Modicon Quantum Automation Series Hardware Reference Guide

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Document Set

At a Glance

This manual consists of two volumes.

Volume 1

- Quantum Automation System Overview
- Quantum Configurations
- Network Configurations
- System Specifications for Quantum Modules
- Hardware Specifications for Quantum Modules
- Power Supply Modules
- CPU Modules
- Quantum Field Bus Modules
- Distributed I/O (DIO) for Quantum Modules
- Quantum Remote I/O Communication Modules
- Quantum Modbus Plus Network Option Modules
- Quantum Modbus Plus Networking on Fiber Module
- Quantum Ethernet Modules
- Intelligent/Special Purpose Modules for Quantum
- Quantum Intrinsically Safe Analog/Digital, Input/Output Modules
- Quantum Simulator Modules
- Quantum Battery Module

Volume 2

- Quantum I/O Modules
- Miscellaneous Components
- Spare Parts
- Hardware Installation
- Power and Grounding Guidelines
- CableFast Cabling
- Error Stopped Codes
- Agency Approvals

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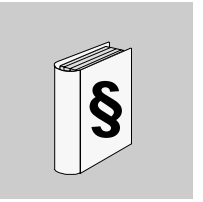
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.

WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

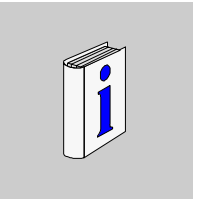
CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

About the Book



At a Glance

Document Scope

This manual is a reference guide for the hardware of the Quantum automation system.

Validity Note

The data and illustrations found in this book are not binding. We reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be construed as a commitment by Schneider Electric.

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Quantum I/O Modules

18

At a Glance

Introduction

The following section provides information on the Quantum input/output (I/O) modules.

What's in this Chapter?

This chapter contains the following sections:

18.1 Overview of I/O Modules

At a Glance

Overview

This section provides an overview of I/O modules used in Quantum.

What's in this Section?

This section contains the following topics:

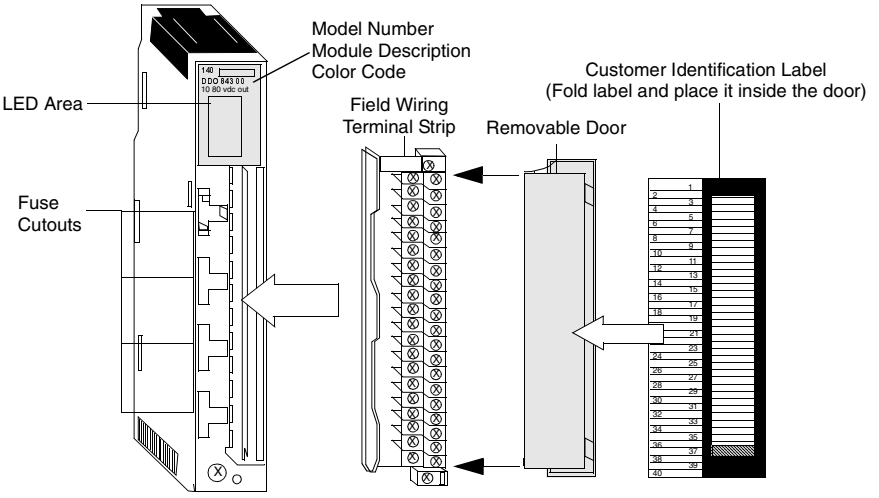
Quantum I/O Modules

Overview

The following section contains specifications for input/output modules. Module descriptions include wiring diagrams, LED indicators and descriptions, illustrations of module figures, and, for discrete modules, true high/true low descriptions.

I/O Module

The following figure shows the I/O modules and its components.



Note: When field wiring the I/O modules, the maximum wire size that should be used on a field wiring terminal is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

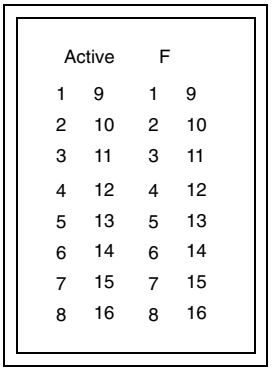
Note: The field wiring terminal strip (Modicon #140XTS00200) must be ordered separately. (The terminal strip includes the removable door and label.)

Quantum I/O LED Descriptions

These tables describe the generic LED blocks used in Quantum I/O modules. Descriptions of each type I/O modules' unique LED configuration are included in the individual I/O module specifications in this section.

LED Indicators and Descriptions for Discrete 16 Point and Analog I/O Modules

The following table shows the LED indicators for discrete 16 point and analog I/O modules.

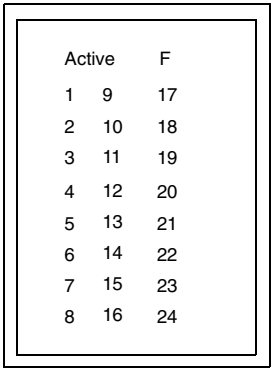


The following table shows the LED descriptions for discrete 16 point and analog I/O modules.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	A fault (external to the module) has been detected.
1 ... 16	Green	The indicated point or channel is turned ON.
1 ... 16	Red	There is a fault on the indicated point or channel.

LED Indicators and Descriptions for 24 Point Input Modules

The following table shows the LED indicators for the 24 point input modules.

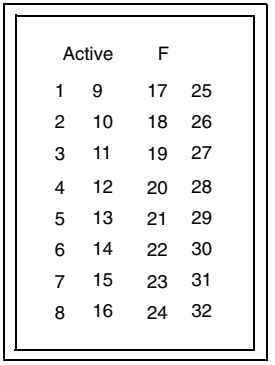


The following table shows the LED descriptions for the 24 point input modules.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	A fault (external to the module) has been detected.
1 ... 24	Green	The indicated point or channel is turned ON.

LED Indicators and Descriptions for 32 Point I/O Modules

The following table shows the LED indicators for the 32 point I/O modules.

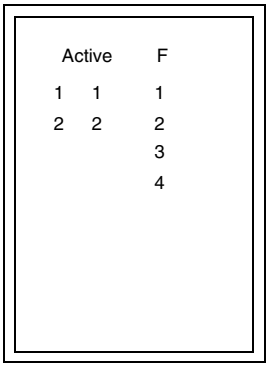


The following table shows the LED descriptions for the 32 point I/O modules.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	A fault (external to the module) has been detected.
1 ... 32	Green	The indicated point or channel is turned ON.

LED Indicators and Descriptions for Bi-Directional Modules

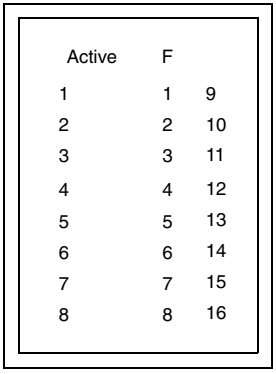
The following table shows the LED indicators for the 140AMM09000 bi-directional module.



The following table shows the LED descriptions for the 140AMM09000 bi-directional module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	No power applied to the output group(s) or input out-of-range.
1 and 2 (left column)	Green	Indicates output is active.
1 and 2 (middle column)	Red	Indicates output status: broken wire or bad field supply.
1 ... 4 (right column)	Red	Indicates input status: under/over range.

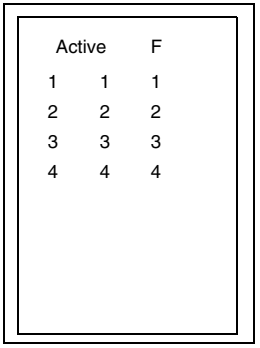
The following table shows the LED indicators for the 140DAM59000 and 140DDM39000 bi-directional modules.



The following table shows the LED descriptions for the 140DAM59000 and 140DDM39000 bi-directional modules.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	A fault (external to the module) has been detected.
1 and 8 (left columns)	Green	The indicated output point and channel is turned ON.
1 and 16 (right two columns)	Green	The indicated input point and channel is turned ON.

The following table shows the LED indicators for the 140DDM69000 bi-directional module.

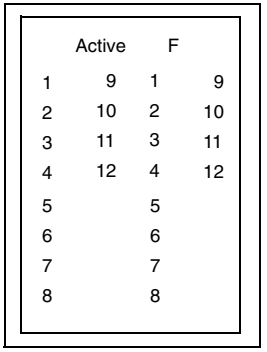


The following table shows the LED descriptions for the 140DDM69000 bi-directional modules.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	Over current condition on any point.
1 and 4 (left columns)	Green	The indicated output point is turned ON.
1 and 4 (middle columns)	Red	The indicated output point has an over current condition.
1 and 4 (right columns)	Green	The indicated input point is turned ON.

LED Indicators and Descriptions for Discrete 12 Point Modules with Fault Indication

The following table shows the LED indicators for the discrete 12 point 140DDO88500 module with fault indication.



The following table shows the LED descriptions for discrete 12 point modules with fault indication.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An over current condition on any point has been detected.
1 ... 12	Green	The indicated point or channel is turned ON.
1 ... 12	Red	The indicated output point has an over current condition.

Field Wiring Terminal Strip/ Module Keying Assignments

Field wiring terminal strips and module housings are slotted on the left and right sides of the PCB card slot to accept keying pins (see I/O Module figure). The purpose of keying is to prevent plugging the terminal strip into the wrong module, once wiring connections have been made. Keying is implemented at the discretion of the user.

CAUTION

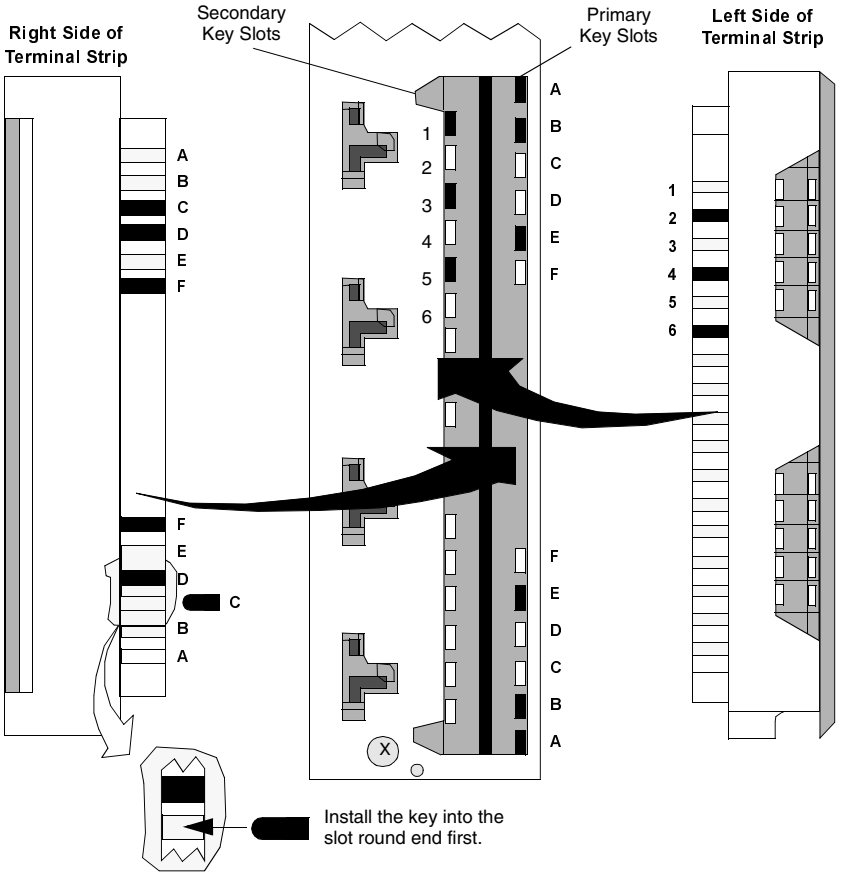
Safety precaution

For maximum safety and protection, Modicon recommends that module key coding be part of the system installation procedure.

Failure to follow this precaution can result in injury or equipment damage.

Primary keying is provided on the right side of the module, marked A through F (top and bottom positions are coded the same). Primary keying provides module class coding. Primary codes have been pre-defined (see the following chart).

Secondary keying is provided on the left side of the module, marked 1 through 6. Secondary keying codes are user-definable and may be used to identify module personality within module classes, or other unique site requirements.
The following figure shows the I/O module keying assignments.



Note: The primary/secondary keys shown (in black) in this example reflect the recommended coding of a 24 Vdc module in slot 6 to its field wiring terminal strip.

To support keying, all I/O modules accepting terminal strips come with 12 customer-installable primary keys (six yellow keys each for the module and terminal strip) and six secondary keys (three white keys each for the module and terminal strip). In the following table, check the Primary Module and Terminal Strip Coding columns for key locations.

I/O Module Terminal Strip Keying

The following table shows the primary module and terminal strip keying for the I/O modules.

Primary Module and Terminal Strip Keying			
Module Class	**Module Part Number**	**Module Coding**	**Terminal Strip Coding**
5 Vdc	140DDI15310	ABC	DEF
	140DDO15310		
9 ... 12 Vdc	Unassigned	ABD	CEF
24 Vdc	140DDI35300	ABE	CDF
	140DDI35310		
	140DDM39000		
	140DDO35300		
	140DDO35310		
	140DSI35300		
	140HLI34000		
10 ... 60 Vdc	140DDI84100	ABF	CDE
	140DDI85300		
	140DDO84300		
	140DVO85300		
125 Vdc	140DDI67300	ACD	BEF
	140DDM69000		
	140DDO88500		
24 Vac	140DAI34000	ACE	BDF
	140DAI35300		
48 Vac	140DAI44000	ACF	BDE
	140DAI45300		
	140DAO84220		
115 Vac	140DAI54000	ADE	BCF
	140DAI54300		
	140DAI53300		
	140DAM59000		
	140DAO84010		
230 Vac	140DAI74000	ADF	BCE
	140DAO84000		
	140DAO84210		
	140DRA84000		

Primary Module and Terminal Strip Keying			
Module Class	**Module Part Number**	**Module Coding**	**Terminal Strip Coding**
Relay	140DRC83000	AEF	BCD
Analog I/O	140ACI03000	BCD	AEF
	140AVI03000		
	140ACO02000	BCE	ADF
	140AVO02000	BCF	ADE
TC/RTD	140ARI03010	BDE	ACF
	140ATI03000		
Analog In/Out	140AMM09000	BDF	ACE
Intelligent/ Special Purpose	140EHC10500	BEF	ACD
	140EHC20200		
Unassigned		CDE	ABF
Unassigned		CDF	ABE
Unassigned		CEF	ABD
Unassigned		DEF	ABC

To implement the user-optional secondary keying code (designed to prevent the mismatching of terminal strips to I/O modules of identical type), 17 slot positions have been provided in modules and terminal strips to support a variety of coding schemes.

In addition (by using the secondary keying code), the user may key the field wiring terminal to the position where the module is installed in a backplane, using the white keys for each code. To determine a unique module code and terminal strip code, refer to the table below.

Secondary Keying and Backplane Positions

The following table shows the secondary keying and backplane positions.

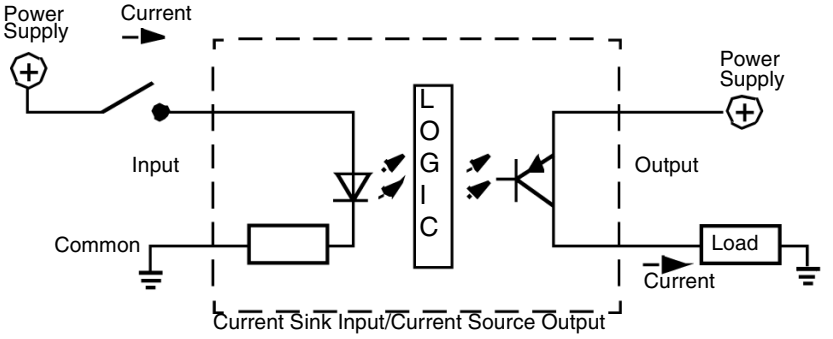
Backplane Position	Module Coding	Terminal Strip Coding
1	123	456
2	124	356
3	125	346
4	126	345
5	134	256
6	135	246
7	136	245
8	145	236
9	146	235
10	156	234
11	234	156
12	235	146
13	236	145
14	245	136
15	246	135
16	256	134

The user may also use personality keying to differentiate between like module types (i.e., DAO84000 and DAO84210 both have the same primary keying pin combinations), using the white keys for each code.

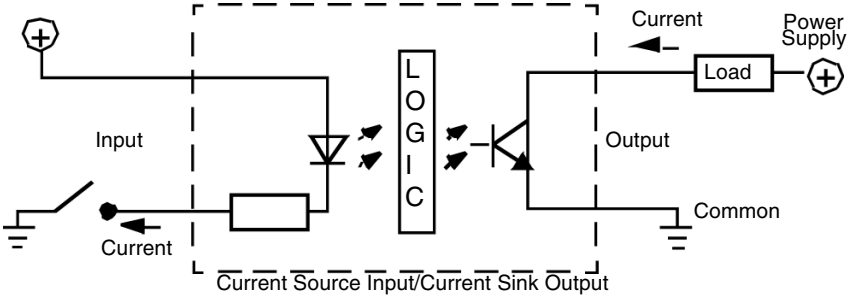
Discrete I/O True High/True Low Circuit Descriptions

The following figures illustrate discrete I/O module true high and true low logic circuits.

True High/Current Sink Input/Current Source Output



True Low/Current Source Input/Current Sink Output



Current Sinking describes a physical implementation of the I/O hardware, which when in the *true state*, sinks current from the external load.

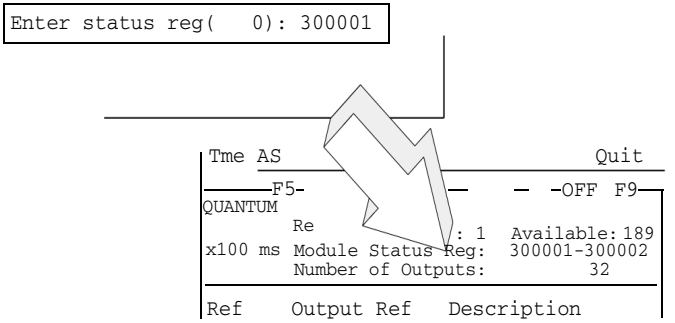
Current Sourcing describes a physical implementation of the I/O hardware, which when in the *true state*, sources current to the external load.

I/O Map Status Byte

Overview

This Quantum I/O map menu entry allows you to assign the 3x register that defines the start of a table in which I/O-mapped module status is available. You may either enter the 3x value, or the value 0 (indicating no choice). The value entered is displayed in the summary information on the top of the Quantum I/O Map. Modules in a backplane report status (and fault) information in an 8-bit byte—therefore, one word of the table conveys the status information for two modules.

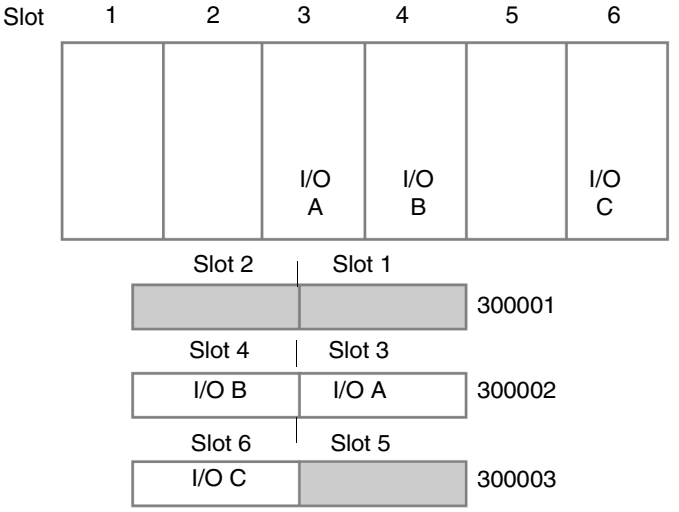
The following figure shows an example of the Quantum report status and fault information.



If you choose to display or develop a program using these values, the table/module relationship is given in the following example:

Table/Module Configuration

The following figure shows the table/module configuration.



Given the above sample configuration, if you select 300001 as the starting address of the status table and there are no I/O modules in the first two locations, the first

I/O module status is found in the least significant byte of the second word (i.e., position 3). The table fills until the last I/O mapped module is found.

Note: The bit pattern reported in each status/error byte is dependent on the module type.

18.2 Analog Input Modules

At a Glance

Overview

This section provides information on Quantum Analog Input Modules.

What's in this Section?

This section contains the following topics:

I/O Configuration for Analog Input Modules

Overview

This section provides information on configuration of Analog Input modules. These modules include:

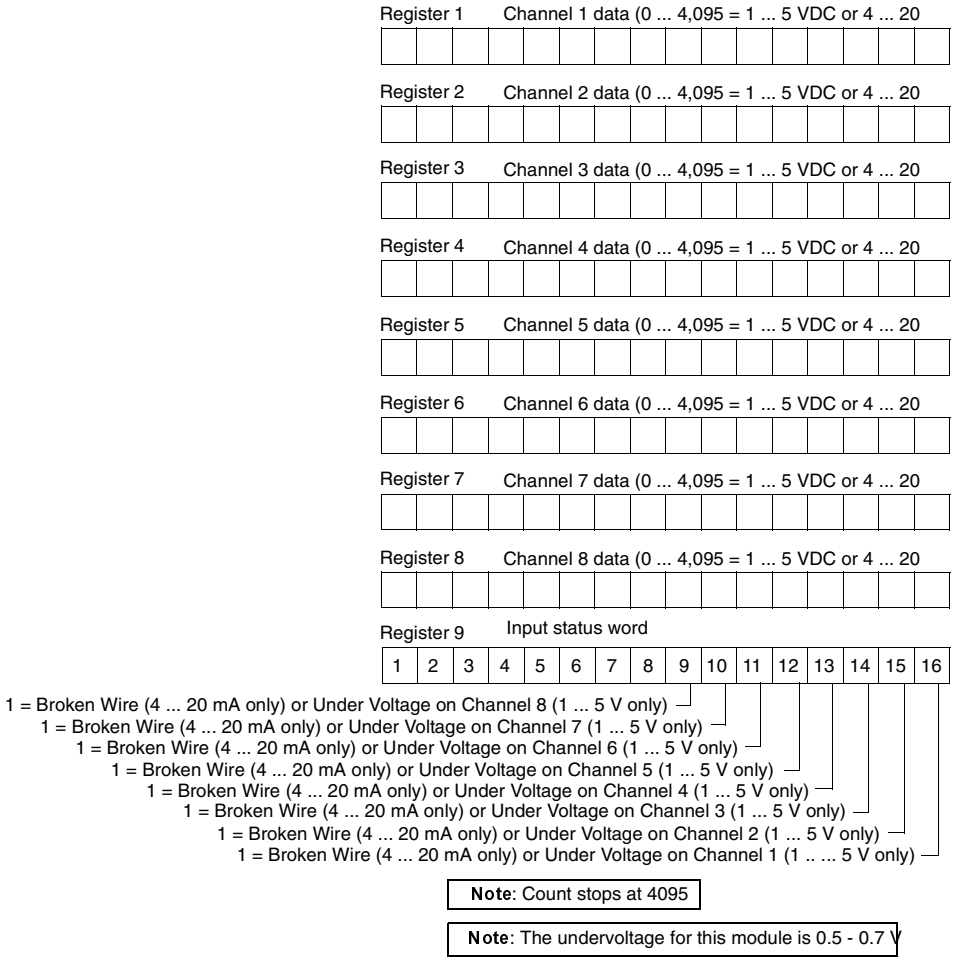
- 140ACI03000
- 140ACI04000
- 140ARI03010
- 140ATI03000
- 140AVI03000

140ACI03000

The following information pertains to configuration of the 140ACI03000 Analog Input module.

I/O Map and Register Assignment

The ACI03000 eight-channel unipolar input module requires nine contiguous input (3x) registers, assigned as follows.



Note: Count stops at 4095

Note: The undervoltage for this module is 0.5 - 0.7 V

CAUTION

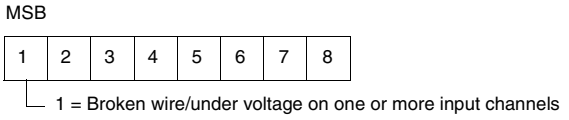
Possible Equipment Failure

When configured for voltage measurement (no jumper installed between INPUT(+) and I SENSE terminals), if a broken field wire occurs, readings will be non-zero and not predictable.

Failure to follow this precaution can result in injury or equipment damage.

I/O Map Status Byte

The most significant bit in the I/O map status byte is used for the 140ACI03000 Input module.The following figure shows the MSB register.



Module Zoom Selections

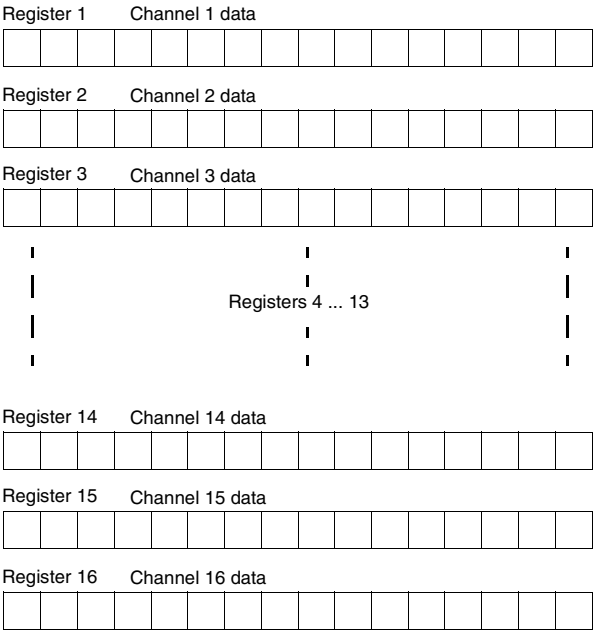
There are no Module Zoom selections required for this module.

140ACI04000

The following information pertains to the 140ACI04000 Analog Input module.

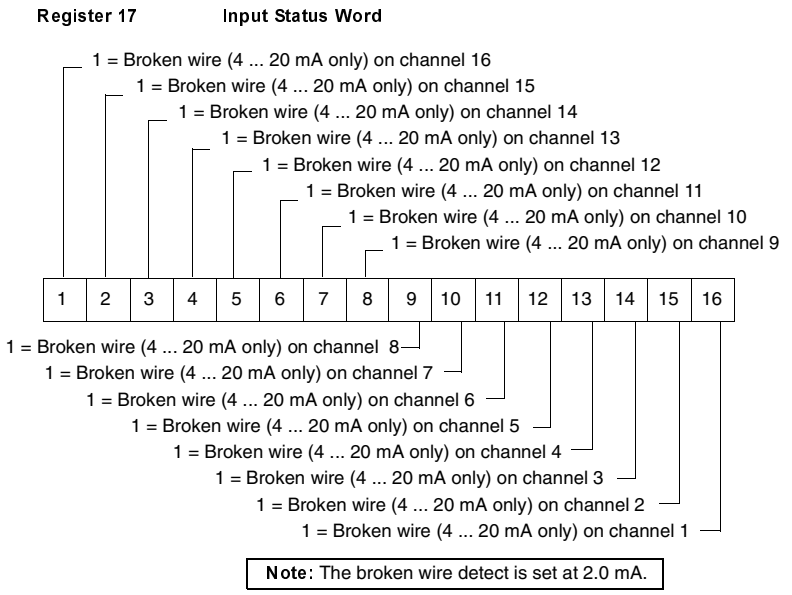
I/O Map Register Assignment

This module requires 17 contiguous input (3x) registers which are assigned as follows:



I/O Map Register Assignments- Register 17

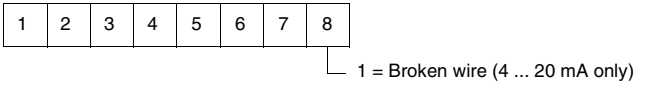
The following figure shows the status warnings for register 17.



Note: The broken wire detect is set at 2.0 mA.

I/O Map Status Byte

I/O map status byte is used as follows:



Modsoft Module Zoom Selections

Push <Enter> to display and select the channel range.

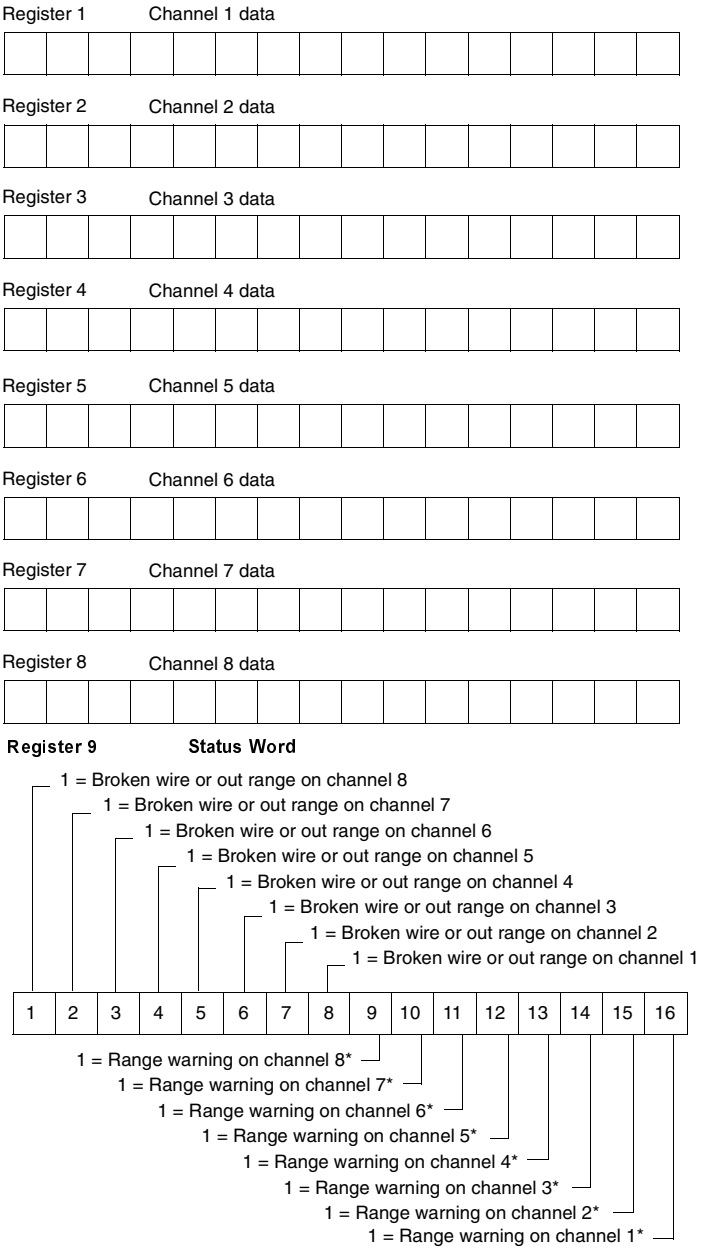
Channel X range selection:	
	4 to 20mA 0 to 16,000
	4 to 20mA 0 to 4095
	4 to 20mA 0 to 20,000
	0 to 25mA 0 to 25,000

140ARI03010

The following information pertains to configuration of the 140ARI03010 Analog Input module.

I/O Map Register Assignment

This module requires nine contiguous 16-bit (3x) registers—eight for input data and one for input status. The data registers formats are as follows:

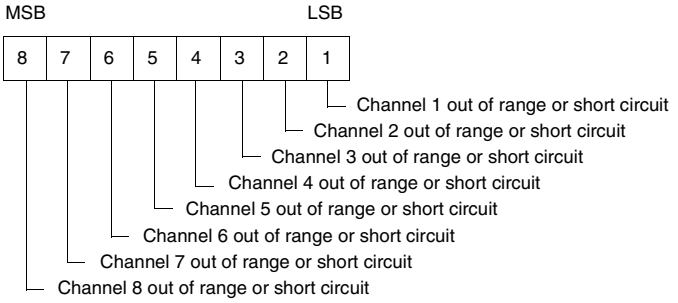


Note: The data format is 16-bit integer values in the positive range and an integer value with the MSB indicating a negative sign in the negative range.

*A range warning is issued when a channel input exceeds the rated input value. An out-of-range bit is set when a channel input exceeds the rated input value by 2.34% or when a broken wire is sensed on the channel. The warning bit is cleared when the out-of-range bit is set.

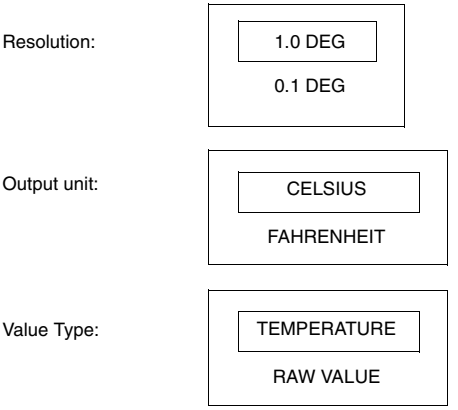
I/O Map Status Byte

The I/O map status byte is used by the 140ARI03010 Input module as follows:

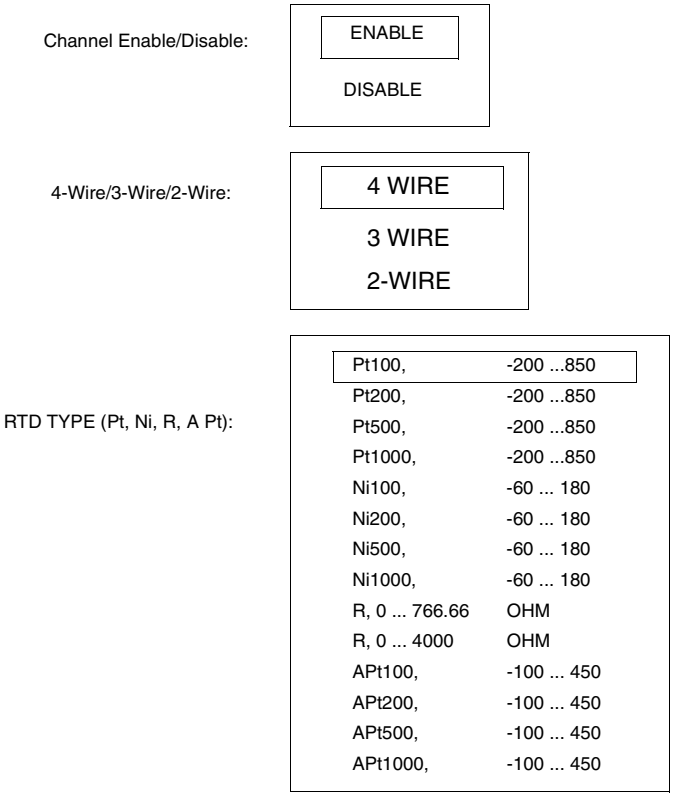


Modsoft Module Zoom Selections

Push <Enter> to display and select the overall module and channel configuration.



The following figure shows the channel X configuration selection.

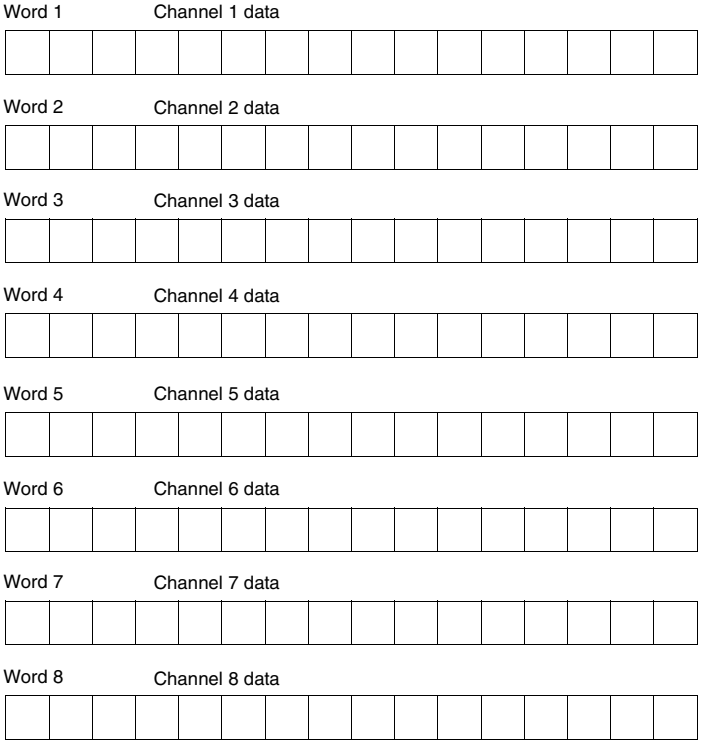


140ATI03000

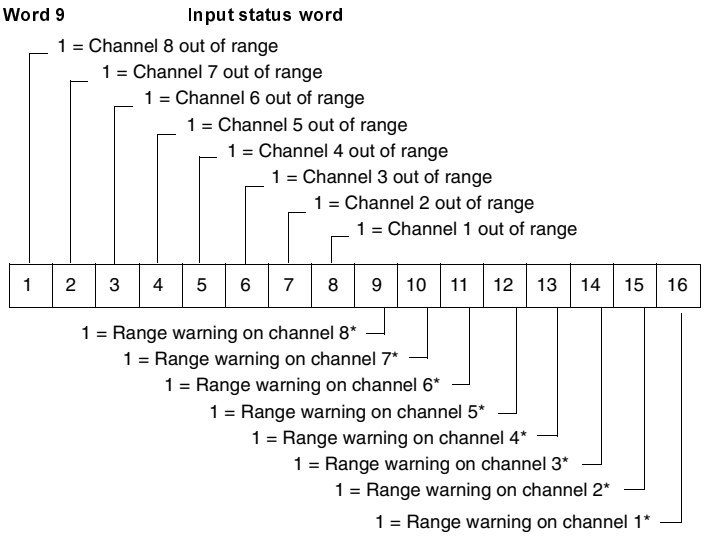
The following information pertains to configuration of the 140ATI03000 Analog Input module.

I/O Map Register Assignments

This module requires ten contiguous, 16-bit words—eight for input data, one for channel status, and one for internal temperature of the module. The data words formats are as follows.

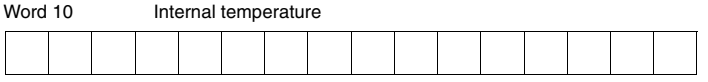


The following shows the word 9 register.



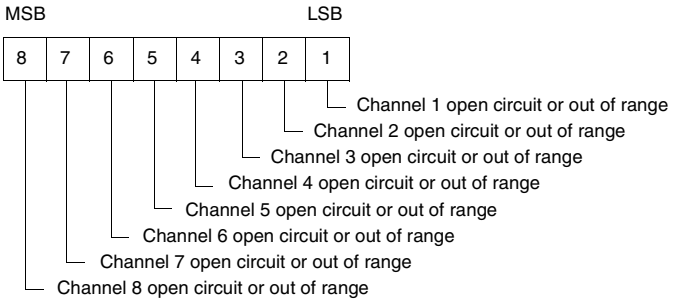
* A range warning is issued when a channel input exceeds the rated input value, as shown in the following table. An out-of-range bit is set when a channel input exceeds the rated input value by 2.4% or when a broken wire is sensed on the channel. The warning bit is cleared when the out-of-range bit is set.

The following figure shows the word 10 register.



I/O Map Status Byte

The I/O map status byte is used by the 140ATI03000 Input Module as follows.



Measurement Ranges

Ranges in the following table are expressed in degrees C. The user can select either 0.1 or 1.0° (C or F) for the output data format.

If the 0.1° format is selected, the decimal point is implied (i.e., a reading of 1234 should be interpreted as 123.4°). The internal CJC data is reported in the same units as the TC output

All TC output data is in signed integer format except as noted for Type B (see below).

Note: If the TC is open, then the warning bit is cleared and the out-of-range bit is set. If it is over range, then the channel's output data word is always 7FFFH; if it is under range, the channel's output data word is always 8001H. These are the possible highest and lowest values.

Measurement Range Tables

This table shows thermocouple ranges.

Thermocouple Ranges					
Data Format	**Input**	**Minimum Reading**	**Normal**	**Over Range Warning**	**Out-of-Range Set**
Modsoft Signed Format	J Type TC	-228.5	-210 to +760	760.1 to 778.6	>778.7
	K Type TC	-302.9	-270 to +1370	1370.1 to 1405.0	>1405.1
	E Type TC	-293.8	-270 to +1000	1000.1 to 1023.9	>1024.0
	T Type TC	-279.5	-270 to +400	400.1 to 409.6	>409.7
	S Type TC	-89.9	-50 to +1665	1665.1 to 1705.0	>1705.1
	R Type TC	-89.6	-50 to +1665	1665.1 to 1704.7	>1704.8
	B Type TC (See Note 3)	+86.4	+130 to +1820	1820.1 to 1863.7	>1863.8

This table shows millivolt ranges.

Millivolt Ranges					
Offset Binary	-100 mV 0 + 100 mV Gain = 25	0	0 8000h FFFFh	None	See Note 2
	-25 mV 0 +25 mV Gain = 100	0	0 8000h FFFFh	None	See Note 2

Note:
1. Open Circuit Detect is always enabled for all TC types and may be disabled for linear ranges.
2. On millivolt ranges, if Open Circuit Detect is enabled, this bit is set on Open Circuit Detect or input FFFFh
3. Data format changes to unsigned if the output is requested in units of 0.1° F to accommodate readings above 3276.8° F.

Module Zoom Selections

Push <Enter> to display and select the configuration parameters.

Resolution:

- [1.0 DEG]
- 0.1 DEG

Output Unit:

- [CENTIGRADE]
- FAHRENHEIT

Cold Junction Compensator:

- [On board]
- Channel 1

CHANNEL X CONFIGURATION

Thermocouple Type:

- Undefined
- [J, gain=25]
- K, gain=25
- E, gain=25
- T, gain=100
- S, gain=100
- R, gain=100
- B, gain=100

Note:
Undefined = Linear Range

The next two entries are for undefined type:

Open Circuit Test:

- [NO]
- YES

Millivolt Range:

- [25]
- 100

This channel installed:

- [YES]
- NO

140AVI03000

The following information pertains to configuration of the 140AVI03000 Analog Input module.

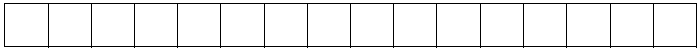
I/O Map Register Assignments

This module requires nine contiguous input (3x) registers.

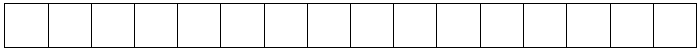
Map Register Assignment

The following figures shows the assignment registers and the input status warnings.

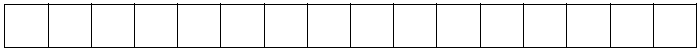
Register 1 Channel 1 data



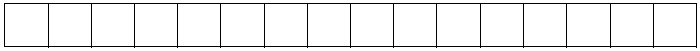
Register 2 Channel 2 data



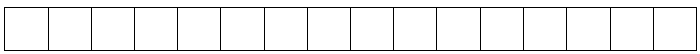
Register 3 Channel 3 data



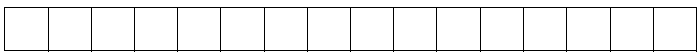
Register 4 Channel 4 data



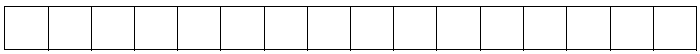
Register 5 Channel 5 data



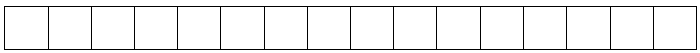
Register 6 Channel 6 data



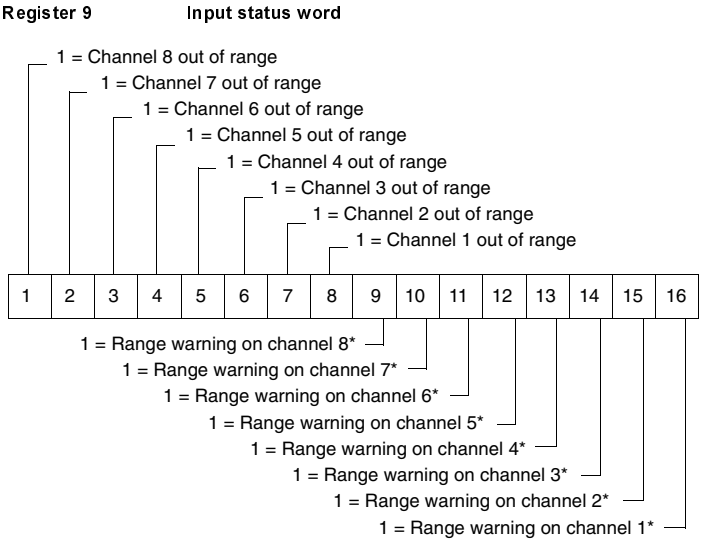
Register 7 Channel 7 data



Register 8 Channel 8 data



The following figure shows Register 9.



*A range warning is issued when a channel input is outside the rated input value, as shown in the following table. Warning bits stay on after out of range bits are set. An out-of-range bit is set when a channel input exceeds the rated input value by 2.4%. Out of range bits are also set if inputs drop below 0.5 V (1 ... 5 V mode) or 2.08 mA (4 ... 20 mA mode).

When configured for current inputs (jumper installed between INPUT(+) and ISENSE terminals), a broken field wire results in a zero current reading. If 4 ... 20 mA is selected, fault LEDs and warning/out of range and I/O Map Status Byte bits are displayed

CAUTION

Possible Equipment Failure

When configured for voltage inputs (no jumper installed between INPUT(+) and ISENSE terminals), if a broken field wire occurs, readings will be non-zero and not predictable.

Failure to follow this precaution can result in injury or equipment damage.

Linear Measuring Ranges

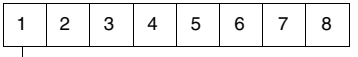
The following table shows the linear measuring ranges for the 140AVI03000 Analog Input module.

Data Format	Input	Under Warning	Normal	Over Warning
16-bit Format	+/- 10 V	< 768	768 ... 64,768	> 64,768
	+/- 5 V, +/- 20 mA	<16,768	16,768 ... 48,768	> 48,768
	0 ... 10 V		0 ... 64,000	> 64,000
	0 ... 5 V, 0 ... 20 mA		0 ... 32,000	> 32,000
	1 ... 5 V, 4 ... 20 mA	<6,400	6,400 ... 32,000	> 32,000
Voltmeter Format*	+/- 10 V	< –10,000	–10,000 ...10,000	> 10,000
	+/- 5 V	< –5,000	–5,000 ... 5,000	> 5,000
	0 ... 10 V		0 ... 10,000	> 10,000
	0 ... 5 V		0 ... 5,000	> 5,000
	1 ... 5 V	< 1,000	1,000 ... 5,000	> 5,000
	+/- 20 mA	< –20,000	–20,000... 20,000	> 20,000
	0 ... 20 mA		0 ... 20,000	> 20,000
	4 ... 20 mA	< 4,000	4,000 ... 20,000	> 20,000
12-bit Format	+/- 10 V	0	0 ... 4,095	4,095
	+/- 5 V, +/- 20 mA	0	0 ... 4,095	4,095
	0 ... 10 V		0 ... 4,095	4,095
	0 ... 5 V, 0 ... 20 mA		0 ... 4,095	4,095
	1 ... 5 V, 4 ... 20 mA	0	0 ... 4,095	4,095

*The Voltmeter ranges are listed in Modsoft signed format.

I/O Map Status Byte

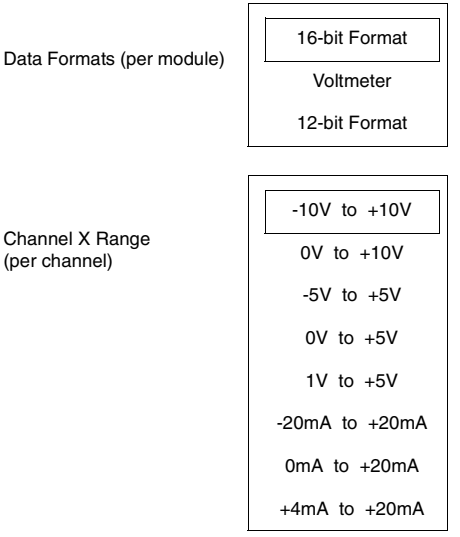
The most significant bit in the I/O map status byte is used for the 140AVI03000 Input module.
The following figure shows the input register.



1 = Out of range or broken field wire on one or more channels (4 .. 20 mA)

Module Zoom Selections

Push <Enter> to display and select data format for the module and the ranges for the individual input channels.
The following figures show the module data format and Channel X range (per channel) options.



140ACI03000 I/O Analog In Module

Overview

The Analog Input 8 Channel Unipolar module accepts mixed current and voltage inputs. Required jumpers between the input and sense terminals for current input measuring are included with the module.

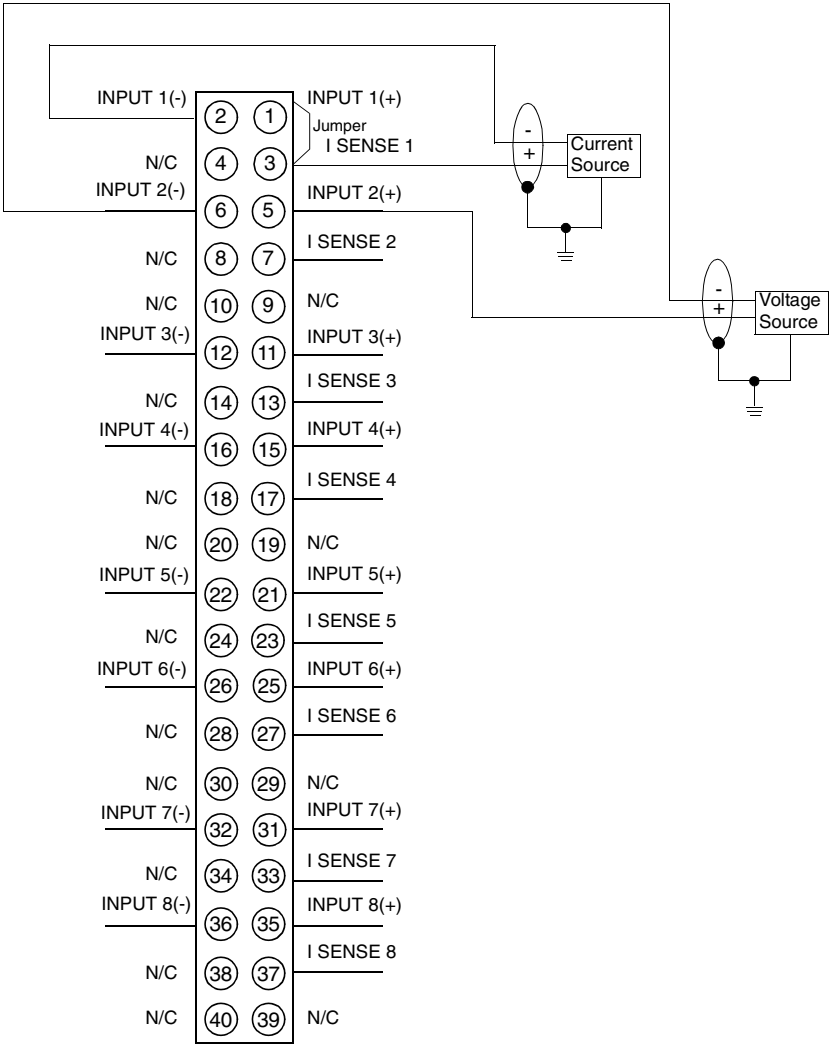
Specifications

The following table shows the specifications for the ACI03000 analog input module.

Specifications	
Number of Channels	8 Differential
LEDs	Active: Indicates bus communication present.
	F: Indicates channel fault. **NOTE**: This module produces a fault signal F if any one channel detects a broken wire condition in the 4 ... 20 mA range.
Required Addressing	9 Words In
Voltage Input	
Linear Measuring Range	1 ... 5 Vdc
Absolute Maximum Input	50 Vdc
Input Impedance	> 20 MΩ
Current Input	
Linear Measuring Range	4 ... 20 mA
Absolute Maximum Input	25 mA
Input Impedance	250 Ω +/- 0.03%
Resolution	12 Bits
Accuracy Error @ 25° C	Voltage Mode Typical: +/- 0.05% of full scale Maximum: +/- 0.1% of full scale
	Current Mode Add +/- 0.03% to voltage specification
Linearity	+/- 0.04%
Accuracy Drift w/ Temperature	Typical: +/- 0.0025% of full scale / °C Maximum: +/- 0.005% of full scale / °C
Common Mode Rejection	> -72 dB @ 60Hz
Input Filter	Single pole low pass, -3 dB cutoff @ 15 Hz, +/- 20%
Isolation	
Channel to Bus	1000 Vdc, 3000 Vpp, for 1 minute
Operating Voltage	
Channel to Channel	30 Vdc max
Update Time	5 ms for all channels
Fault Detection	Broken wire (4 ... 20 mA mode) or under voltage range (1 ... 5 V)
Bus Current Required	240 mA
Power Dissipation	2 W
External Power	Not required for this module

Note: Calibration is not required for this module.

Wiring Diagram The following figure shows the wiring diagram for the ACI030 module.



Note:

1. The current and voltage sources are supplied by the user (fusing is at the discretion of the user).
2. Either a shielded or unshielded signal cable may be used. Shielded types should have a shield tied to earth ground near the signal source end.
3. Unused inputs may cause the activation of the F LED. To avoid this occurrence, wire unused channels in voltage mode to a channel that is in use.
4. N / C = Not connected.

140ACI04000 High Density Analog in I/O Module

Overview

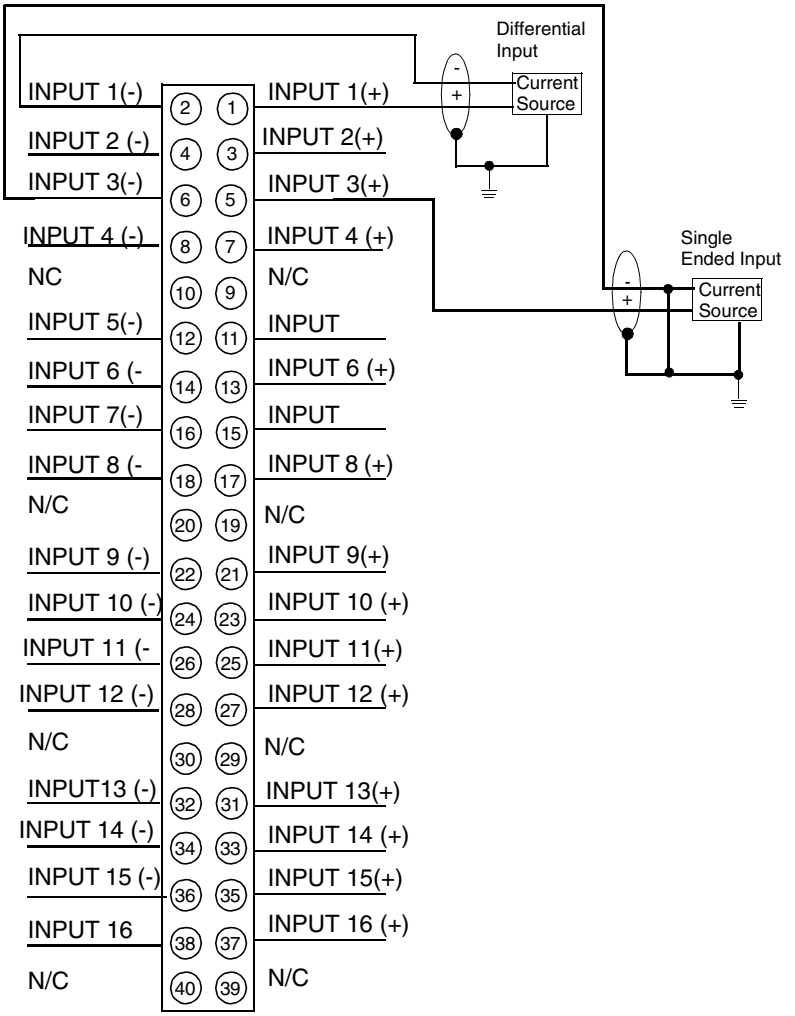
The 140ACI04000 is a 16 channel analog input module which accepts mixed current inputs.

Specifications

The following table shows the specifications for the ACI04000 analog input module.

Specifications	
Number of Channels	16 Differential or 16 externally tied single ended
LEDs	Active: Indicates Bus communication is present F: Indicates channel fault. NOTE: This module produces a fault signal F if any one channel detects a broken wire condition in the 4 ... 20 mA range.
Required Addressing	17 Words In
Current Input	
Linear Measuring Range	0 ... 25 mA, 0 ... 25,000 counts 0 ... 20 mA, 0 ... 20,000 counts 4 ... 20 mA, 0 ...16,000 counts 4 ... 20 mA, 0 ... 4,095 counts
Absolute Maximum Input	30 mA
Input Impedance	250 Ω nominal
Accuracy Error @ 25° C	+/- 0.125% of full scale
Linearity (0 to 60°C)	+/- 6µA max, 0 ... 25 mA, 0 ... 25,000 counts +/- 6µA max, 0 ... 20 mA, 0 ... 20,000 counts +/- 6µA max, 4 ... 20 mA, 0 ... 16,000 counts +/- 12µA max, 4 ... 20 mA, 0 ... 4,095 counts
Accuracy Drift w/ Temperature	Typical: +/- 0.0025% of full scale / °C Maximum: +/- 0.005% of full scale / °C
Common Mode Rejection	> -90 dB @ 60Hz
Input Filter	Single pole low pass, -3 dB cutoff @ 34 Hz, +/- 25%
Isolation	
Field to bus	1780 Vac for 1 minute
Operating Voltage	
Channel to Channel	30 Vdc max
Update Time	15ms for all 16 channels
Fault Detection	Broken wire in 4 ... 20 mA mode
Bus Current Required	360 mA
Power Dissipation	5 W
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Wiring Diagram Wiring diagram for the 140ACI04000 module.



Note:
1. The current sources are supplied by the user (fusing is at the discretion of the user.)
2. Either shielded or unshielded cables may be used. In noisy environments, twisted shielded cable is recommended. Shielded cable should have a shield tied to earth ground near the signal source end.
3. Unused inputs may cause the activation of the F LED. To avoid this occurrence the unused channels should be configured in the 0 ... 25 mA range.
4. The maximum channel to channel working voltage cannot exceed 30 Vdc.
5. N/C = Not connected

140ARI03010 I/O RTD Input 8 Channel Module

Overview

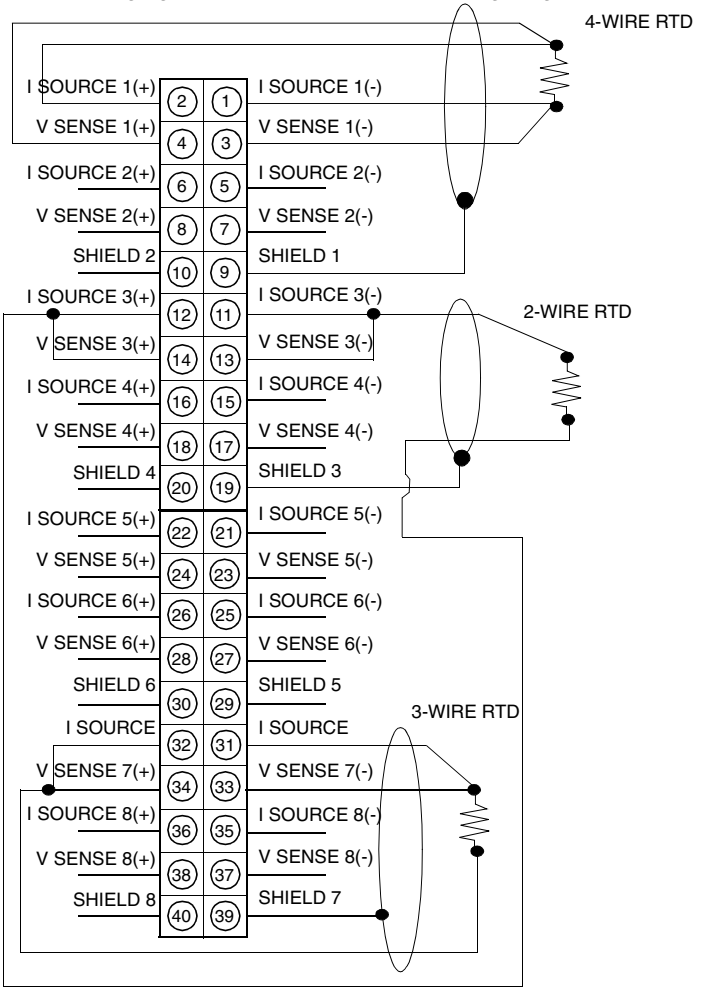
The RTD Input 8 Channel module accepts input from up to eight 2-, 3-, and 4-wire RTD sensors, and provides temperature measurement data to the Quantum CPU.

Specifications The following table shows the ARI030010 RTD IN specifications.

Specifications	
Number of Channels	8
LEDs	Active F 1 ... 8 (Red) - Indicated channel is out of range. (This includes broken wire and short circuit conditions.) R - Module has passed power-up diagnostics
Required Addressing	10 Words In
RTD Types	**Range (degrees C)**
IEC Platinum PT 100, PT200, PT500, PT1000	- 200 to + 850
American Platinum PT 100, PT200, PT500, PT1000	- 100 to + 450
Nickel N100, N200, N500, N1000	- 60 to + 180
Measurement Current	
PT100, PT200, N100, N200	2.5 mA
PT500, PT1000, N500, N1000	0.5 mA
Input Impedance	> 10 MΩ
Linearity	+/- 0.01% of full scale (0 ... 60° C)
Resolution	0.1° C
Absolute Accuracy	+/- 0.5 degrees C (25° C) +/- 0.9 degrees C (0 ... 60° C)
Isolation	
Channel to Channel	300 V peak-to-peak
Channel to Bus	1780 Vac @ 47 ... 63 Hz for 1 minute or 2500 Vdc for 1 minute
Update Time (All Channels)	
2-wire 4-wire	640 ms
3-wire	1.2 s
Fault Detection	Out of range or 8 red LEDs to indicate broken wire conditions
Bus Current Required	200 mA
Power Dissipation	1 W
External Power	Not required for this module

Wiring Diagram Figure

The following figure shows the ARI03010 wiring diagram.



Note:

1. The module is calibrated per:
   IEC Publication 751 for platinum RTDs: 100Ω @ 0 degrees C, TCR (α) = 0.00385Ω/Ω/degrees C.
   DIN 43760 for nickel RTDs
   American Platinum RTDs: 100Ω @ 0 degrees C, TCR (α) = 0.00392Ω/Ω/degrees C
2. Terminals labeled shield are not connected internally. Shields should be grounded at the field device end.
3. When using **2-wire configurations**, the temperature equivalent of **twice** the lead resistance of one leg must be subtracted from the temperature reading.

140ATI03000 I/O Thermocouple Input 8 Channel Module

Overview

The Thermocouple Input 8 Channel is an eight-channel thermocouple input module.

Specifications

The following table shows the specifications for the TC IN module.

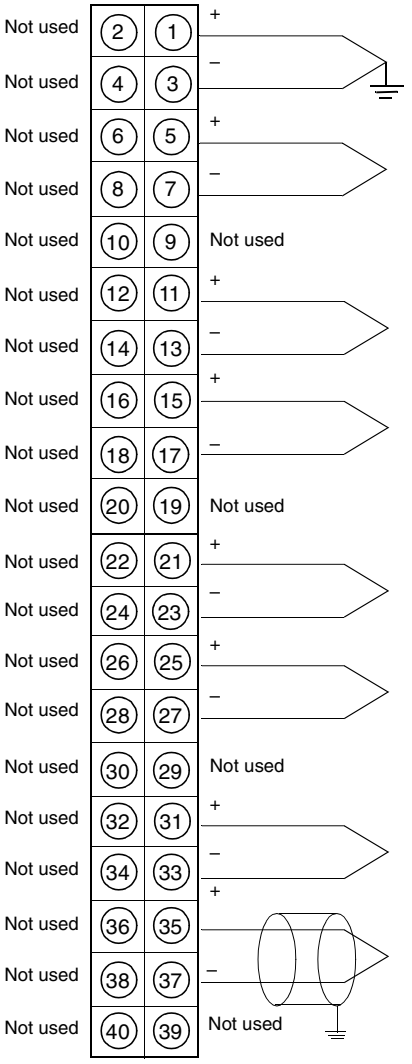
Specifications	
Number of Channels	8
LEDs	Active F 1 ... 8 (Red) - Indicated channel is out of range - or Broken wire condition is detected
Required Addressing	10 Words In
TC Types and Ranges	Range (degrees C)
J	- 210 ... + 760
K	- 270 ... + 1370
E	- 270 ... + 1000
T	- 270 ... + 400
S	- 50 ... + 1665
R	- 50 ... + 1665
B	+ 130 ... + 1820
Millivolt Ranges	- 100 mV ... +100 mV* - 25 mV ... +25 mV* *Open circuit detect can be disabled on these ranges.
TC Resistance / Max Source Resistance	200Ω max for rated accuracy
Input Impedance	> 1 MΩ
Input Filter	Single low pass @ nominal 20 Hz, plus notch filter at 50/ 60 Hz
Normal Noise Rejection	120 dB min @ 50 or 60 Hz
Cold Junction Compensation (CJC)	Internal CJC operates 0 ... 60° C (errors are included in the accuracy specification). The connector door must be closed. Remote CJC can be implemented by connecting a TC (which monitors the external junction block temperature) to channel 1. Types J, K, and T are recommended for remote CJC.

Specifications	
Resolution	
TC Ranges	Choice of: 1.0° C (default) 0.1° C 1.0° F 0.1° F
Millivolt Ranges	100 mV range, 3.05 mV (16 bits) 25 mV range, 0.76 mV (16 bits)
TC Absolute Accuracy (see Note 1)	
Types J, K, E, T (see Note 2)	+/- 2° C plus +/- 0.1% of reading
Types S, R, B (see Note 3)	+/- 4° C plus +/- 0.1% of reading
Millivolt Absolute Accuracy	
@ 25° C	+/- 20 µV plus +/- 0.1% of reading
Accuracy Drift w / Temperature	0.15 µV / °C plus 0.0015% of reading / °C max
Operating Voltage	
Channel to Channel	220 Vac @ 47 ... 63 Hz or 300 Vdc max
Isolation	
Channel to Bus	1780 Vac @ 47 ... 63 Hz or 2500 Vdc for 1 minute
Update Time	1 s (all channels)
Fault Detection	8 red LEDs to indicate out of range or broken wire conditions
Bus Current Required	280 mA
Power Dissipation	1.5 W
External Power	Not required for this module

Note:

1. Absolute accuracy includes all errors from the internal CJC, TC – curvature, offset plus gain, for module temperature of 0 ... 60° C. User supplied TC errors not included.
2. For Type J and K, add 1.5° C inaccuracy for temperatures below -100° C.
3. Type B cannot be used below 130° C.
4. All TC ranges have an open TC detect and upscale output. This results in a reading of 7FFFh or 32767 decimal when an open TC is detected.

Wiring Diagram The following figure shows the ATI03000 wiring diagram.



Note:

1. Either shielded or unshielded TCs may be used. (The user should consider using shielded wire in a noisy environment.) Shielded types should have a shield tied to earth ground near the signal source end.
2. Connections marked **Not Used** are not electrically connected within the module. These points are used as a thermal link to ambient air. They are not recommended as electrical tie points as this could affect the accuracy of cold junction compensation.

140AVI03000 I/O Analog IN 8 Channel Bipolar Module

Overview

The Analog In 8 Channel Bipolar module accepts a mix of current and voltage inputs. Jumpers are required between the input and sense terminals for current inputs.

Specifications

The following table shows the specifications for the AVI03000 ANALOG IN module.

Specifications			
Number of Channels	8 Differential		
LEDs	Active F 1 ... 8 (Red) – Indicated channel is out of range or broken wire condition is detected (4 ... 20mA)		
Required Addressing	9 Words In		
Input Ranges (Selectable on a per-channel basis)			
Bipolar	+/- 10 Vdc	+/- 5 Vdc	+/- 20 mA
Unipolar	0 ... 10 Vdc	0 ...5 Vdc	0 ... 20 mA
Unipolar w/Offset	1 ... 5 Vdc	4 ... 20 mA	
Voltage Input			
Linear Measuring Range	(Input range) x 1.024		
Absolute Maximum Input	50 Vdc		
Input Impedance	>20 MΩ		
Current Input			
Linear Measuring Range	(Input range) x 1.024		
Absolute Maximum Input	25 mA		
Input Impedance	250Ω + 0.03%		
Resolution			
16 Bit	+/- 10 Vdc, 0 ... 10 Vdc		
15 Bit	+/- 5 Vdc, 0 ... 5 Vdc, +/- 20 mA, 0 ... 20 mA		
14 Bit	1 ... 5 Vdc, 4 ... 20 mA		
Absolute Accuracy Error @ 25° C Voltage Mode (Add +/- 0.03% in Current Mode)	Typical: +/- 0.03% Maximum: +/- 0.05% of full scale		
Linearity	+/- 0.008%		
Accuracy Drift w/Temperature	Typical: +/- 0.0015% of full scale / °C Maximum: +/- 0.004% of full scale / °C		
Common Mode Rejection	> -80 dB @ 60Hz		
Input Filter	Single pole low pass, -3dB cutoff @ 847Hz, +/- 20%		
Isolation			
Channel to Bus	750 Vdc, 500 Vac rms, for 1 minute		
Channel to Channel	200 Vdc, 135 Vac rms max		
Update Time	10 ms for all channels		

Specifications	
Fault Detection	Broken wire in 4 ... 20 mA mode, out of range in 1 ... 5 V mode
Bus Current Required	280 mA
Power Dissipation	2.2 W
External Power	Not required for this module

Note: Calibration is not required for this module.

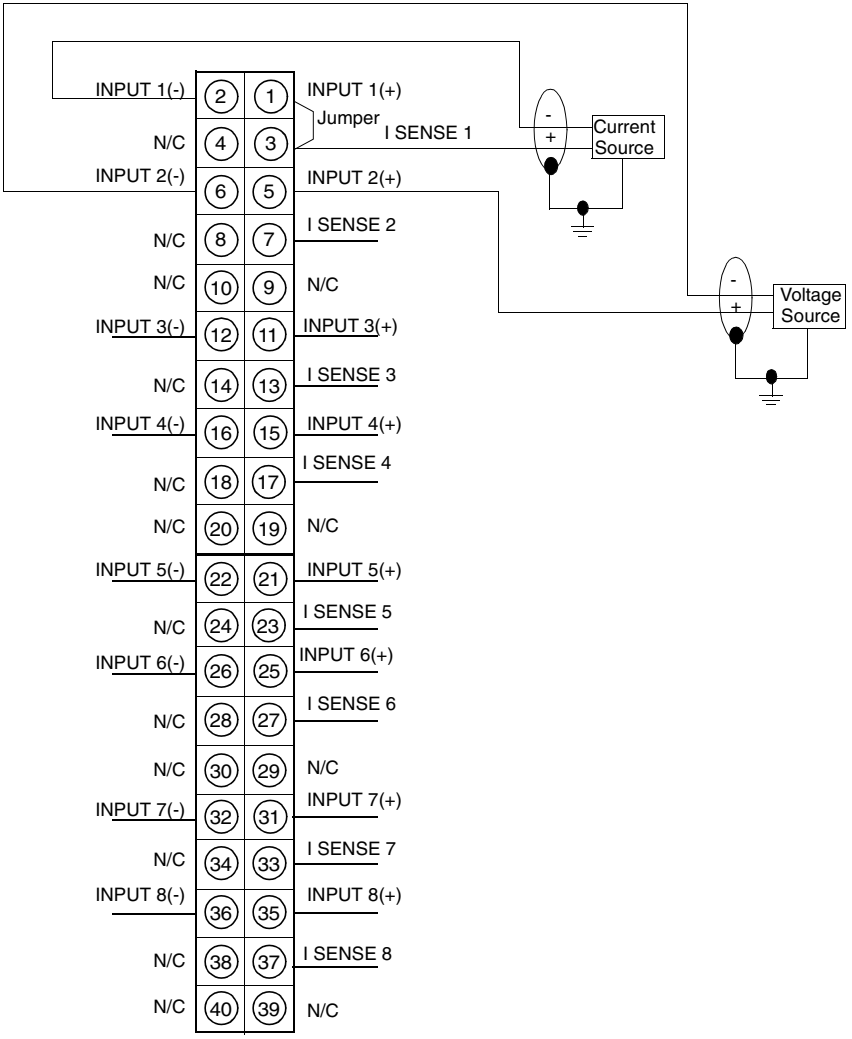
Linear Measuring Ranges

The following table shows the linear measuring ranges for the 140AVI03000 Analog Input Module.

Data Format	Input Range	Under Warning	Normal	Over Warning
16-bit Format	+/- 10 V	< 768	768 ... 64,768	> 64,768
	+/- 5 V, +/- 20 mA	< 16,768	16,768 ... 48,768	> 48,768
	0 ... 10 V		0 ... 64,000	> 64,000
	0 ... 5 V, 0 ... 20 mA		0 ... 32,000	> 32,000
	1 ... 5 V, 4 ... 20 mA	<6,400	6,400 ... 32,000	> 32,000
Voltmeter* Format	+/- 10 V	< -10,000	-10,000 ... 10,000	> 10,000
	+/-5 V, +/- 20 mA	< -5,000	-5,000 ... 5,000	> 5,000
	0 ... 10 V		0 ... 10,000	> 10,000
	0 ... 5 V, 0 ... 20 mA		0 ... 5,000, 0 20,000	> 5,000
	1 ... 5 V, 4 ... 20 mA	< 1,000	1,000 ... 5,000, 4,000 ... 20,000	> 5,000
	+/- 20 mA	< -20,000	-20,000 ... 20,000	> 20,000
	0 ... 20 mA		0 ... 20,000	> 20,000
	4 ... 20 mA	< 4,000	4,000 ... 20,000	> 20,000
12-bit Format	+/- 10 V	0	0 ... 4,095	4,095
	+/- 5 V, +/- 20 mA	0	0 ... 4,095	4,095
	0 ... 10 V		0 ... 4,095	4,095
	0 ... 5 V, 0 ... 20 mA		0 ... 4,095	4,095
	1 ... 5 V, 4 ... 20 mA	0	0 ... 4,095	4,095

*The Voltmeter ranges are listed in signed integer format.

Wiring Diagram The following figure shows the AVI03000 wiring diagram.



Note:

1. The current and voltage sources are supplied by the user (fusing is at the discretion of the user).
2. Either shielded or unshielded signal cables may be used. Shielded types should have a shield tied to earth ground near the signal source end.
3. To prevent improper fault indications, unused inputs should have the + (plus) and – (minus) inputs tied together and be configured for a bipolar input range.
4. N / C = Not Connected.

18.3 Analog Output Modules

At a Glance

Overview

This section provides information on Quantum analog output modules.

What's in this Section?

This section contains the following topics:

I/O Configuration for Analog Output Modules

Overview

This section provides information on the configuration of analog output modules. These modules are:

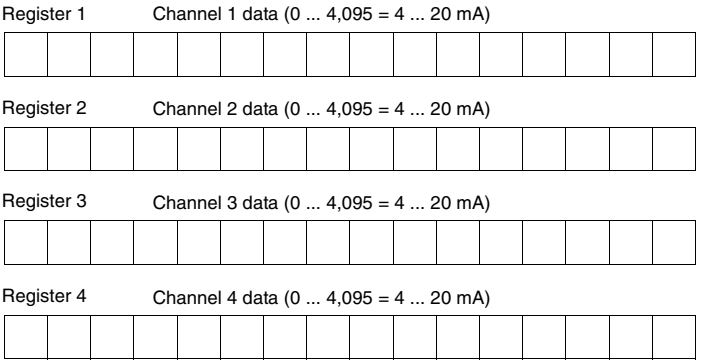
- 140ACO02000
- 140ACO13000
- 140AIO33000
- 140AVO02000

140ACO02000

The following information pertains to configuration of the 140ACO02000 Analog Output module.

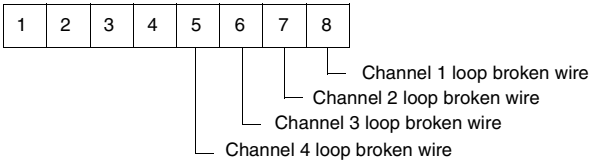
I/O Map Register Assignment

This module requires four contiguous output (4x) registers, which are assigned as follows. The following figure shows the register assignments.



I/O Map Status Byte

The four least significant bits in the I/O map status byte are used for the 140ACO02000 Output module. The following figure shows the status byte register.



Modsoft Module Zoom Selections

Push <Enter> to display and select the timeout states for each channel. Timeout state is assumed when system control of the module is stopped.

Channel X Timeout State (per channel)

Disabled
Last Value
User Defined

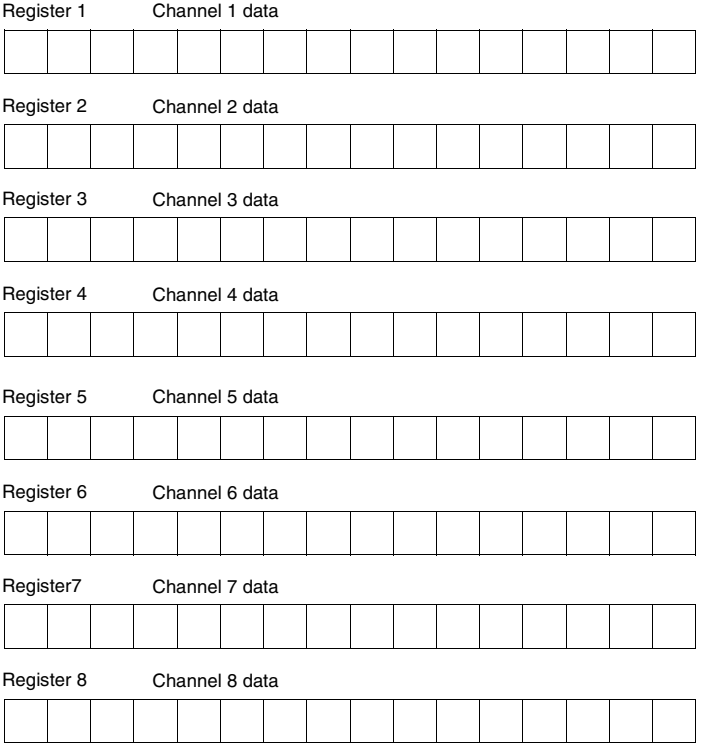
Channel X User Defined Timeout Value: 0 DEC

140ACO13000

The following information pertains to configuration of the 140ACO13000 analog current sink output module.

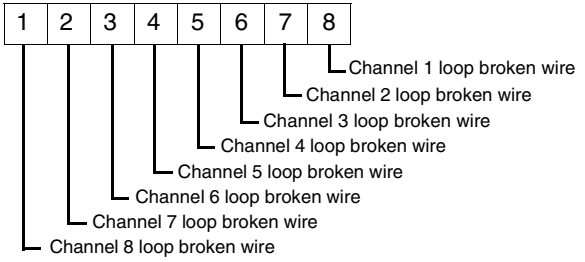
I/O Map Register Assignment

This module requires eight contiguous output (4x) registers, which are assigned as follows. The following figure shows the map register assignment.



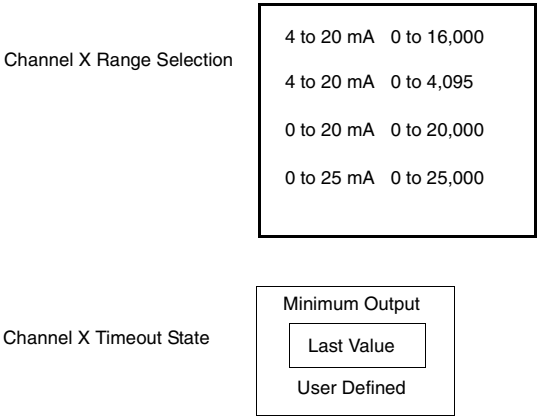
I/O Map Status Byte

The I/O map status is used for the 140ACO13000 output module as follows:



Modsoft Module Zoom Selections

Push <Enter> to display and select channel ranges and timeout states for each channel. Time out state is assumed when system control of the module is stopped. The following figure shows the Channel X timeout state options.

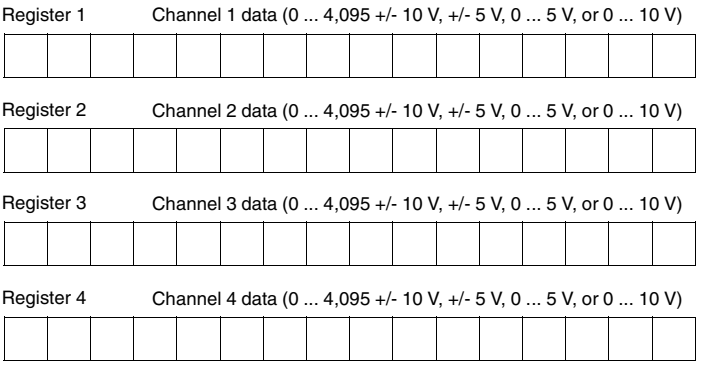


140AVO02000

The following information pertains to configuration of the 140AVO02000 Analog Output module.

I/O Map Register Assignment

This module requires four contiguous output (4x) registers, which are assigned as follows .

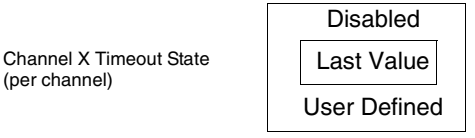


I/O Map Status Byte

There is no I/O map status byte associated with this module.

Modsoft Module Zoom Selections

Push <Enter> to display and select the timeout states for each channel. Timeout state is assumed when system control of the module is stopped.
The following figure shows the Channel X timeout state options.



Note: Selecting "Disabled" for any channel causes all others to default to that state. Output will be what is connected to the module master override terminals, either common or an external voltage. Output LEDs 1-4 will go out when Disabled is selected and the module goes to the inactive state.

140ACO02000 Quantum I/O Analog Current Out Module

Overview

The Analog Output 4 Channel Current module controls and monitors current in 4 ... 20 mA loops.

Specifications

The following table shows the module specifications.

Specifications	
Number of Channels	4
LEDs	Active F 1 ... 4 (Green) - Module outputs switched on 1 ... 4 (Red) - Broken wire on indicated channels NOTE: When the green channel status LEDs are off, the loop current is 0 mA.
Required Addressing	4 Words Out
Loop Voltage	12 ... 30 Vdc. Up to 60 Vdc with an external loop resistor. Outputs are short circuit proof up to 30 Vdc (up to 60 Vdc with external loop resistor).
Loop Resistance	$R_{MIN}* = \frac{V_{loop} - 30Vdc}{0{,}02A}$ *For a loop supply less than 30 volts, $R_{MIN\ is\ 0W}$. $R_{MAX} = \frac{V_{loop} - 7Vdc}{0{,}02A}$ No external resistor is required for loop voltage supply less than 30 volts.
Internal Voltage Drop	7 Vdc min, 30 Vdc max @ 20 mA
Resolution	12 Bits
Accuracy Error @ 25° C	+/- 0.20% of full scale
Linearity	+/- 1 LSB
Accuracy Drift w/Temperature	Typical: 0.004% of full scale / °C. Maximum:0.007% of full scale / °C
Isolation	
Channel to Channel	500 Vac @ 47 ... 63 Hz or 750 Vdc for 1 minute
Channel to Bus	1780 Vac @ 47 ... 63 Hz, or 2500 Vdc for 1 minute

Specifications	
Update Time	3 ms for all channels (simultaneous update)
Settling Time	900 µs to +/- 0.1% of the final value
Fault Detection	Open circuit in 4 ... 20 mA mode. Specific channel is identified when an open circuit is detected through the red channel LED.
Bus Current Required	480 mA
Power Dissipation	5.3 W max
External Power Supply	See Loop Voltage in this table.
Fusing	
Internal	None

WARNING

Possible injury to personnel or equipment.

Before removing the connector, ensure that it is safe to have field wiring in an open circuit condition.

Failure to follow this precaution can result in death, serious injury, or equipment damage.

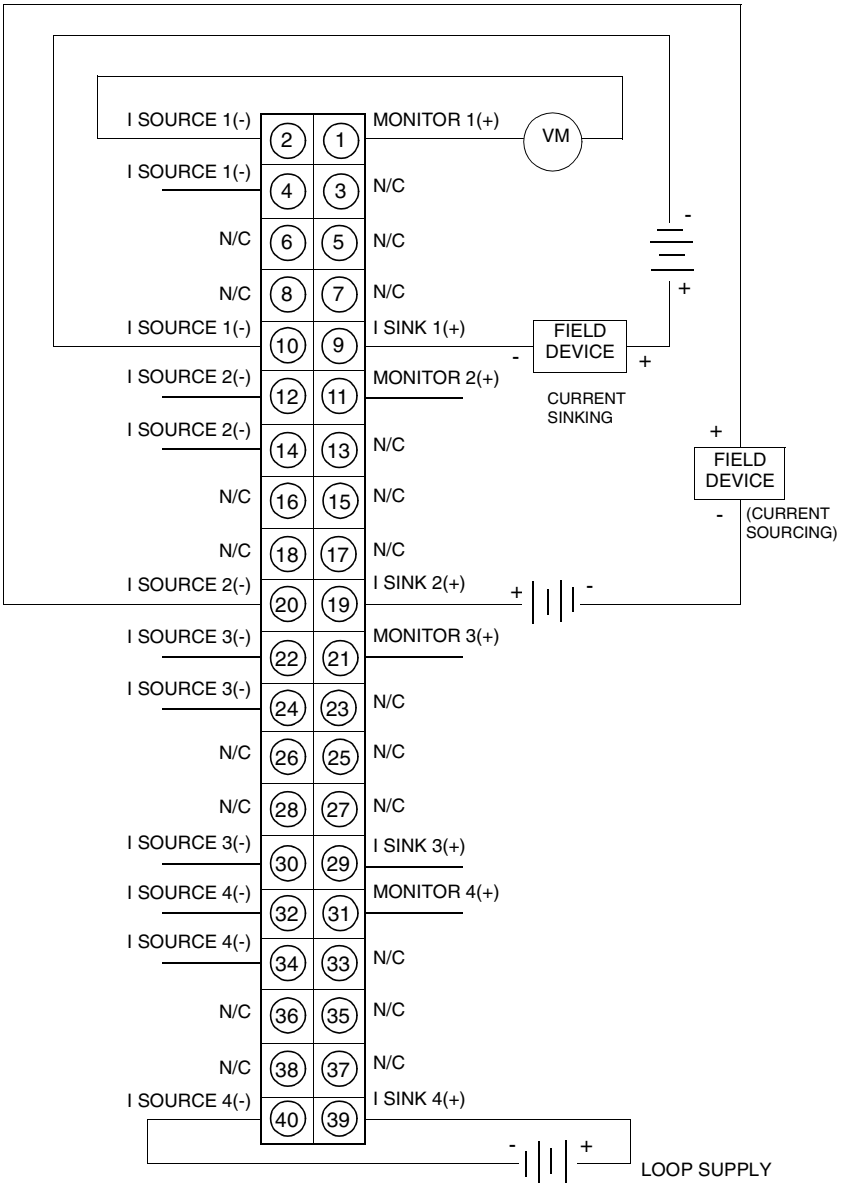
Voltmeter Monitor Specifications

The following table shows the voltmeter monitor specifications.

Voltmeter Monitor Specifications	
Range	1 ... 5 V (Main current loop must be active)
Scaling	V_{OUT} (Volts) = I_{LOOP} (mA) x 0.25
Output Impedance	300Ω Typical
Wire Length	1 m max

ACO02000 Wiring Diagram

The following figure shows the wiring diagram for the 140ACO02000 module.



Note:
1. Unused channels will indicate broken wire status unless wired to the loop supply, as shown on Channel 4. In this example, loop supply must be 30 V or less.
2. VM is an optional voltmeter that can be connected to read voltage that is proportional to the current. Wiring to this terminal is limited to 1 meter maximum.
3. The wiring example shows Channel 1 acting as a current sink and Channel 2 acting as a current source for their respective field devices.
4. N / C = Not Connected.

Note: At power up, the channel outputs are all disabled (current = 0). Configuring any channel as disabled will cause all channels to be disabled when a communication loss occurs.

140ACO13000 High Density Analog Out I/O Module

Overview

The 140ACO13000 is an eight channel analog output module used to control and monitor current in 4 ... 20 mA, 0 ... 20 mA, and 0 ... 25 mA loops.

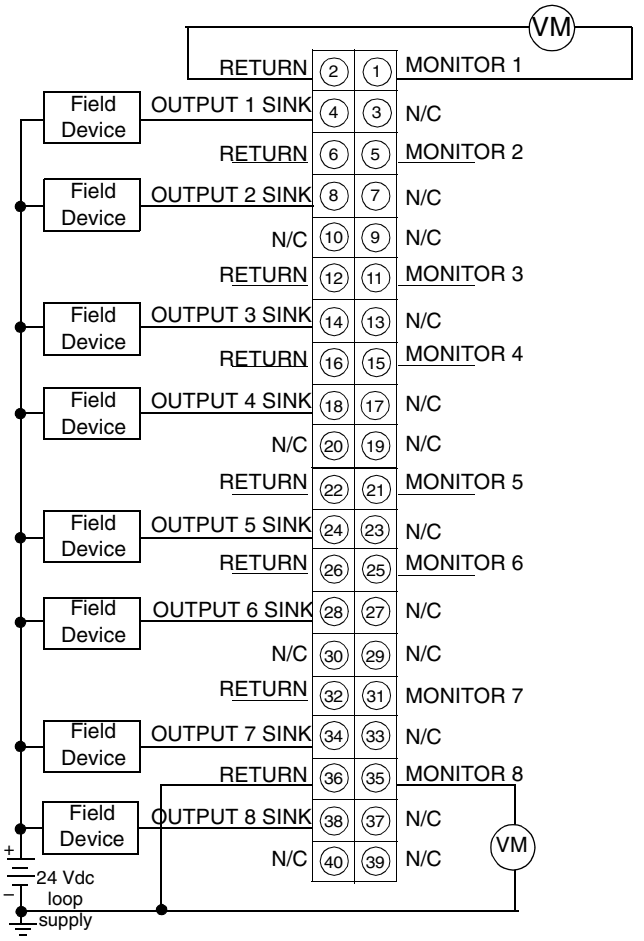
Specifications

The following table shows the technical specifications for the ACO13000 module.

Specifications	
Number of Channels	8
LEDs	Active, indicates bus communication present F, indicates a fault on a channel 1 ... 8 (Green) - Module outputs active 1 ... 8 (Red) - Broken wire on indicated channels
Required Addressing	8 Words Out
Module Ranges and Resolution	0 ... 25 mA, 0 ... 25,000 counts 0 ... 20 mA, 0 ... 20,000 counts 4 ... 20 mA, 0 ...16,000 counts 4 ... 20 mA, 0 ...4,095 counts
Loop Voltage	6 ... 30 Vdc maximum
Internal Voltage Drop	6 Vdc min, 30 Vdc max @ 25 mA
Accuracy Error @ 25 ° C	+/- 0.2% of full scale
Linearity	+/-12 µA, 4 ... 20 mA, 0 ... 4,095 counts +/-4 µA, 0 ... 25 mA, 0 ... 25,000 counts +/-4 µA, 0 ... 20 mA, 0 ... 20,000 counts +/-4 µA, 4 ... 20 mA, 0 ... 16,000 counts
Accuracy Drift w/Temperature	Typical: 0.004% of full scale / °C. Maximum: 0.007% of full scale / °C
Isolation	
Channel to Channel	none
Field to Bus	1780 Vac for 1 minute
Update Time	5 ms for all 8 channels
Settling Time Full Scale **Step Change**	1.6 ms to 5% of the final value 3.2 ms to 0.1% of the final value
Fault Detection	Broken wire in 4 ... 20 mA mode.
Bus Current Required	550 mA
Power Dissipation	5.0 W
External Power Supply	See Loop Voltage above

Specifications	
Fusing	
Internal External	None None
Voltmeter Monitor	
Scaling	V_{OUT} (Volts) = I_{LOOP} (mA) x 0.10
Accuracy @ 25° C	+/- 0.2% of full scale
Output Impedance	300 Ω
Maximum Cable Length	1 meter
Programming Software	Modsoft Ver 2.6 or Concept 2.2

Wiring Diagram 140ACO130 Wiring Diagram



Notes on Wiring Diagram

1. At power up, channel outputs are all at zero current (0 mA).
2. VM is an optional voltmeter that can be connected to read voltage that is proportional to the current. Wiring to this terminal is limited to 1 meter maximum.
3. Either shielded or unshielded cables may be used. In noisy environments, twisted shielded cable is recommended. Shielded cable should have a shield tied to earth ground near the signal source end.
4. Unused outputs may cause the activation of the F (fault) LED. To avoid this occurrence the unused channels should be configured in the 0 ... 25 mA range.
5. All terminals labeled ‘RETURN" are common inside the module.
6. N/C = Not connected

140AVO02000 Quantum I/O Analog Voltage Out Module

Overview

The Analog Out 4 Channel module outputs voltages in mixed modes and levels. These are selected using jumpers on the field-wiring connector.

Specifications

The following table shows the specifications for the AVO02000 Analog Out 4 channel module.

Specifications	
Number of Channels	4
LEDs	Active 1 ... 4 (Green) - Indicates module outputs switched on NOTE: When the green channel status LEDs are off, the module is not generating outputs, however, an output may still be present if the master override signal is used.
Required Addressing	4 words out
Voltage Output Ranges	
Bipolar	+/- 10 Vdc (Min load resistance = 1 kΩ) (Jumper between Reference - Control terminals)
	+/- 5 Vdc (Min load resistance = 500Ω) (Jumper between Reference - Control and Output - R terminals)
Unipolar	0 ... 10 Vdc (Min load resistance = 1 kΩ) (Jumper between Output - R terminals)
	0 ... 5 Vdc (Min load resistance = 500Ω) (Jumper between Output - R and Control - R terminals)
Output Current	+/- 10 mA max any range (outputs are short-circuit proof)
Source Resistance	0.1 Ω
Resolution	12 bits
Accuracy Error @ 25 degrees	+/- 0.15% of full scale
Accuracy Drift w/Temperature	
Unipolar Ranges	0.003% of full scale / °C typical 0.005% of full scale / °C max
Bipolar Ranges	0.004% of full scale / °C typical 0.007% of full scale / °C max
Linearity	+/- 1 LSB
Isolation	
Channel to Channel	500 Vac @ 47 ... 63 Hz for 1 minute

Specifications	
Channel to Bus	1780 Vac @ 47 ... 63 Hz for 1 minute
Maximum Settling Time	700 µs to +/- 0.1% of the final value
Update Time	3 ms for all channels
Fault Detection	None
Wire Length	400 m max
Bus Current Required	700 mA
Power Dissipation	4.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	An external fuse is required on the master override signal when it is connected to an external source. The required fuse is 1/16 A or 0.063 A fuse. Fuse Type: 3AG Fast Acting 1/16 A, 250 V Fuse Holder: 3AG Fuse Type The external fuse is not required if master override is connected to common.

WARNING

Possible injury to personnel or equipment

Before removing the connector, ensure that it is safe to have field wiring in an open circuit condition.

Failure to follow this precaution can result in death, serious injury, or equipment damage.

WARNING

Malfunction of equipment

Master override must be connected to an external source through 1/16 A in line fuse, or strapped to common to avoid erroneous outputs in this module.

Failure to follow this precaution can result in death, serious injury, or equipment damage.

Note: The output levels of this module are either those generated within the module based on data inputs from the system, or from the master override inputs on the field-wiring terminal strip.

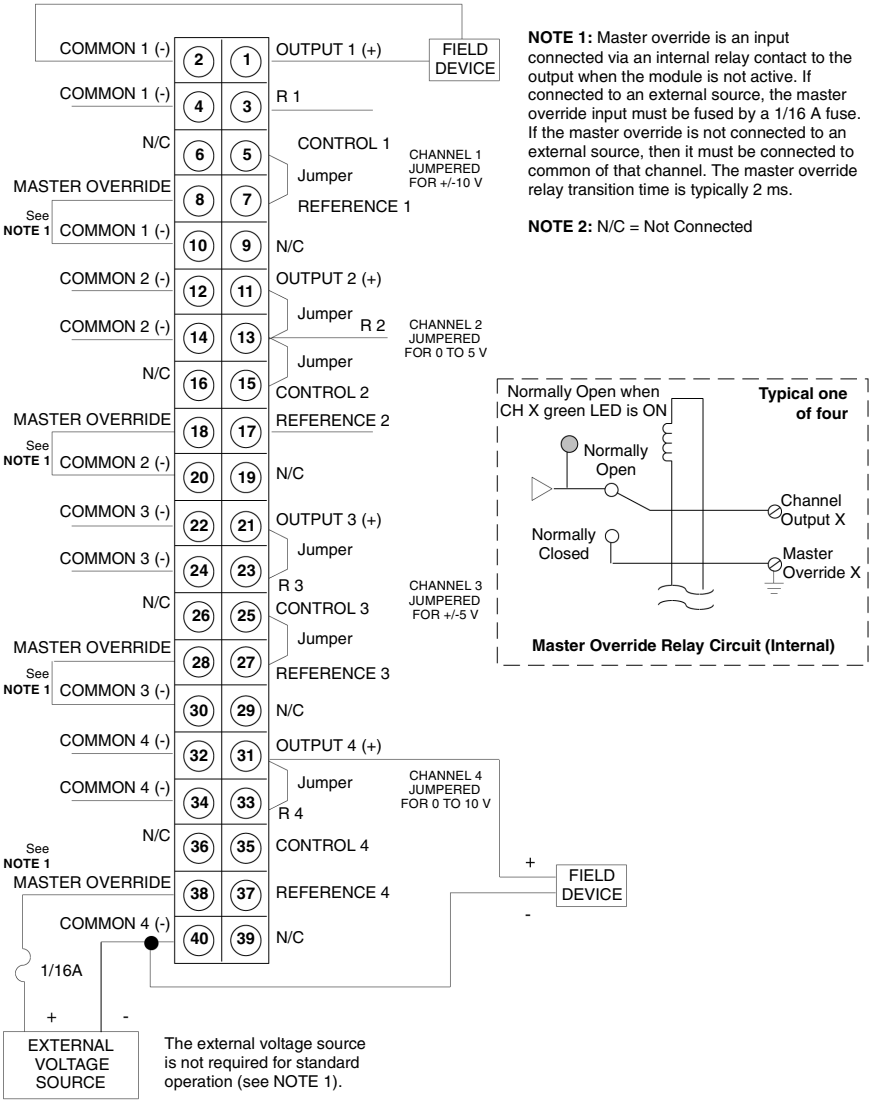
During normal operation, the front panel Active and 1 ... 4 green LEDs are ON. If bus communication to the module stops for any reason, the Active LED will go off and, depending on panel software configuration:

- when LEDs 1 ... 4 are ON, the channel output levels will be as predetermined and held by the module.
- when LEDs 1 ... 4 are OFF, the master override levels are output on each channel.

If module power is lost or the module fails, the master override levels will be output.

The master override inputs must be from an external supply with a source impedance of <200Ω or tied to system common. These inputs for channels that are in use should not be allowed to float and may be unique for each.

Wiring Diagram The following figure shows the wiring diagram for the 140AVO02000 module.



18.4 Analog Input/Output Modules

At a Glance

Overview

This section provides information on Quantum Analog input/output modules.

What's in this Section?

This section contains the following topics:

Configuration of the 140AMM09000 Analog Input/Output Module

Overview

This section provides information on configuration of the analog input/output module 140AMM09000.

Note: Modsoft V2.2 or above is required to set up your Quantum I/O configuration.

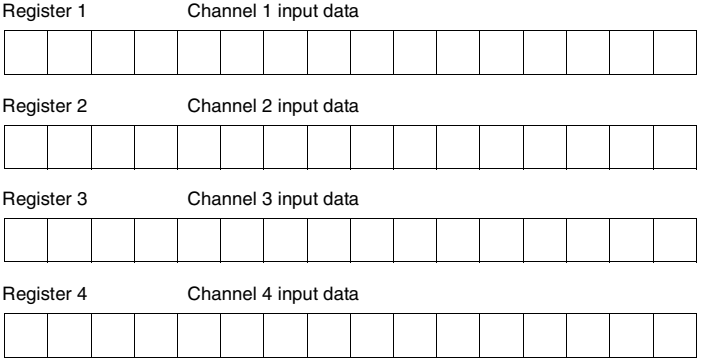
I/O Map Register Assignment

This module requires five contiguous input (3x) registers and two output (4x) registers.

3X Registers

The following figure shows the 3x registers.

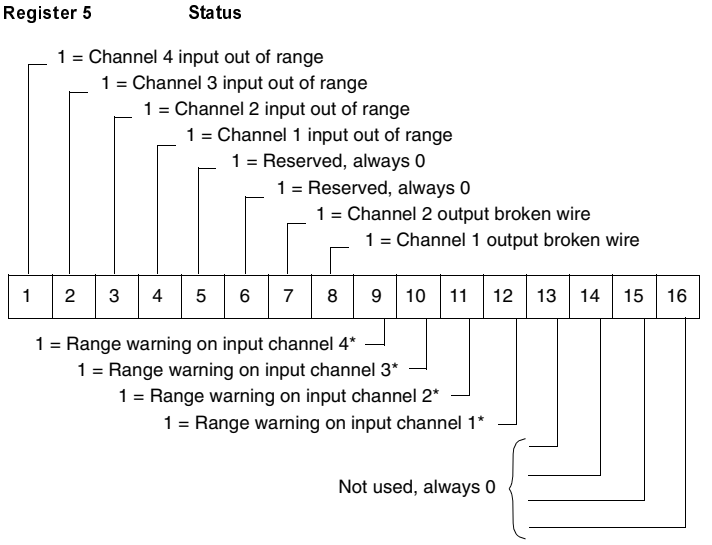
3x Registers



Note: The input data format and resolution are selected in Zoom screen. Voltmeter mode is recommended for bipolar ranges with signed decimal numbers.

Status Warning

The following figure shows the status warnings for register 5.



*A range warning is issued when a channel input is outside the rated input value, as shown in the following table. Warning bits stay on after out of range bits are set. An out-of-range bit is set when a channel input exceeds the rated input value by 2.4%. Out of range bits are also set if inputs drop below 0.5V (1 ... 5V mode) or 2.08 mA (4 ... 20 mA mode).

When configured for current inputs (jumper installed between IN(+) and SENSE terminals), a broken field wire results in a zero current reading. If 4 ... 20 mA is selected, fault LEDs and warning/out of range and I/O Map Status Byte bits are displayed.

CAUTION

Possible Equipment Failure

When configured for voltage inputs (no jumper installed between In(+) and sense terminals), if a broken field wire occurs, readings will be non-zero and not predictable.

Failure to follow this precaution can result in injury or equipment damage.

Linear Measuring Ranges

The following table shows the linear measuring ranges for the 140AMM09000 combination Analog module.

Data Format	Input	Under Warning	Normal	Over Warning
16-bit Format	+/- 10 V	< 768	768 ... 64,768	> 64,768
	+/- 5 V, +/- 20 mA	< 16,768	16,768 ... 48,768	> 48,768
	0 ... 10 V		0 ... 64,000	> 64,000
	0 ... 5 V, 0 ... 20 mA		0 ... 32,000	> 32,000
	1 ... 5 V, 4 ... 20 mA	< 6,400	6,400 ... 32,000	> 32,000
Voltmeter Format*	+/- 10 V	< -10,000	-10,000 ... 10,000	> 10,000
	+/- 5 V	< -5,000	-5,000 ... 5,000	> 5,000
	0 ... 10 V		0 ... 10,000	> 10,000
	0 ... 5 V		0 ... 5,000	> 5,000
	1 ... 5 V	< 1,000	1,000 ... 5,000	> 5,000
	+/- 20mA	< -20,000	-20,000 ... 20,000	> 20,000
	0 ... 20mA		0 ... 20,000	> 20,000
	4 ... 20mA	< 4,000	4000 ... 20,000	>20,000
12-bit Format	+/- 10 V	0	0 ... 4,095	4,095
	+/- 5 V, +/- 20 mA	0	0 ... 4,095	4,095
	0 ... 10 V		0 ... 4,095	4,095
	0 ... 5 V, 0 ... 20 mA		0 ... 4,095	4,095
	1 ... 5 V, 4 ... 20 mA	0	0 ... 4,095	4,095

4x Registers

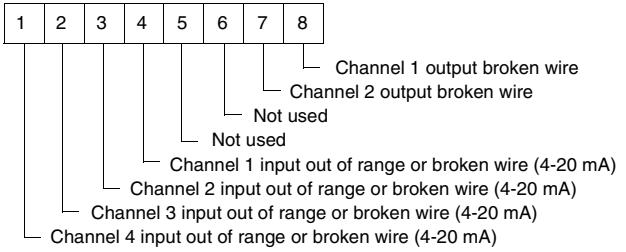
The following figure shows the 4X registers.

4x Registers

Note: The data format is always 0 ... 4095 decimal (in Modsoft).

I/O Map Status Byte

The I/O map status byte is used for the 140AMM09000 Combination module as follows.

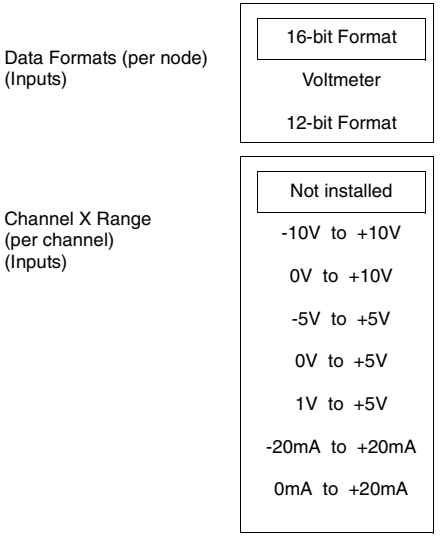


Module Zoom Selections

Module Zoom selection screens for selecting input ranges and output timeout states are as follows.

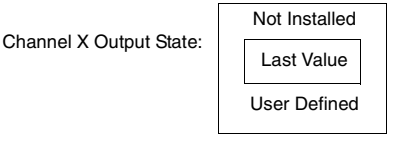
Module Zoom Selections (Inputs)

Push <Enter> to display and select the data format for the module and the ranges for the individual input channels.



Module Zoom Selections (Outputs)

Push <Enter> to display and select the mode for the outputs after a communication's timeout. This mode is selected for each channel. The following figure shows the module zoom selections (outputs).



Not installed = Disabled with output current equal to 0 for all conditions. No error generated for this channel.

Channel X User Defined Output Value: 0 DEC

140AMM09000 Analog Input/Output Module

Overview

The Analog In/Out 4/2 bi-directional module combines four analog inputs which accept a mix of current and voltage, with two isolated analog outputs that control and monitor current in 4 ... 20 mA loops.

Topology Specifications

The following table shows the topology specifications for the analog input/output module.

Topology Specifications	
Number of Input Channels	4 channels
Number of Output Channels	2 isolated channels
LEDs	Active F (red) - No power applied to the output group(s) or channel fault 1 ... 2 (Green - left column) - Indicates output is active 1 ... 2 (Red - middle column) - Indicates output status: broken wire 1 ... 4 (Red- right column) - Indicates input status: under/over range, broken wire 4 ... 20 mA

Input Specifications

The following table shows the input specifications for the analog input/output module.

Input Specifications				
Operating Ranges				
Bipolar	+/- 10 Vdc	+/-5 Vdc	+/- 20 mA	
Unipolar	0 ... 10 Vdc	0 ... 5 Vdc	0 ... 20 mA	
Unipolar w/Offset	1 ... 5 Vdc	4 ... 20 mA		
Voltage Input				
Linear Measuring Range	2.4% over and under range			
Absolute Maximum Input	+/- 50 Vdc			
Input Impedance In Range	>10 MΩ			
Input Impedance Over Range	> 0.5 MΩ			
Current Input				
Linear Measuring Range	+2.4% over range, and -9.6% under range			
Absolute Maximum Input	+/- 25 mA			
Input Impedance	250Ω			
Resolution				
16 Bit	+/- 10 Vdc	0 ...10 Vdc		
15 Bit	+/- 5 Vdc	0 ... 5 Vdc	+/-20 mA	0 ... 20 mA
14 Bit	1 ... 5 Vdc	4 ... 20 mA		
Absolute Accuracy Error @ 25° C (Voltage Mode)	Typical: Maximum:	+/- 0.03% +/- 0.05% of full scale		
Linearity	Monotonic +/- 1 LSB			
Offset 0 ... 60° C **Gain Shift 0 ... 60° C**	+/- 0.0014%/°C of full scale max +/- 0.002%/°C of full scale max			
Common Mode Rejection	Better than 80 dB @ 50 or 60 Hz			
Input Filter	Single pole low pass, -3dB @ 21 Hz, +/- 20%			
Operating Voltage				
Channel to Channel	+/- 40 Vdc max			
Isolation				
Channel to Bus	500 Vac, 750 Vdc, for 1 minute			
Input Channel to Output Channel	500 Vac, 750 Vdc, for 1 minute			
Update Time	320 ms for 4 channels			
Fault Detection	Open circuit in 4 ... 20 mA range, or over range, or under range in bipolar modes only			

Output Specifications

The following table shows the output specifications for the analog input/output module.

Output Specifications	
Loop Voltage	7 ... 30 Vdc, up to 60 Vdc with an external resistor
Loop Resistance	$R_{MIN}^{*} = \frac{V_{loop} - 30Vdc}{0,02A}$ $R_{MAX} = \frac{V_{loop} - 7Vdc}{0,02A}$ *No R_{MIN} is required for loop voltage less than 30 Vdc.
Internal Voltage Drop	7 Vdc min, 30 Vdc max @ 20 mA
Resolution (bits)	12
Accuracy Error @ 25° C	+/- 0.20% of full scale
Linearity	Monotonic +/- 1 LSB
Accuracy Error 0 ... 60° C	Typical: +/- 0.004%/°C of full scale. Maximum:+/- 0.007%/°C of full scale
Isolation	
Channel to Channel	500 Vac, 750 Vdc, for 1 minute
Channel to Bus	500 Vac, 750 Vdc, for 1 minute
Output Channel to Input Channel	500 Vac, 750 Vdc, for 1 minute
Update Time	15 ms for 2 channels
Settling Time	900 µs to +/- 0.1% of final value
Fault Detection	Open circuit indicator light and status byte
External Power Supply	See loop voltage above

Voltmeter Monitor Specifications

The following table shows the specifications for the voltmeter monitor for the analog input/output module.

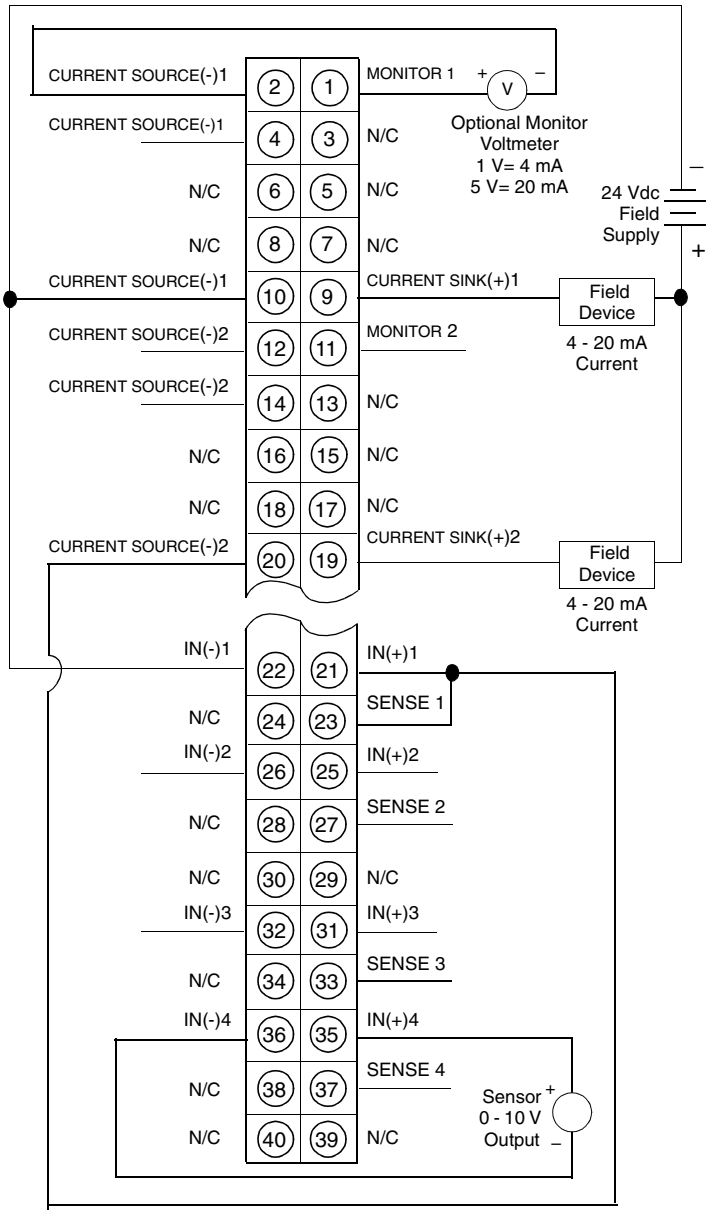
Voltmeter Monitor Specifications	
Range	1 ... 5 V (Loop current must be active)
Scaling	I_{OUT} (mA) x 0.250 = V_{OUT} (volts)
Output Impedance	300Ω typical
Maximum Wire Length	1 meter

Common Specifications

The following table shows the common specifications for the analog input/output module.

Common Specifications	
Required Addressing	5 Words In 2 Words Out
Bus Current Required (module)	350 mA
Fusing	
Internal	None required
External	User discretion

Wiring Diagram The following figure shows the wiring diagram for the 140AMM09000 analog input/ output module.



The following information pertains to the wiring diagram above.
Output Section 2 Channels

Typical Wiring Outputs	
Channel 1	The output shows a connection to an external field device and optional monitor.
Channel 2	The output shows a connection to an external field device and the input of channel 1.

Input Section 4 Channels

Typical Wiring Inputs	
Channel 1	Channel 1 shows 4 - 20 mA current input controlled by output section Channel 2.
Channel 4	The input shows a connection to a voltage output sensor.

Note:
1. Pins 1 ... 20 are outputs
   Pins 21 ... 40 are inputs
2. N / C = Not Connected
3. Jumpers are required between IN (+) and SENSE terminals for all current input ranges.

18.5 Discrete Input Modules

At a Glance

Overview

This section provides information on Quantum discrete input modules.

What's in this Section?

This section contains the following topics:

I/O Configuration for Discrete Input Modules

Overview

This section provides information on configuration of 16-, 24-, 32-, and 96-point input modules.

16-Point Input Modules

The 16-point input modules are:

- 140DAI34000 (AC Input 24 Vac 16x1)
- 140DAI44000 (AC Input 48 Vac 16x1)
- 140DAI54000 (AC Input 115 Vac 16x1)
- 140DAI54300 (AC Input 115 Vac 8x2)
- 140DAI74000 (AC Input 230 Vac 16x1)
- 140DDI84100 (DC Input 10 ... 60 Vdc 8x2 Sink)

I/O Map Register Assignment

The input modules listed above can be configured as either 16 contiguous 1x references or as one 3x register.The following figure shows the 16-point register.

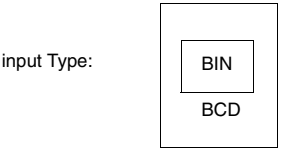
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

I/O Map Status Byte

There is no I/O map status byte associated with these modules.

Modsoft Module Zoom Selections

Push <Enter> to display and select the input type. This selection appears if the module is I/O mapped to a 3x register. The following figure shows the input type display.

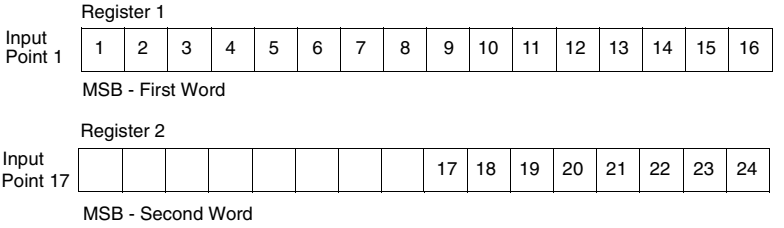


24-Point Input Module

There is only one 24-point input module: 140 DDI 673 00 (DC Input 125 VDC 3x8 Sink).

I/O Map Register Assignment

The input module listed above can be configured as either 24 contiguous discrete input (1x) reference, or as two contiguous input (3x) registers in the following format. The following figures show the input point for Register 1 and Register 2.

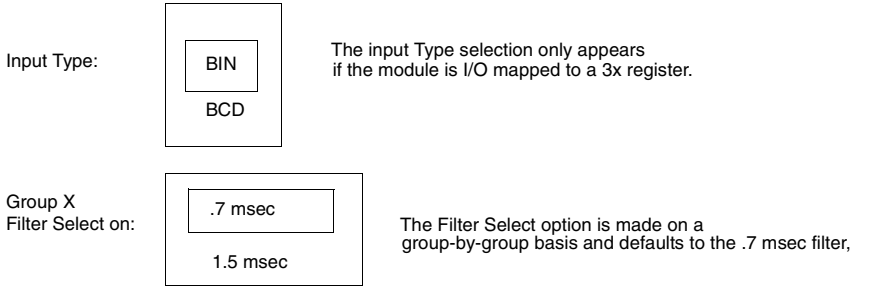


I/O Map Status Byte

There is no input I/O map status byte associated with this module.

Modsoft Module Zoom Selections

Push <Enter> to display and select the Input Type and the Filter Select options. The following figures show the input type and the filter select option.



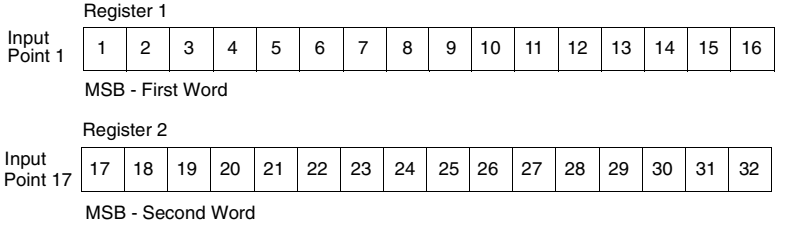
32-Point Input Modules

The 32-point input modules are as follows:

- 140DAI35300 (AC Input 24 Vac 4x8)
- 140DAI45300 (AC Input 48 Vac 4x8)
- 140DAI55300 (AC Input 115 Vac 4x8)
- 140DAI75300 (AC Input 230 Vac 4x8)
- 140DDI15310 (DC Input 5 V TTL 4x8 Source)
- 140DDI35300 (DC Input 24 Vdc 4x8 Sink)
- 140DDI35310 (DC Input 24 Vdc 4x8 Source)
- 140DDI85300 (DC Input 10 ... 60 Vdc 4x8 Sink)

I/O Map Register Assignment

The input modules listed above can be configured as either 32 contiguous discrete input (1x) references or as two contiguous input (3x) registers in the following format. The following figure shows the input points for Register 1 and Register 2.

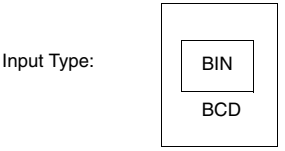


I/O Map Status Byte

There is no I/O map status byte associated with these modules.

Modsoft Module Zoom Selections

Push <Enter> to display and select the input type. This selection appears if the module is I/O mapped to a 3x register. The following figure shows the input type.



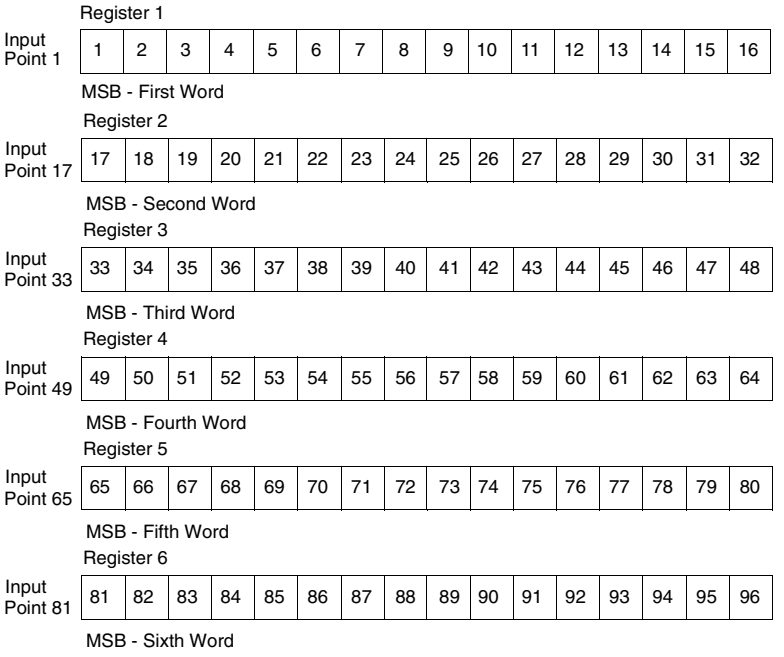
96-Point Input modules

The following is the only 96 point input module:

- 140DDI36400 - DC input 6 x 16 sink

140DDI36400 Register Assignment

The following information pertains to the 140DDI36400 Input module. The following figures show the output points for register 1 through 6.

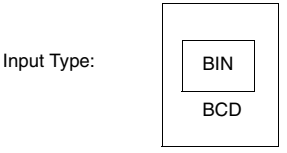


I/O Map Status Byte

There is no I/O map status byte associated with this module.

Modsoft Module Zoom Selections

Push <Enter> to display and select the input type. This selection appears if the module is I/O mapped to a 3x register. The following figure shows the input type.



140DAI34000 Quantum I/O 24 VAC IN Module

Overview

The AC Input 24 Vac 16x1 module accepts 24 Vac inputs.

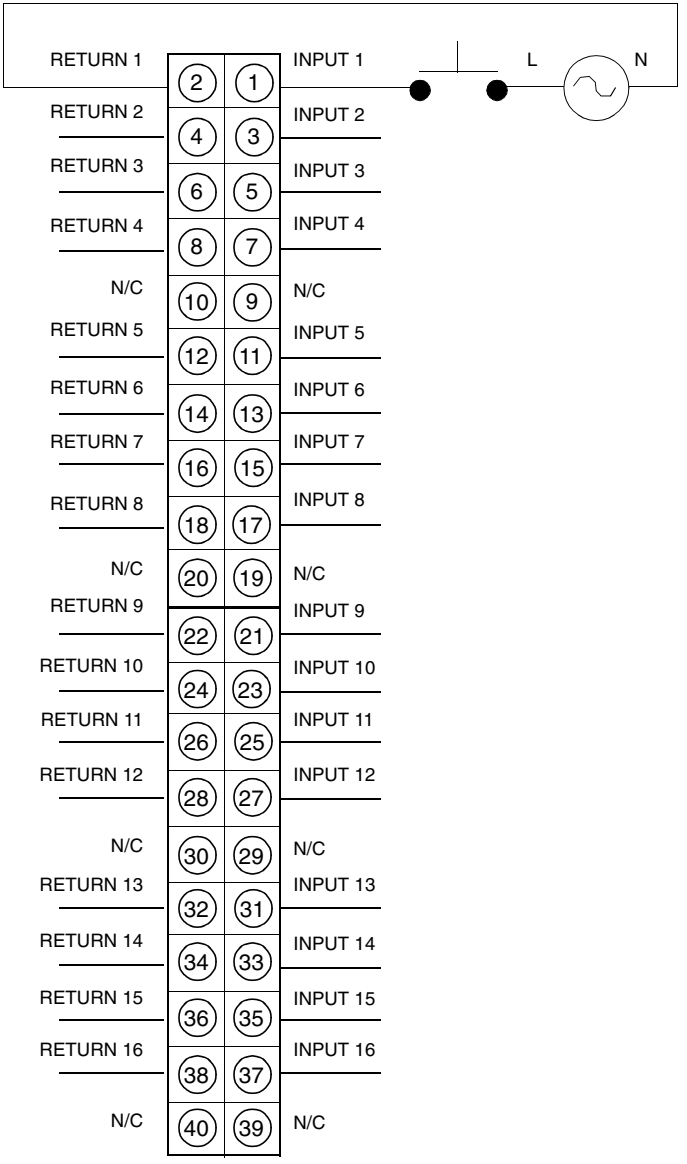
Specifications

The following table shows the specifications for the DAI34000 24 VAC IN module.

Specifications	
Number of Input Points	16 Individually Isolated
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 Word In
Operating Voltages and Input Currents*	
50 Hz Typical Input Impedance	ON: 14 ... 30 Vac (11.1 mA max) OFF: 0 ... 5 Vac 3.1 kΩ capacitive
60 Hz Typical Input impedance	ON: 12 ... 30 Vac (13.2 mA max) OFF: 0 ... 5 Vac 2.6 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	1.9 mA
Absolute Maximum Input	
Continuous	30 Vac
10 s	32 Vac
1 cycle	50 Vac
Response	
OFF - ON	Min 4.9 ms., Max 0.75 line cycle
ON - OFF	Min 7.3 ms., Max 12.3 ms
Isolation	
Input to Input	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	180 mA
Power Dissipation	5.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD (Total Harmonic Distortion) and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the DAI34000 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

140DAI35300 Quantum I/O AC Input 24 Vac Module

Overview The AC Input 24 Vac 4x8 module accepts 24 Vac inputs.

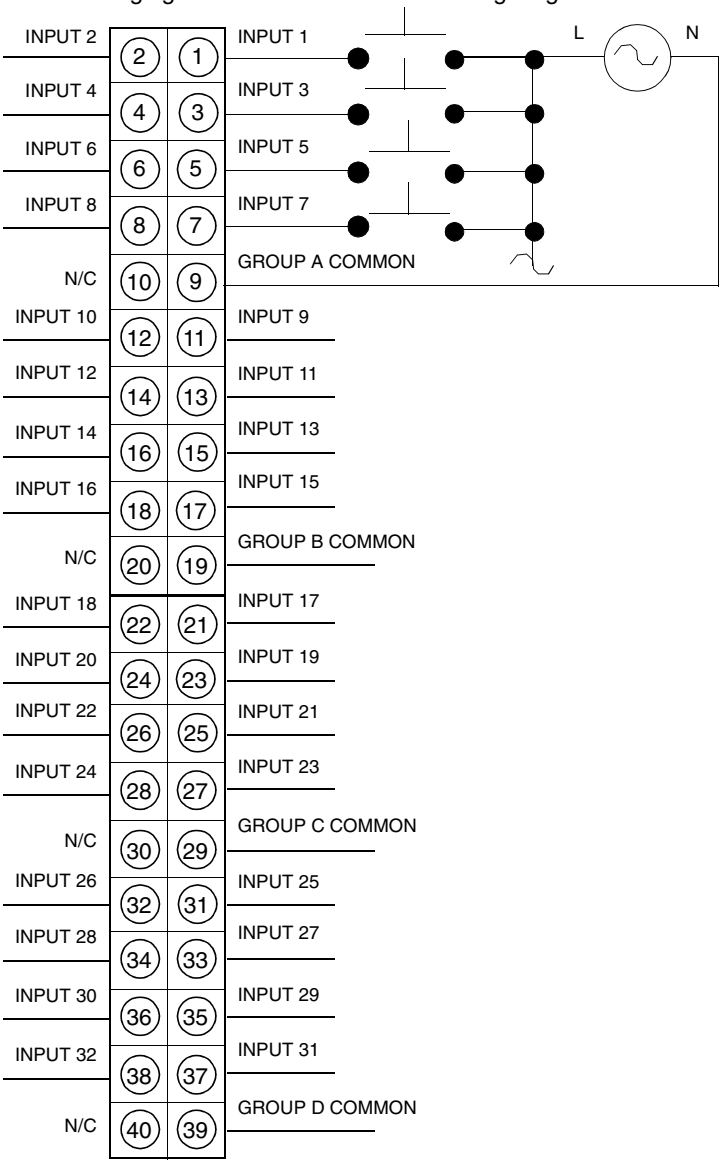
Specifications

The following table shows the specifications for the DAI35300 AC input 24 VAC IN module.

Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Operating Voltages and Input Currents*	
50 Hz Typical Input Impedance	ON: 14 ... 30 Vac (11.1 mA max) OFF: 0 ... 5 Vac 3.1 kΩ capacitive
60 Hz Typical Input Impedance	ON: 12 ... 30 Vac (13.2 mA max) OFF: 0 ... 5 Vac 2.6 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	1.9 mA
Input Frequency	47 ... 63 Hz
Absolute Maximum Input	
Continuous	30 Vac
10 s	32 Vac
1 cycle	50 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Group to Group	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	250 mA
Power Dissipation	10.9 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the DAI35300 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

140DAI44000 Quantum I/O 48 VAC IN Module

Overview The AC Input 48 Vac 16x1 module accepts 48 Vac inputs.

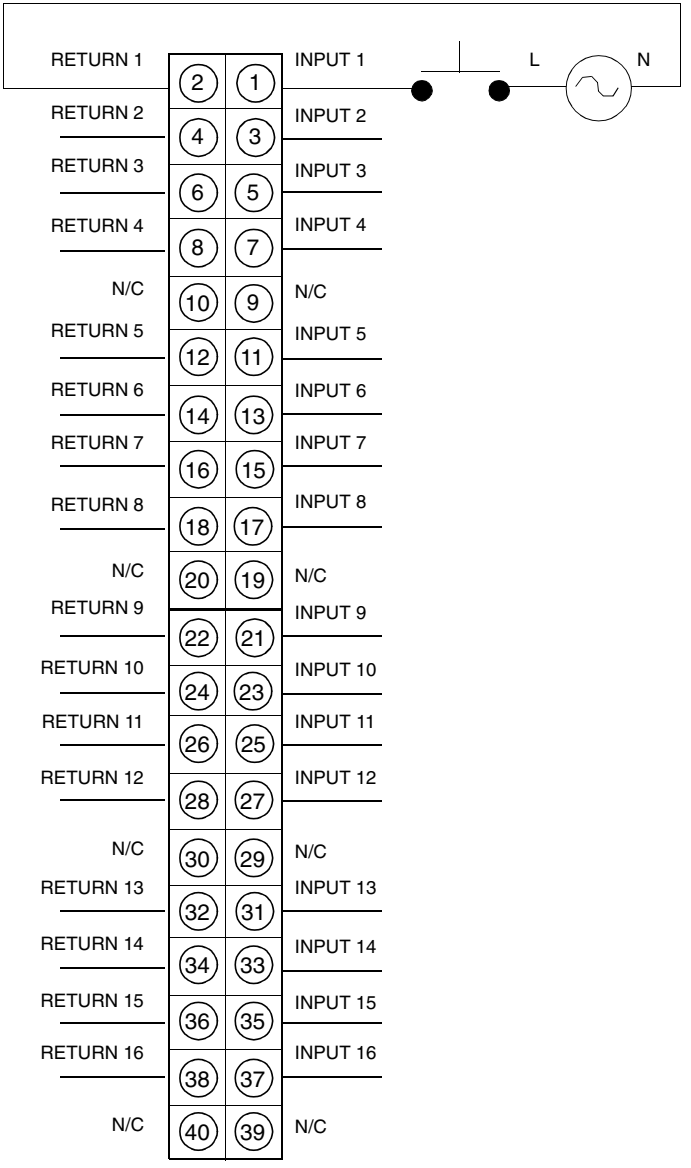
Specifications

The following table shows the specifications for the DAI44000 48 VAC IN module.

Specifications	
Number of Input Points	16 individually isolated
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word in
Operating Voltages and Input Currents*	
50 Hz Typical Input impedance	ON: 34 ... 56 Vac (9.8 mA max) OFF: 0 ... 10 Vac 6.8 kΩ capacitive
60 Hz Typical Input impedance	ON: 29 ... 56 Vac (11.7 mA max) OFF: 0 ... 10 Vac 5.6 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	1.7 mA
Absolute Maximum Input	
Continuous	56 Vac
10 s	63 Vac
1 cycle	100 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Input to Input	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	180 mA
Power Dissipation	5.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the DAI44000 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

140DAI45300 Quantum I/O AC Input 48 Vac 4x8 Module

Overview

The AC Input 48 Vac 4x8 module accepts 48 Vac inputs.

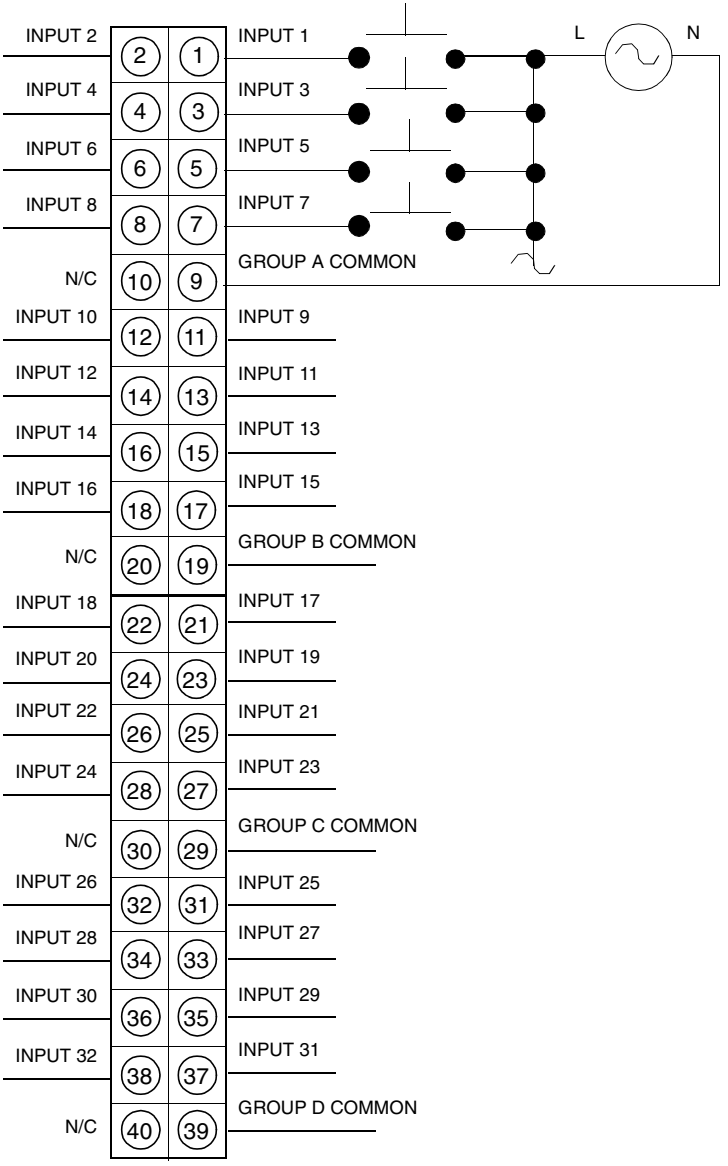
Specifications

The following table shows the specifications for the DAI45300 AC input 48 VAC IN module.

Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Operating Voltages and Input Currents*	
50 Hz Typical Input impedance	ON: 34 ... 56 Vac (9.8 mA max) OFF: 0 ... 10 Vac 6.8 kΩ capacitive
60 Hz Typical Input impedance	ON: 29 ... 56 Vac (11.7 mA max) OFF: 0 ... 10 Vac 5.6 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	1.7 mA
Input Frequency	47 ... 63 Hz
Absolute Maximum Input	
Continuous	56 Vac
10 s	63 Vac
1 cycle	100 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Group to Group	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	250 mA
Power Dissipation	10.9 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the DAI45300 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

140DAI54000 Quantum I/O 115 VAC In Module

Overview

The AC Input 115 Vac 16x1 module accepts 115 Vac inputs.

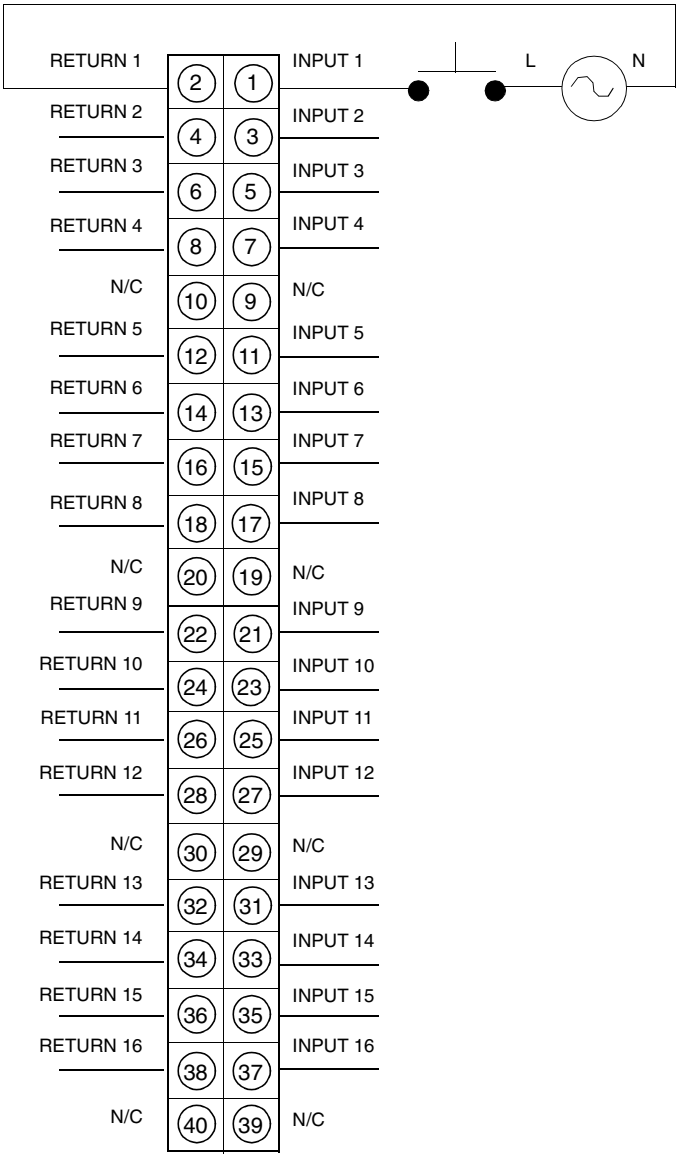
Specifications

The following table shows the specifications for the DAI54000 115 VAC IN module.

Specifications	
Number of Input Points	16 individually isolated
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word in
Operating Voltages and Input Currents*	
50 Hz Typical Input impedance	ON: 85 ... 132 Vac (11.1 mA max) OFF: 0 ... 20 Vac 14.4 kΩ capacitive
60 Hz Typical Input impedance	ON: 79 ... 132 Vac (13.2 mA max) OFF: 0 ... 20 Vac 12 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.1 mA
Absolute Maximum Input	
Continuous	132 Vac
10 s	156 Vac
1 cycle	200 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Input to Input	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	180 mA
Power Dissipation	5.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the 140DAI54000 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

140DAI54300 Quantum I/O AC Input 115 Vac 2x8 Module

Overview

The AC Input 115 Vac 2x8 module accepts 115 Vac inputs.

Specifications

The following table shows the specifications for the DAI54300 AC input 115 VAC IN module.

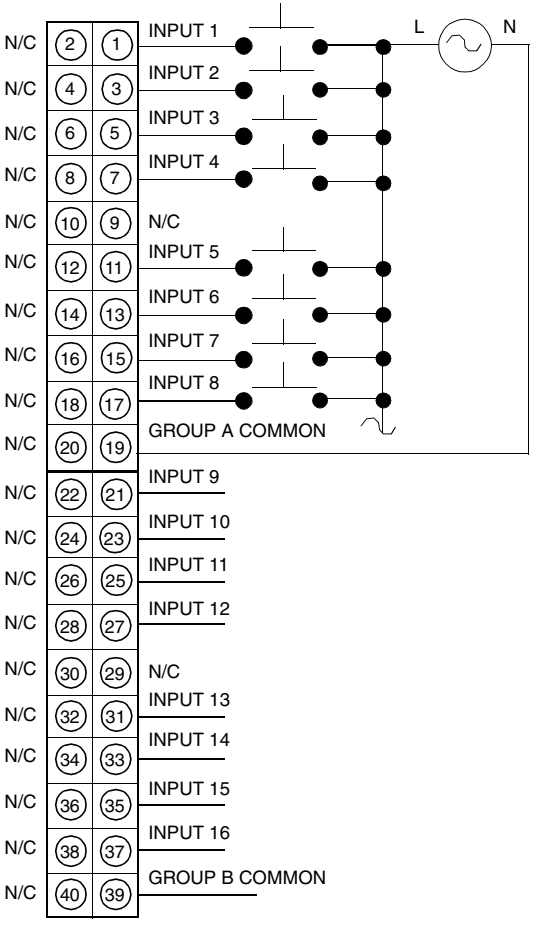
Specifications	
Number of Input Points	16 in two 8 point groups
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word in
Operating Voltages and Input Currents*	
50 Hz Typical Input Impedance	ON: 85 ... 132 Vac (11.1 mA max) OFF: 0 ... 20 Vac 14.4 kΩ capacitive
60 Hz Typical Input Impedance	ON: 79 ... 132 Vac (13.2 mA max) OFF: 0 ... 20 Vac 12 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.1 mA
Input Frequency	47 ... 63 Hz
Absolute Maximum Input	
Continuous	132 Vac
10 s	156 Vac
1 cycle	200 Vac
1.3 ms	276 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Input to Input	All inputs in a group must be from the same phase of line input voltage
Group-to-Group	1780 Vac rms for 1 minute
Input to Bus	1780 Vac rms for 1 minute

Specifications	
Fault Detection	None
Bus Current Required	180 mA
Power Dissipation	5.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram

The following figure shows the DAI54300 wiring diagram.



Note:
1. All inputs in a group must be from the same phase of line input voltage.
2. This module is not polarity sensitive.
3. N / C = Not Connected.

CAUTION

Voltage Compatibility

All inputs in a group must be from the same phase of line input voltage.

Failure to follow this precaution can result in injury or equipment damage.

140DAI55300 Quantum I/O AC Input 115 Vac 4x8 Module

Overview

The AC Input 115 Vac 4x8 module accepts 115 Vac inputs.

Specifications

The following table shows the technical specifications for the DAI55300 115 VAC IN module.

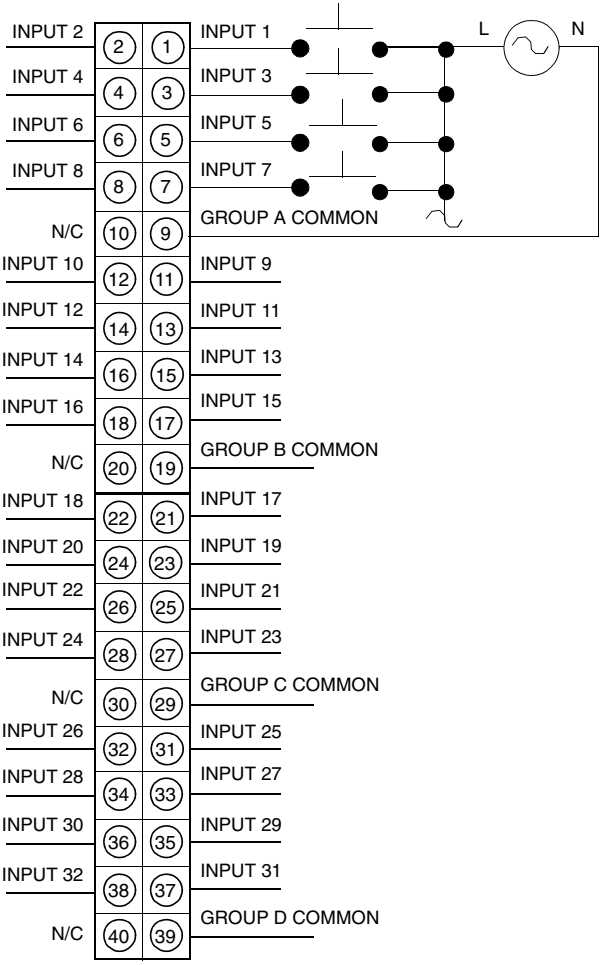
Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active
	1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Operating Voltages and Input Currents*	
50 Hz Typical Input Impedance	ON: 85 ... 132 Vac (11.1 mA max) OFF: 0... 20 Vac 14.4 kΩ capacitive
60 Hz Typical Input Impedance	ON: 79 ... 132 Vac (13.2 mA max) OFF: 0 ... 20 Vac 12 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.1 mA
Input Frequency	47 ... 63 Hz
Absolute Maximum Input	
Continuous	132 Vac
10 s	156 Vac
1 cycle	200 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Input to Input	All inputs in a group must be from the same phase of line input voltage.
Group to Group	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None

Specifications	
Bus Current Required	250 mA
Power Dissipation	10.9 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram

The following figure shows the DAI55300 wiring diagram.



Note:
1. All inputs in a group must be from the same phase of line input voltage.
2. This module is not polarity sensitive.
3. N/C = Not Connected

CAUTION

Voltage Compatibility

All inputs in a group must be from the same phase of line input voltage.

Failure to follow this precaution can result in injury or equipment damage.

140DAI74000 Quantum I/O AC Input 230 Vac 16x1 Module

Overview

The AC Input 230 Vac 16x1 module accepts 230 Vac inputs.

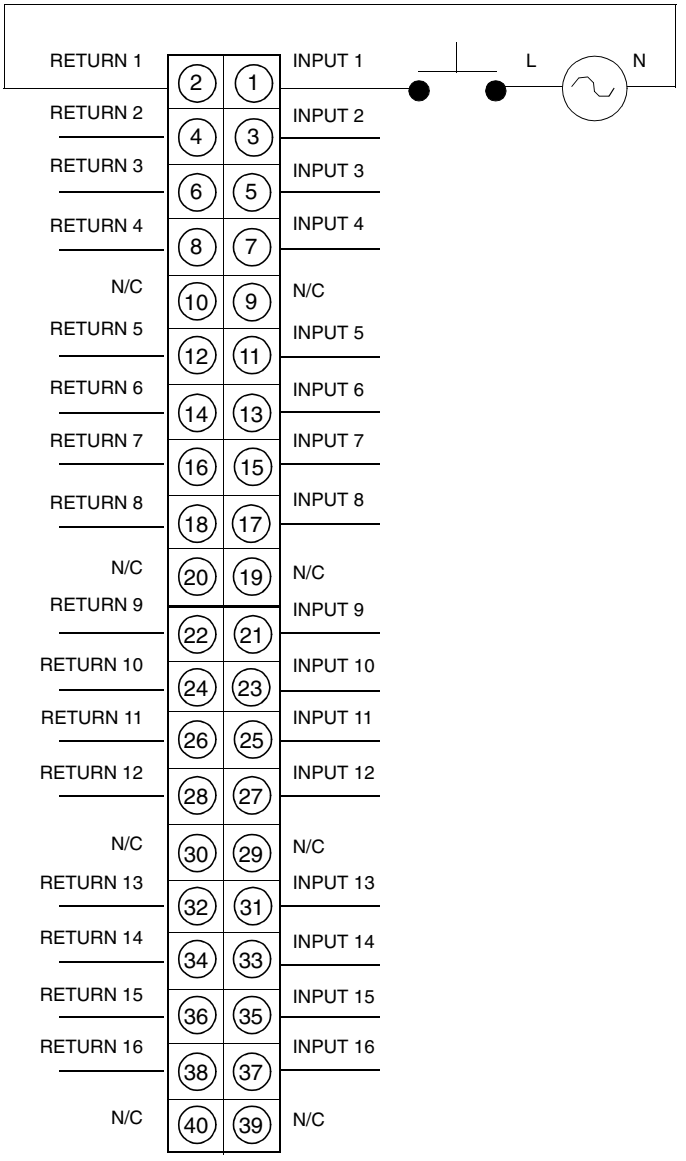
Specifications

The following table shows the specifications for the 230 VAC IN module.

Specifications	
Number of Input Points	16 individually isolated
LEDs	Active 1 - 16 (Green) - Indicates point status
Required Addressing	1 word in
Operating Voltages and Input Currents*	
50 Hz Input Impedance	ON: 175 ... 264 Vac (9.7 mA max) OFF: 0 ... 40 Vac 31. 8 kΩ capacitive
60 Hz Input Impedance	ON: 165 ... 264 Vac (11.5 mA max) OFF: 0 ... 40 Vac 26.5 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.6 mA
Absolute Maximum Input	
Continuous	264 Vac
10 s	300 Vac
1 cycle	400 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Input to Input	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	180 mA
Power Dissipation	5.5 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram The following figure shows the DAI74000 wiring diagram.



Note:
- This module is not polarity sensitive.
- N / C = Not Connected.

140DAI75300 Quantum I/O AC Input 230 Vac 4x8 Module

Overview The AC Input 230 Vac 4x8 module accepts 230 Vac inputs.

Specifications

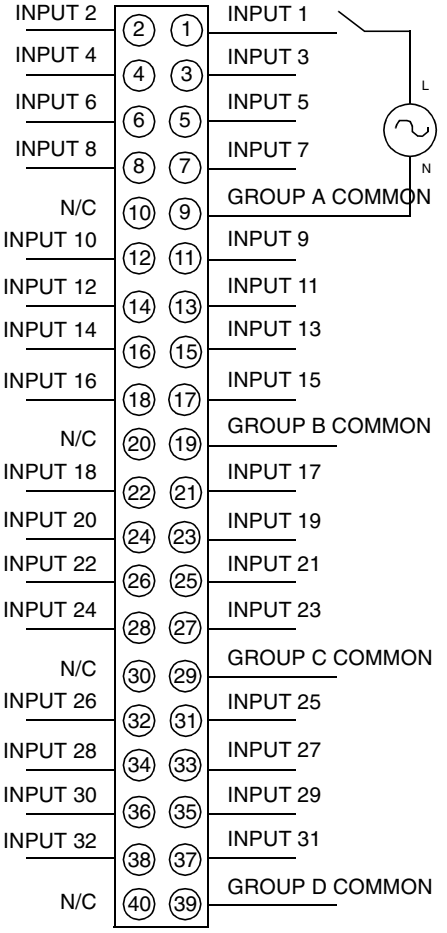
The following table shows the specifications for the DAI75300 AC 230 VAC IN module.

Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active 1 - 32 (Green) - Indicates point status
Required Addressing	2 words in
Operating Voltages and Input Currents*	
50 Hz Typical Input Impedance	ON: 175... 264 Vac (9.7 mA max) OFF:.. 40 Vac 32 kΩ capacitive
60 Hz Typical Input Impedance	ON: 165 ... 264 Vac (11.5 mA max OFF: 0 ... 40 Vac 27 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.6 mA
Absolute Maximum Input	
Continuous	264 Vac
10 s	300 Vac
1 cycle	400 Vac
Response	
OFF - ON	Min: 4.9 ms., Max: 0.75 line cycle
ON - OFF	Min: 7.3 ms., Max: 12.3 ms
Isolation	
Group to Group	1780 Vac for 1 minute
Input to Bus	1780 Vac for 1 minute
Fault Detection	None
Bus Current Required	250 mA
Power Dissipation	9 W max
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Wiring Diagram

The following figure shows the DAI75300 wiring diagram.



Note: N / C = Not Connected.

CAUTION

Voltage Compatibility

All inputs in a group must be from the same phase of line input voltage.

Failure to follow this precaution can result in injury or equipment damage.

140DDI15310 Quantum I/O DC Input 5 V TTL 4x8 Source Module

Overview

The DC Input 5 V TTL 4x8 Source module accepts 5 Vdc inputs, and is for use with sink output devices and is compatible with LS, S, TTL, and CMOS logic.

Specifications

The following table shows the specifications for the DDI15310 5 V TTL IN module.

Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Input Ratings	
ON Level	0.8 Vdc maximum 4.0 mA at U_S = 5.5 and U_{IN} = 0
OFF Level	4 Vdc (min) @ U_S = 5.5 V 3 Vdc (min) @ U_S = 4.5 V
OFF Leakage	200 µA @ U_S = 5.5 V and U_{IN} = 4 Vdc
Internal Pullup Resistor	7.5 k
Absolute Maximum Input	
Continuous	5.5 Vdc
1.3 ms	15 Vdc decaying pulse
Response	
OFF - ON	250 µs (max)
ON - OFF	500 µs (max)
Input Protection	Resistor limited
Isolation	
Group to Group	500 Vac rms for 1 minute
Group to Bus	1780 Vac rms for 1 minute
Fault Detection	None
Bus Current Required	170 mA
Power Dissipation	5 W
External Power (U_S)	4.5... 5.5 Vdc
Module Supply	150 mA
Fusing	
Internal	None
External	User discretion

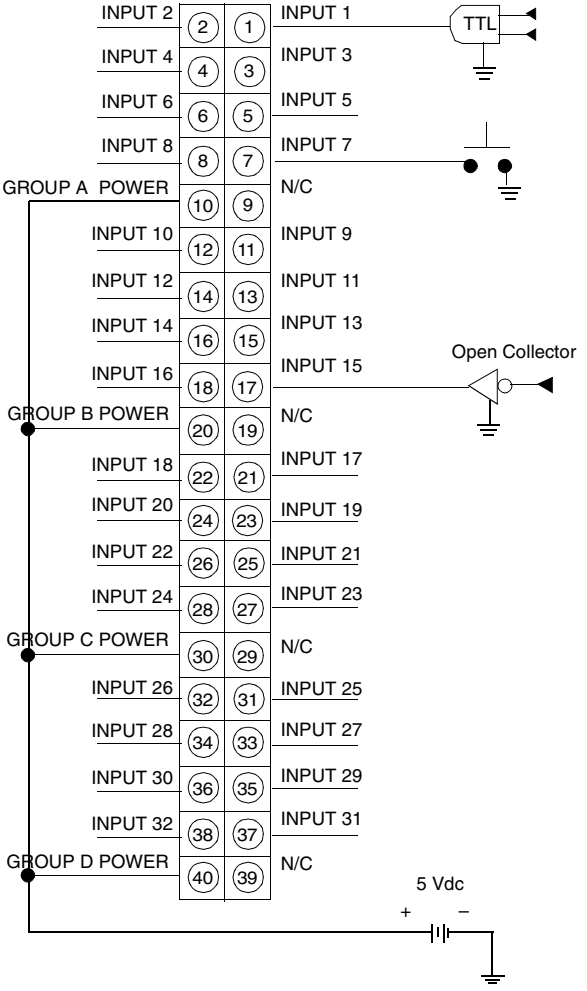
Logic States

The following table shows the logic states for the DDI15310 module.

Input Voltage	Input State	LED
<= 0.8 Vdc	ON	ON
>= 4.0 Vdc @ 5.5 U_S >= 3.0 Vdc @ 4.5 U_S	OFF	OFF
No Connection	OFF	OFF

Wiring Diagram

The following figure shows the DDI15310 wiring diagram.



140DDI35300 Quantum I/O DC Input 24 Vdc 4x8 Sink Module

Overview

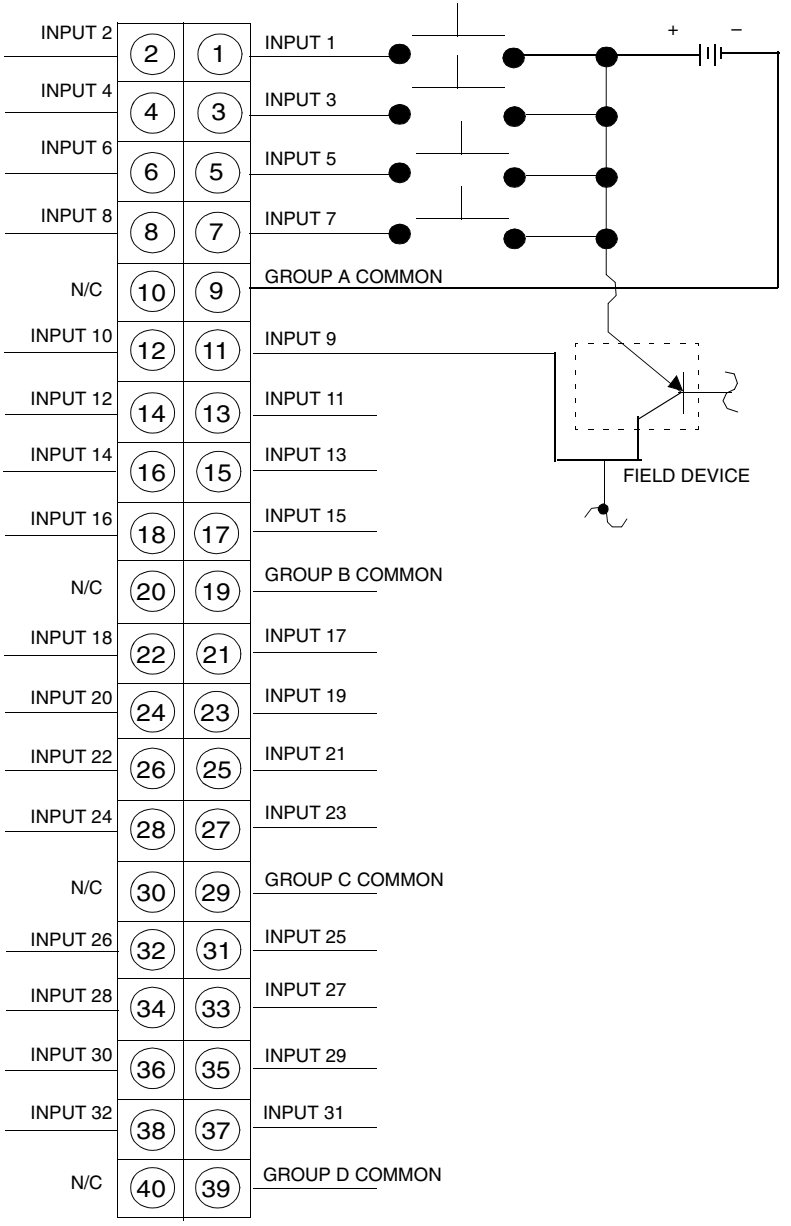
The DC Input 24 Vdc 4x8 Sink module accepts 24 Vdc inputs and is for use with source output devices.

Specifications

The following table shows the specifications for the DDI35300 24 VDC IN module.

Specifications	
Number of Input Points	32 in four 8 point groups
LEDs	Active 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Operating Voltages and Currents	
ON (voltage)	+15 ... +30 Vdc
OFF (voltage)	-3 ... +5 Vdc
ON (current)	2.0 mA min
OFF (current)	0.5 mA max
Absolute Maximum Input	
Continuous	30 Vdc
1.3 ms	56 Vdc decaying pulse
Response	
OFF - ON	1 ms (max)
ON - OFF	1 ms (max)
Internal Resistance	2.5 k
Input Protection	Resistor limited
Isolation	
Group to Group	500 Vac rms for 1 minute
Group to Bus	1780 Vac rms for 1 minute
Fault Detection	None
Bus Current Required	330 mA
Power Dissipation	1.7 W + 0.36 W x the number of points on
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Wiring Diagram The following figure shows the DDI35300 wiring diagram.



Note: N / C = Not Connected

140DDI35310 Quantum I/O DC Input 24 Vdc True Low 4x8 Input Module

Overview

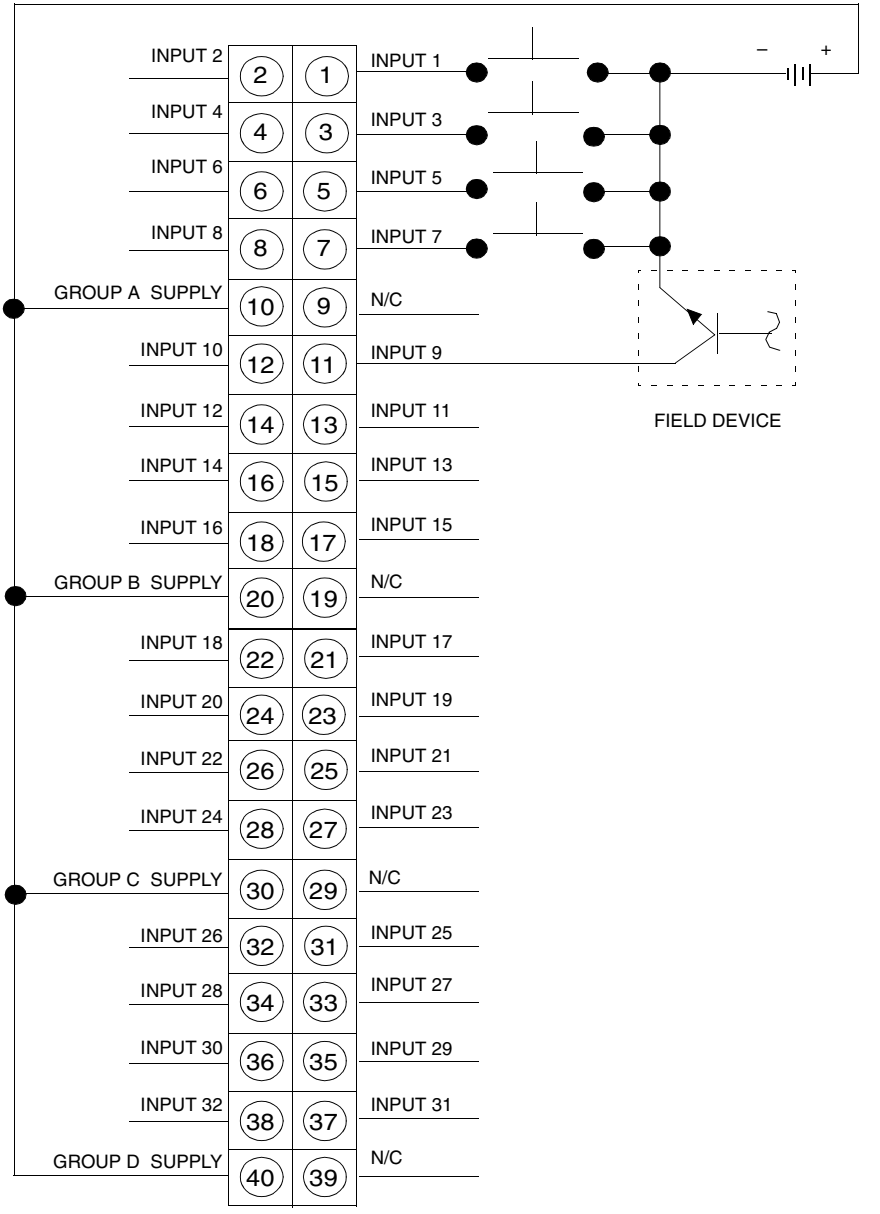
The 24 Vdc True Low 4x8 Input module accepts 24 Vdc inputs and is for use with sink output devices.

Specifications

The following table shows the specifications for the DDI35310 24 VDC IN SOURCE module.

Specifications	
Number of Input Points	32 input points in four 8 point groups
LEDs	Active 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words in
Voltage	
ON (Voltage)	-15 ... -30 Vdc (reference from group supply)
OFF (Voltage)	0 ... -5 Vdc (reference group supply)
ON (Current)	2 mA min; 14 mA max
OFF (Current)	0.5 mA max
Absolute Maximum Input	
Continuous	30 Vdc
1.0 ms	50 Vdc decaying pulse
Response (Resistive Loads)	
OFF - ON	1 ms (max)
ON - OFF	1 ms (max)
Fault Detection	None
Isolation	
Group to Group	500 Vac rms for 1 minute
Input to Bus	1780 Vac rms for 1 minute
Internal Resistance	2.4 k
Input Protection	Resistor limited
Bus Current Required	330 mA max
Power Dissipation	1.5 W + 0.26 W x the number of points ON
External Power	19.2 ... 30 Vdc
Fusing	
Internal	None
External	User discretion

Wiring Diagram The following figure shows the DDI35310 wiring diagram.



Note: N / C = Not Connected

140DDI36400 I/O DC Input 24 VDC 6x16 Telefast Input Module

Overview

The Telefast input module accepts 24 Vdc inputs, and has 6 groups with 16 sink ports each.

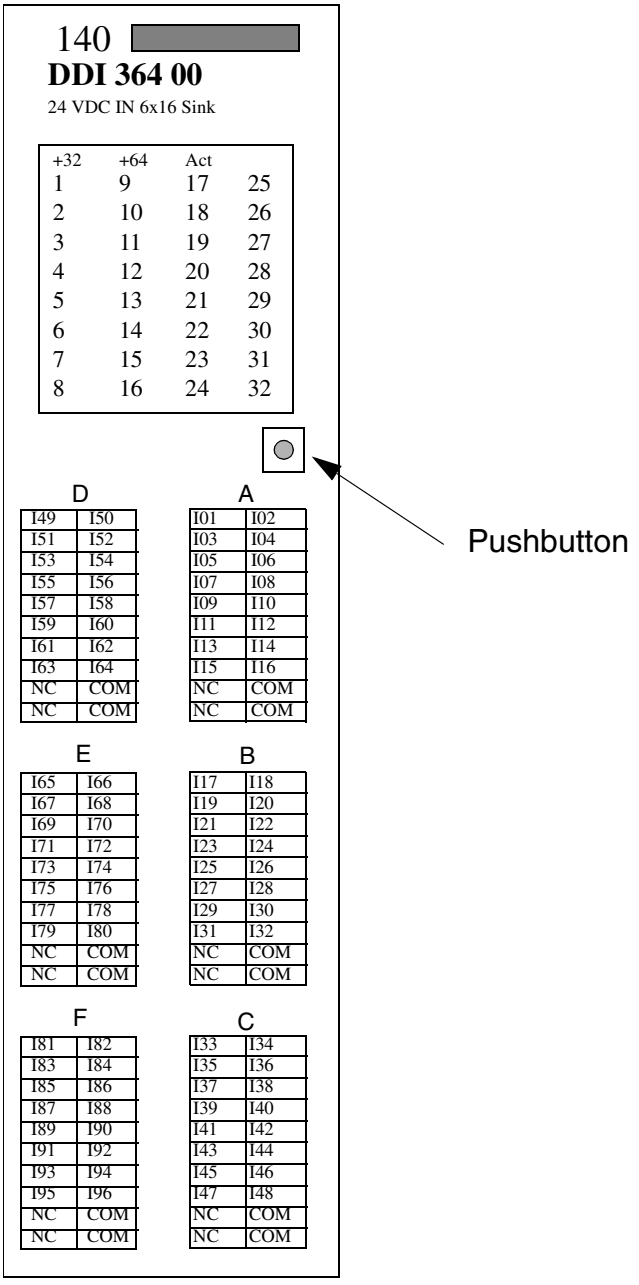
Specifications

The following table provides detailed specifications for the DDI36400 input module.

Specifications		
Number of input points	96 in six 16 point groups	
LEDs	ACT (green)	Bus communication is present
	+32 (green)	Points 33 to 64 displayed on LED matrix
	+ 64 (green)	Points 65 to96 displayed on LED matrix
	1 ... 32 (green)	Indicates point status
Required addressing	6 words in	
Operating voltages and currents		
ON (voltage)	+15 VDC	
ON (current)	2.5 mA minimum	
OFF (voltage)	+5VDC	
OFF (current)	0.7 mA	
Absolute maximum input		
Continuous	30 VDC	
1.0 ms	50 VDC	
Response (resistive load)		
OFF - ON	2.0 ms maximum	
ON - OFF	3.0 ms maximum	
Internal resistance	6.7 KΩ	
Input protection	Resistor limited	
Isolation		
Group to group	500 Vac rms for 1 minute	
Bus current required	270 mA	
Power dissipation	1.35 W + 0.13 W for each ON input	
External power	19.2 ... 30 VDC	
Fusing	User discretion for field power	

Front view of DDI36400 Module

The front view of the DDI36400 input module including terminal assignment numbers:



Selecting Point Status Indicator LEDs

Use the pushbutton to select input points displayed.

LED	+32	+64
Inputs 1 to 32	OFF	OFF
Inputs 33 to 64	ON	OFF
Inputs 65 to 96	OFF	ON

Recommended Cables

The following table shows recommended cables, description, and their length in meters.

Cable Part Number	Description	Length (M)
TSXCDP301	(1) HE 10 - flying leads	3
TSXCDP501	(1) HE 10 - flying leads	5
TSXCDP102	(2) HE 10 - ribbon cable	1
TSXCDP202	(2) HE 10 - ribbon cable	2
TSXCDP302	(2) HE 10 - ribbon cable	3
TSXCDP053	(2) HE 10 - round cable	0.5
TSXCDP103	(2) HE 10 - round cable	1
TSXCDP203	(2) HE 10 - round cable	2
TSXCDP303	(2) HE 10 - round cable	3
TSXCDP503	(2) HE 10 - round cable	5

Color Codes for Input groups

Table indicating cable color coding for all input groups:

1	white	2	brown
3	green	4	yellow
5	gray	6	pink
7	blue	8	red
9	black	10	purple
11	gray/pink	12	red/blue
13	white/green	14	brown/green
15	white/yellow	16	yellow/brown
17	white/gray	18	gray/brown
19	white/pink	20	pink/brown

Compatible Connection Sub-Bases

The following tables shows the compatible connections sub-bases. See *Quantum Modicon Telemecanique Automation Platform, Discrete I/O Chapter, Telefast 2 pre-wire system: connector cables FOR Quantum PLCs* section for more information.

Channels	Type
8	ABE-7H08Rxx[1]
8	ABE-7H08S21[1]
16	ABE-7H16Rxx/H16Cxx
16	ABE-7H16S21
16	ABE-7H16R23
16	ABE-7H16S43
[1]With the splitter sub-base ABE-7ACC02	

Compatible Input Adapter Sub-Base

16 Channels, ABE-7S16E2xx/7P16F3xx

140DDI67300 Quantum I/O DC Input 125 Vdc 3x8 Sink Module

Overview

The DC Input 125 VDC 3x8 Sink module accepts 125 Vdc inputs and is for use with source output devices. The module has software-selectable response time to provide additional input filtering.

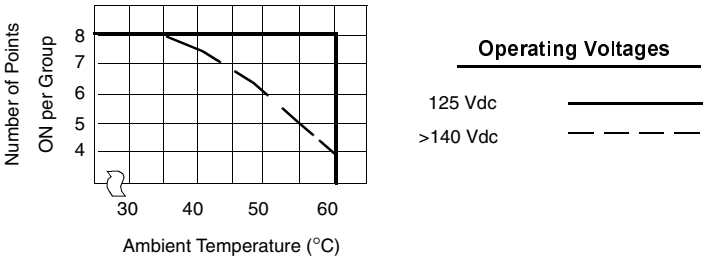
Specifications

The following table shows the specifications for the DDI67300 125 VDC IN module.

Specifications	
Number of Input Points	24 in three 8 point groups
LEDs	Active 1 ... 24 (Green) - Indicates point status
Required Addressing	2 words in
Continuous Operating Voltages and Currents	
ON (voltage)	+88 ... +150 Vdc
OFF (voltage)	0 ... +36 Vdc
ON (current)	2.0 mA min
OFF (current)	0.5 mA max
Absolute Maximum Input	
Continuous	156.25 Vdc including ripple
Input Response (OFF-ON, ON-OFF)	
Default Filter	0.7 ms
Non-default Filter	1.5 ms
Internal Resistance	
OFF State	73.8 kΩ (nominal)
ON State	31.6 kΩ (nominal)
Input Protection	Resistor limited
Isolation	
Group to Bus	2500 Vac rms for 1 minute
Group to Group	1780 Vac rms for 1 minute
Fault Detection	None
Bus Current Required	200 mA
Power Dissipation	1.0 W + (0.62 W x the number of points on)
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Operating Curve

The following figure shows the DDI67300 operating curve.



Note: The following information baselines minimum version levels that will support this module.

Minimum Version Levels

The following table shows the minimum version levels required.Modules marked SV/PV/RL rather than V0X.0X0 exceed the minimum version levels in this table.

Products	**Minimum Version Level (see label illustration)**	**User Action Required**
CPUs and NOMs	< V02.20	Executive upgrade to ≥ V02.10
	≥ V02.20	None
RIOs	< V02.00	Module upgrade
	≥ V02.00 and < V02.20	Executive upgrade to ≥ V01.10
	> V02.20	None
DIOs	< V02.10	Module upgrade
	≥ V02.10	None
Modsoft	< V02.40	Upgrade to V02.40
	≥ V02.40	None
ProWORX NxT	>=V02.00	
Concept	>=V02.00	None

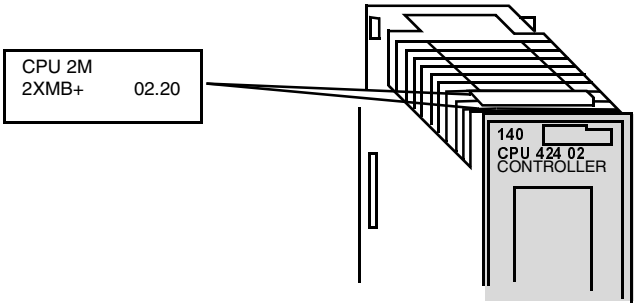
CAUTION

Software compatibility

When using a DIO drop and the CPU and the NOM executive software is not per the compatibility chart, channels 17 ... 24 of this module will be seen as zeroes in the controller when configured as discretes.

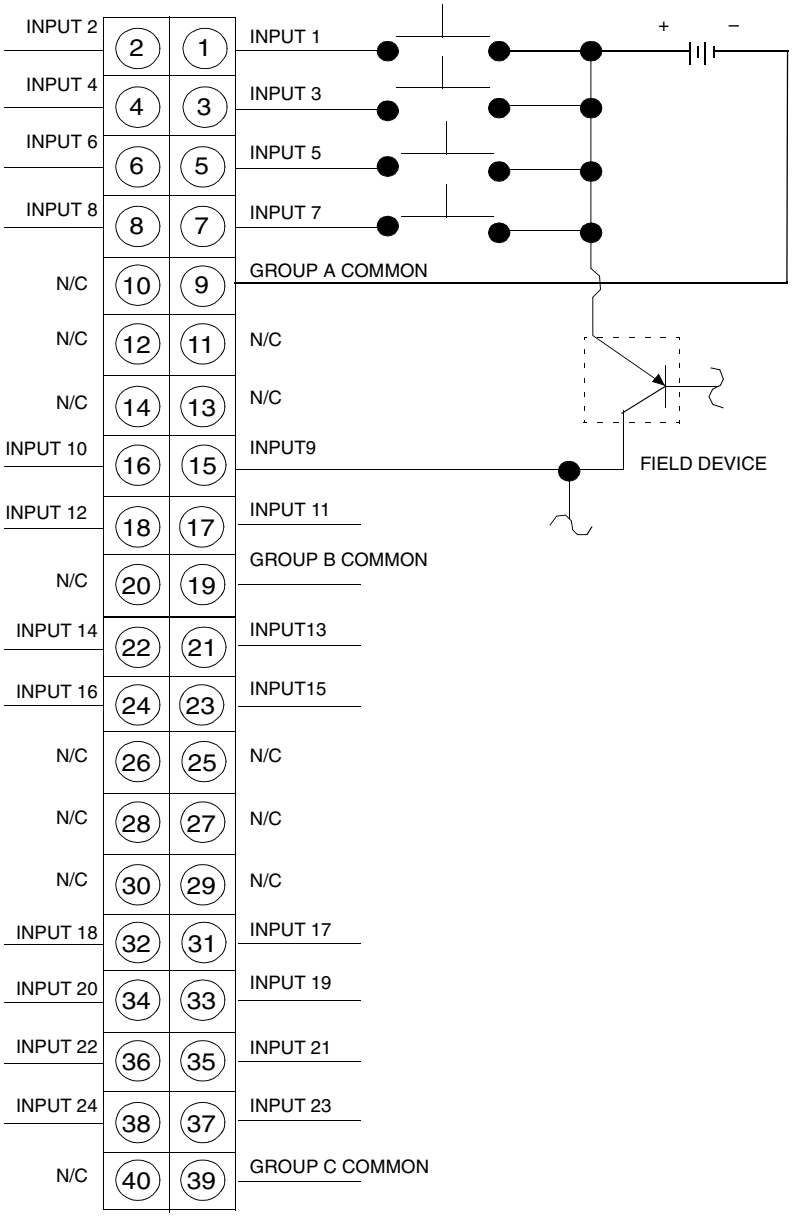
Failure to follow this precaution can result in injury or equipment damage.

Version Label The following figure shows the version label.



Note: The version label is found on the top front of the module.

Wiring Diagram The following figure shows the DDI67300 wiring diagram.



Note: N / C = Not Connected

140DDI84100 Quantum I/O DC Input 10 ... 60 Vdc 8x2 Sink Module

Overview

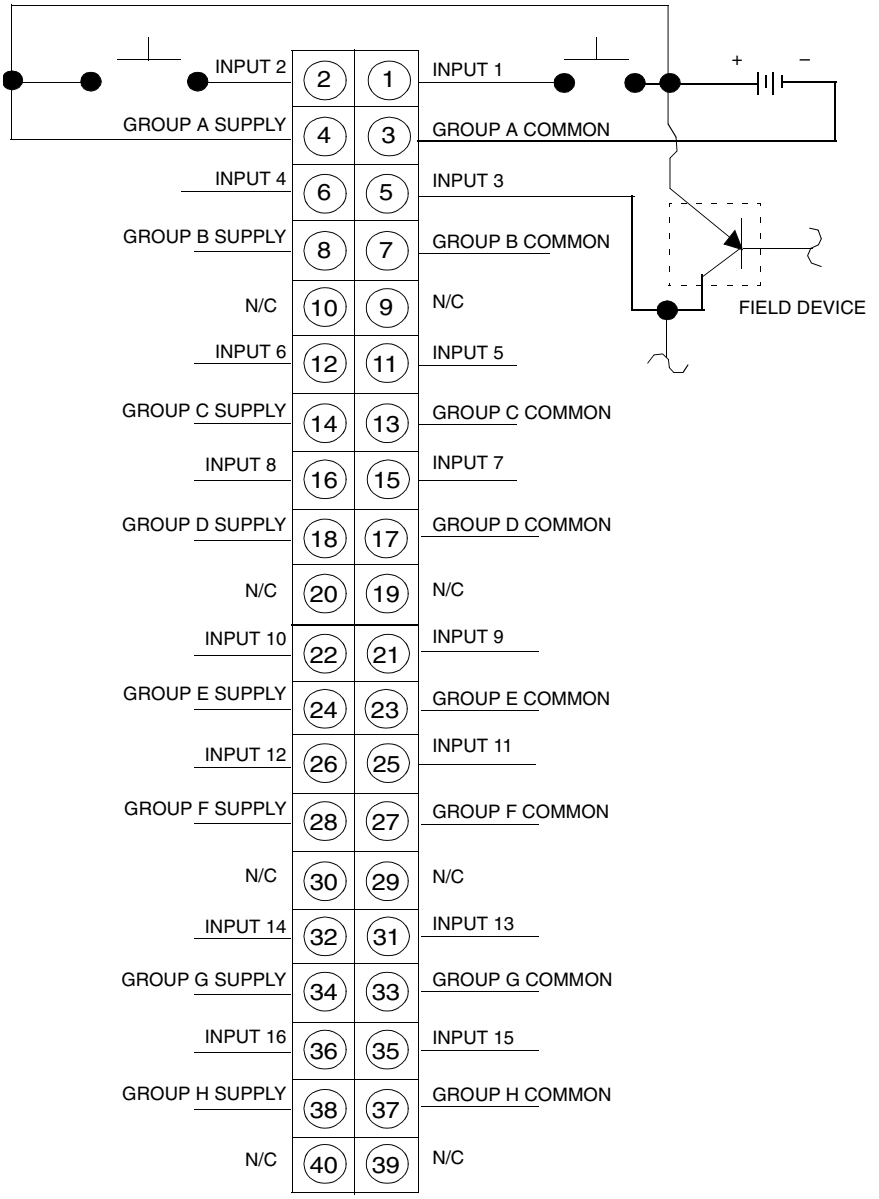
The DC Input 10 ... 60 Vdc 8x2 Sink module accepts 10 ... 60 Vdc inputs and is for use with source output devices. ON-OFF levels are dependent on the reference voltage selected. Different reference voltages may be used for different groups.

Specifications

The following table shows the specifications for the DDI84110 10-60 VDC IN module.

Specifications		
Number of Input Points	16 in eight 2 point groups	
LEDs	Active 1 ... 16 (Green) - Indicates point status	
Required Addressing	1 Word in	
Group Supply / Tolerance	**ON State***	**OFF State***
12 Vdc / +/-5% 24 Vdc / -15% ... +20% 48 Vdc / -15% ... +20% 60 Vdc / -15% ... +20%	9 ... 12 11 ... 24 34 ... 48 45 ... 60	0 ...1.8 IEC 57 Class2 0 ... 5 IEC 65A Type2 0 ... 10 IEC 65A Type1 0 ... 9 IEC 57 Class1 *ON/OFF state ranges are specified at normal reference voltages.
Absolute Maximum Input	75 Vdc	
ON State Current (mA)		
@ 12 Vdc	5 ... 10 mA	
@ 24 Vdc	6 ... 30 mA	
@ 48 Vdc	2 ... 15 mA	
@ 60 Vdc	1 ... 5 mA	
Response		
OFF - ON	4 ms	
ON - OFF	4 ms	
Switching Frequency	<100 Hz	
Input Protection	Resistor limited	
Isolation		
Group to Group	700 Vdc for 1 minute	
Group to Bus	2500 Vdc for 1 minute	
Bus Current Required	200 mA	
Power Dissipation	1 W + 0.25 W x the number of points on	
External Power	10 ... 60 Vdc (group supply)	
Fusing		
Internal	None	
External	User discretion	

Wiring Diagram The following figure shows the DDI84100 wiring diagram.



Note: N / C = Not Connected

140DDI85300 Quantum I/O DC Input 10 ... 60 Vdc 4x8 Sink Module

Overview

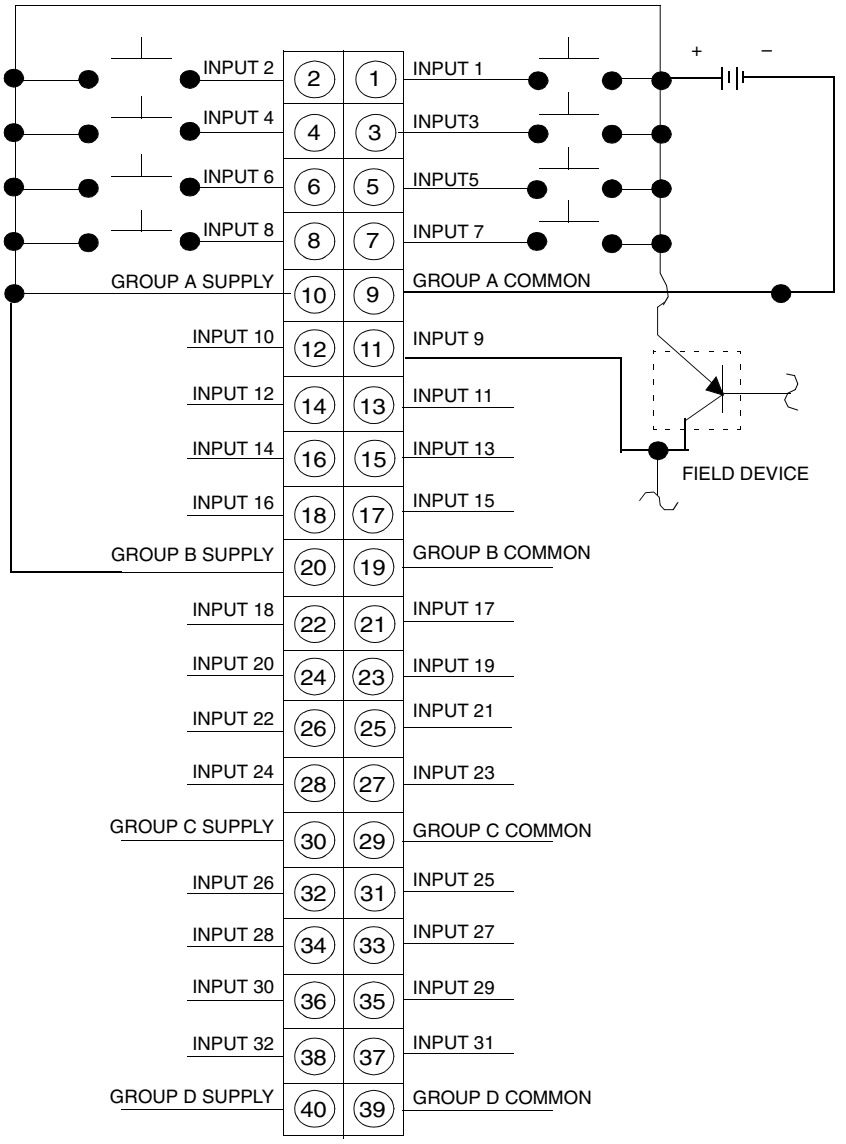
The DC Input 10 ... 60 Vdc 4x8 Sink module accepts 10 ... 60 Vdc inputs and is for use with source output devices. ON-OFF levels are dependent on the reference voltage selected. Different reference voltages may be used for different groups.

Specifications

The following table shows the specifications for the 10-60 VDC IN module.

Specifications		
Number of Input Points	32 in four 8 point groups	
LEDs	Active 1 ... 32 (Green) - Indicates point status	
Required Addressing	2 Words In	
Group Supply / Tolerance	**ON State ***	**OFF State ***
12 Vdc / +/- 5%	9 ... 12	0 ... 1.8 IEC 57 Class 2
24 Vdc / -15% ... +20%	11 ... 24	0 ... 5 IEC 65A Type 2
48 Vdc / -15% ... +20%	34 ... 48	0 ... 10 IEC 65A Type 1
60 Vdc / -15% ... +20%	45 ... 60	0 ... 12.5 IEC 57 Class1
	*ON/OFF state ranges are specified at nominal reference voltages.	
Absolute Maximum Input	75 Vdc	
ON State Current (mA)		
@ 12 Vdc	5 ... 10 mA	
@ 24 Vdc	6 ... 30 mA	
@ 48 Vdc	2 ... 15 mA	
@ 60 Vdc	1 ... 5 mA	
Response		
OFF - ON	4 ms	
ON - OFF	4 ms	
Switching Frequency	<100 Hz max	
Input Protection	Resistor limited	
Isolation		
Group to Group	700 Vdc for 1 minute	
Group to Bus	2500 Vdc for 1 minute	
Fault Detection	None	
Bus Current Required	300 mA	
Power Dissipation	1 W + 0.25 W x the number of points on	
External Power	10 ... 60 Vdc (group supply)	
Fusing		
Internal	None	
External	User discretion	

Wiring Diagram The following figure shows the DDI85300 wiring diagram.



18.6 Discrete Output Modules

At a Glance

Overview

This section provides information on Quantum discrete output modules.

What's in this Section?

This section contains the following topics:

I/O Configuration for Discrete Output Modules

Overview

This section provides information on configuration of 8-, 12-, 16-, 32- and 96-point output modules.

8-Point Output Modules

The following shows the 8-point output module:

- 140DRC83000 (Relay Ouput 8x1 Normally Open/Normally Closed)

I/O Map Register Assignment

The ouput modules listed above can be configured as either eight contiguous discrete output (0x) references or as one output (4x) register. The following figure shows the format for the output modules.

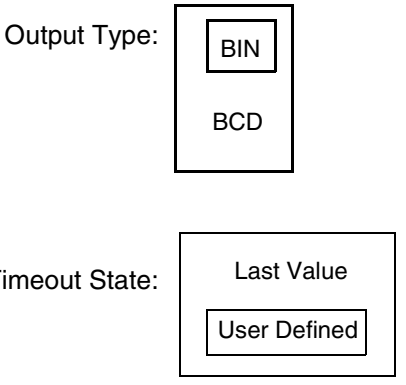
								1	2	3	4	5	6	7	8

I/O Map Status Byte

There is no I/O Map status byte associated with these modules.

Module Zoom Selections

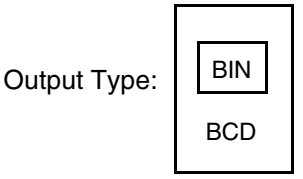
Push <Enter> to display and select the output type and timeout state for the module. Timeout state isassumed when system control of the module is stopped.



User Defined Timeout State Points 1- 8: 00000000

Module Zoom Selections (Outputs)

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when sytem control of the module is stopped.



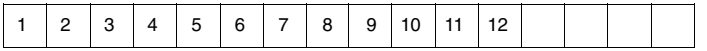
12-Point Output Module

The 12-point output module is:

- 140DDO88500

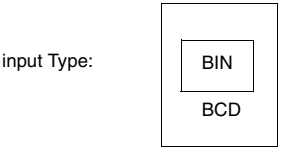
I/O Map Register Assignment (Fault Inputs)

The 140DDO88500 can be configured as either 16 contiguous 1x references or as one 3x register.
The following figure shows the inputs configuration.



Module Zoom Selections (Inputs)

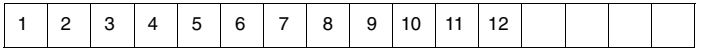
Push <Enter> to display and select the input type. This selection appears if the module is I/O mapped to a 3x register. The following figure shows the input type.



Note: Do not use the BCD selection, as it will incorrectly display fault conditions.

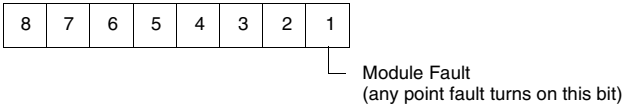
I/O Map Register Assignment (Outputs)

The 140DDO88500 can be configured as one output (4x) register in the following format. The following figure shows the register format for outputs.



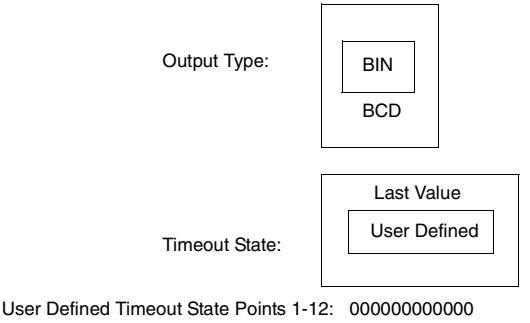
I/O Map Status Byte (Outputs)

The least significant bit in the output I/O map status byte is used as follows. The following figure shows the status byte output register.



Modsoft Module Zoom Selections (Outputs)

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when system control of the module is stopped. The following figure shows the output type and timeout state.



Note: To clear a fault, the point must be commanded OFF in user logic.

16-Point Output Modules

The 16-point output modules are as follows:

- 140DAO84000 (AC Output 24 ... 230 Vac 16x1)
- 140DAO84010 (AC Output 24 ... 115 Vac 16x1)
- 140DAO84210 (AC Output 100 ... 230 Vac 4x4)
- 140DAO84220 (AC Output 48 Vac 4x4)
- 140DDO84300 (DC Output 10 ... 60 VDC 2x8 Source)
- 140DRA84000 (Relay Output 16x1 Normally Open)

I/O Map Register Assignment

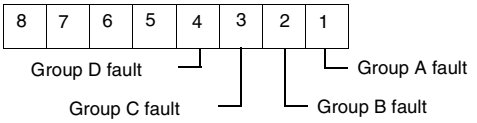
The output modules listed above can be configured as either 16 contiguous discrete output (0x) references, or as one output (4x) register in the following formats. The following figures show the formats for the output modules.

For the 140DAO84000, 140DAO84010, 140DAO84210, 140DAO84220, 140DDO84300, and the 140DRA84000 modules.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

I/O Map Status Byte

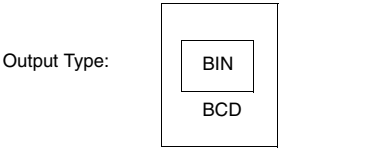
The I/O map status byte is used by the 140DAO84210 and 140DAO84220 output modules. The following figure shows I/O map status bytes use.

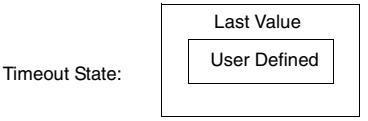


There is no I/O map status byte associated with the 140DAO84000, 140DAO84010, 140DDO84300, or 140DRA84000 module.

Module Zoom Selections

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when system control of the module is stopped. The following figures show the output type and timeout state.





User Defined Timeout State Points 1-16: 0000000000000000

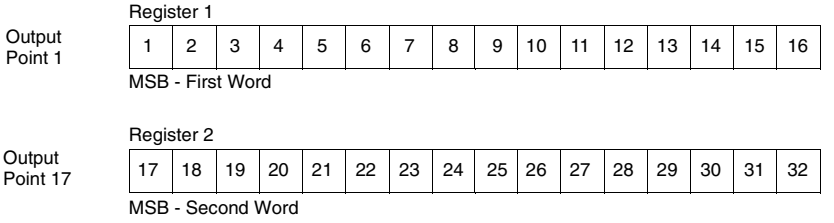
32-Point Output Modules

The following list shows the 32-point output modules:

- 140DAO85300 (AC Output 230 Vac 4x8 Sink)
- 140DDO15310 (DC Output 5 V TTL 4x8 Sink)
- 140DDO35300 (DC Output 24 Vdc 4x8 Source)
- 140DDO35301 (DC Output 24 Vdc 4x8 Source)
- 140DDO35310 (DC Output 24 Vdc True Low 4x8 Sink)

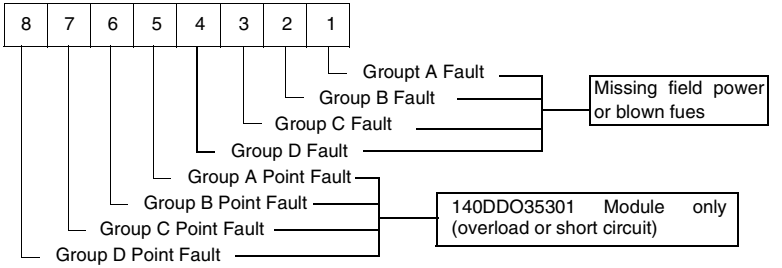
I/O Map Register Assignment

The output modules listed above can be configured as either 32 contiguous 0x references, or as two 4x registers in the following format.
The following figures show the formats for the output modules.



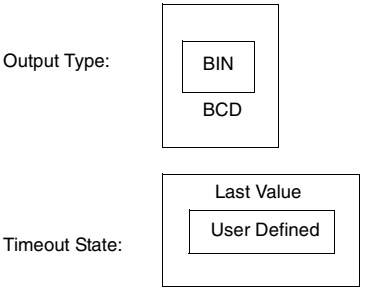
I/O Map Status Byte

The I/O map status byte (not including 140DAO85300 module) is used by the modules as follows:



Module Zoom Selections

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when system control of the module is stopped. The following figure shows the output type and timeout state.



User Defined Timeout State Points 1-16: 0000000000000000
User Defined Timeout State Points 17-32: 0000000000000000

96-Point Output Module

The 96 point output module is:

- 140DDO36400 - DC out 24VDC 6x16 Source

I/O Map Register Assignment

The following figures show the register 1 through 6 format for the 140DDO36400 output module.

Register 1

Output Point 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

MSB - First Word

Register 2

Output Point 17	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

MSB - Second Word

Register 3

Output Point 33	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

MSB - Third Word

Register 4

Output Point 49	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

MSB - Fourth Word

Register 5

Output Point 65	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

MSB - Fifth Word

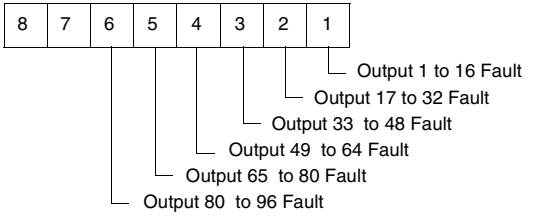
Register 6

Output Point 81	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96

MSB - Sixth Word

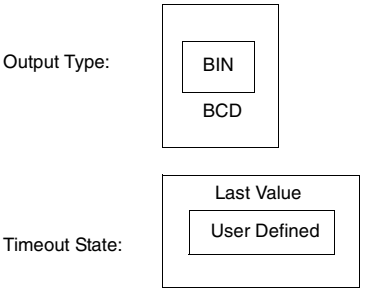
I/O Map Status Byte

The I/O map status byte is used by the module as follows:.



Module Zoom Selections

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when system control of the module is stopped. The following figure shows the output type and timeout state.



User Defined Timeout State Points 1-16: 0000000000000000
User Defined Timeout State Points 17-32: 0000000000000000
User Defined Timeout State Points 33-48: 0000000000000000
User Defined Timeout State Points 49-64: 0000000000000000
User Defined Timeout State Points 65-80: 0000000000000000
User Defined Timeout State Points 81-96: 0000000000000000

140DAO84000 I/O AC Output 24 ... 230 Vac 16x1 Module

Overview

The AC Output 24 ... 230 Vac 16x1 module switches 24 ... 230 Vac powered loads.

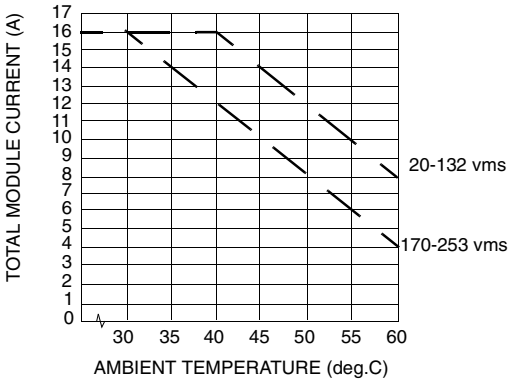
Specifications

The following table shows the specifications for the AC Output 24 ... 230 VAC OUT module.

Specifications	
Number of Output Points	16 isolated
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word out
Voltage (rms)	
Working	20 ... 253 Vac
Absolute Maximum	300 Vac for 10 s 400 Vac for 1 cycle
Frequency	47 ... 63 Hz
ON State Drop / Point	1.5 Vac
Minimum Load Current (rms)	5 mA
Maximum Load Current (rms)	
Each Point*	4 A continuous, 20 ... 132 Vac rms 3 A continuous, 170 ... 253 Vac rms
Any Four Contiguous Points	4 A max continuous for the sum of the four points
Per Module*	16 A continuous (See the derating chart)
Off State Leakage / Point (max)	2.5 mA @ 230 Vac 2 mA @ 115 Vac 1 mA @ 48 Vac 1 mA @ 24 Vac

Specifications

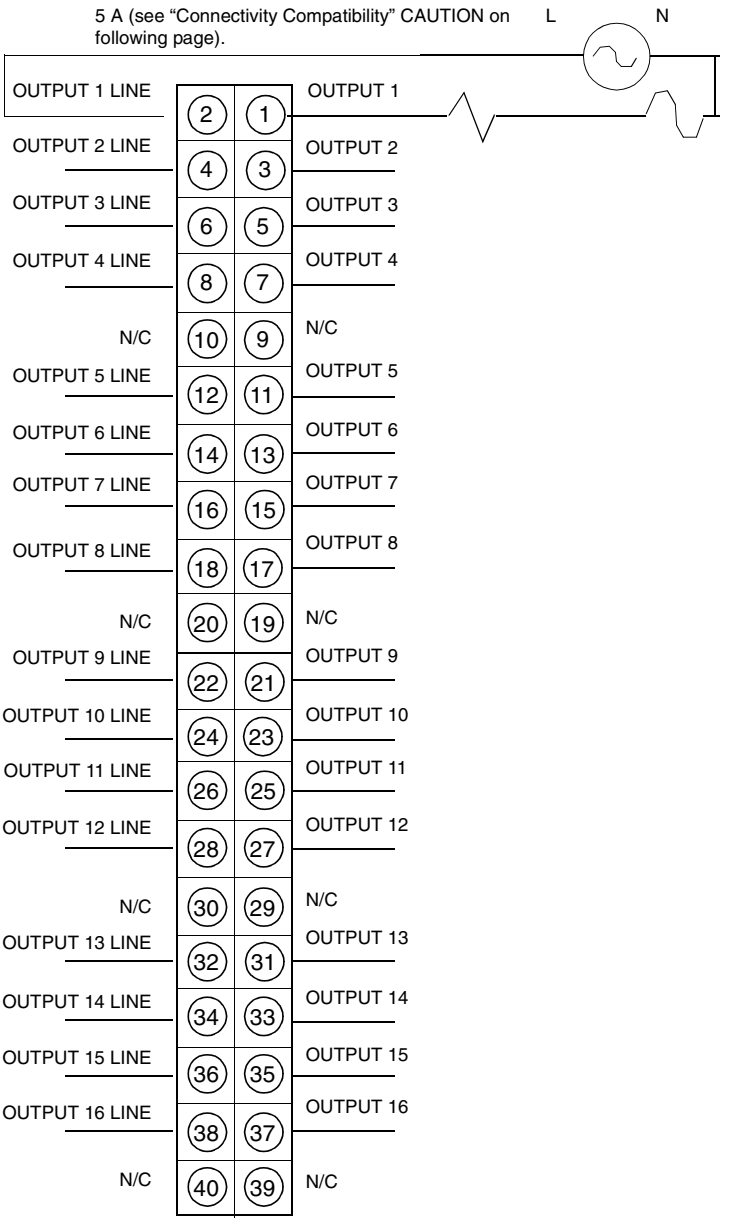
The following figure shows the DAO84000 derating chart.



*The specifications stated are pending UL/CSA approval. This module was originally approved at 2 A each point; and 12 A, 0 ... 50° C (115 Vac) and 0 ... 50° C (230 Vac) per module.

Surge Current Maximum (vms)	Per Point
One Cycle	30 A
Two Cycles	20 A
Three Cycles	10 A
Applied DV / DT	400 V/µs
Response	
OFF - ON	0.50 of one line cycle max
ON - OFF	0.50 of one line cycle max
Output Protection	RC snubber suppression (internal)
Isolation (rms)	
Output to Output	1500 Vac for 1 minute
Output to Bus	1780 for 1 minute
Bus Current Required	350 mA
Power Dissipation	1.85 W + 1.1 x Total Module Load Current
External Power	Not required for this module
Fusing	
Internal	None
External	Each output point must be fused with an external fuse. The recommended fuse is a 5 A fuse (Part # 043502405 or equivalent) or any other fuse with an I^2T rating of less than 87.

Wiring Diagram The following figure shows the DAO84000 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

CAUTION

Agency Compliance

1. Voltages up to 133V may be different phases on adjacent output points.
2. Voltages over 133V of different phases must have an output point separation between them. For example: Output 1 and 2 - Phase A, Skip Output 3, Output 4 - Phase B.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Connectivity Compatibility

Each output point must be fused with an external fuse. The recommended fuse is a 5 A fuse (Part # 043502405) or any other fuse with an I2T rating of less than 87.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Wiring Compatibility

If an external switch is wired to control an inductive load in parallel with the module output, then an external varistor (Harris V390ZA05 or equivalent) must be wired in parallel with the switch.

Failure to follow this precaution can result in injury or equipment damage.

140DAO84010 I/O AC Output 24 ... 115 Vac 16x1 Module

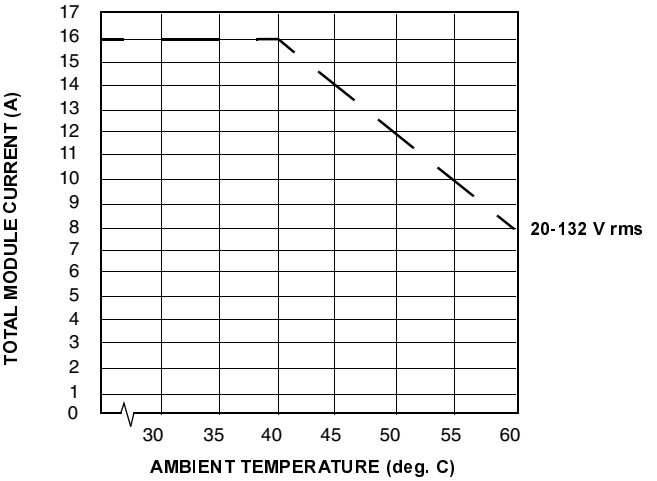
Overview

The AC Output 24 ... 115 Vac 16x1 module switches 24 ... 115 Vac powered loads.

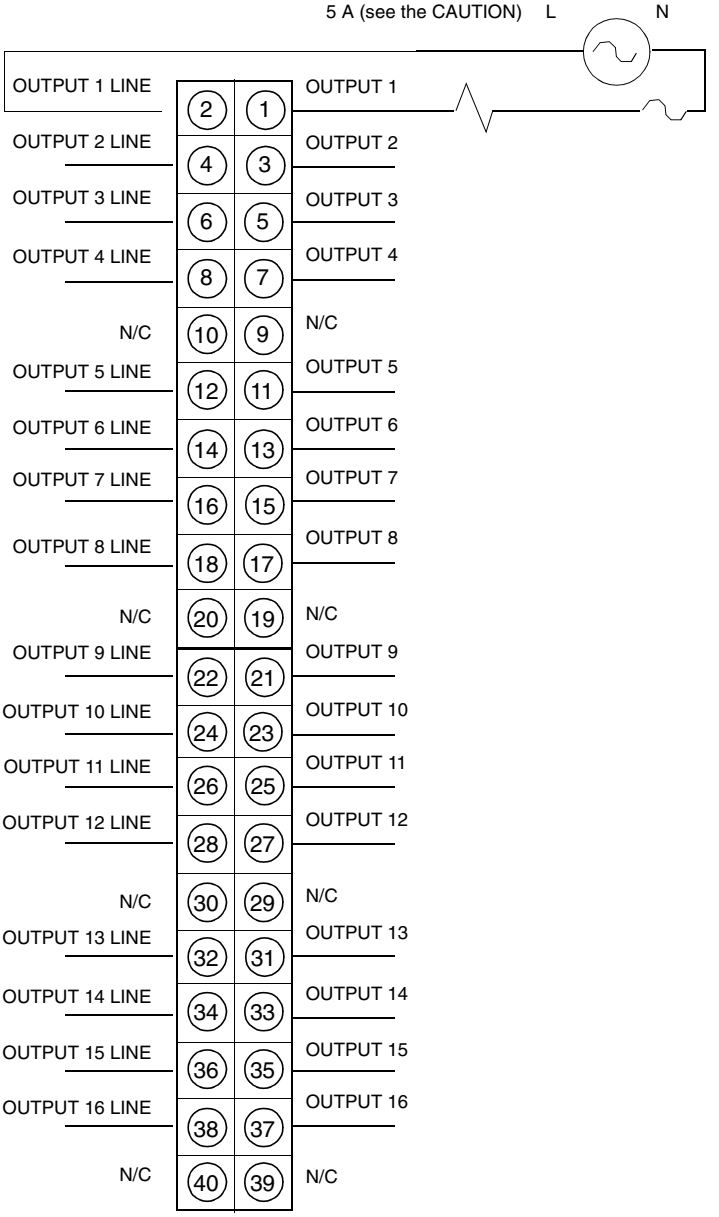
Specifications

The following table shows the specifications for the DAO84010 AC Output 24-115 VAC OUT module.

Specifications	
Number of Output Points	16 isolated
LEDs	Active 1 ... 16 (Green) – Indicates point status
Required Addressing	1 word out
Voltage (rms)	
Working	20 ... 132 Vac
Absolute Maximum	156 Vac for 10 s 200 Vac for 1 cycle
Frequency	47 ... 63 Hz
ON State Drop / Point	1.5 Vac
Minimum Load Current (rms)	5 mA
Maximum Load Current (rms)	
Each Point	4 A continuous, 20 ... 132 Vac rms
Any Four Contiguous Points	4 A max continuous for the sum of the four points
Per Module	16 A continuous (See the derating chart)
Off State Leakage / Point (max)	2 mA @ 115 Vac 1 mA @ 48 Vac 1 mA @ 24 Vac

Specifications	
The following figure shows the DAO84010 derating chart.  	
Surge Current Maximum (rms)	Per Point
One Cycle	30 A
Two Cycles	20 A
Three Cycles	10 A
Applied DV / DT	400 V/µs
Response	
OFF - ON	0.50 of one line cycle max
ON - OFF	0.50 of one line cycle max
Output Protection	RC snubber suppression (internal)
Isolation (rms)	
Output to Output	1500 Vac for 1 minute
Output to Bus	1780 for 1 minute
Bus Current Required	350 mA
Power Dissipation	1.85 W + 1.1 x Total Module Load Current
External Power	Not required for this module
Fusing	
Internal	None
External	Each output point must be fused with an external fuse. The recommended fuse is a 5 A fuse (Part # 043502405 or equivalent) or any other fuse with an I^2T rating of less than 87.

Wiring Diagram The following figure shows the DAO84010 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected

CAUTION

Connectivity Compatibility

Each output point must be fused with an external fuse. The recommended fuse is a 5 A fuse (Part # 043502405), or any other fuse with an I^2T rating of less than 87.

Failure to follow this precaution can result in injury or equipment damage.

140DAO84210 Quantum I/O AC Output 100 ... 230 Vac 4x4 Module

Overview

The AC Output 100 ... 230 Vac 4x4 module switches 100 ... 230 Vac powered loads.

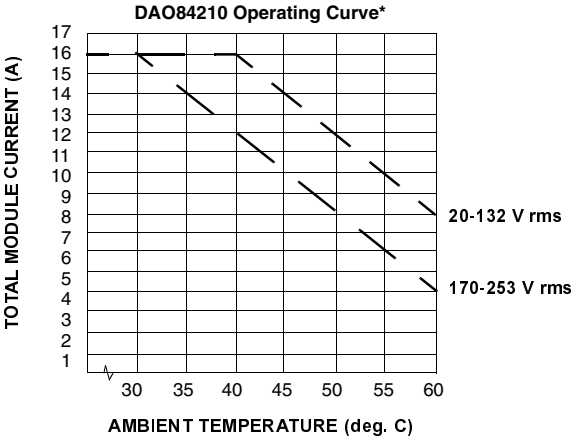
Specifications

The following table shows the specifications for the 100 ... 230 VAC OUT module.

Specifications	
Number of Output Points	16 in four 4 point groups
LEDs	Active F 1 ... 16 (Green) - Indicates point status 1 - 4, 5 - 8, 9 - 12, 13 - 16 (Red) - Indicated group has a blown fuse or no field power
Required Addressing	1 word out
Voltage (rms)	
Working	85 ... 253 Vac
Absolute Maximum	300 Vac for 10 s 400 Vac for 1 cycle
Frequency	47 ... 63 Hz
ON State Drop / Point	1.5 Vac
Minimum Load Current (rms)	5 mA
Maximum Load Current (rms)	
Each Point *	4 A continuous, 85 ... 132 Vac rms, 3 A continuous, 170 ... 253 Vac rms
Each Group	4 A continuous
Per Module*	16 A continuous (See the derating chart)
Off State Leakage / Point (max)	2.5 mA @ 230 Vac 2.0 mA @ 115 Vac

Specifications

The following figure shows the DAO84210 derating chart.



*The specifications stated are pending UL/CSA approval. This module was originally

Surge Current Maximum (rms)	Per Point Per Group
One Cycle	30 A 45A
Two Cycles	20 A 30 A
Three Cycles	10 A 25 A
Applied DV / DT	400 V/µs
Response	
OFF - ON	0.50 of one line cycle max
ON - OFF	0.50 of one line cycle max
Output Protection	RC snubber suppression (internal)
Isolation (rms)	
Group to Group	1000 Vac rms for 1 minute, galvanically isolated
Output to Bus	1780 Vac rms for 1 minute
Fault Detection	Blown fuse detect, loss of field power
Bus Current Required	350 mA
Power Dissipation	1.85 W + 1.1 V x Total Module Load Current
External Power (rms)	85 ... 253 Vac
Fusing	
Internal	5 A fuse for each group. (Part # 043502405 or equivalent). For the location of the fuses see figure below.
External	User discretion

WARNING

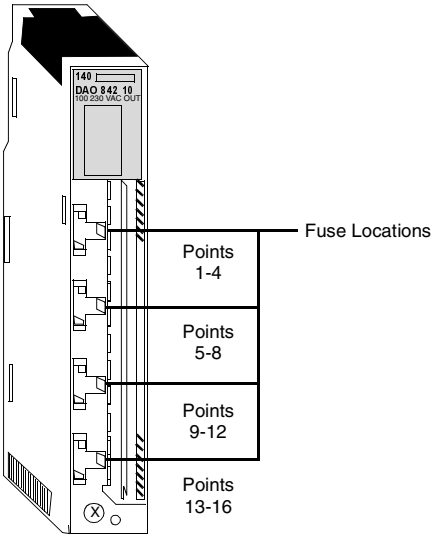
Possible injury to personnel or equipment

First turn off the power to the module to remove the field wiring terminal strip to gain access to the fuses.

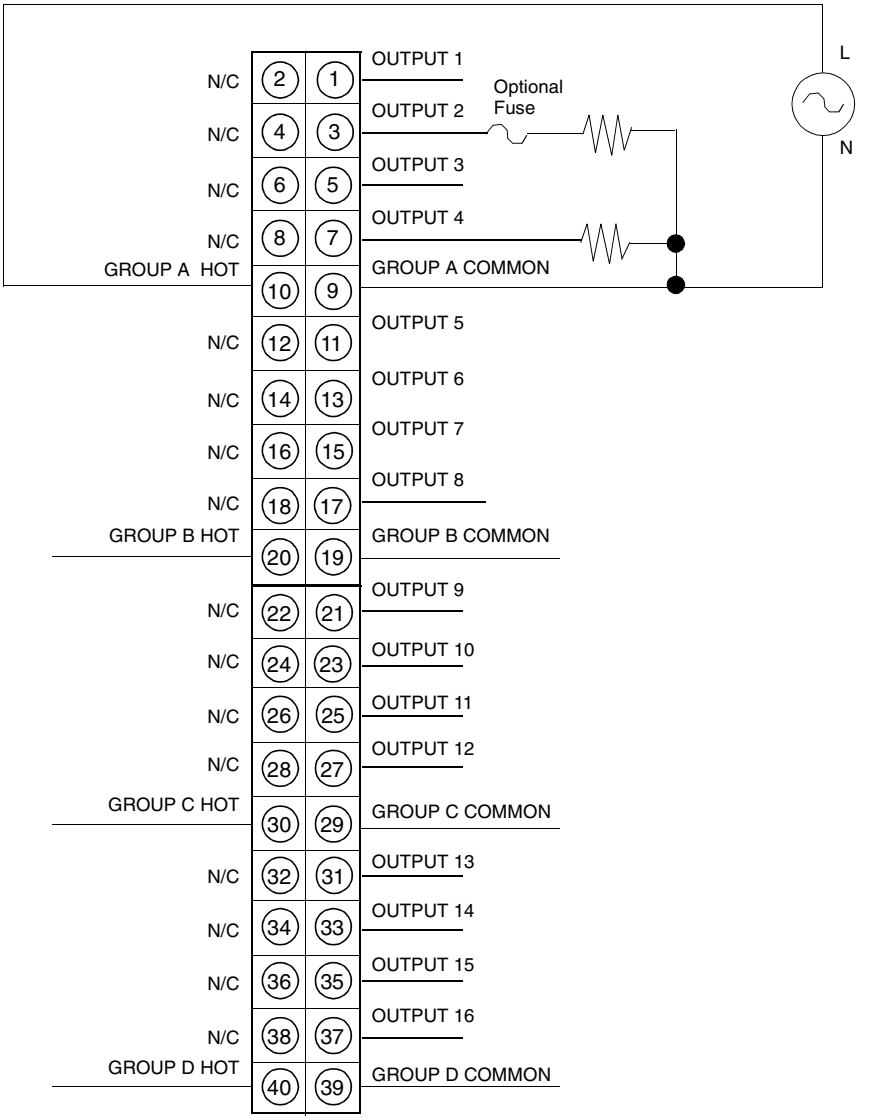
Failure to follow this precaution can result in death, serious injury, or equipment damage.

Fuse Locations

The following figure shows the fuse locations for the DAO84210 module.



Wiring Diagram The following figure shows the wiring diagram for the DAO84210 module.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected

CAUTION

Power Compatibility

The AC power energizing each group must be from a common, single-phase AC power source.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Wiring Compatibility

If an external switch is wired to control an inductive load in parallel with the module output, then an external varistor (Harris V390ZA05 or equivalent) must be wired in parallel with the switch.

Failure to follow this precaution can result in injury or equipment damage.

140DAO84220 Quantum I/O AC Output 24 ... 48 Vac 4x4 Module

Overview

The AC Output 24 ... 48 Vac 4x4 module switches 24 ... 48 Vac powered loads.

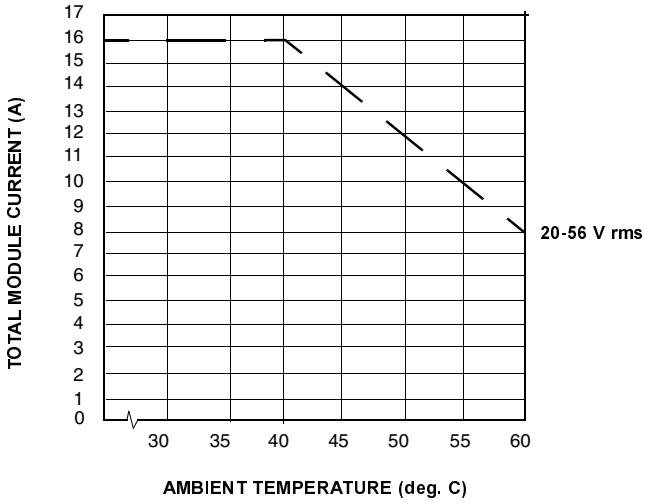
Specifications

The following table shows the specifications for the DAO84220 24 - 48 VAC OUT module.

Specifications	
Number of Output Points	16 in four 4 point groups
LEDs	Active F 1 ... 16 (Green) - Indicates point status 1 - 4, 5 - 8, 9 - 12, 13 - 16 (Red) - Indicates group has a blown fuse or no field power
Required Addressing	1 word out
Voltage (rms)	
Working	20 ... 56 Vac
Absolute Maximum	63 Vac for 10 s 100 Vac for 1 cycle 111 Vac peak for 1.3 ms
Frequency	47 ... 63 Hz
ON State Drop / Point	1.5 Vac
Minimum Load Current (rms)	5 mA
Maximum Load Current (rms)	
Each Point*	4 A continuous, 20 ... 56 Vac rms
Each Group	4 A continuous
Per Module*	16 A continuous (See the derating chart)
Off State Leakage / Point	1 mA max
*The specifications stated are pending UL/CSA approval. This module was originally approved at 2 A each point; 12 A, 0 ... 50° C per group.	

Specifications

The following figure shows the DAO84220 derating chart.



Surge Current Maximum (rms)	Per Point Per Group
One Cycle	30 A 45 A
Two Cycles	20 A 30 A
Three Cycles	10 A 25 A
Applied DV/DT	400 V/µs
Output Protection	RC snubber suppression (internal)
Isolation (rms)	
Group to Group	1000 Vac for 1 minute. Galvanically Isolated.
Output to Bus	1780 for 1 minute
Fault Detection	Blown fuse detect, loss of field power
Bus Current Required	350 mA
Power Dissipation	1.85 W + 1.1 V x Total Module Load Current
External Power Supply (rms)	20 ... 56 Vac
Fusing	
Internal	5 A fuse for each group (Part # 043502405 or equivalent) For the location of the fuses, see *p. 579*.
External	User discretion

CAUTION

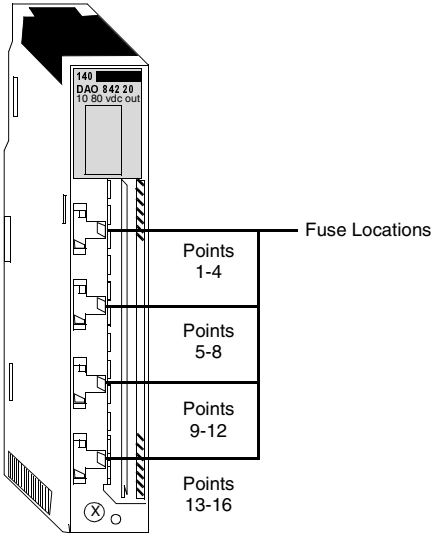
Possible injury to personnel or equipment

First turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

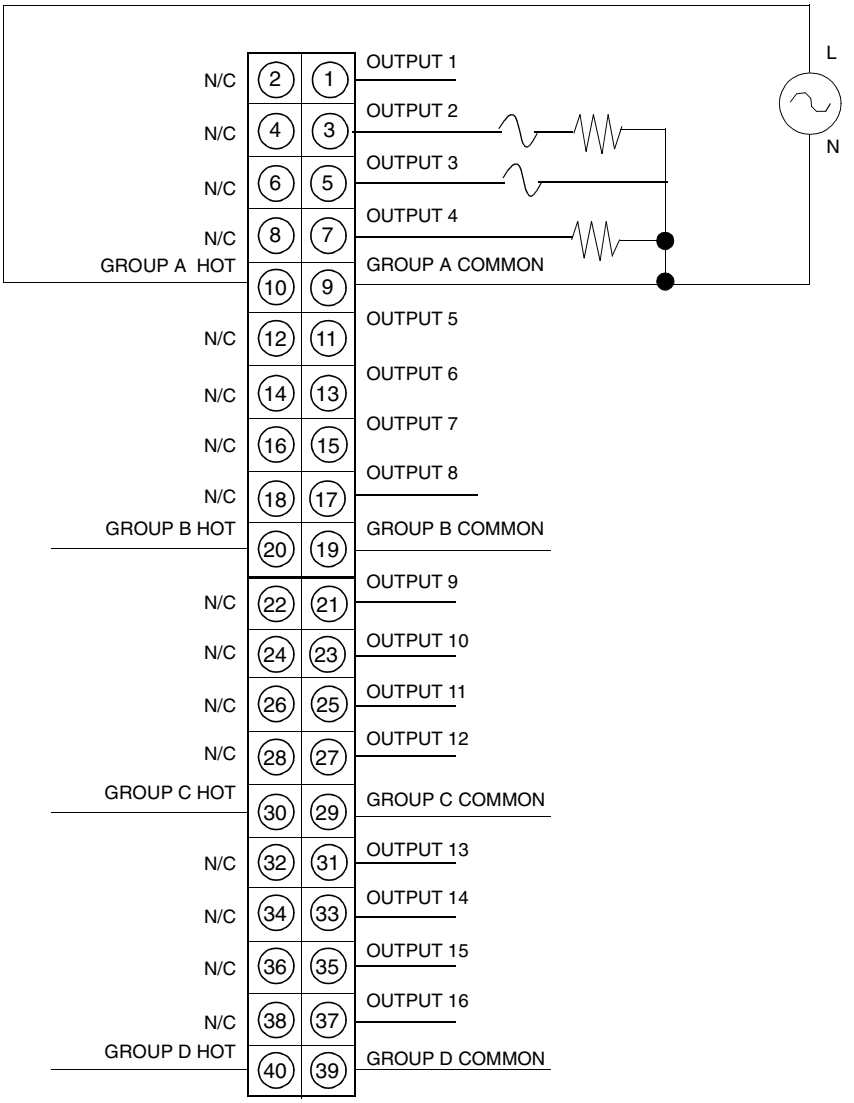
Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations

The following figure shows the DAO84220 fuse locations.



Wiring Diagram The following figure shows the DAO84220 wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N/C = Not Connected.

CAUTION

Power Compatibility

The AC power energizing each group must be from a common, single-phase AC power source.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Wiring Compatibility

If an external switch is wired to control an inductive load in parallel with the module output, then an external varistor (Harris V390ZA05 or equivalent) must be wired in parallel with the switch.

Failure to follow this precaution can result in injury or equipment damage.

140DAO85300 Quantum I/O AC Output 24 ... 230 Vac 4x8 Module

Overview

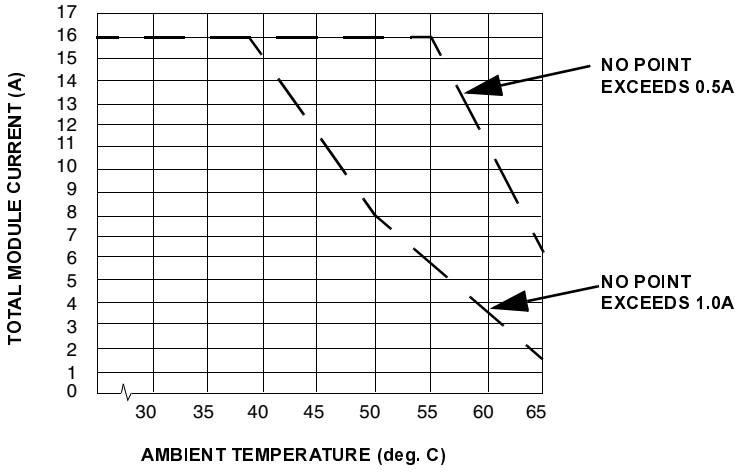
The AC Output 230 Vac 4x8 module switches 24 ... 230 Vac powered loads.

Specifications

The following table shows the specifications for the 230 VAC OUT module.

Specifications	
Number of Output Points	32 in four 8 point fused groups
LEDs	Active 1 - 32 (Green) - Indicates point status
Required Addressing	2 words out
Operating Voltages (rms)	
Working	20 ... 253 Vac
Absolute Maximum	300 Vac for 10 sec 400 Vac for 1 cycle
Frequency	47 ... 63 Hz
On State Drop / Point	1.5 Vac
Minimum Load Current (rms)	10 mA resistive
Maximum Load Current (rms)	
Each Point	1 A continuous, 20 ... 253 Vac rms
Each Group	4 A max
Per module	16 A continuous (See derating chart)

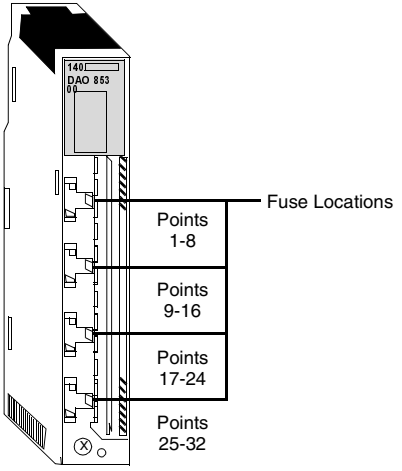
The following figure shows the DAO85300 derating chart.



Specifications	
Off State Leakage / Point (max)	2.0 mA @ 230 Vac 1.1 mA @ 115 Vac 0.4 mA @ 48 Vac 0.2 mA @ 24 Vac
Surge Current Maximum (rms)	
One Cycle	15 A per point
Two Cycles	12 A per point
Three Cycles	8 A per point
Applied DV/DT	400 V/µs
Response	
OFF - ON	0.50 of one line cycle max
ON - OFF	0.50 of one line cycle max
Output Protection	RC snubber protection (internal)
Isolation (rms)	
Group to Group	1780 Vac for 1 minute
Output to Bus	1780 Vac for 1 minute
Bus Current Required	320 mA
Power Dissipation	1.60W+1.0 x Total Module Load Current
External Power	Not required
Fusing	
Internal	4 A, 250 V fuse (Little Fuse 217004) for each group. For location of fuses see the Fuse Locations Figure.
External	User discretion

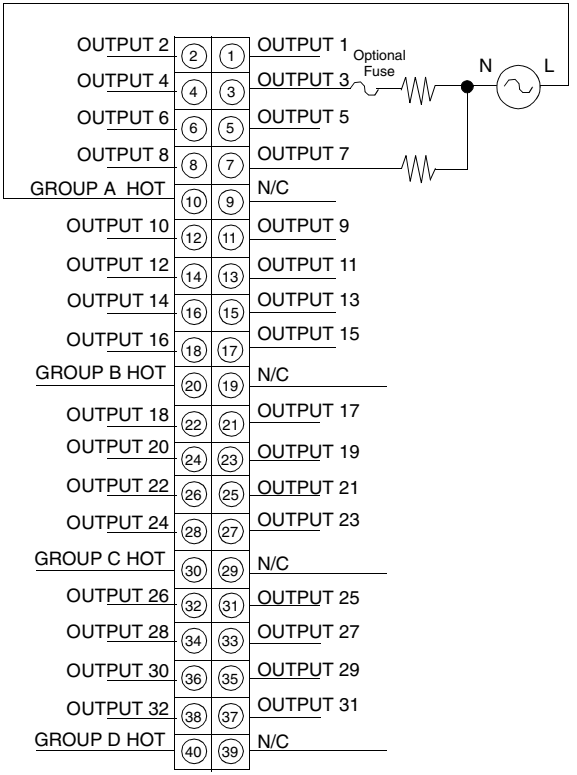
Fuse Locations

The following figure shows the fuse locations for the DAO85300 module.



Wiring Diagram

The following figure shows the DAO85300 wiring diagram.



CAUTION

Power Compatibility

The AC power energizing each group must be from a common, single-phase AC power source.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Wiring Compatibility

If an external switch is wired to control an inductive load in parallel with the module output, then an external varistor (Harris V390ZA05 or equivalent) must be wired in parallel with the switch.

Failure to follow this precaution can result in injury or equipment damage.

140DDO15310 I/O DC Output 5 V TTL 4x8 Sink Module

Overview

The DC Output 5 V TTL 4x8 Sink module switches 5 Vdc loads and is for use with source devices and is compatible with LS, S, TTL, and CMOS logic.

Specifications

The following table shows the specifications for the 5 V TTL OUT module.

Specifications	
Number of Output Points	32 in four 8 point groups
LEDs	Active F 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words out
Output Ratings	
ON Level	0.2 Vdc (max) @ 75 mA sinking
OFF Level	V_{OUT} = U_S - 1.25 V @ 1 mA source V_{OUT} = 3.2 V (min) @ 1 mA, U_S = 4.5 V
Internal Pullup Resistor	440 Ω
Maximum Load Current	
Each Point	75 mA (sinking)
Each Group	600 mA
Per Module	2.4 A
Surge Current Maximum	
Each Point	750 mA @ 500 µs duration (no more than 6 per minute)
Response (Resistive Loads)	
OFF - ON	250 µs (max)
ON - OFF	250 µs (max)
Output Protection (internal)	Transient voltage suppression
Isolation	
Group to Group	500 Vac rms for 1 minute
Output to Bus	1780 Vac rms for 1 minute
Fault Detection	Blown fuse detect, loss of field power
Bus Current Required	350 mA
Power Dissipation	4 W
External Power (U_S)	4.5 ... 5.5 Vdc continuous
Absolute Voltage (U_S) max	15 Vdc for 1.3 ms decaying voltage pulse
External Power Supply Current	400 mA + Load current per point
Fusing	
Internal	1A fuse for each group. Modicon # 043508953. For the location of the fuses, see *p. 588*.
External	None

Module States

The following table shows the module states for the DDO15310 module.

External Power	Command	Active	Output	LED	Fault
ON	OFF	ON	>3.2	OFF	OFF
ON	ON	ON	<0.2	ON	OFF
OFF	X	X	*	OFF	ON
OFF	ON	ON	*	ON	ON

*440 Ω pullup resistor to the power rail
X = OFF or ON state

CAUTION

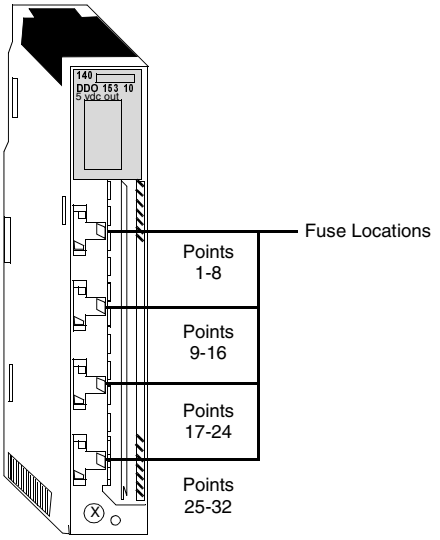
Possible danger to equipment or personnel.

Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

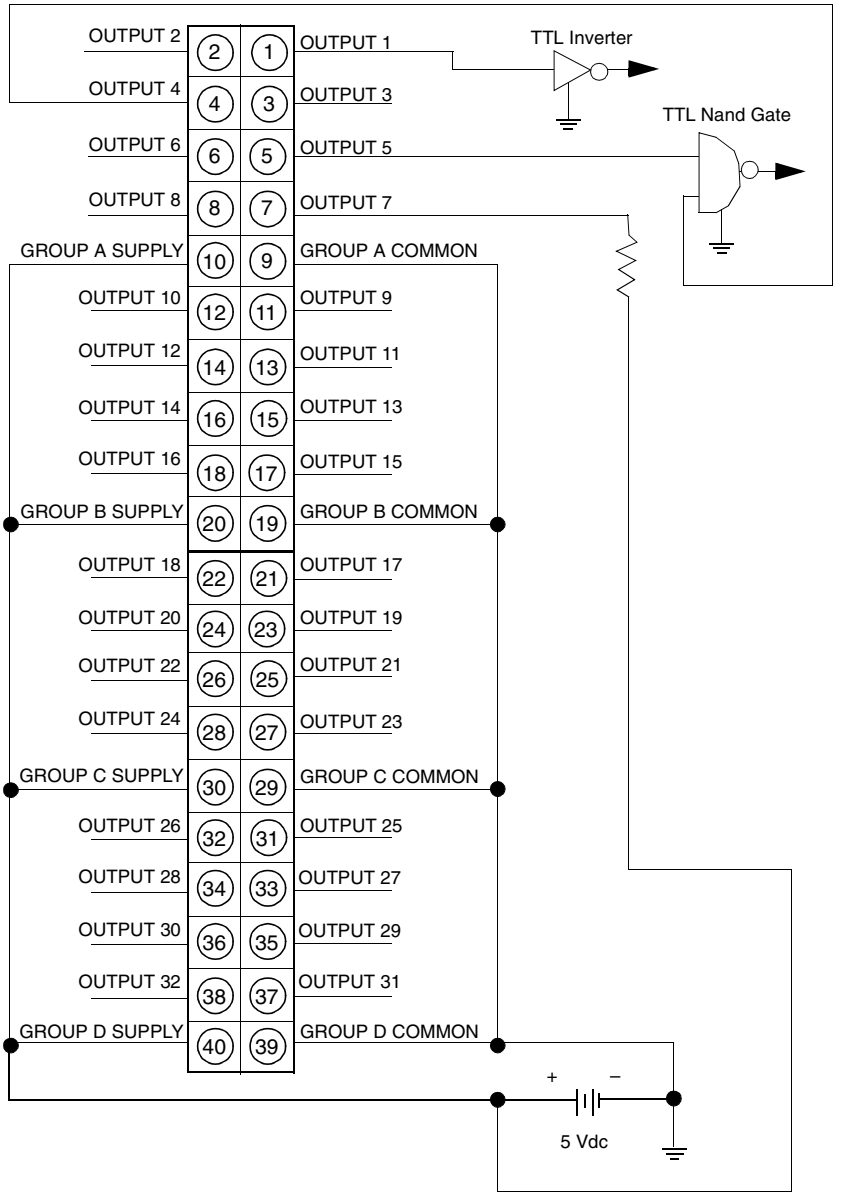
Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations

The following figure shows the locations of the fuses for the DDO15310 module.



Wiring Diagram The following figure shows the DDO15310 wiring diagram.



140DDO35300 Quantum I/O DC Output 24 Vdc 4x8 Source Module

Overview

The DC Output 24 Vdc 4x8 Source module switches 24 Vdc powered loads and is for use with sink devices.

Specifications

The following table shows the specifications for the DDO35300 24 VDC OUT module.

Specifications	
Number of Output Points	32 in four 8 point groups
LEDs	Active F 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words out
Voltage	
Operating (max)	19.2 ... 30 Vdc
Absolute (max)	56 Vdc for 1.3 ms decaying voltage pulse
ON State Drop / Point	0.4 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Off State Leakage / Point	0.4 mA @ 30 Vdc
Surge Current Maximum	
Each Point	5 A @ 500 µs duration (no more than 6 per minute)
Response (Resistive Loads)	
OFF - ON	1 ms (max)
ON - OFF	1 ms (max)
Output Protection (internal)	Transient voltage suppression
Load Inductance Maximum	0.5 Henry @ 4 Hz switch frequency or $L = \frac{0.5}{I^2F}$ where: L = Load Inductance (Henry) I = Load Current (A) F = Switching Frequency (Hz)
Load Capacitance Maximum	50 µf

Specifications	
Isolation	
Group to Group	500 Vac rms for 1 minute
Output to Bus	1780 Vac rms for 1 minute
Fault Detection	Blown fuse detect, loss of field power
Bus Current Required	330 mA
Power Dissipation	1.75 W + 0.4 V x Total Module Load Current
External Power	19.2 ... 30 Vdc
Fusing	
Internal	5A fuse for each group. Modicon Part # 043502405. For the location of the fuses see *p. 592*.
External	Each group is protected with a 5A fuse to protect the module from catastrophic failure. The group fuse is not guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be protected with a 3/4 A, 250 V fuse, (Part # 57-0078-000).

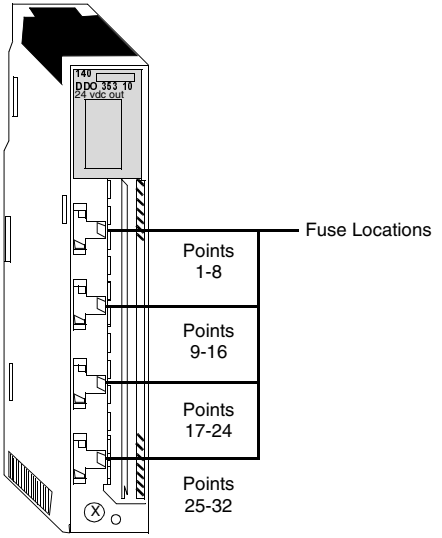
CAUTION

Possible danger to equipment or personnel.

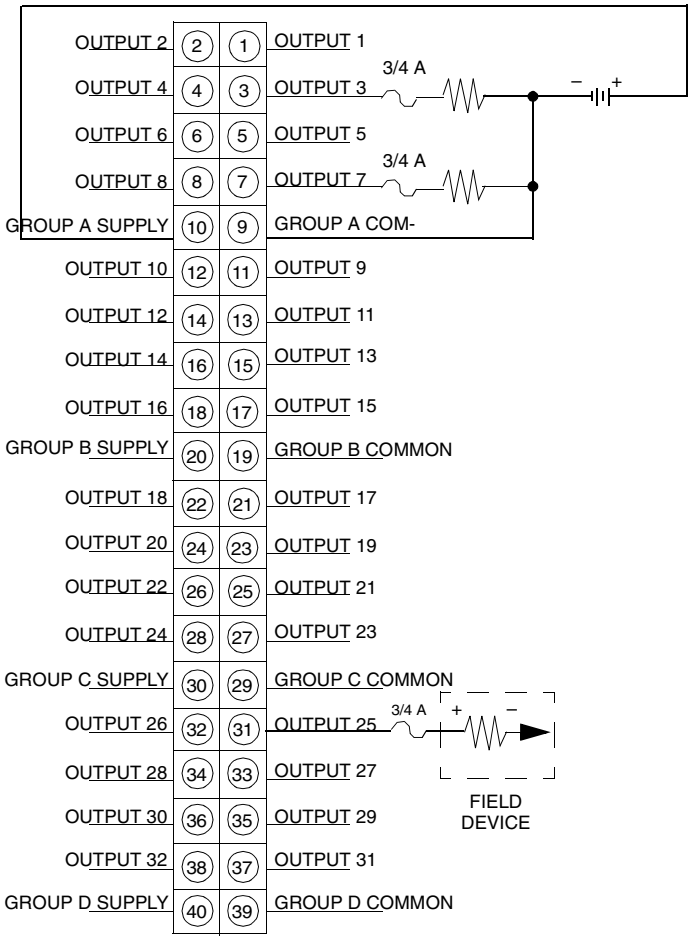
Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations The following figure shows the fuse locations for the DDO35300 module.



Wiring Diagram The following figure shows the DDO35300 wiring diagram.



CAUTION

Possible Equipment Failure

Each group is protected with a 5 A fuse to protect the module from catastrophic failure. The group fuse will not be guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be protected with a 3/4 A, 250 V fuse (Part # 57-0078-000).

Failure to follow this precaution can result in injury or equipment damage.

140DDO35301 I/O DC Output 24 VDC 4x8 Discrete Source Module

Overview

The 140DDO35301 source module switches 24 Vdc powered loads, and is short circuit and overload resistant.

Specifications

The following table shows the specifications for the DDO35301 24 VDC OUT module.

Specifications	
Number of Output Points	32 in four 8-point groups
LEDs	Active (Green) Bus communication is present F (Red) Group power missing or point faulted 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words out
Voltage	
Operating	19.2 ... 30 Vdc
ON State Drop / Point	0.5 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Off State Leakage / Point	<1 mA @ 24 Vdc
Surge Current Maximum	
Each Point	2 A (Internally limited)
Response (Resistive Loads)	
OFF - ON	< 0.1 ms
ON - OFF	< 0.1 ms
Output Protection (internal)	Thermal overload and short circuit
Load Inductance Maximum	0.5 Henry @ 4 Hz switch frequency, or: $L = \frac{0.5}{I^2 F}$ where: L = Load inductance (Henry) I = Load current (A) F = Switching Frequency (Hz)
Load Capacitance Maximum	50 µf
Isolation	
Group to Group	500 Vac rms for 1 minute
Output to Bus	500 Vac rms for 1 minute

Specifications	
Fault Detection	Group indication: Loss of field power/faulted point
Bus Current Required	250 mA max.
Power Dissipation	5 W (all points on)
External Power	19.2 ... 30 Vdc
Fusing	
Internal	5A fuse for each group. Modicon Part # 043502405. For the location of the fuses see *p. 595*.
External	User discretion

CAUTION

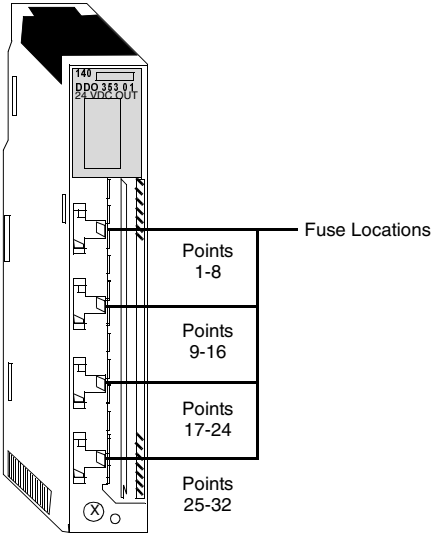
Possible danger to equipment or personnel.

Disconnect the supply voltage to the module and remove the field wiring terminal strip to gain access to fuses.

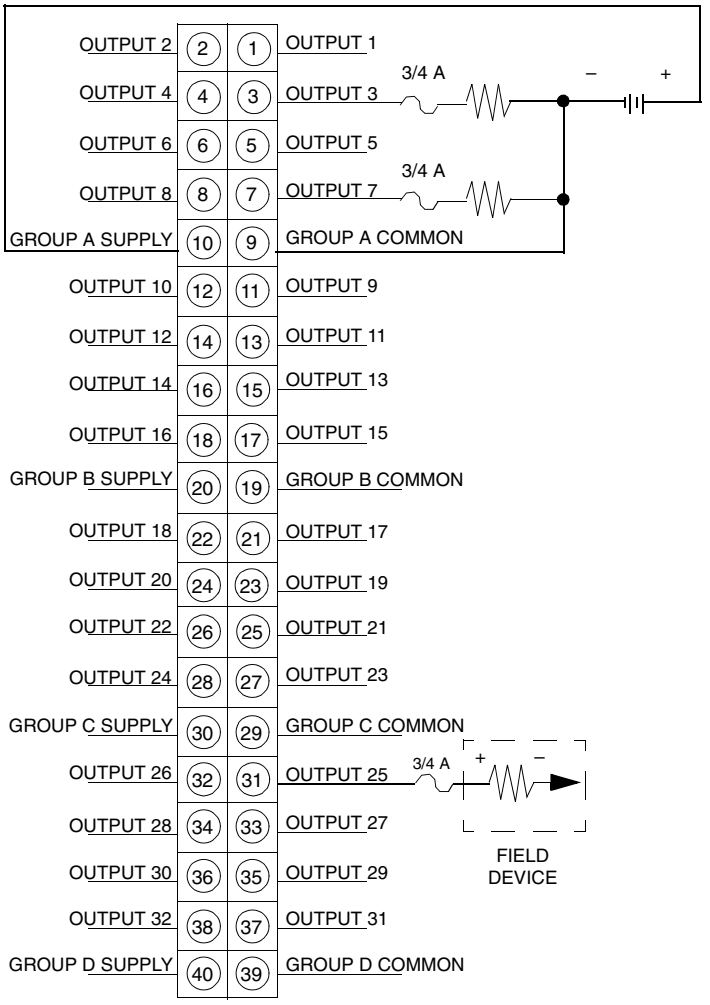
Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations

The following figure shows the fuse locations for the DDO35301 module.



Wiring Diagram The following figure shows the DDO35301 wiring diagram.



CAUTION

Possible Equipment Failure

Each group is protected with a 5 A fuse to protect the module from catastrophic failure.

Failure to follow this precaution can result in injury or equipment damage.

140DDO35310 I/O DC Output 24 Vdc 4x8 Sink Module

Overview

The 24 Vdc True Low 4x8 Sink module switches 24 Vdc, and is capable of driving displays, logic, and other loads up to 500 mA sinking, in the ON state.

Specifications

The following table shows the specifications for the DDO35310 24 VDC OUT SINK module.

Specifications	
Number of Output Points	32 output points in four 8 point groups
LEDs	Active F 1 ... 32 (Green) - Indicates point status
Required Addressing	2 words out
Voltage	
Operating (max)	19.2 ... 30 Vdc
1.0 ms	50 Vdc decaying pulse
ON State Drop / Point	0.4 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	4 A
Per Module	16 A
OFF State Leakage/Point	0.4 mA @ 30 Vdc
Surge Current Maximum	
Each Point	5 A@ 1 ms duration (no more than 6 per minute).
Response (Resistive Loads)	
OFF - ON	1 ms (max)
ON - OFF	1 ms (max)
Fault Detection	Blown fuse detect, loss of field power
Isolation	
Group to Group	500 Vac rms for 1 minute
Output to Bus	1780 Vac rms for 1 minute

Specifications	
Load Inductance Maximum	0.5 Henry @ 4 Hz switch frequency or $L = \frac{0.5}{I^2 F}$ where: L = Load Inductance (Henry) I = Load Current (A) F = Switching Frequency (Hz)
Load Capacitance Maximum	50 µf
Tungsten Load Maximum	12 W @ 24 Vdc
Output Protection (internal)	Transient voltage suppression: 36 V
Bus Current Required	330 mA max
Power Dissipation	2.0 W + (0.4 V x Total Load Current)
External Power	19.2 ... 30 Vdc
Fusing	
Internal	5.0 A fuse per group. Part # 043502405. For the location of the fuses see *p. 599*.
External	Each group is protected with a 5 A fuse to protect the module from catastrophic failure. The group fuse is not guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be protected with a 3/4 A, 250 V fuse, Part # 57-0078-000.

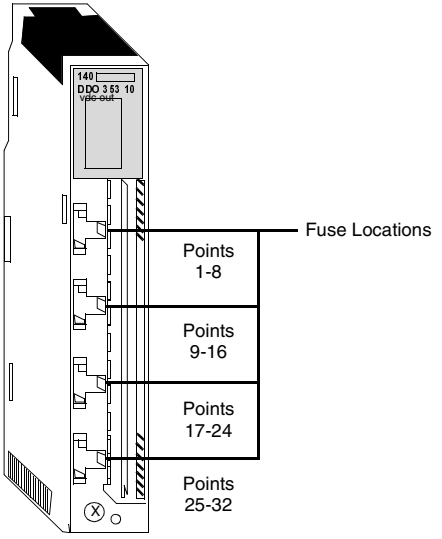
CAUTION

Access to Fuses

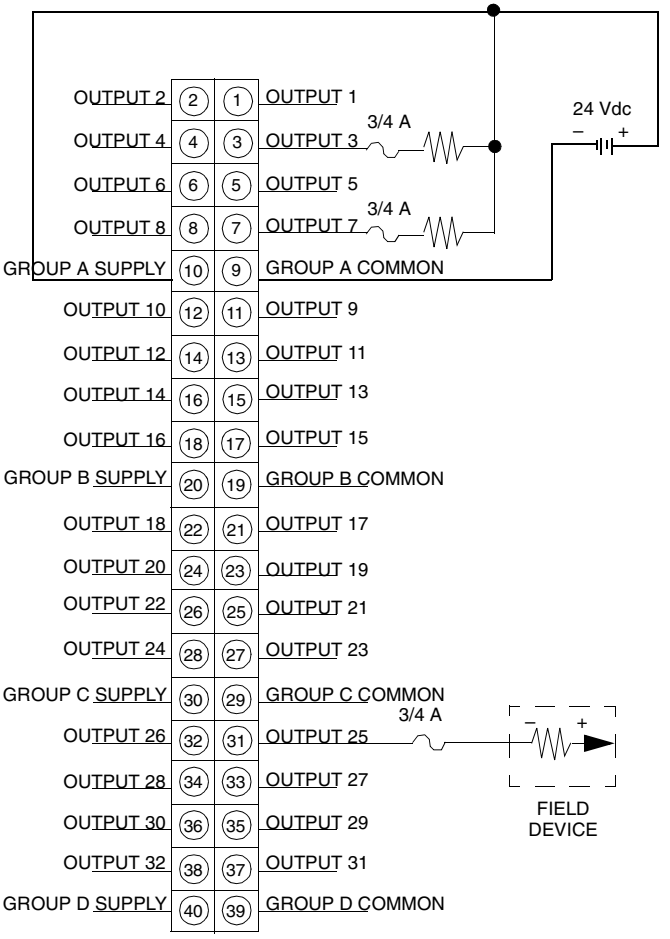
Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations The following figure shows the locations of the fuses for the DDO35310 module.



Wiring Diagram The following shows the DDO35310 wiring diagram.



CAUTION

Possible Equipment Failure

Each group is protected with a 5 A fuse to protect the module from catastrophic failure. The group fuse will not be guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be fused with a 3/4 A, 250 V fuse Part # 57-0078-000.

Failure to follow this precaution can result in injury or equipment damage.

140DDO36400 I/O DC Output 24VDC 6x16 Telefast Output Module

Overview

The Telefast Output Source module switches 24 Vdc powered loads. Outputs are thermally protected.

Specifications

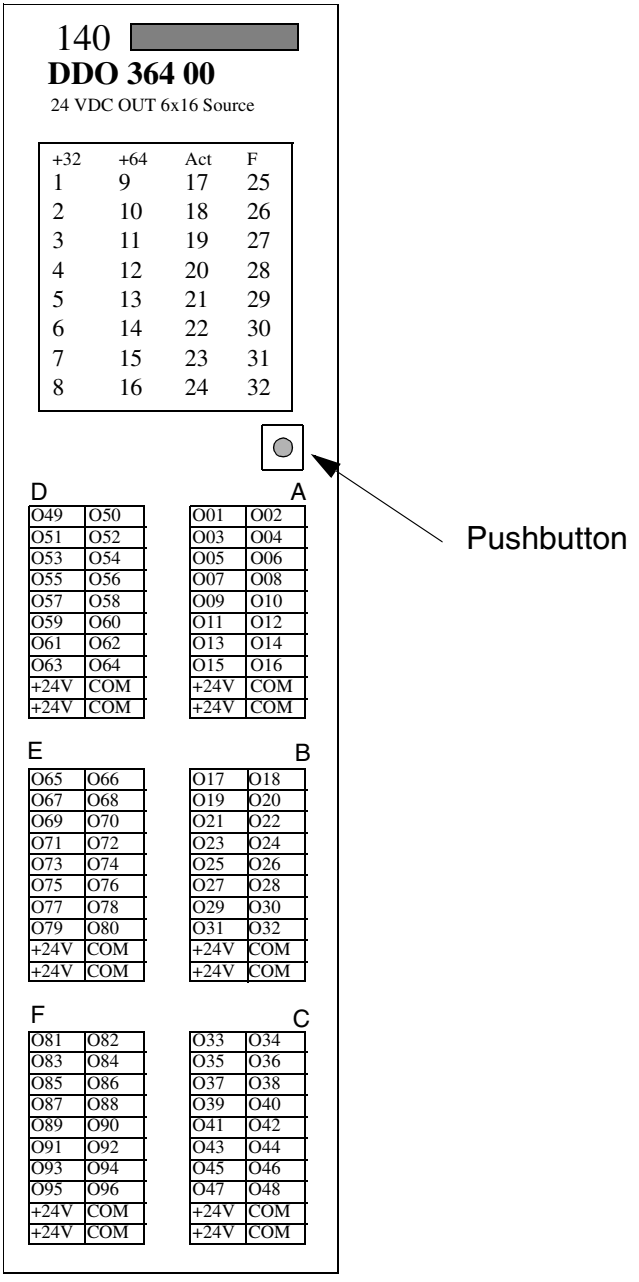
The following table shows the specifications for the 140DDO36400 output module:

Specifications	
Number of Output Points	96 in six 16 point groups
LEDs	ACT (Green) Bus communications are present F (Red) Group power missing or point faulted +32 (Green) Points 33 to 64 displayed on LED matrix +64 (Green) Points 65 to 96 displayed on LED matrix 1 ... 32 (Green) - Indicates point status
Required Addressing	6 words out
Voltage	
Operating	19.2 ... 30 Vdc
ON State Drop / Point	0.5 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	3.2 A
Per Module	19.2 A
Off State Leakage / Point	<1 mA @ 24 Vdc
Surge Current Maximum	
Each Point	2 A (Internally limited)
Response (Resistive Loads)	
OFF - ON	<.1 ms
ON - OFF	<.1 ms
Output Protection (internal)	Thermal overload and short circuit
Load Inductance Maximum	0.5 Henry @ 4 Hz switch frequency, or: $L = \frac{0.5}{I^2 F}$ where: L = Load inductance (Henry) I = Load current (A) F = Switching frequency (Hz)
Load Capacitance Maximum	50 µf

Specifications	
Isolation	
Output to Bus	500 Vac rms for 1 minute
Fault Detection	Group indication: loss of field power/faulted point (short circuit or overload)
Bus Current Required	250 mA max.
Power Dissipation	7 W (all points on)
External Power	19.2 ... 30 Vdc. 19.2 A maximum (depends on load)
Fusing	
External	User discretion for field power

Front view of 140DDO36400 Module

The front view of the 140DDO36400 output module including terminal assignment numbers:



Selecting Point Status Indicator LEDs

Use the pushbutton to select output points to be displayed as per the following table:

LED	+32	+64
Out 1 to 32	Off	Off
Out 33 to 64	On	Off
Out 65 to 96	Off	On

Recommended Cables

The following table shows recommended cables, description, and their length in meters.

Cable Part Number	Description	Length (M)
TSXCDP301	(1) HE 10 - flying leads	3
TSXCDP501	(1) HE 10 - flying leads	5
TSXCDP053	(2) HE 10 - round cable	0.5
TSXCDP103	(2) HE 10 - round cable	1
TSXCDP203	(2) HE 10 - round cable	2
TSXCDP303	(2) HE 10 - round cable	3
TSXCDP503	(2) HE 10 - round cable	5

Color Codes for Input Groups

The following table shows the color codes for all groups.

1. White	2. Brown
3. Green	4. Yellow
5. Gray	6. Pink
7. Blue	8. Red
9. Black	10. Purple
11. Gray/pink	12 Red/blue
13. White/green	14. Brown/green
15. White/yellow	16. Yellow/brown
17. White/gray	18. Gray/brown
19. White/pink	20. Pink/brown

Compatible Output Adapter Sub-Bases

The following tables shows the compatible output adapter sub-bases. See *Quantum Modicon Telemecanique Automation Platform, Discrete I/O Chapter, Telefast 2 pre-wired system: connector cables FOR Quantum PLCs* section for more informaton.

Channels	Type
8	ABE-7S08S2xx[1]
8	ABE-7R08Sxxx/7P08T330[1]
16	ABE-7R16Sxxx
16	ABE-7R16Txxx/7P16Txxx
[1]With the splitter sub-base ABE-7ACC02	

140DDO84300 Quantum I/O DC Output 10 ... 60 Vdc 2x8 Source Module

Overview

The DC Output 10 ... 60 Vdc 2x8 Source module switches 10 ... 60 Vdc powered loads and is for use with sink devices. External power supplies may be mixed between groups.

Specifications

The following table shows the specifications for the DDO84300 10 ... 60 VDC OUT module.

Specifications	
Number of Output Points	16 in two 8 point groups
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word out
Voltage	
Operating	10.2 ... 72 Vdc
Absolute Maximum	72 Vdc (continuous)
ON State Drop / Point	1 V max @ 2 A
Maximum Load Current	
Each Point	2 A
Each Group	6 A
Per Module	12 A
Off State Leakage / Point	1 mA @ 60 Vdc max
Surge Current Maximum	
Each Point	7.5 A @ 50 ms duration (no more than 20 per minute)
Response (Resistive Loads)	
OFF - ON	1 ms
ON - OFF	1 ms
Output Protection (internal)	Over voltage (suppression diode)
Isolation	
Group to Group	700 Vdc for 1 minute
Group to Bus	2500 Vdc for 1 minute
Bus Current Required	160 mA
Power Dissipation	1 W + 1 V x Total Module Load Current
External Power	10 ... 60 Vdc (module inrush at power up approximately 0.75A, < 1 msec)

Specifications	
Fusing	
Internal	8A fuse time-lag for each group (Part # 042701994 or equivalent).For location of fuses, see *p. 607*.
External	Each group is protected with an 8 A fuse to protect the module from catastrophic failure. The group fuse is not guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be fused with a 2 A fuse: Little Fuse 312-002 or equivalent.

CAUTION

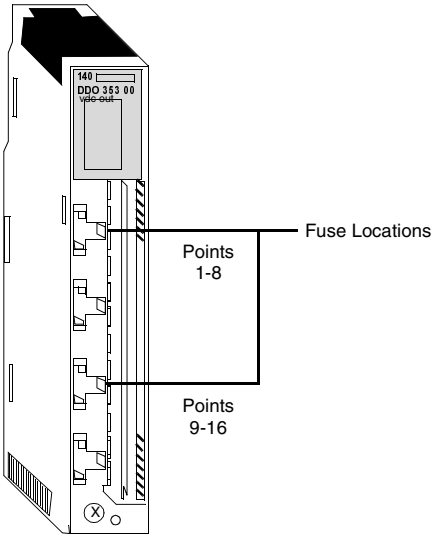
Possible danger to equipment or personnel.

Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

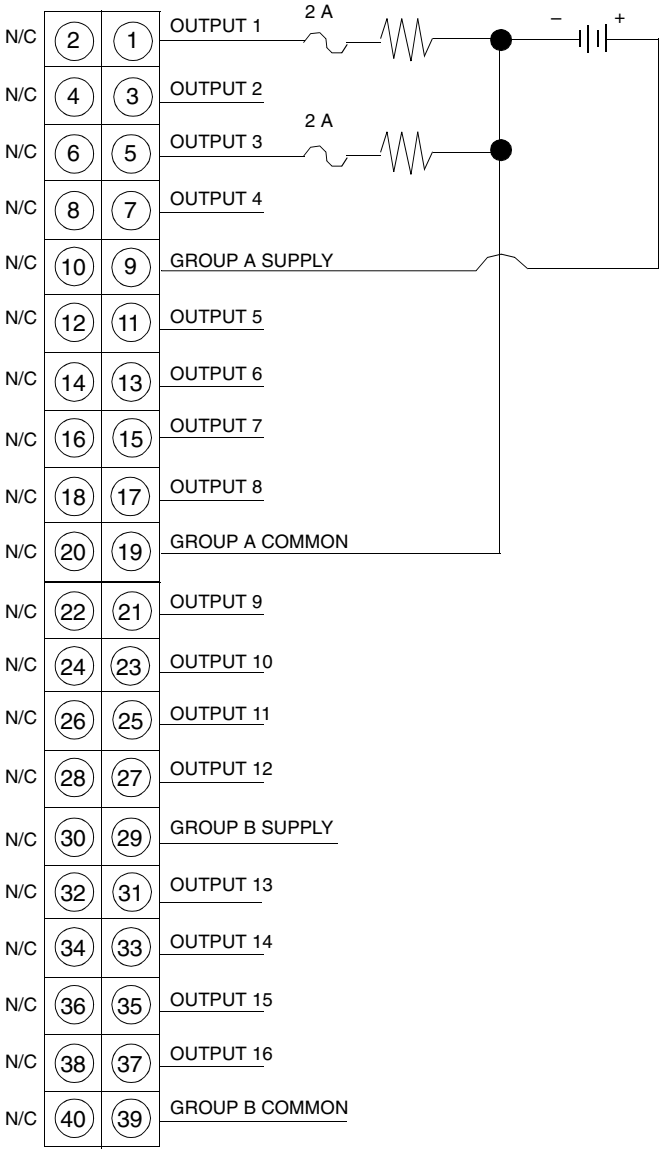
Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations

The following figure shows fuse locations for the DDO84300 module.



Wiring Diagram The following figure shows the DDO84300 wiring diagram.



Note: N / C = Not Connected

140DDO88500 Quantum I/O DC Output 24-125 Vdc 2x6 Source Module

Overview

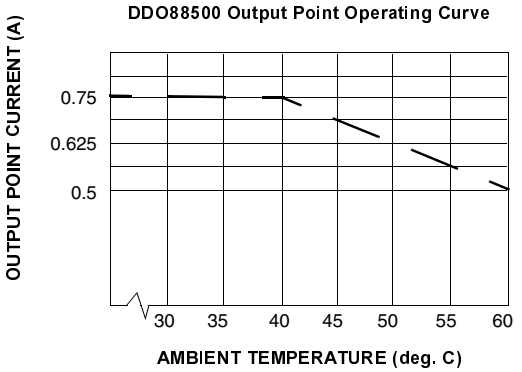
The DC Output 24-125 Vdc 2x6 Source module switches 24-125 VDC powered loads and is for use with sink devices.

Specifications

The following table shows the specifications for the DDO88500 24-125 VDC OUT module.

Specifications		
Number of Output Points		12 in two 6 point groups
LEDs		Active F (Red) - An over current condition on any point has been detected 1 - 12 (Green) - The indicated point or channel is turned ON 1 - 12 (Red) - The indicated output point has an over current condition
Required Addressing		1 word in
		1 word out
Voltages		
Working		19.2 to 156.2 Vdc including ripple
ON State Voltage Drop		0.75 Vdc @ 0.5 A
Maximum Load Current		
Each Point		0.75 A, < 40° C (see the operating curve below)
Each Group		3 A, 0 ... 60° C
Per Module		6 A, 0 ... 60° C
Surge Current Maximum		4 A, 1 ms pulse, no more than 6 per minute
OFF State Leakage		0.5 mA @ 150 Vdc
Maximum Tungsten	@ 130 Vdc	46 W per point
	@ 115 Vdc	41 W per point
	@ 24 Vdc	8 W per point

Specifications



NOTE: Each group: 3 A, 0 ... 60° C. Per module: 6 A, 0 ... 60° C	
Inductance	Internal diode protected, no limit on inductance
Output Response (OFF - ON, ON - OFF)	1.0 ms, resistive
Switching Frequency	50 Hz maximum
Output Protection (internal)	Group varistor and individual point over current sense
Isolation	
Field to Bus	2500 Vac for 1 minute
Group-to-Group	1200 Vac for 1 minute
Fault Detection	Over current (see note below)
Bus Current Required	
6 points ON	375 mA
12 points ON	650 mA
Power Dissipation	1.0 W + 0.77 W x number of points ON
External Power	None
Fusing	
Internal	4 A (Part # 043511382 or equivalent) See below for the location of the fuses.
External	Not required for this module.

Note: Each output point is protected by an over current sense circuit. When an over current condition is detected, the point is turned OFF, its LED fault indicator is turned ON, and the appropriate bit is set in the module fault register.

The output point will be turned OFF after a short is detected. A fault greater than 9.4 A will guarantee that the point will be turned OFF and will latch the output point in the OFF state. To clear a fault, the point must be commanded OFF in user logic.

CAUTION

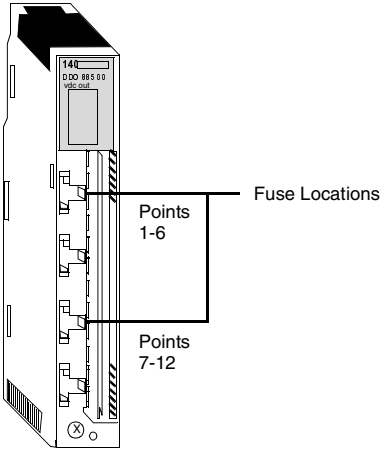
Possible danger to equipment or personnel.

Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

Failure to follow this precaution can result in injury or equipment damage.

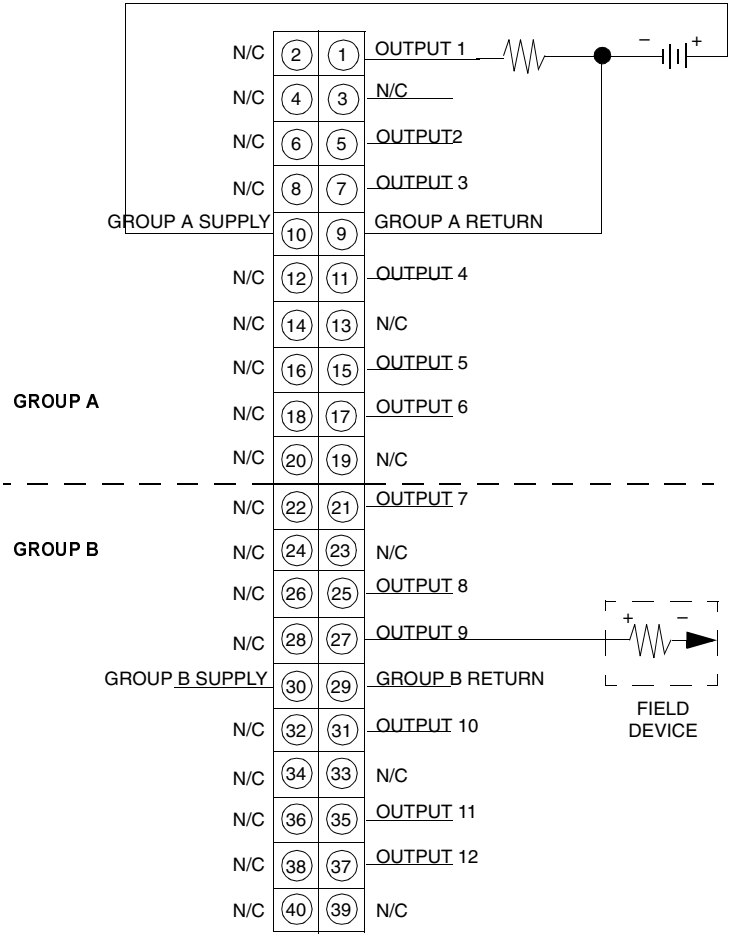
Fuse Locations

The following figure shows the fuse locations for the DDO88500 module.



Note: At a minimum, Modsoft V2.40, ProWorX NxT V2.0, or Concept V2.0, is required to configure this module.

Wiring Diagram The following figure shows the DDO885 wiring diagram.



Note: N / C = Not Connected.

CAUTION

Reverse Polarity Possibility

This module is not protected against reverse polarity. If you want to protect against polarity miswiring, an external diode in series with each group supply line is recommended. This diode must be able to support the group load current.

Failure to follow this precaution can result in injury or equipment damage.

140DRA84000 Quantum I/O Relay Output 16x1 Normally Open Module

Overview

The Relay Output 16x1 Normally Open module is used to switch a voltage source using 16 relays with normally open contacts.

Specifications

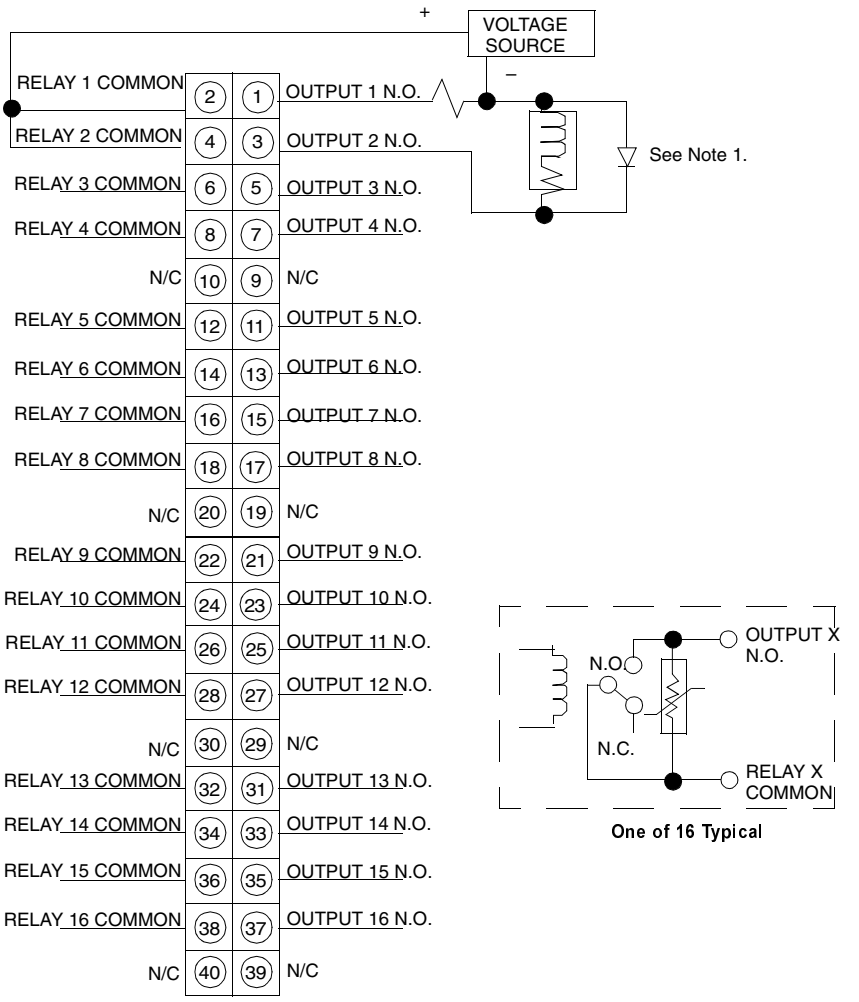
The following table shows the specifications for the RELAY OUT module.

Specifications	
Number of Output Points	16 normally open
LEDs	Active 1 ... 16 (Green) - Indicates point status
Required Addressing	1 word out
Voltage	
Working	20 ... 250 Vac 5 ... 30 Vdc 30 ... 150 Vdc (reduced load current)
Maximum Load Current	
Each Point	2 A max, at 250 Vac or 30 Vdc @ 60° C ambient, resistive load 1 A Tungsten lamp load 1 A @ a power factor of 0.4 1/8 hp @ 125/250 Vac
Each Point (30 ... 150 Vdc)	300 mA (resistive load) 100 mA (L/R = 10 msec)
Minimum Load Current	50 mA Note: Minimum load current if the contact is used at rated loads of 5 ... 150 Vdc or 20 ... 250 Vac
Each Point	2 A max, at 250 Vac or 30 Vdc @ 60° C ambient resistive load
Surge Current Maximum	
Each Point	10 A capacitive load @ τ = 10 ms
Switching Capability	500 VA resistive load
Response	
OFF - ON	10 ms max
ON - OFF	20 ms max
Off State Leakage	< 100 μA
Relay Contact Life	
Mechanical Operations	10,000,000
Electrical Operations	200,000 (resistive load @ max voltage and current)

Specifications	
Electrical Operations (30 ... 150 Vdc) (see note below)	100,000, 300 mA (resistive load) 50,000, 500 mA (resistive load) 100,000, 100 mA (L/R = 10 msec) 100,000 Interposing Relay (Westinghouse Style 606B, Westinghouse type SG, Struthers Dunn 219 x 13 XP)
Relay Type	Form A
Contact Protection	Varistor, 275 V (internal)
Isolation	
Channel to Channel	1780 Vac rms for one minute
Field to Bus	1780 Vac rms for one minute 2500 Vdc for one minute
Bus Current Required	1100 mA
Power Dissipation	5.5 W + 0.5 x N = Watts (where N = the number of points on)
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Relay contact life for inductive loads may be significantly increased by using external contact protection such as a clamping diode across the load.

Wiring Diagram The following figure shows the DRA84000 wiring diagram.



Note:
1. For 125 Vdc inductive loads, external clamping is recommended to extend relay contact life. (1N 4004 or equivalent).
2. N/C = Not Connected. N.O. = Normally Open. N.C. = Normally Closed.

140DRC83000 Quantum I/O Relay Output 8x1 Normally Open/Normally Closed Module

Overview

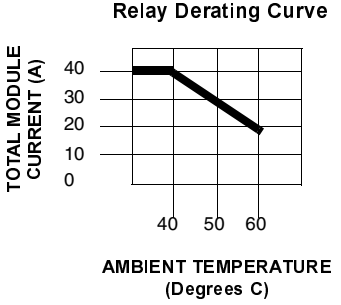
The Relay Output 8x1 Normally Open/Normally Closed module is used to switch voltage sources using eight relays with normally open and normally closed contacts.

Specifications

The following table shows the specifications for the DRC83000 RELAY OUT module.

Specifications	
Number of Output Points	8 normally open / normally closed pairs
LEDs	Active 1 ... 8 (Green) - Indicates point status
Required Addressing	0.5 word out
Voltage	
Working	20 ... 250 Vac 5 ... 30 Vdc 30 ... 150 Vdc (reduced load current)
Maximum Load Current	
Each Point	5 A max at 250 Vac, 30 Vdc @ 60° C ambient, resistive load 2 A Tungsten lamp load 3 A @ power factor 0.4 1/4 hp @ 125/250 Vac
Each Point (30 ... 150 Vdc)	300 mA resistive 100 mA (L/R = 10 msec)
Maximum Module Current	40 A (see the derating curve below)

The following figure shows the relay derating curve.

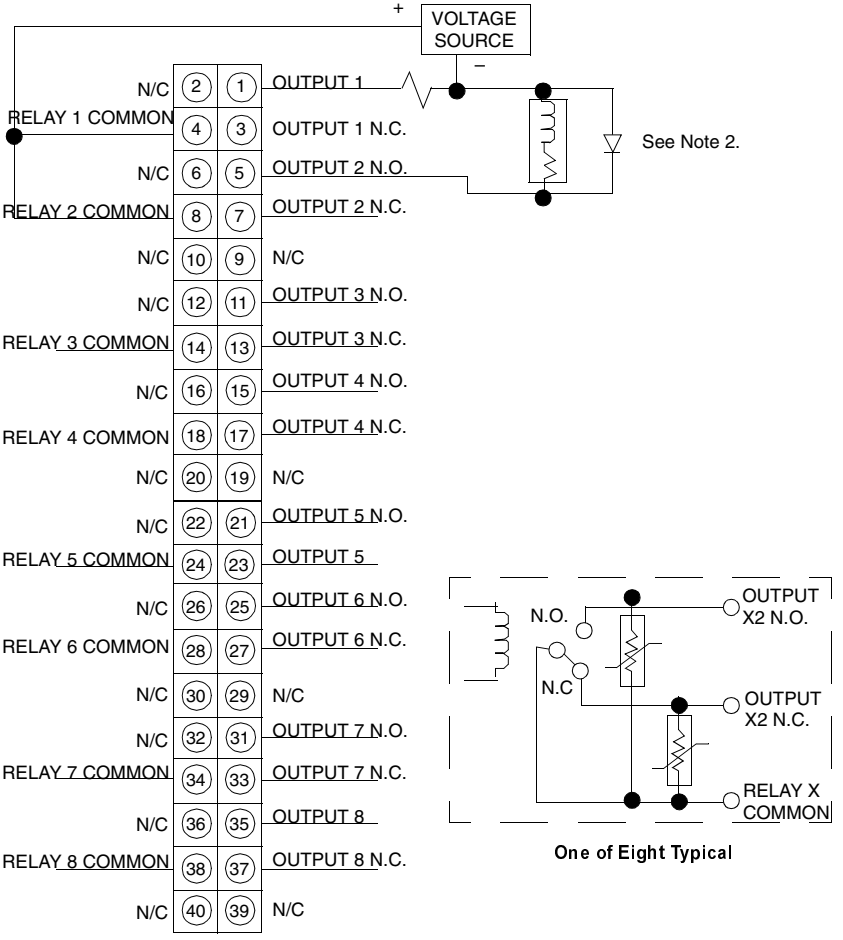


Specifications	
Minimum Load Current	50 mA Note: Minimum load current if the contact is used at rated loads of 5 ... 150 Vdc or 20 ... 250 Vac
Maximum Frequency (F)	30 Hz resistive loads, or: $F = \frac{0.5}{I^2 L}$ where: L = Load Inductance (Henry) I = Load Current (A)
Surge Current Maximum	
Each Point	20 A capacitive load @ τ = 10 ms
Switching Capability	1250 VA resistive load
Response (Resistive Loads)	
OFF - ON	10 ms max
ON - OFF	20 ms max
Off State Leakage	< 100 μA
Relay Contact Life	
Mechanical Operations	10,000,000
Electrical Operations	100,000 (Resistive load @ max voltage and current)
Electrical Operations (30 ... 150 Vdc) (see note)	100,000, 300 mA (resistive load) 50,000, 500 mA (resistive load) 100,000, 100 mA (L/R = 10 msec) 100,000 Interposing Relay (Westinghouse Style 606B, Westinghouse type SG, Struthers Dunn 219 x 13 XP)
Relay Type	Form C, NO / NC contacts
Contact Protection	Varistor, 275 V (internal)
Isolation	
Channel to Channel	1780 Vac rms for one minute
Field to Bus	1780 Vac rms for one minute, 2500 Vdc for one minute
Bus Current Required	560 mA
Power Dissipation	2.75 W + 0.5 x N = Watts (where N is the number of points on)
External Power	Not required for this module
Fusing	
Internal	None
External	User discretion

Note: Relay contact life for inductive loads may be significantly increased by using external contact protection such as a clamping diode across the load.

Wiring Diagram

The following figure shows the DRC83000 wiring diagram.



Note:

1. When switching DC voltages, it is recommended that the source be connected to the common pin and the load be connected to the N.O. or N.C. contact.
2. For 125 Vdc inductive loads, external clamping is recommended to extend relay contact life (1N 4004 or equivalent).
3. N / C = Not Connected. N.O. = Normally Open. N.C. - Normally Closed.

18.7 Discrete Verified Output Module

At a Glance

Overview

This section provides information on the discrete verified output module, the 140DVO85300, a 32-point output module.

What's in this Section?

This section contains the following topics:

I/O Configuration for the Discrete Verified Output Module – 140DVO85300

Overview

The following provides information on the 140DVO85300 DC verified output 10 - 30 Vdc 32 point module.

Verified Output Module

The following is the verified output module:

- 140DVO85300 (DC Output 10-30 Vdc 4x8 Source)

I/O Map Register Assignment (Outputs)

The 140DVO85300 is configured as two output (4x) registers. The following diagram shows the register formats:

Register 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Output Point 1																

MSB - First Word

Register 2

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Output Point 17																

MSB - Second Word

I/O Map Register Assignment (Inputs)

The 140DVO85300 is configured using 32 contiguous 1x references or two 3x registers assigned as follows:

Register 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Input Sense Point 1																

MSB - First Word

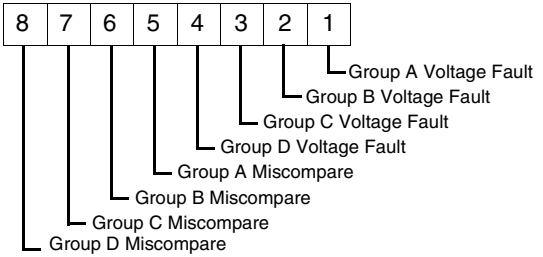
Register 2

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Input Sense Point 17																

MSB - Second Word

I/O Map Status Byte

The eight bits in the I/O map status byte are used as follows:



The voltage fault bit is set when the field supply is not present, or the group fuse is blown.
The miscompare bit is set when any point within the group does not match its commanded state.

Modsoft Zoom Screens Selections

The module zoom screen selections are shown below.

Head - slot: X Drop: X Slot: X

Output Shutdown State: [Fail States / **Disabled**]

Group Number	Fail States	User Defined Values	Status/Input
Group X	**Outputs OFF** Last Value User Defined	00000000	**Verified Health** Verified Fault Input Only Actual

ALLOW AUTOMATIC RESTART OF FAULTED POINTS [**NO** / YES]

Zoom Screen Selection Descriptions

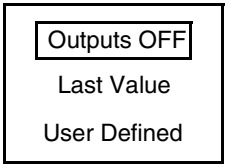
Output Shutdown State - Determines the module output states if backplane communication is lost (i.e., no "Active" LED on module).

Fail States: Group outputs are per the selection made in the “Fail States” column.

Disabled: Forces all outputs to be in the OFF state.

Fail States - Module output state choices if selected in "Output Shutdown State" menu.

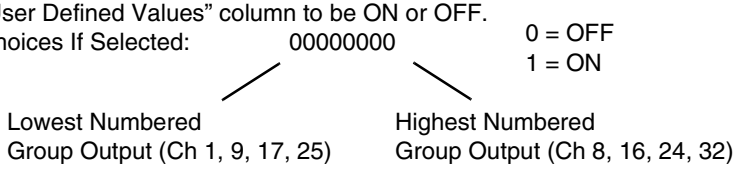
Fail States



Outputs OFF: Group outputs turn OFF

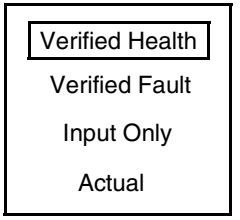
Last Value: Group outputs remain in the state they were in.

User Defined: Group output states may be individually selected in the “User Defined Values” column to be ON or OFF.



Status/Input - RE: I/O map register assignments (Inputs).

Status/Input



Verified Health: The associated bit = 1 when the point output command and module output state agree

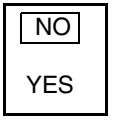
Verified Fault: The associated bit = 1 when the point output command and module output state disagree.

Input Only: Input module operation for diagnostic purposes only. When an output point has a high applied, the associated 1x bit or 3x register location = 1.There are no specifications for output terminals read as inputs and the DVO should not be operated as an input module in a system.
If the corresponding 4x register point is turned OFF, a high will also cause the LED display red F to appear and a group miscompare bit will set in the I/O Map status byte. If the corresponding 4x point is turned ON, no LED ref F or group miscompare will be displayed when a high is applied to the output point.
The status byte voltage fault bits work in this mode.

Actual: Module output state, 1 = ON

Allow Automatic Restart of Faulted Points:

ALLOW AUTOMATIC RESTART OF FAULTED POINTS



NO: Module outputs that fault during the on state are latched off until the user clears the point bit to the OFF (0) state, and then sets it back to the ON (1) state.

State of output point, Status bits, LEDs and Fault Bit for the three operating states are as follows:

Mode	Fault Occurs (Point commanded ON shuts OFF)	Off command sent	On command sent (After fault is removed)
Verified health	Output point=OFF Status bit=0 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=OFF Status bit=0 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=ON Status bit=1 Output LED=ON Fault LED=OFF Group fault flag=0
Verified fault	Output point=OFF Status bit=1 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=OFF Status bit=1 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=ON Status bit=0 Output LED=ON Fault LED=OFF Group fault flag=0
Actual	Output point=OFF Status bit=0 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=OFF Status bit=0 Output LED=OFF Fault LED=ON Group fault flag=1	Output point=ON Status bit=1 Output LED=ON Fault LED=OFF Group fault flag=0

YES: Module outputs that fault during the ON state are controlled by a thermal protection mechanism. At shutdown the appropriate fault/status indications will be present.
After shutdown, the output device will cool and try to turn itself back on. If the fault has been removed, the output will function normally and fault/status indications will be removed. If the fault is still present. the point will again shut down and repeat the cycle until the fault is removed or the point is commanded off.
When a faulted point is commanded off, all fault indications will no longer be present because the miscompare will no longer exist.

WARNING

Possible Safety Hazard

When choosing "YES", the use of thermally protected output devices with the 140DVO85300 module can produce safety concerns.
In the event of an enabled output sensing an overcurrent condition, the output will disable, until the overcurrent condition is removed. The output will then re-enable itself, if still set ON in the logic program.

Failure to follow this precaution can result in death, serious injury, or equipment damage.

140DVO85300 I/O Verified 10-30 VDC Out Module

Overview

The Quantum Verified Output module is a 10 ... 30 Vdc, 32 point output module with diagnostic capability. The module will detect and report the output state sensed at the field connector and, depending on the selected configuration, will verify that the output point is in the state commanded by the PLC. The module is configured in four groups of eight source outputs.

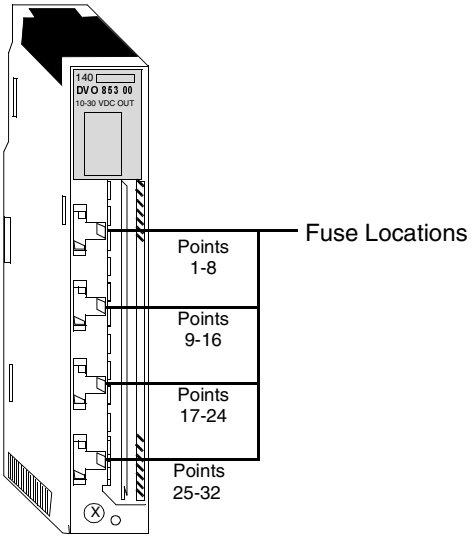
Specifications

Key specifications for the Quantum 140DVO85300 module are as follows:

Specifications	
Number of Output Points	32 in four 8 point groups
LEDs	Active (Green): Bus communication present. 1 ... 32 (Green): Indicates output point status. F (Red): Indicates incorrect output state on a channel, loss of field power, or blown fuse.
Required addressing	2 words in, 2 words out
Voltage	
Operating	10.0 ... 30 Vdc
Absolute Maximum	50 Vdc for 1.0 ms decaying voltage pulse
On state Drop/Point	0.4 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Off State Leakage/Point	0.4 mA @ 30 Vdc
Surge Current Maximum	
Each Point	2.5 A @ 1 ms duration (no more than 6 per minute)
Response (Resistive Loads)	
OFF - ON	1 ms (typical), 2 ms (max)
ON - OFF	1 ms (typical), 2 ms (max)
Load Inductance Maximum	0.5 Henry @ 4 Hz switching frequency, or: $L = \frac{0.5}{I^2F}$ where: L = Load inductance I = Load current (A) F = Switching frequency (Hz)

Specifications	
Tungsten Load Maximum	2.5 W @ 10 Vdc 3 W @ 12 Vdc 6 W @ 24 Vdc
Load Capacitance Maximum	75 µf
Isolation	
Group to Bus	1780 Vac RMS for 1 minute
Group to Group	500 Vac for 1 minute
Output Protection (internal)	Transient voltage suppression, overload (short circuit) protection
Fault Detection	Blown fuse detect, loss of power, incorrect output state
Bus Current Required	500 mA
Power Dissipation	[2.5 + (0.1 x No. of points ON) + (total load current x 0.4)] watts
External Power	10 ... 30 Vdc
Fusing	
Internal External	5.0 Amp fuse per group, P/N 0043502405 Not required. If desired, a 3/4 A, 250 V fuse (P/N 57-0078-00) may be used
Programming Software	
Type and version	Concept, Version 2.2 or higher Modsoft, Version 2.6.1 or higher

Fuse Locations A view of fuse locations on the module is shown below.



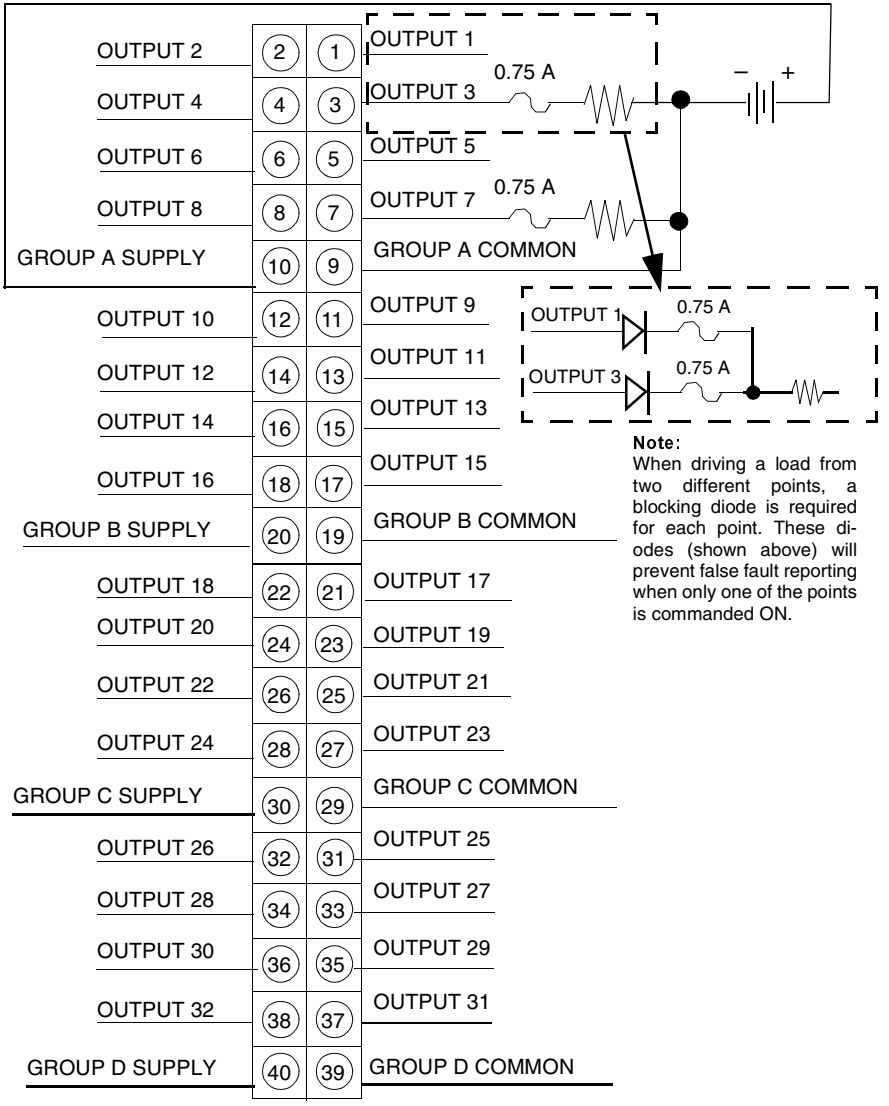
CAUTION

Possible danger to equipment or personnel.

Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

Failure to follow this precaution can result in injury or equipment damage.

Wiring Diagram A wiring diagram for the Quantum 140DVO85300 module is shown below.



18.8 Discrete Supervised Input Module

At a Glance

Overview

This section provides information on the discrete supervised input module, the 140DSI35300, a 32-point input module.

What's in this Section?

This section contains the following topics:

I/O Configuration for the Discrete Supervised Input Module – 140DSI35300

Overview

The following provides information on the 140DSI35300 supervised input 24 Vdc 32-point module.

Supervised Input Module

The following is the supervised input module:

- 140DSI35300 (DC input, 24 Vdc, 4x8 sink)

I/O Map Register Assignment (Input)

The DSI35300 is configured as four input (3x) registers. The following diagram shows the register formats:

Register 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Input Point 1																

Register 2

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Input Point 17																

Register 3

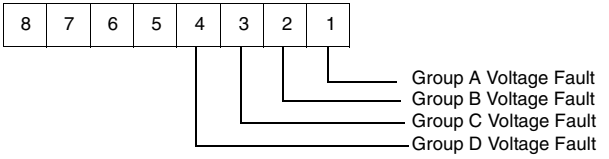
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Broken Wire 1																

Register 4

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Broken Wire 17																

I/O Map Status Byte

The eight bits in the I/O map status byte are used as follows:



Modsoft Module Zoom Selections

There are no Modsoft Zoom selections.

140DSI35300 I/O DC 24V Supervised Input Module

Overview

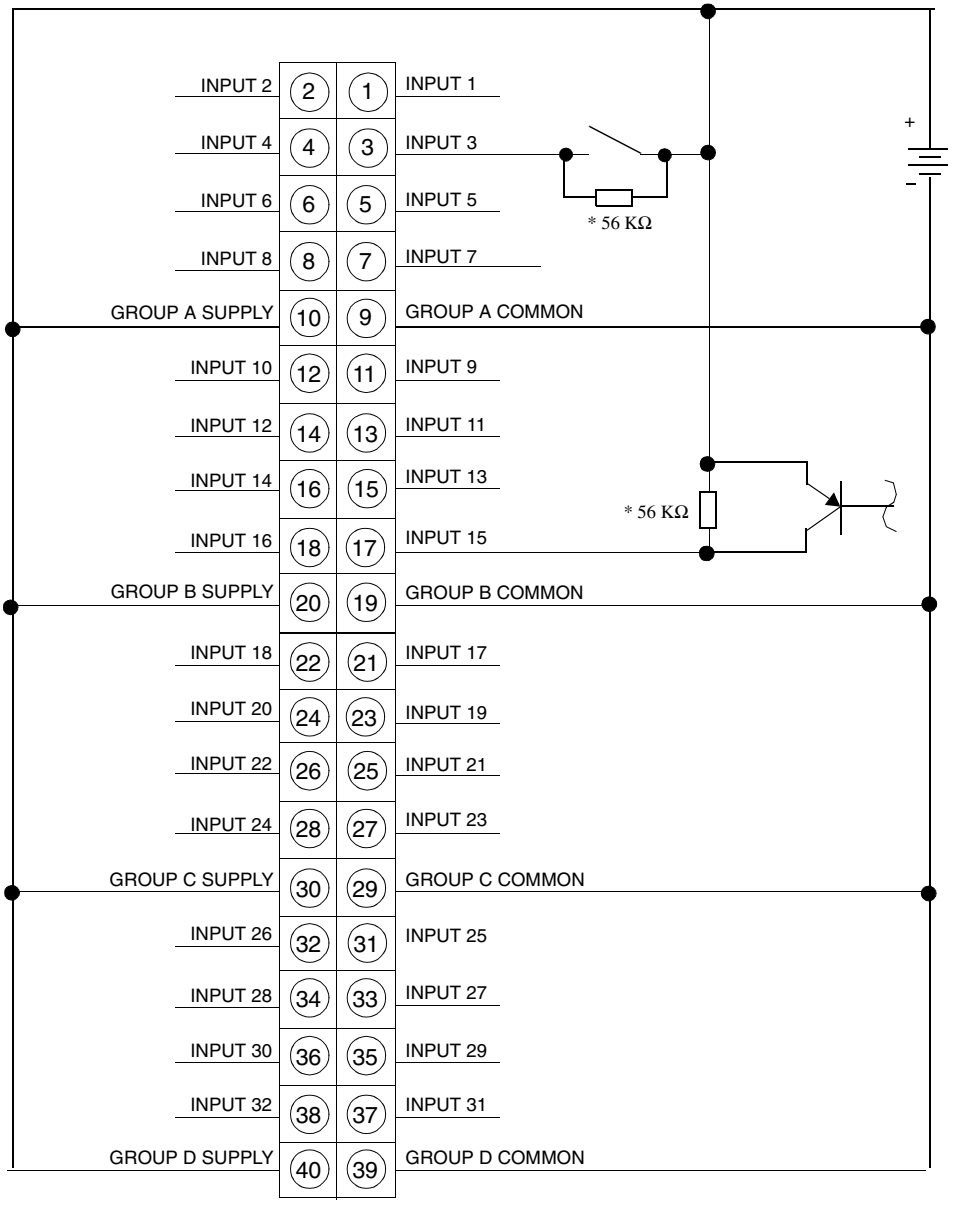
The Supervised Input module is used with source output devices. It accepts 24 Vdc inputs. It has 32 Sink input points (four groups of 8), each with broken wire detection.

Specifications

The following table shows the technical specifications for the 140DSI35300 module:

Specifications	
Number of Input Points	32 in four 8 point groups‘
LEDs	
Active (Green)	Indicates bus communication present
1 ... 32 (Green)	Indicates point status
F (Red)	External Supply missing
Required addressing	4 words in
Operating Voltage and Current	
ON (voltage)	+11 Vdc
ON (current)	2.5 mA min.
OFF (voltage)	+5 Vdc
OFF (current)	min. 0.3 mA ...1.2 mA
Absolute Maximum Input	
Continious	30 Vdc
10 ms	45 Vp
Response time	
OFF - ON	2.2 ms
ON - OFF	3.3 ms
Internal Resistance	4.3k
Input Protection	Resistor limited
Isolation	
Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute
Bus Current Required	250 mA
Power Dissipation	7 W (all points on)
External Power Supply	+20 ... 30 VDC, 20 mA/group
Open–Circuit Monitoring	
Broken–wire detection	OFF current < 0.15 mA
Shunt resistor	Recommended 56 kΩ with 24 Vdc external power supply
Fusing	
Internal	None
External	User discretion

Wiring Diagram Wiring diagram for the 140DSI35300 Module:



* Recommended resistor value for 24 Vdc.

18.9 Discrete Input/Output Modules

At a Glance

Overview

This section provides information on the Quantum discrete input/output modules: the 140DDM39000 and the 140DDM69000.

What's in this Section?

This section contains the following topics:

I/O Configuration for Discrete Input/Output Modules

Overview

This section provides information on configuration of 4 In/4 Out and 16 In/8 Out modules.

4-Point Input/4-Point Output Module

The following shows the 4 In/4 Out module:

- 140DDM69000 (125 Vdc Input/High Power Output)

I/O Map Register Assignments

The 140DDM69000 input/output module can be configured as either eight contiguous 1x references; or as one 3x register and either eight contiguous 0x references or one 4x register.

CAUTION

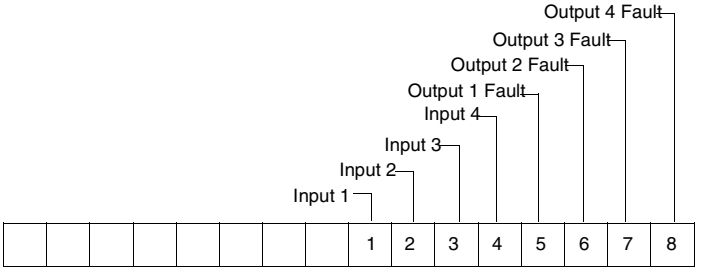
I/O Mapping

When I/O mapping module inputs using discrete (1x) references in remote drops, users should not split discrete words between drops. The lowest discrete reference for a drop should start on a word boundary.

Failure to follow this precaution can result in injury or equipment damage.

I/O Map Register (Inputs)

The following figure shows the 3x input register.



I/O Map Status Byte (Inputs)

There is no input I/O map status byte associated with the inputs.

Modsoft Module Zoom Selection (Inputs)

Push <Enter> to display and select the Dual Mode and Filter Select options.

Dual Mode: Disabled / Enabled

When Dual Mode Is Enabled

1. Output 1 is turned ON when Input 1 and Input 2 are ON and when both “Fast Trip 1 Enable” and “Fast Trip 2 Enable” are enabled; or by directly turning ON the Output 1 bit.
2. Output 2 is controlled by the Output 2 bit.
3. Output 3 is turned On when Input 3 and Input 4 are ON and when both “Fast Trip 3 Enable” and “Fast Trip 4 Enable” are enabled; or by directly turning ON the Output 1 bit.
4. Output 4 is controlled by the Output 4 bit.

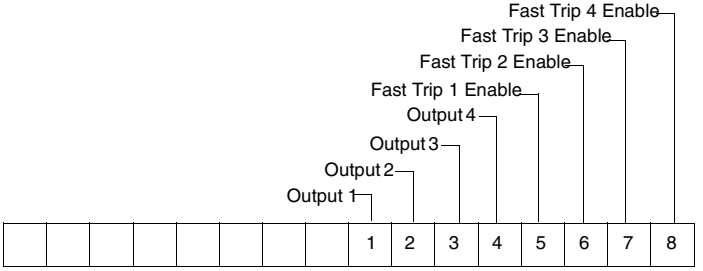
Filter Select: .5 msec / 1.5 msec

Filter Select

This entry selects which filter response time to use for the input circuits.

I/O Map Register (Outputs)

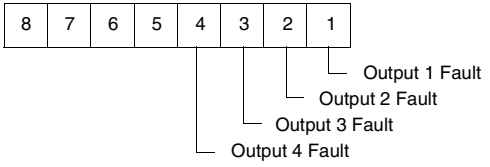
The following figure shows the 4x output register.



In Fast Trip Mode, each output can be turned ON by the Command Bit (e.g., Output 1) or by the corresponding Input Bit plus the Fast Trip Enable Bit (e.g., last order Input 1 controls Output 1 directly).

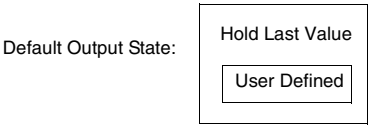
I/O Map Status Byte (Outputs)

The four least significant bits in the I/O map status are used as follows:



Modsoft Module Zoom Selections (Outputs)

Push <Enter> to display and select the timeout state for the module. Timeout state is assumed when the system control of the module is stopped.



16-Point Input/8-Point Output Modules

The following information pertains to the 140DAM59000 (AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4) and the 140DDM39000 (DC Input 24 Vdc 2x8 / DC Output 24 Vdc 2x4) modules.

- 140DAM59000 (AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4)
- 140DDM3900 (DC Input 24 Vdc 2X8 / DC Output 24 Vdc 2x4)

I/O Map Register Assignments

The modules listed above can be configured as either 16 contiguous 1x references or as one 3x register and as one 4x register.

I/O Map Register (Inputs)

The following figure shows the 3x input register.

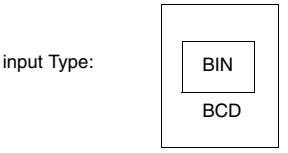
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

I/O Map Status Byte (Inputs)

There is no input I/O map status byte associated with these modules.

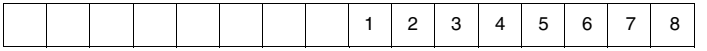
Module Zoom Selections (Inputs)

Push <Enter> to display and select the input type. This selection appears if the module is I/O mapped to a 3x register and one 4x register.



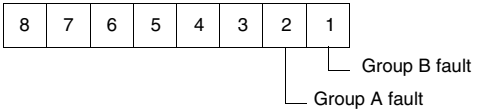
I/O Map Assignment (Outputs)

The modules listed above can be configured as 8 0x references or as 1 output (4x) register in the following format.



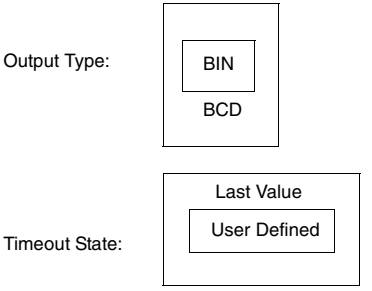
I/O Map Status Byte (Outputs)

The two least significant bits in the output I/O map status byte are used as follows.



Modsoft Module Zoom Selections (Outputs)

Push <Enter> to display and select the output type and the timeout state for the module. Timeout state is assumed when system control of the module is stopped.



User Defined Timeout State Points 1-8: 00000000

140DAM59000 Quantum I/O AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4)

Overview

The AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4 module accepts 115 Vac inputs and switches 115 Vac loads.

Topology Specifications

The following table shows the specifications for the 115 VAC and AC IN/OUT module for the Topology.

Topology	
Number of Input Points	16 in two 8 point groups
Number of Output Points	8 in two 4 point groups
LEDs	Active F (red) - No power applied to the group(s) or blown fuse 1 ... 16 (Green - right two columns) - Indicates input status 1 ... 8 (Green - left column) - Indicates output status
Required Addressing	1 word in 0.5 words out

Input Specifications

The following table shows the Input specifications.

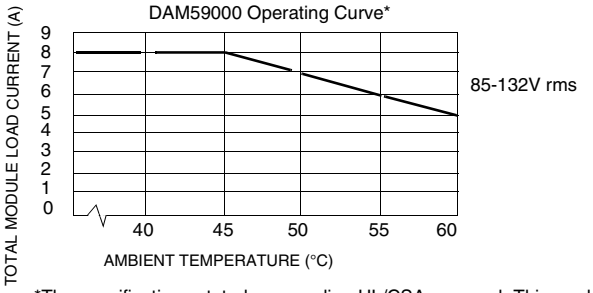
Input Specifications	
Operating Voltages and Input (Wetting) Currents*	
50 Hz Typical Input Impedance	ON: 85 ... 132 Vac (11.1 mA max) OFF: 0 ... 20 Vac 14.4 kΩ capacitive
60 Hz Typical Input Impedance	ON: 79 ... 132 Vac (13.2 mA max) OFF: 0 ... 20 Vac 12 kΩ capacitive
*Do not use outside the 47 ... 63 Hz range.	
Maximum Allowable Leakage Current from an External Device to be Recognized as an OFF Condition	2.1 mA
Absolute Maximum Input Voltages	
Continuous	132 Vac
10 s	156 Vac
1 cycle	200 Vac
Response (Inputs)	
OFF - ON	Min 4.9 ms/max 0.75 line cycle
ON - OFF	Min 7.3 ms/max 12.3 ms

Note: Input signals must be sinusoidal with less than 6% THD and 63 Hz maximum frequency.

Output Specifications

The following table shows the Output specifications.

Output Specifications	
Absolute Maximum Output Voltages	
Continuous	85 ... 132 Vac
10 seconds	156 Vac
1 cycle	200 Vac
On State Drop / Point	1.5 Vac
Minimum Load Current (rms)	5 mA
Maximum Load Current (rms)	
Each Point*	4 A continuous
Each Group	4 A continuous
Per Module*	8 A continuous (see the derating chart below)



*The specifications stated are pending UL/CSA approval. This module was originally approved at 2 A each point; 7 A, 0 ... 50° C per group.

Off State Leakage / Point (max)	2 mA @ 115 Vac	
Surge Current Maximum (rms)	**Per Point**	**Per Group**
One Cycle	30 A	45 A
Two Cycles	20 A	30 A
Three Cycles	10 A	25 A
Response		
OFF - ON, ON - OFF	0.50 of one line cycle max	
Applied DV / DT	400 V/µs	
Output Protection	RC snubber suppression (internal)	

Common Specifications

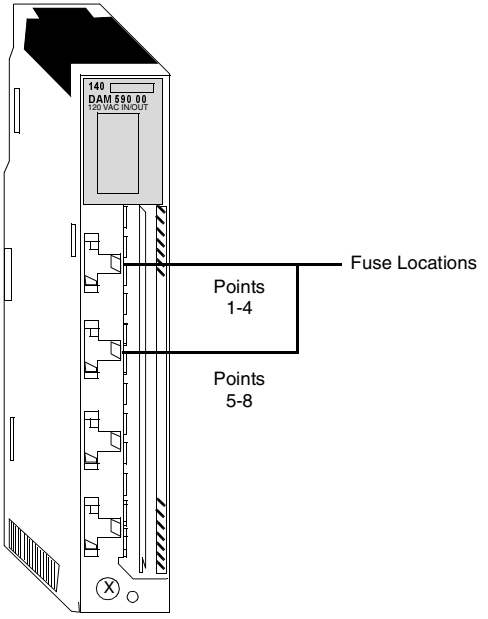
The following table shows the Common specifications.

Common Specifications	
Frequency	47 ... 63 Hz
Isolation	
Group to Group	1000 Vac for 1 minute
Input or Output to Bus	1780 Vac for 1 minute
Fault Detection	
Input	None
Output	Blown fuse detect, loss of field power
Bus Current Required	250 mA
Power Dissipation	5.5 W + 1.1 V x Total module load current
External Power	85 ... 132 Vac required for output groups
Fusing	
Input	Internal – None External – User discretion
Output	Internal – 5 A fuse for each group (part # 043502405 or equivalent). For the location of the fuses, see *p. 643*. External – User discretion

Note: Turn off power to the module and remove the field wiring terminal strip to gain access to the fuses.

Fuse Locations

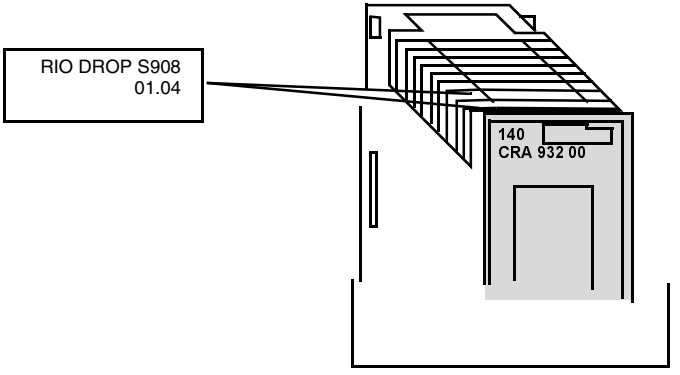
The following figure shows the fuse locations for the DAM59000 module.



Note: If the 140DAM59000 module is used in a RIO drop, the 140CRA93X00 RIO Drop must be Version 1.04 at a minimum. Check the version label (see below) on the top front of the 140CRA93X00 module and ensure that it is at the proper revision level.

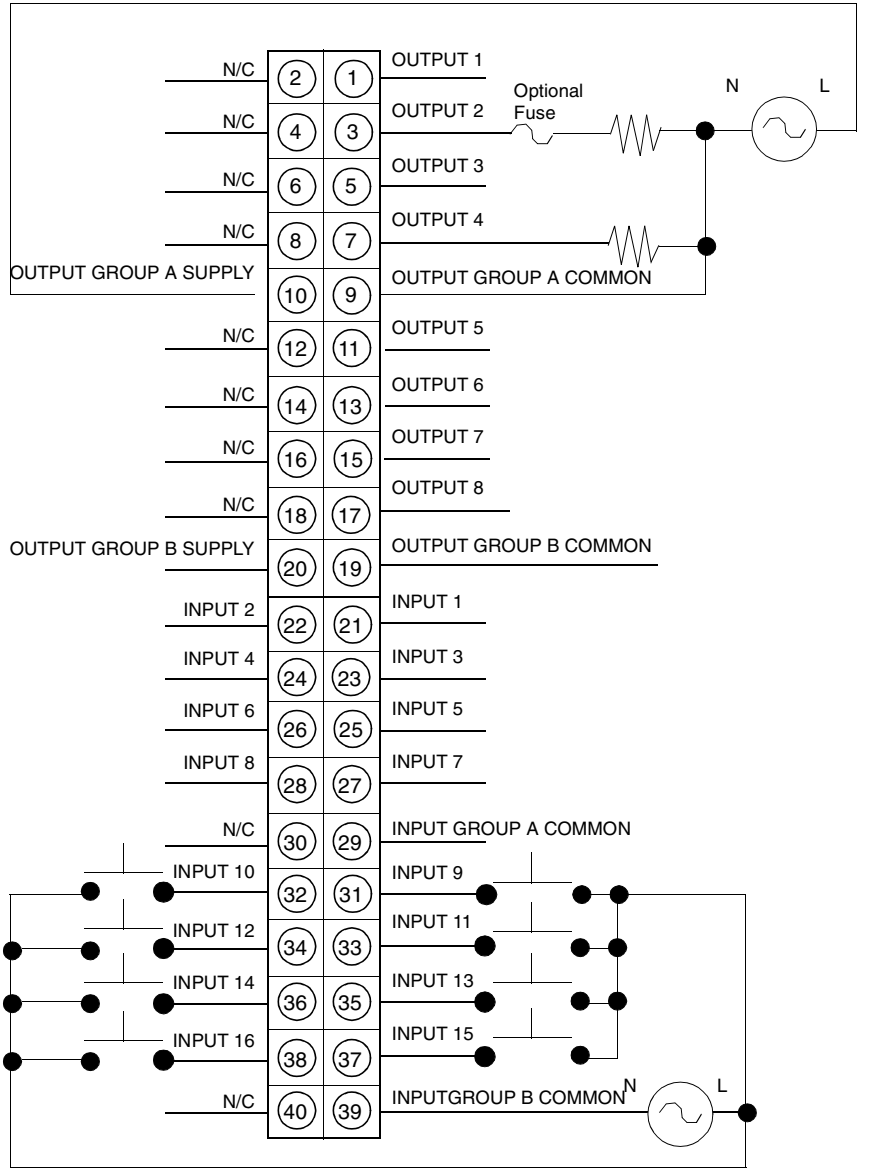
Revision Numbr Location for RIO Drop

The following figure shows the revision number location.



Note: Since this original note, revision marking format has changed. Any RIO drop module with PV/RL/SV formatted labeling is acceptable.

Wiring Diagram The following figure shows the DAM590wiring diagram.



Note:
1. This module is not polarity sensitive.
2. N / C = Not Connected.

CAUTION

AC Power Compatibility

The AC power energizing each group must be from a common single phase AC power source.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

Wiring Compatibility

If an external switch is wired to control an inductive load in parallel with the module output, then an external varistor (Harris V390ZA05 or equivalent) must be wired in parallel with the switch.

Failure to follow this precaution can result in injury or equipment damage.

140DDM39000 I/O DC Input 24 Vdc 2x8 Sink/DC Output 24 Vdc 2x4 Source Module

Overview

The DC Input 24 Vdc 2x8 Sink / DC Output 24 Vdc 2x4 Source module accepts and switches 24 Vdc inputs/outputs and is for use with sink input and source output devices.

Topology

The following table shows the topology for the DDM39000 module.

Topology	
Number of Input Points	16 in two 8 point groups
Number of Output Points	8 in two 4 point groups
LEDs	Active F (red) - No power applied to the group(s) or blown fuse 1 ... 16 (Green - right two columns) - Indicates input status 1 ... 8 (Green - left column) - Indicates output status
Required Addressing	1 Word In 0.5 Word Out

Input Specifications

The following table shows input specifications for the DDM39000 module.s

Input Specifications	
Operating Voltages and Currents (Input)	
ON (voltage)	+15 ... +30 Vdc
OFF (voltage)	-3 ... +5 Vdc
ON (current)	2.0 mA min
OFF (current)	0.5 mA max
Absolute Maximum Input	
Continuous	30 Vdc
1.3 ms	56 Vdc decaying pulse
Internal Resistance (Input)	2.5 kΩ

Output Specifications

The following table shows the output specifications for the DDM39000 module.

Output Specifications	
Voltage (Output)	
Operating (max)	19.2 ... 30 Vdc
Absolute (max)	56 Vdc for 1.3 ms decaying voltage pulse
ON State Drop / Point	0.4 Vdc @ 0.5 A
Maximum Load Current	
Each Point	0.5 A
Each Group	2 A
Per Module	4 A
Off State Leakage / Point	0.4 mA @ 30 Vdc
Surge Current Maximum	
Each Point	5 A @ 500 µs duration (no more than 6 per minute)
Load Inductance Maximum (Output)	0.5 Henry @ 4 Hz switch frequency or: $L = \frac{0.5}{I^2 F}$ where: L= Load Inductance (Henry) I = Load Current (A) F = Switching Frequency (Hz)
Load Capacitance Maximum	50 µf

Common Specifications

The following table shows the common specifications for the DDM39000 module.

Common Specifications	
Response (Input and Output)	
OFF - ON	1 ms (max) - (resistive load output)
ON - OFF	1 ms (max) - (resistive load output)
Module Protection	
Input Protection	Resistor limited
Output Protection	Transient voltage suppression (internal)
Isolation (Input and Output)	
Group to Group	500 Vac rms for 1 minute
Group to Bus	1780 Vac rms for 1 minute
Fault Detection	
Input	None
Output	Blown fuse detect, loss of field power
Bus Current Required (Module)	330 mA
Power Dissipation	1.75 W + 0.36 x input points on + 1.1 V x total outputs load currents
External Power (Module)	Not required for this module
Fusing	
Input	**Internal** – None **External** – User discretion
Output	**Internal** - 5 A fuse for each group (Part # 043502405 or equivalent). For the location of the fuses, see *p. 649*. **External** - Each group is protected with a 5 A fuse to protect the module from catastrophic failure. The group fuse is not guaranteed to protect each output for all possible overload conditions. It is recommended that each point be fused with a 1.25 A fuse, Part # 043508930 (Littlefuse 3121.25, 1.25 A, 250 V).

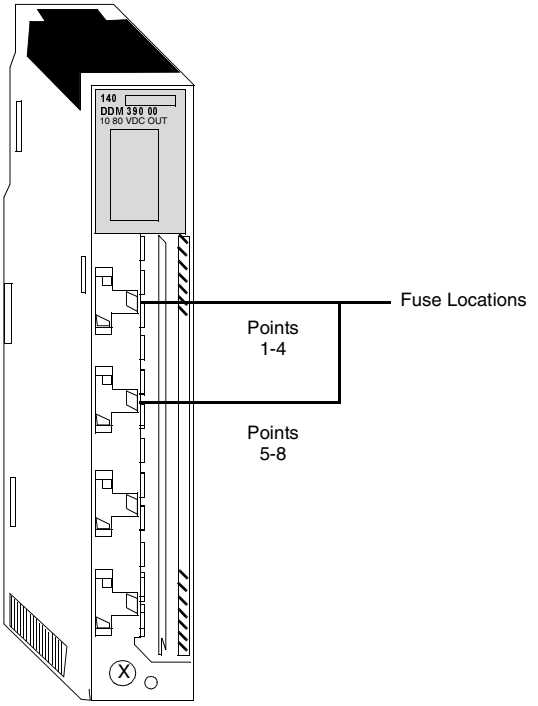
CAUTION

Possible injury to personnel or equipment.

Turn off power to the module and remove the field wiring terminal strip to gain access to fuses.

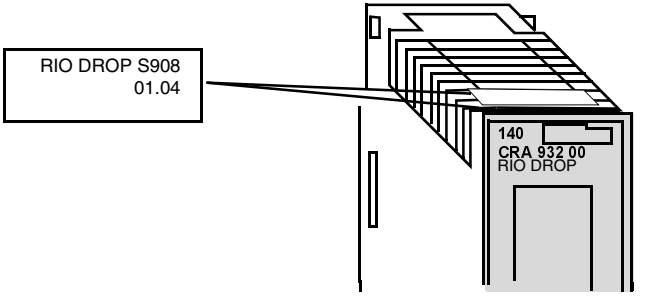
Failure to follow this precaution can result in injury or equipment damage.

Fuse Locations The following figure shows the fuse locations of the DDM39000 module.

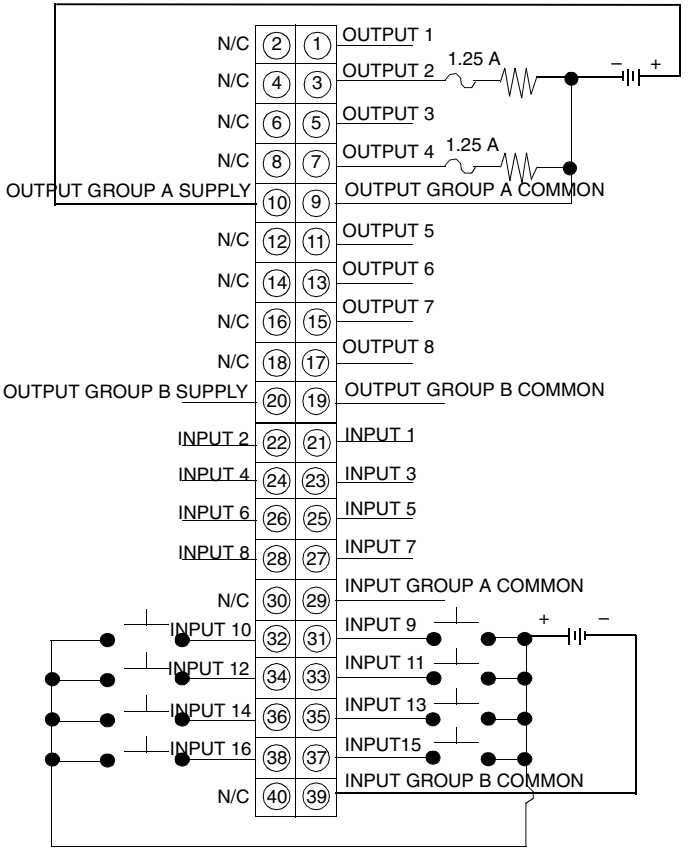


Note: If the 140DDM39000 module is used in an RIO drop, the 140CRA93X00 RIO Drop must be Version 1.04 at a minimum. Check the version label (see *p. 649*) on the top front of the 140CRA93X00 module and ensure that it is at the proper revision level. Any module marked PV/RL/SV is acceptable.

Version Label The following figure shows the location of the version label.



Wiring Diagram The following figure shows the DDM39000 wiring diagram.



Note: N / C = Not Connected

CAUTION

Possible Equipment Failure

Each group is protected with a 5 A fuse to protect the module from catastrophic failure. The group fuse will not be guaranteed to protect each output switch for all possible overload conditions. It is recommended that each point be fused with a 1.25 A fuse, Part # 043508930 (Littlefuse 3121.25, 1.25 A, 250 V).

Failure to follow this precaution can result in injury or equipment damage.

140DDM69000 I/O 125 VDC Input/High Power Output Module

Overview

The 125 VDC Input/High Power Output module provides four isolated outputs and four grouped inputs. The outputs switch 24 to 125 Vdc powered loads and are for use with sink and source devices. The outputs also have short-circuit sense, indication, and shutdown circuitry. The inputs accept 125 Vdc inputs and are for use with source output devices. The inputs have software-selectable response times to provide additional input filtering.

Topology

The following table shows the topology for the DDM69000 module.

Topology	
Number of Input Points	4 in 1 group
Number of Output Points	4 isolated
LEDs	Active F (red) - Over current condition on any point 1 ... 4 (Green - left column) - Indicated output point is turned ON 1 ... 4 (Red - middle column) - Indicated output point has an over current condition 1 ... 4 (Green - right column) - Indicated input point is turned ON
Required Addressing	1 word in, 1 word out

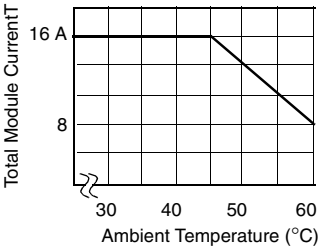
Input Specifications

The following table shows the input specifications for the DDM69000 module.

Input Specifications	
Operating Voltages and Currents (Input)	
ON (voltage)	+88 ... +156.2 Vdc including ripple
OFF (voltage)	0 ... +36 Vdc
ON (current)	2.0 mA min
OFF (current)	1.2 mA max
Absolute Maximum Input	Continuous, 156.2 Vdc including ripple
Input Response (OFF-ON, ON-OFF)	Default Filter: 0.5 ms Non-default Filter: 1.5 ms
Internal Resistance (Input)	24 kΩ (nominal)

Output Specifications

The following table shows the output specifications for the DDM69000 module.

Output Specifications	
Voltage (Output)	
Operating (max)	19.2 ... 156.2 Vdc including ripple
ON State Drop / Point	0.75 Vdc @ 4 A
Maximum Load Current	
Each Point	4 A continuous
Per Module	16 A continuous (see the derating curve below)
Off State Leakage / Point	1.2 mA @ 150 Vdc
Output Response (OFF-ON, ON-OFF)	0.2 ms, max (resistive load output)
The following figure shows the DDM69000 Derating Curve.  	
Surge Current Maximum	
Each Point	30 A @ 500 ms duration
Load Inductance Maximum (Output)	For switching intervals ≥ 15 secondsper ANSI/IEEE C37.90- 1978/1989): $L \leq \frac{9}{I^2}$ For repetitive switching: $L \leq \frac{0.7}{I^2F}$ where: L = Load Inductance (Henry) I = Load Current (A) F = Switching Frequency (Hz)
Load Capacitance Maximum	0.1 µf @ 150 Vdc 0.6 µf @ 24 Vdc

Common Specifications

The following table shows the common specifications for the DDM69000 module.

Common Specifications	
Module Protection	
Input Protection	Resistor limited
Output Protection	Transient voltage suppression (internal)
Isolation (Input and Output)	
Input Group-to-Output	1780 Vac rms for 1 minute
Output-to-Output	
Group to Bus	2500 Vac rms for 1 minute
Fault Detection	
Input	None
Output	Over current - each point
Bus Current Required (Module)	350 mA
Power Dissipation	0.4 W x (1.0) x number of input points ON + (0.75) x total module output current
External Power (Module)	Not required for this module
Fusing	
Input	Internal - None External - User discretion
Output	Each output is protected by an electronic shutdown: For current output surges between 4 A and 30 A, the outpoint point will shutdown after 0.5 s. For current surges greater than 30 A, the output will shutdown immediately.

Version Levels

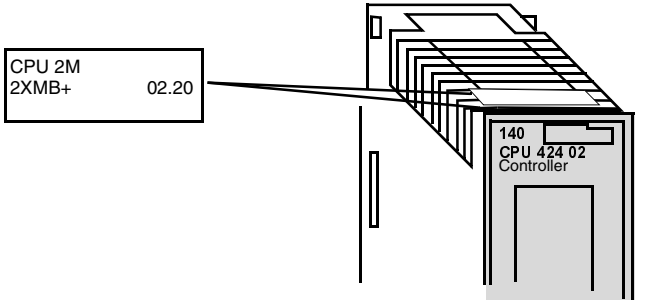
The following table shows the required version levels. Modules marked with SV/PV/RL rather than V0X.X0 exceed the minimum version levels in this table

Products	Minimum Version Level (see lable illustration)	User Action Required
CPUs and NOMs	< V02.20	Executive upgrade to ≥ V02.10
	≥ V02.20	None
RIOs	< V02.00	Module upgrade
	≥ V02.00 and < V02.20	Executive upgrade to ≥ V01.10
	≥ V02.20	None
DIOs	< V02.10	Module upgrade
	≥ V02.10	None
Modsoft	< V02.40	Upgrade to V02.40
	≥ V02.40	None
ProWORX NxT	≥ V02.00	
Concept	≥ V02.00	None

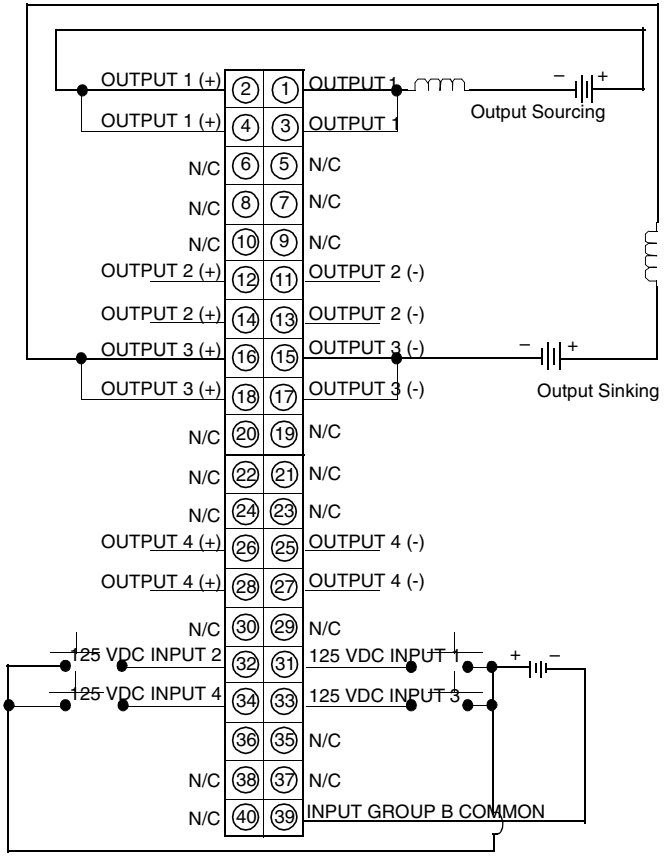
Note: See (*p. 654*). This figure is found on the top front of the module.

Version Label

The following figure shows the version number location.



Wiring Diagram The following figure shows the DDM69000 wiring diagram.



Note:
1. Each output has two terminals for multiple wire connections.
2. N / C = Not Connected.

CAUTION

Polarity awareness

The output points are not protected against reverse polarity. Reverse polarity will turn an output point ON.

Failure to follow this precaution can result in injury or equipment damage.

Appendices

At a Glance

What's in this Appendix?

The appendix contains the following chapters:

Miscellaneous Components

A

Miscellaneous Components

Overview

This appendix contains information on cabling and illustrations of miscellaneous components.

For more detailed information on Modbus Plus components, see the *Modbus Plus Network Planning and Installation Guide* (890 USE 100 00).

For more detailed information on Remote I/O components, see the *Remote I/O Cable Planning and Installation Guide* (890 USE 101 00).

Cables

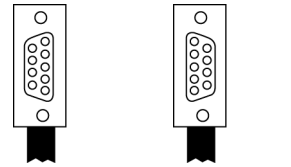
The following table shows the available cables.

Part Number	Description
990NAA26320	Modbus Programming Cable, RS-232, 12 ft. (2.7 m)
990NAA26350	Modbus Programming Cable, RS-232, 50 ft. (15.5 m)
990NAD21110	Modbus Plus Drop Cable, 8 ft. (2.4 m)
990NAD21130	Modbus Plus Drop Cable, 20 ft. (6 m)
990NAD21810	Modbus Plus Drop Cable (left side drop), 8 ft (2.4 m)
990NAD21830	Modbus Plus Drop Cable (left side drop), 20 ft. (6 m)
990NAD21910	Modbus Plus Drop Cable (right side drop), 8 ft (2.4 m)
990NAD21930	Modbus Plus Drop Cable (right side drop), 20 ft. (6 m)
AS-MBII-003	Prefabricated S908 RIO drop cable, RG-6 cable, 50 ft. (14 m)
AS-MBII-004	Prefabricated S908 RIO drop cable, RG-6 cable, 140 ft. (43 m)

Modbus Plus Cable Connector Orientation

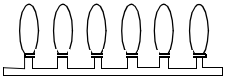
The following figure shows the connector orientation for the 990NAD21XX0.

990NAD218/219X0 Connector Orientation



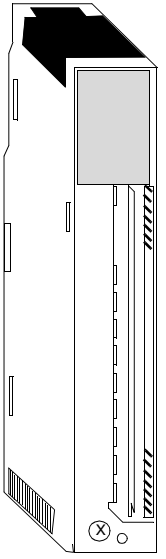
Coding Kit, 140XCP20000

The following figure shows the coding kit – a typical 1 set of 18 (Plastic Keys: 6 white sets, 12 yellow sets), part number 140XCP20000.



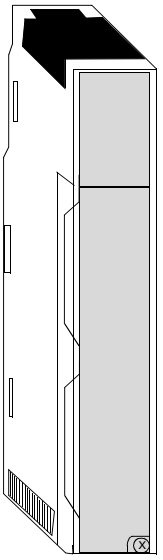
Empty Module, 140XCP50000

The following figure shows an empty module without a terminal strip, part number 140XCP50000.



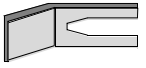
Empty Module with Door Cover, 140XCP51000

The following figure shows an empty module without the terminal strip and with a door cover, part number 140XCP51000.



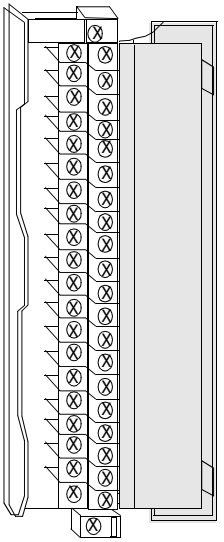
Terminal Strip Jumper Kit, 140XCP60000

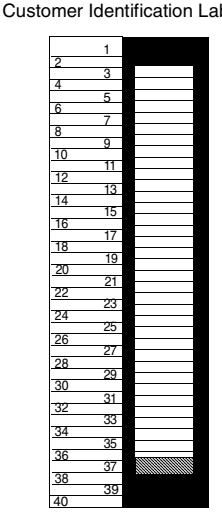
The following figure shows the terminal strip jumper kit (qty: 12), part number 140XCP60000.



Field Wiring Terminal Strip, 140XTS00200

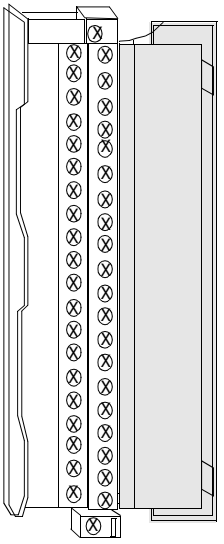
The following figure shows the 40-pin field wiring terminal strip, part number 140XTS00200.



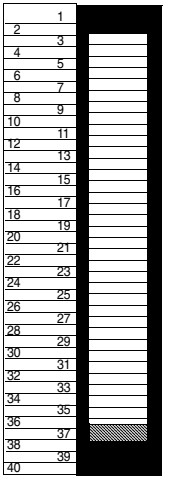


IP 20 Compliant Field Wiring Terminal Strips, 140XTS00100 and 140XTS00500

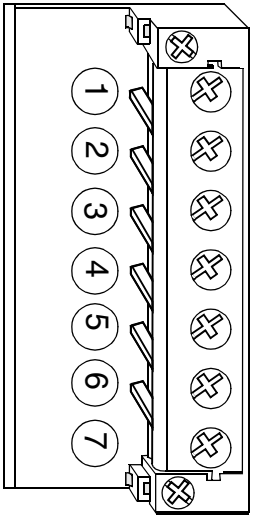
The following figure shows the 40-pin field wiring terminal strip with IP 20 compatible, finger-safe, fixed terminal screw shield, part number 140XTS00100.



Customer Identification Label

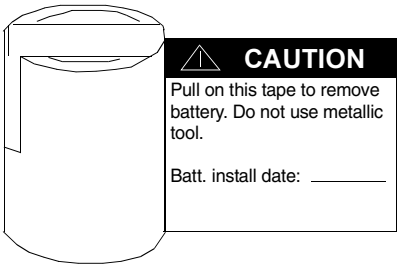


The following figure shows the 7-pin field wiring I/O power connector with IP 20 compatible, finger-safe, fixed terminal screw shield, part number 140XTS00500.



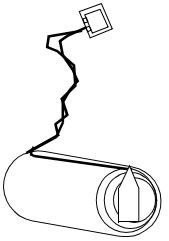
Battery, 990XCP90000

The following figure shows the battery for the Battery Module, part number 990XCP90000.



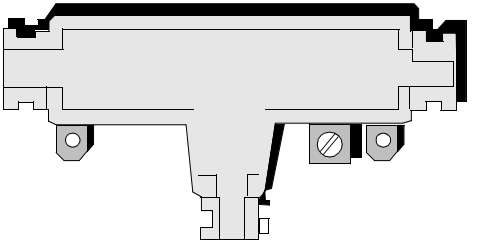
CPU Battery, 990XCP98000

The following figure shows the CPU battery, part number 990XCP98000.



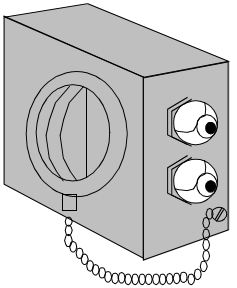
Modbus Plus Tap

The following figure shows the Modbus Plus Network tap, part number 990NAD23000.



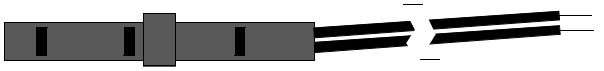
Modbus Plus Ruggedized Tap

The following figure shows the Modbus Plus Network ruggedized tap, part number 990NAD23010.This tap is mounted on the ruggedized Modbus Plus tap din rail mounting bracket, part number 990NAD23012.



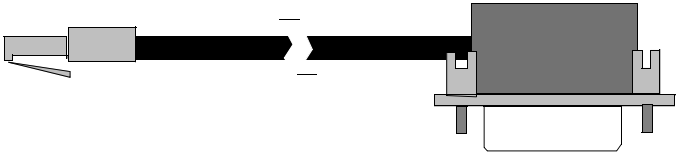
Modbus Plus Ruggedized Tap Terminator

The following figure shows the Modbus Plus network terminator plug, part number 990NAD23011, for the ruggedized Modbus Plus tap.



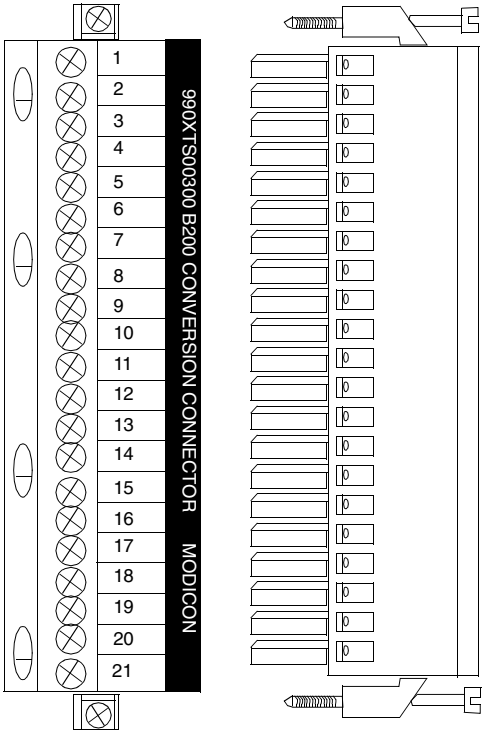
Modbus Plus Ruggedized Tap Programming Cable

The following figure shows the Modbus Plus programming cable, part number 990NAA21510, for the ruggedized network tap.



I/O Conversion Connector

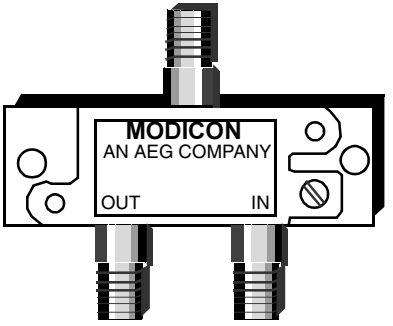
The following figure shows the 200 series I/O conversion connector, part number 990XTS00300.



Front View Side View

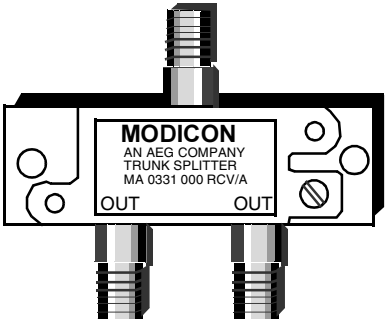
Remote I/O Tap

The following figure shows the remote I/O network tap, part number MA-0185-100.



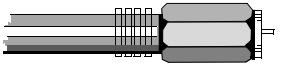
Remote I/O Splitter

The following figure shows the remote network I/O splitter, part number MA-0186-100.



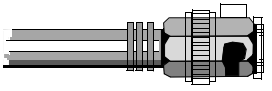
RG-6 Remote I/O F Connector

The following figure shows the remote I/O network F connector, part number MA-0329-001. This is the F connector for quad shield RG 6 cable.



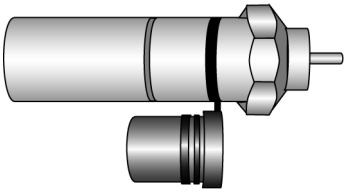
Remote I/O BNC Connectors

The following figure shows the remote I/O network BNC connectors: part number 043509446–BNC connector for quad shield RG-6 cable, and 52-0487-000 BNC connector for non-quad shield RF-6 cable.



RG-11 Remote I/O F Connector

The following figure shows the remote I/O network F connector, part number 490RIO00211. This is the F connector for the quad shield RG-11 cable.



Spare Parts

B

Spare Parts

Overview

This section provides information on miscellaneous spare parts and fuses.

Miscellaneous Spare Parts

The following table shows the miscellaneous spare parts for the Quantum modules.

Spare Part Number	Description
043502480	X13 CPU Door Label
043502952	Universal Module Door (smoked, obsolete)
043503019	1X4 AC Power Supply Door Label
043503328	24 Vdc, 7 Position (includes safety cover) Field Wiring Terminal Block
043503381	Module Ground Clip
043504417	NOM Door Label
043505673	AC DIO Door Label
043504639	2X4 DC Power Supply Door Label
043504640	DC DIO Door Label
043504680	RIO Door Label
043504708	111 AC Power Supply Door Label
043504710	211 DC Power Supply Door Label
043506326	115/230 Vac, 7 Position (includes safety cover) Field Wiring Terminal Block
043506673	424 CPU Door Label
043513804	Universal Module Door (clear)
043509695	200 Series I/O Conversion Connector Label
043503242	Yellow Safety Keys (6)
043503243	White Safety Keys (6)
043503020	Backplane Connector Dust Cover
043503356	Field Wiring Terminal Block Jumpers
043503416	Module Mounting Screw
043505125	Field Wiring Terminal Block, Terminal Screw
31000207	40 Position Wiring Terminal Block Door Label
31000221	NOE Door Label
31000226	x34 1x CPU Door Label
31000264	Hot Standby Door Label
31002249	x34 1xA CPU Door Label

Fuses

The following table shows the fuses for the Quantum modules.

Part Number/Fuse Type	Fuse Value	Fuse Holder
042701994	8 A SloBlo	Not required
043502405	5 A SloBlo	Wickman 820 (Holder*) Wickman 835 (Flush Cap)
043502515	1.5 A SloBlo	Wickman 5700000000 (Holder*) Wickman 5750000100 (Cover)
043502516	2.5 A SloBlo	Wickman 5700000000 (Holder*) Wickman 5750000100 (Cover)
043503948	2.5 A	Not required
043508930	1.25 A	57-001-000
57-0078-000	3/4 A	57-001-000
57-0089-000	2 A SloBlo	57-001-000
3 AG Fast Acting 1/16 A, 250 V	1/16 A	3 AG Fuse Type

Hardware Installation

C

At a Glance

Introduction

This section provides information on selecting backplanes, selecting mounting brackets, space requirements for the Quantum system and mounting Quantum modules.

What's in this Chapter?

This chapter contains the following topics:

Hardware Installation – Selecting Backplanes

Overview

Backplanes are designed to mechanically secure and electrically connect all modules used in drops. The backplane contains a passive circuit board which permits modules to communicate with each other and to identify their slot numbers without further switch settings.

Refer to the following tables for front view illustrations and dimensions of the backplanes (all backplane dimensions are nominal).

Note: To meet vibration/shock specifications, the backplane must be mounted using all specified mounting holes. The mounting surface should be flat to within +/ - 1.0 mm. The backplane is mounted using standard hardware (described below).

The recommended length for the mounting screws should be within the following range: 0.24 in. (6 mm) - 0.52 in. (13 mm)

The head height of the screws should not exceed 0.14 in. (3.5 mm). 1/4' X 20 screws are recommended.

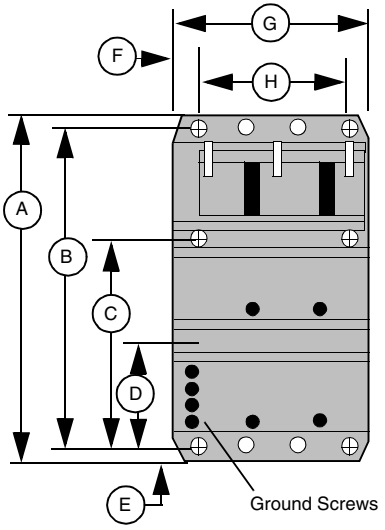
Backplanes

The following table shows the backplanes.

Part Number	Module Slots	Weight (Old Model)	Weight (New Model)
140 XBP 002 00	2	0.5 lbs (0.23 kg)	0.9 lbs (0.41 kg)
140 XBP 003 00	3	0.75 lbs (0.34 kg)	1.35 lbs (0.62 kg)
140 XBP 004 00	4	1.0 lbs. (0.45 kg)	1.8 lbs (0.82 kg)
140 XBP 006 00	6	1.4 lbs (0.64 kg)	2.7 lbs (1.23 kg)
140 XBP 010 00	10	2.2 lbs (1.0 kg)	4.5 lbs (2.04 kg)
140 XBP 016 00	16	3.5 lbs (1.58 kg)	7.2 lbs (3.27 kg)

Two Position Backplane Figure

The following figure shows the two position backplane.



⊕ =Mounting Hole
Diameter: 8mm/0.31 inches.

○ =Optional locations for Modbus Plus communication cable grounding.
Diameter: 8 mm/0.31 inches

● =Threaded mounting holes for half and full height modules.
Diameter: 4mm/0.16 inches

A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

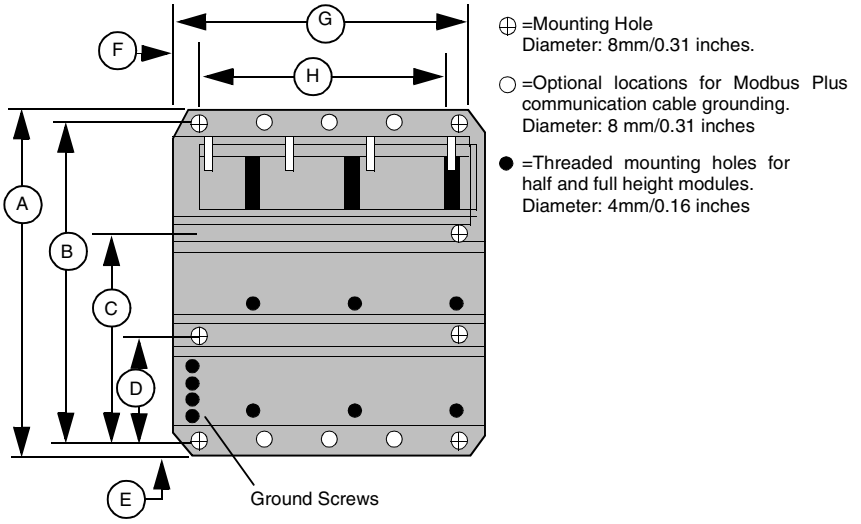
F 15 mm / 0.59 inches

G 102.61 mm / 4.04 inches

H 72.44 mm / 2.85 inches

Three Position Backplane Figure

The following figure shows the three position backplane.



A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

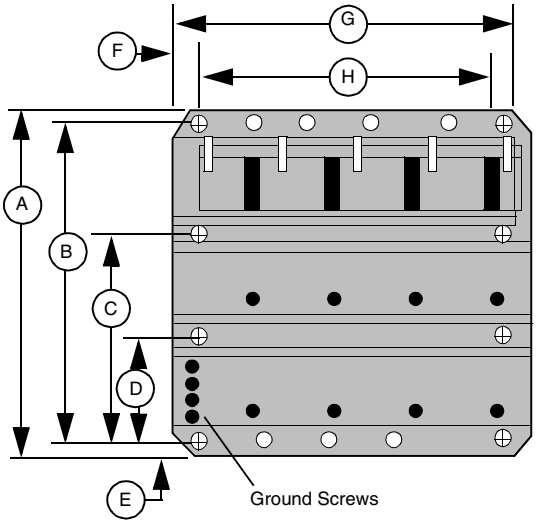
F 15 mm / 0.59 inches

G 143.13 mm / 5.64 inches

H 113.08 mm / 4.45 inches

Four Position Backplane Figure

The following figure shows the four position backplane.



⊕ =Mounting Hole
Diameter: 8mm/0.31 inches.

○ =Optional locations for Modbus Plus communication cable grounding.
Diameter: 8 mm/0.31 inches

● =Threaded mounting holes for half and full height modules.
Diameter: 4mm/0.16 inches

A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

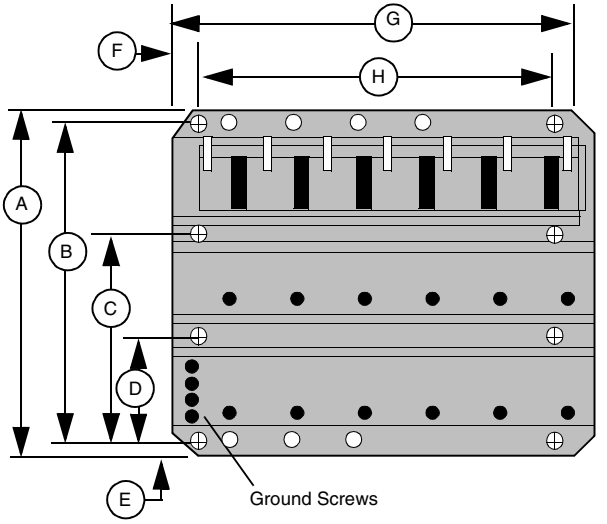
F 15 mm / 0.59 inches

G 183.69 mm / 7.23 inches

H 153.72 mm / 6.05 inches

Six Position Backplane Figure

The following figure shows the six position backplane.



⊕ =Mounting Hole
Diameter: 8mm/0.31 inches.

○ =Optional locations for Modbus Plus communication cable grounding.
Diameter: 8 mm/0.31 inches

● =Threaded mounting holes for half and full height modules.
Diameter: 4mm/0.16 inches

A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

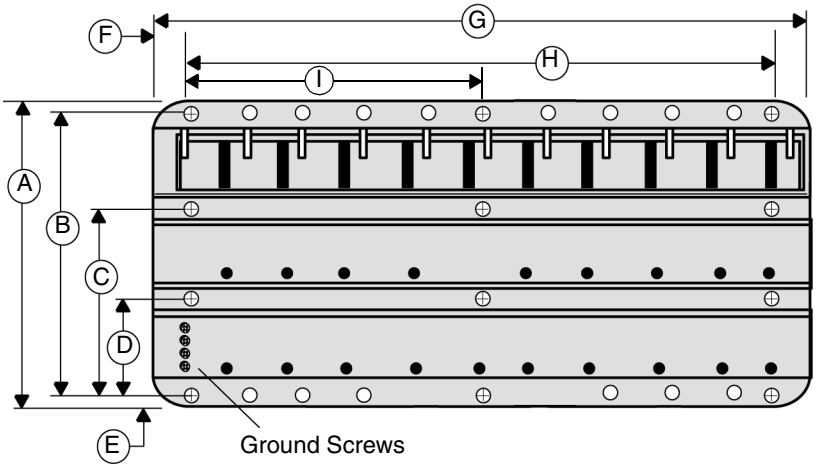
F 15 mm / 0.59 inches

G 265.1 mm / 10.44 inches

H 235 mm / 9.25 inches

Ten Position Backplane Figure

The following figure shows the ten position backplane.



⊕ =Mounting Hole
Diameter: 8mm/0.31 inches.

○ =Optional locations for Modbus Plus communication cable grounding.
Diameter: 8 mm/0.31 inches

● =Threaded mounting holes for half and full height modules.
Diameter: 4mm/0.16 inches

A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

F 15 mm / 0.59 inches

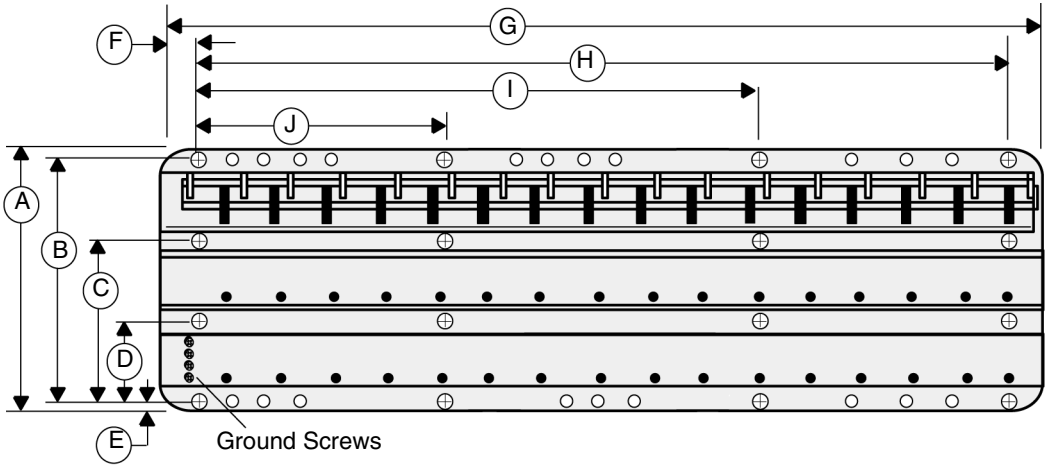
G 427.66 mm / 16.84 inches

H 397.56 mm / 15.65 inches

I 198.78 mm / 7.825 inches

Sixteen Position Backplane Figure

The following figure shows the sixteen position backplane.



⊕ =Mounting Hole
Diameter: 8mm/0.31 inches.

○ =Optional locations for Modbus Plus communication cable grounding.
Diameter: 8 mm/0.31 inches

● =Threaded mounting holes for half and full height modules.
Diameter: 4mm/0.16 inches

A 290 mm / 11.42 inches

B 270 mm / 10.63 inches

C 175.5 mm / 6.91 inches

D 94.5 mm / 3.72 inches

E 10 mm / 0.39 inches

F 15 mm / 0.59 inches

G 670.74 mm / 26.41 inches

H 641.4 mm / 25.25 inches

I 427.6 mm / 16.83 inches

J 213.8 mm / 8.42 inches

Hardware Installation – Mounting Brackets

Overview

Brackets are required when mounting backplanes in 19 inch NEMA cabinets. These brackets support the 2 through 10 position backplanes. The bracket mounts to rails using standard NEMA hardware.

Mounting brackets are offered in two sizes: 20 mm for back rail mounting, and 125 mm for front rail mounting (refer to the following illustrations).

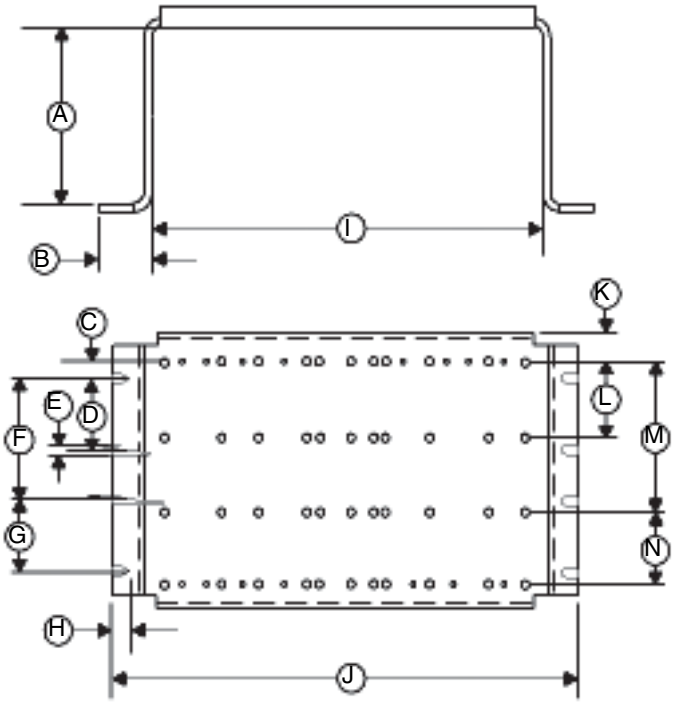
Backplane Mounting Brackets

The following table shows the mounting brackets.

Part Number	Description
140XCP40100	125 mm Bracket
140XCP40200	20 mm Bracket

125 mm Mounting Bracket

The following figure shows the 125 mm mounting bracket.



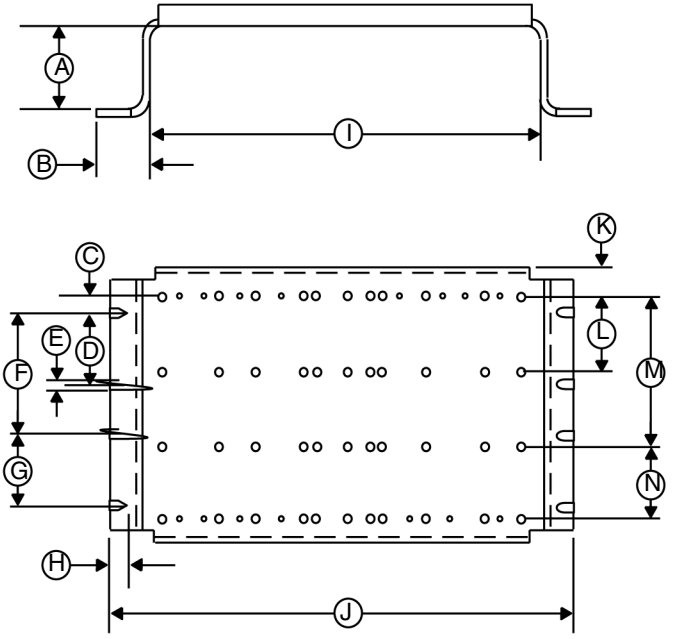
Diameter of the mounting holes: 6.6 mm / 0.26 inches

A 125 mm / 4.92 inches
B 22.83 mm / 0.90 inches
C 17.5 mm / 0.69 inches
D 88.9 mm / 3.50 inches
E 7.1 mm / 0.28 inches
F 146.1 mm / 5.75 inches
G 88.9 mm / 3.50 inches
H 14.7 mm / 0.58 inches
I 436.6 mm / 17.19 inches
J 482.25 mm / 18.99 inches
K 20.2 mm / 0.79 inches
L 94.5 mm / 3.72 inches
M 175.5 mm / 6.91 inches
N 94.5 mm / 3.72 inches

Note: Before installing a Quantum backplane to a mounting bracket, ensure that the mounting holes of the bracket and backplane are properly aligned.

20 mm Mounting Bracket

The following figure shows the 20 mm mounting bracket.



Diameter of the mounting holes: 6.6 mm / 0.26 inches

A 20 mm / 0.79 inches

B 22.83 mm / 0.90 inches

C 17.5 mm / 0.69 inches

D 88.9 mm / 3.50 inches

E 7.1 mm / 0.28 inches

F 146.1 mm / 5.75 inches

G 88.9 mm / 3.50 inches

H 14.7 mm / 0.58 inches

I 436.6 mm / 17.19 inches

J 482.25 mm / 18.99 inches

K 20.2 mm / 0.79 inches

L 94.5 mm / 3.72 inches

M 175.5 mm / 6.91 inches

N 94.5 mm / 3.72 inches

Hardware Installation – Space Requirements for the Quantum System

Overview

When mounting Quantum systems in a cabinet, a 4 in. (101.60 mm) space should be maintained above and below the modules. Side spacing should be 1 in. (25.40 mm) minimum. Wiring ducts up to 2 in. (50.80 mm) square may be centered horizontally between backplanes.

Duct work or similar items mounted in this manner that extend further out than 2 in. require a 4 in. space (instead of 1 in.) between them and the upper and lower modules, to allow for air movement. (See *p. 685* for the spacing required when installing Quantum systems.) There is no front clearance restriction regarding heat. Only sufficient mechanical clearance is required.

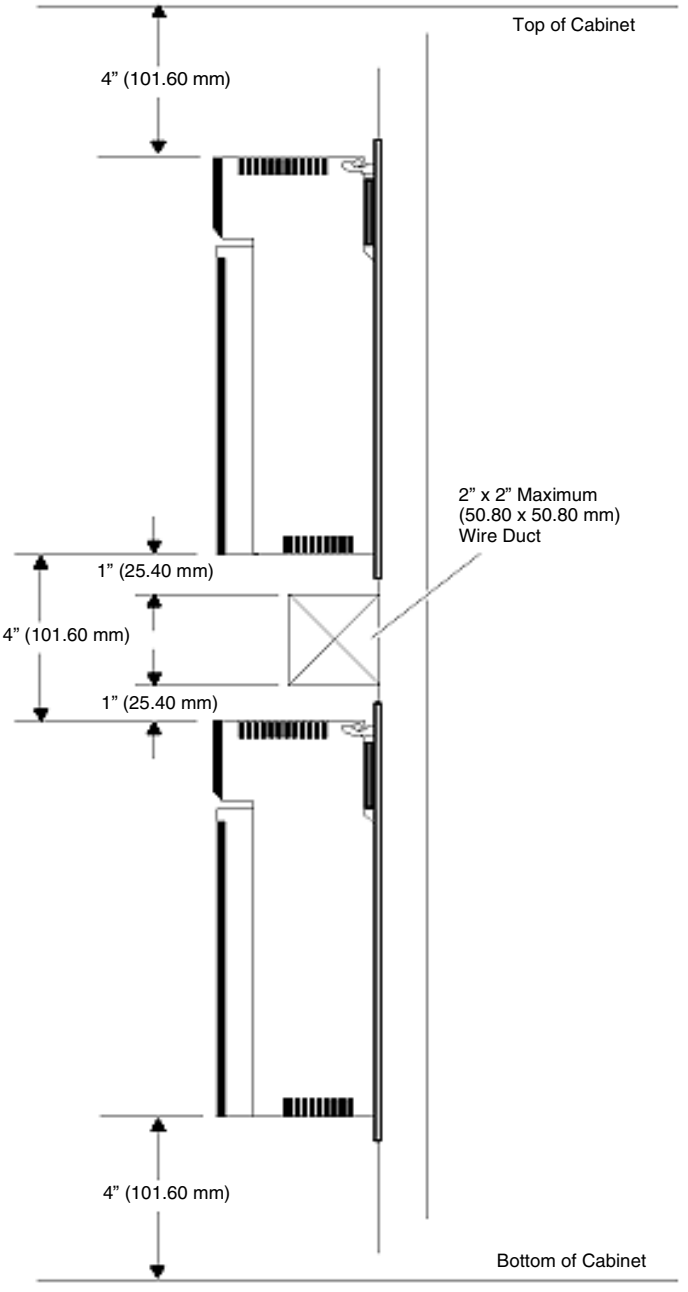
Spacing Requirements

The following table gives a summary of the spacing requirements for a Quantum system.

Minimum Spacing	Location
4 in. (101.60 mm)	Between the top of the cabinet and the top of the modules in the upper backplane.
4 in.	Between the cabinet bottom and the bottom of the lower modules in the lower backplane.
4 in.	Between the upper and lower modules when the backplanes are mounted one above the other.
1 in. (25.40 mm)	On either side between the cabinet walls and end modules.
Note: Wiring ducts up to 2 in. x 2 in. (50.80 mm x 50.80 mm) may be centered between back planes. If the duct extends further than 2 in. out from the mounting panel, there must be a 4 in. space between the modules and duct on the top and bottom.	

Spacing Requirements Figure

The following figure shows the Quantum system spacing requirements.



Hardware Installation – Mounting Quantum Modules

Overview

Quantum modules, with the exception of power supply modules, can be inserted into any slot of any backplane, and, with the added exception of CPU modules, can be removed under power (hot swapped) without damaging modules or the backplane; power supply modules must be installed in the first or last slots of the backplane. Refer to the following figures and procedure when mounting modules.

CAUTION

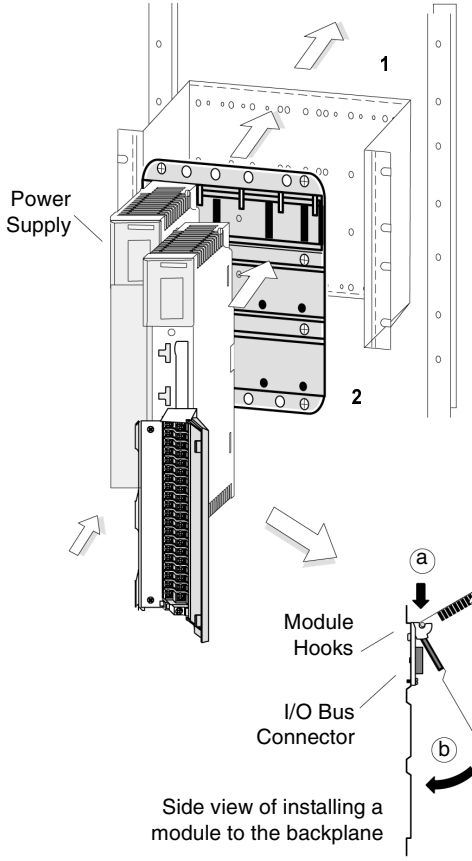
Possible danger to personnel or equipment.

An I/O module can only be hot swapped with the field side terminal strip removed.

Failure to follow this precaution can result in injury or equipment damage.

Mounting Quantum Modules

The following figure shows a step-by-step procedure for mounting Quantum modules.

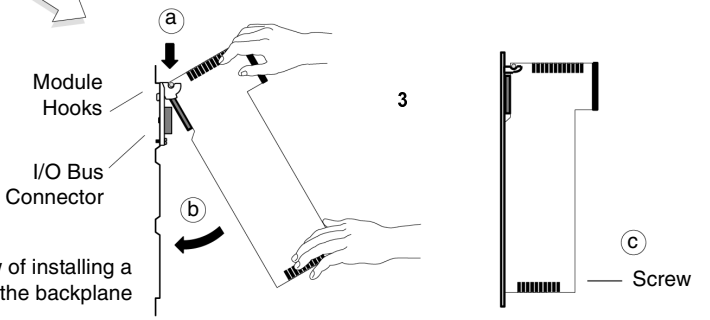


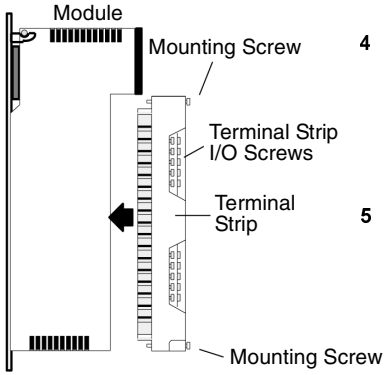
1 If required for the application, select and install a 20 mm or 125 mm mounting bracket to the rack using standard hardware.

2 Select and install the appropriate backplane to the mounting bracket using standard hardware and remove the plastic backplane connector dust covers.

3
- **a.** Mount the module at an angle on to the two hooks located near the top of the backplane.
- **b.** Swing the module down to make an electrical connection with the backplane I/O bus connector.
- **c.** Tighten the screw at the bottom of the module to fasten it to the backplane.

The maximum tightening torque for this screw is 2-4 in-lbs (0.23 - 0.45 Nm).





4 Install the appropriate terminal strip (if required) on the module, and with a philips screwdriver tighten the mounting screws at the top and bottom of the terminal.

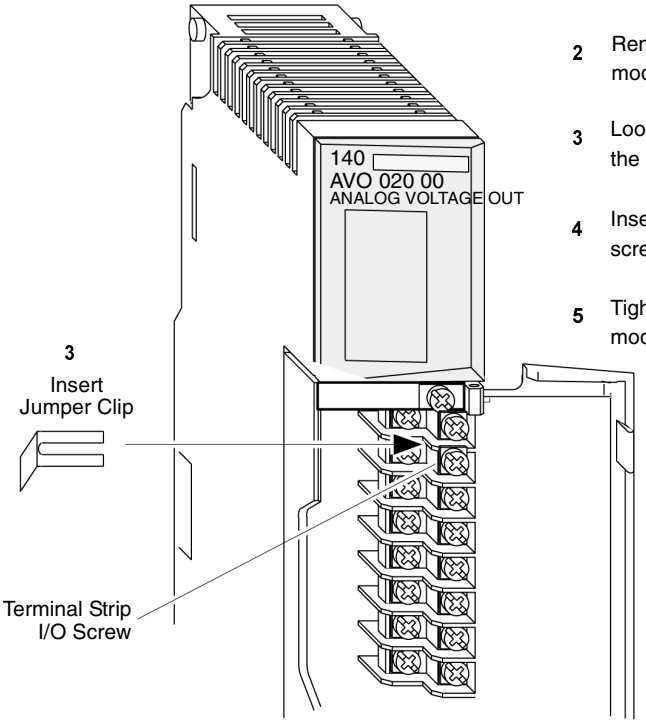
The maximum tightening torque for the mounting screws is 10 in-lbs (1.13 Nm).

5 With a philips screwdriver, make all I/O connections to the terminal strip as shown in the individual Quantum module wiring diagrams.

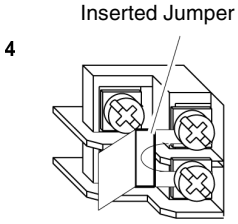
The maximum tightening torque for the terminal strip field wiring screws is 10 in-lbs (1.13 Nm).

Installing Module Terminal Strip Jumper Clips

Terminal strip jumper clips (see below) are installed when contiguous I/O points need to be jumpered (i.e., the AVO 020 00 Analog Voltage Out module). Follow the procedure below for installing jumper clips.



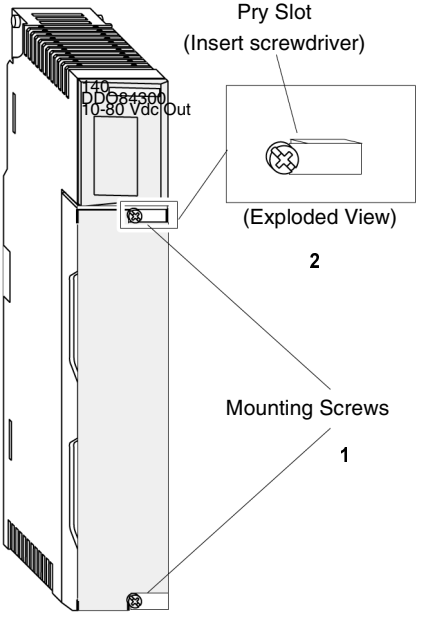
1. Turn power off to the system.
2. Remove the terminal strip from the module (see next page).
3. Loosen the terminal strip I/O screws of the points that you want jumpered.
4. Insert the jumper clip under the loosened screws (see exploded view below).
5. Tighten the screws and reinstall the module (see previous page).



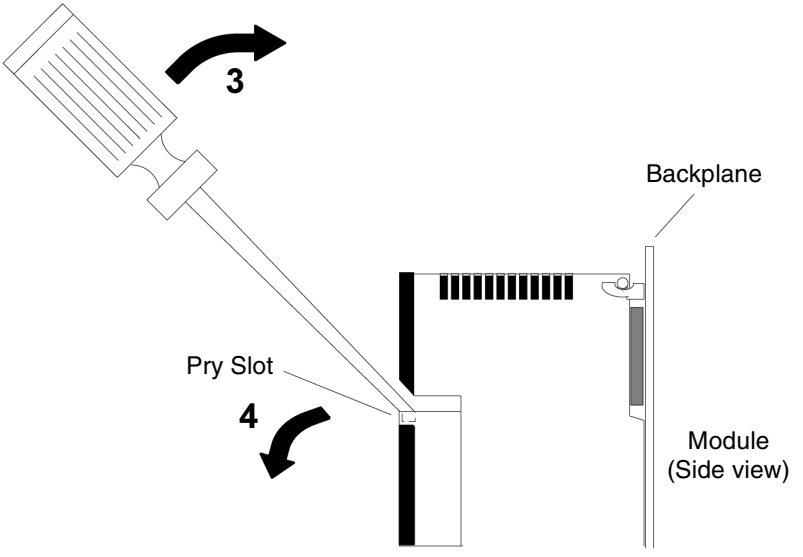
Exploded view of an inserted jumper clip

Removing a Quantum I/O Terminal Strip

The Quantum Automation Series I/O terminal strips have been designed with a pry slot to assist in their removal. Follow the procedure below to remove the terminal strip.

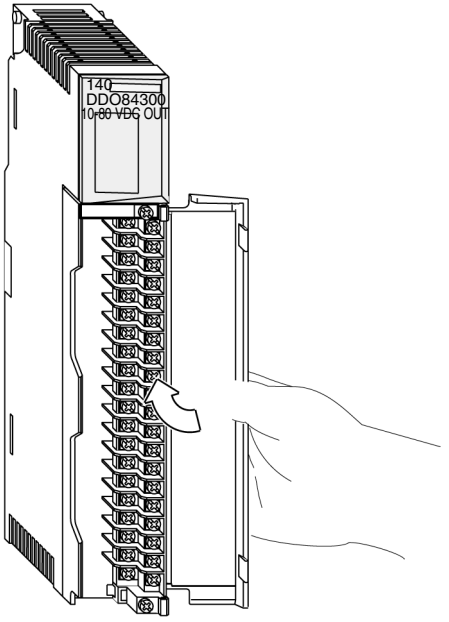


1. Loosen the terminal strip mounting screws located at the top and bottom of the terminal strip.
2. Located the pry slot at the top of the terminal strip near the top mounting screw.
3. From the front and at an angle, insert a flat edge screwdriver into the pry slot and lever the top of the terminal strip away from the module.
4. Once the top of the terminal strip has been loosened, the terminal strip may be completely removed by continuous outward pressure with the screwdriver.
5. To reinstall the terminal strip into the module, follow the procedure previously described.



Removing a Quantum Module Door

The Quantum Automation Series module terminal strips have been designed with a flexible, removable door to allow for easier wiring and access to the terminal strip. Follow the procedure below to remove the module door.



1. Open the module door.
2. Place your thumb near the middle of the door (as illustrated).
3. With your thumb, apply pressure until the door bends and the door hinge pins pop out of the retaining holes at the top and bottom of the terminal strip.
4. After wiring the module, reinstall the door using the reverse of the above procedure.

Power and Grounding Guidelines

D

At a Glance

Introduction

This section provides information of power and grounding considerations for AC and DC powered systems, system design considerations for Quantum power supplies, grounding and closed system installation.

What's in this Chapter?

This chapter contains the following topics:

Power and Grounding Considerations for AC and DC Powered Systems

Overview

The required power and grounding configurations for AC powered and DC powered systems are shown in the following illustrations.

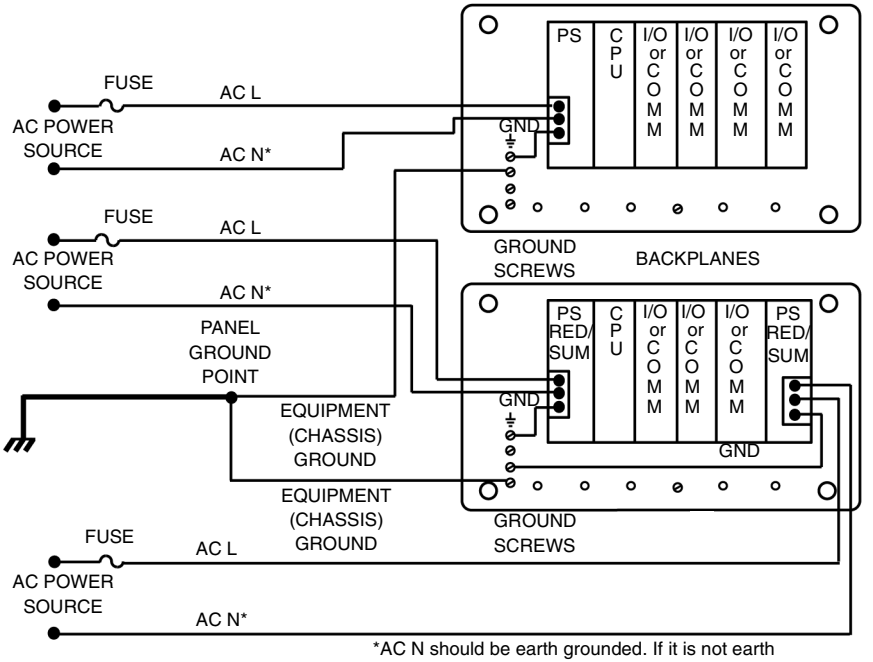
Each backplane shown has its own ground connection; that is, a separate wire returning to the main grounding point, rather than "daisy chaining" the grounds between power supplies or mounting plates.

The main grounding point is the local common connection of the panel ground, equipment ground, and earth grounding electrode.

Also shown are power and grounding configurations of AC and DC systems required for CE compliance. The CE mark indicates compliance with the European Directive on Electromagnetic Compatibility (EMC) (89/336/EEC) and the Low Voltage Directive (73/23/EEC). In order to maintain compliance, the Quantum system must be installed per the installation instructions.

AC Powered Systems

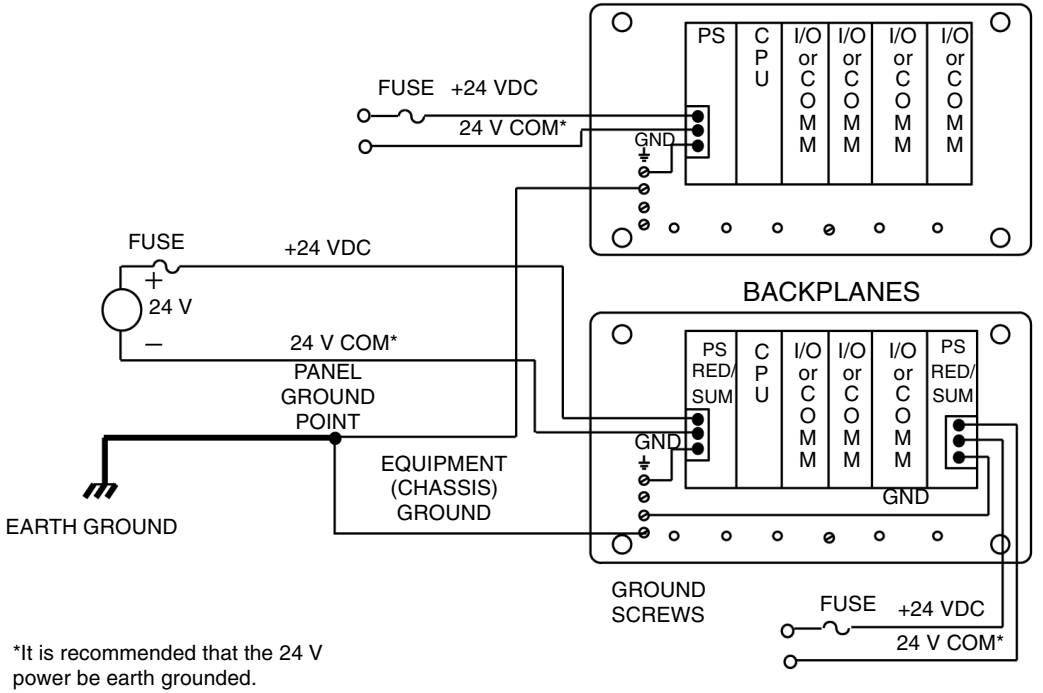
The following figure shows the AC powered systems.



Note: this power and grounding configuration is compliant with the CE standards for the 140CPS11420 and 140CPS12420 power supplies, and for the 140CPS11100 (PV 01 or greater) power supply.

DC Powered Systems

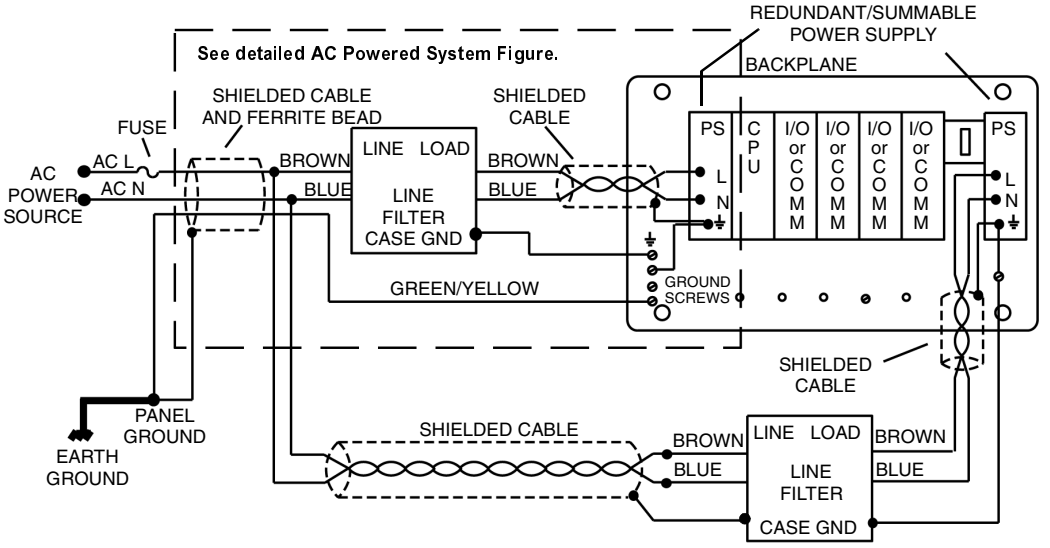
The following figure shows the DC powered systems.



*It is recommended that the 24 V power be earth grounded.

AC Powered Systems for CE Compliance

The following figure shows the AC powered systems for CE compliance.



CAUTION

European Compliance

To maintain CE compliance with the European Directive on EMC (89/336/EEC), the 140CPS11100 (PV00 only), 140CPS11400, 140CPS11410, and 140CPS12400 power supplies must be installed in accordance with these instructions.

Failure to follow this precaution can result in injury or equipment damage.

CAUTION

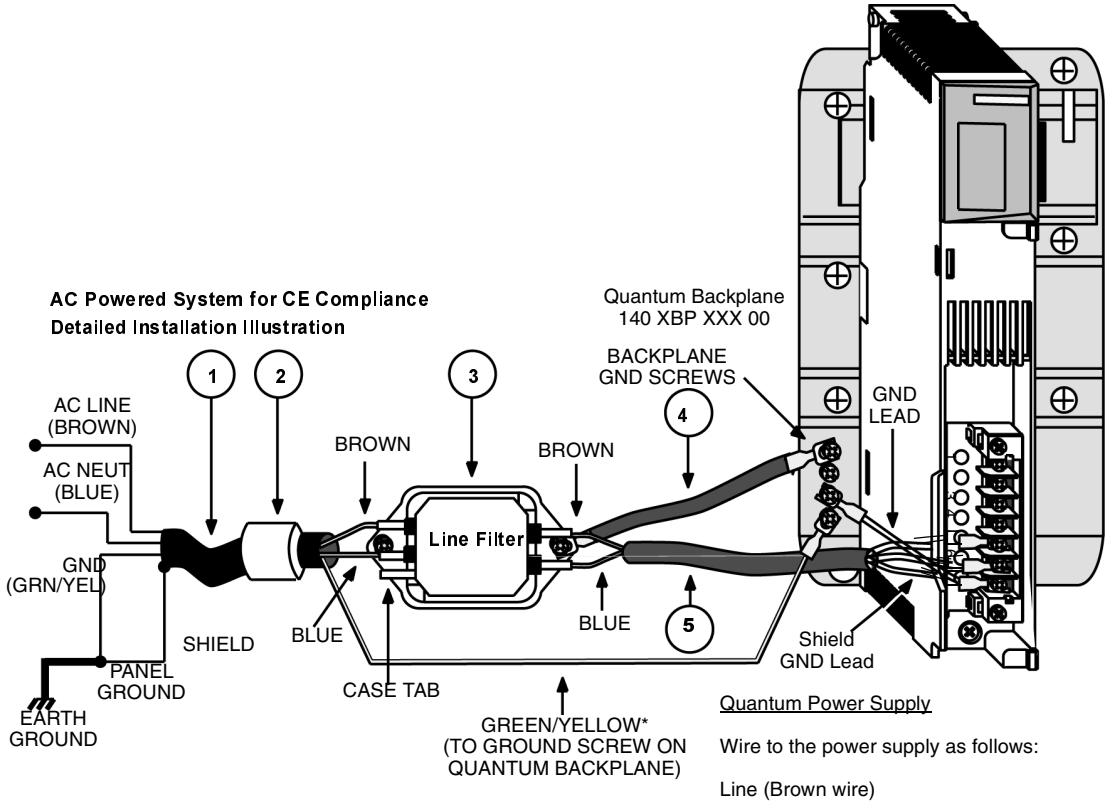
Requirements Compliance

For installations that must meet "Closed System" requirements, as defined in EN 61131-2 (without relying upon an external enclosure), connector models 140 XTS 00100 and 140 XTS 00500 are required. Also, if an external Line Filter is used, it must be protected by a separate enclosure which meets the "finger safe" requirements of IEC 529, Class IP20 (see *p. 712*).

Failure to follow this precaution can result in injury or equipment damage.

Detailed AC Powered System

The following figure shows the details for the AC powered system for CE compliance.



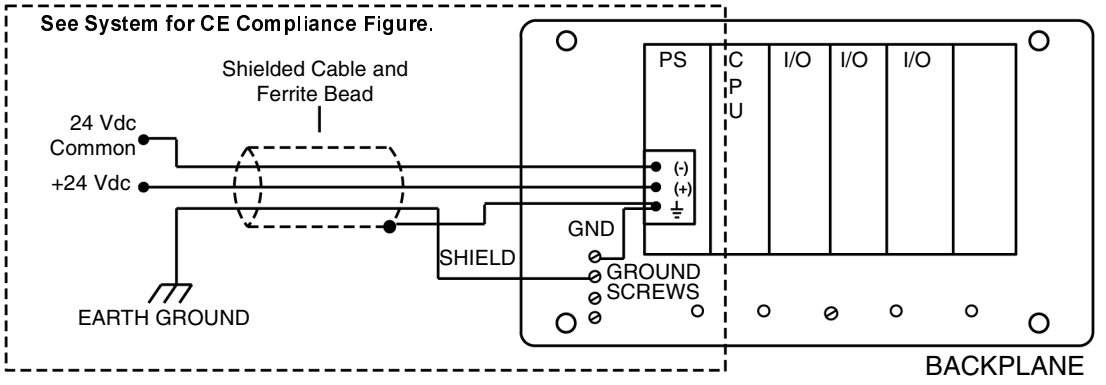
*Note: Only one ground wire per backplane is required. In redundant and summable systems, this lead is not connected for the additional line filter/power supply.

The following table shows the list of parts for the AC Powed System figure.

Callout	Vendor (or equivalent)	Part Number	Description	Instruction
1	Offlex Series 100cy	35005	Line Cord	Terminate the shield at panel ground; the filter end of the shield is not terminated.
2	Steward	28 B 0686-200	Ferrite Bead	Install next to the filter and secure with tie wraps at both ends of the ferrite bead.
	Fair Rite	2643665702		
3	Schaffner	FvN670-3/06	Line Filter (fast on terminals) Dimensions: Length: 3.4" (85 mm) Width: 2.2" (55 mm) Height: 1.6" (40 mm) Mounting Holes: 0.2 in (5.3 mm) dia., 3 in (75 MM) centerline mounted. Fast on terminals: 0.25 in (6.4 mm)	Install next to the power supply.
4	N/A	N/A	Ground Braid Flat braid 0.5 in (134 mm) with a maximum length of 4" (100 mm)	N/A
5	Offlex Series 100cy	35005	Line Cord The maximum length is 8.5" (215 mm)	Third lead (green/yellow) is not used; terminate the shield at the power supply ground terminal.

24 Vdc Powered Systems for CE Compliance

The following figure shows the 3 A, 24 Vdc powered systems for CE compliance.



CAUTION

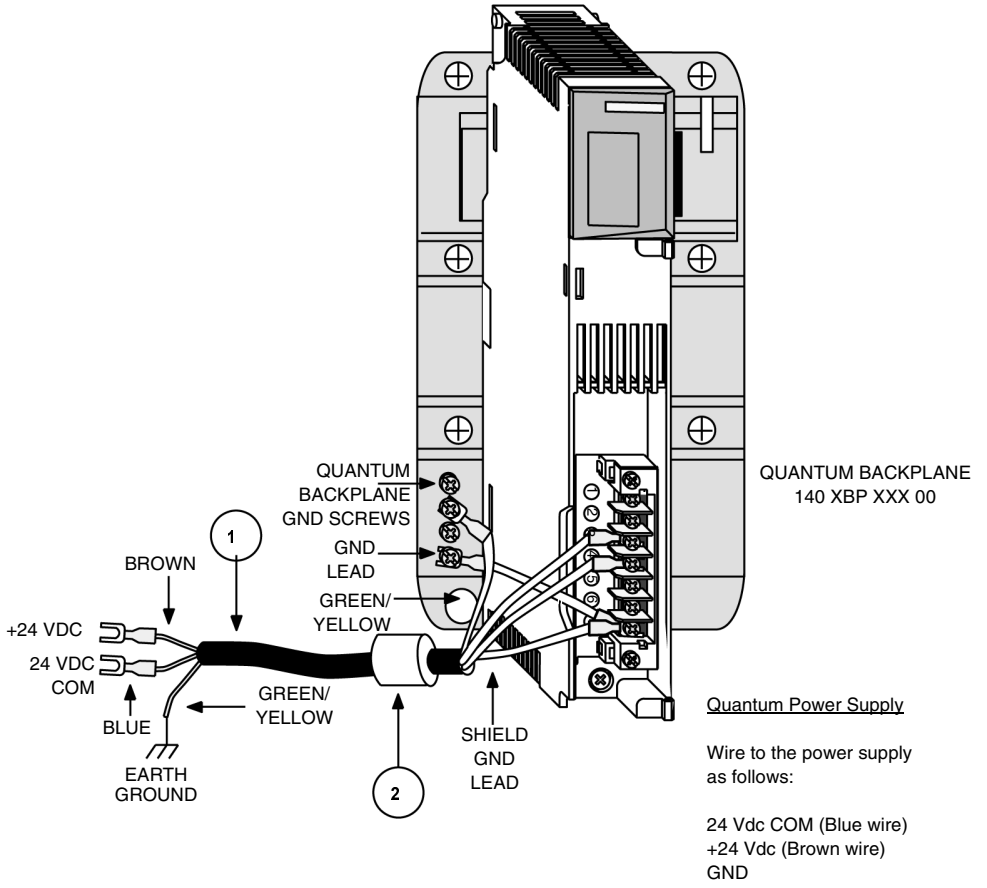
European compliance

To maintain CE compliance with the European Directive on EMC (89/336/EEC) and the Low Voltage Directive (73/23/EEC), the 140CPS21100, the 140CRA21120, and the 140CRA21220 must be installed in accordance with these instructions.

Failure to follow this precaution can result in injury or equipment damage.

Detailed System for CE Compliance

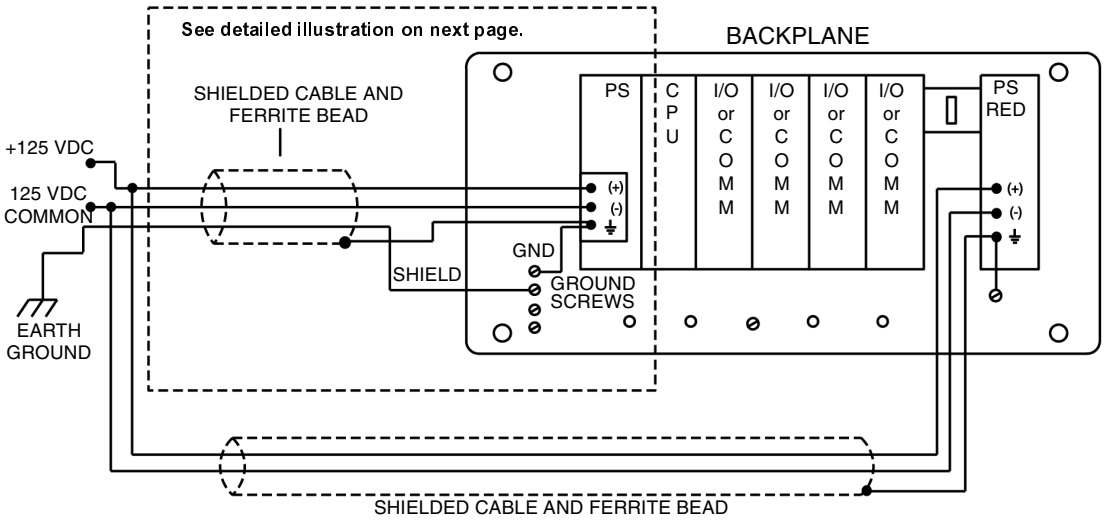
The following figure shows the detailed installation for the CE compliance system and the parts list callouts.



The following table provides a list of parts for the CE Compliance Figure.

Callout	Vendor (or equivalent)	Part Number	Description	Instruction
1	Offlex Series 100cy	35005	Line Cord	Terminate the shield at the power supply ground terminal
2	Steward	28 BO686-200	Ferrite Bead	Install next to the filter and secure with tie wraps at Both ends of the ferrite bead.
	Fair Rite	2643665702		

125 Vdc Powered System The following figure shows the 125 Vdc powered system for CE compliance.



CAUTION

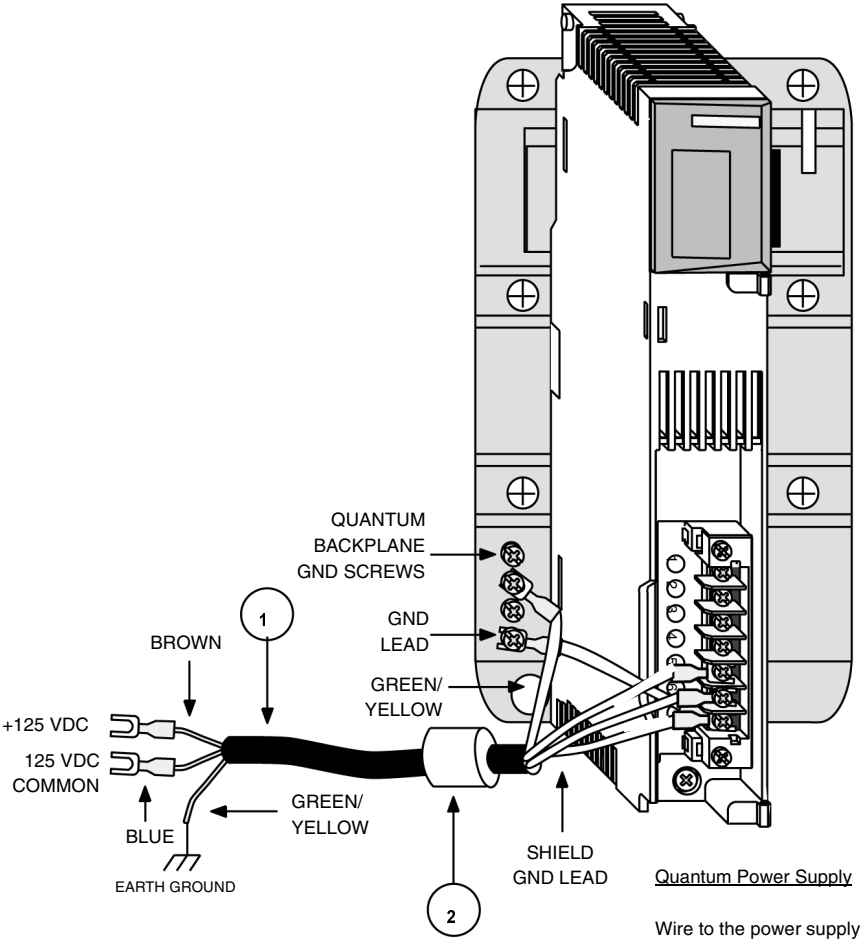
European compliance

To maintain CE compliance with the European Directive on EMC (89/336/EEC) and the Low Voltage Directive (73/23/EEC), the 140CPS51100 and the 140CPS52400 must be installed in accordance with these instructions.

Failure to follow this precaution can result in injury or equipment damage.

125 Vdc Powered Installation

The following figure shows the detailed installation for the 125 Vdc powered system for CE compliance with parts list callouts.



Quantum Backplane
140XBPXXX00

Quantum Power Supply

Wire to the power supply as follows:

+125 Vdc (Brown wire)
125 Vdc COM (Blue wire)
GND

The following table provides a list of parts for the 125 Vdc Powered Installation Figure..

Callout	Vendor (or equivalent)	Part Number	Description	Instruction
1	Offlex Series 100cy	35005	Line Cord	Terminate the shield at the power supply ground terminal
2	Steward	28 BO686-200	Ferrite Bead	Install next to the filter and secure with tie wraps at Both ends of the ferrite bead.
	Fair Rite	2643665702		

CAUTION

European compliance

To maintain CE compliance with the European Directive on EMC (89/336/EEC) and the Low Voltage Directive (73/23/EEC), the 140CPS51100 and the 140CPS52400 must be installed in accordance with these instructions.

Failure to follow this precaution can result in injury or equipment damage.

System Design Considerations for Quantum Power Supplies

Overview

There exist some important design differences between various models of Quantum power supplies that require careful consideration by the system designer in order to achieve maximum system performance. The principal difference lies in the generation within the power supply of important backplane signals related to the health of the power supply and the status of the input power.

All Quantum power supplies include on-board early power fail detection logic which is used to signal all other modules on the backplane that input power has failed. This signal is called POK (power OK) and is active high (i.e., when the signal is high, power is OK).

There is both an internal (to the power supply) and an external (as seen by the backplane and all other modules) version of the POK signal. The internal POK signal is represented by the Pwr ok LED (light emitting diode) on the front panel of all power supplies.

The system POK signal is generated so that there is sufficient time between the negative going edge of system POK (power has failed) and the actual interruption of power to the backplane. This early warning of power failure is necessary for the Quantum executive to perform an orderly system shutdown.

Standalone Power Supplies

Three models of standalone power supplies are offered:

• 140CPS11100	115...230 Vac input	3 A output
• 140CPS21100	24 Vdc input	3 A output
• 140CPS51100	125 Vdc input	3 A output

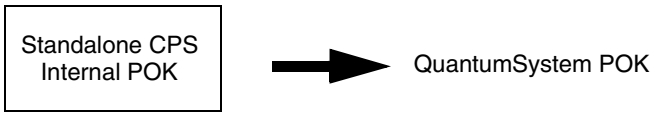
CAUTION

Equipment compatibility.

Standalone units must be the only power supply installed in a backplane. No fault tolerant or redundant capability exists in systems powered by standalone power supplies.
In systems powered by a standalone power supply, the internal power supply POK is provided directly to the Quantum system POK.

Failure to follow this precaution can result in injury or equipment damage.

The following figure shows the single internal POK that relates directly to the Quantum system POK.



Summable Power Supplies

Four summable power supply models are offered:

• 140CPS11410	115...230 Vac input	8 A output
• 140CPS11420	115...230 Vac input	11 A output
• 140CPS21400	24 Vdc input	8 A output
• 140CPS41400	48 Vdc input	8 A output

A summable power supply may be used as a standalone power supply without reservation in any Quantum system.

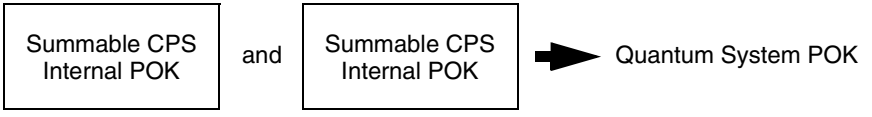
For systems configured with a mix of CPS, NOM, expert, and I/O modules, whose total current consumption from the backplane exceeds the current provided by one summable supply, two summable supplies may be used in a single backplane. In such a system, the total current available on the backplane is the sum of the capability of both supplies:

- 16 A for two 140CPS11410
- 16 A for two 140CPS21400
- 16 A for two 140CPS41400
- 20 A for two 140CPS11420
- 16 A for one 140CPS11410 and one 140CPS11420

Use only like summable power supplies (same product reference) except for 140CPS11410 and 140CPS11420, which can be summed.

The summable supplies are designed so that they split the current supplied to the load almost equally, which also has the added benefit of increasing total system MTBF, and to distribute the thermal load across the backplane. Summable supplies should be installed at opposite ends of in the Quantum backplane to maximize the system thermal performance.

The Quantum system POK signal in systems powered by two summable power supplies is only true (power is OK) when both internal POK signals (in the 140CPSX14X0) are true. Quantum summable power supplies are not hot-swappable.
The following figure shows that the internal summable supply Quantum POKs are ANDed to create the Quantum System POK.



The proper method for starting systems powered by summable power supplies is to insert both supplies in the backplane in an unpowered state, and then apply power to each supply. For 140CPS11410, 140CPS21400, and 140CPS414 models, there is no requirement to power each supply simultaneously. For 140CPS11420, or wherever this module is operated with a 140CPS11410, the delay between the two powering times should not be greater than five seconds. The system designer must realize that the operation of the summable supply described above is independent of total backplane load, i.e., even if the total load on the backplane is less than 8 A, if there are two summable supplies installed in the backplane, the system POK is generated as shown in this section.

For the special case of a single summable supply used as a standalone, the system POK generation reverts to the standalone case as shown previously in this section.

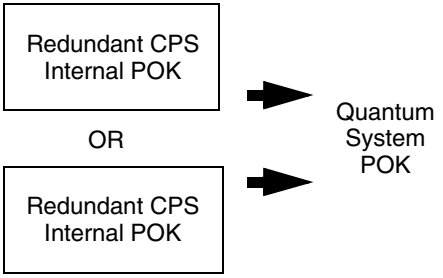
Redundant Power Supplies

Five redundant power supply models are offered:

• 140CPS12400	115 ... 230 Vac input	8 A output
• 140CPS12420	115 ... 230 Vac input	10 A output
• 140CPS22400	24 Vdc input	8 A output
• 140CPS42400	48 Vdc input	8 A output
• 140CPS52400	125 Vdc input	8 A output

Similar to the summable supplies, the Quantum redundant power supplies also contain circuitry which forces the installed power supplies to share output current almost equally. An important difference between the summable and the redundant supply lies in the system POK generation circuitry.

The Quantum system POK signal in systems powered by redundant power supplies is true (power is OK) if either or both internal POK is true. The following figure shows the internal Quantum redundant supply POKs are ORed to create the Quantum System POK.



Note: Redundant power supply module health may be monitored in an I/O module health status word. (Refer to the STAT Block description in *Modicon Ladder Logic Block Library User Guide*, 840USE10100.)

Another important difference from the summable system is the total available system backplane loading. If there are N redundant power supplies installed in a backplane, the total backplane load must not exceed the capability of N – 1 supplies.

For example:

- If three 8 A redundant power supplies are installed (N = 3), the maximum backplane load available for redundant operation is the current sourced by N – 1 (= 2) supplies, which is 16 A.
- if two 8 A power supplies are installed in the backplane (N = 2), the maximum backplane load available for redundant operation is the current sourced by N – 1 (= 1) supplies, which is 8 A.

CAUTION

Limits to Backplane Load

- If two 140CPS12420 power supplies are installed in the backplane, the maximum backplane load available for redundant operation is 10 A.
- If three 140CPS12420 power supplies are installed in the backplane, the maximum backplane load available for redundant operation is 20 A.

Use only like redundant power supplies except for 140CPS12420 which can be mixed with one 140CPS22400 or one 140CPS42400.

- If one CPS12420 is installed with one 140CPS22400 or one 140CPS42400 in the backplane, the maximum backplane load available for redundant operation is 8 A.
- If one 140CPS12420 is installed with two 140CPS22400 or two 140CPS42400 in the backplane, the maximum backplane load available for redundant operation is 16 A.
- If two 140CPS12420 are installed with one 140CPS22400 or one 140CPS42400 in the backplane, the maximum backplane load available for redundant operation is 16 A.

Failure to follow this precaution can result in injury or equipment damage.

If these constraints are observed, then in a system of two or three redundant supplies, one supply (it doesn't matter which one) is hot-swappable. This is possible because there is excess capacity in the N – 1 remaining supplies to source the backplane current while the Nth supply is being swapped.

An obvious extension to this argument is that a single redundant power supply may be used as a standalone supply (but the lowest cost solution will be achieved by using a summable or standalone supply for this application).

Compatibility Issues

Power supplies:

- With the exception of standalone models, power supplies with the same model number are always compatible when installed in the same backplane.
- Do not mix different models of power supplies on the same backplane, except in the following combinations:
  - One 140CPS11420 and one 140CPS11410 power supply may be installed for configurations consuming more than the rated current of one supply. In this case the total load capacity is 16 A @ 60° C.
  - One 140CPS12420 and one 140CPS22400 power supply may be used for configurations requiring power for uninterrupted system operation with redundancy between an AC voltage source and a 24 Vdc voltage source. In this case, the total load capacity is 8 A @ 60° C. Three redundant supplies can also be mixed in a backplane. See *p. 707* for details.
  - One 140CPS12420 and one 140CPS42400 power supply may be used for configurations requiring power for uninterrupted system operation, with redundancy between an AC voltage source and a 48 Vdc voltage source. In this case the total load capacity is 8 A @ 60° C. Three redundant supplies can also be mixed on a backplane. See *p. 707* for details.
- Do not mix DC input power supplies into the same backplane as the corresponding AC version.
- Do not use a standalone power supply in combination with any other supply in the same backplane.

DIO:

- While it is possible to use a standalone or a summable power supply with a DIO drop (as long as the DIO input is left unpowered), it is not possible to use a redundant supply with the DIO drop.
- The added power supply must not be included in the system I/O map.
- The added power supply need not be of the same type as the DIO adapter. AC powered supplies may be used with DC type adapters and vice-versa.
- DIO module current load with an added power supply is typically 200 mA.

Grounding

Overview

This appendix provides information on grounding issues for the chassis, power supply Modbus Plus, and other equipment and system requirements.

Chassis Grounding

A chassis ground wire is required for each backplane. The wire is connected between one of four ground screws (located on the backplane) and the main ground point of the power system. This wire should be green (or green with a yellow stripe) and the AWG rating must be (at a minimum) sized to meet the fuse rating of the supply circuit.

Power Supply Grounding

On each power supply connector there is a ground connection. This connection must be made for safety reasons. The preferred connection is between the power supply connector ground terminal and one of the backplane ground screws. This wire should be green (or green with a yellow stripe) and at a minimum the same AWG rating as the power connections to the supply.

In backplanes with multiple power supplies, each supply should have a ground connection between its input connector and the backplane ground screws.

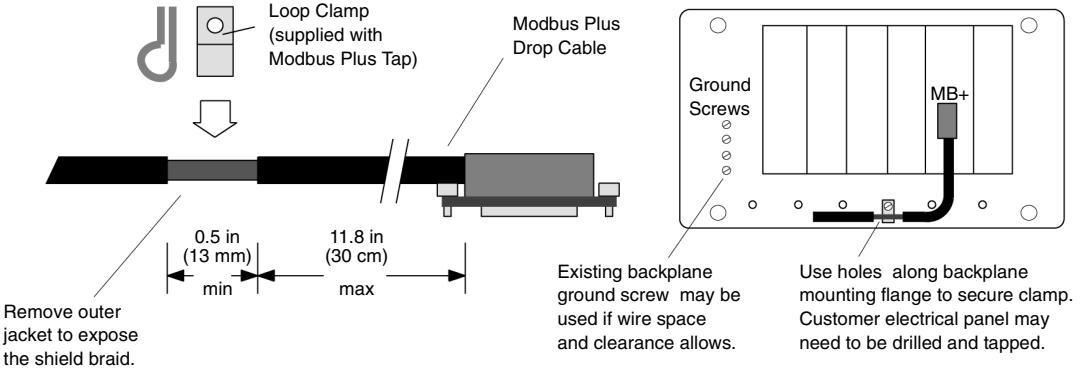
Note: It is recommended that the power supplying the I/O modules be grounded at the main ground point.

Modbus Plus (MB+) Communication Tap Grounding

Modbus Plus network drop cables require a ground connection to the backplane. The connection is made by means of a metal loop clamp that grounds the cable shield to the ground point. The maximum allowable distance from the ground point to the drop cable's connector is 30 cm (11.8 in).

Modbus Plus Grounding Figure

The following figure shows Modbus Plus grounding information.



CAUTION

European compliance

To maintain CE compliance with the European Directive on EMC (89/336/EEC), the Modbus Plus drop cables must be installed in accordance with these instructions.

Failure to follow this precaution can result in injury or equipment damage.

Other Equipment Grounding

Other equipment in the installation should not share the grounding conductor of the system. Each piece of equipment should have its own grounding conductor returning to the main grounding point from which the equipment power originates.

Systems with Multiple Power Feeds

In systems with multiple power feeds, the grounding should proceed in the same manner as single feed systems. However, a zero volt potential difference must be maintained between the equipment grounding conductors of the separate systems to prevent current flow on communication cables.

Closed System Installation

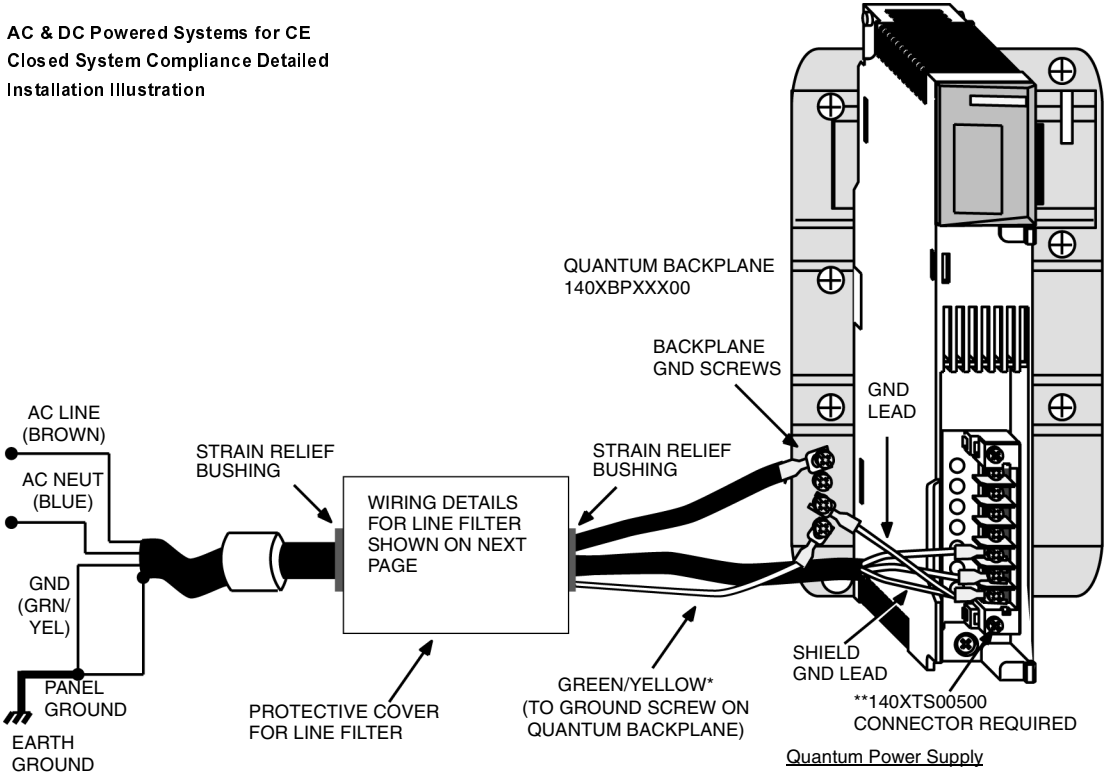
Overview

For installations that must meet "Closed System" requirements, as defined in EN 61131-2 (without relying upon an external enclosure) in which an external Line Filter is used, it must be protected by a separate enclosure which meets the "finger safe" requirements of IEC 529, Class IP20.

AC/DC Installation

The following figure shows the detailed installation for the AC and DC powered systems for CE closed system compliance.

AC & DC Powered Systems for CE Closed System Compliance Detailed Installation Illustration



Quantum Power Supply

Wire to the power supply as follows:

Line (Brown wire)
Neutral (Blue wire)
GND (Green/Yellow wire)

* **Note:** Only one ground wire per backplane is required. In redundant and summable systems, this lead is not connected for the additional line filter/power supply.

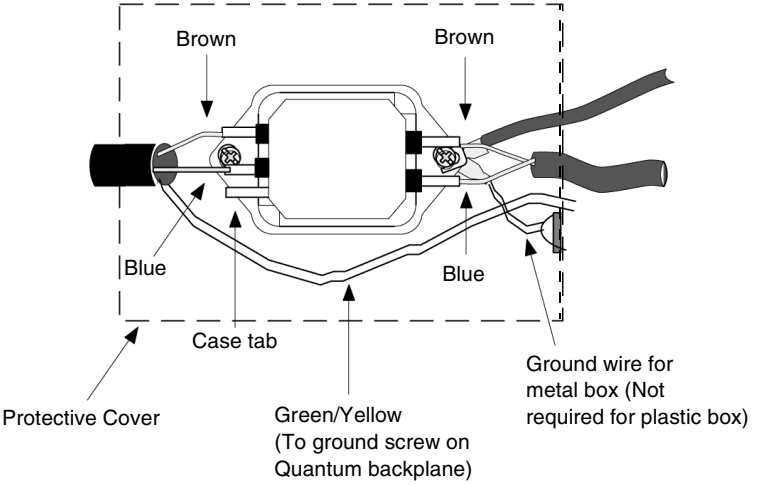
** **Note:** Connectors 140 XTS 005 00 (for all power supplies) and 140 XTS 001 00 (for all I/O modules) must be ordered separately.

Protective Cover

The protective cover must completely enclose the line filter. Approximate dimensions for the cover are 12.5 cm by 7.5 cm. Wire entry/exit shall be through strain relief bushings.

Line Filter Connections

The following figure shows the wiring connections to the enclosed line filter.



CableFast Cabling

E

At a Glance

Introduction

The following information pertains to the CableFast cabling system.

What's in this Chapter?

This chapter contains the following topics:

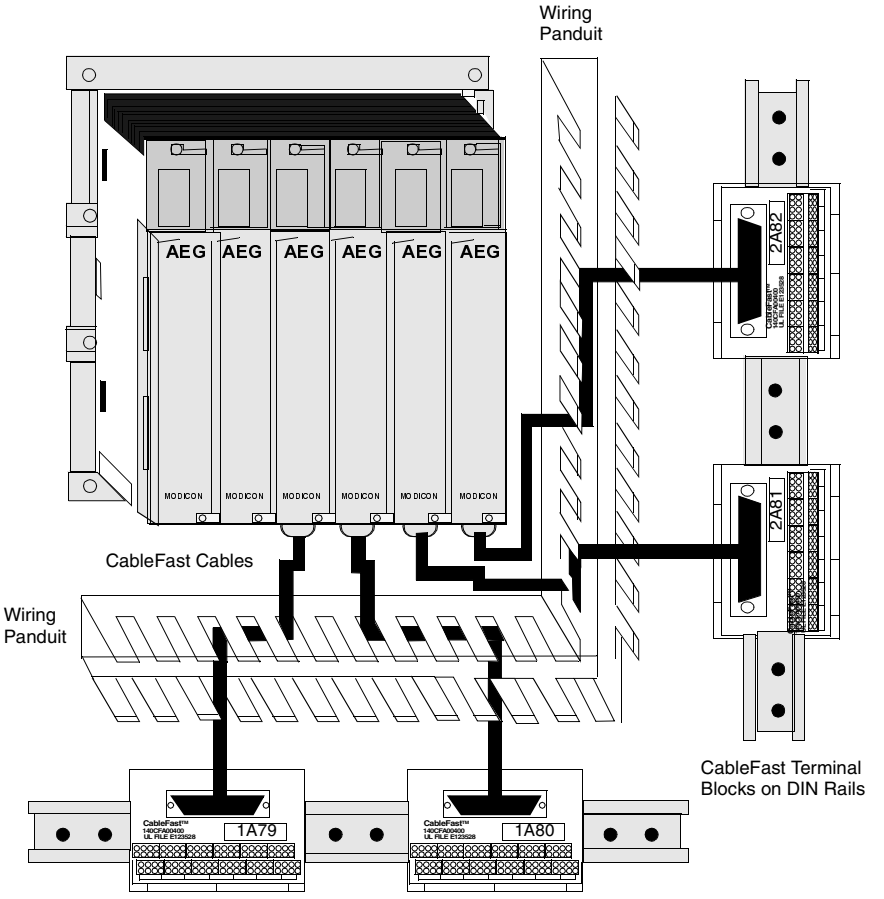
Features of the CableFast Cabling System

Overview

The CableFast wiring system consists of pre-wired Quantum field wiring terminal strips, available in various cable lengths that are terminated with "D" type connectors. The "D" connectors plug into DIN rail-mounted terminal blocks offered in straight through or special application versions. Cables and terminal blocks are ordered separately and all terminal blocks may be used with any cable length. Pigtail cable versions are also available.

Quantum Modules and Backplane

The following figure shows the Quantum modules and backplane components.



Note: Ensure that the wiring panduits are large enough to support 12 ft. cables.

Specifications

All CableFast systems are designed to the following specifications.

Specifications		
Power Ratings	150 Vac/Vdc @ 0.5 A per point	
	150 Vac/Vdc @ 2.0 A per point * *Requires the 140CFG01600 Terminal Block and the 140XTS012XX Cable	
Dielectric Withstanding Voltage	1060 Vac and 1500 Vdc	
Creepage and Clearance	per IEC 1131, UL 508, CSA 22.2 #142-1987	
Terminal Block Wire Sizes per Terminal	One wire - #12 AWG (2.5 mm2)	
	Two wires - #16 AWG (1.0 mm2) and above (See below for the maximum number of wires allowed per terminal.)	
	Note: It is recommended that no more than two wires be used at one time.	
	Wire Size	Number of Wires
	#24 #22 #18 #16 #14 #12	4 4 3 2 1 1
Terminal Screw Size	M3	
Screwdriver Head Size	0.13" (3.3 mm) flat head min.	
Terminal Screw Type	Captive	
Terminal Screw Finish	Tin plate (197 µin min.)	
Terminal Screw Tightening Torque	7.2 lb.-in (0.8 Nm)	
System Flammability Rating	94 V-2	
Temperature		
Operating	0 ... 60° C (32 ... 140° F)	
Storage	-40 ... +65° C (-40 ... +149° F)	
Humidity	0 ... 95% RH noncondensing	
Altitude	6,666 ft. (2000 m) full operation	
Shock	+/- 15 g peak, 11 ms, half sine wave	
Vibration	10 ... 57 Hz @ 0.075 mm displacement 57 ... 150 Hz @ 1 g, total 10 sweeps	
Mounting Configuration	DIN rail mount, NS35/7.5 and NS32	

Terminal Block Selection Guide Use this table to select valid combinations of Quantum I/O modules and CableFast terminal blocks.

	140CFA04000	140CFB03200	140CFC03200	140CFE03200	140CFE03200	140CFG01600	140CFH00800	140CFI00800	140CFJ00400	140CFK00400
140ACI03000	X						X	X		
140ACO02000	X								X	X
140ACI04000	X									
140ACO13000	X									
140ARI03010	X									
140ATI03000	X (See Note 3)									
140AMM09000	X									
140AVI03000	X						X	X		
140AVO02000	X									X
140DAI34000	X					X				
140DAI35300	X	X	X	X						
140DAI44000	X					X				
140DAI45300	X	X	X	X						
140DAI54000	X					X				
140DAI54300	X									
140DAI55300	X	X	X	X						
140DAI74000	CableFast Not Allowed									
140DAI75300	CableFast Not Allowed									
140DAM59000	X (See Note 1)									
140DAO84000						X (See Note 2)				
140DAO84010						X (See Note 2)				
140DAO84210						X (See Note 2)				
140DAO84220						X (See Note 2)				
140DAO85300	X (See Note 1)									
140DDI15310	X		X							
140DDI35300	X	X	X							
140DDI35310	X									
140DDI36400	Not compatible with CableFast. See *p. 542* for recommended cables									

	140CFA04000	140CFB03200	140CFC03200	140CFE03200	140CFE03200	140CFG01600	140CFH00800	140CFI00800	140CFJ00400	140CFK00400
140DDI67300	X									
140DDI84100	X									
140DDI85300	X	X	X	X						
140DDM39000	X									
140DDM69000	X (See Note 1)									
140DDO15310	X									
140DDO35300	X		X		X					
140DDO35301	X		X		X					
140DDO35310	X									
140DDO36400	Not compaitble with CableFast. See *p. 601* for recommended cables.									
140DDO84300						X (See Note 2)				
140DDO88500	X (See Note 1)									
140DRA84000	X (See Note 1)									
140DRC83000	X (See Note 1)									
140DSI35300	X									
140DVO85300	X									
X = Valid Selections.										

Note: These are the maximum load current capacities of the 140CFA04000 and CFG01600 terminal blocks:

1. When using the 140CFA04000 terminal block, the indicated module outputs are limited to 0.5 A per point, 150 Vac maximum and 0.5 A per point, 150 Vdc maximum.
2. When using the 140CFG01600 terminal block and either the 140XTS012xx or 140XTS102XX high power cables, the indicated module output ratings are 2 A per point, 150 Vac maximum, and 2 A per point, 150 Vdc maximum.
3. The 140CFA04000 block does not incorporate an isometric barrier and is not recommended for use with the 140ATI03000 TC module. Without such a barrier, temperature readings may vary up to 2 degrees from one end of the block to the other. If the application can tolerate this temperature error, the block (and module remote CJC) may be used.

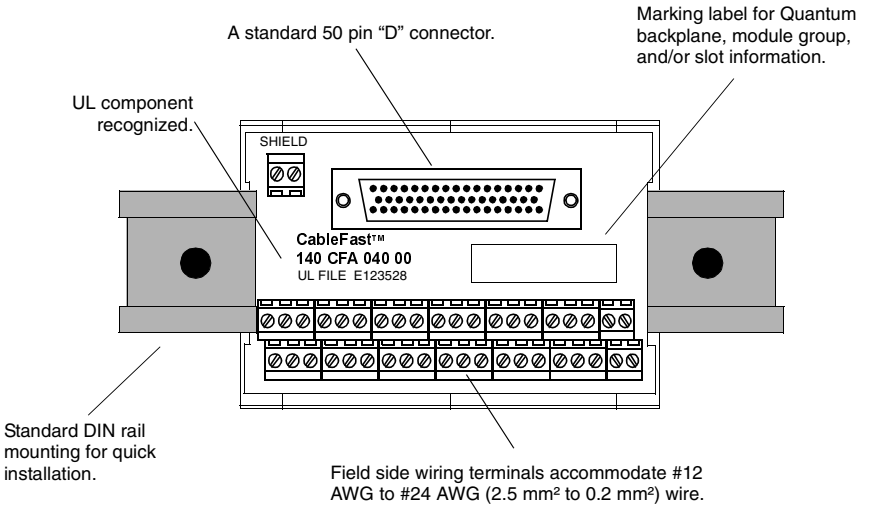
CableFast Terminal Blocks

This table includes descriptions for the following terminal blocks.

Block Number	Block Description
140CFA04000	The A block is a straight through point to point connection on the terminal block. Wiring of this block is identical to wiring the Quantum I/O connector (140XTS00200).
140CFB03200	The B block is used for individually fused 2-wire digital inputs. This terminal block is designed to prevent a single point failure from affecting the remaining inputs. It is not recommended for sourced 1-wire inputs (powered from the field).
140CFC03200	The C block provides connection for 32 group fused input or output points. The block may be used for 1- or 2-wire inputs or outputs, and features a fuse per group, four groups total. Users select input or output mode via four switches located on the module. (The default is input mode.)
140CFD03200	The D block is used for sensors requiring either 2- or 3-wire electrical interface. A fuse per group is supplied to accommodate the I/O module (4) groups.
140CFE03200	The E block provides connection for 32 individually fused 24 Vdc outputs. 1- and 2-wire interfacing may be selected. Field power must be supplied to the four groups.
140CFG01600	The G block is a high power output block used on both AC and DC circuits requiring up to 2 A. Individual fusing is provided and may be used in both 1- and 2-wire installations. It is also used for isolated AC modules.
140CFH00800	The H block is used for analog inputs, with individual fusing provided per channel. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.
140CFI00800	The I block is used for analog inputs. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.
140CFJ00400	The J block is used for analog outputs, with individual fusing provided per channel. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.
140CFK00400	The K block is used for analog outputs. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.

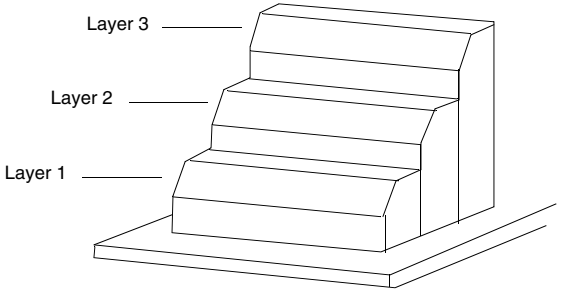
CableFast Terminal Block Features

All CableFast terminal blocks have the following features.



CableFast Terminal Block Stacking Convention

The following figure and table show the stacking convention used by CableFast terminal blocks.



Signal			Layer 3
Positive	Signal	Signal	Layer 2
Negative	Positive	Negative	Layer 1

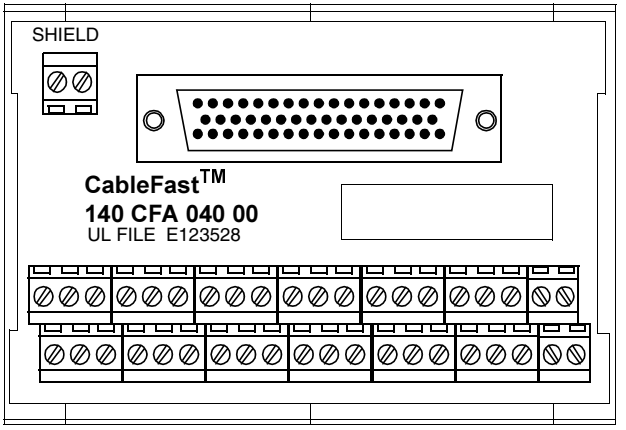
140 CFA 040 00 Quantum CableFast Cabling Block

Overview

The A block is a straight-through point-to-point connection on the terminal block. Wiring this block (and other CableFast cabling blocks) is identical to wiring the Quantum I/O connector (140 XTS 002 00).

140 CFA 040 00 terminal block

The following terminal block is unique to the 140 CFA 040 00 module.



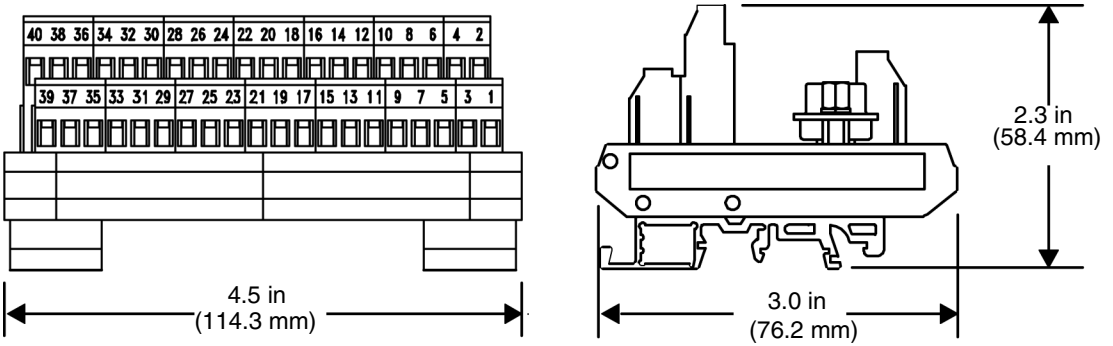
Application notes

The following are the application notes for the 140 CFA 040 00 terminal block.

1. **Configuration** – two columns
2. **Compatibility** – this terminal block provides straight through (point-to-point) connection.

Note: You may use this terminal block with all Quantum I/O modules except the 140 ATI 030 00 thermocouple module.

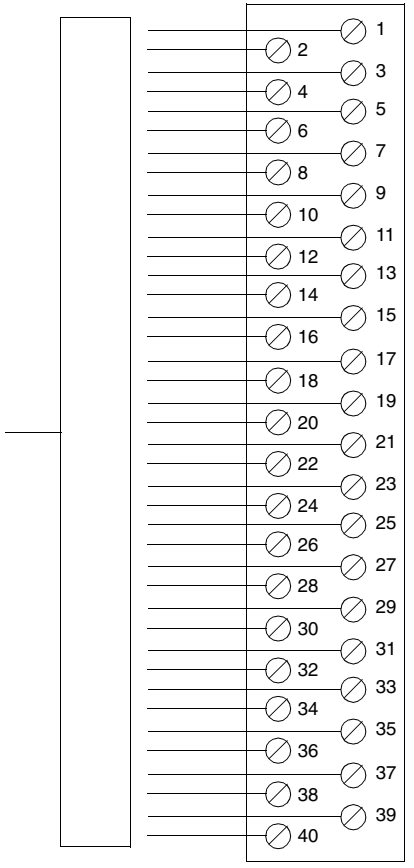
140 CFA 040 00
Dimensions



140 CFA 040 00
Wiring Diagram

The wiring of the 140 CFA 040 00 block is identical to that of the 140 XTS 002 00 Quantum I/O connector.

Refer to the module wiring diagrams.



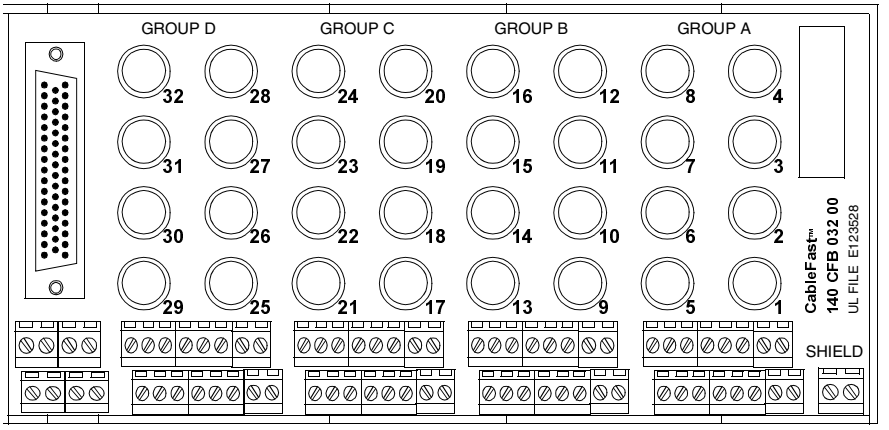
140 CFB 032 00 Quantum CableFast Cabling Block

Overview

The B block is used for individually fused 2-wire digital inputs. This CableFast terminal block is designed to prevent a single point failure from affecting the remaining inputs. It is not recommended for sourced 1-wire inputs (powered from the field).

Terminal block

The following figure shows the terminal block for the 140 CFB 032 00 module.



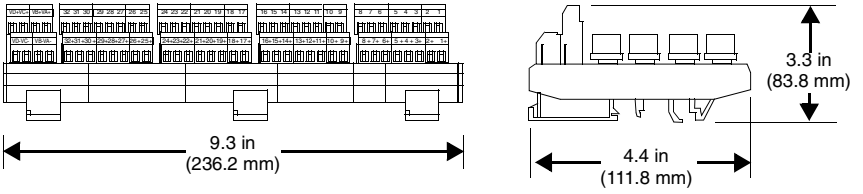
Application notes

The following are the application notes for the 140 CFB 0320 0 terminal block.

1. **Configuration** – arranged in four groups of eight I/O points. Two terminals per point prevent disruption of service due to a single point failure.
2. **Compatibility** – this terminal block provides individual 32 point 0.8 A fusing for the following input modules:140 DAI 353 00, 140 DAI 453 00, 140 DAI 553 00, 140 DDO 153 10, 140 DDI 353 00, and 140 DDI 853 00.

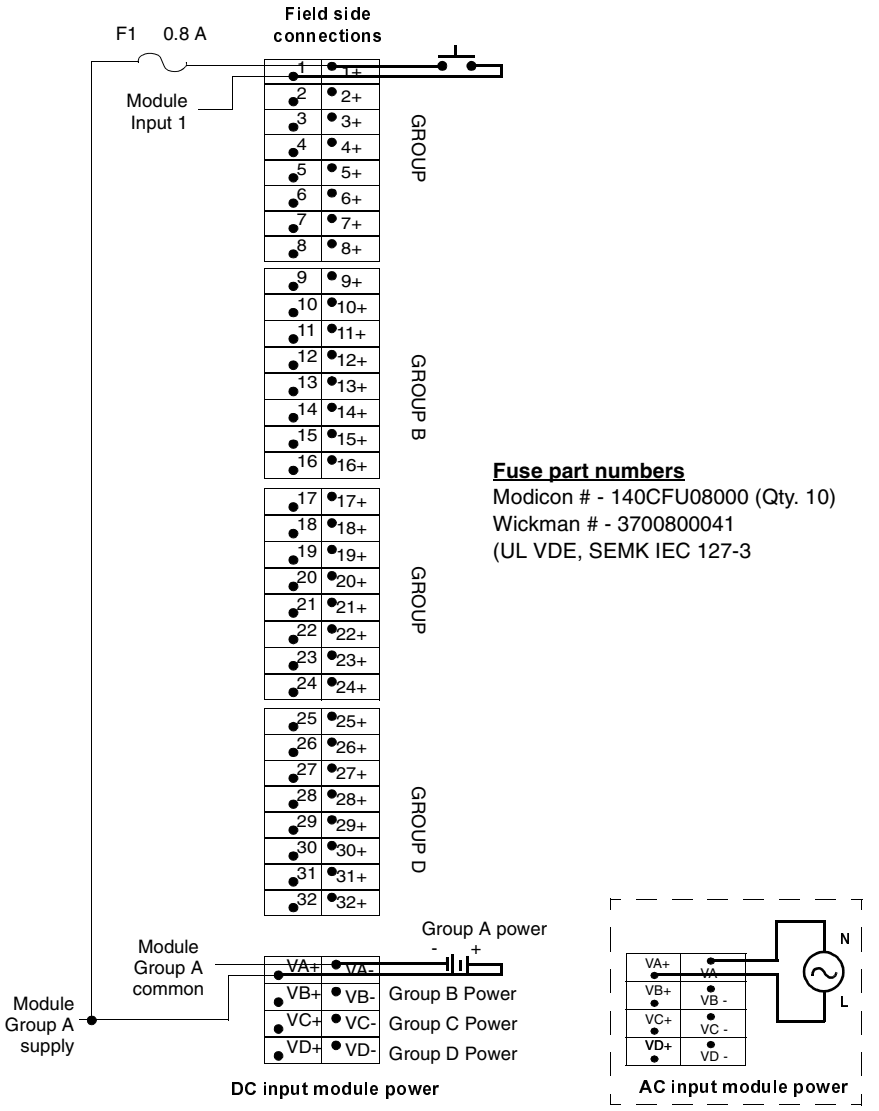
Dimensions

The following figures show the dimensions for the 140CFB03200 terminal block.



Wiring of input modules

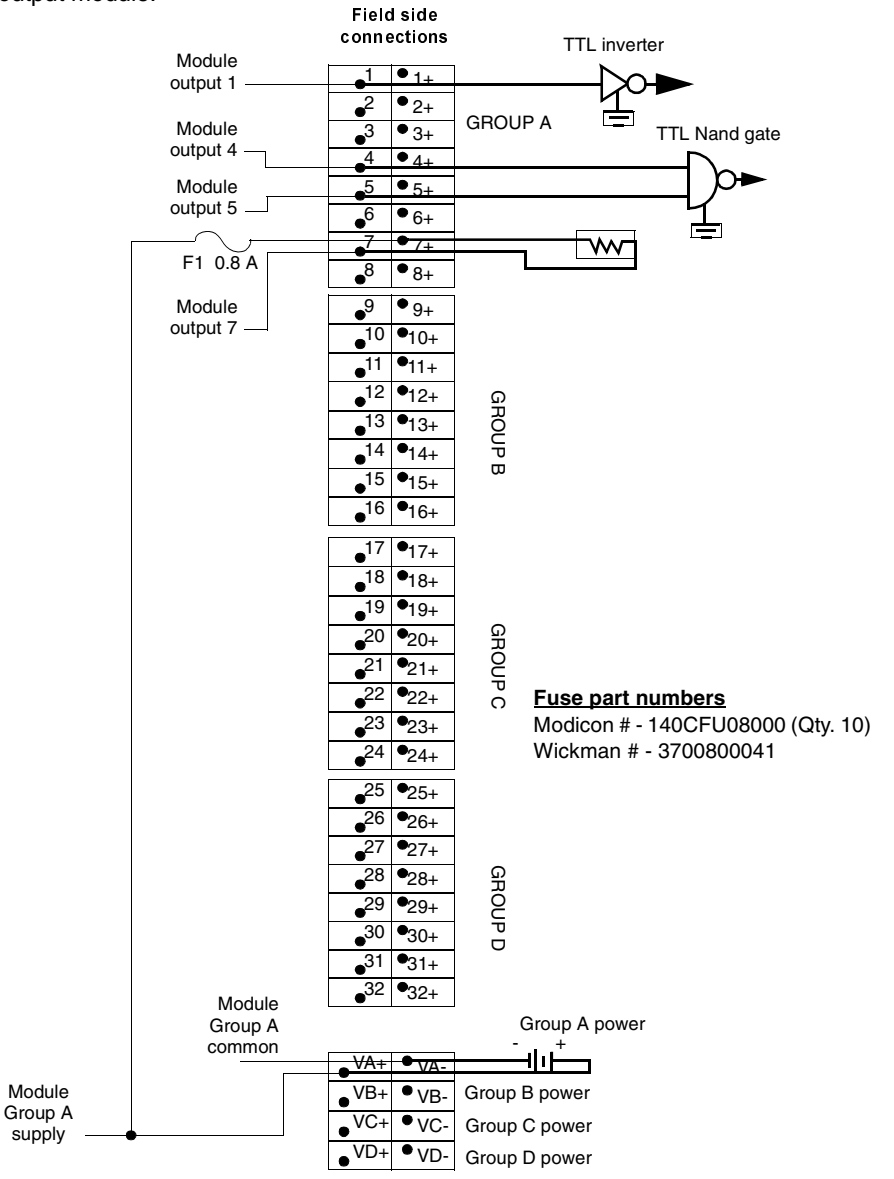
The following figure shows the 140 CFB 032 00 wiring for the following input modules: 140 DAI 353 00, 140 DAI 453 00, 140 DAI 553 00, 140 DDI 353 00, and 140 DDI 853 00.



Note: The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10) can be used to jumper the power between groups.

Wiring of output module

The following figure shows the 140 CFB 032 00 wiring for the 140 DDO 153 10 output module.



Note: The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10) can be used to jumper the power between groups.

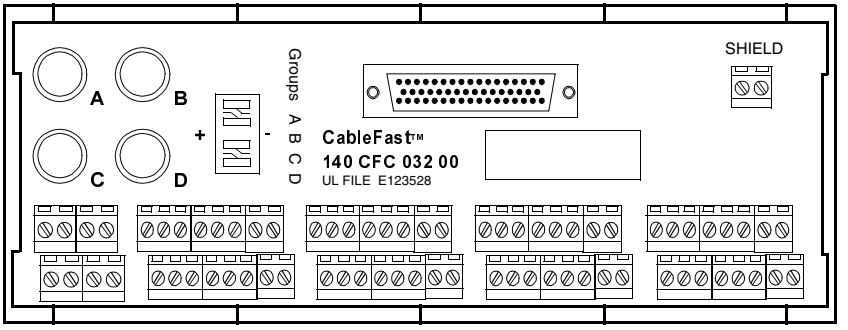
140 CFC 032 00 Quantum CableFast Cabling Block

Overview

The C block provides connections for 32 group fused input or output points. You may use this CableFast terminal block for 1- or 2-wire inputs or outputs, and features a fuse per group – up to a total of four groups. Users select input or output mode via four switches located on the module. (The default is input mode.)

Terminal block

The following figure shows the terminal block for the 140 CFC 032 00 module.



Application notes

The following are the application notes for the 140 CFC 032 00 module.

1. **Configuration** – arranged in four groups of eight I/O points (two terminals per point). This block may be used for one- and two-wire inputs or outputs. The input and output mode is selected via four switches located on the block.
2. **Compatibility** – this terminal block provides 0.8 A group fusing for the following discrete modules:

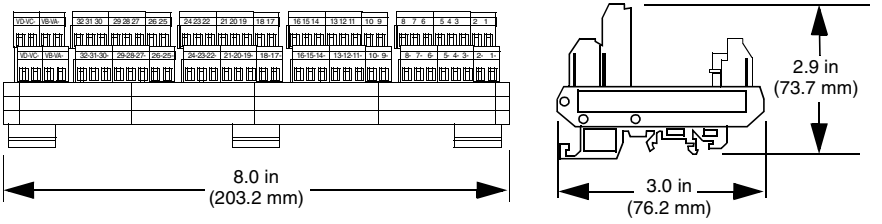
The following table shows the modules provided with 0.8 A group fusing.

Module	Mode	Switch setting	Fuse rating
140 DAI 353 00	Input	+	0.8 A
140 DAI 453 00	Input	+	0.8 A
140 DAI 553 00	Input	+	0.8 A
140 DDI 153 10	Input	-	0.8 A
140 DDI 353 00	Input	+	0.8 A
140 DDI 853 00	Input	+	0.8 A
140 DDO 153 10	Output	+	4 A
140 DDO 353 00	Output	-	4 A

Note: Select input or output mode with the four switches located on the terminal.

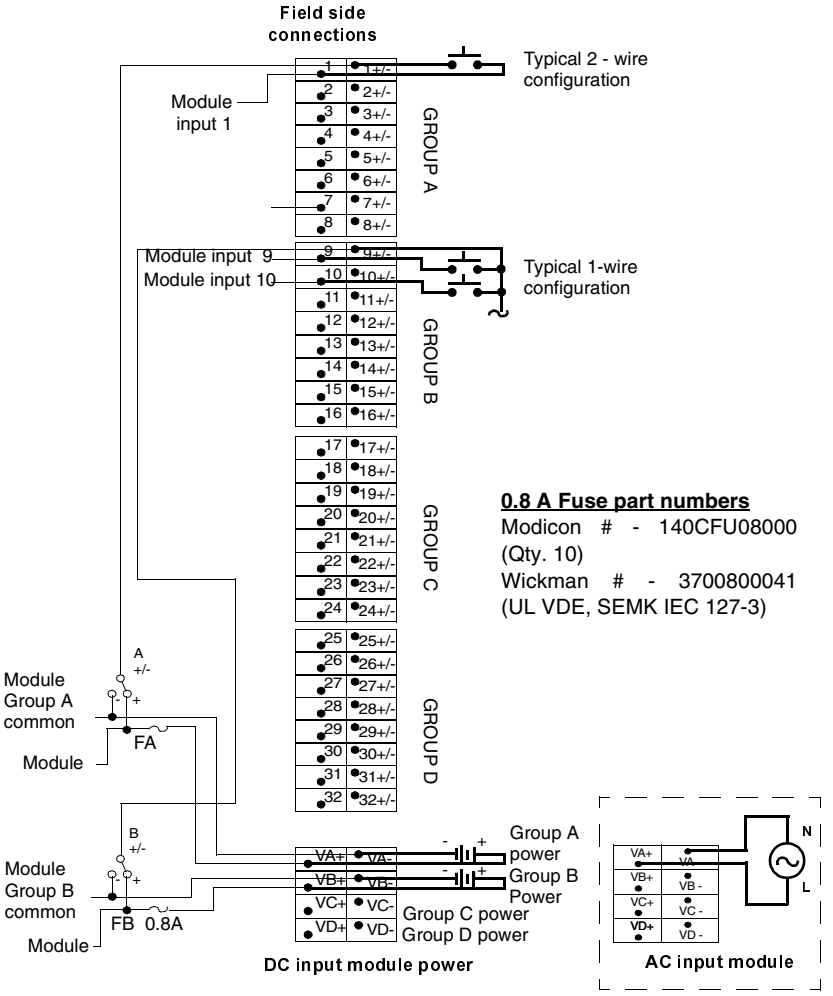
Dimensions

The following figures show the dimensions for the 140 CFC 032 00 terminal block block. All four switches must be set to the same position.



Wiring for input modules

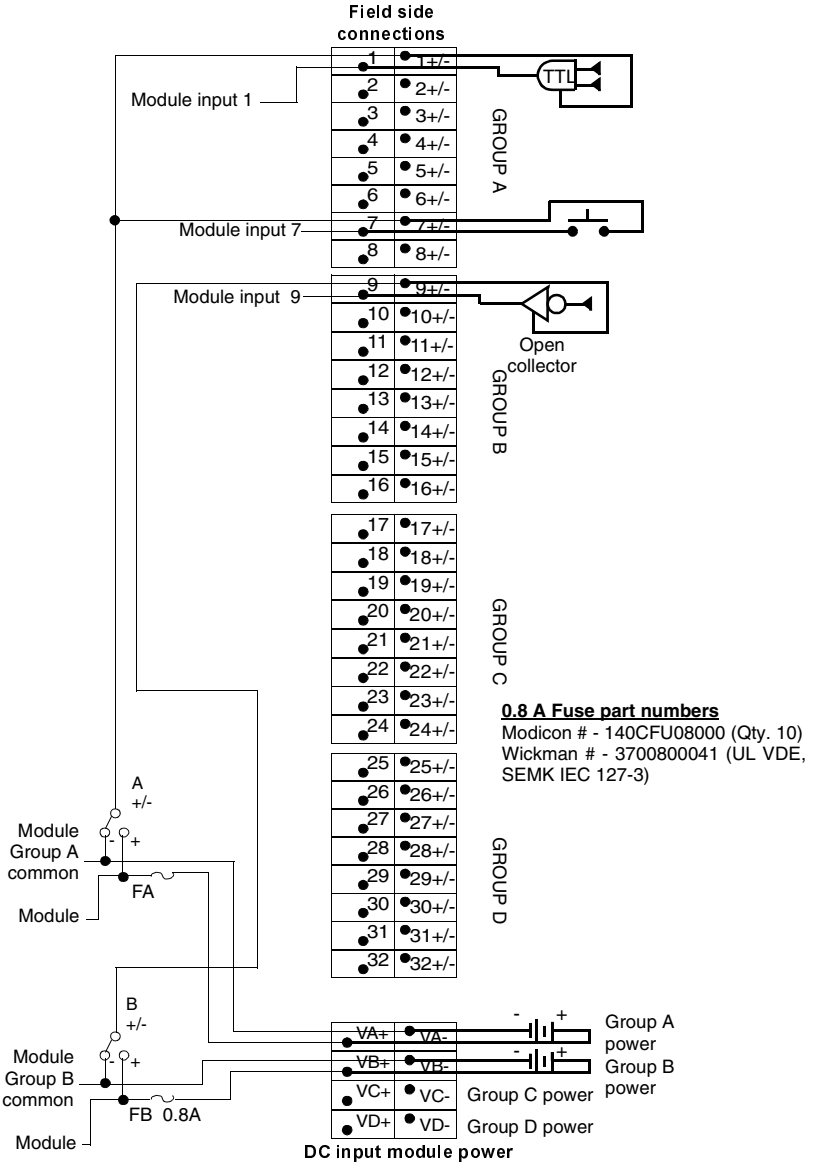
The following shows the 140 CFC 032 00 wiring for the following input modules: 140 DAI 353 00, 140 DAI 453 00, 140 DAI 553 00, 140 DDI 353 00, and 140 DDI 853 00.



Note: The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.

Wiring for 140 DDI 153 10 input module

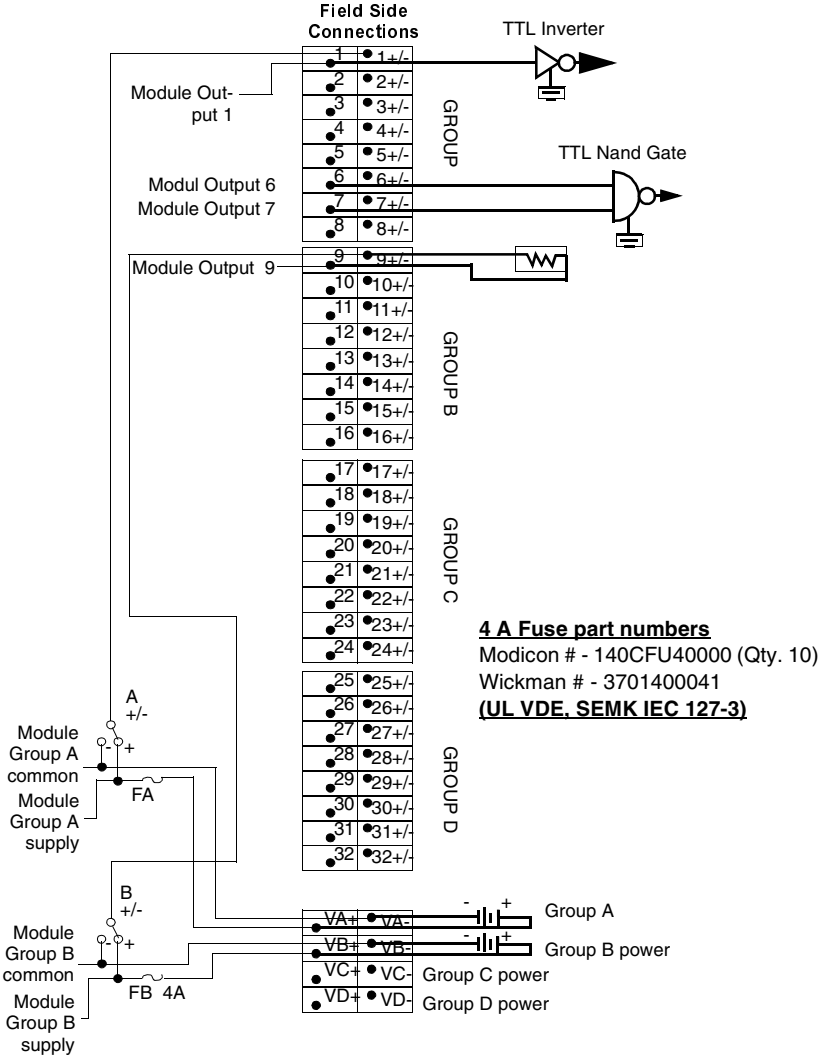
The following figure shows the 140 CFC 032 00 wiring for the 140 DDI 153 10 input module.



Note: The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.

Wiring for 140 DDO 153 10 output module

The following figure shows the 140 CFC 032 00 wiring for the 140 DDO 153 10 output module.

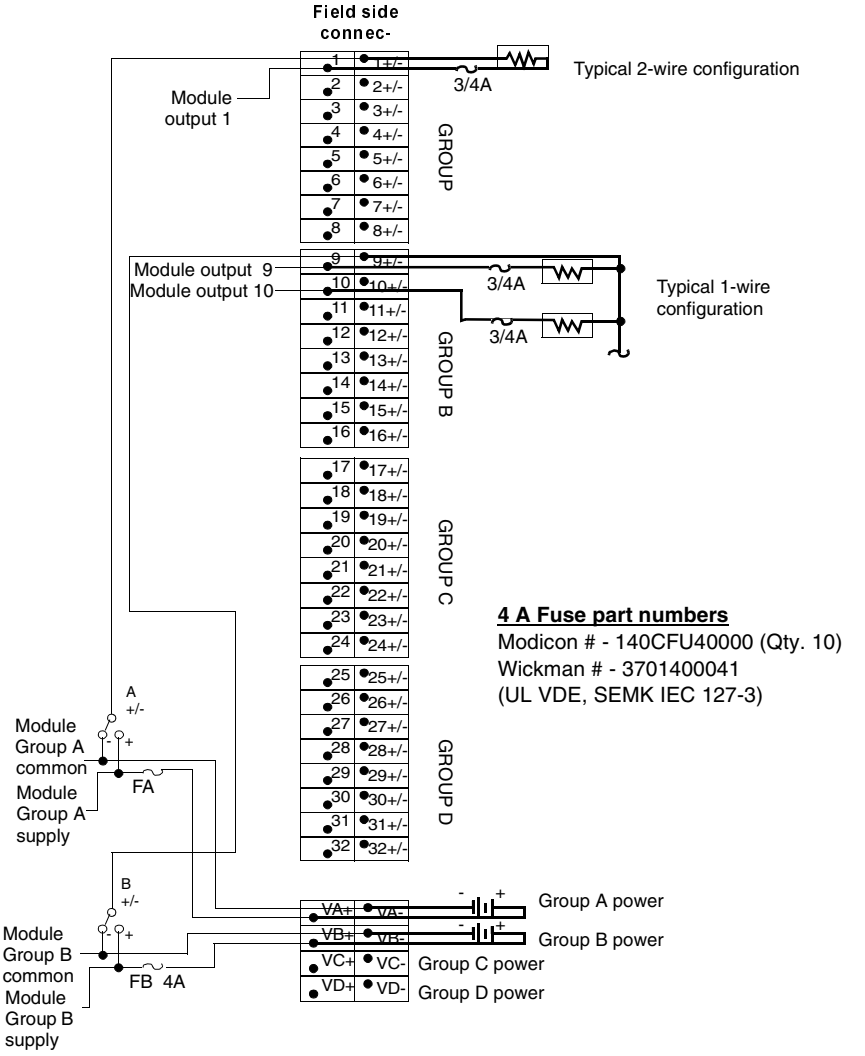


Note:

1. The 140 CFC 032 00 is shipped with Modicon the 140 CFU 080 00 (0.8 A) fuse installed. Check that the Modicon 140CFU40000 (4 A) fuse is installed when the 140 CFC 032 00 and the 140 DDO 153 00 are wired together.
2. The terminal block commoning strip, Modicon 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.

Wiring for 140 DDO 353 0X output module

The following figure shows the 140 CFC 032 00 wiring for the 140 DDO 353 00 and 140 DDO 353 01 output modules.



Note:

1. The 140 CFC 032 00 is shipped with the Modicon 140 CFU 080 00 (0.8 A) fuse installed. Make sure the Modicon 140 CFU 400 00 (4 A) fuse is installed when the 140 CFC 032 00 and the 140 DDO 353 00 are wired together.
2. The terminal block commoning strip, Modicon 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.

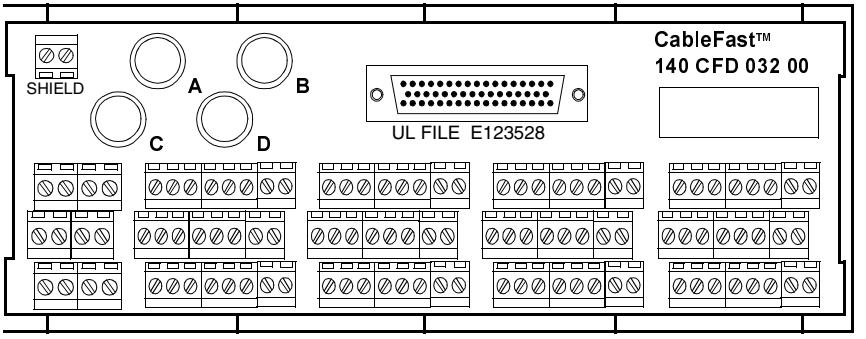
140 CFD 032 00 Quantum CableFast Cabling Block

Overview

The CableFast cabling D block is used for sensors requiring either 2- or 3-wire electrical interfaces. A fuse per group is supplied to accommodate the I/O module (4) groups.

Terminal block

The following figure shows the 140 CFD 032 00 terminal block.



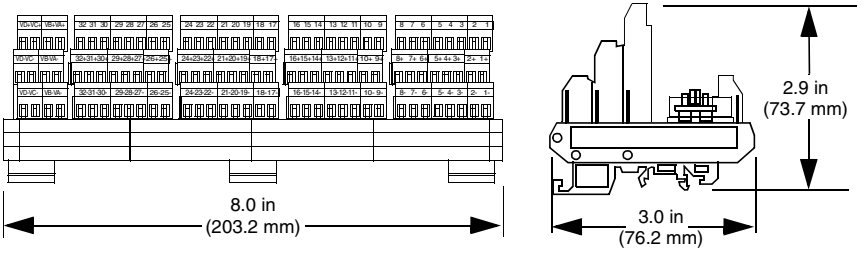
Application notes

The following are the application notes for the 140 CFD 032 00 module.

1. **Configuration** – arranged in four groups of eight I/O points. Each input is allocated three terminals.
2. **Compatibility** – this terminal block provides 0.8 A group fusing connection points for 3- and 2-wire proximity switches and is used with the following modules: 140 DAI 353 00, 140 DAI 453 00, 140 DAI 553 00, 140 DDI 353 00, and 140 DDI 853 00.

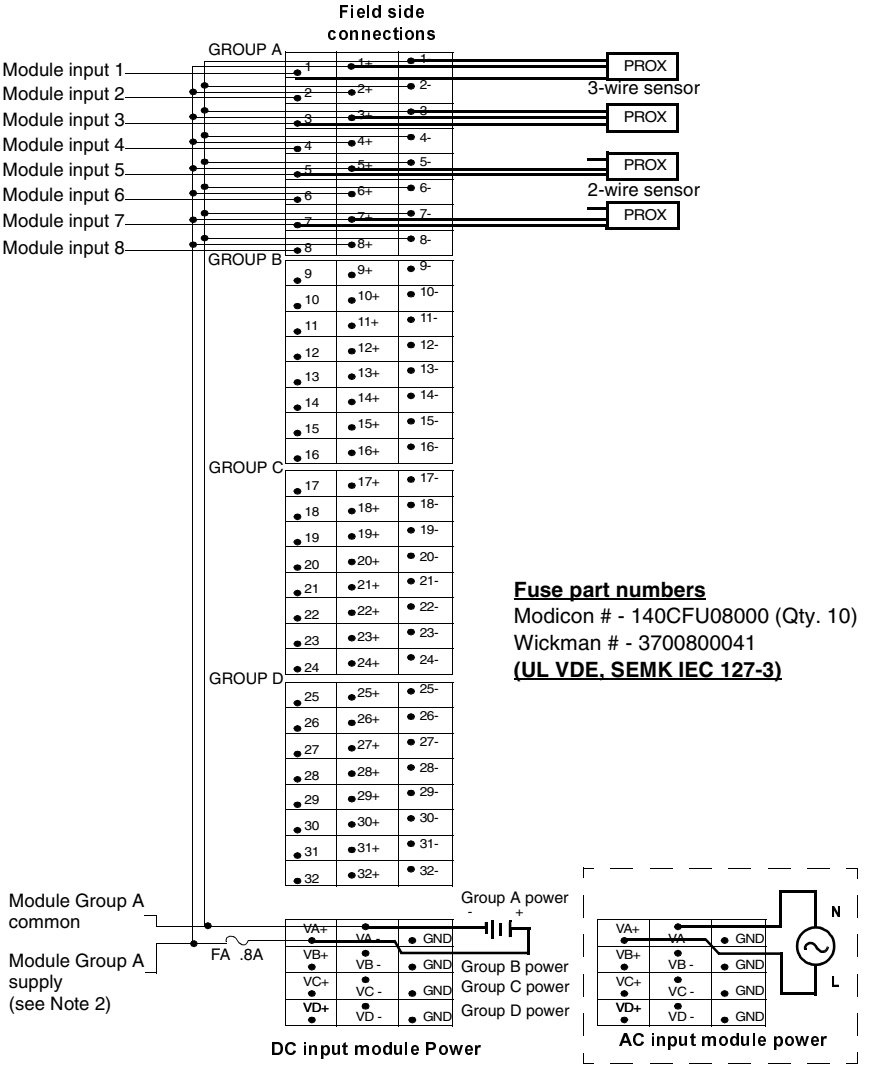
Dimensions

The following shows the dimensions for the 140 CFD 032 00 module.



Wiring

The following figure shows the wiring for the 140 CFD 032 00 module.



Note:

1. The GND (ground) terminal points are not connected.
2. The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.

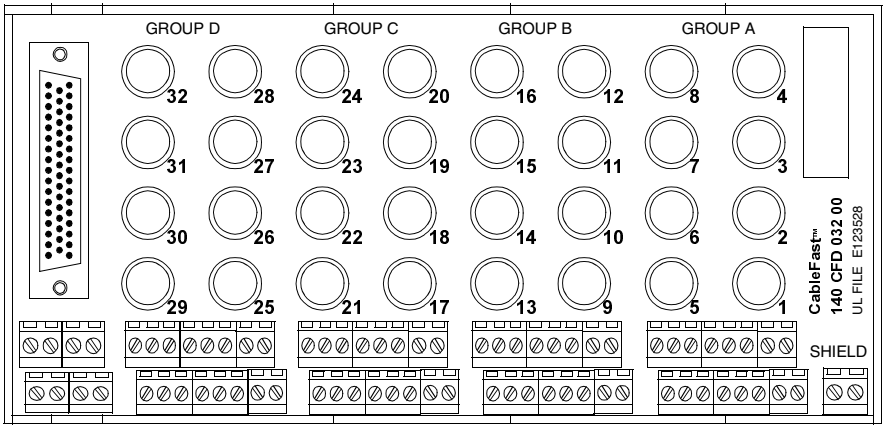
140 CFE 032 00 Quantum CableFast Cabling Block

Overview

The CableFast E cabling block provides connections for 32 individually fused 24 VDC outputs. 1- and 2-wire interfacing may be selected. Field power must be supplied to the four groups.

Terminal block

The following figure shows the 140 CFE 032 00 terminal block.



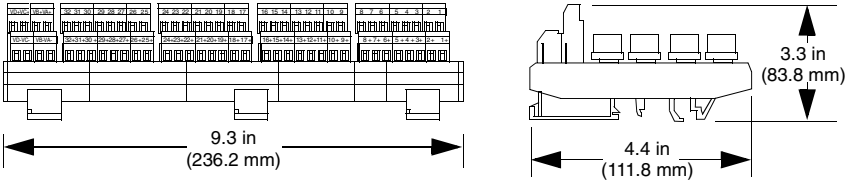
Application notes

The following are the application notes for the 140 CFE 032 00 module.

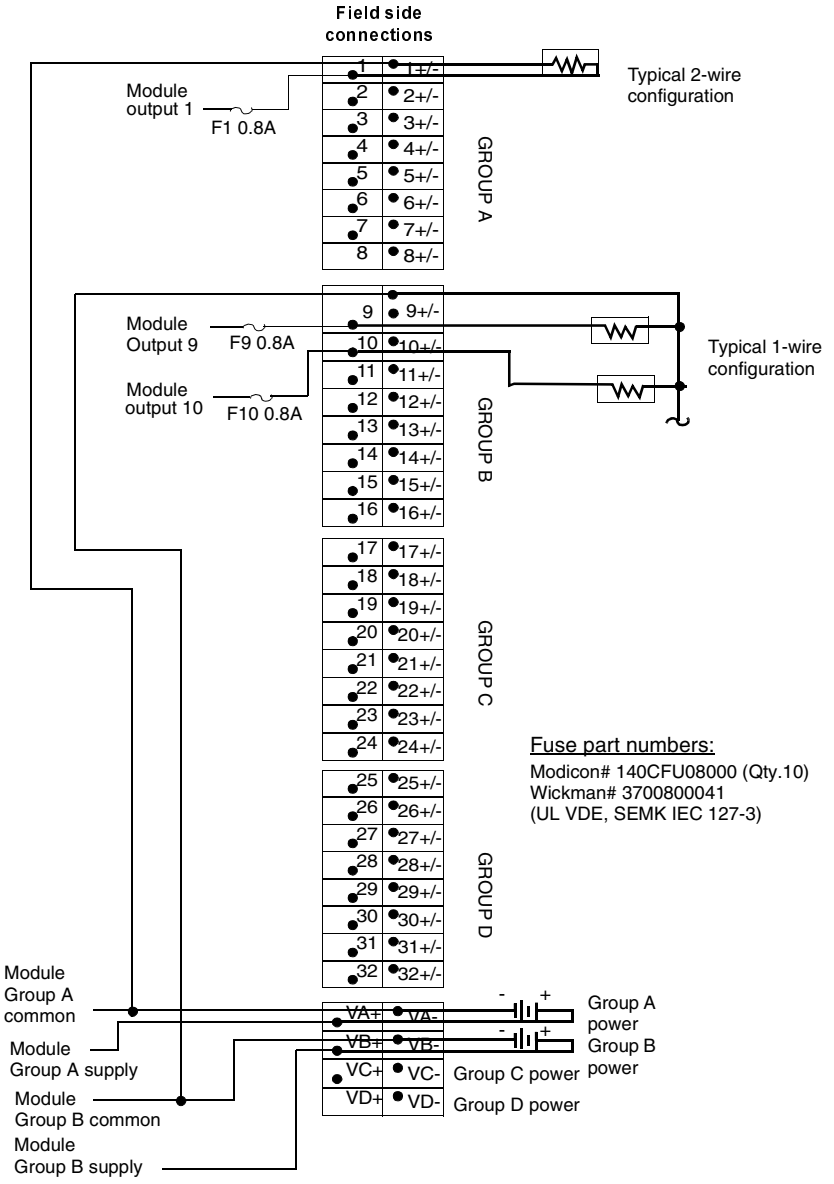
1. **Configuration** – arranged in four groups of eight I/O points. Two terminals per point prevent disruption of service due to a single point failure.
2. **Compatibility** – this terminal block provides individual 32-point 0.8 A fusing for the 140 DDO 353 00 and the 140 DDO 353 01 modules.

Dimensions

The following shows the dimensions for the 140 CFE 032 00 module.



Wiring diagram The following figure shows the wiring for the 140 CFE 032 00 module.



Note: The terminal block commoning strip, Modicon # 140 CFX 001 10 (QTY. 10), can be used to jumper the power between groups.

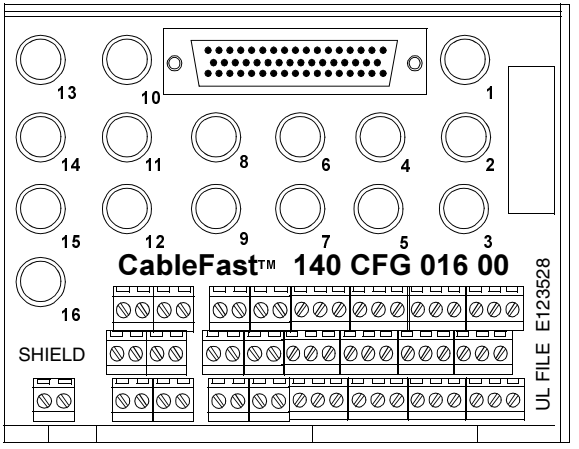
140 CFG 016 00 Quantum CableFast Cabling Block

Overview

The G CableFast cabling block is a high-power output block used on both AC and DC circuits requiring up to 2 A. Individual fusing is provided and may be used in both 1- and 2-wire installations. It is also used for isolated AC modules.

Terminal block

The following figure shows the 140 CFG 016 00 terminal block.



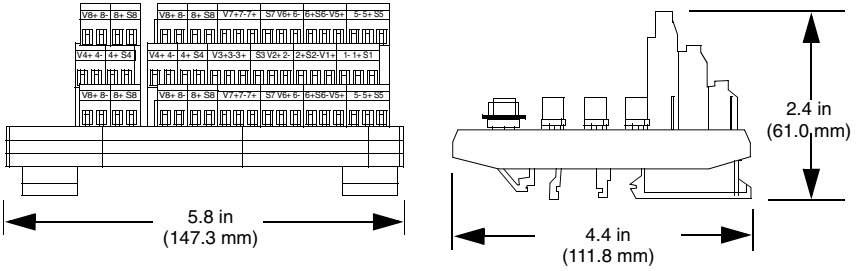
Application notes

The following are the application notes for the 140 CFG 016 00 module.

1. **Configuration** – Arranged in 16 isolated I/O points.
2. **Compatibility** – This terminal block provides individual 16-point 4 A fused connection points for the following modules: 140 DAI 340 00, 140 DAI 440 00, 140 DAI 540 00, 140 DAO 840 00, 140 DAO 840 10, 140 DAO 842 10, 140 DAO 842 20, and 140 DDO 843 00.

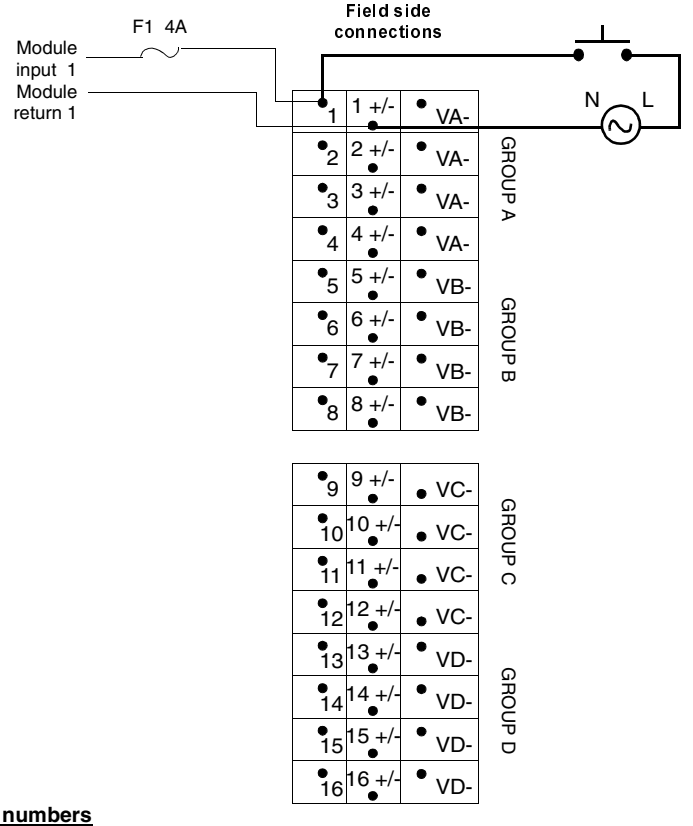
Dimensions

The following figures show the dimensions for the 140 CFG 016 00 module.



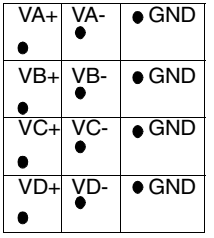
Wiring for isolated AC input mode

The following figure shows the 140 CFG 016 00 wiring for the input (isolated AC input mode) modules: 140 DAI 340 00, 140 DAI 440 00, and 140 DAI 540 00.



Fuse part numbers

Modicon # - 140CFU40000 (Qty. 10)
Wickman # - 3701400041 (UL VDE, SEMK IEC 127-3)

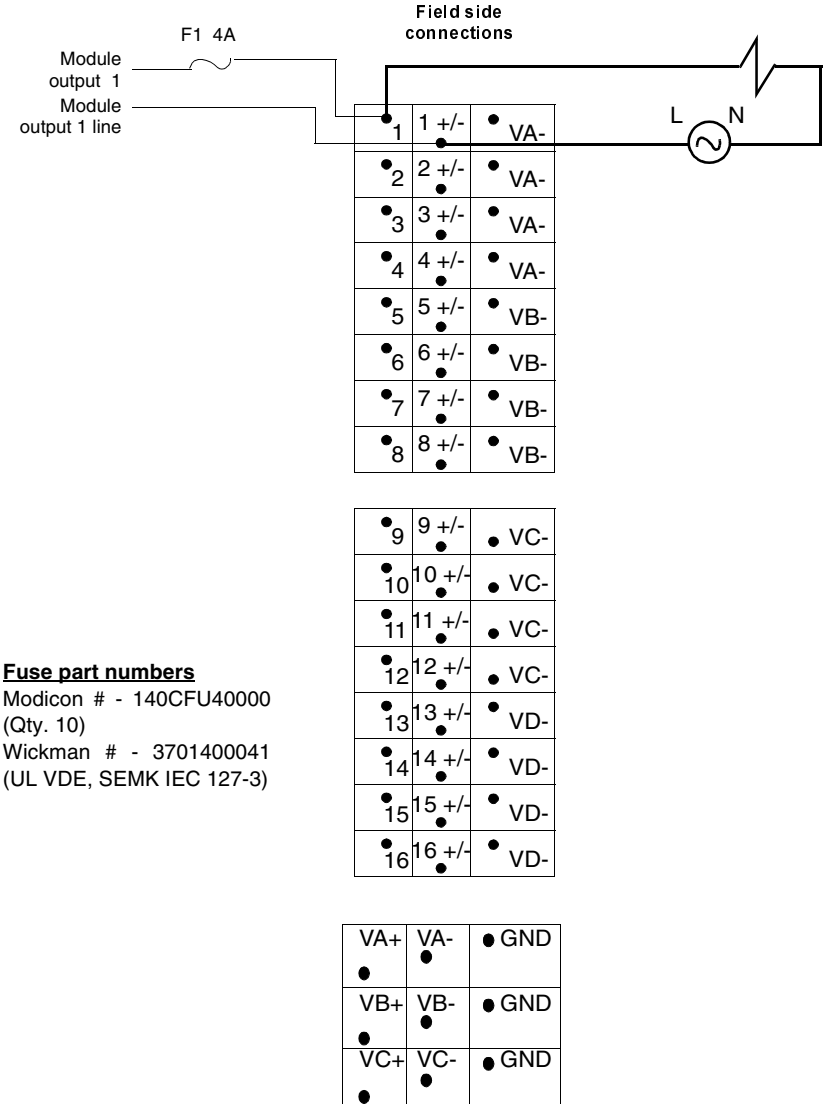


Note:

1. The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.
2. The GND (ground) terminal points are not connected.

Wiring for isolated output mode

The following shows the 140 CFG 016 00 wiring for the 140 DAO 840 00 and 140 DAO 840 10 output modules (isolated output mode).

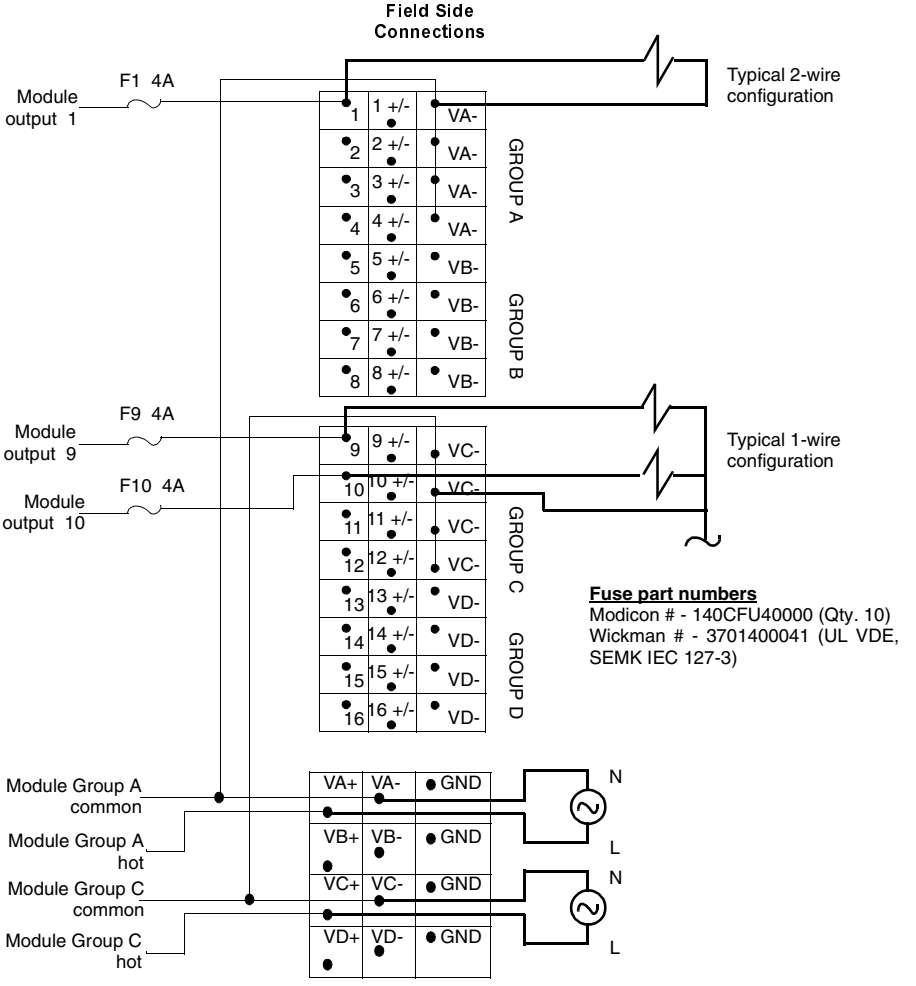


Fuse part numbers
Modicon # - 140CFU40000 (Qty. 10)
Wickman # - 3701400041 (UL VDE, SEMK IEC 127-3)

Note:
1. The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.
2. The GND (ground) terminal points are not connected

Wiring for grouped AC output mode

The following figure shows the 140 CFG 016 00 wiring for the 140 DAO 842 10 and 140 DAO 842 20 output modules (grouped AC output mode).

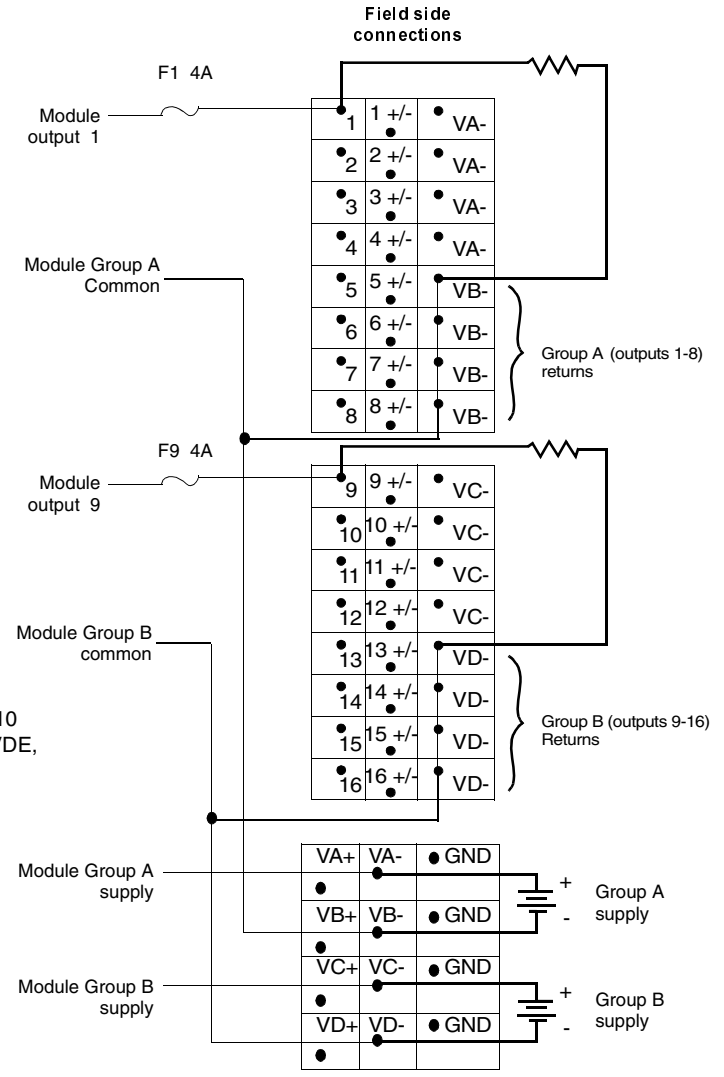


Note:

1. The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.
2. The GND (ground) terminal points are not connected.

Wiring for grouped DC output mode

The following figure shows the 140 CFG 016 00 wiring for the 140 DDO 843 00 (grouped DC output mode) module.



Fuse part numbers
Modicon # - 140CFU40000 (Qty. 10
Wickman # - 3701400041 (UL VDE, SEMK IEC 127-3)

Note:

1. The terminal block commoning strip, Modicon # 140 CFX 001 10 (Qty. 10), can be used to jumper the power between groups.
2. The GND (ground) terminal points are not connected.

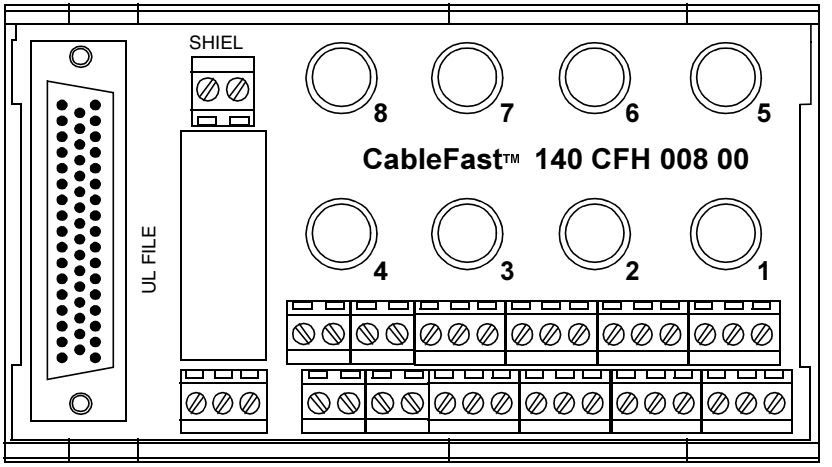
140 CFH 008 00 Quantum CableFast Cabling Block

Overview

The H CableFast cabling block is used for analog inputs, with individual fusing provided per channel. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.

Terminal block

The following figure shows the 140 CFH 008 00 terminal block.



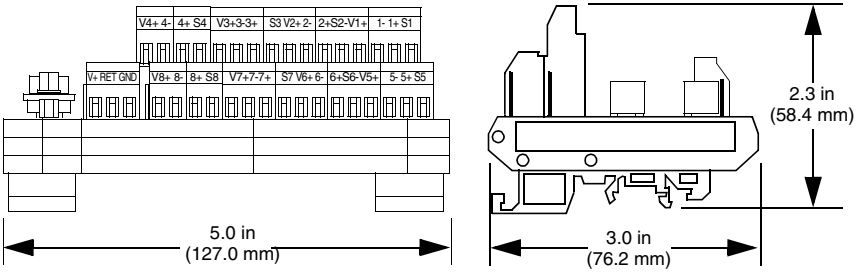
Application Notes

The following are the application notes for the 140 CFH 008 00 module.

1. **Configuration** – eight analog inputs with a common loop supply. Each point is allocated four terminals.
2. **Compatibility** – this terminal block provides individually 0.063 A fused connection point sets for the 140 ACI 030 00 and 140 AVI 030 00 analog input modules.

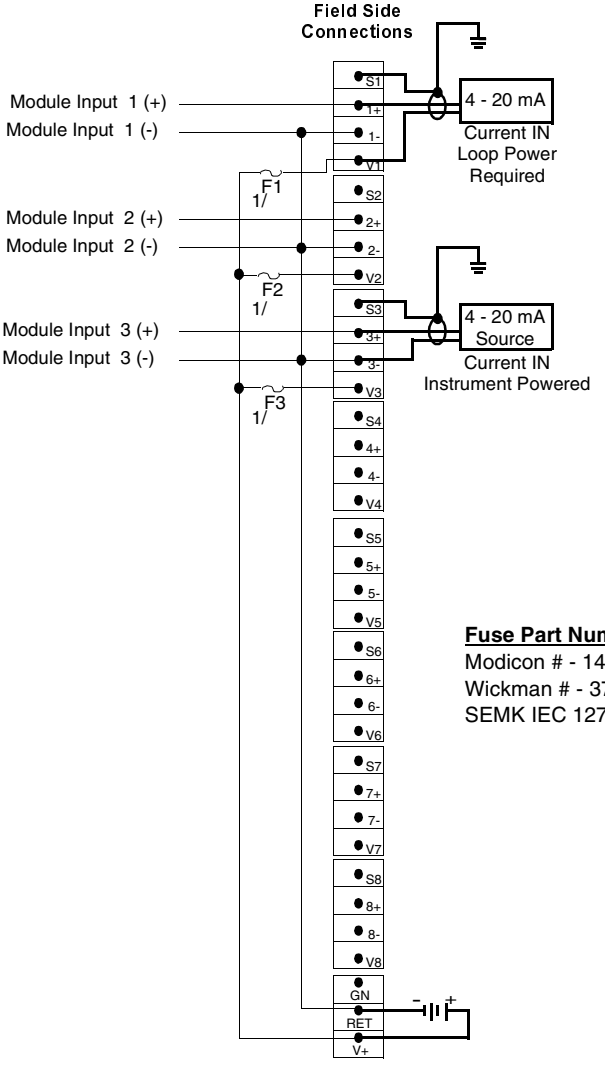
Dimensions

The following figures show the dimensions for the 140 CFH 008 00 module.



Wiring diagram (source grounding)

The following figure shows the wiring for the 140 CFH 008 00 (source grounding) module.

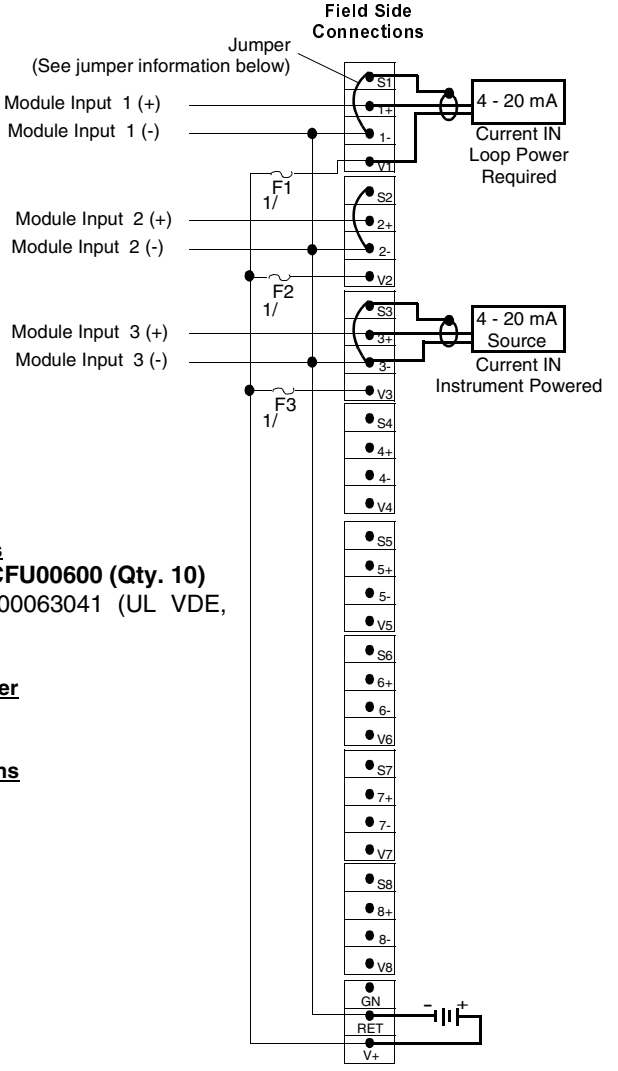


Note:

1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140 ACI 030 00 and the 140 AVI 030 00, see the wiring diagrams for said modules.
3. The GND (ground) terminal point is not connected.

Wiring diagram (instrument grounding)

The following figure shows the wiring (instrument grounding) for the 140 CFH 008 00 module.



Fuse Part Numbers

Modicon # - 140CFU00600 (Qty. 10)

Wickman # - 3700063041 (UL VDE, SEMK IEC 127-3)

Jumper Part Number

140CFX00110

Jumper Connections

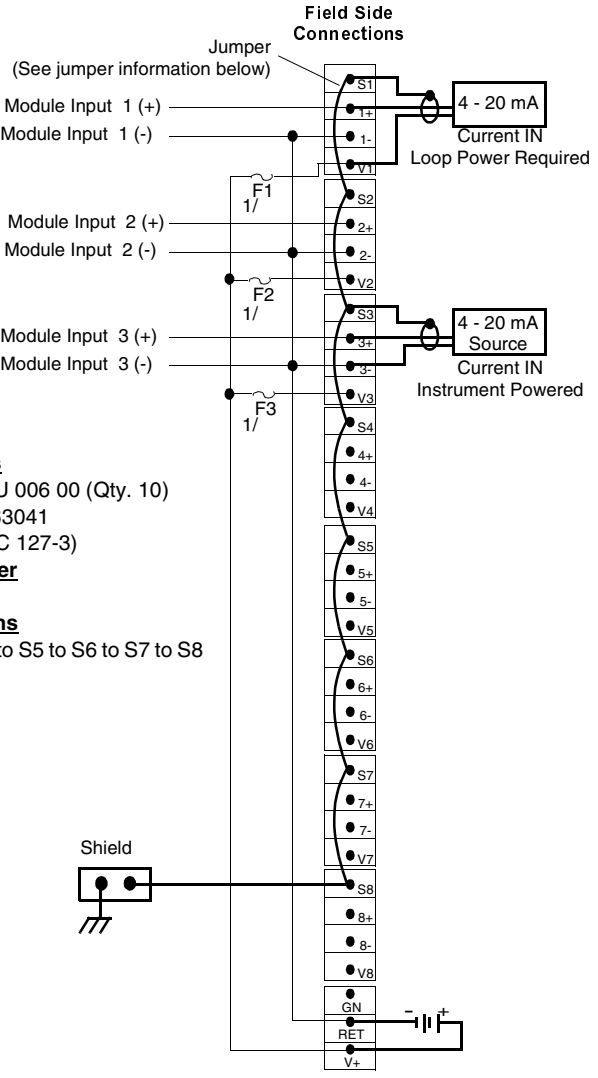
S1 to 1-
S2 to 2-
S3 to 3-

Note:

- If you use a single power supply, there will be no channel-to-channel isolation of the input points.
- For the required jumper options for the 140 ACI 030 00 and the 140 AVI 030 00, see the wiring diagrams for said modules.
- The GND (ground) terminal point is not connected.

Wiring diagram (chassis grounding)

The following figure shows the wiring (chassis grounding) for the 140 CFH 008 00 module.



Fuse Part Numbers
Modicon # - 140 CFU 006 00 (Qty. 10)
Wickman # - 3700063041
(UL VDE, SEMK IEC 127-3)

Jumper Part Number
140CFX00110

Jumper Connections
S1 to S2 to S3 to S4 to S5 to S6 to S7 to S8

Note:
1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140 ACI 030 00 and the 140 AVI 030 00, see the wiring diagrams for said modules.
3. The GND (ground) terminal point is not connected.

140CFI00800 Quantum CableFast Cabling Block

Overview

The I block is used for analog inputs. This interface provides plus, minus, shield, and power supply interfaces for both field and loop power configurations.

See *p. 716* for information on common specifications and features of CableFast cabling blocks.

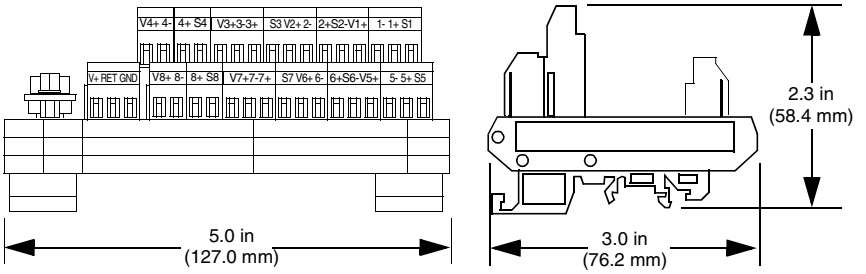
Application Notes

The following are the application notes for the 140CFI00800 module.

1. **Configuration** – Eight analog inputs with a common loop supply. Each point is allocated four terminals.
2. **Compatibility** – This terminal block provides eight connection point sets for the 140ACI03000 and 140AVI03000 analog input modules.

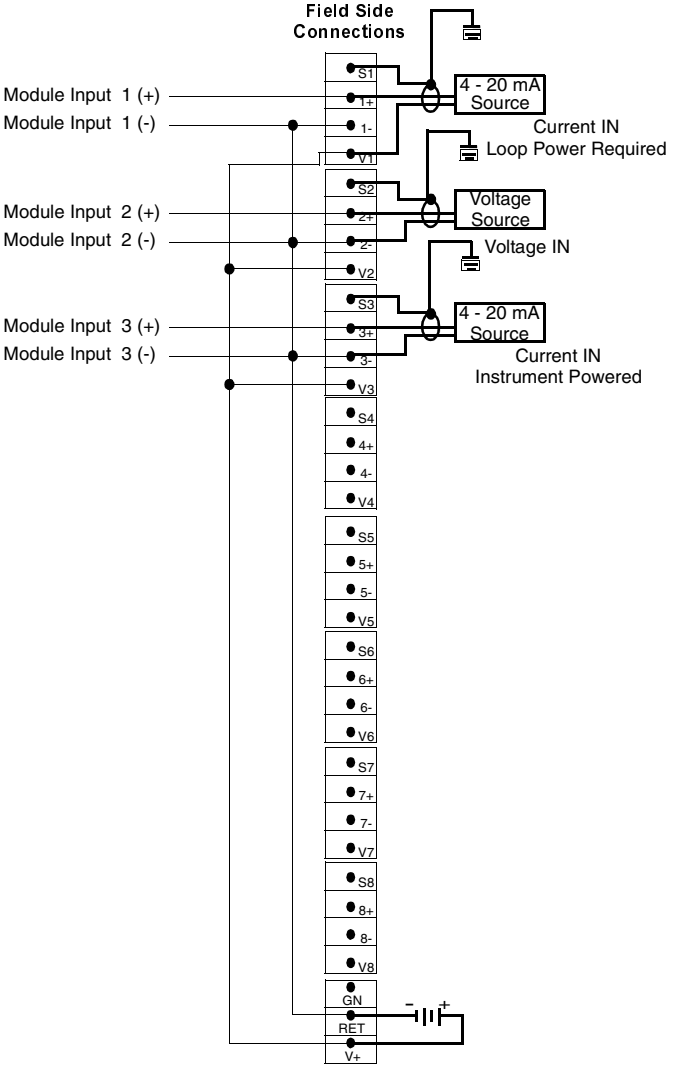
Dimensions

The following figures show the dimensions for the 140CFI00800 module.



Wiring Diagram (Source Grounding)

The following figure shows the wiring for the140CFI00800 (source grounding) module.

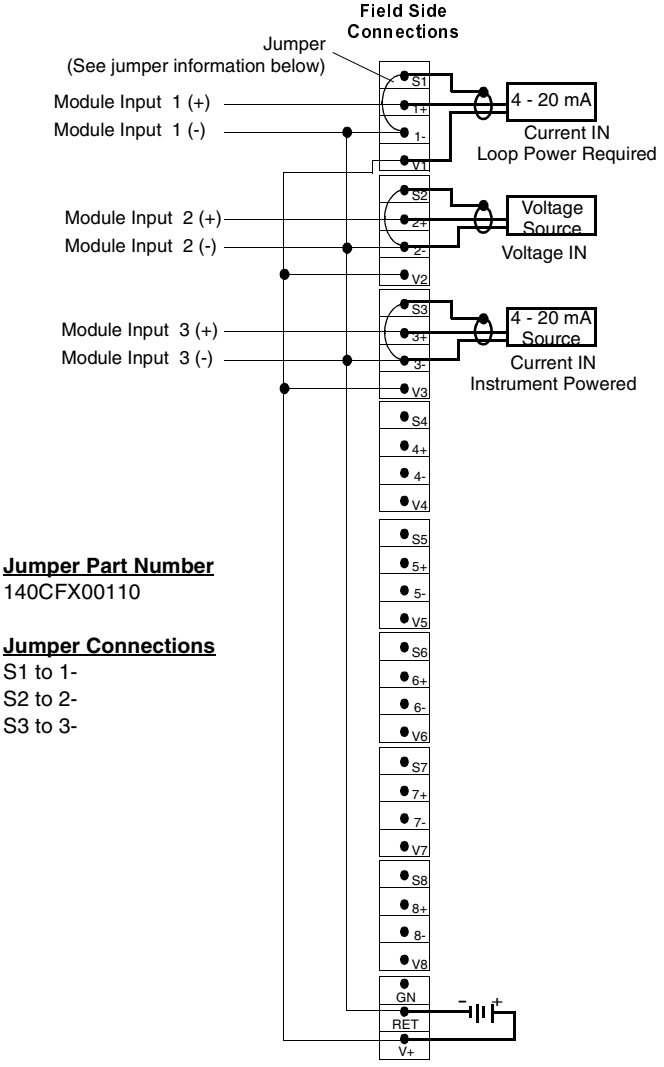


Note:

1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACI03000 and the 140AVI03000, see the wiring diagrams on *p. 461* and *p. 473*.
3. The GND (ground) terminal point is not connected.

Wiring Diagram (Instrument Grounding)

The following figure shows the wiring for the140CFI00800 (instrument grounding) module.



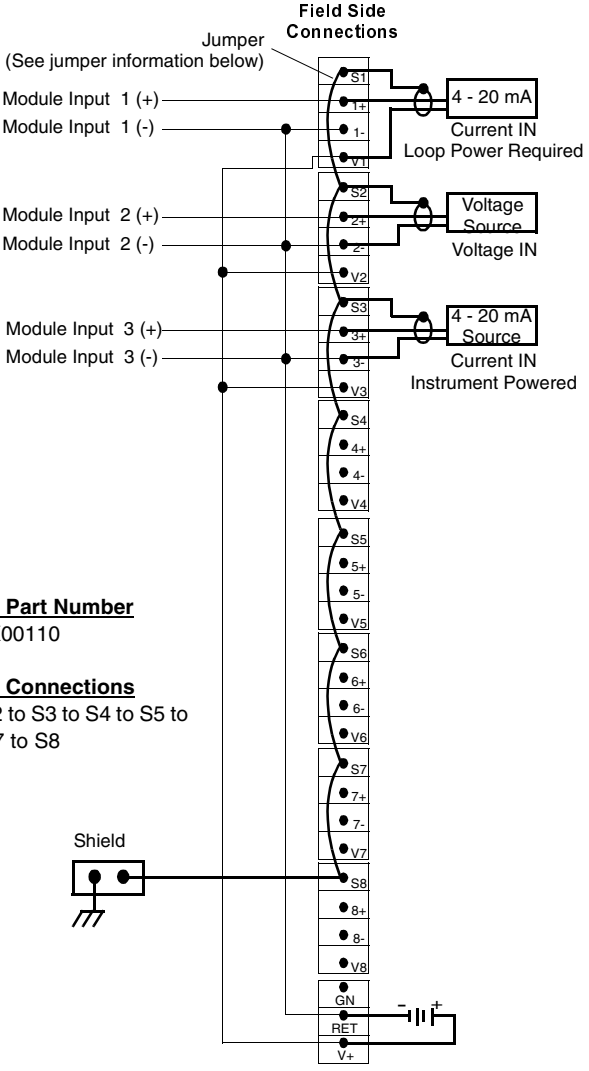
Jumper Part Number
140CFX00110

Jumper Connections
S1 to 1-
S2 to 2-
S3 to 3-

Note:
1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACI03000 and the 140AVI03000, see the wiring diagrams on *p. 461* and *p. 473*.
3. The GND (ground) terminal point is not connected.

Wiring Diagram (Chassis Grounding)

The following figure shows the wiring for the 140CFI00800 (chassis grounding) module.



Jumper Part Number
140CFX00110

Jumper Connections
S1 to S2 to S3 to S4 to S5 to S6 to S7 to S8

Note:

1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACI03000 and the 140AVI03000, see the wiring diagrams on *p. 461* and *p. 473*.
3. The GND (ground) terminal point is not connected.

140CFJ00400 Quantum CableFast Cabling Block

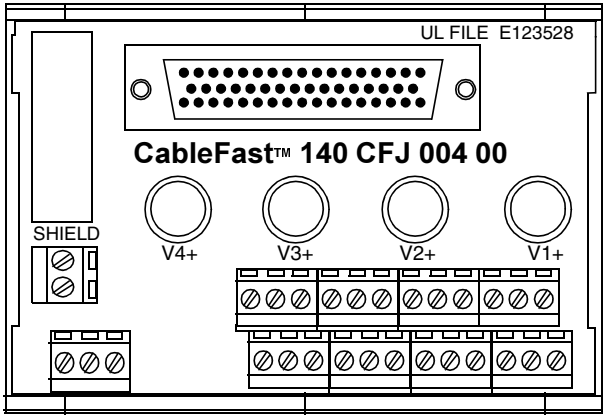
Overview

The J block is used for analog outputs, with individual fusing provided per channel. This interface provides plus, minus, shield, and power supply interfaces for both field and loop power configurations.

See *p. 716* for information on common specifications and features of CableFast cabling blocks.

Terminal Block

The following figure shows the 140CFJ00400 terminal block.



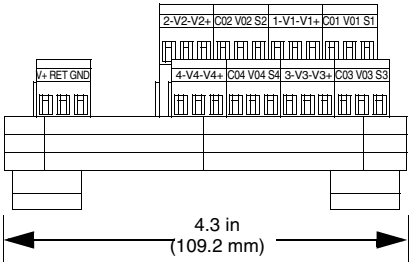
Application Notes

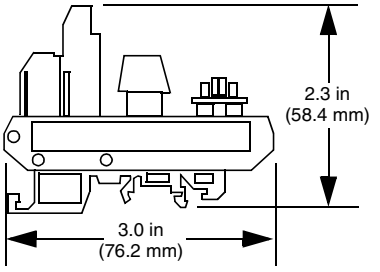
The following are the application notes for the 140CFJ00400 module.

1. **Configuration** – Four analog outputs with a common loop supply. Each point is allocated six terminals.
2. **Compatibility** – This terminal block provides four individually 0.063 A fused connection point sets for the 140ACO02000 analog output module.

Dimensions

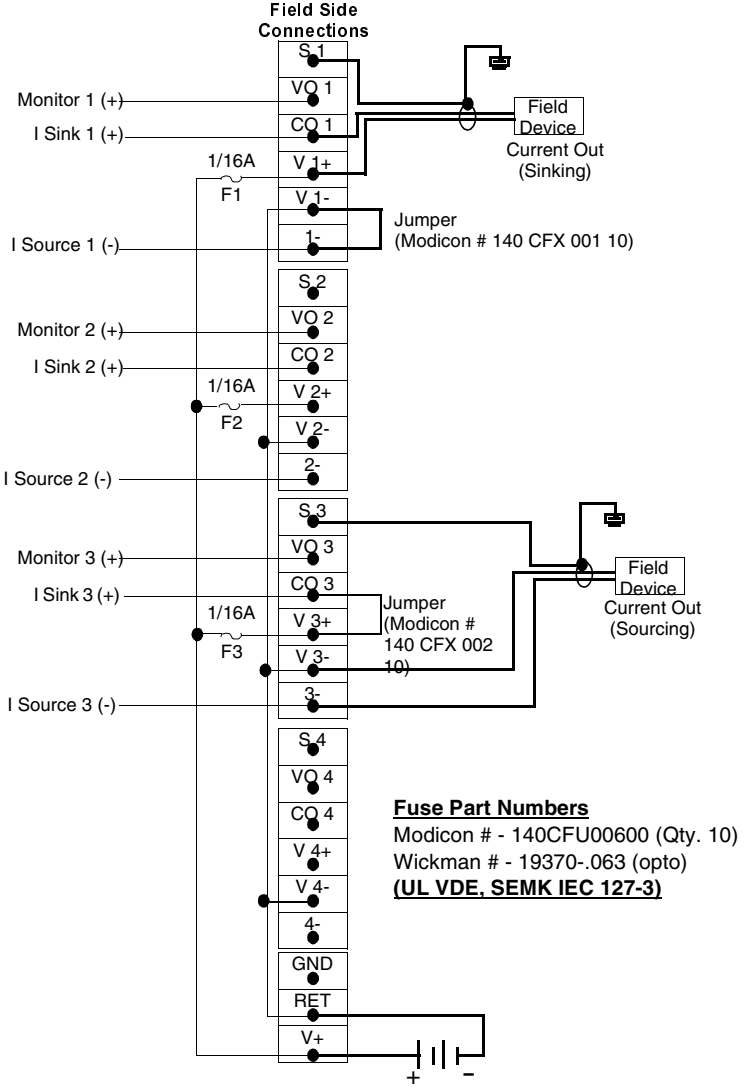
The following figures show the dimensions for the 140CFJ00400 module.





Wiring Diagram (Source Grounding)

The following figure shows the wiring for the 140CFJ00400 (source grounding) module.

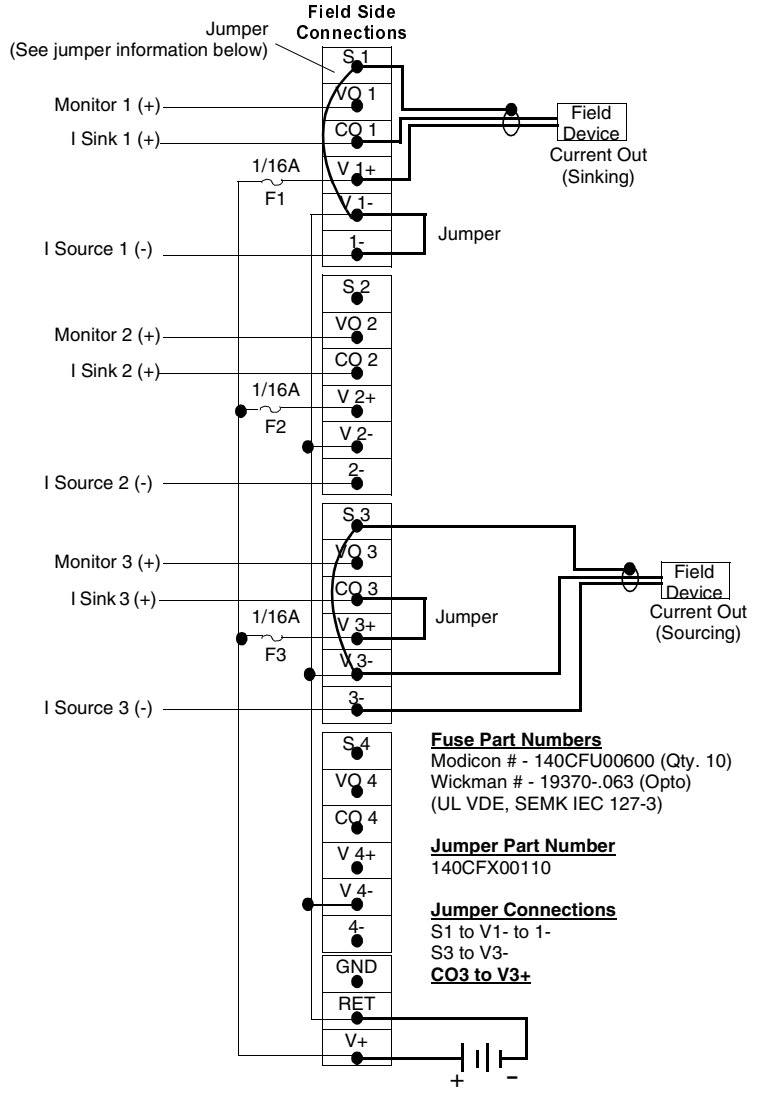


Fuse Part Numbers
Modicon # - 140CFU00600 (Qty. 10)
Wickman # - 19370-.063 (opto)
(UL VDE, SEMK IEC 127-3)

Note:
1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACO02000, see the wiring diagrams on *p. 484*.
3. The GND (ground) terminal point is not connected.

Wiring Diagram (Instrument Grounding)

The following figure shows the wiring for the140CFJ00400 (instrument grounding) module.

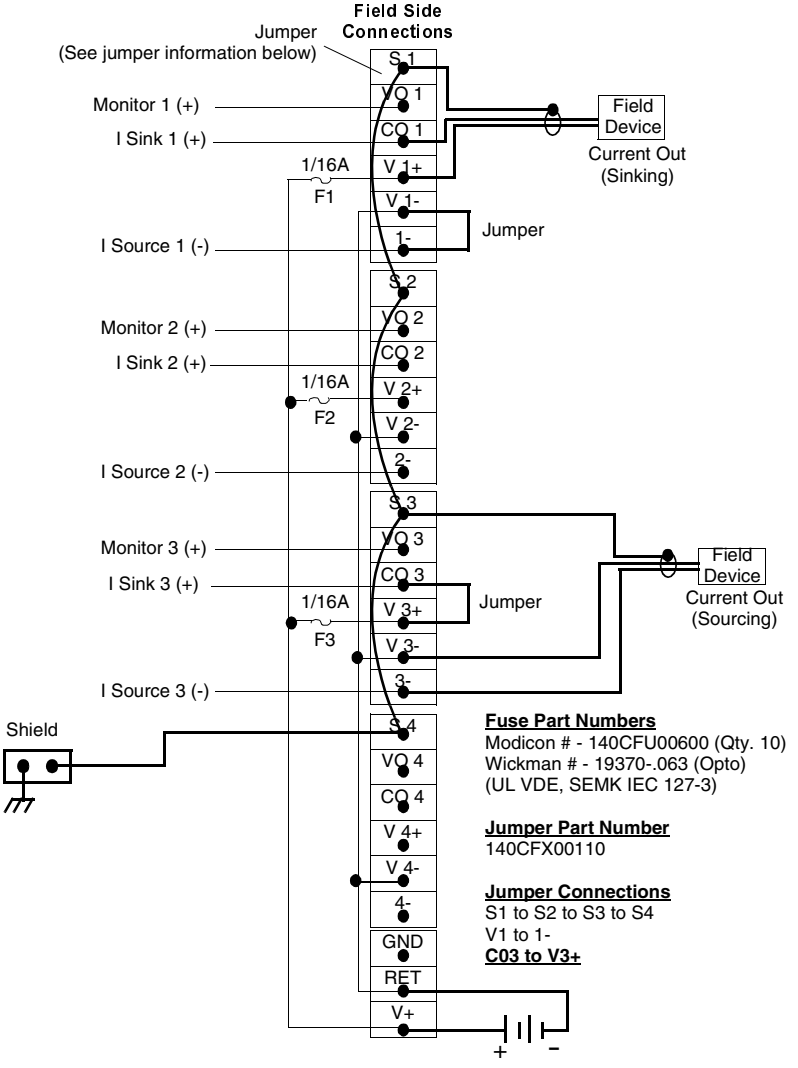


Note:

1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACO02000, see the wiring diagrams on *p. 484*.
3. The GND (ground) terminal point is not connected.

Wiring Diagram (Chassis Grounding)

The following figure shows the wiring for the 140CFJ00400 (chassis grounding) module.



Note:

1. When using a single power supply, there will be no channel-to-channel isolation of input points.
2. For the required jumper options for the 140ACO02000, see the wiring diagrams on *p. 484*.
3. The GND (ground) terminal point is not connected.

140CFK00400 Quantum CableFast Cabling Block

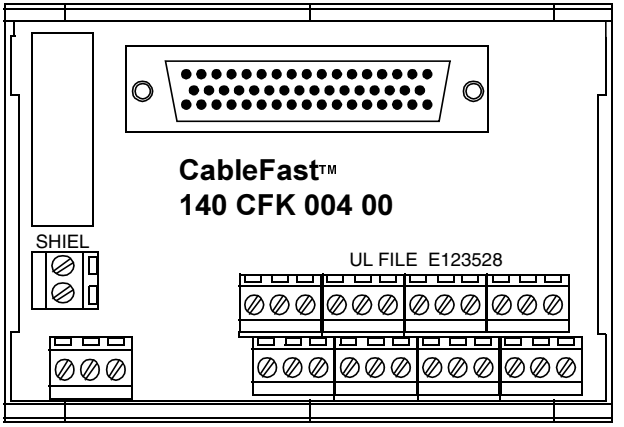
Overview

The K block is used for analog outputs. This interface provides plus, minus, shield, and power supply interface for both field and loop power configurations.

See *p. 716* for information on common specifications and features of CableFast cabling blocks.

Terminal Block

The following figure shows the 140CFK00400 terminal block.



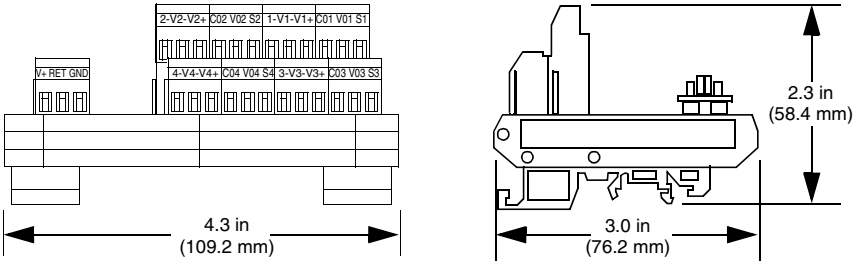
Application Notes

The following are the application notes for the 140CFK00400 module.

1. **Configuration** – Four analog outputs with a common loop supply. Each point is allocated four terminals.
2. **Compatibility** – This terminal block provides four individually unfused connection point sets for the 140ACO02000 and 140AVO02000 analog output modules.

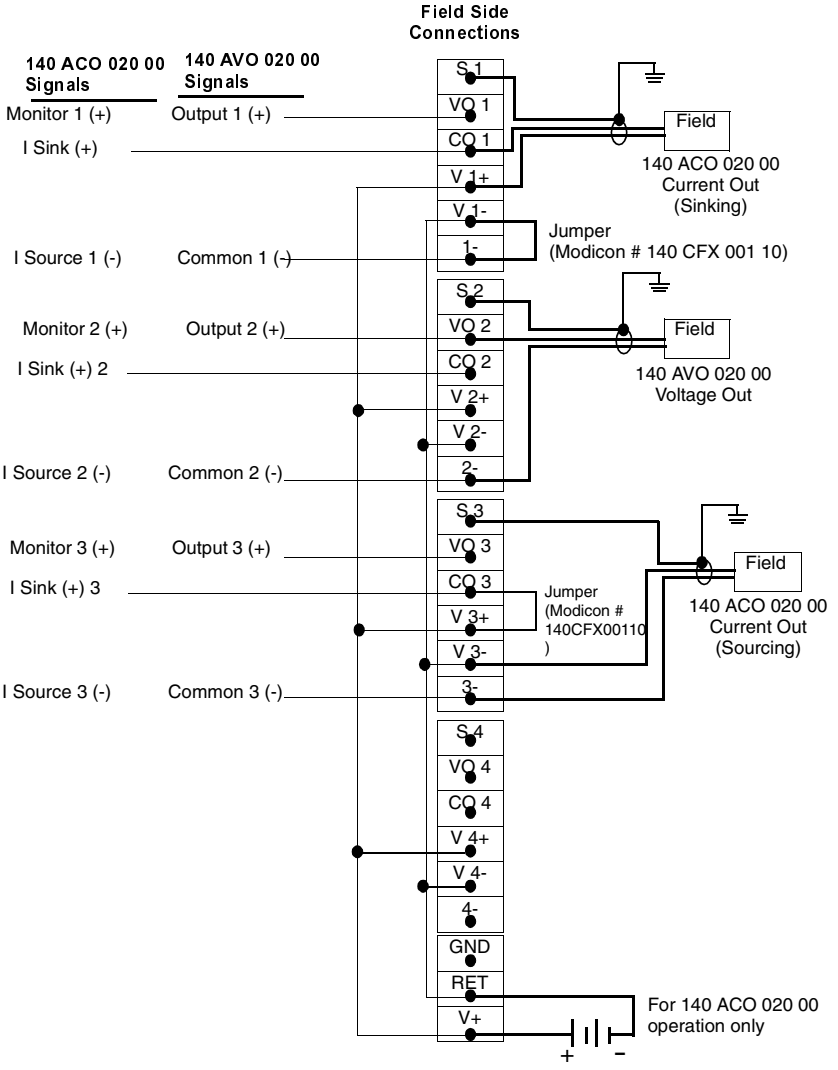
Dimensions

The following figures show the dimensions for the 140CFK00400 module.



Wiring Diagram (Source Grounding)

The following shows the wiring for the 140CFK00400 (source grounding) module.

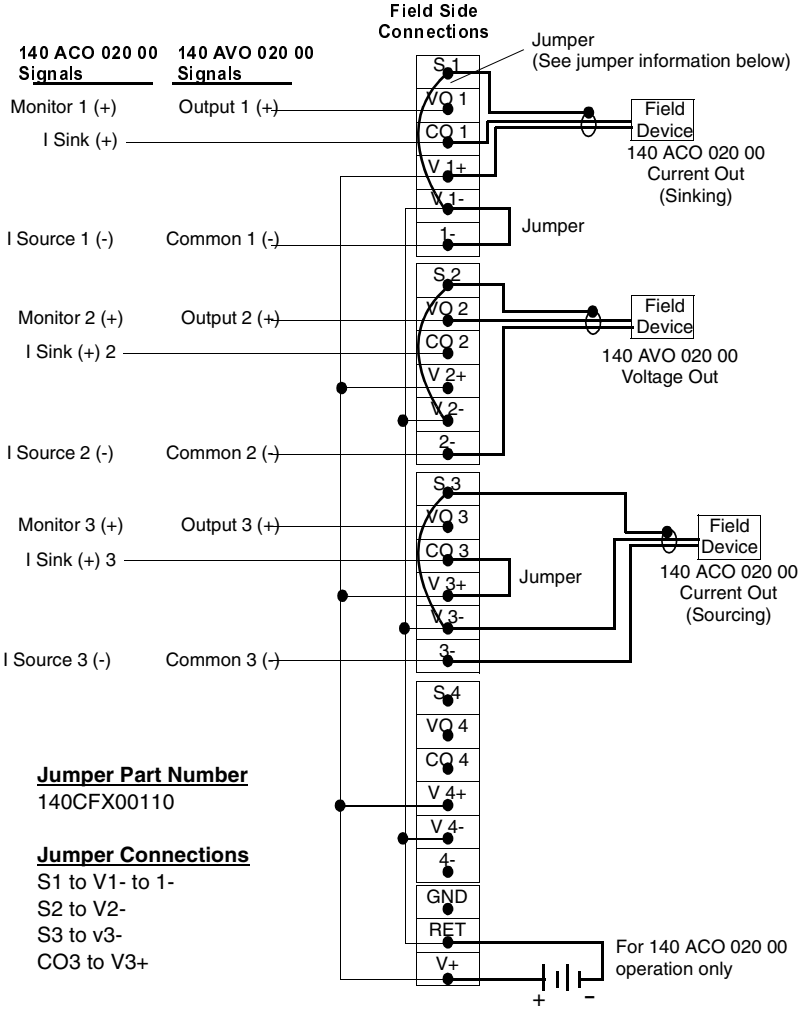


Note:

1. When used with the 140AVO02000 analog voltage out module, the master override connections and range select must be made on the Quantum I/O connector.
2. When using a single power supply, there will be no channel-to-channel isolation of input points.
3. For the required jumper options for the 140ACO02000, see wiring diagram on *p. 482*.
4. The GND (ground) terminal point is not connected.

Wiring Diagram (Instrument Grounding)

The following figure shows the wiring for the 140CFK00400 (instrument grounding) module.

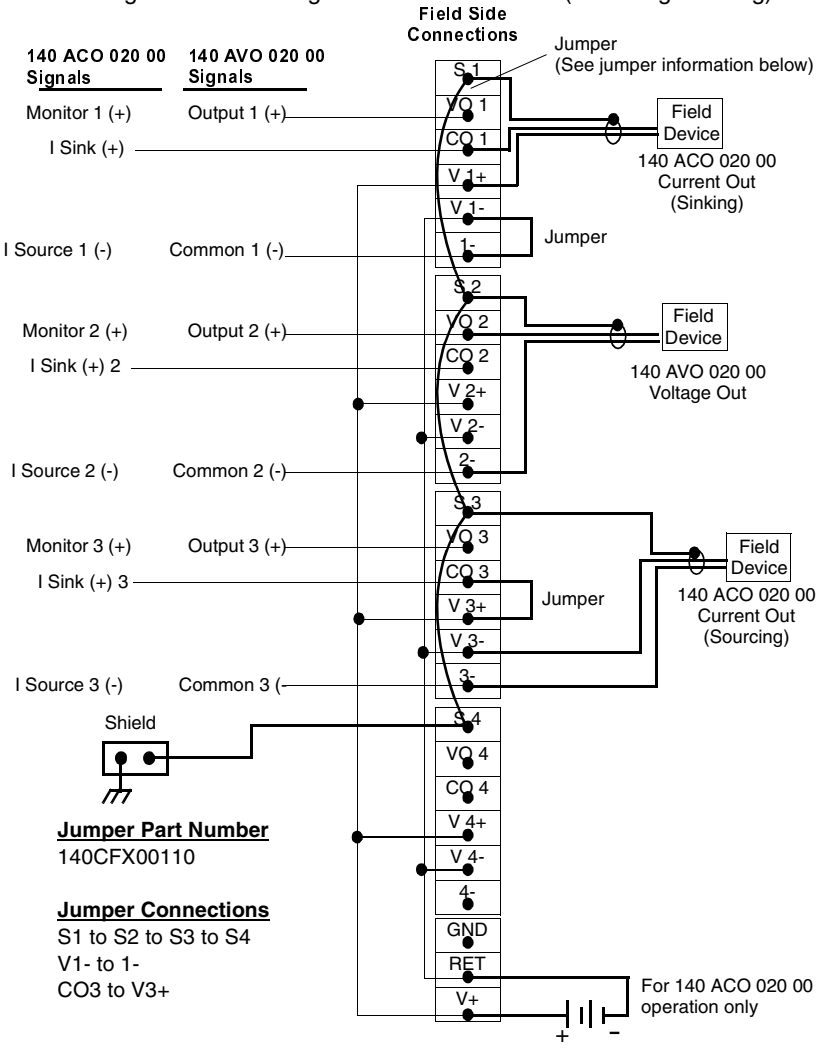


Note:

1. When used with the 140AVO02000 analog voltage out module, the master override connections and range select must be made on the Quantum I/O connector.
2. When using a single power supply, there will be no channel-to-channel isolation of input points.
3. For the required jumper options for the 140ACO02000 and the AVO02000, see wiring diagrams on *p. 482* and *p. 489*.
4. The GND (ground) terminal point is not connected.

Wiring Diagram (Chassis Grounding)

The following shows the wiring for the 140CFK00400 (chassis grounding) module.



Note:

1. When used with the 140AVO02000 analog voltage out module, the master override connections and range select must be made on the Quantum I/O connector.
2. When using a single power supply, there will be no channel-to-channel isolation of input points.
3. For wiring the 140ACO02000 and the 140AVO02000, see the wiring diagrams on *p. 482* and *p. 489*.

The GND (ground) terminal point is not connected.

CableFast Cables

Overview

This section provides CableFast cable specifications, cable lengths, inner wire color codes (for standard and high power cables), cable selections, and accessories.

Cable Specifications

The following table shows the CableFast cable specifications.

Cable Specifications	
Standard Power	
Cable Diameter	0.43 in. nominal (10.9 mm)
Number of Conductors	8-#20 AWG (0.8 mm), 7/28 tinned annealed copper; semi rigid PVC 32-#26 AWG (0.4 mm), 7/34 tinned annealed copper; semi rigid PVC
Bend Radius (I.D.)	0.75 in. min. (19.0 mm)
High Power	
Cable Diameter	0.55 in. nominal (14.0 mm)
Number of Conductors	8-#18 AWG (1.0 mm), 16/30 tinned annealed copper; semi rigid PVC 32-#20 AWG (0.8 mm), 10/30 tinned annealed copper; semi rigid PVC
Bend Radius (I.D.)	1.50 in. min. (38.1 mm)
Common Specifications	
Cable Jacket	Jacket color: black, 0.040 in wall min, flexible PVC
Wire Strip Length	0.32 in. (8 mm)
Wire Marking	See the wire color coding table (next page)
Wire Rating	300 V, 105° C UL rated 2517, CSA Type AWM 1/2 FT1
Cable Rating	300 V, 105° C rated
Shielding	Aluminum/polyester tape (aluminum side out) attached at connector body (360°). #22 AWG, 7/30 drain wire.Shield resistance 16.55 Ohms/Mft nominal
Agency Approval	UL-758; AWM style 2517 VW-1 and CSA C22:210.2; AWM I/II A/B FT1

Cable Lengths

The following table shows the cable lengths for the CableFast system.

Cable Lengths	Terminated		Pigtail
	Standard Power	High Power	High Power
3 ft. (0.91 m)	X	X	
6 ft. (1.82 m)	X	X	X
9 ft. (2.73 m)	X	X	
12 ft. (3.64 m)	X	X	
15 ft. (4.6 m)			X

Inner Wire Color Codes

The following table provides the wire color codes for standard power and high power cables.

Wire/ Pin #	AWG for Standard Power Cable	AWG for High Power Cable	Color	Wire/ Pin #	AWG for Standard Power Cable	AWG for High Power Cable	Color
1	26	20	Black	21	26	20	White/Blue
2	26	20	Brown	22	26	20	White/Violet
3	26	20	Red	23	26	20	White/Gray
4	26	20	Orange	24	26	20	White/Black/ Brown
5	26	20	Yellow	25	26	20	White/Black/ Red
6	26	20	Green	26	26	20	White/Black/ Orange
7	26	20	Blue	27	26	20	White/Black/ Yellow
8	26	20	Violet	28	26	20	White/Black/ Green
9	20	18	Black	29	20	18	Yellow
10	20	18	Brown	30	20	18	Green
11	26	20	Gray	31	26	20	White/Black/ Blue
12	26	20	White	32	26	20	White/Black/ Violet
13	26	20	White/ Black	33	26	20	White/Black/ Gray
14	26	20	White/ Brown	34	26	20	White/Brown/ Red

Wire/ Pin #	AWG for Standard Power Cable	AWG for High Power Cable	Color	Wire/ Pin #	AWG for Standard Power Cable	AWG for High Power Cable	Color
15	26	20	White/ Red	35	26	20	White/Brown/ Orange
16	26	20	White/ Orange	36	26	20	White/Brown/ Yellow
17	26	20	White/ Yellow	37	26	20	White/Brown/ Green
18	26	20	White/ Green	38	26	20	White/Brown/ Blue
19	20	18	Red	39	20	18	Blue
20	20	18	Orange	40	20	18	Violet

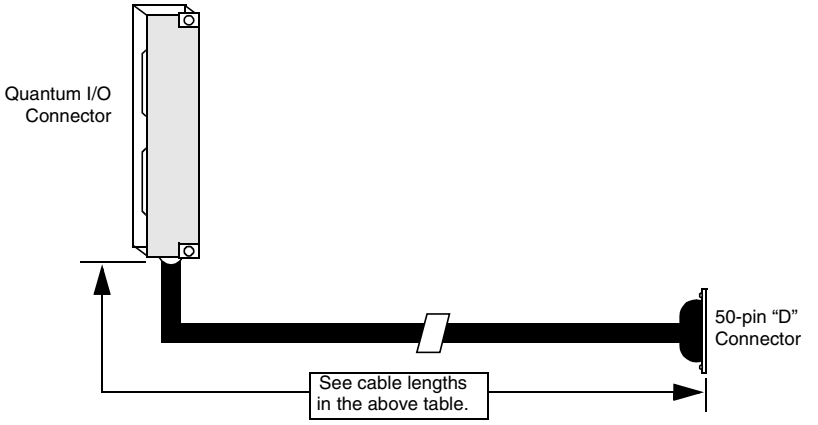
Cable Selections (XTS)

The following table shows the 140XTS0xx terminated cables.

Part Number	Cable Type		Cable Description
	Standard Power	High Power	
140XTS00203	X		CableFast system cable with Quantum I/O connector, 3 ft. (0.9 m) and "D" sub connector
140XTS01203		X	
140XTS00206	X		CableFast system cable with Quantum I/O connector, 6 ft. (1.8 m) and "D" sub connector
140XTS01206		X	
140XTS00209	X		CableFast system cable with Quantum I/O connector, 9 ft. (2.7 m) and "D" sub connector
140XTS01209		X	
140XTS00212	X		CableFast system cable with Quantum I/O connector, 12 ft. (3.7 m) and "D" sub connector
140XTS01212		X	

I/O Connector for Quantum

The following figure shows the I/O Connector for the Quantum system.



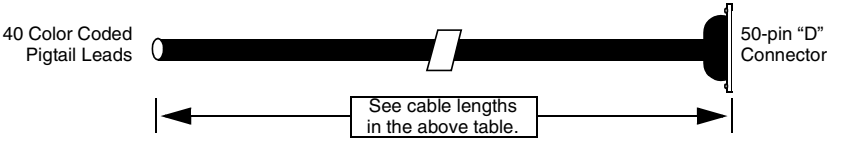
XCA102xx Pigtail

The following table shows the 140XCA102xx Pigtail cable description.

Part Number	Cable Type		Cable Description
	Standard Power	High Power	
140XCA10206		X	CableFast system cable, 6 ft (1.8 m), with "D" sub connector and pigtails
140XCA10215		X	CableFast system cable, 15 ft (4.6 m), with "D" sub connector and pigtails

Pigtail Leads

The following figure shows the color coded pigtail leads.



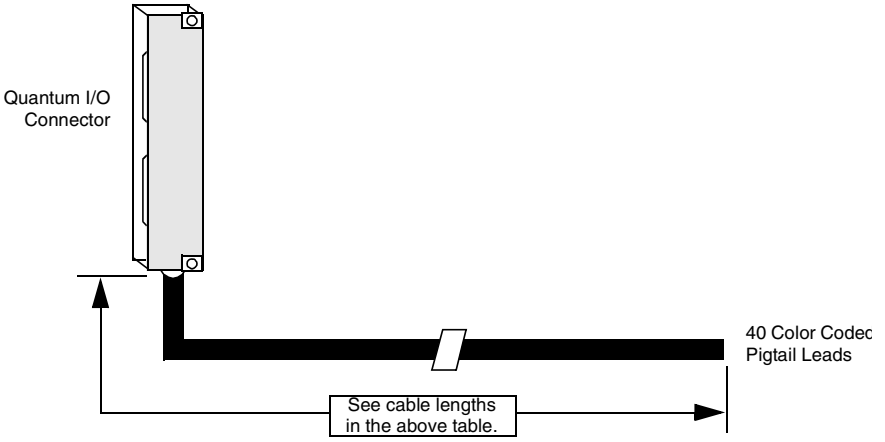
XTS102xx Pigtail

The following table shows the 140XTS102xx Pigtail cables.

Part Number	Cable Type		Cable Description
	Standard Power	High Power	
140XTS10206		X	CableFast system cable with Quantum I/O connector, 6 ft. (1.8 m), and pigtail cable
140 XTS10215		X	CableFast system cable with Quantum I/O connector, 15 ft. (4.6 m), and pigtail cable

I/O Connector for Pigtail Leads

The following figure shows the I/O connector for pigtail leads.



CableFast Accessories

Overview

The following information pertains to the CableFast accessories.

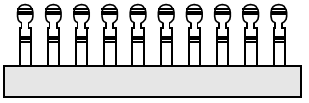
Accessories

The following table shows the part numbers and descriptions for CableFast Accessories.

Part Number	Description	Quantity
140CFU40000	Fuse Kit, Wickmann 4 A	10
140CFU08000	Fuse Kit, Wickmann 0.8 A	10
140CFU00600	Fuse Kit, Wickmann 0.063 A	10
140CFX00110	Terminal Block Common Strip, 10 Position (see below)	10

Terminal Block Common Strip

The following figure shows the terminal block common strip.

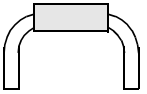


Jumper, Fuse Replacement

Fuse replacement information is given in the following table.

Part Number	Description	Quantity
140 CFX 002 10	Jumper, Fuse Replacement (see below)	10

The following figure shows a jumper.



Note: The jumper is used instead of fuses as a disconnect device.

Error Stopped Codes

F

Error Stopped Codes

Overview

The following is a list of error stopped codes and their definitions.

Error Stopped Codes

The following is a list of error stopped codes for the Quantum system.

Stop Bit Code (hex)	Description
7FFF	PLC unhealthy
8000	PLC stopped
4000	Bad I/O map
2000	PLC unconfigured
1000	Bad Modbus port intervention
0800	Bad segment scheduler
0400	Start-of-network (SON) did not start a segment
0200	Bad power-down checksum
0100	No end of logic detected
0080	Watchdog timer has expired
0040	Real time clock has failed
0020	Bad coil used table
0010	RIO option has failed
0008	Illegal node type found
0004	User logic checksum error
0002	Discrete disable table error
0001	Bad configuration

Definitions for Error Stopped Codes

The following are definitions for Error Stopped Codes.

- **PLC unhealthy:** This condition indicates that the CPU has failed one or more of its health diagnostics. In all probability the CPU will have to be replaced.
- **PLC stopped:** By itself, an 8000 hex is not an error but a CPU state. If, for example, a user issues a CPU stop command, the status register would indicate "8000" hex. An error condition exists when "8000" is anded with one or more of the previously defined errors (bits 0-14). An example would be an error code of "8100"; this suggests a PLC stopped with No End of Logic Node detected.
- **Bad I/O map:** This error will occur if the user declares more than one I/O drop in his configuration but does not have an RIO Head installed. This error may also occur if a drop has been configured in such a way so as to exceed the maximum number of inputs/outputs allowable per drop.
- **PLC unconfigured:** The user should expect this condition if he is trying to log into the CPU for the first time. This error indicates that the CPU has not been configured. The user should write a configuration offline and transfer it to the CPU prior to attempting to login to the CPU. If this error appears while seeking to coomunicate to a previously running CPU, this would suggest a corrupted state memory in the CPU. The usr should clear memory and attempt to reload the user logic program.
- **Bad modbus port intervention:** This error will most likely appear in conjunction with another error. The CPU would in all likelihood be stopped when this error occurs. This error may also appear upon the user's attempt to clear the system stop state. The user should try to clear user logic and reload.
- **Bad segment scheduler:** This error indicates improper programming of the segment scheduler.
- **Start-of-network (SON) did not start a segment:** This error is most often caused by improper programming. It can also be caused by a corrupted program and can be detected by issuing a start command to the CPU.
- **Bad power-down checksum:** This error indicates that continuous run time ram diagnostic has failed. Reload the user logic program. If this error persists, replace the CPU.
- **No end of logic detected:** This error is usually caused by an incomplete or unsuccessful load of the program. Try another reload.
- **Watchdog timer has expired:** This error indicates that the CPU has taken too much time to complete its current scan. This error will sometimes occur with ambitious DX programming techniques. The user may want to increase the Watchdog Timer value. This error may also point to a failure of the CPU.
- **Real time clock has failed:** Replace the CPU.

- **Bad coil used table:** This error means that the coil used table does not match user logic. Possible causes include:
  1. This error is often seen when a program is altered offline by non-Modsoft users and then reloaded. It may be neccesary to update the coil used table manually in order to recover from this error.
  2. The battery coil is not configured or configured in correctly. This error is not uncommon if the program is being relocated from another PLC.
  3. There may be a hardware failure of the CPU.
- **RIO option has failed:** The RIO option board (140CRP93x00) has been determined to be unhealthy. Replace the board.
- **Illegal node type found:** This error is usually seen when downloading a program to the CPU. Some of the things a user should look for include:
  1. The user is loading/relocating logic from a CPU that supported a loadable function block to another CPU that hasn't been configured for the same function block. (ie HSBY or XMIT)
  2. A constant or reference is outside the range of that particular CPU's instruction set. This may occur when relocating logic from a 24 bit CPU to a 16 bit CPU. This error is generally not seen as a hardware failure and the user is advised to examine his user logic for incompatibility with the target PLC. RIO Option Has Failed.
- **User logic checksum error:** The calculated user logic checksum does not agree with the stored checksum. It can be caused by an illegal change in memory. The user should try to reload his user logic program. If the error persists, replace the CPU.
- **Discrete disable table error:** This error occurs when the user attempts to run the CPU in Optimize mode with disabled coils in user logic.
- **Bad configuration:** The most probable cause would be that the memory has been modified through the MODBUS/MODBUS PLUS ports. If this error occurs during a program download, check configuration data for values greater than the CPU's specified addressable range. This error can also appear if the CPU's memory is defective.

Agency Approvals

G

Agency Approvals

Overview

The following tables provide the agency approvals and also include the conformal coating availability of the indicated Quantum products.

Power Supplies

The following table provides the agency approvals and conformal coating availability for the power supplies of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CPS11100	√	√	√	√	√	√	√
140CPS11400	√	√	√	√	√	√	√
140CPS11410	√	√	√	√	√	√	√
140CPS11420	√	√	√	√	√	√	
140CPS12400	√	√	√	√	√	√	√
140CPS12420	√	√	√	√	√	√	
140CPS21100	√	√	√	√	√	√	√
140CPS21400	√	√	√	√	√	√	√
140CPS22400	√	√	√	√	√	√	√
140CPS41400	√	√	√	√	√	√	
140CPS42400	√	√	√	√	√	√	
140CPS51100	√	√	√	√	√	√	√
140CPS52400	√	√	√	√	√	√	√

CPUs

The following table provides the agency approvals and conformal coating availability for the CPUs of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CPU11302	√	√	√	√	√	√	√
140CPU11303	√	√	√	√	√	√	√
140CPU21304	√	√	√	√	√	√	√
140CPU42402	√	√	√	√	√	√	√
140CPU43412	√	√	√	√	√	√	
140CPU43412A	√	√	√	√	√	√	
140CPU53414	√	√	√	√	√	√	
140CPU53414A	√	√	√	√	√	√	

DIO Drops

The following table provides the agency approvals and conformal coating availability for the DIO drops of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CRA21110	√	√	√	√	√	√	√
140CRA21210	√	√	√	√	√	√	√
140CRA21120	√	√	√	√	√	√	
140CRA21220	√	√	√	√	√	√	√

RIO Heads and Drops

The following table provides the agency approvals and conformal coating availability for the RIO Heads and Drops of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CRA93100	√	√	√	√	√	√	
140CRA93200	√	√	√	√	√	√	√
140CRP93100	√	√	√	√	√	√	√
140CRP93200	√	√	√	√	√	√	√
140CRA93101					√		√

Field Bus Modules

The following table provides the agency approvals and conformal coating availability for the Field Bus modules of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CRP81100					√		
140EIA92100					√		
140NOA61100	√	√		√	√	√	
140NOA61110		√	√	√	√	√	
140NOL91100		√		√		√	
140NOL91110		√		√		√	
140NOL91120		√		√		√	

NOEs

The following table provides the agency approvals and conformal coating availability for the NOEs of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140NOE21100	√	√	√	√	√	√	√
140NOE25100	√	√	√	√	√	√	√
140NOE31100	√	√	√	√	√	√	√
140NOE35100	√	√	√	√	√	√	
140NOE51100	√	√	√	√	√	√	√
140NOE55100	√	√	√	√	√	√	√
140NOE77100	√	√	√	√	√	√	
140NOE77101	√	√	√		√		
140NOE77110	√	√	√	√	√	√	
140NOE77111	√	√	√		√		

NOMs

The following table provides the agency approvals and conformal coating availability for the NOMs of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140NOM21100	√	√	√	√	√	√	√
140NOM21200	√	√	√	√	√	√	√
140NOM25200	√	√	√	√	√	√	√

Hot Standby

The following table provides the agency approvals and conformal coating availability for the Hot Standby of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140CHS11000	√	√	√	√	√	√	√

Counters

The following table provides the agency approvals and conformal coating availability for the Counters of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140EHC10500	√	√	√	√	√	√	√
140EHC20200	√	√	√	√	√	√	√

ASCII Interface

The following table provides the agency approvals and conformal coating availability for the ASCII Interface of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140ESI06210	√	√	√	√	√	√	√

High Speed Interrupts

The following table provides the agency approvals and conformal coating availability for the High Speed Interrupt of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140HLI34000	√	√	√	√	√	√	√

Single Axis Motion

The following table provides the agency approvals and conformal coating availability for the Single Axis Motion of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140MSB10100	√	√	√	√	√	√	
140MSC10100	√	√	√	√	√	√	

Simulators

The following table provides the agency approvals and conformal coating availability for the Simulators of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140XSM002	√	√	√	√			
140XSM010	√	√	√	√			

Intrinsically Safe Modules

The following table provides the agency approvals and conformal coating availability for the intrinsically safe I/O modules of the indicated Quantum products.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 1	CE	CSA Class I, Div 2
140AII33000	√	√	√	√	√	√	√
140AII33010	√	√	√	√	√	√	√
140AIO33000	√	√	√	√	√	√	√
140DII33000	√	√	√	√	√	√	√
140DIO33000	√	√	√	√	√	√	√

Battery Module

The following table provides the agency approvals and conformal coating availability for the Battery module of the indicated Quantum products. **Note**: These modules should not be installed in a Class 1, Division 1 environment. They can monitor/ contorl intrinsically ssafe apparatus located in hazardous areas without the use of additional barriers. See *p. 361* for installation guidelines.

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140XCP90000	√	√	√	√	√	√	

I/O

The following table provides the agency approvals and conformal coating availability for the I/O of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140ACI03000	√	√	√	√	√	√	√
140ACI04000	√	√	√	√	√	√	
140ACO02000	√	√	√	√	√	√	√
140ACO13000	√	√	√	√	√	√	
140AMM09000	√	√	√	√	√	√	√
140ARI03010	√	√	√	√	√	√	
140ATI03000	√	√	√	√	√	√	√
140AVI03000	√	√	√	√	√	√	√
140AVO02000	√	√	√	√	√	√	√
140DAI34000	√	√	√	√	√	√	√
140DAI35300	√	√	√	√	√	√	√
140DAI44000	√	√	√	√	√	√	√
140DAI45300	√	√	√	√	√	√	√
140DAI54000	√	√	√	√	√	√	√
140DAI54300	√	√	√	√	√	√	
140DAI55300	√	√	√	√	√	√	√
140DAI74000	√	√	√	√	√	√	√
140DAI75300	√	√	√	√	√	√	
140DAM59000	√	√	√	√	√	√	√
140DAO84000	√	√	√	√	√	√	√
140DAO84010	√	√	√	√	√	√	√
140DAO84210	√	√	√	√	√	√	√
140DAO84220	√	√	√	√	√	√	√
140DAO85300	√	√	√	√	√	√	√
140DDI15310	√	√	√	√	√	√	√
140DDI35300	√	√	√	√		√	
140DDI35310	√	√	√	√	√	√	√
140DDI36400	√	√	√	√	√	√	
140DDI67300	√	√	√	√	√	√	√
140DDI84100	√	√	√	√		√	

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140DDI85300	√	√	√	√		√	
140DDM39000	√	√	√	√	√	√	√
140DDM69000	√	√	√	√	√	√	√
140DDO15310	√	√	√	√	√	√	√
140DDO35300	√	√	√	√	√	√	√
140DDO35301	√	√	√	√	√	√	
140DDO35310	√	√	√	√	√	√	√
140DDO36400	√	√	√	√	√	√	
140DDO84300	√	√	√	√	√	√	√
140DDO88500	√	√	√	√	√	√	√
140DRA84000	√	√	√	√	√	√	√
140DRC83000	√	√	√	√	√	√	√
140DSI35300	√	√	√	√	√	√	
140DVO85300	√	√	√	√	√	√	

Backplanes

The following table provides the agency approvals and conformal coating availability for the I/O of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140XBP00200	√	√	√	√	√	√	
140XBP00300	√	√	√	√	√	√	
140XBP00400	√	√	√	√	√	√	
140XBP00600	√	√	√	√	√	√	
140XBP01000	√	√	√	√	√	√	
140XBP01600	√	√	√	√	√	√	

Backplane Expander

The following table provides the agency approvals and conformal coating availability for the backplane expander of the indicated Quantum products

Quantum Part Numbers	Conformally Coated Version Availabilty	Agency Approval Status					
		UL 508	CSA 22.2-142	C-UL	Factory Mutual Class I, Div 2	CE	CSA Class I, Div 2
140XBE10000	√	√	√	√	√	√	

Maritime Approvals

The following talbe provides maritime approvals for selected group of modules. Check **www.modicon.com** for details.

ABS/U.S.A.	DNV Norway	GL Germany	LR United Kingdom	RINA Italy	RRS Russia
√	√	√	√	√	√

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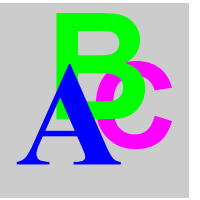

Numerics

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