

USEP MANUAL

User's Manual Pub. 0300287-06 Rev. A

PowerFlex[®] 8-Channel Universal Analog Input Module

Catalog Number: 20-750sc-8U

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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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[®] 8 Channel Universal Analog Input Module.

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 20-750sc-8U Plug-In 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.
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
Detailed information on preventative maintenance, component testing, and hardware replacement features.	PowerFlex 750-Series AC Drives Hardware Service Manual - Frame 8 and Larger.	750TG001

For	Refer to this Document	Allen-Bradley Pub. No.
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.	750COM-UM001
	PowerFlex 750-Series Drive DeviceNet Option Module User Manual.	750COM-UM002
	PowerFlex 7-Class Network Communication Adapter User Manual.	750COM-UM <i>xxx</i>
Detailed information on how to install, configure, and operate the 750-series safety option modules.	PowerFlex 750-Series Safe Torque Off User Manual	750-UM002
	Safe Speed Monitor Option Module for PowerFlex 750-Series AC Drives Safety Reference Manual.	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
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 all Spectrum products. Contact numbers are as follows:

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

or send an email to support@spectrumcontrols.com

Documentation

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

Co Us Ma	nventions ed in This anual		
		 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. <i>Italic</i> type is used for emphasis. 	
		Bold type identifies headings and sub-headings:	
		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.	
		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 PowerFlex[®] 8 Channel Universal Analog Input Module (20-750sc-8U) is an 8-point universal analog option card designed for use in PowerFlex 753/755 systems. The option card supports up to 8 concurrent channels of current, voltage, and resistance measurements, and/or up to 4 channels of 3- and 4-wire resistance temperature detector (RTD) measurements. (3- and 4-wire RTD measurements use adjacent channel pairs, which reduces the number of available channels.) All inputs have fault tolerance and ESD protection to avoid damage to the circuitry on the board. The option card is designed to plug into an available option slot (4, 5, or 6) within a PowerFlex 753/755 series drive. This chapter includes information about:

- General Description
- Input Specifications
- Hardware Features
- System overview and option card operation

Section 1.1 General Description



The 20-750sc-8U option card plugs into I/O module openings 4, 5, or 6, in the Control Pod of the PowerFlex 750 family of AC drives. The option card uses a 64-pin edge connector to provide the connection to the AC drive. The option card has pre-defined locations to hold configuration, status, and channel values that are accessible to the AC drive through the backplane Drive Peripheral Interface (DPI). Each input channel can be defined as voltage, current, resistance, or RTD. You connect the analog input signals to the option card using a 24-pin spring-cage, removable terminal block on the option card.

You use Rockwell-supplied 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. Data exchanged between the option card and the AC drive communicates option card configuration, status, and digitized samples from the 8 analog inputs. Types of communication include reset commands from the AC drive to the option card, interrupts from the option card to the AC drive, option card status queries from the AC drive, and configuration changes.

Power is provided to the option card across the backplane. The option card provides power to run the attached resistances or RTDs.

WARNING	Hazard of injury to personnel or damage to equipment.
	Do NOT hot-swap a 20-750sc-8U option card. This will damage the option card, and/or cause injury to the personnel.
	The unit is not designed to be hot swapped. The option card must be plugged into the drive before the 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.

Section 1.2 Input Specifications

The 20-750sc-8U option card has the following input specifications:

Input Description	Value
Operating Temperature	-5 °C to 65 °C (23 °F to 149 °F) (unless otherwise noted)
Storage/Non-Operating Temperature	-40 °C to + 85 °C (-40 °F to + 185 °F)
Operating Humidity	5% to 85%, non-condensing
Storage/Non-Operating Humidity	5% to 95%, non-condensing
Vibration/Operating	2 Hz to 13.2 Hz, 0.040 in. max. displacement
	13.2 Hz, 0.7 g, max to 55 Hz, per curve
	55 Hz to 512 Hz, 2 g, max
Storage//Non-Operational Vibration	2 Hz to 2 kHz, 5 g max
Operating Shock	15 g, peak acceleration, 11±1 ms pulse.
Storage/Non-Operating Shock	50 g peak acceleration, 11 ± 1 ms pulse.
Pollution Level	Meets Pollution Degree 2 requirements.
ESD	Meets CE requirements for operating ESD category B at 4 kV. On ADC corruption detection, the last valid value may be reported for up to 3 consecutive samples. Contact discharges are tested to up to 6 kV; air discharges are tested up to 8 kV.

Table 1-1. Input/Performance/Environmental Requirements

Input Description	Value	
ESD/Non-operating/Not installed	Option card is open on all sides when not installed. ESD standard is only applicable to points that are accessible when option card is installed in an AC drive.	
RoHS	Meets European and Chinese RoHS component standards (January 2011 and earlier).	
REACH	Meets European REACH requirements, (March 2011 and earlier).	
Inputs per option card	 8 channels of voltage/current/resistance 6 channels of voltage/current/resistance + 1 channel of 4 (3) wire RTD inputs 4 channels of voltage/current/resistance + 2 channels of 4 (3) wire RTD inputs 2 channels of voltage/current/resistance + 3 channels of 4 (3) wire RTD inputs 4 channels of 4 (3) wire RTD inputs (Analog Multiplexed into one ADC) 	
Input ranges	Current: 0-20 mA, 4-20 mA, Voltage: 0-5 V, 0-10 V, ± 10 V, Resistance: 0-150 Ω , 0-500 Ω , 0-1000 Ω , 0-3000 Ω A 0-20 Ohm range is available to even channels. Platinum: 100 PT 385 100 PT 385 200 PT 3916 200 PT 385 200 PT 3916 500 PT 385 500 PT 3916 1000 PT 385 and 3916 Nickel: 100 NI 618 120 NI 672 Nickel-Iron: 604 NI-FE 518 Copper: 10 CU 427 For input type versus temperature range support, see Table 1-2	
Voltage accuracy	+ 12 mV maximum for 0.5 V inputs	
(4 and 17 Hz filters)	+ 40 mV maximum for 0-10 V inputs	
	\pm 40 mV maximum for \pm 10 V inputs	
	System accuracy at 25 °C	
	\pm 6 mV maximum for 0-5 V inputs	
	± 20 mV maximum for 0-10 V inputs	
	± 20 mV maximum for ± 10 V inputs	

Input Description	Value
Current accuracy	± 120 uA maximum for 0-20 mA inputs
(4 and 17 Hz filters)	± 120 uA maximum for 4-20 mA inputs
	System accuracy at 25 °C
	\pm 50 uA maximum for 0-20 mA inputs
	\pm 50 uA maximum for 4-20 mA inputs
RTD accuracy	± 5.1 °C for 100 Ω Platinum 385
(4 and 17 Hz filters)	± 4.7 °C for 100 Ω Platinum 3916
	± 3.9 °C for 200 Ω Platinum 385
	\pm 3.6 °C for 200 Ω Platinum 3916
	± 2.4 °C for 500 Ω Platinum 385
	± 2.3 °C for 500 Ω Platinum 3916
	\pm 1.2 °C for 1000 Ω Platinum 385 and 3916
	\pm 5.1 °C for Nickel
	\pm 1.0 °C for Nickel-Iron
	\pm 3.6 °C for Copper
	System accuracy at 25 °C
	\pm 3.4 °C for 100 Ω Platinum 385
	\pm 3.1 °C for 100 Ω Platinum 3916
	± 2.6 °C for 200 Ω Platinum 385
	± 2.4 °C for 200 Ω Platinum 3916
	\pm 1.5 °C for 500 Ω Platinum 385
	\pm 1.4 °C for 500 Ω Platinum 3916
	\pm 0.7 °C for 1000 Ω Platinum 385 and 3916
	\pm 1.0 °C for Nickel
	\pm 0.5 °C for Nickel-Iron
	\pm 1.1 °C for Copper
Resistance accuracy	$\pm 0.5 \Omega$ for 150 Ω range
(4 and 17 Hz filters)	$\pm 0.5 \Omega$ for 500 Ω range
	$\pm 2.5 \Omega$ for 1000 Ω range
	$\pm 2.5 \Omega$ for 3000 Ω range
	System accuracy at 25 °C
	$\pm 0.3 \Omega$ for 150 Ω range
	$\pm 0.3 \Omega$ for 500 Ω range
	$\pm 1.5 \Omega$ for 1000 Ω range
	$\pm 1.5 \Omega$ for 3000 Ω range
	0-20 Ohms for even channels

Input Description	Value		
Repeatability (at 25 °C)	4 Hz filter	17 Hz filter	60, 240, and 470 Hz filters ¹
0-5 V, 0-10 V, ±10 V	$\pm 1.5 \text{ mV}$	$\pm 1.8 \text{ mV}$	$\pm 6 \text{ mV}$
0-20 mA, 4-20 mA	$\pm 1 \text{ mA}$	$\pm 4 \text{ mA}$	± 15 mA
RTD, Platinum 385, 3916	± 0.3 °C	± 0.4 °C	± 2 °C
Resistance	$\pm 0.2 \ \Omega$	$\pm 0.3 \ \Omega$	$\pm 2 \Omega$
CMRR	84 dB minimum at 50 an	d 60 Hz for 4 Hz	and 17 Hz filters
NMRR	4 Hz filter	72 dB minimum	at 50 and 60 Hz
	17 Hz filter	62 dB minimum	at 50 and 60 Hz
Crosstalk	-70 dB maximum		
Cable resistance (applies only to 3- and 4-wire RTD & resistance measurements)	25 Ω maximum except 5	Ω max for 10 $Ω$	Cu RTD
Input bias current (Voltage ranges only)	Less than $\pm 2.5 \ \mu$ A steady state for $\pm 10 \ V$ inputs. Less than 1.75 mA for all other voltage inputs. Less than $\pm 40 \ mA$ peak for all voltage input configurations.		
Current input impedance	249 $\Omega \pm 0.1\%$, 10 PPM/°C		
Voltage input impedance	10 MΩ, typical		
Input protection	Voltage Mode \pm 30 VDC continuous.		
	Current Mode 28 mA continuous.		
Current source	210 mA \pm 5% @ 25 °C, \pm 8% from -5 °C to 65 °C		
	$1 \text{ mA} \pm 5\% \text{ (a)} 25 \text{ °C}, \pm 8\% \text{ from -5 °C to 65 °C for 10 } \Omega \text{ Cu RTD}$		
Power source	12 VDC from backplane		
Input to backplane isolation	4.2 kVDC for 1 minute; 250 VAC continuous		
Channel-to-channel isolation	None		
Power consumption	<3.0 W		
Inrush current	<500 mA at 12 V, for < 1 Sec.		
Fusing	$0.47 \ \Omega \ 1/10 \ W \ resistor \ on \ 12 \ VDC \ input$		
Fault detection	Over/under range for all types, open circuit in voltage, RTD, resistance ranges shown as over-range		
Input sampling rates	4 Hz, 17 Hz, 60 Hz, 470 Hz, 240 Hz		
Wire size:	Connection data	0	Conductor Cross Section
#16 to #24 AWG	Solid min	C	0.2 mm ²
	Solid max	1	.5 mm ²
	Stranded min	C	.2 mm ²
	Stranded max	1	.5 mm ²

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	
	Stranded, with ferrule without plastic sleeve min	0.25 mm ²
	Stranded, with ferrule without plastic sleeve max	1.5 mm ²
	Stranded, with ferrule with plastic sleeve min	0.25 mm ²
	Stranded, with ferrule with plastic sleeve max	0.75 mm ²
Agency approvals / evaluations	CE and UL/cUL 508C	
Manufacturing	RoHS & REACH compliant	
Dimensions	130 mm × 83.1 mm × 25 mm	

Table 1-2. Input Type versus Temperature Range Support

Sensor Type	Low Temperature Limit	High Temperature Limit
Platinum 385	-200 °C	850 °C
Platinum 3916	-200 °C	630 °C
Copper 427	-100 °C	260 °C
Nickel 618	-100 °C	260 °C
Nickel 672	-80 °C	260 °C
Nickel-Iron 518	-100 °C	200 °C

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 Na, 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)					

Environmental Tests	Industry Standards
Shock (Non-operating) (Performance Criteria B)	IEC60068-2-27: (Test Ea, Unpackaged Shock)
Radiated Emissions	CISPR 11; Group 1, Class A
Conducted Emissions	IEC 61000-6-4:2011
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
AC Mains Voltage Dips, Interruptions and Variations	IEC 61000-4-11

Table 1-4. Safety Test Specification Table

Safety Tests	Industry Standards
UL Safety	UL 508C, Power Conversion Equipment and UL 61800-5-1 Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy
	Canadian National Standard C22.2 No. 274-13 ADJUSTABLE SPEED DRIVES
CE Low Voltage Directive	EN 61800-5-1:2007 Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy

Section 1.3 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 1.4 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, resistance, and RTD ranges. Inputs are protected from electrostatic discharge up to 4 kV, fault-protected up to 30 V for voltage inputs, and 28 mA for current inputs. The 20-750sc-8U option card samples input channels one-by-one and provides readings to the rest of the system via Data Links (DLs).

Option card configuration is done 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 illustration below shows the option card's hardware features.

Figure 1-1. 20-750sc-8U Module



1.4.1 LED Indicators

The 20-750sc-8U 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.

The status LEDs are defined below (as documented in RA Publication 750COM-UM005-EN-P).

	LED	Name	Description	
	0	Port Status	Option card port status	
(2)	2	Mod Status	Option card status	
()	8	Channel Status	Option card channel status	

Table 1-5. LED Status Indicators

Indicator	State	Description				
	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.				
	Solid Green	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. No action is required.				
Option Card Port Status	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 module to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque.				
	Solid 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).				
Channel Status	Off	The option card is not powered on. 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).				

Indicator	State	Description						
	Solid 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.						
	Solid Red	Double-check configuration parameters. Check Input Status bits to determine which channel(s) has the invalid setting.						
	Flashing Red	One or more channels are open circuit. Check connections to terminal block (spring-loaded). Disable unused/unconnected channels.						
	Off	The option card is not powered on. 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.						
	Solid Green	The option module is properly connected and communicating with the drive. No action required.						
Mod Status	Solid 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.						

Section 1.5 System Overview

The PowerFlex 750 series AC drives use a spring-loaded, edge card connector to interface to the 20-750sc-8U option card. The option card receives 12 VDC power through the bus interface. The option card is expected to operate indefinitely. It does not require periodic maintenance or calibration.

1.5.1 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 4-20 mA range.

1.5.2 Option Card Operation

The 750sc-8U option card provides eight independent analog input channels. Each channel includes four selectable filter settings and can be configured for voltage, thermocouple, current, resistance or RTD input types.

The 750sc-8U option card uses an Analog to Digital Converter (ADC) to achieve 20-bit resolution. Inputs to the ADC are first multiplexed through analog switches then buffered by a precision, low offset and drift, programmable gain amplifier. The ADC also provides the programmable current source used in resistive measurements.

The 750sc-8U 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 drive +12 VDC power supply only. The supply is 12 VDC (9 VDC minimum, 15 VDC maximum). Current rating is 250 mA maximum. Power rating is 3 Watts maximum.

Section 2.3 General Considerations

20-750sc-8U 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 2^2 .

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 analog I/O option card bus connector pins or the terminal block on the input 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

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. As 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.					

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.

2.3.4 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.

Limited wire exposed outside of shield



Shield termination wire kept short and terminated close to the option card

Section 2.4 Mounting

2.4.1 Before You Begin

Note that product can be used with the following:

• 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 750sc-8U 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 – October 2014.

NOTE	Avoid over-tightening retaining screws.

To install an option card:

- 1. Firmly press the option card edge connector into the desired port.
- 2. Tighten the top and bottom retaining screws.
 - Recommended torque is 0.45 N.m (4.0 lb.in)
 - Recommended screwdriver is T15 Hexalobular.



2.4.3 Wiring Diagram

The following images explain the general layout of the option card terminal block and the associated wiring diagrams for the various input types:

IRET3	IN-3	IN+3	IRET2	IN-2	IN+2	IRET1	IN-1	IN+1	IRETO	IN-0	IN+0	Bottom	
IRET7	IN-7	IN+7	IRET6	IN-6	IN+6	IRET5	IN-5	IN+5	IRET4	IN-4	IN+4	of Drive	





Chapter 3 Configuring the 20-750sc-8U Using CCW

This chapter covers the following subjects:

- Using Connected Components Workbench (CCW) software to configure the option card.
- Analog Data and Status settings.
- Data Links settings.
- Setting configuration parameters and associated values.
- Using CopyCat to download individual parameters or parameter sets for the host drive or any of its connected peripherals into a Human Machine Interface (HIM).

Section 3.1 Introduction

You use CCW programming software to configure the 20-750sc-8U:



Section 3.2 Analog Data and Status

The analog data and status information are written to the first ten Data Links From Net. Data Links 01 to 08 represent the eight input channels in order (0 to 7). The last two Data Links (09 and 10) represent status.

3.2.1 Data Links

The following table lists Data Link from Net data channels and data types:

Link from Net: Name: Type:

Table 3-1. Data Link Representations from Net

Data Link from Net:	Name:	Туре:
01	Chan 0 Data	REAL
02	Chan 1 Data	REAL
03	Chan 2 Data	REAL
04	Chan 3 Data	REAL
05	Chan 4 Data	REAL
06	Chan 5 Data	REAL
07	Chan 6 Data	REAL
08	Chan 7 Data	REAL
09	Input Status	UDINT
10	Module Status	UDINT

You configure the drive and option card Data Links to be used. Data written to each Channel *n* Data is a REAL data type. Both Status Data Links are of UDINT or DWORD type so that individual bits are readable.

After each channel completes an acquisition, the values are updated. The Data Links are transmitted continuously over the backplane at 2-millisecond intervals. Actual acquisition rate is determined by the filter settings.

		-	
ODK Card in Port	Port 6	Port 0	Port 4
6	Host Parameters	Drive Parameters	(COMM) Parameters
Chan 0 Data	DL From Net 01	UserData Real 00 (1800)	DL To Net 01
Chan 1 Data	DL From Net 02	UserData Real 01 (1801)	DL To Net 02
Chan 2 Data	DL From Net 03	UserData Real 02 (1802)	DL To Net 03
Chan 3 Data	DL From Net 04	UserData Real 03 (1803)	DL To Net 04
Chan 4 Data	DL From Net 05	UserData Real 04 (1804)	DL To Net 05
Chan 5 Data	DL From Net 06	UserData Real 05 (1805)	DL To Net 06
Chan 6 Data	DL From Net 07	UserData Real 06 (1806)	DL To Net 07
Chan 7 Data	DL From Net 08	UserData Real 07 (1807)	DL To Net 08
Input Status	DL From Net 09	UserData Int 00 (1700)	DL To Net 09
Module Status	DL From Net 10	UserData Int 01 (1701)	DL To Net 10

The following table maps channel names to all other ports in the system, including Data Link commands, and shows data flow between the ports from left to right:

Table 3-2. Analog Input Status

Each channel is allocated 4 bits for status. See below for details.

Values	CH7 BC	Ch7 UR	Ch7 OR	ch7 oc	Ch6 BC	Ch6 UR	Ch6 OR	ch6 oc	Ch5 BC	ch5 UR	Ch5 OR	ch5 oc	Ch4 BC	Ch4 UR	Ch4 OR	Ch4 OC
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	Ch3 BC	Ch3 UR	Ch3 OR	Ch3 OC	Ch2 BC	Ch2 UR	Ch2 OR	Ch2 OC	Ch1 BC	Ch1 UR	Ch1 OR	Ch1 OC	Ch0 BC	Ch0 UR	Ch0 OR	Ch0 OC
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	1 5	1 4	1 3	1 2	1 1	1 0	0 9	0 8	0 7	0 6	0 5	0 4	0 3	0 2	0 1	0 0

OC (Open Circuit). Wire disconnected. Bit is not set for 0-20 mA range. For the 4-20 mA range, an input less than 2 mA will be considered Open Circuit. This bit is cleared when the condition no longer exists.



When the input is greater than 3 mA, the open circuit bit is cleared for the 4-20 mA range, to prevent toggling of the status.

OR (Over Range). Value is greater than or equal to High Range value (see Range Value Table). This bit is cleared when the condition no longer exists.

UR (Under Range). Value is less than or equal to Low Range value (see Range Value Table). This bit is cleared when the condition no longer exists.

BC (Bad Configuration). The configuration data for the channel is invalid. If an invalid configuration is set for a channel it will be considered disabled (analog value set to 0.0) until a valid setting is passed. When an even numbered channel is configured for 3 or 4wire resistive measurements, the adjacent odd channel configuration will be ignored.

Table 3-3. Option Card Status

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1

Values	Unused	Unused	Unused	Unused	Unused											
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
				T	_			T				•	•			
Values	Unused	Firmware	Cal Fault	Watchdog	Comms Fault	ADC Fault										
Default	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit[15:00]	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0

Bit-0: ADC Fault. Bit set when an error is detected by the analog processor while communicating with the ADC.

0 9

Bit-1: Comms Fault. Bit set when communications to the analog processor is disrupted.

8 7

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4 3

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Bit-2: Watchdog TO. Watchdog timer has timed out. A critical software error has taken place.

Bit-3: Cal Fault. Calibration data is invalid, and the option card is running with uncalibrated measurements. Calibration must be performed at the factory.

Bit-4: Firmware Fault. Firmware mismatch between main CPU and Analog CPU.

Section 3.3 Setting Configuration Parameters

You set configuration parameters using the CCW Parameters option table. You may set the parameters directly in the table or double-clicking a parameter in the list to access the Parameter Properties dialog. You can also change the configuration for each channel through the LCD display on the drive:



Pa	ramet	ers - Po	owerFlex 755_1* Port 6							▼ 🗆 ×		
Ρ	Parameters Host Config											
6	Group: Filter Value:											
Non-Defaults												
	# Name Value Units Internal Value Default Min Max											
	*	1	Port Number	6			6	5	0	7		
	*	2	DLs From Net Act	10			10	0	0	16		
	*	3	DLs To Net Act	0			0	0	0	16		
	•	4	Reset Module	Ready	-		0	Ready		2		
	*	5	CH0 Config Word	00000000 10100000	-		160	0000000 0000000	0	16383		
	*	6	CH1 Config Word	00000000 10100000	-		160	0000000 0000000	0	4095		
	*	7	CH2 Config Word	00000000 10100000	-		160	0000000 0000000	0	16383		
	*	8	CH3 Config Word	0000000 10100000	-		160	0000000 0000000	0	4095		
	*	9	CH4 Config Word	00000000 10100000	-		160	0000000 0000000	0	16383		
	*	10	CH5 Config Word	00000000 10100000	-		160	0000000 0000000	0	4095		
	*	11	CH6 Config Word	00000000 10100000	-		160	0000000 0000000	0	16383		
	*	12	CH7 Config Word	00000000 10100000	-		160	0000000 0000000	0	4095		
	*	13	Config Control	Lock	-		1	Unlock	0	1		

The Parameter List Window displays with the following column headers and pull-down menu options access:

Parameters - PowerFlex 755_1 Port 6

Param	eters	Host Config							
Group	:	▼ S Non-	how Defaults	ie:					
	# 🔺	Name	Value		Units	Internal Value	Default	Min	Max
	1	Port Number	5			5	5	0	7
	2	DLs From Net Act	0			0	0	0	16
	3	DLs To Net Act	0			0	0	0	16
	4	Reset Module	Ready	-		0	Ready	0	2
Þ	5	CH0 Config Word	XX000000 1010000) 🔻		160	0000000 0000000		16383
	6	CH1 Config Word	Disable 🛃 00	•		160	0000000 00000000	0	4095
	7	CH2 Config Word	Filter:0	-		160	0000000 00000000	0	16383
	8	CH3 Config Word	Filter:2 00	-		160	0000000 00000000	0	4095
	9	CH4 Config Word	Range:0 00	-		160	0000000 00000000	0	16383
	10	CH5 Config Word	Range:1 00	-		160	0000000 00000000	0	4095
	11	CH6 Config Word	Range:3 00	-		160	0000000 00000000	0	16383
	12	CH7 Config Word	Range:4 00	-		160	0000000 00000000	0	4095
	13	Config Control	00:1	-		1	Unlock	0	1
-			Leg F						

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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 is 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.

The following	description	of columns is	s conied from	CCW Heln
The following	description	or conumns is	s copied from	CC W Help.

Naming conventions similar to the existing analog option card are used.

3.3.1	Parameter	List
0.0.1	1 al ameter	LISU

Param#	Display Name Full Name Description	Values		Read/W rite	Data Type
1	Port Number <i>Port Number</i> 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 Read-only parameter.	R	8-bit INT
2	DLs From Net Act <i>Data Links from Net Active</i> Indicates the number of DLs from Net that are active	Default: Options:	10 Read-only parameter Set to 0 when Config Control set to Unlock.	R	8-bit INT
3	DLs To Net Act <i>Data Links to Net Active</i> Indicates the number of DLs to Net that are active.	Default: Options:	0 This will be set to 4 when BITE jumper is installed. Set to 0 when Config Control set to Unlock.	R	8-bit INT
4	Reset Module Reset Module This parameter allows the user 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	CH0 Config Word <i>Channel 0 Configuration Word</i> Used to configure Channel 0	Default: Options:	0 (see EVEN Channel Configuration Table)	RW	16-bit INT
6	CH1 Config Word Channell Configuration Word Used to configure Channel 1	Default: Options:	0 (see ODD Channel Configuration Table)	RW	16-bit INT
7	CH2 Config Word Channel 2 Configuration Word Used to configure Channel 2	Default: Options:	0 (see EVEN Channel Configuration Table)	RW	16-bit INT
8	CH3 Config Word <i>Channel 3 Configuration Word</i> Used to configure Channel 3	Default: Options:	0 (see ODD Channel Configuration Table)	RW	16-bit INT

Param#	Display Name Full Name Description	Values		Read/Write	Data Type
9	CH4 Config Word Channel 4 Configuration Word Used to configure Channel 4	Default: Options:	0 (see EVEN Channel Configuration Table)	RW	16-bit INT
10	CH5 Config Word <i>Channel 5 Configuration Word</i> Used to configure Channel 5	Default: Options:	0 (see ODD Channel Configuration Table)	RW	16-bit INT
11	CH6 Config Word <i>Channel 6 Configuration Word</i> Used to configure Channel 6	Default: Options:	0 (see EVEN Channel Configuration Table)	RW	16-bit INT
12	CH7 Config Word <i>Channel 7 Configuration Word</i> Used to configure Channel 7	Default: Options:	0 (see ODD Channel Configuration Table)	RW	16-bit INT
13	Config Control <i>Data Link Configuration Control</i> 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

	Bit Names:	Ignored	Ignored	Wire 1	Wire 0	Tmp Units	0C 1	0C ()	Range 4	Range 3	Range 2	Range 1	Range ()	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
D: 11	Enable (Default)																0
Disable	Disabled																1
	17 Hz (Default)													0	0	0	
	4 Hz													0	0	1	
Filter	60 Hz													0	1	0	
	240 Hz													0	1	1	
	470 Hz													1	0	0	
Range	4-20 mA (Default)								0	0	0	0	0				
8	0-20 mA								0	0	0	0	1				
	0-5 V								0	0	0	1	0				
	0-10 V								0	0	0	1	1				
	0 to 20 ohms								0	0	1	0	0				
	0 to 150 ohms								0	0	1	0	1				
	0 to 500 ohms								0	0	1	1	0				
	0 to 1000 ohm								0	0	1	1	1				
	0 to 3000 ohms								0	1	0	0	0				
	10 ohm Copper 426								0	1	0	0	1				-
	100 ohm Platinum 385								0	1	0	1	0				
	200 ohm Platinum 385								0	1	0	1	1				
	500 ohm Platinum 385								0	1	1	0	0				
	1000 ohm Platinum								0	1	1	0	0				
	385								0	1	1	0	1				
	100 ohm Platinum								0	1	1	0	1				
	3016								0	1	1	1	0				
	200 ohm Platinum								0	1	1	1	0				
	3016								0	1	1	1	1				
	500 ohm Platinum								0	1	1	1	1				
	3916								1	0	0	0	0				
	1000 ohm Platinum								1	0	0	0	0				
	3916								1	0	0	0	1				
	120 ohm Nickel 672								1	0	0	1	0				
	100 ohm Nickel 618								1	0	0	1	1				
	604 ohm Nickel-Iron								-	Ŭ	~	-	-				
	518								1	0	1	0	0				
	Full Scale (Default)						0	0	-		-	<i>.</i>					
OC	Minimum Scale						Ő	1									
Action	Zero						1	0									
Temp	Deg C (Default)					0											<u> </u>
Units	Deg F					1											
01110	3-Wire (Default)			0	0	1											<u> </u>
Wire	4-Wire			0	1												
Mode	2-Wire			1	0												
Ignored	N/A	X	X	1	0												<u> </u>

3.3.2 EVEN Channel Configuration Table

	Bit Names:	Ignored	Ignored	Ignored	Ignored	Temp Units	0C1	0C ()	Range 4	Range 3	Range 2	Range 1	Range ()	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
D: 11	Enable (Default)																0
Disable	Disabled																1
	17 Hz (Default)													0	0	0	
	4 Hz													0	0	1	
Filter	60 Hz													0	1	0	
	240 Hz													0	1	1	
	470 Hz													1	0	0	
	4-20 mA (Default)								0	0	0	0	0				
	0-20 mA								0	0	0	0	1				
	0-5 V								0	0	0	1	0				
	0-10 V								0	0	0	1	1				
	Invalid								0	0	1	0	0				
	0 to 150 ohms								0	0	1	0	1				
	0 to 500 ohms								0	0	1	1	0				
	0 to 1000 onm								0	0	1	1	1				
	U to 3000 onms								0	1	0	0	1				
	100W Plotinum								0	1	0	0	1				
	385								0	1	0	1	0				
	200W Platinum 385								0	1	0	1	1				
	500W Platinum								0	1	1	0	0				
Danaa	385 1000W PL 4								0	1	1	0	0				
Kalige	385								0	1	1	0	1				
	100W Platinum								0				<u>^</u>				
	3916 200W Platinum								0	1	1	1	0				
	3916								0	1	1	1	1				
	500W Platinum								1	0	0	0	0				
	1000W Platinum								1	0	0	0	0				
	3916								1	0	0	0	1				
	120W Nickel 672								1	0	0	1	0				
	100W Nickel 618								1	0	0	1	1				
	604W Nickel-Iron								-	•	•	-	-				
	518								1	0	1	0	0				
	Full Scale (Default)						0	0									
OC Action	Minimum Scale						0	1									
	Zero					-	1	0									
Temp.	Deg C (Default)					0											
Units	Deg F	v	v	v	v	1											
ignored	IN/A	Λ	Λ	A	A												

3.3.3 ODD Channel Configuration Table

3.3.4 Diagnostics

The 20-750sc-8U is capable of displaying diagnostic data to the end-user via CCW. This information is for troubleshooting purposes and cannot be used programmatically. All of the 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	Chan 0 Analog
8	Chan 1 Analog
9	Chan 2 Analog
10	Chan 3 Analog
11	Chan 4 Analog
12	Chan 5 Analog
13	Chan 6 Analog
14	Chan 7 Analog
15	Chan Status
16	Module Status
17	DL To Net 01 Val
18	DL To Net 02 Val
19	DL To Net 03 Val
20	DL To Net 04 Val
21	DPI Rx Errs
22	DPI Rx Errs Max
23	DPI Tx Errs
24	DPI Tx Errs Max

3.3.5 Event Log

The 20-750sc-8U is capable of logging 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 show how the Event Log is displayed in CCW:

2)				1.1.0					1.1.1
	Εv	ents	- P	owe	erFlex 75	5_1* Port 6			
	F	Even	ts						
				#	Code	Description	Time Stamp		
		►	*	1	14	DPI Baud 500K	2015-07-16 13:	22:05.471	
			*	2	26	SI Online	2015-07-16 13:	22:05.440	
			*	3	3	Device Reset	2015-07-16 13:	22:05.418	
			*	4	25	DPI Manual Reset	2015-07-16 13:	22:03.951	
			*	5	14	DPI Baud 500K	1969-12-31 16:	00:34.493	

- #. Sequential numbered list of events.
- Code. Numeric code for the event
- **Description**. Text string of the event
- **Time Stamp**. When the event occurred.

A full list of events is provided below:

Code	Text
1	No Event
2	Device Power Up
3	Device Reset
4	EEPROM CRC Error
5	App Updated
6	Boot Updated
7	Watchdog Timeout
8	DPI Bus Off
9	DPI Ping Timeout
10	DPI Port Invalid
11	DPI Port Changed
12	DPI Host Reset
13	DPI Baud 125K
14	DPI Baud 500K
15	DPI Host Invalid
16	DPI Dup Port
17	DPI Type 0 Logon
18	DPI Type 0 Time

Code	Text			
19	DPI DL Logon			
20	DPI DL Error			
21	DPI DL Time			
22	DPI Ctrl Disable			
23	DPI Ctrl Enable			
24	DPI Msg Timeout			
25	DPI Manual Reset			
26	SI Online			
27	SI Logon Error			
28	SI Comm Fault			
29	Net Link Up			
30	Net Link Down			
31	Net Dup Address			
32	Net Comm Fault			
33	Net Sent Reset			
34	Net IO Close			
35	Net Idle Fault			
36	Net IO Open			
37	Net IO Timeout			
38	Net IO Size Err			
39	PCCC IO Close			
40	PCCC IO Open			
41	PCCC IO Timeout			
42	Msg Ctrl Open			
43	Msg Ctrl Close			
44	Msg Ctrl Timeout			
45	Peer IO Open			
46	Peer IO Timeout			
47	Net Bus Off			
48	Net Poll Timeout			
49	Net IO Frag Err			
50	Net COS Timeout			
51	Net Poll Alloc			
52	Net COS Alloc			
53	Net Poll Close			
54	Net COS Close			
55	BOOTP Response			
56	Email Failed			

Code	Text					
57	Option Card Flt					
58	Module Defaulted					

3.3.6 Spectrum Defined Events

These event codes are defined and used by Spectrum Controls.

Code	Text
59	ADC Fault
60	Comms Fault
61	Calibration Fault
62	Analog WDT
63	Firmware Fault

3.3.7 Scan Time

The amount of time it takes to scan all enabled channels varies. The number of enabled channels and the filter settings for each channel determine the total scan time.

These are documented maximum scan times per channel. To determine the total scan time for all enabled channels, add the scan time for each filter. It is recommended to disable unused channels to improve performance.

For 4-wire resistive measurements, the adjacent odd channel is not considered.

For 3-wire resistive measurements, the worst case time will be $2 \times$ Scan Time since the lead wire is periodically measured from the adjacent odd channel using the same filter frequency:

Filter Setting	Per Channel Scan Time
4 Hz	505 ms
17 Hz	145 ms
60 Hz	60 ms
240 Hz	35 ms
470 Hz	30 ms

3.3.8 Input Under Range/Over Range

Software will provide input under range and over range indication to the user through Under Range (UR)/Over Range (OR) status bits. The input value that determines Under Range or Over Range depends on the input type. See the Data Format table in section 5.1.3 for these values.

The OR bit is set when the input value is greater than or equal to the High Range value. This bit may also be set during an open wire condition if the OC Action parameter is set to "Full Scale".

The UR bit is set when the input 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".

3.3.9 Input Display Data Limit

The following table describes displayed data	Range and Limit values.	Measured values
that exceed the Limit values are clipped.		

Input Range	Condition	mA, Volts, Deg. C, Ohms	Deg. F
	High Limit	21.0	N/A
1 20 m A	High Range	20.0	N/A
420 MA	Low Range	4.0	N/A
	Low Limit	3.0	N/A
	High Limit	21.0	N/A
0.20	High Range	20.0	N/A
020 mA	Low Range	0.0	N/A
	Low Limit	0.0	N/A
	High Limit	5.250	N/A
0.5.1	High Range	5.0	N/A
05 V	Low Range	0.0	N/A
	Low Limit	0.0	N/A
	High Limit	10.5	N/A
0 10 37	High Range	10.0	N/A
010 V	Low Range	0.0	N/A
	Low Limit	0.0	N/A
	High Limit	850.0	1562.0
100 Ok D4 295	High Range	850.0	1562.0
100 Onm Pt 385	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
	High Limit	850.0	1562.0
200 Ohm Dt 295	High Range	850.0	1562.0
200 Onin Ft 365	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
	High Limit	850.0	1562.0
500 Ohm Dt 395	High Range	850.0	1562.0
500 Onn 1 t 505	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
	High Limit	850.0	1562.0
1000 Ohm Pt 385	High Range	850.0	1562.0
1000 Onin 1 (305	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
	High Limit	630.0	1166.0
100 Ohm Dt 302	High Range	630.0	1166.0
100 Onn 1 (372	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
	High Limit	630.0	1166.0
200 Ohm D+ 302	High Range	630.0	1166.0
200 Onin F t 392	Low Range	-200.0	-328.0
	Low Limit	-200.0	-328.0
500 Ohm Pt 392	High Limit	630.0	1166.0

Input Range	Condition	mA, Volts, Deg. C, Ohms	Deg. F	
	High Range	630.0	1166.0	
	Low Range	-200.0	-328.0	
	Low Limit	-200.0	-328.0	
	High Limit	630.0	1166.0	
1000 Ohm D4 202	High Range	630.0	1166.0	
1000 Ohm Pt 392	Low Range	-200.0	-328.0	
	Low Limit	-200.0	-328.0	
	High Limit	260.0	500.0	
10 C- 42(High Range	260.0	500.0	
10 Cu 420	Low Range	-100.0	-148.0	
	Low Limit	-100.0	-148.0	
	High Limit	260.0	500.0	
100 N: (10	High Range	260.0	500.0	
100 NI 018	Low Range	-100.0	-148.0	
	Low Limit	-100.0	-148.0	
	High Limit	260.0	500.0	
100 Nº (70	High Range	260.0	500.0	
120 Ni 672	Low Range	-80.0	-112.0	
	Low Limit	-80.0	-112.0	
	High Limit	200.0	392.0	
604 NiFe 518	High Range	200.0	392.0	
	Low Range	-100.0	-148.0	
	Low Limit	-100.0	-148.0	
	High Limit	20.0	N/A	
0.20 Ohmu	High Range	20.0	N/A	
0-20 Onms	Low Range	0.0	N/A	
	Low Limit	0.0	N/A	
	High Limit	150.0	N/A	
0.150 Ohma	High Range	150.0	N/A	
0-150 Onms	Low Range	0.0	N/A	
	Low Limit	0.0	N/A	
	High Limit	500.0	N/A	
0.500 Ohma	High Range	500.0	N/A	
0-500 Onms	Low Range	0.0	N/A	
	Low Limit	0.0	N/A	
	High Limit	1000.0	N/A	
0 1000 Oh-	High Range	1000.0	N/A	
U-1000 Unms	Low Range	0.0	N/A	
	Low Limit	0.0	N/A	
	High Limit	3000.0	N/A	
	High Range	3000.0	N/A	
0-3000 Ohms	Low Range	0.0	N/A	
	Low Limit	0.0	N/A	

3.3.10 Open Wire Indication

The module has an open-wire indication for the following inputs. When detected, the value is set according to the OC Action parameter. Temperature ranges set to display Fahrenheit are scaled accordingly. The input circuitry uses pull-up resistors 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 inputs. The table below shows *approximate* trigger points. Physically open wires are guaranteed to hit full-scale values for voltage ranges and 2/3-wire resistive ranges. 4-wire resistive ranges can only be guaranteed to measure open circuit when the primary measurement leads have been opened. If the source leads are open, measurement values can be unpredictable and may not display open circuit.

Range	O.C. Input Trigger
4-20 mA	Inputs less than 2.0 mA
0-20 mA	There is no open circuit indication for this range.
0-10 V	$>= 11.1 \text{ V} (\pm 0.4 \text{ V})$
0-5 V	$>= 11.1 \text{ V} (\pm 0.4 \text{ V})$
0-20 Ohm	>= 144.4 ohms
0-150 Ohm	>= 577.4 ohms
0-500 Ohm	>= 1154.8 ohms
0-1000 Ohm	>= 1154.8 ohms
0-3000 Ohm	>= 4896.1 ohms

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.

Appendix A Using CopyCat for 20-750sc-8U Uploads and Downloads



The behavior of the Copycat function is affected by the presence of an Universal Analog option card. There is a known anomaly that prevents restoring a complete drive configuration with the option card installed.

You may back up the complete drive configuration with the option card installed. You will need to physically remove the option card, perform the restore operation, and then re-install the option card in order for the restore to be successful.

You will receive an error message if you try to restore a complete configuration with the option card installed.

You may use the Copycat function to backup and restore just the option card configuration as documented below.

A human-interface module is able to perform a CopyCat upload of the 20-750sc-8U Module contents using your standard HIM procedure.

However, downloading a module's contents to the same module, or to another module when copying a standard configuration, has a very specific set of steps that differ from those you may use with other add-on modules.

Use the following CopyCat procedures to upload and download a 20-750sc-8U module contents, either to the same module, or to a different module.

These procedures switch between the locked and unlocked states at the correct step in each set of steps.

Uploading a Configuration from the 20-750sc-8U

- 1. Install the 20-750sc-8U into an available port (Port 5 for this example) of the PowerFlex 753/755 AC Drive via CCW.
- 3. In the Parameters list, before you use CopyCat, set the **Config. Control** to **Unlocked**.
- 4. Leave the module connected to CCW.

Stopped 0.0000 Hz F Analog I/O 20-750sc-8U 05 Allocated ESC REF PAR# TEXT

5. From the LCD HIM, navigate to Port 5 from the main screen.

6. Using the left and right arrows, navigate to the Memory tab.



- 7. Select HIM CopyCat.
- 8. Select **CopyCat from Device to HIM**. This is an upload of the configuration from the module to the HIM. The configuration is then stored in the HIM.



9. Select **New File**. This is the configuration file that will be created from the upload.



10. Select Enter to confirm and start the upload. When it is completed you receive a

confirmation popup on the LCD.



- 11. Now you have a configuration file stored on the HIM, so you can put in a new 20-750sc-8U module and configure the module quickly by using this CopyCat feature.
- 12. Set the Config. Control to Locked to allow operation of the card.

Downloading a Configuration to a 20-750sc-8U

- 1. Using CCW or the HIM, change the Config Control to Unlocked.
- 2. On the LCD HIM, once again navigate to the memory tab and select CopyCat.



3. Select **CopyCat from HIM to Device**. This is basically a download from the LCD HIM memory to the 20-750sc-8U.



4. Select **Analog I/O** as the file you would like to download. This is the file that was created when you did the upload.

Stopped 0.0000 Hz	AUTO F
PSelect File to Dnload	
ESC	ENTER

- The download starts but is interrupted by an error text DPI Error Object State Conflict'. At present, you may ignore this error. The download actually downloads correctly. Select ESC to exit out of this popup screen.
- 6. Once the download is completed, go back to CCW, and in the parameter list, once again change the **Config. Control** to **Locked**.

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Corporate Headquarters Spectrum Controls Inc. 1705 132nd Ave NE, Bellevue, WA 98005 Fax: 425-641-9473 Tel: 425-746-9481

Web Site: www.spectrumcontrols.com

