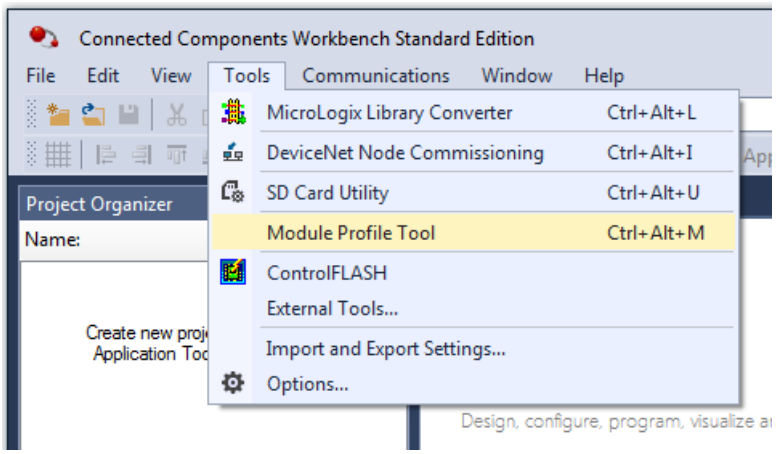
Available upon request

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

Appendix A
Manually Importing an AOP

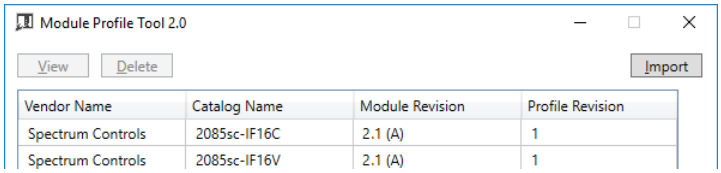
This appendix explains how to manually import an AOP rampp file into CCW software.

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:

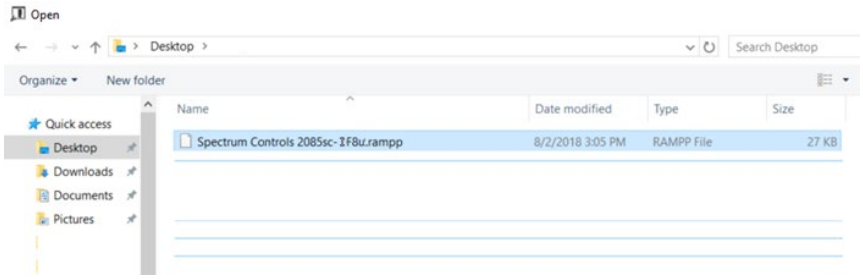


4. When prompted by Windows User Account Control, to confirm that you wish to run the program, click **Yes** button.

   The Module Profile Tool 2.0 window appears:

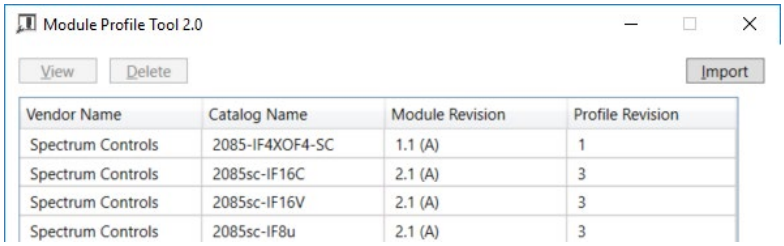


5. Click the **Import** button.
6. An Open dialog appears. Navigate to the provided .rampp file location, and click the file you downloaded:

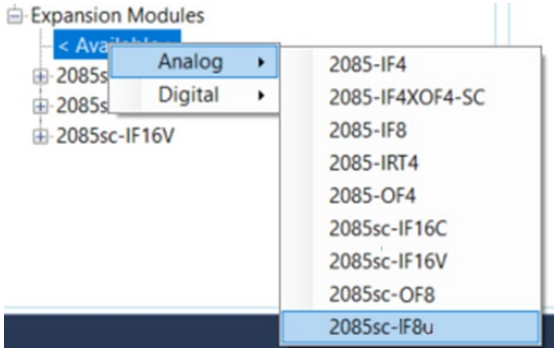


7. Click **Open** to import the file.

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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