USER MANUAL

SPECTRUM CONTROLS

An Allient Company

User's Manual Pub. 0300320-03 Rev. A0

PowerFlex®
4 Channels/4 Channels Out

Catalog Number: 20-750-IF4XOF4-SC

Important Notes

1. Please read all the information in this owner's guide before installing the product.
2. The information in this owner's guide applies to hardware Series A and firmware version 1.1.*n* or later, where *n* is the build number.
3. This guide assumes that the reader has a full working knowledge of the relevant PowerFlex drive.

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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 PowerFlex® 750 Series Analog Combo Option Card (4Ch In/4Ch Out).

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 PowerFlex® 750 Series Analog Combo Option card (4Ch In/4Ch Out).

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.
A description and overview of the PowerFlex 750-Series AC Drives and Installation.	PowerFlex 750-Series AC Drives Installation Instructions	750-IN0010-EN-P, 20F, 20G, 21G
Detailed information on I/O, control, and feedback options, parameters and programming, faults, alarms, and troubleshooting.	PowerFlex 750-Series AC Drives Programming Manual	750-PM001
Detailed information on drive specifications, option specifications, fuse and circuit breaker ratings.	PowerFlex 750-Series AC Drives Technical Data publication.	750-TD001
Detailed information on HIM components, operation, features.	PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual.	20HIM-UM001

For	Refer to this Document	Allen-Bradley Pub. No.
Detailed information on preventative maintenance, component testing, and hardware replacement features.	PowerFlex 750-Series AC Drives Hardware Service Manual - Frame 8 and Larger.	750TG001
Detailed information on how to configure, use, and troubleshoot PowerFlex 750-series communication option modules and adapters.	PowerFlex 755 Drive Embedded EtherNet/IP Adapter User Manual. PowerFlex 750-Series Drive DeviceNet Option Module User Manual. PowerFlex 7-Class Network Communication Adapter User Manual.	750COM-UM001 750COM-UM002 750COM-UM*xxx*
Detailed information on how to install, configure, and operate the 750-series safety option modules.	PowerFlex 750-Series Safe Torque Off User Manual Safe Speed Monitor Option Module for PowerFlex 750-Series AC Drives Safety Reference Manual.	750-UM002 750-RM001
Basic information to properly wire and ground PWM AC drives.	Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives.	DRIVES-IN001
Basic information to properly wire and ground PWM AC drives with a common bus.	PowerFlex AC Drives in Common Bus Configurations	DRIVES-AT002
General guidelines for the application, installation, and maintenance of solid-state control.	Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control.	SGI-1.1
Practices for guarding against Electrostatic damage.	Guarding Against Electrostatic Damage.	8000-4.5.2

For	Refer to this Document	Allen-Bradley Pub. No.
Declarations of conformity, certificates, and other certification details.	Product Certification website: http://ab.com	

Technical Support

For technical support, please contact your local Rockwell Automation TechConnect Office for most 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)

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.
- 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

The 20-750-IF4XOF4-SC is a four-channel analog input, four-channel analog output, plug-in option card designed for use with PowerFlex 750 Series systems. The option card supports up to four, concurrent channels of current and voltage measurements, and up to four channels of current or voltage output simultaneously:

- General description
- General specifications
- Output specifications
- Input specifications
- Environmental specifications
- Filter frequencies
- Hardware features
- System overview

Section 1.1 General Description

The PowerFlex 20-750-IF4XOF4-SC option card plugs into slots 4, 5, or 6 in the Control Pod of the PowerFlex 750 family of AC drives. It is similar in functionality to a standard I/O module within a system that consists of a PLC and backplane.

The option card uses a 64-pin edge connector to provide the connection to the AC drive. The Serial Interface (SI) and Drive Peripheral Interface (DPI) pass through this connection.

You connect the analog I/O signals to the option card using a 24-pin spring-cage, removable terminal block on the option card.

Power is provided to the option card across the backplane connector.

The card measures voltage and current signals, and outputs commanded voltage and/or current signals as needed. The option card provides pre-defined locations to hold the configuration, status, and channel values that are exchanged with the AC drive controller through the backplane DPI. The data exchanged includes the option card configuration, status, and digitized samples from the four analog inputs, and sets values for the four outputs. Types of communication also include reset commands from the AC drive to the option card, option card status queries from the AC drive, configuration changes, and other associated communications.

You use Rockwell-supplied Connected Components Workshop (CCW) software, version 10.0 or later to configure the option card upon installation, and to communicate with the option card via the AC drive and the backplane. You may also program the option card with the HIM interface that plugs into the front of the AC drive.

WARNING 	**Hazard of injury to personnel or damage to equipment.** **Do NOT hot-swap a 20-750-IF4XOF4-SC option card. This may cause injury to the personnel and/or damage the option card.** The unit is not designed to be hot swapped. The option card must be plugged into the drive before power is turned on to the drive. When removing the option card, power must be turned off to the drive before attempting to remove the option card.

During operation, the 20-750-IF4XOF4-SC samples the user-defined input voltage or current channels one-by-one and provides readings to the rest of the system. The output channels are continuously updated with the latest user output value. The user scaling for each channel is set by the configuration parameters. You may set the alarm levels for output channels.

Output functions provided are:

- Four output channels.
- Floating point user data.
- Five output range types:
  - Current: 0 to 20 mA, 4 to 20 mA.
  - Voltage: 0 to 5 V, 0 to +10 V, ±10 V.
- User scaling in engineering units.
- Over and under range detection.
- Open circuit detection available in current mode.
- Short circuit detection available in voltage mode.
- User-defined clamp limits and alarms.

Input functions provided are:

- Four input channels.
- Floating point user data.
- Five input range types:
  - Current: 0 to 20 mA, 4 to 20 mA.
  - Voltage: 0 to 5 V, 0 to 10 V, ±10 V.
- User scaling in engineering units.
- Over and under range detection.
- Open wire detection except 0 to 20 mA current range.

Section 1.2 General Specifications

Parameter	Specification	Notes
Option Card Location	PowerFlex 750 Series drive	
+12 V power consumption	3 W, maximum	
-12 V power consumption	0.825 W, maximum	
12 V inrush current from backplane	Less than 500 mA	
-12 V inrush current from backplane	Less than 500 mA	
Card scan time for all channels—analog	Less than 3 s	Normal case; no communication error occurs between channels and backplane. 4 input channels need 2 s (0.5 s/channel) with 4 Hz filter; 10 ms for output channels.
Isolation	250 VAC working voltage Reinforced isolation between channels and backplane; tested at 4100 VDC for 60 seconds. 250 VAC Basic isolation between input and output channel groups and FGND, tested at 2050 VDC for 1 minute	The isolation barriers are designed for 250 VAC continuous operation and pollution degree 2, based on IEC 61800-5-1, Table 10.
Card DAC Conversion Method	String R-Ladder DAC	Card DAC Conversion method
Card ADC conversion type	20-bit Delta-Sigma ADC	Card ADC conversion type
Calibration	Field calibration is not supported. Unit will maintain published accuracy for a minimum of 5 years. Factory recalibration can be performed if unit fails customer accuracy test.	

Parameter	Specification	Notes	
Field wiring	24-position RTB	Spring Cage Clamp type RTB, Shielded cables	
Recommended tightening torque on terminal block	2.2 lb-in (0.25 N-m)	RTB screws to PCB terminal block	
Wire size	#16–24 AWG	Connection data	Conductor Cross Section
		Solid min	0.2 mm²
		Solid max	1.5 mm²
		Stranded min	0.2 mm²
		Stranded max	1.5 mm²
		Stranded, with ferrule without plastic sleeve min	0.25 mm²
		Stranded, with ferrule without plastic sleeve max	1.5 mm²
		Stranded, with ferrule with plastic sleeve min	0.25 mm²
		Stranded, with ferrule with plastic sleeve max	0.75 mm²
Wire strip length	0.25 in		
Card size	110 mm (4.3 in) × 87 mm (3.4 in) × 51 mm (2.0 in)		

Section 1.3
Output Specifications

Parameter	Specification	Notes
Number of outputs	4 current/voltage output channels	Each channel can output voltage while another channel outputs current at the same time.
Output current range	0 to 20 mA 4 to 20 mA	Hardware Support range: 0 ~ 20.4 mA and 3.92 ~ 20.4 mA
Output voltage range	-10 to +10 VDC 0 to +10 V 0 to 5 V	
Output overvoltage protection	±24 VDC	
Output short circuit protection in current mode	In current mode, the option card can output current in the range of 0 ~ 20.4 mA (or 4 ~ 20.4 mA) with the maximum load of 500 ohm on each channel.	

Parameter	Specification	Notes
Output short circuit protection in voltage mode	Output current is limited at 15 mA	
Output current resolution	366 nA	0 ~ 24 mA range setting is used. 16 bits across 24 mA
Output voltage resolution	366 µV/bit at range of ±10 V 183 µV/bit at range of 0 ~ 10 V	16 bits across 24 V. 16 bits across 12 V.
	Better than 366µ V/bit at range of 0 ~ 5V	-6 V ~ +6 V range setting is used, 16 bits across 12 V (183 µV/bit)
Output drive capability	50 to 500 ohms with short circuit survival in current mode	Based on calculation, the output can survive a 0 Ohm load condition continuously.
	Less than or equal to 1 Kohm in voltage mode	
Load reactance	100 µH max in current mode	
	Less than 1 µF in voltage mode	
Output settling time	Less than 1 ms to 63% of full scale with resistive loads in current mode	With active load
	Less than 1 ms to 63% of full scale with resistive loads in voltage mode	
Output ripple	Less than 15 mV in voltage mode	
	Less than 30 µA in current mode	Less than 15 mV ripple on any resistance load in the range of 50 ~ 500 Ohm
Output current accuracy (calibrated)	±15 µA (maximum)	For both 0 ~ 20 mA and 4 mA ~ 20 mA ranges at 25 °C
	±23 µA (maximum)	For both 0 ~ 20 mA and 4 mA ~ 20 mA current ranges at temperature range of -20 °C ~ 65 °C
Output voltage accuracy (calibrated)	±10 mV (maximum)	For both 0 ~ 10 V and -10 V ~ +10 V ranges at 25 °C
	±15 mV (maximum)	For both 0 ~10 V and -10 V ~ +10 V ranges at temperature range of -20 °C ~ 65 °C
	±5 mV (maximum)	For 0 ~ 5 V range at 25 °C
	±10 mV (maximum)	For 0 ~ 5 V range at temperature range of -20 °C ~ 65 °C
Output impedance in current mode	Greater than 1 Mohm	
Output current repeatability at 25 °C	Better than ±5 µA	For both 0 ~ 20 mA and 4 ~ 20 mA range

Parameter	Specification	Notes
Output voltage repeatability at 25 °C	Better than ±2 mV	For both 0 ~ 10 V and -10 V ~ +10 V range
	Better than ±0.5 mV	For 0 ~5 V range
Output impedance in voltage mode	Less than 1 Ohm	

Section 1.4 Input Specifications

The 20-750-IF4XOF4-SC option card has the following performance specifications:

Parameter	Specification	Notes
Number of inputs	4 current/voltage input channels Each channel measures either voltage or current signals.	Each channel can accept either voltage or current.
Input current range	0 to 20 mA 4 to 20 mA	
Input voltage range	-10 to +10 VDC 0 to +10 V 0 to 5 V	
Input overvoltage protection	±28 V	In voltage mode.
Protection in current mode	±32 mA (maximum)	
Input current resolution	381 nA/bit typical	16 bits across 23.148 mA, 353 nA/bit is actual calculation value.
Input voltage resolution	339.2 µV typical in the range of ±10 V, 0 ~ 10 V, 0 ~ 5 V	16 bits across 2.5 V in front of ADC. 305.2 uV/bit for the range of ±10 V, 0 ~ 10 V, and 0 ~ 5 V.
Current measurement accuracy	±20 µA maximum for 0 ~ 20 mA range	At 25 °C, with 4 and 17 Hz filters
	±20 µA maximum for 4 ~ 20 mA range	
	±60 µA maximum for 0 ~ 20 mA range	-20 ~ 65 °C, with 4 and 17 Hz filters
	±60 µA maximum for 4 ~ 20 mA range	

Parameter	Specification	Notes
Voltage measurement accuracy	±5 mV maximum for 0 ~ 5 V range	At 25 °C, with 4 and 17 Hz filters
	±20 mV maximum for 0 ~ 10 V range	
	±20 mV maximum for -10 ~ 10 V range	
	±15 mV maximum for 0 ~5 V range	-20 ~ 65 °C, with 4 and 17 Hz filters
	±60 mV maximum for 0 ~ 10 V range	
	±60 mV maximum for -10 ~ 10 V range	
Current measurement repeatability	±2 µA maximum for 0 ~ 20 mA range	At 25 °C with 4 and 17 Hz filters, 10% of accuracy at 25 °C
	±2 µA maximum for 4 ~ 20 mA range	At 25 °C with 4 and 17 Hz filters, 10% of accuracy at 25 °C
Voltage measurement repeatability	±500 µV maximum for 0 ~ 5 V range	At 25 °C with 4 and 17 Hz filters, 10% of accuracy at 25 °C
	±2 mV maximum for 0 ~ 10 V range	At 25 °C with 4 and 17 Hz filters, 10% of accuracy at 25 °C
	±2 mV maximum for -10 ~ 10 V range	At 25 °C with 4 and 17 Hz filters, 10% of accuracy at 25 °C
Common mode voltage range	±10 V maximum per channel	
Common mode rejection	Greater than 84 dB at 50 and 60 Hz	With 4 Hz and 17 Hz filters
Normal mode rejection	72 dB (minimum) at 50 Hz and 60 Hz	With 4 Hz filter
	62 dB (minimum) at 50 Hz and 60 Hz	With 17 Hz filter
Crosstalk	-70 dB maximum	
Input impedance in current mode	250 Ω ±5 Ω	With input current less than 24 mA
Input impedance in voltage mode	15 Mohms except during open circuit detection	

Section 1.5
Environmental Specifications

Environmental Tests	Industry Standards	Test Values
Temperature (Operating) (Performance Criteria A). NOTE: This is temperature of the air inside the chassis.	IEC60068-2-1: (Test Ad, Operating Cold), IEC60068-2-2: (Test Bd, Operating Dry Heat), IEC60068-2-14: (Test Nb, Operating Thermal Shock)	-20 °C to 65 °C (-4 °F to 149 °F)
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)	-40 °C to 85 °C (-40 °F to 185 °F)
Humidity (Operating) (Performance Criteria A)	IEC60068-2-30: (Test Db, Unpackaged Damp Heat):	5 to 95% non-condensing
Vibration (Operating) (Performance Criteria A)	IEC60068-2-6: (Test Fc, Operating)	2 G at 10 to 500 Hz, 0.030 in. max. peak-to-peak
Shock (Operating) (Performance Criteria A)	IEC60068-2-27: (Test Ea, Unpackaged Shock)	15 G, 11 ms half-sine (3 mutually perpendicular axes)
Shock (Non-operating) (Performance Criteria B)	IEC60068-2-27: (Test Ea, Unpackaged Shock)	25 G, 11 ms half-sine (3 mutually perpendicular axes)
Radiated Emissions	IEC 61800-3:2012 (CISPR 11)	PDS category 3, Second Environment
Conducted Emissions	IEC 61800-3:2012 (CISPR 11)	PDS category 3, Second Environment
ESD immunity (Performance Criteria B)	IEC 61000-4-2	6 kV Indirect (Coupling Plate) 6 kV Contact Discharge (to points of initial contact) 8 kV Air Discharge (to points of initial contact)

Environmental Tests	Industry Standards	Test Values
Radiated RF immunity (Performance Criteria A)	IEC 61000-4-3: Level 3	10 V/M with 1 kHz sine-wave 80% AM from 80…1.4 GHz 10 V/M with 200 Hz square-wave 50% Pulse 100% AM at 900 MHz 10 V/M with 200 Hz square-wave 50% Pulse 100% AM at 1890 MHz 3 V/M with 1 kHz sine-wave 80% AM from 1.4…2.7 GHz (10 V/M goal)
EFT/B immunity (Performance Criteria B)	IEC 61000-4-4	Signal Ports: ±2 kV at 5 kHz for 5 minutes, Criteria B Power Ports: ±2 kV at 5 kHz for 5 minutes, Criteria B
Surge transient immunity (Performance Criteria B)	IEC 61000-4-5	Signal Ports: ±2 kV line-earth {CM}at 2Ω on shielded ports Power Ports ± 2 kV CM at 12 Ω ± 1 kV DM at 2 Ω
Conducted RF immunity (Performance Criteria A)	IEC 61000-4-6	10 VRMS with 1 kHz sine wave 80% AM from 150 kHz…80 MHz on signal and power ports
AC Mains Voltage Dips, Interruptions and Variations	IEC 61000-4-11	Follow the 61000-4-11.

Section 1.6
Regulatory Information

CE

- LVD Directive 2014/35/EU
  EN 61800-5
- EMC Directive 2014/30/EU
  EN 61000-6-4, EN 61800-3, EN 61000-3-2, EN 61000-3-3

UKCA

- Electrical Equipment (Safety) Regulations 2016
  EN 61800-5-1
- Electromagnetic Compatibility Regulations 2016
  BS EN 61000-6-4, BS EN 61800-3, BS EN 61000-3-2, BS EN 61000-3-3

CMIM

- Arrêté ministériel n° 6404-15 du 29 ramadan 1436 (16 juillet 2015) NM EN 61000-6-4, NM EN 61800-3, NM EN 61000-3-2, NM EN 61000-3-2

Section 1.7 Filter Frequencies

For input channels, the option card uses a digital filter that provides high frequency noise rejection for each input signal. The filter for each channel is programmable, allowing you to select from the following different filter frequencies:

- 4 Hz
- 17 Hz
- 60 Hz
- 120 Hz
- 240 Hz
- 470 Hz

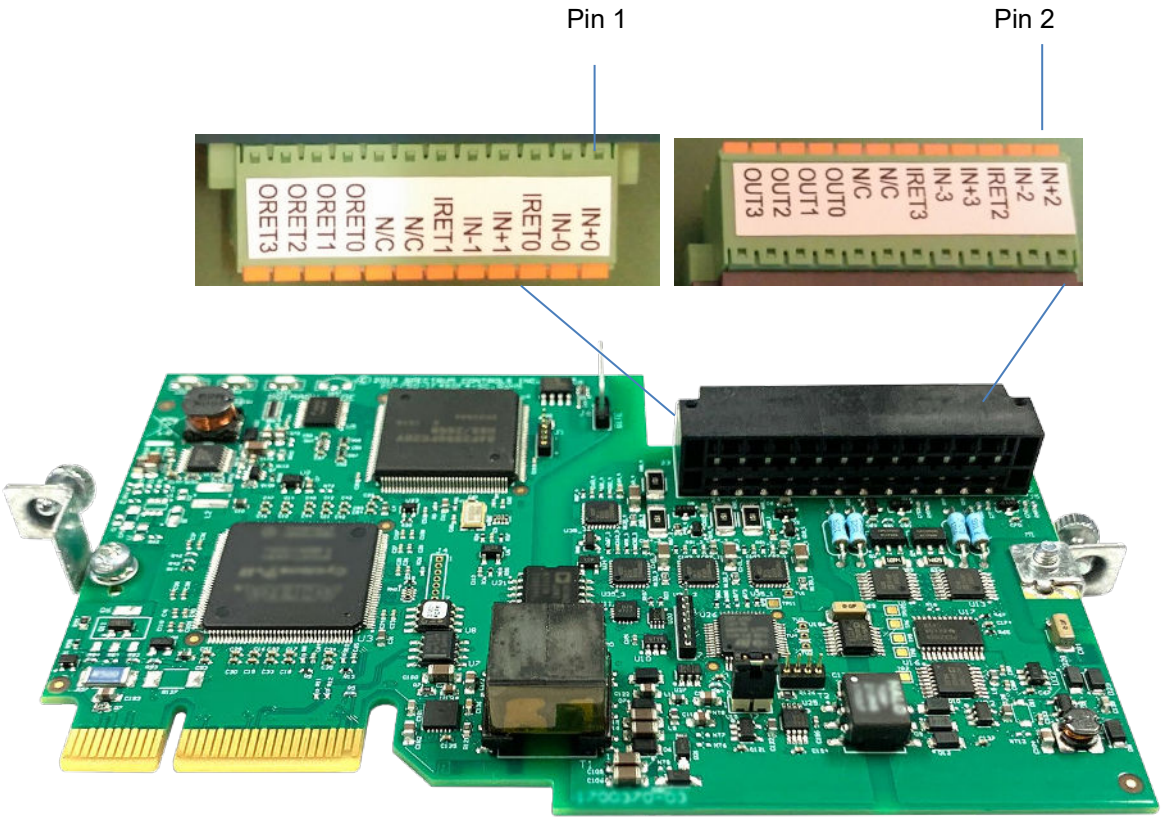
Section 1.8 Hardware Features

The minimum Drive firmware required to recognize the option card is version 10.0. The option card is configured via Rockwell-supplied CCW software, version 10.0 or later. The following languages are supported:

- English
- French
- Spanish
- Italian
- German
- Portuguese
- Dutch
- Chinese (Simplified)
- Japanese

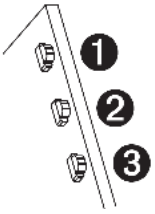
The option card Device parameters are stored on the card. Host Parameters are stored in the memory of the AC drive. Refer to your drive's user manual for more information.

The images below show the option card's hardware features, and closeups of both sides of the labeled terminal block (IN+0 is Pin 1. IN+2 is Pin 2):



1.8.1 LED Indicators

The 20-750-IF4XOF4-SC option card uses three LEDs to show operational status (Rockwell standard function). These LEDs are not visible after the option card is installed and the drive cover is closed.

	LED	Name	Description
	❶	Port Status	Option card port status
	❷	Mod Status	Option card status
	❸	Channel Status	Option card channel status

Indicator	State	Description
Option Card Port Status	Off	No power applied to device or not properly connected to the drive. To correct: Securely connect and ground the option card to the drive by fully inserting it into the drive port and tightening its captive screws to the recommended torque. Torque both screws to 0.45 to 0.67 Nm (4.0 to 6.0 lb-in). Apply power to the drive.
	Steady Green	The option card is properly connected and communicating with the drive. No action is required.
	Flashing Green	The option card is establishing communication with the drive. The status indicator will turn steady green or red. No action is required.
	Flashing Red	The option card is not receiving any communication from the drive. To correct: Cycle power to the drive after securely connecting and grounding the option card to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque.
	Steady Red	The option card detected a duplicate or invalid drive port ID. Cycle power to the drive after securely connecting and grounding the option card to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque. Option card can only be installed in slots 4, 5, and 6.
	Flashing Red/Green	Device is in self-test mode. This is only used during factory test and power-up.
	Steady Orange	The option card and drive brands do not match. Connect the option card to a compatible product of the same brand (an Allen-Bradley PowerFlex 750-series drive).
Mod Status	Off	The option card is not powered on or is not properly connected to the drive. To correct: Securely connect and ground the option card to the drive by fully inserting it into the drive port and tightening its captive screws to the recommended torque. Torque both screws to 0.45 to 0.67 Nm (4.0 to 6.0 lb-in). Apply power to the drive.

Indicator	State	Description
	Steady Green	The option card is properly connected and communicating with the drive. No action required.
	Steady Red	A critical hardware error occurred. To correct, cycle power to the drive, or replace the option card.
	Flashing Red	The option card has failed the firmware test. To correct: Cycle power to the drive. Parameter settings may have changed. Clear faults in the option card. If cycling power does not correct the problem, the option card parameter settings may have been corrupted. Reset defaults and reconfigure the option card. The factory calibration data may be corrupted. Replace the module.
Channel Status	Off	The option card is not powered on, or major hardware error. To correct: Securely connect and ground the option card to the drive by fully inserting it into the drive port and tightening its captive screws to the recommended torque. Torque both screws to 0.45 to 0.67 Nm (4.0 to 6.0 lb-in).
	Steady Green	All channels operating normally. No action required.
	Flashing alternating Red/Green	Calibration mode. This condition only exists during the manufacturing process. It is not enabled in the field.
	Steady Red	Double-check configuration parameters. Check Input Status bits to determine which channel(s) has the invalid setting.
	Flashing Red	• Current Output channel is open circuit. • Voltage Output channel is short circuit. • Input channel is open circuit (except 0-20 mA range). Check connections to terminal block (spring-loaded). Disable unused/unconnected channels.

Section 1.9 System Overview

The PowerFlex 750 series AC drives use a spring-loaded, edge card connector to interface to the 20-750-IF4XOF4-SC option card. The option card receives 12 VDC power through the bus interface. The option card is expected to operate indefinitely and cannot be upgraded in the field. It does not require periodic maintenance.

1.9.1 Option Card Power-up

At power-up, the option card performs a check of its internal circuits, memory, and basic functions. If no faults are found during power-up diagnostics, the option card status LED is turned on.

After power-up checks are complete, the option card loads its stored configuration parameters. When new, the option card begins operation in a default usable condition. The default configuration is all channels enabled in the 0-20 mA range.

1.9.2 Option Card Operation

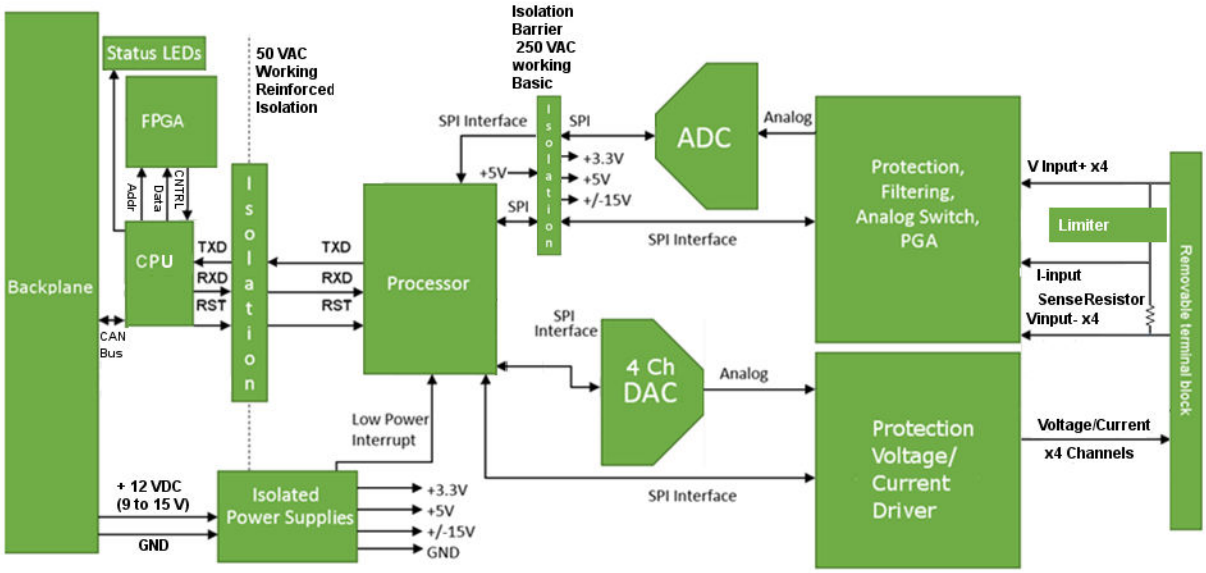
The 20-750-IF4XOF4-SC option card provides four independent analog input channels, and four independent analog output channels. Each input channel includes six selectable filter settings and can be configured for voltage or current.

The option card uses:

- An analog-to-digital converter (ADC) to achieve 16-bit resolution on each input channels.
- A 16-bit digital-to-analog converter and four separate output drivers to provide for either current or voltage output signals on each output channel.

The 20-750-IF4XOF4-SC plug-in option card communicates over the backplane Drive Peripheral Interface (DPI) to the PLC AC drive.

See the block diagram below:



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 750sc-8U option card is tested to meet the EMC Directive 2014/30/EU and the following standards, in whole or in part, documented in a technical construction file:

- EN 61800-3: Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods
- EN 61000-3-2: Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤16 A per phase)
- EN 61000-3-3: Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

This product is intended for use in an industrial environment.

2.1.2 Low Voltage Directive

This product is tested to meet the LVD Directive 2014/35/EU, by applying EN 61800-5: Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy. For specific information required by EN 61800-5, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- *Industrial Automation, Wiring and Grounding Guidelines for Noise Immunity*, publication 1770-4.1
- *Automation Systems Catalog*, publication B113

Section 2.2 Power Requirements

The option card receives power through the bus interface from the AC.

Section 2.3 General Considerations

20-750-IF4XOF4-SC option card 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[1].

2.3.1 Hazardous Location Considerations

This equipment is not suitable for hazardous locations.

2.3.2 Prevent Electrostatic Discharge

WARNING 	Electrostatic discharge can damage integrated circuits or semiconductors if you touch the analog I/O option card bus connector pins or the terminal block on the option card. Follow these guidelines when you handle the option card: • 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 option card. • If available, use a static-safe workstation. When it is not in use, keep the option card in its static-shield bag.

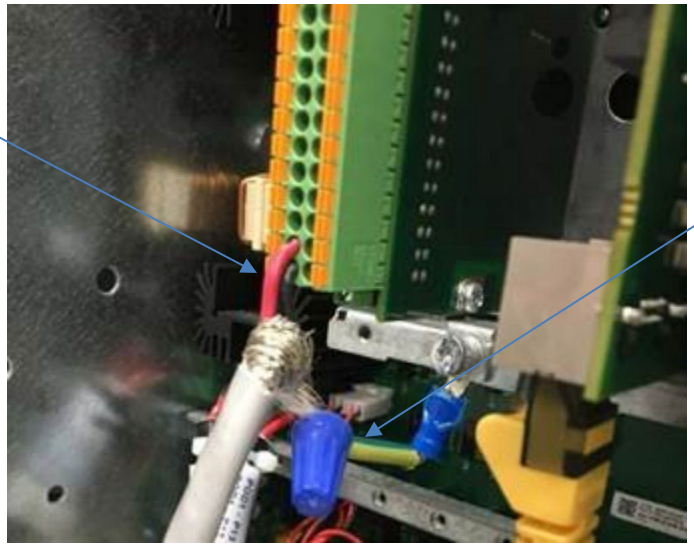
2.3.3 Remove Power

WARNING 	Remove power before removing or inserting this option card. When you remove or insert an option card 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. • Electrical arcing causes excessive wear to contacts on both the option card and its mating connector and may lead to premature failure.

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

2.3.4 Reducing Noise

Route shielded, twisted-pair analog wiring away from any high voltage I/O wiring, and other sources of electrical noise such as hard-contact switches, relays, and AC motor drives. The inputs must be wired using twisted shielded pairs, with the shield terminated at the PowerFlex POD with a very short wire (the shorter the better) and any exposed wire being kept to less than 2 inches (the shorter the better). Good high frequency termination would be a 360 degree termination. If only a small portion of the cable shielding is being terminated, it can appear as a high impedance to high frequency. Low noise methods of wiring require a low impedance path to ground for the shielding.



Section 2.4 Mounting

2.4.1 Before You Begin

The product can be used with Rockwell Automation 750 series drives ONLY, using CCW software, version 10 or later.

2.4.2 Install the I/O Option Card

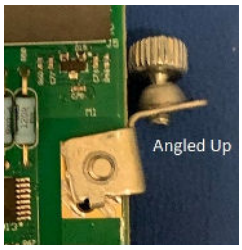
The option card uses a 64-pin connector for the drive backplane library. The 20-750-IF4XOF4-SC option card is restricted to ports 4, 5, and 6 in the drive.

WARNING 	**EQUIPMENT DAMAGE HAZARD** If an option card is installed or removed while the drive is powered, you can damage the option card or the drive. To avoid damaging the drive, verify that the voltage on the bus capacitors on the drive has discharged completely, and all control power is removed before performing any work on the drive. For complete information about installing I/O option cards in 750 Series drives, refer to Rockwell Automation Publication 750-IN001-EN-P.

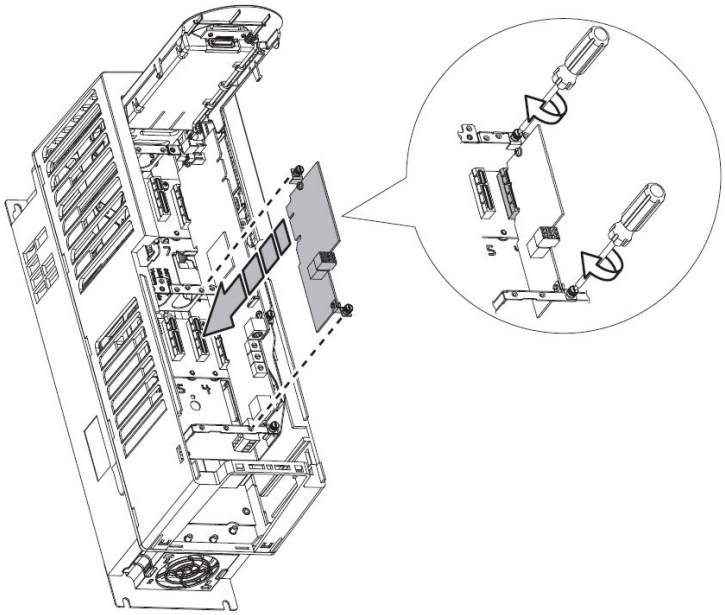
NOTE	Avoid over-tightening retaining screws.

To install an option card:

1. Firmly press the option card edge connector into the desired port.
2. The board mounting clips (2 per card) have a range of possible angles when the card is assembled. You may need to adjust the angle of each mounting clip in order to fit the card in the space provided. Review card placement to see how the clips need to be adjusted before you fully insert the card in its slot. If you need to adjust clip angles to fit the card in its space, loosen the board mounting clips on the card, adjust the angle slightly upwards or downwards as needed, and re-tighten the board clip to the card. Angles shown below are greater than needed for illustration purposes:



3. Tighten the top and bottom retaining screws.
   - Recommended torque is 0.45 Nm. (4.0 lb.in)
   - Recommended screwdriver is T15 Hexalobular.



2.4.3 Wiring Diagram

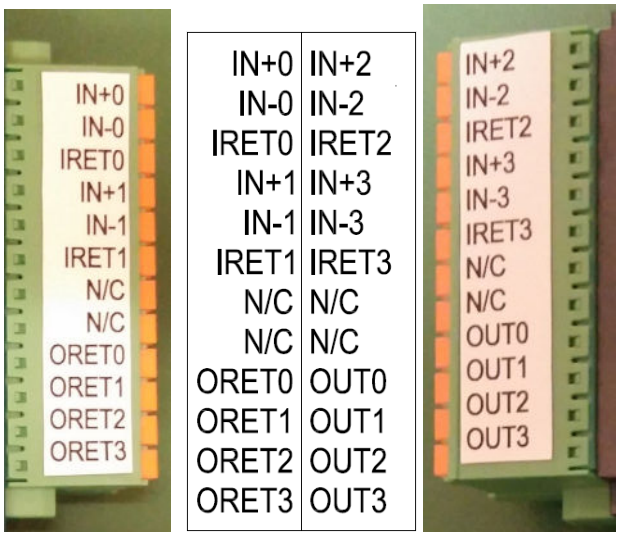
Refer to the following tables and wiring diagrams for field wiring connections.

A 2-row × 12 pin (24 pins total) removable terminal block with 3.5 mm pin spacing is used to provide for a connection between input and output signals and

the 20-750-IF4XOF4-SC card:

RTB Pin#	Usage	Usage	RTB Pin#
2	IN+2	IN+0	1
4	IN-2	IN-0	3
6	IRET2	IRET0	5
8	IN+3	IN+1	7
10	IN-3	IN-1	9
12	IRET3	IRET1	11
14	N/C	N/C	13
16	N/C	N/C	15
18	OUT0	ORET0	17
20	OUT1	ORET1	19
22	OUT2	ORET2	21
24	OUT3	ORET3	23

IN+0 is Pin 1. IN+2 is Pin 2. Each side of the terminal block is clearly labeled as follows:

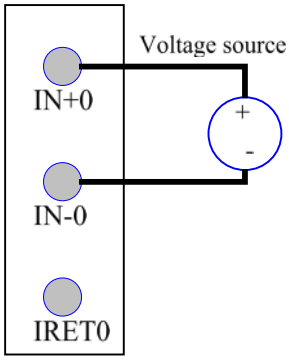


WARNING	HAZARD OF EQUIPMENT DAMAGE
	In the current input mode, the maximum safe input voltage is reduced. To prevent damage to the sense resistor, avoid connecting a voltage or current above the maximum ratings.

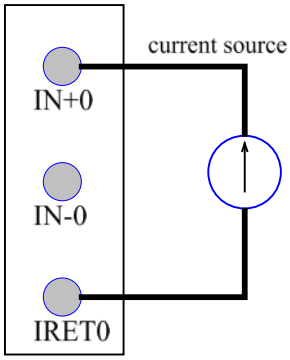
The option card is available in only one configuration. This card has no switches or shunts for setting the current input or other modes. The card uses different pins for different modes. Please see the wiring diagrams below for reference.

In the current input mode, the maximum safe input voltage is reduced, and care should be taken not to connect a voltage or current above the maximum ratings to prevent damage to the sense resistor.

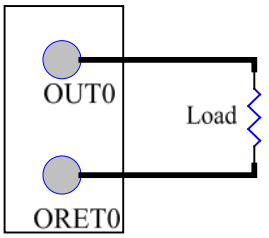
Example wiring diagrams for input channel 0 and output channel 0 are shown below. Other channels are identical:



Input voltage wiring



Input current mode wiring



voltage and current output wiring

Wires, either solid or stranded, are retained by a spring clamp inside the terminal block housing, as opposed to the more traditional screw terminal. Wires are removed by pushing in on the actuator adjacent to the wire hole, releasing the clamp on the wire, then removing the wire. Shielded cables are required for both input and output channels.

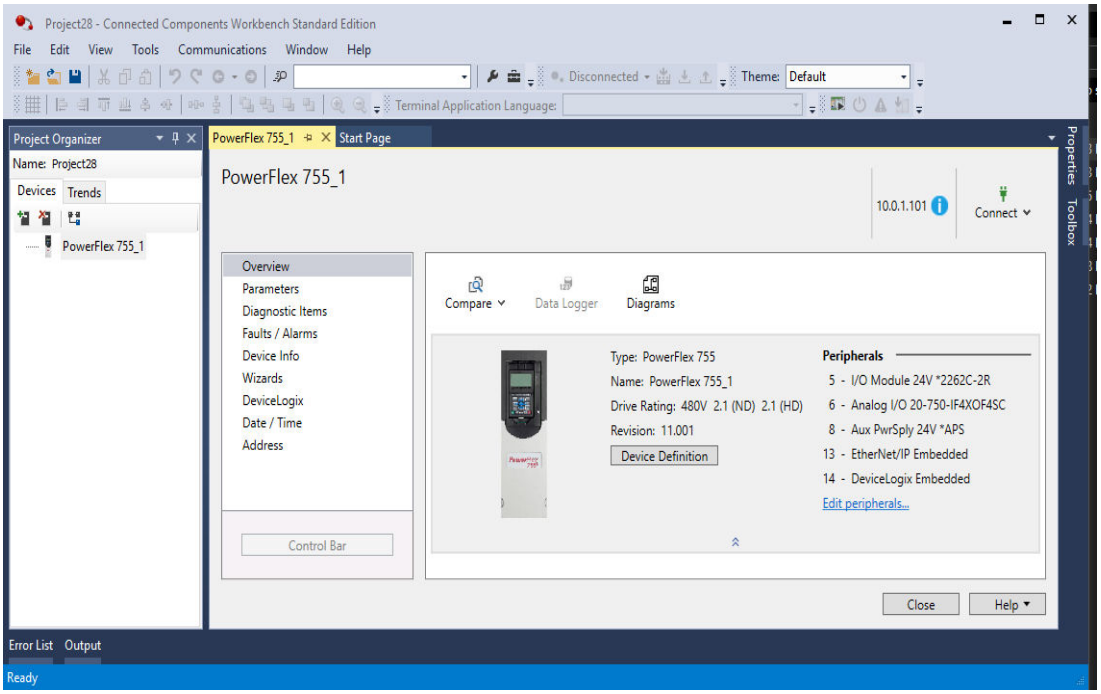
Chapter 3
Configuring the 20-750-IF4XOF4-SC Using CCW

This chapter covers the following subjects:

- Introduction (using CCW software to configure the option card.
- Data Links settings.
- Setting configuration parameters and associated values.
- Output fault and mode handling.
- Diagnostics.
- Event log
- Languages
- Software system attributes
- PLC interfaces

Section 3.1
Introduction

You use CCW programming software to configure the 20-750-IF4XOF4-SC:



Section 3.2
Data Links

The option card has access to 16 32-bit Data Links To Net and 16 Data Links

From Net.

The analog data and status for the option card are written to the first 11 Data Links (DLs) From Net. DLs 01-04 represent the four input channels' data and DLs 05-08 echo the four output channels' data. The next three DLs (09-11) represent status. The remaining DLs From Net are unused.

Output channel command data is set via four DLs To Net (01-04). DL To Net 05 is used for status bit unlatching. The remaining DLs To Net are unused.

3.2.1 Default System Settings

You must set parameters to appropriate default values (accessed by the PF-750-IF4XOF4-SC Data Links) during setup. Some of these parameters control the outputs at the terminal block of the PF-750-IF4XOF4-SC.

The PF-750-IF4XOF4-SC uses Data Link parameters to relay I/O data. The Data Links to Net 01, 02, 03, 04 are normally configured pointing to floating point parameters in the Drive (or DeviceLogix). Values in those parameters determine the outputs at the terminal block.

NOTE	During power-up, and before an IO connection is established, the default values are used.

After an I/O connection is established, the parameters are updated by Data Links from Net located within the EtherNet/IP peripheral (assuming this is how the system is configured). At this point, the outputs are under system logic control and the default values are overwritten by incoming I/O data.

NOTE	Modifying UserData values while connected to active Data Links will be preserved but not visible. Viewing and modifying values can be done while the project is offline. Once running, those values are overwritten by live data from the connected Data Links. **It is important to set User Data values for outputs to a known safe value since the startup and configuration process can cause temporary disconnection with Data Links. In that case, the value that is set will be used until the Data Link is fully configured.**

For systems that do not connect data externally via Data Links (using I/O connection), it is assumed user-defined logic within the Drive is controlling the values of the parameters. Since there are no active Data Links writing to the parameters, you can set the values as needed.

It is still important to make sure the target parameters are set to a safe default since DeviceLogix may not be set to execute.

3.2.2 From Net (Input Table)

The following table shows how the data is represented in the From Net DLs.

Data Link From Net	Name	Type
01	In Chan 0 Data	REAL
02	In Chan 1 Data	REAL
03	In Chan 2 Data	REAL
04	In Chan 3 Data	REAL
05	Out Chan 0 Echo	REAL
06	Out Chan 1 Echo	REAL
07	Out Chan 2 Echo	REAL
08	Out Chan 3 Echo	REAL
09	Input Status	UDINT
10	Output Status	UDINT
11	Module Status	UDINT
12	Unused	
13	Unused	
14	Unused	
15	Unused	
16	Unused	

You must properly configure the Drive and Option Card DLs to be used. The data written to each Chan X Data is a REAL data type. Status DLs are to be considered UDINTs (or DWORDs) so that individual bits may be read.

3.2.3 Input Status (DL 09)

Each input channel is allocated 8 bits for status within Data Link 09. See below for details. The bit definitions are listed below the table.

Values	Reserved	Reserved	Reserved	Reserved	In3 BadCfg	In3 UnderRng	In3 OverRng	In3 OpenCirc	Reserved	Reserved	Reserved	Reserved	In2 BadCfg	In2 UnderRng	In2 OverRng	In2 OpenCirc
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[31:16]	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Values	Reserved	Reserved	Reserved	Reserved	In1 BadCfg	In1 UnderRng	In1 OverRng	In1 OpenCirc	Reserved	Reserved	Reserved	Reserved	In0 BadCfg	In0 UnderRng	In0 OverRng	In0 OpenCirc
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Bit Definitions		
Bit	**Name**	**Description**
0,8,16,24	**In[n] OpenCirc**	**Open Circuit** A wire is disconnected. This bit is cleared when the condition no longer exists. It is not set for 0-20 mA range. For the 4-20 mA range, an input less than 2 mA is considered Open Circuit. The open circuit bit will be cleared for the 4-20 mA range when the input is greater than 3 mA to prevent toggling of the status. The amount of time to detect open circuit can take up to the total scan of all channels. The input filter setting for all enabled channels determines the total scan time. NOTE: Do not leave an input channel un-connected or permit it to become open circuit when its open circuit detection function has been disabled. If you allow this, readings from this channel will be random data and cannot be used.
1,9,17,25	**In[n] OverRng**	**Over Range** The measured value is greater than or equal to High Range value (see Range Value Table). This bit is cleared when the condition no longer exists.
2,10,18,26	**In[n] UnderRng**	**Under Range** The measured value is less than or equal to Low Range value (see Range Value Table). This bit is cleared when the condition no longer exists.
3,11,19,27	**In[n] BadCfg**	**Bad Configuration** One or more configuration parameters for the channel is invalid. If an invalid configuration is set for a channel it continues to execute with the previous valid configuration. The bit is cleared when a valid configuration is set.

3.2.4 Output Status (DL 10)

Each output channel is allocated 8 bits for status within Data Link 10. See below for details. The bit definitions are listed below the table.

Values	Reserved	Out3 NAN	Out3 DACErr	Out3 BadCfg	Out3 OvrTmp	Out3 LoadErr	Out3 OvrRng	Out3 UndrRng	Reserved	Out2 NAN	Out2 DACErr	Out2 BadCfg	Out2 OvrTmp	Out2 LoadErr	Out2 OvrRng	Out2 UndrRng
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[31:16]	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Values	Reserved	Out1 NAN	Out1 DACErr	Out1 BadCfg	Out1 OvrTmp	Out1 LoadErr	Out1 OvrRng	Out1 UndrRng	Reserved	Out0 NAN	Out0 DACErr	Out0 BadCfg	Out0 OvrTmp	Out0 LoadErr	Out0 OvrRng	Out0 UndrRng
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Bit Definitions		
Bit	**Name**	**Description**
0,8,16,24	**Out[n] UnderRng**	**Under Range** The commanded value is less than or equal to the value you selected (see Low Clamp & Alarm parameter). This bit is cleared when the output is greater than the user-defined value.
1,9,17,25	**Out[n] OverRng**	**Over Range** The commanded value is greater than or equal to value you (see High Clamp & Alarm parameter). This bit is cleared when the output is less than the user-defined value.
2,10,18,26	**Out[n] LoadErr**	**Load Error** • If the channel is configured for voltage output, this bit indicates a short circuit. • If the channel is configured for current output, this bit indicates an open circuit. NOTE: This status may not be set if the output is at, or near, zero.
3,11,19,27	**Out[n] OvrTmp**	**Over Temperature** The output driver for the channel is indicating that it is detecting an over temperature condition. NOTE: The output is disabled when this bit is set.
4,12,20,28	**Out[n] BadCfg**	**Bad Configuration** One or more configuration parameters for the channel is invalid. If an invalid configuration is set for a channel it continues to execute with the previous valid configuration. The bit is cleared when a valid configuration is set.

Bit Definitions		
Bit	**Name**	**Description**
5,13,21,29	**Out[n] DACErr**	**DAC Error** There is an internal communications error with the DAC. NOTE: The output is disabled when this bit is set.
6,14,22,30	**Out[n] NAN**	The expected floating-point output data is not a valid floating-point number. The output will remain at its last valid commanded value.

3.2.5 Module Status (DL 11)

Module status is reported in Data Link 11. The following tables show layout and description of individual bits.

Values	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Code Fault	Cal Fault
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[31:16]	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Values	Unused	Output Power	Watchdog TO	Comms Fault	ADC Fault	DAC Fault	Out Grp Flt	In Grp Flt	Out3 Fault	Out2 Fault	Out1 Fault	Out0 Fault	In3 Fault	In2 Fault	In1 Fault	In0 Fault
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Bit Definitions		
Bit	**Name**	**Description**
0:3	**In[n] Fault**	Set when any of the specified Input Channel status bits are set. Each bit represents an individual channel.
4:7	**Out[n] Fault**	Set when any of the specified Output Channel status bits are set. Each bit represents an individual channel.
8	**In Grp Flt**	Input Group Fault Set when any of the above In[n] Fault bits are set (bits 0:3).
9	**Out Grp Flt**	**Output Group Fault** Set when any of the Out[n] Fault bits are set (bits 4:7).
10	**DAC Fault**	Set when a DAC related hardware fault takes place. Only set for the following conditions: • Over temperature condition reported by DAC. • Detected communications error.

Bit Definitions		
Bit	**Name**	**Description**
11	**ADC Fault**	Set when an ADC related hardware fault takes place. Only set for the following conditions: • Timeout waiting for acquisition. • Detected communications error.
12	**Comms Fault**	Set when communication between the analog and backplane processors is disrupted. Analog input data will not be updated. The outputs will be set to fault mode, assuming the analog processor did not encounter a catastrophic failure.
13	**Watchdog TO**	Watchdog timer timed out.
14	**Output Power Fault**	The internal voltage source that feeds the output channels has a fault monitor. When this fault is detected, the Output Power Fault bit is set, and all outputs are disabled. This is a latched condition. Once it is set, a power cycle is required to reset the fault and allow normal operation. If a power cycle does not clear the fault, there is a serious hardware malfunction, and the card will need to be replaced.
15	**Unused**	

3.2.6 To Net (Output Table)

You set the outputs via four DLs.

As stated previously, you must properly configure the DLs to be used by logic:

Data Link To Net	Name	Type
01	Out Chan 1 Data	REAL
02	Out Chan 2 Data	REAL
03	Out Chan 3 Data	REAL
04	Out Chan 4 Data	REAL
05	Unlatch Alarms	DWORD

3.2.7 Unlatch Alarms (Output Channels Only)

When the Alarm Latch Enable (ALE) bit is set in the channel configuration, the Under Range, Over Range and Load Error status alarm bits will remain set even when the condition is cleared. The only way to clear the alarm is to set the appropriate Unlatch bit for that channel. Once it has been set, and the alarm condition has been cleared, the Unlatch bit should be cleared as well to allow subsequent latching. If the ALE setting is not enabled, these bits are ignored by the option card.

Values	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[31:16]	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

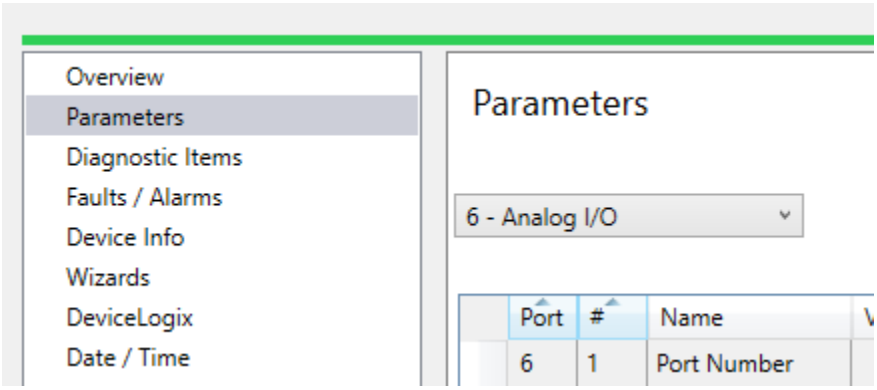
Values	Reserved	Out3 UnlLD	Out3 UnlOvr	Out3 UnlUndr	Reserved	Out2 UnlLD	Out2 UnlOvr	Out2 UnlUndr	Reserved	Out1 UnlLD	Out1 UnlOvr	Out1 UnlUndr	Reserved	Out0 UnlLD	Out0 UnlOvr	Out0 UnlUndr
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Section 3.3 Configuration

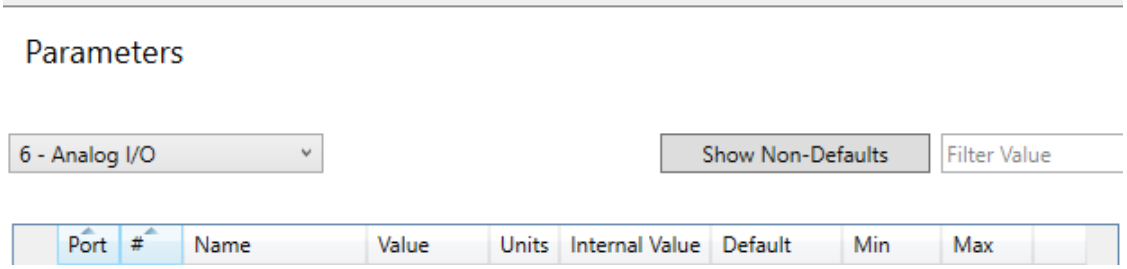
Configuration parameters are set via the parameter list table. They may be set directly in the table or by double-clicking on a parameter in the list to access the Parameter Properties window. If you have no offline database for the option card, you must first have the system powered up.

All configuration parameters are stored in non-volatile memory and retrieved after each power-cycle. Factory defaults may be set using the Reset Module parameter.

1. Using CCW (v. 12 shown), access the Parameter List by clicking the **Parameters** Button in the tab for the Option Card:



The Parameter List Window appears with the following column headers:



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.
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 Parameter List

No.	Display Name *Full Name* Description	Values		Read/Write	Data Type
1	**Port Number** *Port Number* Current port number of option card. This is a read-only parameter that indicates the slot where the option card is installed.	Default: Options:	4 or 5 or 6 Not settable	R	8-bit INT
2	**DLs From Net Act** *Data Links from Net Active* Indicates the number of DLs from Net that are active. Set to 0 when Config Control set to Unlock.	Default: Options:	11 Not settable	R	8-bit INT

No.	Display Name *Full Name* Description	Values		Read/Write	Data Type
3	**DLs To Net Act** *Data Links to Net Active* Indicates the number of DLs to Net that are active. Set to 0 when Config Control set to Unlock.	Default: Options:	5 (6 when BITE jumper installed) Not settable	R	8-bit INT
4	**Reset Module** *Reset Module* This parameter allows you to remotely reset the module or set factory defaults. 0 – This is for display only and does not perform an action. 1 = Soft reset of module. Forces a reboot. 2 = Reset all parameters to factory defaults.	Default: Options:	0 – Ready 0 – Ready 1 – Reset Module 2 – Set Defaults	RW	8-bit INT
5	**In0 Cfg Bits** *Input Channel 0 Configuration Bits* Bit fields to set channel configuration.	Default Options:	0×00 (See Input Configuration Table below)	RW	16-bit WORD
6	**In0 Low Eng** *Input Channel 0 Low Engineering Units* Used for user scaling. This value scales to the *Low Range* value of the selected range. Default range is 0-20 mA	Default Options:	0.0 Must be less than High Engineering value.	RW	32-bit REAL
7	**In0 High Eng** *Input Channel 0 High Engineering Units* Used for user scaling. This value scales to the *High Range* value of the selected range. Default range is 0-20 mA	Default Options:	20.0 Must be greater than Low Engineering value.	RW	32-bit REAL
8	**In1 Cfg Bits**		See In Ch0	RW	16-bit WORD
9	**In1 Low Eng**		See In Ch0	RW	32-bit REAL
10	**In1 High Eng**		See In Ch0	RW	32-bit REAL
11	**In2 Cfg Bits**		See In Ch0	RW	16-bit WORD
12	**In2 Low Eng**		See In Ch0	RW	32-bit REAL

No.	Display Name *Full Name* Description	Values		Read/Write	Data Type
13	**In2 High Eng**		See In Ch0	RW	32-bit REAL
14	**In3 Cfg Bits**		See In Ch0	RW	16-bit WORD
15	**In3 Low Eng**		See In Ch0	RW	32-bit REAL
16	**In3 High Eng**		See In Ch0	RW	32-bit REAL
17	**Out0 Cfg Bits** *Output Channel 0 Configuration Bits* Bit fields to set channel configuration.	Default: Options:	0×00 (See Output Configuration Table below)	RW	16-bit WORD
18	**Out0 Low Eng** *Output Channel 0 Low Engineering Units* Used for user scaling. This value scales to the *Low Range* value of the selected range. Default range is 0-20 mA	Default: Options:	0.0 Must be less than High Engineering value.	RW	32-bit REAL
19	**Out0 High Eng** *Output Channel 0 High Engineering Units* Used for user scaling. This value scales to the *High Range* value of the selected range. Default range is 0-20 mA	Default Options:	20.0 Must be greater than Low Engineering value.	RW	32-bit REAL
20	**Out0 Low Clamp** *Output Channel 0 Low Clamp* User-defined low clamp and alarm value. This parameter is valid only when *Low Clam & Alarm* set to User. Value is in Engineering Units. Low Clamp & Alarm defaults to Range.	Default: Options:	0.0 Valid values are less than High Clamp (if High Clamp enabled). The value will be clipped to the maximum limits as well.	RW	32-bit REAL

No.	Display Name *Full Name* Description	Values		Read/Write	Data Type
21	**Out0 High Clamp** *Output Channel 0 High Clamp* User defined high clamp and alarm value. This parameter is valid only when *High Clam & Alarm* set to User. Value is in Engineering Units. High Clamp & Alarm defaults to Range.	Default: Options:	0.0 Valid values are greater than Low Clamp (if enabled) and less than or equal to High Limit.	RW	32-bit REAL
22	**Out0 Fault Val** *Output Channel 0 Fault Mode Value* User-defined output when Fault Mode set to User. The output is set to this value for the following conditions: • Experiences a fault when Config Control set to Unlock	Default: Options:	0.0 Any value may be used but will be clipped to the value determined by the High or Low Clamp & Alarm settings (see Input Configuration Bits)	RW	32-bit REAL
23	**Out1 Cfg Bits**		See Out0	RW	16-bit WORD
24	**Out1 Low Eng**		See Out0	RW	32-bit REAL
25	**Out1 High Eng**		See Out0	RW	32-bit REAL
26	**Out1 Low Clamp**		See Out0	RW	32-bit REAL
27	**Out1 High Clamp**		See Out0	RW	32-bit REAL
28	**Out1 Offline Val**		See Out0	RW	32-bit REAL
29	**Out2 Cfg Bits**		See Out0	RW	16-bit WORD
30	**Out2 Low Eng**		See Out0	RW	32-bit REAL
31	**Out2 High Eng**		See Out0	RW	32-bit REAL

No.	Display Name *Full Name* Description	Values		Read/Write	Data Type
32	**Out2 Low Clamp**		See Out0	RW	32-bit REAL
33	**Out2 High Clamp**		See Out0	RW	32-bit REAL
34	**Out2 Offline Val**		See Out0	RW	32-bit REAL
35	**Out3 Cfg Bits**		See Out0	RW	16-bit WORD
36	**Out3 Low Eng**		See Out0	RW	32-bit REAL
37	**Out3 High Eng**		See Out0	RW	32-bit REAL
38	**Out3 Low Clamp**		See Out0	RW	32-bit REAL
39	**Out3 High Clamp**		See Out0	RW	32-bit REAL
40	**Out3 Offline Val**		See Out0	RW	32-bit REAL
41	**Config Control** *Data Link Configuration Control* Used to allow configuration of Data Links.	Default: Options:	0 (Unlocked) 0 = Unlock 1 = Lock **Unlock** allows configuration of the Data Links. **Lock** allows data to flow through the Data Links.	RW	8-bit BYTE

3.3.2 Input Configuration Bits

	Bit Names:	Ignored							OC Action 1	OC Action 0	Range 2	Range 1	Range 0	Filter 2	Filter 1	Filter 0	Disable
Name	**Setting**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Disable	Enable	Default															0
	Disabled																1
Filter	17 Hz	Default												0	0	0	
	4 Hz													0	0	1	
	60 Hz													0	1	0	
	120 Hz													0	1	1	
	240 Hz													1	0	0	
	470 Hz													1	0	1	
Range	0-20 mA	Default									0	0	0				
	4-20 mA										0	0	1				
	0-5 V										0	1	0				
	0-10 V										0	1	1				
	±10 V										1	0	0				
OC Action	Upscale	Default							0	0							
	Downscale								0	1							
	Zero								1	0							
	Disabled*	(voltage range only)							1	1							
Ignored	N/A	X	X	X	X	X	X	X									

Configuration Table – Bit Definitions for Input Channel are:

Bit Definitions		
Bit	**Name**	**Description**
0	**Disable**	Set to 1 to disable channel.
1:3	**Filter Frequency**	0 = 17 Hz 1 = 4 Hz 2 = 60 Hz 3 = 120 Hz 4 = 240 Hz 5 = 470 Hz

Bit Definitions		
4:6	**Input Range**	0 = 0-20 mA 1 = 4-20 mA 2 = 0-5 V 3 = 0-10 V 4 = ±10 V
7:8	**Open Circuit Detection**	0 = Upscale 1 = Downscale 2 = Zero 3 = Disabled
9:15	**Unused**	

3.3.3 Output Configuration Bits

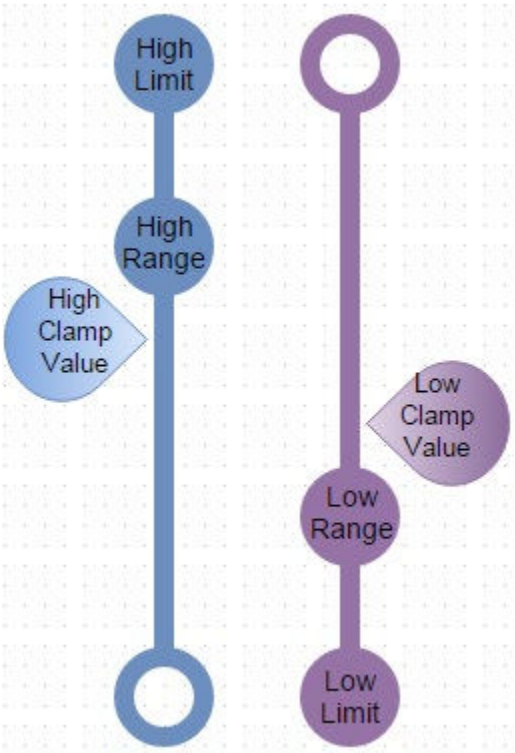
		Ignored						**FaultMode**	**AlmLatchEn**	**HiClmpAlm 1**	**HiClmpAlm 0**	**LowClmpAlm 1**	**LowClmpAlm 0**	**Range 2**	**Range 1**	**Range 0**	**Disable**
Name	**Setting**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Disable	Enable	Default															0
	Disable																1
Range	0-20 mA	Default												0	0	0	
	4-20 mA													0	0	1	
	0-5 V													0	1	0	
	0-10 V													0	1	1	
	±10 V													1	0	0	
Low Clamp & Alarm	Range	Default										0	0				
	Limit											0	1				
	User											1	0				
High Clamp & Alarm	Range	Default								0	0						
	Limit									0	1						
	User									1	0						
Alarm Latch EN	Disable	Default							0								
	Enable								1								
Fault Mode	Hold	Default						0									
	User							1									
Ignored	N/A	X	X	X	X	X	X										

Configuration Table – Bit Definition for Output Channel are:

Bit Definitions		
Bit	**Name**	**Description**
0	**Disable**	Set to 1 to disable the output channel.
1:3	**Output Range**	0 = 0-20 mA (default) 1 = 4-20 mA 2 = 0-5 V 3 = 0-10 V 4 = ±10 V
4:5	**Low Clamp & Alarm**	Clamp channel output and Set Output Under Range Alarm status bit when the channel output is less or equal to the user-defined option and clamp value. Clamp and trigger Under Range Alarm Status bit at: 0 = (default) Low Range value. User-defined Low Clamp value is ignored. 1 = Low Limit value. User-defined Low Clamp value is ignored. 2 = User-defined Low Clamp value. The value will be clipped to high or low limit.
6:7	**High Clamp & Alarm**	Clamp channel output and Set Output Over Range Alarm status bit when the channel output is greater or equal to the user-defined option and clamp value. Clamp and trigger Over Range Alarm Status bit at: 0 = (default) High Range value. User-defined High Clamp value is ignored. 1 = High Limit value. User-defined High Clamp value is ignored. 2 = User-defined High Clamp value. The value will be clipped to high or low limit.
8	**ALE**	**Alarm Latch Enable** When this bit is set, the Over Range, Under Range, and Load Error Alarm bits in the Output Status will remain set even when the Alarm condition is cleared. The Unlatch Alarm bits for this channel in the Output Table must be set to clear the alarms. 0 = Disable (default) 1 = Enable
9	**Fault Mode**	This setting determines the output value when a fault condition is detected. Changes to the commanded output value will have no effect until the condition is cleared. If the condition is cleared, the output resumes using the value in the channels Data Link. 0 = Hold (default). The output is held at its last value. 1 = User. The output is set to the Offline Val parameter.
10:15	**Unused**	

3.3.4 Selected and User-defined High and Low Clamp Values

The following section provides information about how user-defined high and low clamp values function. The following diagram shows the relationship between high and low clamp values:



A User-defined High Clamp Value must be greater than the Low Clamp Value if both are enabled:

- Validation of the High Clamp value is ignored if High Clamp & Alarm option is not set to User.
- Validation of the Low Clamp value is ignored if Low Clamp & Alarm option is not set to User.

The following conditions trigger a Configuration error:

- If both High and Low Clamp & Alarm parameters are set to User, the High Clamp value must be greater than the Low Clamp value.
- If the High or Low Clamp & Alarm parameter is set to User, the value cannot be set beyond the Limit of the specified Range setting.
- If the High Clamp & Alarm parameter is set to User, the value must be greater than the Low Limit value and greater than or equal to the Low Range value.
- If only the Low Clamp & Alarm parameter is set to the user-defined Clamp value, the value must be less than the High Range or Limit value.

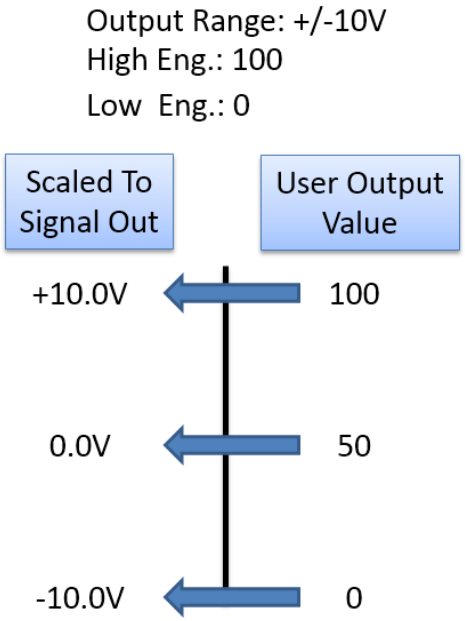
3.3.5 User Scaling

You may configure each channel to scale as necessary to fit your application. Scaling is the same for both inputs and outputs. There are two configuration parameters used to set the scaling:

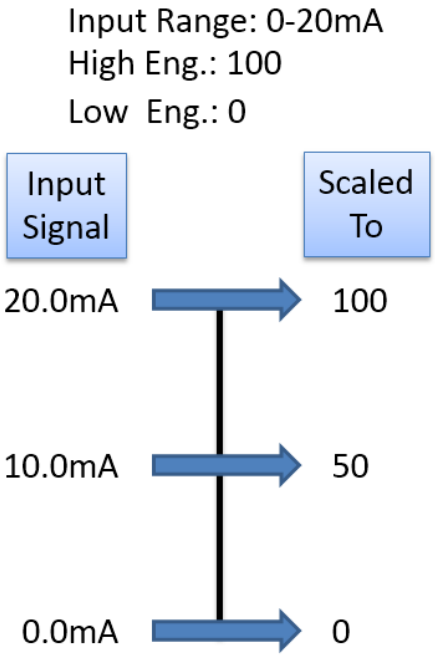
- <In/Out>Low Engineering
- <In/Out>High Engineering

The selected range indicates how the High and Low Engineering units are scaled. The Low Eng parameter is matched with the Ranges Low Eng. value. Example: the ±10 V range would set the Low Eng. value to match -10. The High Eng. value would match +10.

The following diagram shows how user values are scaled to signal outputs. This example is for the ±10 V Output Range.



The next diagram shows how the input signal is scaled to the same user High and Low Engineering units. This example is for the 0-20 mA Input Range.



The following table describes the relationship in detail:

Range	Low Engineering	High Engineering
0-20 mA	0	20
4-20 mA	4	20
0-5 V	0	5
0-10 V	0	10
±10 V	-10	+10

Reverse scaling is not permitted. The Low Engineering value must be less than the High Engineering parameter value. The Low and High Engineering value may not be equal. In either case, the Bad Config bit will be set for the channel and the configuration shall be ignored.

Section 3.4 Output Fault and Mode Handling

The outputs will always remain under firmware control. The only exception may be if a catastrophic failure takes place within the analog MCU. In that case, the hardware watchdog will reset the processor and outputs. If the processor is still not functional, the hardware watchdog will continue to reset the MCU and outputs. Since the output drivers are disabled by default after reset, they will remain in a steady disabled state.

3.4.1 Fault Conditions

These are the expected conditions that shall be handled by the option card.

Condition	Description
BKP Online	Online status reported by Drive backplane. Internally, the communication state between the option card and Drive can change from Online to Offline. Normally this only takes place during power up. If there is any kind of backplane communication disruption, an Offline condition is considered.
DAC Fault	See Module Status DAC Fault bit.
Power Fault	See Module Status Power Fault bit.
Comms Fault	See Module Status Comms Fault bit.
Watchdog Fault	See Module Status Watchdog TO bit.

3.4.2 Fault Mode Behavior

The following table illustrates transitions between modes and how they affect outputs. Highlighted cells indicate changed values between sequences.

	States					Configuration		Output		Notes
Sequence	**BKP Online**	**DAC Fault**	**Watchdog**	**Power Fault**	**Comm Fault**	**Fault Mode**	**Fault Value**	**User Output**	**Output Signal**	
1	1	0	0	0	0	Hold	NA	5	5	Normal operation.
2	0	0	0	0	0	Hold	NA	5	5	Transition to BKP Offline. Hold.
3	0	0	0	0	0	Hold	NA	10	5	New User Output ignored.
4	1	0	0	0	0	Hold	NA	10	10	Transition to BKP Online sets User Output.
5	1	1	0	0	0	Hold	NA	10	0	Transition to DAC Fault disables output. Requires power cycle to clear.
6	1	1	0	0	0	Hold	NA	5	0	New User Output ignored.
7	1	0	0	0	0	Hold	NA	5	5	Transition to normal operation after power cycle.
8	1	0	1	0	0	Hold	NA	5	0	WDT detected. Requires power cycle to clear.
9	1	0	1	0	0	Hold	NA	10	0	New User Output ignored.

	States					Configuration		Output		Notes
Sequence	**BKP Online**	**DAC Fault**	**Watchdog**	**Power Fault**	**Comm Fault**	**Fault Mode**	**Fault Value**	**User Output**	**Output Signal**	
10	1	0	0	0	0	Hold	NA	10	10	Transition to normal operation after power cycle.
11	1	0	0	0	0	User	7	5	5	New settings. User Fault Mode
12	0	0	0	0	0	User	7	5	7	BKP Offline detected. Set User Fault Value
13	0	0	0	0	0	User	7	10	7	New User Output ignored.
14	1	0	0	0	0	User	7	10	10	Transition to BKP Online sets User Output.
15	1	0	0	1	0	User	7	10	0	Field Power Fault detected. Outputs off.
16	1	0	0	1	0	User	7	5	0	New User Output ignored. Outputs off.
17	1	0	0	0	0	User	7	5	0	Once the Power Fault is set, user intervention is required (power cycle) even if the condition clears at run-time.
18	1	0	0	0	1 >500 ms	User	7	5	->7 ->0	If a comms fault is detected, the fault value is set until the backplane MCU holds it in reset (after 500 mS). This condition requires user intervention.
19	1	0	0	0	1	User	7	10	0	Outputs remain off while in fault state.
20	1	0	0	0	0	User	7	10	10	After power cycled, recovered communication sets user value.
21	1	0	0	0	->1 <500 ms ->0	User	7	5	7->5	If a momentary interruption takes place between MCU's requiring retries (<500 mS), the outputs shall be set to the User Fault value during retries, and then back to the normal setting.
22	1	0	0	0	0	User	7	10	10	Outputs set to User Output value.

3.4.3 Fault Priority

For situations where multiple fault conditions exist, the following priority is observed.

Fault Mode	Priority (1 is highest priority)
Power Fault	1
DAC Fault	2
Watchdog Fault	3
Comms Fault	4
BKP Online	5

Section 3.5 Diagnostics

The option card can display diagnostic data to the end-user via CCW. This information is for troubleshooting purposes and cannot be used programmatically. All diagnostic data is read-only and cannot be user-modified.

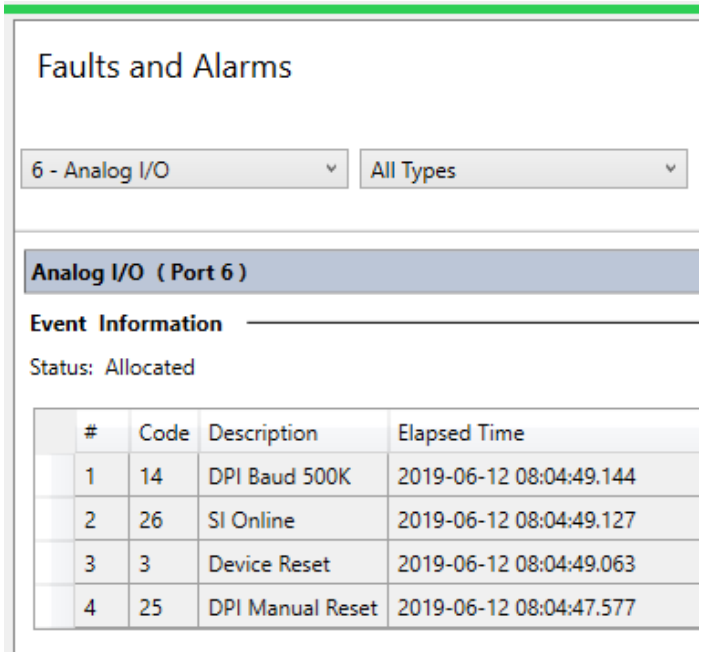
Instance	Name
1	Common Logic Cmd
2	Prod Logic Cmd
3	Reference
4	Common Logic Sts
5	Prod Logic Sts
6	Feedback
7	Input Chan 0 Analog
8	Input Chan 1 Analog
9	Input Chan 2 Analog
10	Input Chan 3 Analog
11	Output Chan 0 Echo
12	Output Chan 1 Echo
13	Output Chan 2 Echo
14	Output Chan 3 Echo
15	Input Chan Status
16	Output Chan Status
17	Module Status
18	DL To Net 01 Val
19	DL To Net 02 Val
20	DL To Net 03 Val

Instance	Name
21	DL To Net 04 Val
22	DPI Rx Errs
23	DPI Rx Errs Max
24	DPI Tx Errs
25	DPI Tx Errs Max

Section 3.6 Event Log

The option card can log event information related to certain operations. The log holds a maximum of 32 events. After the log has reached 32 events, the oldest event is removed from the list. This information is stored across power-cycles.

The following example illustrates how the Event Log is displayed in CCW:



– Sequential numbered list of events.

Code – Numeric code for the event

Description – Text string of the event

Elapsed Time – When the event occurred.

3.6.1 Rockwell-Defined Events

The following table is a list of all events pre-defined by the RA tool kit. They are undocumented and hopefully self-explanatory. The included library uses them and is not under Spectrum control:

Code	Text	Code	Text
1	No Event	**30**	Net Link Down
2	Device Power Up	**31**	Net Dup Address
3	Device Reset	**32**	Net Comm Fault

Code	Text	Code	Text
4	EEPROM CRC Error	**33**	Net Sent Reset
5	App Updated	**34**	Net IO Close
6	Boot Updated	**35**	Net Idle Fault
7	Watchdog Timeout	**36**	Net IO Open
8	DPI Bus Off	**37**	Net IO Timeout
9	DPI Ping Timeout	**38**	Net IO Size Err
10	DPI Port Invalid	**39**	PCCC IO Close
11	DPI Port Changed	**40**	PCCC IO Open
12	DPI Host Reset	**41**	PCCC IO Timeout
13	DPI Baud 125 K	**42**	Msg Ctrl Open
14	DPI Baud 500 K	**43**	Msg Ctrl Close
15	DPI Host Invalid	**44**	Msg Ctrl Timeout
16	DPI Dup Port	**45**	Peer IO Open
17	DPI Type 0 Logon	**46**	Peer IO Timeout
18	DPI Type 0 Time	**47**	Net Bus Off
19	DPI DL Logon	**48**	Net Poll Timeout
20	DPI DL Error	**49**	Net IO Frag Err
21	DPI DL Time	**50**	Net COS Timeout
22	DPI Ctrl Disable	**51**	Net Poll Alloc
23	DPI Ctrl Enable	**52**	Net COS Alloc
24	DPI Msg Timeout	**53**	Net Poll Close
25	DPI Manual Reset	**54**	Net COS Close
26	SI Online	**55**	BOOTP Response
27	SI Logon Error	**56**	Email Failed
28	SI Comm Fault	**57**	Option Card Flt
29	Net Link Up	**58**	Module Defaulted

3.6.2 Spectrum-Defined Events

These event codes are defined and used by Spectrum Controls:

Code	Text	Note
59	ADC Fault	
60	Comms Fault	
61	Cal. Fault	Spectrum internal diagnostic. Not seen by user.
62	Analog WDT	
63	Firmware Fault	Spectrum internal diagnostic. Not seen by user.
64	DAC Fault	

Section 3.7 Languages

English is displayed by default for columns that do not contain a string for a specific language.

Each string type has an allowable maximum length for Non-Unicode and Unicode. Those length values may not be modified:

String Type	Max Non-Unicode Length	Max Unicode Length
Parameter Object Name	16	14
Event text string	16	16
Enum Value	12	12

Available Languages are:

0. English
1. French
2. Spanish
3. Italian
4. German
5. Portuguese
6. Dutch
7. Chinese
8. Japanese
9. Korean

Although the above list of languages is supported, some strings default to English.

Section 3.8 Software System Attributes

3.8.1 Performance Requirements

Update Rate

The drive backplane can update Data Links every 2 ms. The option card is capable of servicing that data every 10 ms. To allow for processing overhead, an additional 3 ms is added to give a total minimum update time of 15 ms. It may update faster than this value but will not exceed it.

Communication transfer time outside of the drive (connection to PLC) is not considered in the Update Rate.

Output Update Rate

The frequency of updating new output data to the outputs is expected to be no slower than the specified Update Rate.

Input Scan Time

The amount of time it takes to scan all enabled input channels varies. The

number of enabled channels and the filter setting of each channel determines the total scan time. Open circuit detection also contributes to the scan time. That feature may be disabled within the channel configuration.

The following table shows maximum scan times for a single enabled channel. To determine the total scan time for all enabled channels, add the scan time for the filter setting. It is recommended to disable unused channels to improve performance. Disabling Open Circuit detection (for voltage ranges only) improves performance at the expense of disabling the feature.

Filter Setting (Hz)	RA -3dB Filter (Hz)	Per Channel Max Scan Time OC *Disabled*	Per Channel Max Scan Time OC *Enabled*
4	**1**	508	524
17	**4**	147	164
60	**15**	59	72
120	**30**	42	58
240	**60**	33	50
470	**115**	32	45

Under Range / Over Range

The software provides input/output under range and over range indication to the user through Under Range(UR)/Over Range (OR) status bits. The value that determines Under Range or Over Range depends on the range and user scaling. See the sections discussing range and user scaling for these values.

The OR bit is set when the input (or output) value is greater than or equal to the High Range value.

The UR bit is set when the input (or output) value is less than or equal to the Low Range value. This bit may also be set during an open wire condition if the OC Action parameter is set to Minimum Scale.

Input/Output Data Limit

The following table describes displayed data Range and Limit values for input and output channels. Values that exceed the Limit values are clipped. Note that these are signal values. User scaling should be applied:

Input Range	Condition	mA, Volts
4..20 mA	High Limit	20.4
	High Range	20.0
	Low Range	4.0
	Low Limit	3.92
0..20 mA	High Limit	20.4
	High Range	20.0
	Low Range	0.0
	Low Limit	0.0

Input Range	Condition	mA, Volts
0..5 V	High Limit	5.25
	High Range	5.0
	Low Range	0.0
	Low Limit	0.0
0..10 V	High Limit	10.5
	High Range	10.0
	Low Range	0.0
	Low Limit	0.0
±10 V	High Limit	10.5
	High Range	10.0
	Low Range	-10.0
	Low Limit	-10.5

Circuit Fault Indication

Input Open Circuit Detection

The software provides open wire indication for all voltage ranges and the 4-20 mA range. When detected, the value is set according to the OC Action parameter. Voltage input circuitry uses a 100 uA current to swing the input to full-scale high when there is no physical connection. The detection method looks for full-scale ADC counts directly from the ADC. Therefore, it is possible to trigger an open circuit by overdriving the voltage inputs. Due to the nature of applying a current to the voltage input, in some cases, you may wish to disable this feature in the configuration (OC Action = Disabled). When configured this way, open circuit detection cannot be guaranteed.

The table below shows *approximate* trigger points. Physically open wires are guaranteed to hit full-scale values for voltage ranges. For current, an open circuit cannot be detected except when using the 4-20 mA range. In this case, a current less than 2 mA is assumed to be open circuit.

Range	Open Circuit Input Trigger
4-20 mA	Inputs less than 2.0 mA
0-20 mA	There is no open circuit indication for this range.
±10 V	>= 10.787 V (±0.4 V)
0-10 V	>= 10.787 V (±0.4 V)
0-5 V	>= 10.787 V (±0.4 V)

Open Circuit Detection Time

Periodic, active, open circuit detection only takes place for voltage ranges when the feature is enabled. If the OC Action setting is set to Disabled, no time is spent testing for open circuit. The 4-20 milliamp range does not require active open

circuit detection. It is simply based on its latest measurement value.

Active detection is performed every 3 seconds. At that time, the measurement scan is interrupted to test for open circuit. Normal analog measurement continues after the open circuit check is made.

Output Channels

The outputs shall report open circuit status for channels configured for current and short circuit status for channels that are configured for voltage. Both conditions are indicated in the Channel Status' Circuit Fault bit. The status shall be cleared when the condition is not present.

Section 3.9 PLC Interfaces

3.9.1 RSLogix Setup

It is possible to connect the option card Data Link data to a PLC. This requires drive firmware version 10.00 and later. An RSLogix project may be set up to read the option card DLs from Net (Input data) and write DLs to Net (Output data). The version of RSLogix used needs to support 700 series drives. The option card configuration must still be configured by normal means. The example that follows uses a Drive with built-in Ethernet/IP. This is used to connect to the PLC and transmit the Input/Output Data.

NOTE	It is recommended that you configure the drive and its option cards using CCW before setting up the RSLogix project. The Drive firmware version must be 10.00 and later. If it is not, download the latest firmware from the RA website, and update the Drive using ControlFLASH. Configure the Drive for a static IP if possible. This example is using 10.0.1.10. It is also highly recommended that you install the latest AOP for the Drive.

Input Data Connection

The option card DLs from Net must be configured under the Host Config tab for the card (CCW). The first 8 DLs must be set to the Drive UserData Real *xx* parameters. Data Links 09 to 11 must be set to UserData Int *xx* parameters. It is not a hard requirement to use these specific Drive Parameters, but it is important to use the data types (Real and Int) as shown.

The Ethernet/IP port for the drive must also have its DLs to Net set. Notice the option card has From Net linked to the drive parameters while the Ethernet/IP port has its To Net linked to the same parameter. This allows data to flow from Card->Drive->Eth/IP->PLC.

Function	20-750-IF4XOF4-SC DL ***From*** Net	Drive Parameter	Ethernet/IP DL ***To*** Net
Ch 0 Data	01	UserData Real 00	01
Ch 1 Data	02	UserData Real 01	02
Ch 2 Data	03	UserData Real 02	03
Ch 3 Data	04	UserData Real 03	04

Function	20-750-IF4XOF4-SC DL *From* Net	Drive Parameter	Ethernet/IP DL *To* Net
Ch 4 Data	05	UserData Real 04	05
Ch 5 Data	06	UserData Real 05	06
Ch 6 Data	07	UserData Real 06	07
Ch 7 Data	08	UserData Real 07	08
Input Status	09	UserData Int 00	09
Output Status	10	UserData Int 01	10
Mod. Status	11	UserData Int 02	11

Output Data Connection (Option Card DLs To Net)

Normal Runtime

During normal execution, the five DLs To Net for the option card are linked to Drive Parameter's as shown in the table below. The data types for the Drive parameters should be as shown. The exact parameter is not important as long as they are not the same used for the DL From Net settings above.

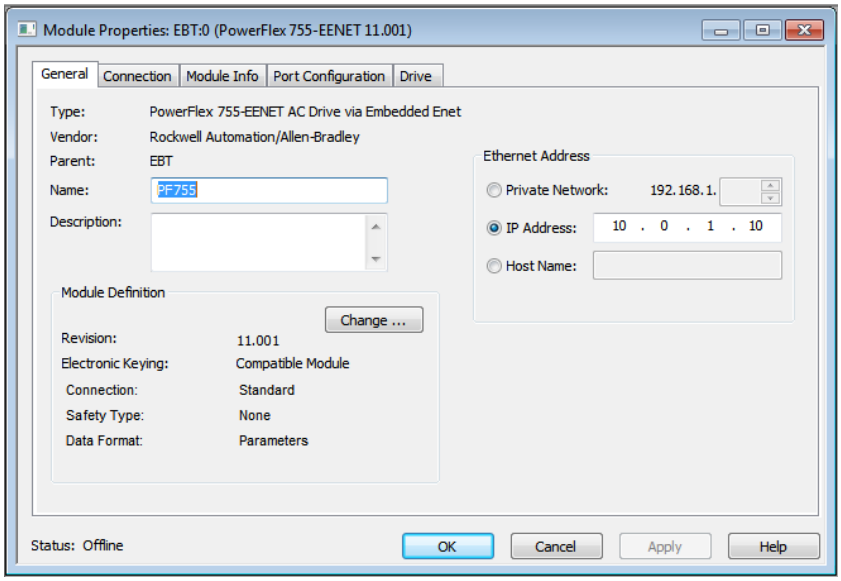
Function	20-750-IF4XOF4-SC DL *To* Net	Drive Parameter	Ethernet/IP DL *From* Net
Out0 Data	01	UserData Real 08	01
Out1 Data	02	UserData Real 09	02
Out2 Data	03	UserData Real 10	03
Out3 Data	04	UserData Real 11	04
UnlatchBits	05	UserData Int 03	05

3.9.2 RSLogix Project

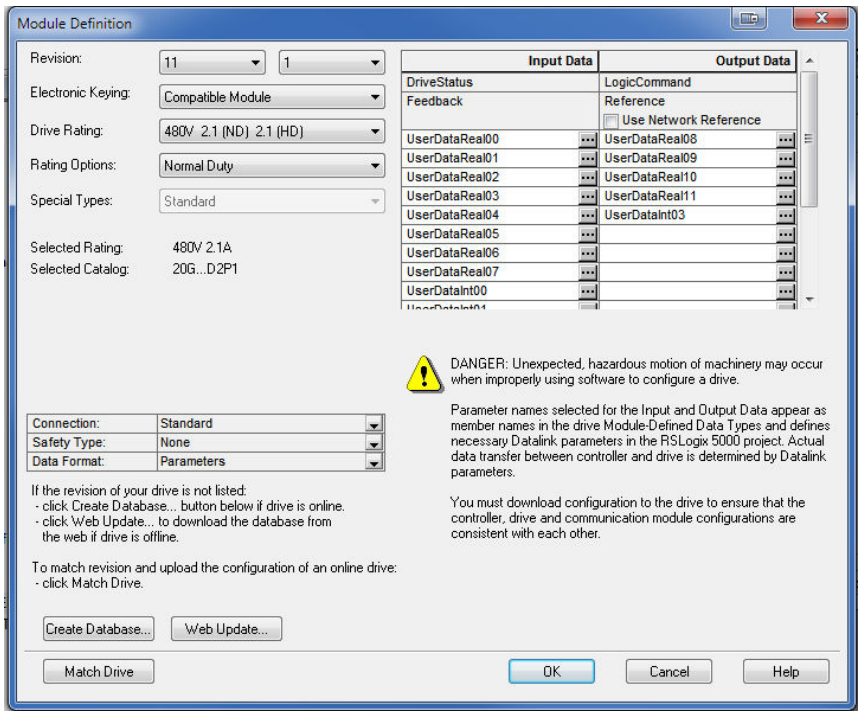
NOTE	Before you begin, be sure the Drive has been configured with the option card and communications adapter to properly set the Data Links for data pass-through. See sections above. Be sure the latest AOP is being used as well. It must support Drive f/w version 10 and above.

Configure as follows:

1. Add the Drive to the project and open the Properties dialog.
2. Enter the static IP (this example is using **10.0.1.10**).

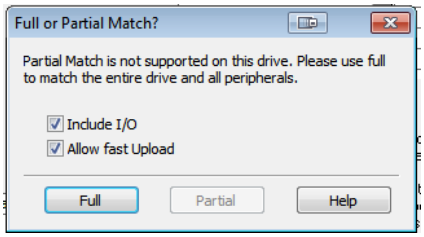


3. Click the **Change** button in the Module Definition section.
   The following dialog appears:

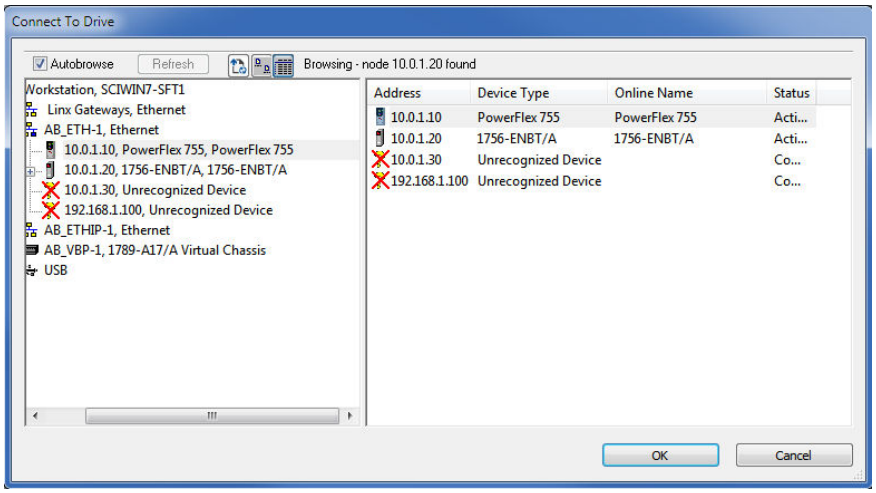


4. Click the **Match Drive** button.

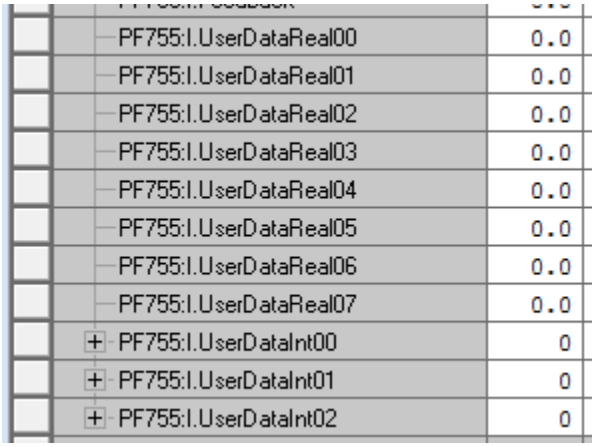
The following prompt appears:



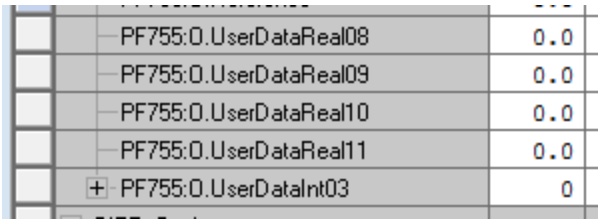
5. Click the **Full** button.
   The Connect to Drive dialog appears:



6. Connect to the Drive at the appropriate IP (**10.0.1.10**).
7. Once the match is complete, click **OK** for the Properties dialog and save the project.
8. Download the project to the PLC and let it run.
9. Open the Controller Tags and expand the I and O tags:
   Input Tags at the bottom of tags list:



   Output Tags:



ADC (Automatic Device Configuration)

During ADC operation, the process may take longer than usual (a few minutes) if CCW is connected and monitoring data from the Drive. If CCW is not needed, is recommended to leave it disconnected to allow faster operation.

Getting Technical Assistance

Note that your option card 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 option card should need to be returned to Spectrum Controls, Inc., please ensure that the unit is enclosed in approved ESD packaging (such as static-shielding / metalized bag or black conductive container).

Spectrum Controls, Inc. 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:

USA - 425-746-9481

Declaration of Conformity

Available upon request.

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