User's Manual Pub. 0300306-01 Rev. A

Micro850™
16-Channel Analog Input Module

Catalog Numbers: 2085sc-IF16C/
2085sc-IF16V

SPECTRUM
CONTROLS

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

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Table of Contents

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 publications
- Conventions used in this manual
- Technical support

Who Should Use This Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting control systems that use the Micro850™ 16-Channel 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 and Micro850 Programmable Controllers User Manual. Also 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 Micro850™ 16-Channel Analog Input Module.

Related Documentation

The table below provides a listing of publications that contain important information about Allen-Bradley AC drive 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
Installing 24-point PLC	Micro850 24-Point Programmable Controllers Installation Instructions	2080-IN007

For	*Refer to this Document*	*Allen-Bradley Pub. No.*
Installing 48-point PLC	Micro850 48-Point Programmable Controllers Installation Instructions	2080-IN008
User manual information	Micro830 and Micro850 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 60259
Declarations of conformity, certificates, and other certification details.	Product Certification website: http://spectrumcontrols.com	

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  Used to identify critical information for you and the installation.

NOTE  Used to identify useful tips and hints.

Chapter 1
Module Overview

The Micro850™ 16-Channel Analog Input Modules (2085sc-IF16C/2085sc-IF16V) are 16-point analog modules designed to expand the local I/O or communication capability of a Rockwell Automation Micro850 System. The minimum configuration in which an expansion module can be installed is a Micro850 Controller and a power supply.

Section 1.1 General Description

SPECTRUM CONTROLS Enabled™ By Rockwell Automation TECHNOLOGIES
P.O. BOX 6489 Bellevue, WA 98008 USA
CAT. NO.
2085sc–IF16V
16 CHANNEL VOLTAGE
ANALOG INPUT MODULE
P/N: 9060146–02 P/R: A F/W REV: 1.1
F/N: 2050442–01
S/N: 00000001 SERIES: A M/D: 1623 Fac. 1G
MANUALS ONLINE AT:
http://spectrumcontrols.com
PRODUCT OF USA SEE INSTALL GUIDE FOR INSTAL. INFO.

CAT. NO.
2085sc–IF16V
BACKPLANE:
100mA @ 5VDC
20mA @ 24VDC
INPUT:
0–5VDC, 0–10VDC
+/–10VDC

c UL us LISTED 1P98
IND. CONT. EQ.
FOR HAZ. LOC.
CLASS I DIV. 2
GROUPS ABCD
TEMP CODE T5
–20 C < Ta < +65 C

SPECTRUM CONTROLS Enabled™ By Rockwell Automation TECHNOLOGIES
P.O. BOX 6489 Bellevue, WA 98008 USA
CAT. NO.
2085sc–IF16C
16 CHANNEL CURRENT
ANALOG INPUT MODULE
P/N: 9060145–02 P/R: A F/W REV: 1.1
F/N: 2050431–01
S/N: 00000001 SERIES: A M/D: 1623 Fac. 1G
MANUALS ONLINE AT:
http://spectrumcontrols.com
PRODUCT OF USA SEE INSTALL GUIDE FOR INSTAL. INFO.

CAT. NO.
2085sc–IF16C
BACKPLANE:
100mA @ 5VDC
20mA @ 24VDC
INPUT:
0–20mA
4–20mA

c UL us LISTED 1P98
IND. CONT. EQ.
FOR HAZ. LOC.
CLASS I DIV. 2
GROUPS ABCD
TEMP CODE T5
–20 C < Ta < +65 C

The 2085sc-IF16C/V input modules measure current or voltage input data. The module supports:

- Sixteen input channels.
- 2085sc-IF16C module: Current measurements. The module measures the channel input current across a low-drift precision resistor, measures the voltage, and converts the voltage to a current reading.
- 2085sc-IF16V module: Direct voltage measurements. There is no low-drift precision resistor installed, and the channel accepts the voltage source directly.
- Open-wire detection (voltage ranges and current 4-20 mA range).
- Range scaling of input data.
- High and low process alarms that provide a warning on under- or over-range detection (from user-defined values).
- Four data formats.
- Four filter frequency setup.
- Disabling open-wire detection for any, or all, channels.

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. Individual channels are not isolated from each other.

The 2085sc-IF16 modules use two sets of 20-bit Sigma-Delta analog-to-digital converters to achieve a 16-bit resolution. The modules digitally convert and store analog data from either the current or voltage input type. Each input channel is individually configured via Rockwell-provided Connected Component Workbench (CCW) software for the Micro850 family of PLC controllers, and with the Module Configuration Converter 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:

- The default configuration for the 2085sc-IF16C is for all channels enabled in the 4 to 20 mA range with the 17 Hz filter in Engineering ×1 units.
- The default configuration for the 2085sc-IF16V is for all channels enabled in the ±10 V range with the 17 Hz filter in Engineering ×1 units.

Section 1.2
Input Specifications

The 2085sc-IF16C/2085sc-IF16V modules have 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 203 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 indirect (coupling plate).	
Radiated Immunity	10 V/M with 200 Hz square-wave 50% Pulse 100% AM at 900 MHz and at 1890 MHz 10 V/M with 1 kHz sine-wave 80% AM from 80…2000 MHz 20 V/M with 1 kHz sine-wave 80% AM from 2000…6000 MHz	
Inputs per module	16 current or voltage differential input channels	
Input ranges	**Current**: 0-20 mA, 4-20 mA **Voltage**: 0-5 V, 0-10 V, ±10 V	
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
Voltage accuracy (4 and 17 Hz filters)	**Error at 25 °C, Max**	**Error over -20 °C to 65 °C, Max**
0-5 V	±3 mV	±6 mV
0-10 V	±10 mV	±20 mV

Input Description	Value		
±10 V	±10 mV		±20 mV
Repeatability (at 25 ºC)	4 Hz filter	17 Hz filter	60 and 470 Hz filters[1]
0-5 V, 0-10 V, ±10 V 2085sc-IF16V	±1.0 mV	±2 mV	±3 mV
0-20 mA, 4-20 mA 2085sc-IF16C	±2 µA	±3 µA	±10 µA
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		
Input Bias Currents and Impedance			
Open Wire Detection Current (Voltage range only)	Approximately 100 µA during open wire checks for a duration of one channel scan time, with a 470 Hz filter.		
Current input impedance (2085sc-IF16C)	249.5 Ω ±0.5%		
Voltage input impedance (2085sc-IF16V)	15 MΩ (except during open wire checks).		
Input protection: (2085sc-IF16C) (2085sc-IF16V)	Current: 32 mA continuous (approximately 8 V) Voltage: ±28 VDC continuous. (Note: maximum voltage between any two pins must be limited to 28 VDC as well.)		
Peak Inrush Current	Less than 150 mA for +5 V. Less than 400 mA for +24 V.		
Isolation			
Input to backplane isolation	50 VAC working Reinforced isolation tested at 2 kV DC for 1 minute.		
Input to Chassis GND isolation	50 VAC working Reinforced isolation tested at 2 kV DC for 1 minute.		
Power Requirements			
Bus +5 V (4.75 V to 5.4 V)	100 mA max		
Bus +24 V (19.9 V to 26.4 V)	20 mA max		
Power Dissipation (within module)	1.0 W max, for 16V. 2.8 W max for 16C, with all inputs at 21 mA.		

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

Input Description	Value
Fault detection	Over/under range for all types. Open Circuit detection is supported on all ranges except the 0-20 mA range. Note: Voltage open circuit (open wire) is periodically checked to keep input impedance high during normal measurements.
Wire size	#16 to #28 AWG
Wire Strip Length	0.375 in.
Recommended Tightening Torque:	0.25 N-m (2.2 lb-in)
RoHS	Meets European RoHS component standards (January 2015 and earlier).
REACH	Meets European REACH 7 requirements.
Dimensions	110 mm × 87 mm × 51 mm (plastics) 110 mm × 89 mm × 51 mm (with RTBs installed.)

Table 1-2. Environmental Specification Table

Environmental Tests	Industry Standards
Temperature (Operating) (Performance Criteria A)	IEC60068-2-1: (Test Ad, Operating Cold), IEC60068-2-2: (Test Bd, Operating Dry Heat), IEC60068-2-14: (Test Nb, Operating Thermal Shock)
Temperature (Non-operating) (Performance Criteria B)	IEC60068-2-1: (Test Ab, Unpackaged Non-operating Cold), IEC60068-2-2: (Test Bb, Unpackaged Non-operating Dry Heat), IEC60068-2-14: (Test Nb, Unpackaged Non-operating Thermal Shock)
Operating Altitude	2000 meters (6561 feet)
Humidity (Operating) (Performance Criteria A)	IEC60068-2-30: (Test Db, Unpackaged Damp Heat):
Vibration (Operating) (Performance Criteria A)	IEC60068-2-6: (Test Fc, Operating)
Shock (Operating) (Performance Criteria A)	IEC60068-2-27: (Test Ea, Unpackaged Shock)
Shock (Non-operating) (Performance Criteria B)	IEC60068-2-27: (Test Ea, Unpackaged Shock)
Radiated Emissions	IEC 61000-6-4:2007 (CISPR 11)
Conducted Emissions	IEC 61000-6-4:2007 (CISPR 11)

Environmental Tests	Industry Standards
ESD immunity (Performance Criteria B)	IEC 61000-4-2
Radiated RF immunity (Performance Criteria A)	IEC 61000-4-3: Level 3
EFT/B immunity (Performance Criteria B)	IEC 61000-4-4
Surge transient immunity (Performance Criteria B)	IEC 61000-4-5
Conducted RF immunity (Performance Criteria A)	IEC 61000-4-6
Magnetic Field (Performance Criteria A)	IEC 61000-4-8
AC Mains Voltage Dips, Interruptions and Variations	IEC 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) cUL 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	ULH ANSI/ISA–12.12.01–2007 Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous (Classified) Locations (NRAG) cULH 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, and d
CE EMC Directive	IEC 61131-2 Programmable Controllers: Third Edition 2007-02, Clause 8 IEC 61000-6-2: Generic Industrial Immunity IEC 61000-6-4: Generic Industrial Emissions

Section 1.3 Data Formats

There are four data input types:

- Engineering units ×1
- Engineering units ×10
- Raw/proportional count
- Percent Range

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 voltage and 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 24 VDC for voltage inputs, and up to 32 mA for current inputs.

1.4.1 LED Indicators

The 2085sc-IF16 module 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.

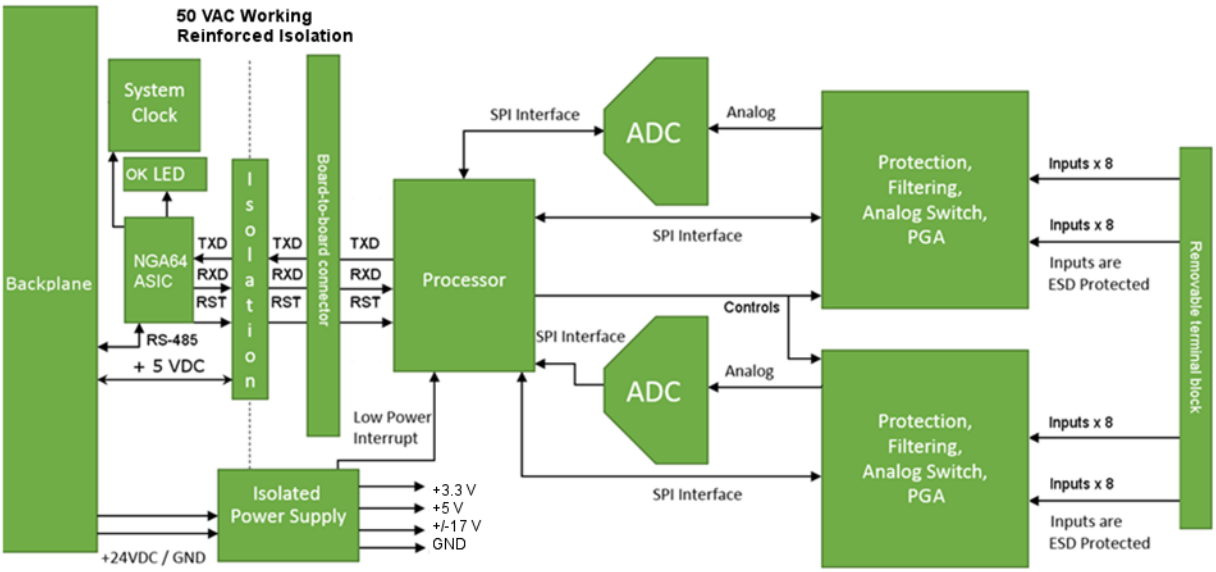
Table 1-4 LED Status Indicators

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	Module has power and passed self-test. No action is required.
	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.

Section 1.5 System Overview

The 2085sc-IF16 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

The 2085sc-IF16 modules are tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

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

This product is intended for use in an industrial environment.

Section 2.2 Power Requirements

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

The module receives power through the bus interface from the +5 VDC (4.75 to 5.4 V)/+24 VDC (19.9 to 26.4 V) system power supply.

Current rating for + 5 V is 100 mA maximum; for +24 V it is 20 mA maximum. Power rating is 3 Watts maximum:

5 VDC	24 VDC
100 mA	20 mA

Section 2.3 General Considerations

The 2085sc-IF16 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].

2.3.1 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. 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.
- Device shall be installed in an enclosure which can only be opened with the use of a tool.
- 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 analog module card bus connector pins or the terminal block on the input 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 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 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. Such 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 inputs are highly susceptible to electrical noise. Electrical noise coupled to the analog inputs 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

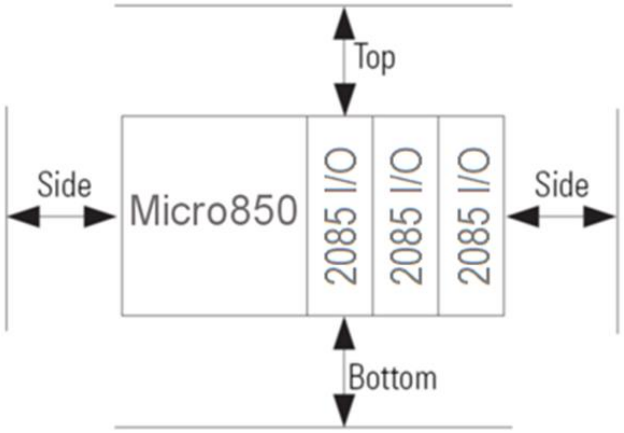
WARNING

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

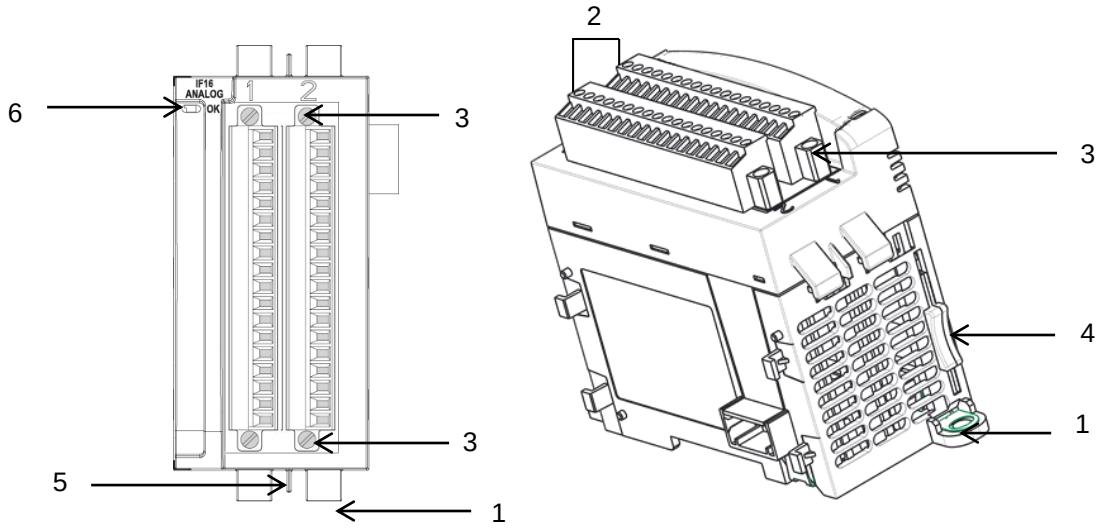
Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown:



2.4.2 Parts List

Your package contains one Micro850 2085sc-IF16C or 2085sc-IF16V 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

2.4.1 Insert Module into the Controller

You can choose to wire the plug-in before inserting it into the controller, or wire

it once the module is secured in place.

NOTE

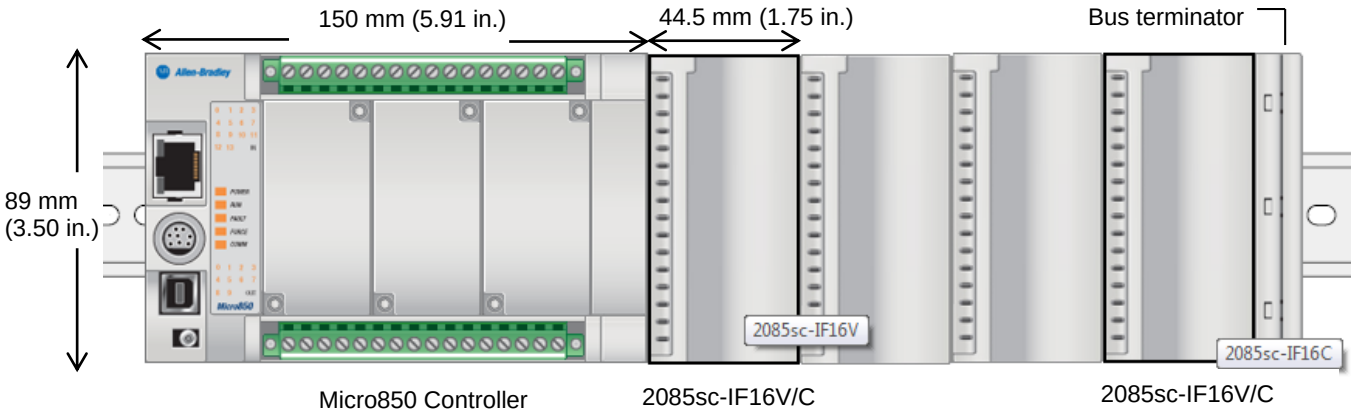
- This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbance.
- Be careful when stripping wires. 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 plug-in 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.
- Do not insert or remove the plug-in module while power is applied, otherwise, permanent damage to equipment may occur.

Follow the instructions to insert and secure the plug-in 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.
4. Snap the module into the module bay.
5. Using a screwdriver, tighten the 10…12 mm (0.39…0.47 in.) M3 self-tapping screw to torque specifications: 0.25 N-m (2.2 lb-in).

Panel Mounting

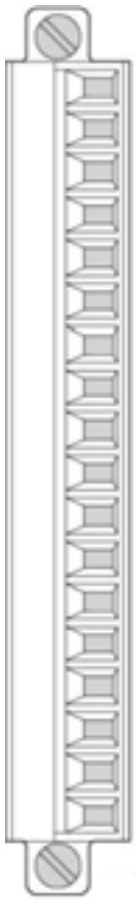
The preferred mounting method is to use two M4 (#8) screws per module. Hole spacing tolerance is ±0.4 mm (0.016 in.). For mounting dimensions, refer to Micro830 and Micro850 Programmable Controller User Manual 2080-UM002. To install:

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.

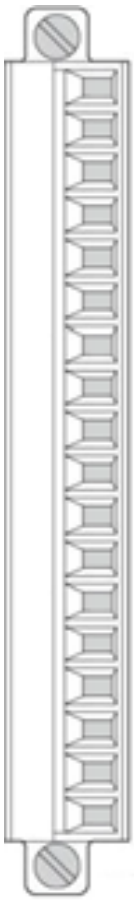
2.4.2 Wiring Diagram

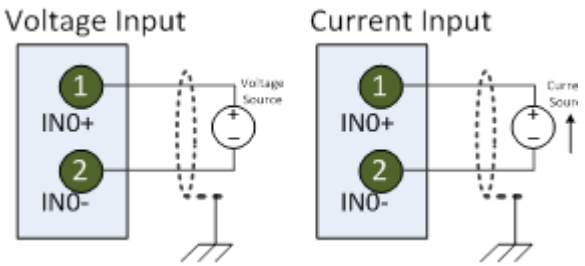
The following images explain the general layout of the module terminal blocks and the associated wiring diagrams for the various input signals and the Micro850 2085sc-IF16C or 2085sc-IF16V module:

RTB1#	Name
1	IN0+
2	IN0-
3	IN1+
4	IN1-
5	IN2+
6	IN2-
7	IN3+
8	IN3-
9	IN4+
10	IN4-
11	IN5+
12	IN5-
13	IN6+
14	IN6-
15	IN7+
16	IN7-
17	NC
18	NC



RTB2#	Name
19	IN8+
20	IN8-
21	IN9+
22	IN9-
23	IN10+
24	IN10-
25	IN11+
26	IN11-
27	IN12+
28	IN12-
29	IN13+
30	IN13-
31	IN14+
32	IN14-
33	IN15+
34	IN15-
35	NC
36	NC





Terminal Block Input signal descriptions are as follows:

RTB1#	Name	Description	RTB2#	Name	Description
1	IN0+	Ch. 0 Voltage/Current Input	19	IN8+	Ch. 8 Voltage/Current Input
2	IN0-	Ch. 0 Voltage/Current Return	20	IN8-	Ch. 8 Voltage/Current Return
3	IN1+	Ch. 1 Voltage/Current Input	21	IN9+	Ch. 9 Voltage/Current Input
4	IN1-	Ch. 1 Voltage/Current Return	22	IN9-	Ch. 9 Voltage/Current Return
5	IN2+	Ch. 2 Voltage/Current Input	23	IN10+	Ch. 10 Voltage/Current Input
6	IN2-	Ch. 2 Voltage/Current Return	24	IN10-	Ch. 10 Voltage/Current Return
7	IN3+	Ch. 3 Voltage/Current Input	25	IN11+	Ch. 11 Voltage/Current Input
8	IN3-	Ch. 3 Voltage/Current Return	26	IN11-	Ch. 11 Voltage/Current Return
9	IN4+	Ch. 4 Voltage/Current Input	27	IN12+	Ch. 12 Voltage/Current Input
10	IN4-	Ch. 4 Voltage/Current Return	28	IN12-	Ch. 12 Voltage/Current Return
11	IN5+	Ch. 5 Voltage/Current Input	29	IN13+	Ch. 13 Voltage/Current Input
12	IN5-	Ch. 5 Voltage/Current Return	30	IN13-	Ch. 13 Voltage/Current Return
13	IN6+	Ch. 6 Voltage/Current Input	31	IN14+	Ch. 14 Voltage/Current Input
14	IN6-	Ch. 6 Voltage/Current Return	32	IN14-	Ch. 14 Voltage/Current Return
15	IN7+	Ch. 7 Voltage/Current Input	33	IN15+	Ch. 15 Voltage/Current Input
16	IN7-	Ch. 7 Voltage/Current Return	34	IN15-	Ch. 15 Voltage/Current Return
17	NC	No Connect	35	NC	No Connect
18	NC	No Connect	36	NC	No Connect

Chapter 3
Configuring the 2085sc-IF16 Using CCW

This chapter covers the following subjects:

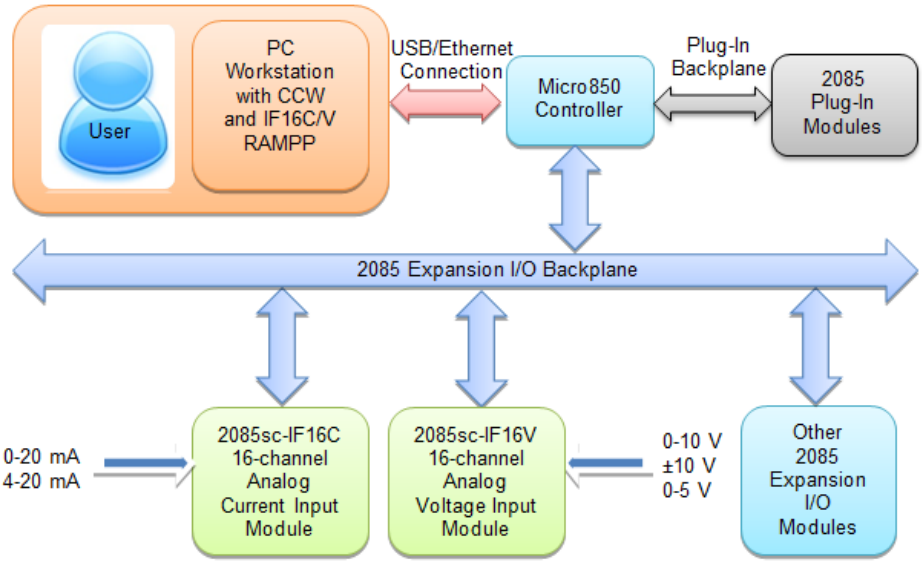
- How to use Connected Components Workbench (CCW) and optionally ModuleConfigConverter.exe software to configure the Module.
- Analog Data and Status settings.
- Data Links settings.
- Setting configuration parameters and associated values.

Section 3.1 Introduction

You use Connected Components Workbench programming software to configure the 2085sc-IF16. You may import and download a module profile to the controller. You then send the configuration setup to the module. Rockwell Automation provides a customized, module-specific add-on profile to configure the 2085sc-IF16V or 2085sc-IF16C.

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

- Micro850 Power Supply (separate module or built-in the main controller).
- Micro850 Controller
- Plug-in Modules

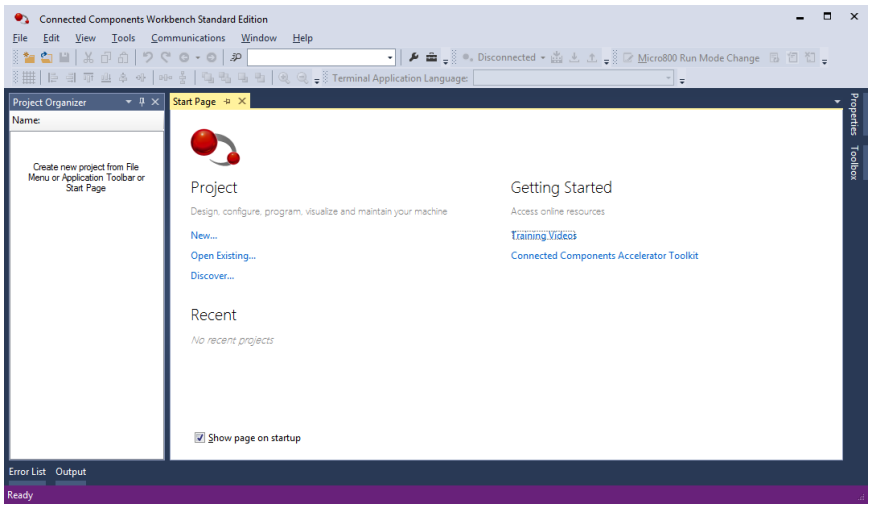


Spectrum Controls, Inc. also provides a custom configuration software utility that you may use to provide configuration settings to the profile.

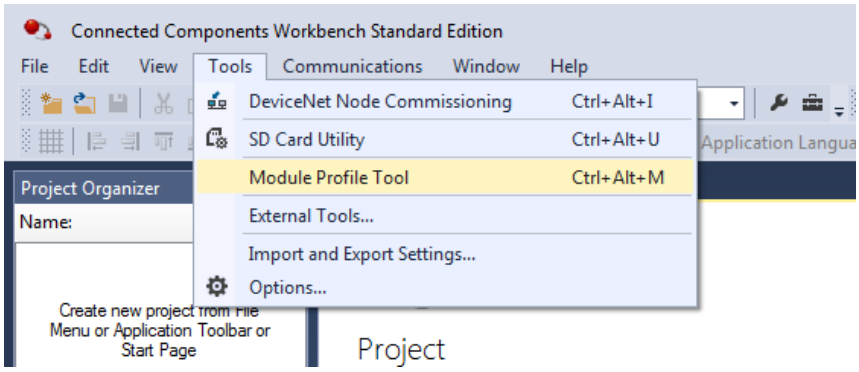
Section 3.2 Importing a Profile into CCW Software

Rockwell Automation provides an add-on profile for the 2085sc-IF16. You import this profile into the CCW software as follows:

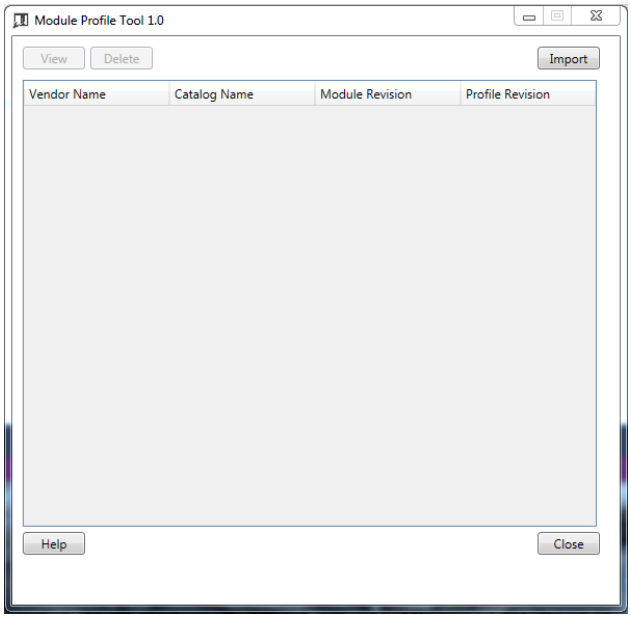
1. Start the CCW software on your personal computer. The following dialog appears:



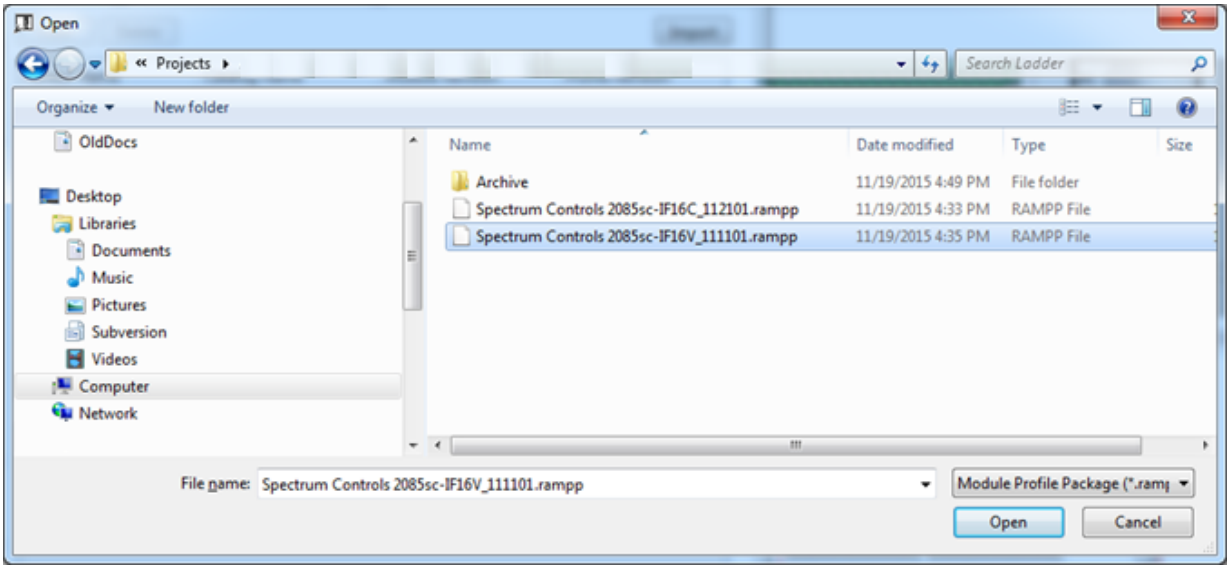
2. From the Tools menu, select the **Module Profile Tool** option:



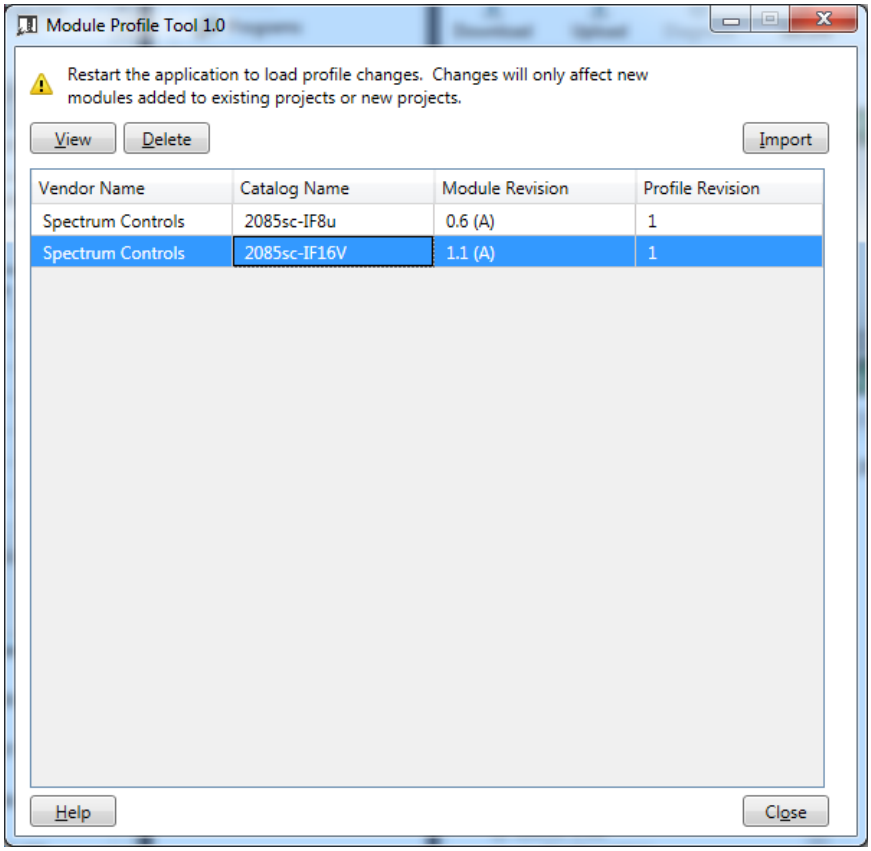
If necessary, confirm with the Windows operating system that you wish to run the software. The Module Profile Tool dialog appears.



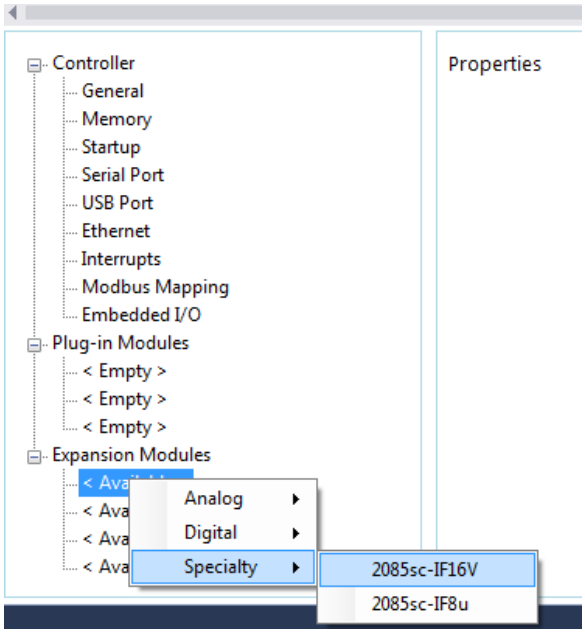
3. Click the **Import** button:
4. From the Open File dialog that appears, navigate to the directory containing the **2085sc-IF16C.rampp** and **2085sc-IF16V.rampp** files and open the relevant file:



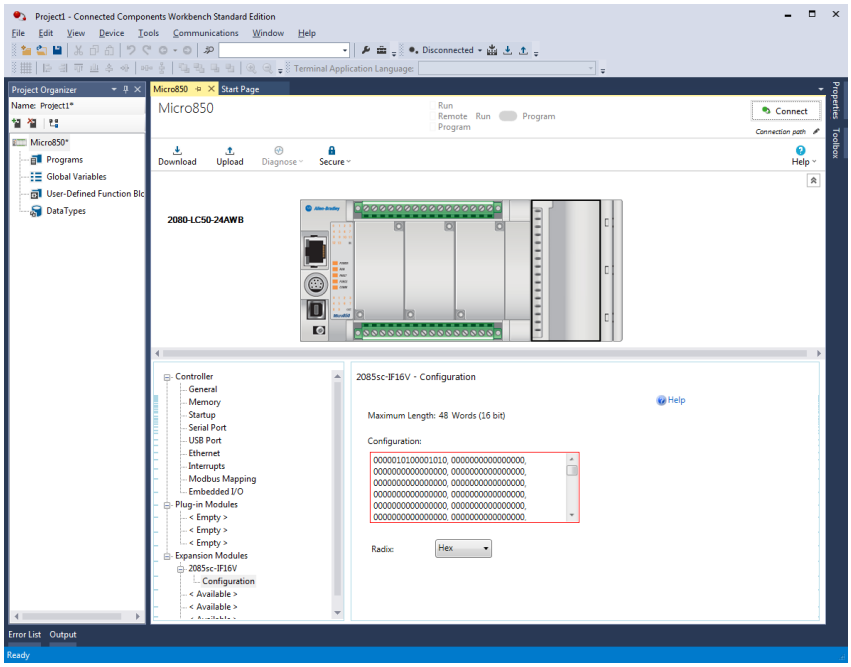
5. The selected profile appears in the Module Profile Tool dialog:



6. Click **Close** to exit and re-open the CCW software so that the software recognizes the imported Add-On profile.
7. Navigate to the Micro850 project of interest, and from **Expansion Module**, select **Available:Specialty:2085sc-IF16V**:



8. The 2085sc-IF16V Configuration dialog appears associated with the selection. You may either manually enter the configuration for your system, or use the ModuleConfigConverter.exe utility provided by Spectrum Controls, Inc. Once you have your configuration, you then copy the data into the **Configuration:** field:



9. To create your configuration using ModuleConfigConverter.exe, refer to the section below.

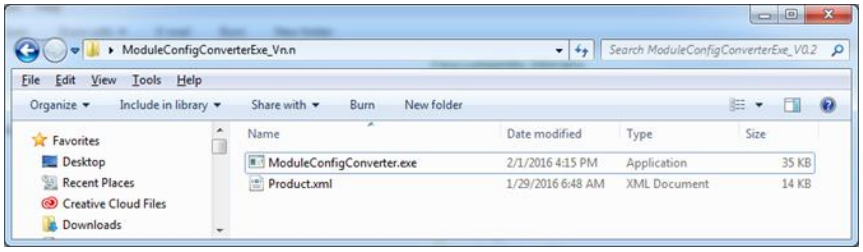
Section 3.3 Setting Configuration Parameters Using ModuleConfigConverter.exe

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.

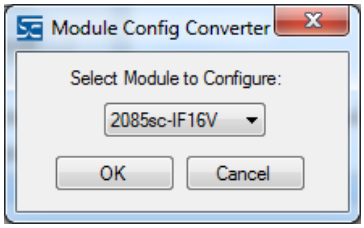
NOTE It is recommended that when you generate your configuration, that you use the **Binary Radix** selection. If you choose the **Decimal Radix**, the utility is unable to work with negative values.

To start the configuration converter:

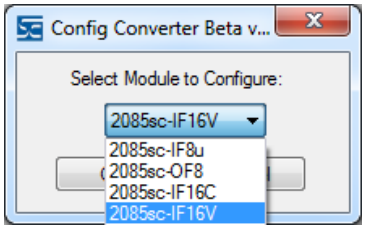
1. Navigate to where you placed the downloaded the Module Configuration Converter executable folder, open the folder, and run the following executable file: **ModuleConfigConverter.exe**:



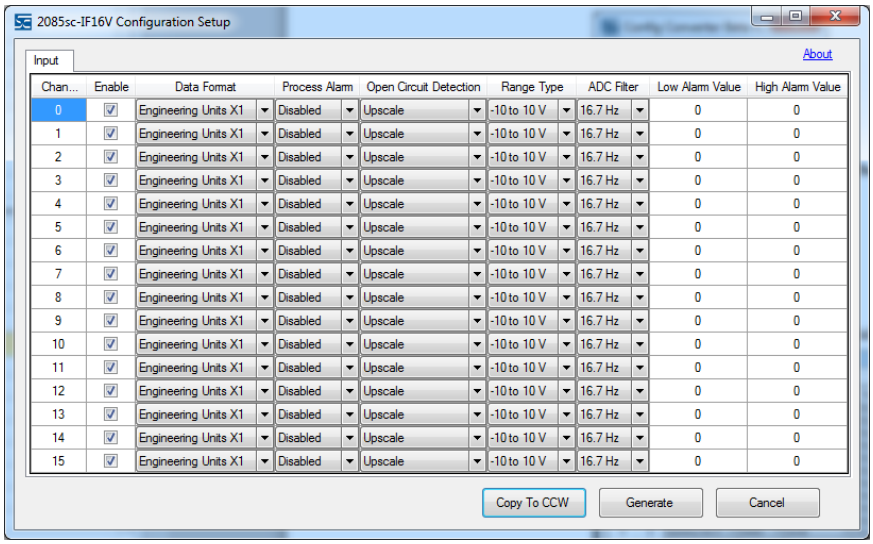
The Config Converter dialog appears:



2. From the drop-down menu, select the **2085sc-IF16V** option and click **OK**.

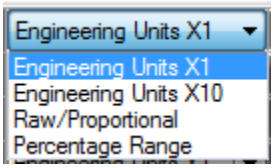


The 2085sc-IF16V Configuration Setup dialog appears:

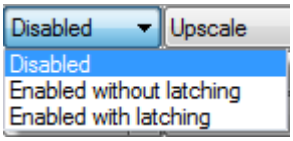


3. View and specify the following options as needed. See Channel Configuration Bit locations listed later in this section for details on the settings for every configuration bit:
   - **Channel**. Lists number of input channel from **0** to **15**. Click to select.

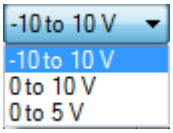
- **Enable**. Specifies whether to enable use of this channel. **Enabled** by default (checkmark selected).
- **Data Format**. Specifies which data format to use for reporting input values. Default is **Engineering Units X1**:



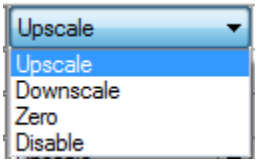
- **Process Alarm**. Specifies process alarm enabling or disabling. Select type from drop-down list. **Disabled** is default:



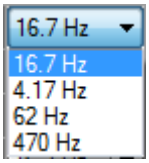
- **Range Type**. Specifies voltage range to use. Default is **-10 to 10 V**:



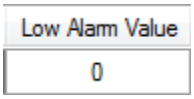
- **Open Circuit Detection**. Specifies how to respond to an open circuit condition. Default is **Upscale**.



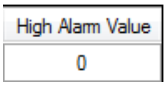
- **ADC Filter**. Specifies which filter to use. Default is **16.7 Hz**.



- **Low Alarm Value**. Specifies value below which alarm is triggered. Default value is **0**. Example: Low alarm value for ±10 Volts is -10 V.



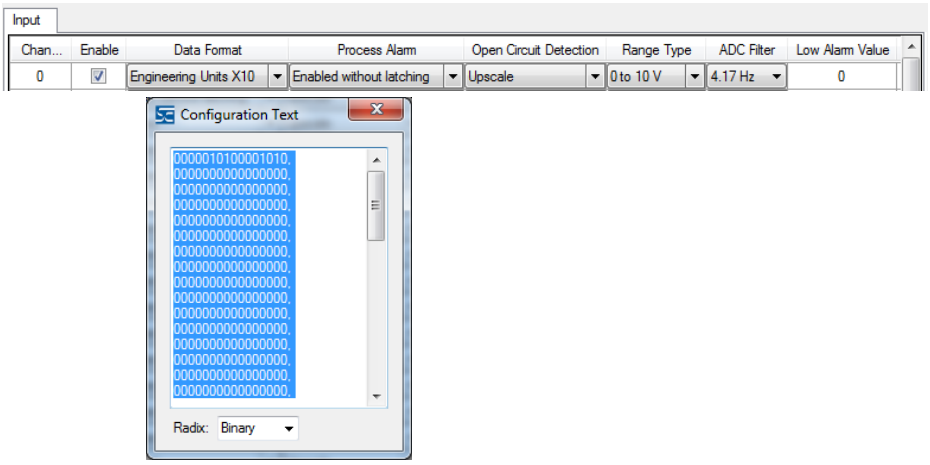
- **High Alarm Value**. Specifies value above which alarm is triggered. Default value is **0**. Example: High alarm value for ±10 Volts is +10 V.



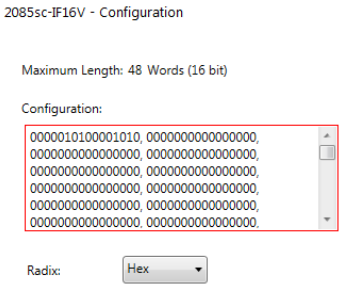
4. When finished making selections, click **Generate**.

   The Configuration Text dialog appears, with your configuration settings for each enabled channel.

The example below shows example channel 0 selections in the utility and the associated channel 0 configuration text generated from those selections:



5. To copy the generated values into the CCW **Configuration:** field, click **Copy to CCW**. The software copies the configuration and shows it in the CCW **Configuration** field:



6. Download and run.

The following description of columns is copied from CCW Help.

Column	Description
	Currently selected parameter. As a device is monitored and updated, an asterisk (*) appears in this column.
#	Parameter number. Click the column header to list the data in the column in ascending (default) or descending order.
Name	Short name of the parameter. Click the column header to list the data in the column in ascending (default) or descending order.
Value	The current value of the parameter. Writable parameter values are shown with a white background and can be changed directly in this field.
Units	The measurement units used for this parameter (examples: Volts and Amps).
Internal Value	The unscaled value used internally in the device and by AC drives that communicate with the device. The information in this field provides the scaling information to calculate Internal Value from a scaled value.
Default	The initial value of a parameter as defined at the factory.

Column	Description
Min	The minimum value is the lowest possible value for this parameter.
Max	The maximum value is the highest possible value for this parameter.

3.3.1 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.

3.3.2 Software Updates

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

3.3.3 Startup and Factory Default Conditions

After the module boots and before the initial configuration is received, the modules run with default configurations as specified in the PLC Interfaces.

- The default configuration for the IF16C is for all channels enabled in the 4-20 mA range with the 17 Hz filter in Engineering ×1 units.
- The default configuration for the IF16V is for all channels enabled in the ±10 V range with the 17 Hz filter in Engineering ×1 units.

3.3.4 PLC Interfaces

The 2085 platform treats all data on an I/O module as a member of a named Array of Words.

Module Identity

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

Parameter	2085sc-IF16C	2085sc-IF16V
Vendor ID	58 (Spectrum Controls)	58 (Spectrum Controls)
Product Type	10 (Analog)	10 (Analog)
Product Code	112	111
Series	A	A
Module Catalog Number	2085sc-IF16C	2085sc-IF16V
Module Feature Code	0 [0×00]	0 [0×00]
Interrupts	Not Supported	Not Supported
Distance Rating	8	8
Input Data Type	16-bit Signed Integer	16-bit Signed Integer
Output Data Type	16-bit Collection of Bits	16-bit Collection of Bits
Parameter	IF16C	IF16V

3.3.5 Connection Types and Assembly Sizes

The size of each assembly is listed in the table below.
These values are stored in the Mod_Size array:

Table	Size (Bytes)
Configuration Assembly	48
Input Assembly	25
Output Assembly	5

3.3.6 Channel Configuration Bit Location Data

Channel Configuration Bit location details are listed below.

Descriptions of each section are provided following this table. Unused bits must remain 0.

To Select		Make these bit settings															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Channel Enable	Enable																0
	Disable																1
Data Format	Engineering Unit ×1														0	0	
	Engineering Unit ×10														0	1	
	Raw/Proportional Data														1	0	
	Percentage														1	1	
Process Alarm	Disabled												0	0			
	Enabled without latching												0	1			
	Enabled with latching												1	1			
Open Circuit Detection	Upscale										0	0					
	Downscale										0	1					
	Zero										1	0					
	Disable										1	1					
Range Type	4 to 20 mA (IF16C only)							0	0								
	0 to 20 mA (IF16C only)							0	1								
	-10 to 10 V (IF16V only)							0	0								
	0 to 10 V (IF16V only)							0	1								

To Select		Make these bit settings															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0 to 5 V (IF16V only)							1	0								
ADC Filter	16.7 Hz					0	0										
	4.17 Hz					0	1										
	62 Hz					1	0										
	470 Hz					1	1										

3.3.7 Input Assembly

The input array is organized as follows:

Name	Type	Length (Words)	Description
Ch 0 Data	INT	1	Analog Channel Data Channel 0
Ch 1 Data	INT	1	Analog Channel Data Channel 1
Ch 2 Data	INT	1	Analog Channel Data Channel 2
Ch 3 Data	INT	1	Analog Channel Data Channel 3
Ch 4 Data	INT	1	Analog Channel Data Channel 4
Ch 5 Data	INT	1	Analog Channel Data Channel 5
Ch 6 Data	INT	1	Analog Channel Data Channel 6
Ch 7 Data	INT	1	Analog Channel Data Channel 7
Ch 8 Data	INT	1	Analog Channel Data Channel 8
Ch 9 Data	INT	1	Analog Channel Data Channel 9
Ch 10 Data	INT	1	Analog Channel Data Channel 10
Ch 11 Data	INT	1	Analog Channel Data Channel 11
Ch 12 Data	INT	1	Analog Channel Data Channel 12
Ch 13 Data	INT	1	Analog Channel Data Channel 13
Ch 14 Data	INT	1	Analog Channel Data Channel 14
Ch 15 Data	INT	1	Analog Channel Data Channel 15
Ch 0-1 Status	STRUCT	1	Channel Status Bits Channel 0-1
Ch 2-3 Status	STRUCT	1	Channel Status Bits Channel 2-3
Ch 4-5 Status	STRUCT	1	Channel Status Bits Channel 4-5
Ch 6-7 Status	STRUCT	1	Channel Status Bits Channel 6-7
Ch 8-9 Status	STRUCT	1	Channel Status Bits Channel 8-9
Ch 10-11 Status	STRUCT	1	Channel Status Bits Channel 10-11
Ch 12-13 Status	STRUCT	1	Channel Status Bits Channel 12-13
Ch 14-15 Status	STRUCT	1	Channel Status Bits Channel 14-15

Name	Type	Length (Words)	Description
Module Status	STRUCT	1	Module Status Bits

Channel Enable or Disable Description

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

Data Format Description

The data format allows you to select how analog data is presented. The raw analog input data is scaled according to the data format selection and the input range selection. The corresponding range limit is 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.

Range limits associated with each data format, input range, and signal value are listed below.

Once a module receives its configuration, the range scaling feature is always active:

Input Range	Signal		Raw/ Proportional	Engineering Units ×1	Engineering Units ×10	Percentage Full Scale
-10 to +10 V (IF16V only)	Low Limit	-10.500 V	-32768	-10500	-1050	-250
	Low Range	-10.000 V	-31208	-10000	-1000	0
	High Range	+10.000 V	31207	10000	1000	10000
	High Limit	+10.500 V	32767	10500	1050	10250
0 to 10 V (IF16V only)	Low Limit	-0.500 V	-32768	-500	-50	-500
	Low Range	0.000 V	-29789	0	0	0
	High Range	+10.000 V	29788	10000	1000	10000
	High Limit	+10.500 V	32767	10500	1050	10500
0 to 5 V (IF16V only)	Low Limit	-0.500 V	-32768	-500	-50	-1000
	Low Range	0.000 V	-27069	0	0	0
	High Range	+5.000 V	29918	5000	500	10000
	High Limit	+5.250 V	32767	5250	525	10500
4 to 20 mA (IF16C only)	Low Limit	+3.200 mA	-32768	3200	320	-500
	Low Range	+4.000 mA	-29823	4000	400	0
	High Range	+20.000 mA	29085	20000	2000	10000
	High Limit	+21.000 mA	32767	21000	2100	10625
0 to 20 mA (IF16C only)	Low Limit	+0.000 mA	-32768	0	0	0
	Low Range	+0.000 mA	-32768	0	0	0
	High Range	+20.000 mA	29646	20000	2000	10000
	High Limit	+21.000 mA	32767	21000	2100	10500

Process Alarms

Process alarms allow you to specify alarm limits for the input signal, and to have the module report when those signal limits have been exceeded. The feature is active if enabled in the channel(s) configuration.

To set up, input the desired alarm values (Enable Process Alarms, Process Alarm Latch, Process Alarm High Value, Process Alarm Low Value) for each channel into the configuration table, as described in Configuration Assembly. Report a configuration error if any alarm value in the configuration table has been set incorrectly.

Set the Process Alarm High status bit in the channel status struct when the channel input value is greater than the Process Alarm High Value in the configuration table.

Set the Process Alarm Low status bit in the channel status struct when the channel input value is less than the Process Alarm Low Value in the configuration table.

- If the Process Alarm Latch bit is disabled, then clear the appropriate alarm status bit when the channel input value is no longer within the alarm value range.

- If the Process Alarm Latch bit is enabled, then clear the appropriate alarm status bit when both of the following conditions are satisfied:
  - The channel input value is no longer within the alarm value range, and
  - The Set Latch Clear bit in the output table is set.

NOTE This bit must remain set until the appropriate Alarm Status bit is cleared. This bit can then be cleared again. The module does not latch an alarm condition if a transition from no alarm to alarm occurs while a channel's Set Latch Clear bit is set.

Open Circuit Detection

The open circuit detection feature alerts you to an open circuit condition by setting the open circuit status bit and displaying a high limit, low limit, or zero data value for the appropriate channel(s) in the input table.

Open circuit detection may also be disabled for any or all channels:

Index	Open Circuit Detection	Note
0	Upscale	Default
1	Downscale	
2	Zero	
3	Disable	

The open circuit detection behavior depends on the channel input range selection and the open circuit detection selection bits for each channel:

- For voltage range selections (IF16V only):
  - Open circuit detection takes place on a periodic basis, every 3 seconds, by temporarily enabling the PGA burnout current, and initiating an ADC conversion at the fastest filter frequency (470 Hz).
  - The previous measurement remains in the input table during the open circuit detection procedure (that is, the measurement value with the burnout current enabled is not reported).
  - Within 3 seconds of an open circuit condition, transitional data may be reported prior to the open circuit status bit being set.
- For the Upscale open circuit detection setting, an open circuit condition causes the channel input data to report the high limit data value for the selected input range and data format and the open circuit status bit is set. As a side effect of this, the over range status bit is also set.
- For the Downscale open circuit detection setting, an open circuit condition causes the channel input data to report the low limit data value for the selected input range, and data format and the open circuit status bit is set. As a side effect of this, the under range status bit is also set.
- For the Zero open circuit detection setting, an open circuit condition causes the channel input data to report a value equivalent to zero for the selected input range, and data format and the open circuit status bit is set.

As a side effect of this, depending on the selected range, the under range status bit may also be set.

- For the Disabled open circuit detection setting (IF16V only), an open circuit condition is not reported. Also, the periodic open circuit detection does not take place.
- For the 0-20 mA current range selection (IF16C only), an open circuit condition cannot be detected, and the open circuit status bit is not set.
- An open circuit condition may also be triggered by applying an input value well beyond the specified Low or High Limit values indicated in Section 1.5 above.

Input Range Values

Input Range Values are:

Input Range Selection	IF16V	IF16C
±10 V	√	
0-10 V	√	
0-5 V	√	
0-20 mA		√
4-20 mA		√

Input Type Description

You may scale input data using the following ranges:

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
±10 V (IF16V only)	-10.500 V dc	Low Limit	-10500	-1050	-32768	-250
	-10.000 V dc	Low Range	-10000	-1000	-31208	0
	+10.000 V dc	High Range	10000	1000	31207	10000
	+10.500 V dc	High Limit	10500	1050	32767	10250
0-10 V (IF16V only)	-0.500 V dc	Low Limit	-500	-50	-32768	-500
	0.000 V dc	Low Range	0	0	-29789	0
	+10.000 V dc	High Range	10000	1000	29788	10000
	+10.500 V dc	High Limit	10500	1050	32767	10500
0-5 V (IF16V only)	-0.500 V dc	Low Limit	-500	-50	-32768	-1000
	0.000 V dc	Low Range	0	0	-27069	0
	+5.000 V dc	High Range	5000	500	29918	10000
	+5.250 V dc	High Limit	5250	525	32767	10500
4-20 mA (IF16C only)	+3.200 mA	Low Limit	3200	320	-32768	-500
	+4.000 mA	Low Range	4000	400	-29823	0
	+20.000 mA	High Range	20000	2000	29085	10000
	+21.000 mA	High Limit	21000	2100	32767	10625

Input Range	Input Value	Condition	EU ×1	EU ×10	Raw Prop	Percentage
0-20 mA (IF16C only)	+0.000 mA	Low Limit	0	0	-32768	0
	+0.000 mA	Low Range	0	0	-32768	0
	+20.000 mA	High Range	20000	2000	29646	10000
	+21.000 mA	High Limit	21000	2100	32767	10500

Input ADC Filter Frequencies

The modules use an input ADC digital filter that provides high-frequency noise rejection for each input signal. The filter setting attenuates the input signal beginning at the specified frequency.

The filter for each channel is programmable, allowing you to select from four different filter frequencies:

Index	Filter (Hz)	Note
0	17	Default
1	4	
2	62	
3	470	

Software System Features

The software uses the following channel scan times. The scan time is based on each channel's Input ADC Filter configuration, and is the sum of the multiplexer settling time, PGA register setup time, ADC conversion period (which is [2/filter] + 1 ms), and microcontroller processing overhead.

The module contains two ADC filters and scans two sets of 8 channels in parallel.

Below is the approximate timing for each input filter selection:

Filter Selection	MUX Settling Time	ADC Conversion Period	Processing Overhead	Total Channel Scan Time
17 Hz	5 ms	121 ms	12 ms	138 ms
4 Hz	5 ms	481 ms	12 ms	498 ms
62 Hz	5 ms	33 ms	12 ms	50 ms
470 Hz	5 ms	5 ms	12 ms	22 ms

3.3.8 Channel Status Struct

The structure definition for each 'Ch *n* Status' in the Input Assembly table is described below.

Each channel status struct is only one byte. Two channel status structs are stored in each input word. The low byte (bits 0-7) of each channel status word is for the first channel; the high byte (bits 8-15) is for the second channel. For example, "Input 23" word bits 0-7 represent channel 14 and bits 8–15 represent channel 15. Unused bits are 0.

Bit	Name	Description
Bit 0 / Bit 8	Channel Fault	0: No Channel Fault 1: Channel Fault This bit is set when the channel has an open circuit condition, data error, or under/over range condition. It is also set if the Module Power Up bit is set or the Module General Fault bit is set.
Bit 1 / Bit 9	Data Error	0: No Data Error 1: Data Error This bit is set for an enabled channel that is not receiving a reading from the ADC. When set, the respective channel data value remains the same as the previous sample.
Bit 2 / Bit 10	Process Alarm Low	0: No Alarm 1: Alarm
Bit 3 / Bit 11	Process Alarm High	0: No Alarm 1: Alarm
Bit 4 / Bit 12	Under-range	0: Not Under-range 1: Input Signal Under-range
Bit 5 / Bit 13	Over-range	0: Not Over-range 1: Input Signal Over-range
Bit 6 / Bit 14	Open Circuit	0: No Open Circuit 1: Open Circuit Condition Detected
Bit 7 / Bit 15	(unused)	(unused)

3.3.9 Module Status Struct

The structure definition for the 'Module Status' word in the Input Assembly table is described below. Unused bits are 0.

Bit	Name	Description
Bit 0-12	(unused)	(unused)
Bit 13	Invalid Serial Number Data	0: Serial Number Valid 1: Serial Number Invalid This bit is set if the factory-programmed serial number data is missing or has become corrupt.
Bit 14	Invalid Calibration Data	0: Calibration Valid 1: Calibration Invalid This bit is set if the module's calibration data has not been programmed or has become corrupt.
Bit 15	Module Fault	0: No Fault 1: Fault This bit is set if any of the above bits are set or if any channel has its fault bit set.

3.3.10 Output Assembly

The Output array is organized as follows:

Word	Bit	Name	Description
Output 0	Bit 0	Ch 0 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 1	Ch 0 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 2	Ch 1 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 3	Ch 1 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 4	Ch 2 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 5	Ch 2 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 6	Ch 3 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 7	Ch 3 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 8	Ch 4 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch

Word	Bit	Name	Description
	Bit 9	Ch 4 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 10	Ch 5 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 11	Ch 5 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 12	Ch 6 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 13	Ch 6 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 14	Ch 7 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 15	Ch 7 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
Output 1	Bit 0	Ch 8 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 1	Ch 8 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 2	Ch 9 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 3	Ch 9 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 4	Ch 10 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 5	Ch 10 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 6	Ch 11 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 7	Ch 11 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 8	Ch 12 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 9	Ch 12 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 10	Ch 13 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 11	Ch 13 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch

Word	Bit	Name	Description
	Bit 12	Ch 14 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 13	Ch 14 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 14	Ch 15 Process Alarm High Latch Clear	0: Normal Operation 1: Clear Alarm Latch
	Bit 15	Ch 15 Process Alarm Low Latch Clear	0: Normal Operation 1: Clear Alarm Latch

The bits in output words 0 and 1 are written during run mode to clear any latched low or high process alarms. The alarm is unlatched when the Latch Clear bit is set (1) and the alarm condition no longer exists. If the alarm condition persists, then the Latch Clear bit has no effect until the alarm condition no longer exists.

You need to keep the Latch Clear bit set (1) until the corresponding Process Alarm status bit from the input table has been cleared (0). After that you are able to reset (0) the Latch Clear bit. The module does not latch an alarm condition if there is an alarm transition from no alarm to alarm while the channel's Latch Clear bit is set.

Output words 2, 3, and 4 are reserved for manufacturing purposes and must be set to 0.

3.3.11 Module Errors

The module notifies the host of critical and non-critical module errors using the Mod_Condition array.

Module errors are expressed as two fields: Mod_Error (3 bits) and Extended_Error_Info (9 bits). This arrangement is based on the 2085 toolkit:

Bit	Name	Description
Bit 0–8	Extended_Error_Info	Module specific error information; specific meaning depends on the value of the Mod_Error field.
Bit 9–11	Mod_Error	0: No Errors. No need to check the Extended_Error_Info field 1: Hardware Error. General and specific error codes may be specified by the Extended_Error_Info field. 2: Configuration Error. Module-specific error code specified in the Extended_Error_Info field. A configuration error correlates to options that you can change directly (Example: Input Range or Input ADC Filter selections). 3–7: Invalid
Bit 12	Bus_WD_Timeout_Latch	0: Default state 1: Bus watchdog timeout has occurred. See the description below for more details.
Bit 13	Mod_Configured	0: Module has not received a valid configuration 1: Module is configured.

Bit	Name	Description
Bit 14–15	Output_State	Unused by this module.

3.3.12 Extended_Error_Info

The Extended_Error_Info field is checked when a non-zero value is present in the Mod_Error field. Depending on the value of Mod_Error, the Extended_Error_Info field can contain error codes that are either general common errors or module specific errors.

General common errors and module specific extended error codes are further described in the appropriate sections below.

Error Type	Mod_Error	Extended_Error_Info (hex)
No Error	000	000: No error Always 000.
Hardware Error	001	000: No additional information 001: Power-on reset (set by ASIC) 002–0ff: Reserved 100: MCU Communication Failure (set by ASIC) 101–1ff: Module specific hardware errors
Configuration Error	010	000: No additional information 001–0ff: Module specific channel configuration errors 100–1ff: Module specific general configuration errors

3.3.13 Bus_WD_Timeout Latch

The Bus_WD_Timeout_Latch bit indicates when a Bus watchdog timeout has occurred. The ASIC has logic to track the time elapsed since the last transaction on the bus. If 64 K of the active baud rate times have elapsed since the last valid command request and the En_Bus_WD bit is set in the Mod_Cntrl array, then this bit is set. If this bit is set, the Bus_N_Int output is de-activated (High-Z). The Reset value of this bit is 0. This bit is reset by the Rst_Mod_Err directed command.

3.3.14 Module Specific Hardware Errors

Mod_Error [11:9] (binary)	Extended_Error_Info [8:0] (hex)	Combined [11:0] (hex)	Description
001	101	301	**Watchdog reset** This hardware error is set if the module detects an unexpected reset due to a watchdog timeout.
001	102	302	**Brown-out error** This hardware error is set if the module detects a brown-out condition.
001	103	303	(Unused by the 2085sc-IF16)

Mod_Error [11:9] (binary)	Extended_Error_Info [8:0] (hex)	Combined [11:0] (hex)	Description
001	104	304	**ADC communication error** This hardware error is set if the module detects the analog-to-digital converter is not functioning properly.
001	105	305	(Unused by the 2085sc-IF16)
001	106	306	**ASIC communication error** This hardware error is set if a communications error to the ASIC from the microcontroller has been detected.
001	107	307	**Checksum error** This hardware error is set if the calibration data stored in the module is missing or corrupted.

3.3.15 Module Specific Channel Configuration Errors

The following table lists module specific channel configuration errors for the 2085sc-IF16.

For the module specific configuration errors, the Extended_Errror_Info (bits 0 – 8) field is further divided as follows:

- Bits 0–3 indicate the channel (0–15) that has the configuration error. If multiple channels have an error, only the first channel that has the error is reported.
- Bits 4–7 indicate the specific channel configuration error.
- Bit 8 is 0 to indicate a channel configuration error.

Mod_Error [11:9] (binary)	Extended_Error_Info [8:0]			Combined [11:0] (hex)	Description
	Reserved [8] (binary)	Error [7:4] (binary)	Channel [3:0] (binary)		
010	0	0000	0000	400	**General channel configuration error, no additional information**
010	0	0001	0000–1111	410–41f	**Invalid Input Range selection** Check the Range Type setting in the Channel Configuration data.
010	0	0010	0000–1111	420–42f	**Invalid Input ADC Filter selection** Check the ADC Filter setting in the Channel Configuration data.
010	0	0011	0000–1111	430–43f	**Invalid Input Data Format selection** Check the Data Format setting in the Channel Configuration data.

Mod_Error [11:9] (binary)	Extended_Error_Info [8:0]			Combined [11:0] (hex)	Description
	Reserved [8] (binary)	Error [7:4] (binary)	Channel [3:0] (binary)		
010	0	0100	0000–1111	440–44f	**Alarm Not Enabled** Check the Channel Enable, Process Alarm Enable, and Process Alarm Latch bits in the Channel Configuration data. This error occurs if the channel is enabled and the Process Alarm Latch bit is set, but the Process Alarm Enable bit is not set.
010	0	0101	0000–1111	450–45f	**Invalid Alarm Data** 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: Range Max < AHV Range Min > ALV AHV <= ALV ALV is the Process Alarm Low Value AHV is the Process Alarm High Value Range Max and Range Min are the full scale values for the selected Input Range and Input Data Formats.

3.3.16 Module Specific General Configuration Errors

The following table lists module specific general configuration errors for the 2085sc-IF16 module. Bit 8 is set to indicate general configuration errors.

Mod_Error [11:9] (binary)	Extended_Error_Info [8:0] (hex)	Combined [11:0] (hex)	Description
010	100	500	**General Configuration Error** This error is set if an unexpected configuration error occurs.
010	101	501	(unused by the 2085sc-IF16)
010	102	502	(unused by the 2085sc-IF16)

Section 3.4 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 630

Section 3.5 Declaration of Conformity

Available upon request

Index

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