Quantum using EcoStruxure™ Control Expert

Discrete and Analog I/O Reference Manual

Original instructions

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

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, service, 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 a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

At a Glance

Document Scope

This documentation is a reference for the discrete and analog I/O hardware of the Quantum automation system with EcoStruxure™ Control Expert.

Validity Note

This document is valid for EcoStruxure™ Control Expert 15.0 or later.

Related Documents

Title of documentation	Reference number
EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual	35006144 (English), 35006145 (French), 35006146 (German), 35013361 (Italian), 35006147 (Spanish), 35013362 (Chinese)
Quantum using EcoStruxure™ Control Expert, Hardware Reference Manual	35010529 (English), 35010530 (French), 35010531 (German), 35013975 (Italian), 35010532 (Spanish), 35012184 (Chinese)

Product Related Information

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product.

Follow all local and national safety codes and standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Part I
General Information

Introduction

This part provides general information on the discrete and analog I/O modules.

What Is in This Part?

This part contains the following chapters:

Chapter 1
Module Configuration

Purpose

This chapter provides information on software configuration of the module.

What Is in This Chapter?

This chapter contains the following topics:

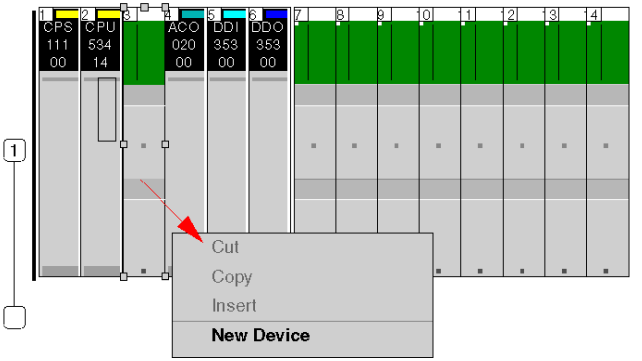
Mapping a Local Quantum I/O Station

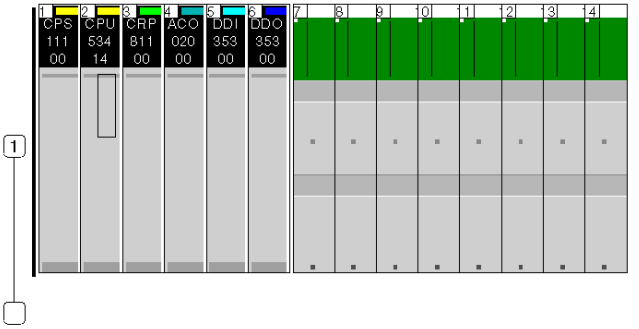
Overview

Use the following dialog to map an existing local Quantum I/O station with a new module.

Inserting a module (local)

This table shows the steps required for inserting a module in a local station.

Step	Action
1	Call the Bus Editor
2	Mark a free slot in the local station (left mouse button)
3	Move the mouse pointer over the marked slot
4	Click on the right mouse button **Result:** A shortcut menu is opened 
5	Select **New Device** **Result:** A dialog window opens that displays available modules

Step	Action
6	Select the desired module from the respective category in the Hardware catalog. **Result:** The new module is inserted in the empty slot on the local station. 

Open the Parameter Configuration

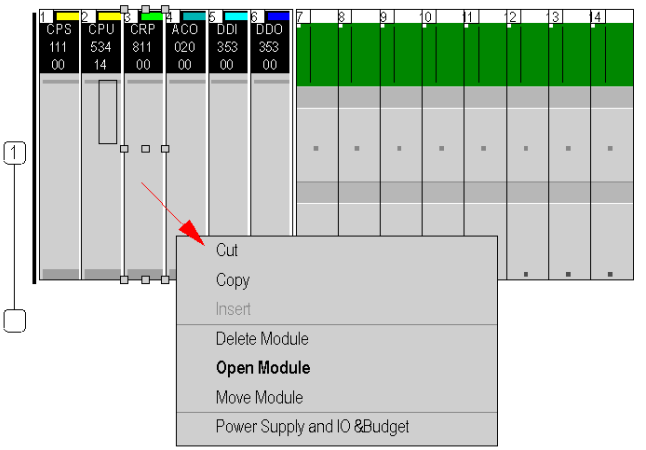
Overview

The following dialog box enables you to call the parameter configuration for a module.

An explanation of the individual parameters can be found in the respective module chapters.

Open the Parameter Configuration

This table shows the steps required to open the parameter configuration.

Step	Action
1	Call the Bus Editor
2	Select the module
3	Click on the right mouse button **Result:** A shortcut menu is opened 
4	Select **Open Module** **Result:** The module opens with the parameter configuration window

Chapter 2
Quantum Addressing Modes

Purpose

This chapter provides information on the three different modes Control Expert allows to address the I/O data from a Quantum I/O module:

- Flat Addressing
- Topological Addressing
- IODDT Addressing

NOTE: Topological addresses overlapping (%IWr.m.c) is not supported by Quantum application, use flat addressing (%IWx) when memory overlapping control is needed.

NOTE: The different addressing modes refer to the same physical location in the PLC memory for a given data point.

While Flat Addressing and Topological Addressing are available for all Quantum I/O modules, IODDTs are only provided for modules that deliver information in addition to the I/O values (e.g. errors or warnings).

Also provided is information about I/O module status bytes and bit order.

What Is in This Chapter?

This chapter contains the following topics:

Flat Addressing—800 Series I/O Modules

Introduction

800 series I/O modules follow a system of flat address mapping in Control Expert. To work properly. each module requires a determinate number of bits and/or words. The IEC addressing system is equivalent to the 984LL register addressing. Use the following assignments:

- 0x is now `%Mx`
- 1x is now `%Ix`
- 3x is now `%IWx`
- 4x is now `%MWx`

The following table shows the relationship between 984LL notation and IEC notation.

Outputs and Inputs	984LL Notation Register Addresses	IEC Notation		
		System Bits and Words	Memory Addresses	I/O Addresses
output	0x	System Bit	%Mx	%Qx
input	1x	System Bit	%Ix	%Ix
input	3x	System Word	%IWx	%IWx
output	4x	System Word	%MWx	%QWx

To access the I/O data of a module,

Step	Action
1	Enter the address range in the configuration screen.

Examples

The following examples show the relationship between 984LL register addressing and IEC addressing:

000001 is now `%M1`

100101 is now `%I101`

301024 is now `%IW1024`

400010 is now `%MW10`

Topological Addressing—800 Series I/O Modules with Control Expert

Accessing I/O Data Values

Use topological addressing to access I/O data items. Identify the topological location of the module within an 800 series I/O module with Control Expert using the following notation:

```
%<Exchangetype><Objecttype>[\b.e\]r.m.c[.rank]
```

where:

- **b** = bus
- **e** = equipment (drop)
- **r** = rack
- **m** = module slot
- **c** = channel

NOTE: When addressing,

1. The [\b.e\] defaults to \1.1\ in a local rack and does not need to be specified.
2. The rank is an index used to identify different properties of an object with the same data type (value, warning level, error level).
3. The rank numbering is zero-based, and if the rank is zero, omit the entry.

For detailed information on I/O variables, please refer to the *EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual*.

Reading Values: An Example

To read	Action
input value (rank = 0) from channel 7 of an analog module located in slot 6 of a local rack:	Enter `%IW1.6.7[.0]`
input value (rank = 0) from channel 7 of an analog module located in slot 6 of drop 3 of RIO bus 2:	Enter `%IW\2.3\1.6.7[.0]`
'out of range' value (rank = 1) from channel 7 of an analog module located in slot 6 of a local rack:	Enter `%I1.6.7.1[.0]`

IODDT Addressing

IODDT Addressing

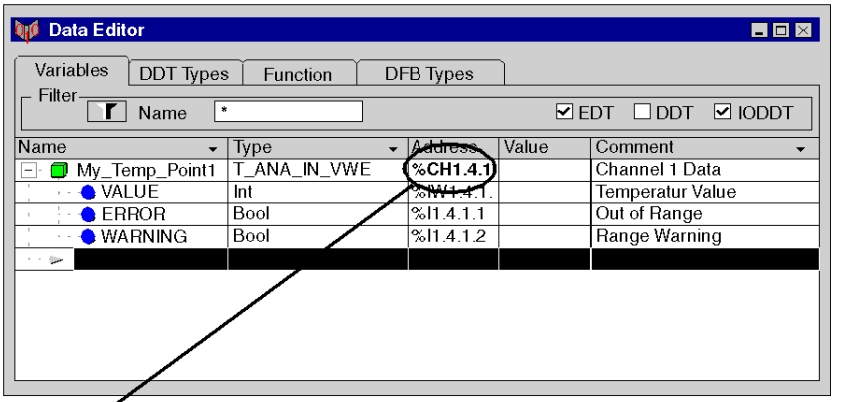
An IODDT allows all information (bits and registers) related to a channel to be handled through a user-defined variable. This variable is defined in the Control Expert data editor by selecting the appropriate IODDT for the module as a data type and specifying the topological address of the module using the following syntax:

`%CH[\b.e\]r.m.c`

where:

- **b** = bus
- **e** = equipment (drop)
- **r** = rack
- **m** = module slot
- **c** = channel

Here is an example of an IODDT for a thermocouple input module in slot 4 of a local rack:



Note: Only `%CH1.4.1` needs to be entered. The topological addresses related to this channel (`%IW..` and `%I..`) are generated automatically.

Variables in the User Program

You can access all information related to channel 1 of the module using the following variables:

- `My_Temp_Point1.VALUE` for the measured value
- `My_Temp_Point1.ERROR` indicating an out-of-range condition
- `My_Temp_Point1.WARNING` indicating an over-range condition

Quantum IODDTs

Introduction

Control Expert provides a couple of IODDTs which are either generic and can be used for several I/O modules or belong to one specific module.

NOTE: Deviating from the general description of the data types in the Direct Addressing Data Instances chapter in the *EcoStruxure™ Control Expert Reference Manual*, in Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

T_ANA_IN_VE

`T_ANA_IN_VE` is used with all channels of the following I/O modules:

- ACI 030 00
- AII 330 10
- ACI 040 00
- ACI 040 00

IODDT for analog input modules supporting **V**alue and **E**rror

Object	Symbol	Rank	Description
%IW	VALUE	0	Input value
%I	ERROR	1	Input error

T_ANA_IN_VWE

`T_ANA_IN_VWE` is used with all channels of the following I/O modules:

- ARI 030 10,
- AVI 030 00
- ATI 030 00
- AII 330 00
  and
- Channels 3 and 4 of AMM 090 00

IODDT for analog input modules supporting **V**alue, **W**arning and **E**rror

Object	Symbol	Rank	Description
%IW	VALUE	0	Input value
%I	ERROR	1	Input error
%I	WARNING	2	Input warning

T_ANA_BI_VWE

T_ANA_BI_VWE is used with the following I/O modules:

- Channels 1 and 2 of AMM 090 00

IODDT for bidirectional analog modules supporting **V**alue, **W**arning and **E**rror

Object	Symbol	Rank	Description
%IW	VALUE_IN	0	Input value
%QW	VALUE_OUT	0	Output value
%I	ERROR_IN	1	Input error
%I	WARNING	2	Input warning
%I	ERROR_OUT	3	Output error

T_CNT_105

T_CNT_105 is used with all channels of the following I/O modules:

- EHC 105

Specific IODDT for high speed counter module EHC 105

Object	Symbol	Rank	Description
%IW	VALUE_L	1	Input value: Low word
%IW	VALUE_H	2	Input value: High word
%I	ERROR	1	Error in Counter
%I	SP_FINAL	2	Final Set Point signal
%I	SP_FIRST	3	First Set Point signal
%I	SP_SECOND	4	Second Set Point signal
%QW	STOP_VALUE	1	For CNT_DIR="0", final set point value
%QW	INITIAL_VALUE	2	For CNT_R="1", initial set point value
%Q	LS	1	"1", Counter load/start (controlled by the rising edge)
%Q	RSTART	2	"1", Counter restart (controlled by the rising edge)
%Q	OUT_OFF	3	"1", Counter output switch-off
%Q	CNT_DIR	4	"0" Counter counts up "1" Counter counts down
%Q	OM1	5	Operating Mode bit 1
%Q	OM2	6	Operating Mode bit 2
%Q	OM3	7	Operating Mode bit 3
%Q	OM4	8	Operating Mode bit 4

Addressing Example

Comparing the 3 Addressing Modes

The following example compares the 3 possible addressing modes. An 8-channel thermocouple 140 ATI 030 00 module with the following configuration data is used:

- mounted in slot 5 of the CPU rack (local rack)
- starting input address is 201 (input word `%IW201`)
- end input address is 210 (input word `%IW210`)

To access the I/O data from the module you can use the following syntax:

Module data	Flat Addressing	Topological Addressing	IODDT Addressing	Concept Addressing
Channel 3 temperature	%IW203	%IW1.5.3	My_Temp.VALUE	300203
Channel 3 out of range	%IW209.5	%I1.5.3.1	My_Temp.ERROR	300209 Bit 5 to be extracted by user logic
Channel 3 range warning	%IW209.13	%I1.5.3.2	My_Temp.WARNING	300209 Bit 13 to be extracted by user logic
Module internal temperature	%IW210	%IW1.5.10	not accessible through IODDT	300210

NOTE: For the IODDT the data type `T_ANA_IN_VWE` is used and the variable `My_Temp` with the address `%CH1.5.10` was defined.

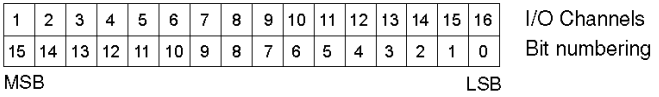
For comparison, the register addressing as used with Concept is added in the last column. As Concept does not support direct addressing of a bit in a word, the bit extraction has to be performed in the user program.

Discrete I/O Bit Numbering

Introduction

The numbering of channels of an I/O module usually starts with 1 and counts up to the maximum number of supported channels. The software however starts numbering with a 0 for the least significant bit in a word (LSB). The Quantum I/O modules have their lowest channel mapped to the most significant bit (MSB).

The following figure shows the mapping of I/O channels related to the bits in a word:.



Word Addressing Versus Bit Addressing

Mainly discrete I/O modules can be configured to deliver their I/O data either in word format or in bit format. This can be selected during configuration by selecting either `%IW` (`%MW`) or `%I` (`%M`). If you need to access a single bit from an I/O module configured to use an I/O word, you can use the syntax `%word.bit`. The following table gives you the connection between I/O point number and the associated I/O address in bit and word addressing.

The table shows a 32-point input module in the main rack, slot 4 configured with starting address `%I1` or `%IW1`:

I/O channel	Bit address (flat addressing)	Bit address (topological addressing)	Bit address extracted from word (flat addressing)	Bit address extracted from word (topological addressing)
1	%I1	%I1.4.1[.0]	%IW1.15	%IW1.4.1.1.15
2	%I2	%I1.4.2[.0]	%IW1.14	%IW1.4.1.1.14
3	%I3	%I1.4.3[.0]	%IW1.13	%IW1.4.1.1.13
• • •				
15	%I15	%I1.4.15[.0]	%IW1.1	%IW1.4.1.1.1
16	%I16	%I1.4.16[.0]	%IW1.0	%IW1.4.1.1.0
17	%I17	%I1.4.17[.0]	%IW2.15	%IW1.4.1.2.15
18	%I18	%I1.4.18[.0]	%IW2.14	%IW1.4.1.2.14
• • •				
31	%I31	%I1.4.31[.0]	%IW2.1	%IW1.4.1.2.1
32	%I32	%I1.4.32[.0]	%IW2.0	%IW1.4.1.2.0

I/O Module Status Byte

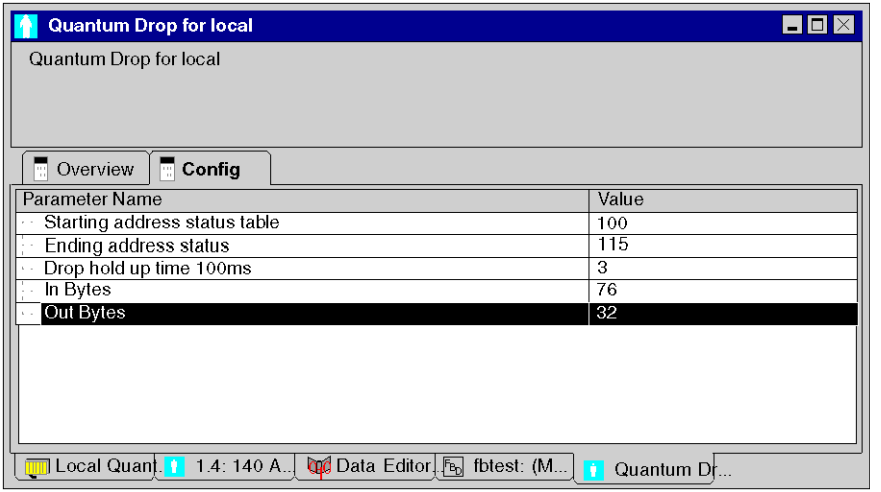
Addressing Module Status Data

In addition to possible channel related diagnostics data, a module related status byte may be used. The status information of all modules in a drop is administered by a table of %IW words. The starting address of this table can be entered in the configuration screen for the drop.

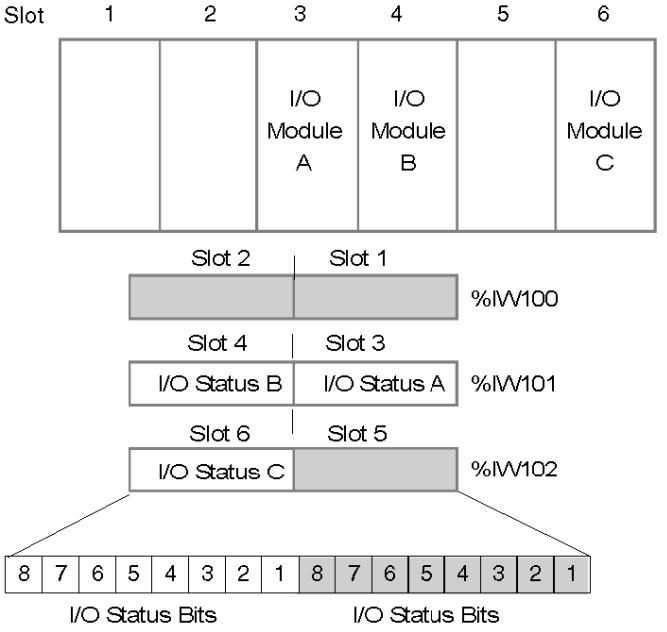
This information is not accessible through topological addressing.

NOTE: The status information is only available if the module supports a status byte. For the meaning of the status byte, check the module descriptions.

Example of a drop configuration screen with the starting address of the status table set to 100:



The following illustration shows how one word of the table conveys the status information for two modules:

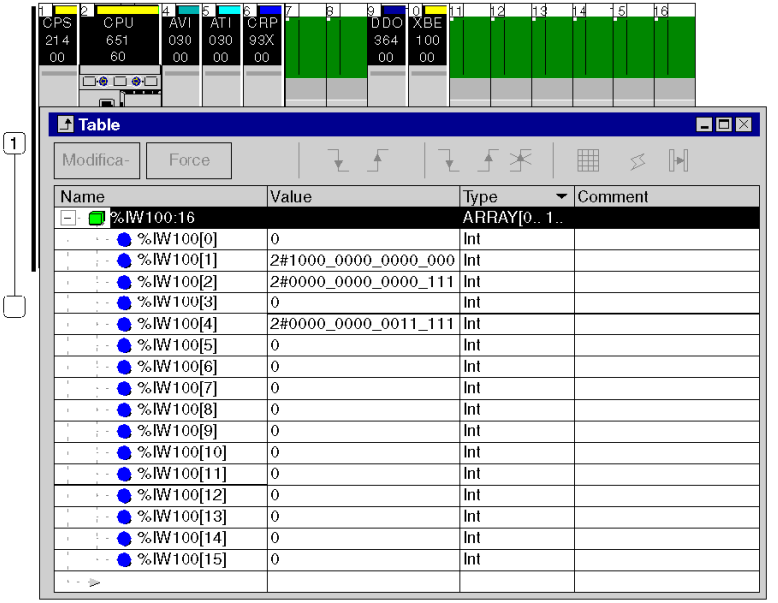


Example

The following example shows a rack and the corresponding I/O status bytes displayed in an animation table. The drop is configured to start at word `%IW100` and allocates 16 words. This represents the local and expansion rack, and assumes they are 16 slot racks.

If a module does not have have a status byte associated with the module or the slot is empty, then the byte = 0.

Rack configuration and animation table:



Relation between slot, input word and status byte. The byte related to the module is marked:

Slot	Input Word	Value	Module	Module
1	%IW[0]	0	power supply	no status byte
2		0	CPU	no status byte
3	%IW[1]	2#1000_0000_**0000_0000**	CPU	no status byte
4		2#**1000_0000**_0000_0000	AVI	At least one channel is not operating correctly.
5	%IW[2]	2#0000_0000_**0000_1111**	ATI	Channels 1 ... 4 are not operating correctly.
6		2#**0000_0000**_0000_1111	140 CRP 93• 00	no status byte

Slot	Input Word	Value	Module	Module
NOTE: If you install a 140 CRP 312 00 remote I/O head module on the local rack instead of a 140 CRP 93• 00 module, then:		2#**1101_1110**_0000_0000	140 CRP 312 00	CRP status byte[1]
7	%IW[3]	0	empty	
8		0	empty	
9	%IW[4]	2#0000_0000_**0011_1111**	DDO	All channels are not operating correctly.
10		2#**0000_0000**_0011_1111	XBE	no status byte
• • •				

[1] If you install a 140 CRP 312 00 remote I/O head module on the local rack instead of a 140 CRP 93• 00 module, the status byte is the **ETH_STATUS** detailed in the *Device DDT Names* topic in the *Quantum EIO Remote I/O Modules Installation and Configuration Guide*.

I/O Configuration for Discrete Input Modules

Overview

This section provides information on configuration of 8-, 16-, 24-, 32-, and 96-point input modules.

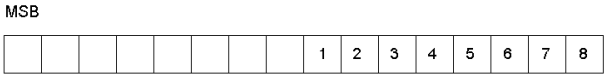
8-Point Input Modules

The 8-point input modules are:

- 140 DII 330 00 (DC Input Intrinsically Safe)

Flat Addressing

The input modules listed above can be configured as either 8 contiguous `%I` references or as one `%IW` word. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 8-Point Input Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 7	%I[\b.e\]r.m.7	Value
Input 8	%I[\b.e\]r.m.8	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

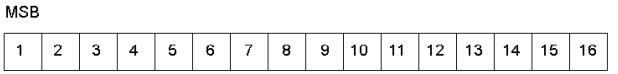
16-Point Input Modules

The 16-point input modules are:

- 140 DAI 340 00 (AC Input 24 Vac 16x1)
- 140 DAI 440 00 (AC Input 48 Vac 16x1)
- 140 DAI 540 00 (AC Input 115 Vac 16x1)
- 140 DAI 543 00 (AC Input 115 Vac 8x2)
- 140 DAI 740 00 (AC Input 230 Vac 16x1)
- 140 DDI 841 00 (DC Input 10 ... 60 Vdc 8x2 Sink)
- 140 HLI 340 00 (DC Input 24 Vdc 16 Sink/Source)

Flat Addressing

The input modules listed above can be configured as either 16 contiguous `%I` references or as one `%IW` word. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 16-Point Input Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 15	%I[\b.e\]r.m.15	Value
Input 16	%I[\b.e\]r.m.16	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

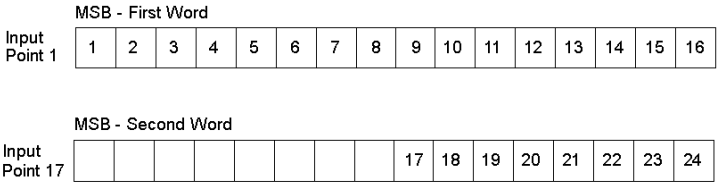
24-Point Input Module

There is only one 24-point input module:

- 140 DDI 673 00 (DC Input 125 VDC 3x8 Sink)

Flat Addressing

The input module listed above can be configured as either 24 contiguous discrete input %I reference, or as 2 contiguous %IW input words in the following format. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 24-Point Input Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 23	%I[\b.e\]r.m.23	Value
Input 24	%I[\b.e\]r.m.24	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Inputword 2	%IW[\b.e\]r.m.1.2	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

32-Point Input Modules

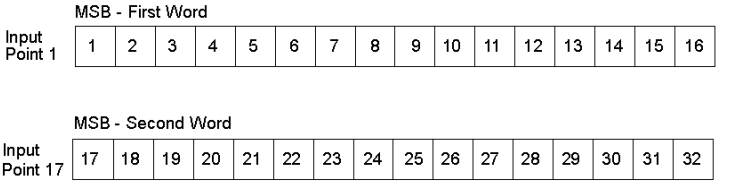
The 32-point input modules are as follows:

- 140 DAI 353 00 (AC Input 24 Vac 4x8)
- 140 DAI 453 00 (AC Input 48 Vac 4x8)
- 140 DAI 553 00 (AC Input 115 Vac 4x8)
- 140 DAI 753 00 (AC Input 230 Vac 4x8)
- 140 DDI 153 10 (DC Input 5 V 4x8 Source)
- 140 DDI 353 00 (DC Input 24 Vdc 4x8 Sink)
- 140 DDI 353 10 (DC Input 24 Vdc 4x8 Source)
- 140 DDI 853 00 (DC Input 10 ... 60 Vdc 4x8 Sink)

For addressing information of the 140 DSI 353 00, please refer to *Addressing, page 316*.

Flat Addressing

The input modules listed above can be configured as either 32 contiguous discrete input `%I` references or as two contiguous `%IW` input words in the following format. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 32-Point Input Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 31	%I[\b.e\]r.m.31	Value
Input 32	%I[\b.e\]r.m.32	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Inputword 2	%IW[\b.e\]r.m.1.2	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

96-Point Input modules

The following is the only 96 point input module:

- 140DDI36400 - DC input 6 x 16 sink

Flat Addressing

The following information pertains to the 140DDI36400 Input module. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.

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

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

	MSB - Third Word															
Input Point 33	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

	MSB - Fourth Word															
Input Point 49	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

	MSB - Fifth Word															
Input Point 65	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

	MSB - Sixth Word															
Input Point 81	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96

Topological Addressing

The following tables show the topological addresses for the 96-Point Input Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 95	%I[\b.e\]r.m.95	Value
Input 96	%I[\b.e\]r.m.96	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Inputword 2	%IW[\b.e\]r.m.1.2	Value
Inputword 3	%IW[\b.e\]r.m.1.3	Value
Inputword 4	%IW[\b.e\]r.m.1.4	Value
Inputword 5	%IW[\b.e\]r.m.1.5	Value
Inputword 6	%IW[\b.e\]r.m.1.6	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

I/O Configuration for Discrete Output Modules

Overview

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

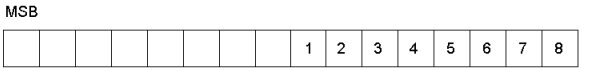
8-Point Output Modules

The following shows the 8-point output module:

- 140 DRC 830 00 (Relay Ouput 8x1 Normally Open/Normally Closed)
- 140 DIO 330 00 (Safe Discrete OUT Module)

Flat Addressing

The ouput modules listed above can be configured as either eight contiguous discrete %M output references or as one %MW output word. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 8-Point Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 7	%Q[\b.e\]r.m.7	Value
Output 8	%Q[\b.e\]r.m.8	Value

Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Outputword 1	%QW[\b.e\]R.S.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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

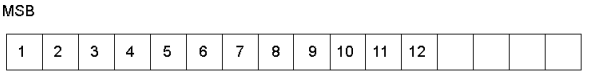
12-Point Output Module

The 12-point output module is:

- 140 DDO 885 00

Flat Addressing (Error Inputs)

The Error Inputs of the 140 DDO 885 00 can be configured as either 16 contiguous `%I` references or as one `%IW` word. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 12-Point Error Inputs.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 11	%I[\b.e\]r.m.11	Value
Input 12	%I[\b.e\]r.m.12	Value

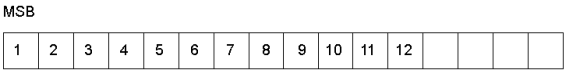
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

Flat Addressing (Outputs)

The 140DDO88500 can be configured as one `%MW` output word in the following format. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 12-Point Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 11	%Q[\b.e\]r.m.11	Value
Output 12	%Q[\b.e\]r.m.12	Value

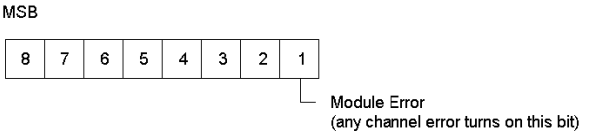
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Outputword 1	%QW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte (Outputs)

The least significant bit in the output I/O map status byte is used as follows. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



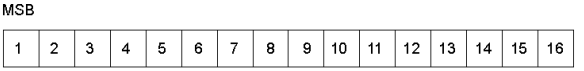
16-Point Output Modules

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)

Flat Addressing

The output modules listed above can be configured as either 16 contiguous discrete %M output references, or as one %MW output word in the following formats. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 16-Point Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 15	%Q[\b.e\]r.m.15	Value
Output 16	%Q[\b.e\]r.m.16	Value

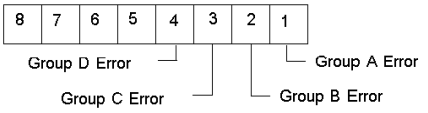
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Outputword 1	%QW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

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.

32-Point Output Modules

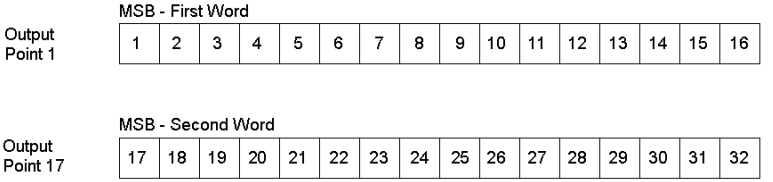
The following list shows the 32-point output modules:

- 140DAO85300 (AC Output 230 Vac 4x8 Sink)
- 140DDO15310 (DC Output 5 V 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)

For addressing information of the 140DVO85300, please refer to *Addressing, page 473*.

Flat Addressing

The output modules listed above can be configured as either 32 contiguous %M references, or as two %MW words in the following format. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 32-Point Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 31	%Q[\b.e\]r.m.31	Value
Output 32	%Q[\b.e\]r.m.32	Value

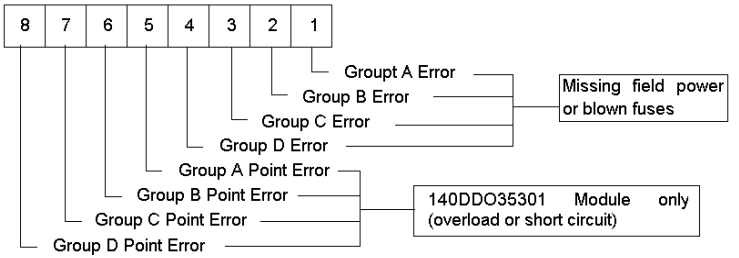
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Outputword 1	%QW[\b.e\]r.m.1.1	Value
Outputword 2	%QW[\b.e\]r.m.1.2	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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



96-Point Output Module

The 96 point output module is:

- 140DDO36400 - DC out 24VDC 6x16 Source

Flat Addressing

The following figures show the words 1 through 6 format for the 140DDO36400 output module. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.

MSB - First Word

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

MSB - Second Word

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

MSB - Third Word

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

MSB - Fourth Word

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

MSB - Fifth Word

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

MSB - Sixth Word

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

Topological Addressing

The following tables show the topological addresses for the 16-Point Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 95	%Q[\b.e\]r.m.95	Value
Output 96	%Q[\b.e\]r.m.96	Value

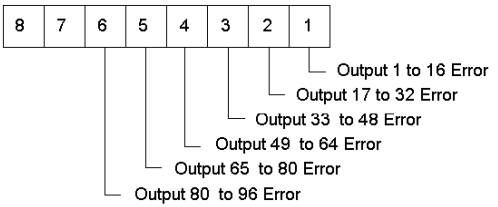
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Outputword 1	%QW[\b.e\]r.m.1.1	Value
Outputword 2	%QW[\b.e\]r.m.1.2	Value
Outputword 3	%QW[\b.e\]r.m.1.3	Value
Outputword 4	%QW[\b.e\]r.m.1.4	Value
Outputword 5	%QW[\b.e\]r.m.1.5	Value
Outputword 6	%QW[\b.e\]r.m.1.6	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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



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)

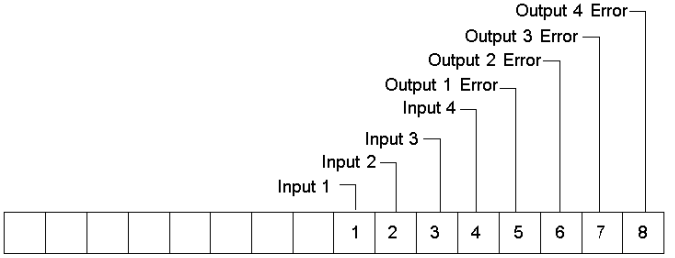
Flat Addressing

The 140DDM69000 input/output module can be configured as either eight contiguous `%I` references; or as one `%IW` word and either eight contiguous `%M` references or one `%MW` word.

> **⚠ CAUTION**
>
> **UNINTENDED EQUIPMENT OPERATION - INCORRECT I/O MAPPING**
>
> When I/O mapping module inputs using discrete `%I` references in remote drops, do not split discrete words between drops. The lowest discrete reference for a drop should start on a word boundary.
>
> **Failure to follow these instructions can result in injury or equipment damage.**

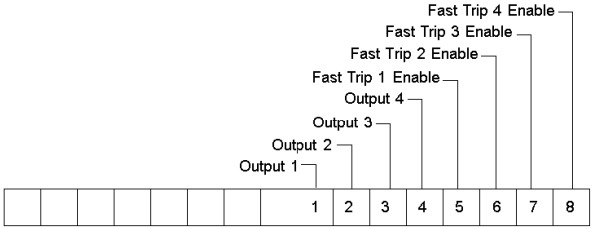
I/O Map Register (Inputs)

The following figure shows the `%IW` input word.



I/O Map Assignment (Outputs)

The following figure shows the %MW output word.



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).

Topological Addressing

The following tables show the topological addressing for the 140 DDM 690 00 Input/Output Module.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 7	%I[\b.e\]r.m.7	Value
Input 8	%I[\b.e\]r.m.8	Value
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 7	%Q[\b.e\]r.m.7	Value
Output 8	%Q[\b.e\]r.m.8	Value

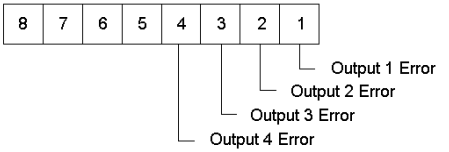
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Outputword 1	%QW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte (Outputs)

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



16-Point Input/8-Point Output Modules

The following information pertains to the 140 DAM 590 00 (AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4) and the 140 DDM 390 00 (DC Input 24 Vdc 2x8 / DC Output 24 Vdc 2x4) modules.

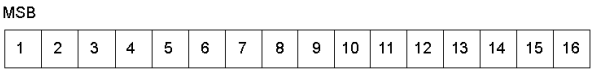
- 140 DAM 590 00 (AC Input 115 Vac 2x8 / AC Output 115 Vac 2x4)
- 140 DDM 390 00 (DC Input 24 Vdc 2X8 / DC Output 24 Vdc 2x4)

Flat Addressing

The modules listed above can be configured as either 16 contiguous `%I` references or as one `%IW` word and as one `%MW` word.

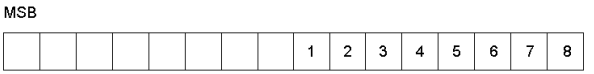
I/O Map Register (Inputs)

The following figure shows the `%IW` input word. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



I/O Map Assignment (Outputs)

The modules listed above can be configured as 8 `%M` references or as 1 `%MW` output word in the following format. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.



Topological Addressing

The following tables show the topological addresses for the 16/8-Point Input/Output Modules.

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 15	%I[\b.e\]r.m.15	Value
Input 16	%I[\b.e\]r.m.16	Value
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 7	%Q[\b.e\]r.m.7	Value
Output 8	%Q[\b.e\]r.m.8	Value

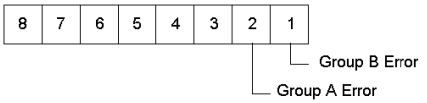
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Outputword 1	%QW[\b.e\]r.m.1.1	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte (Outputs)

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



Chapter 3
General Rules for Attaching Discrete and Analog Input/Output Modules Terminal Blocks

Attaching a Discrete and Analog Modules Terminal Blocks

At a glance

Attaching a terminal block to a discrete/analog module is decribed below.

Discrete Modules

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before mounting/removing a discrete module,

- remove the power to the module (sensors and pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

Analog Modules

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before mounting/removing an analog module,

- make sure that the terminal block is still connected to the ground, and
- remove the power to the module (sensors and pre-actuators).
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

Wiring Rules

					
mm^2	0.14…1.5	0.16…0.75	0.14…2.5	0.14…4	0.16…1.5
AWG	20…16	20…18	20…14	20…12	20…16

 Ø 3,5	 C	Nm	0.6
		pound-inch	5.4

Part II
Analog IN Modules

Introduction

The following part provides information on the Quantum Analog IN modules.

What Is in This Part?

This part contains the following chapters:

Chapter 4
140 ACI 030 00: Analog Current / Voltage IN Module

About this Chapter

The following chapter provides information of the Quantum 140 ACI 030 00 Module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

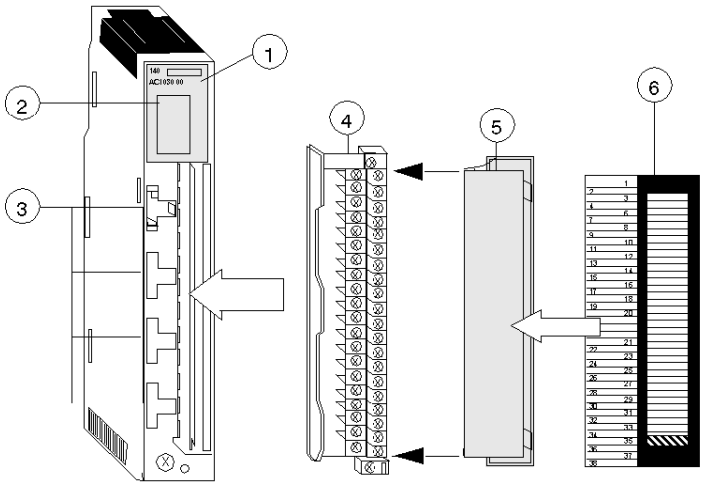
Function

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.

NOTE: This module is HART compatible

Illustration

The following figure shows the140 ACI 030 00 module and its components.



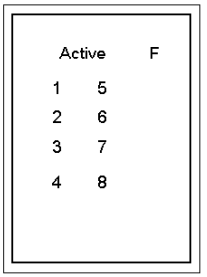
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ACI 030 00 module.



Description

The following table shows the LED descriptions for the 140 ACI 030 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.

Diagnostic

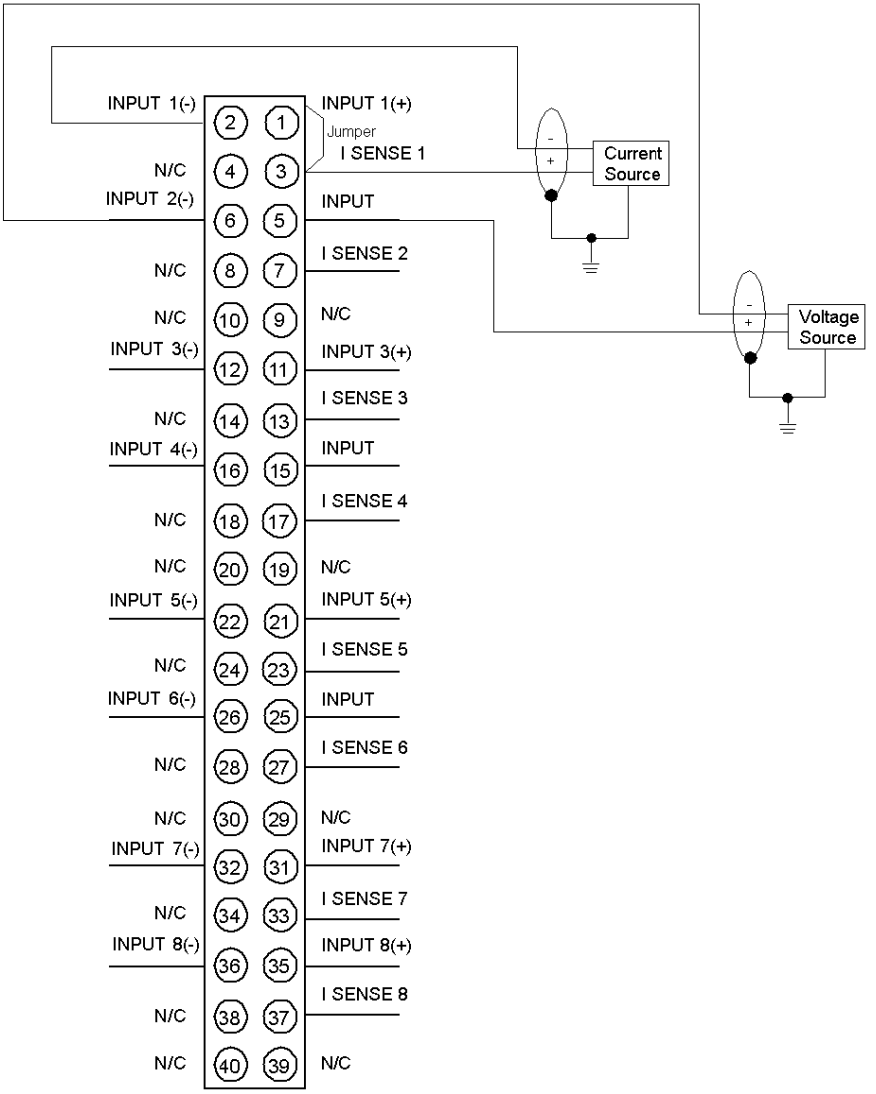
1. Unused inputs may cause the activation of the F LED. To avoid this occurrence, please wire unused channels in voltage mode to a channel that is in use.
2. This module produces an error signal F if any channel detects a broken wire condition in the 4-20 mA range or a under voltage condition in the 1-5 V range.

Wiring Diagram

Illustration

⚠ CAUTION
UNWIRED INPUTS CAUSE INVALID READINGS 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. The field wiring terminal strip must not be removed when the module is operating. **Failure to follow these instructions can result in injury or equipment damage.**

The following figure shows the wiring diagram for the 140 ACI 030 00 module.



External Wiring Recommendation

1. The user supplies the current and voltage sources (installation and calibration of fuses are at the discretion of the user).
2. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommanded.
3. Shielded cables should be connected to PLC's ground.
4. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
5. The maximum channel to channel working voltage cannot exceed 30 Vdc.
6. N / C = Not connected.

NOTE: if polarity is reversed the analog values becomes zero nothing happens to channel. The module is polarity sensitive and will read in one direction and not in the other direction but stay on zero.

NOTE: When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG (1.5 mm²) or 2-16 AWG (2 mm²); the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	8 Channel IN Differential
External Power	Not required
Bus Current required (Module)	240 mA
Power Dissipation	2 W
I/O map	9 input words
Error Detection	Broken wire (4 ... 20 mA mode) or under voltage range (1 ... 5 V)

Voltage / Input

Voltage / Input

Operating Voltage (Channel to Channel)	30 VDC (max.)
Absolute Voltage (max.)	50 VDC
Linear Mesuring Range	1 ... 5 VDC
Input Impedance	> 20 Mohms

Current / Input

Current / Input

Absolute Current (max.)	25 mA
Linear Measuring Range	4 ... 20 mA
Input Impedance	250 Ohms Internal conversion resistor
Maximum Overload Authorized for Inputs	Protected for accidental: -19.2 - 30 VDC wiring

Resolution / Conversion

Resolution / Conversion

Resolution	12 bit
Absolute Accuracy Error @ 25 degrees C (voltage mode)	Typical: +/- 0.05% of full scale Maximum: +/- 0.1% of full scale
Linearity	+/- 0.04%
Accuracy drift with temperature	Typical: +/- 0.0025% of full scale / degrees C Maximum: +/- 0.005% of full scale / degrees C
Common Mode Rejection	< -72 dB @ 60 Hz
Input Filter	Single pole low pass, -3 dB cutoff @ 15 Hz, +/- 20%
Update Time	5 ms for all channels

Isolation

Isolation

Channel to Bus	1000 VDC 3000 Vpp for 1 minute

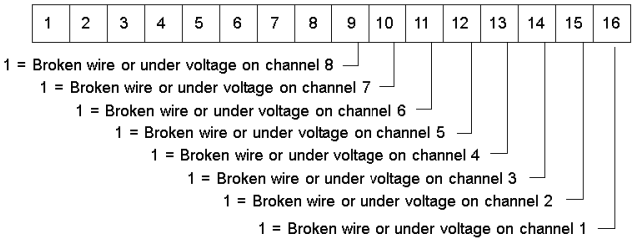
NOTE: Calibration is not required for this module.

Addressing

Flat Addressing

This module requires nine contiguous, 16-bit words-eight for input data and one for channel status. The data words formats are as follows.

The following shows the word 9 register.



NOTE: Count stops at 4095.

NOTE: The undervoltage for this module is 0.5 - 0.7 V.

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

Topological Addressing

Topological addresses for the 140 ACI 030 00 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Broken wire or under voltage
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Broken wire or under voltage
Status Word	%IW[\b.e\]r.m.9	Status of input channels

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 ACI 030 00 Input Module uses the `T_ANA_IN_VE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR

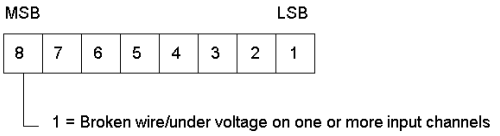
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for **%I** and **%Q**.

I/O Map Status Byte

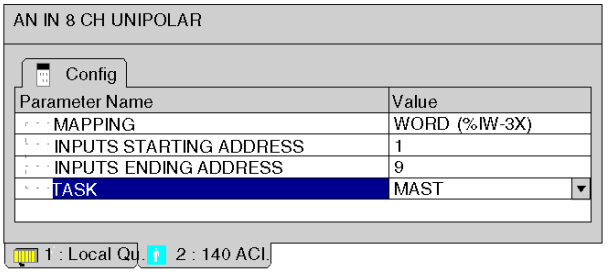
The I/O map status byte is used by the 140 ACI 030 00 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	9	-	includes a Statusword
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

Chapter 5
140 ACI 040 00: Analog Mixed Current IN Module

About this Chapter

The following chapter provides information on the Quantum 140 ACI 040 00 Module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

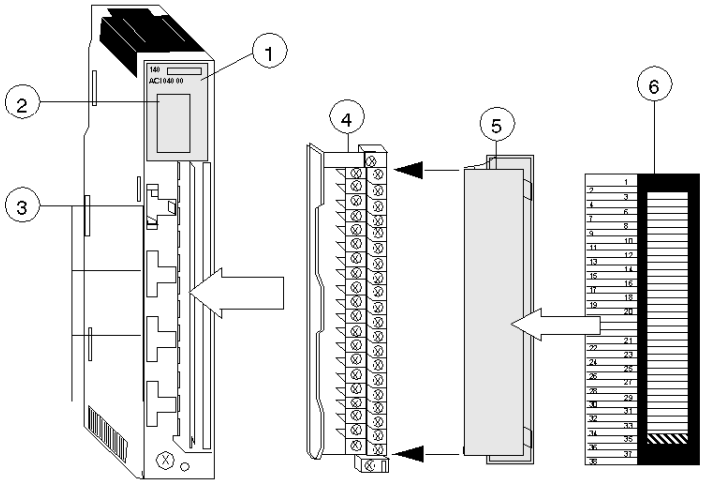
Function

The 140 ACI 040 00 is a 16 channel analog input module which accepts mixed current inputs.

NOTE: This module is HART compatible

Illustration

The following figure shows the140 ACI 040 00 module and its components.



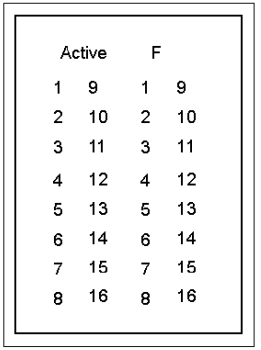
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ACI 040 00 module.



Descriptions

The following table shows the LED descriptions for the 140 ACI 040 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.

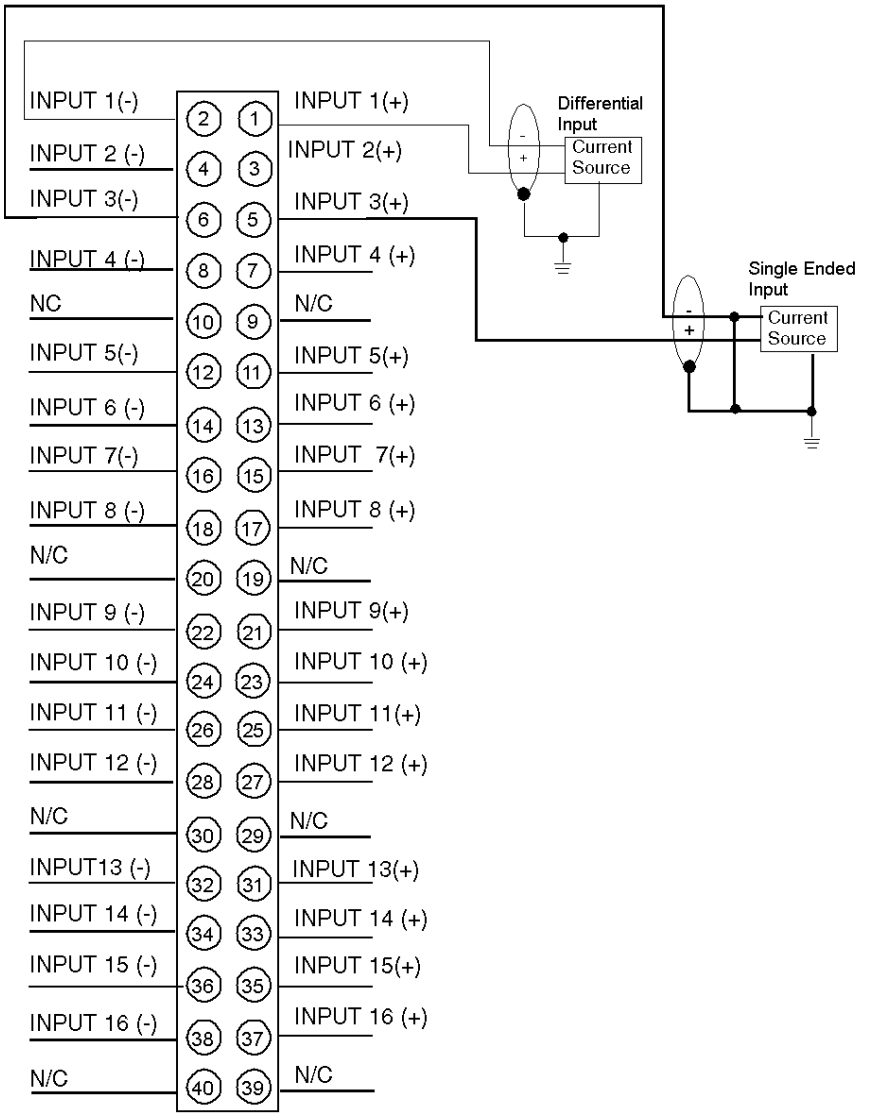
Diagnostics

1. Unused inputs may cause the activation of the F LED. To avoid this occurence, the unused channels should be configured in the 0...25 ma range.
2. This module produces an error signal F if any channel detects a broken wire condition in the 4...20 mA range.

Wiring Diagram

Illustration

Wiring diagram for the 140 ACI 040 00 Module.



External Wiring Recommendations

1. The user supplies the current and voltage sources (installation and calibration of fuses are at the discretion of the user).
2. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommanded.
3. Shielded cables should be connected to the PLC's ground.
4. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
5. The maximum channel to channel working voltage cannot exceed 30 Vdc.
6. N / C = Not connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 Channel IN (Differential or externally tied single ended)
External Power	Not required
Operating Voltage (Channel to Channel)	30 VDC (max.)
Bus Current required (Module)	360 mA
Power Dissipation	5 W
I/O map	17 input words
Error Detection	Broken wire (4 ... 20 mA mode)
Isolation (Field to Bus)	1780 VAC for 1 minute

Current / Input

Current / Input

Absolute Current (max.)	30 mA
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
Input Impedance	250 ohms nominal

Resolution / Conversion

Resolution / Conversion

Resolution	0 ... 25,000 counts 0 ... 20,000 counts 0 ...16,000 counts 0 ... 4,095 counts
Absolute Accuracy Error @ 25 degrees C	+/- 0.125% of full scale
Linearity (0 to 60 degrees C)	+/- 12 microA max., 4 ... 20 mA +/- 6 microA max., 0 ... 25 mA +/- 6 microA max., 0 ... 20 mA +/- 6 microA max., 4 ... 20 mA
Accuracy drift with temperature	Typical: +/- 0.0025% of full scale / degrees C Maximum: +/- 0.005% of full scale / degrees C
Common Mode Rejection	< -90 dB @ 60 Hz
Input Filter	Single pole low pass, -3 dB cutoff @ 34 Hz, +/- 25%
Update Time	15 ms for all channels

Fuses

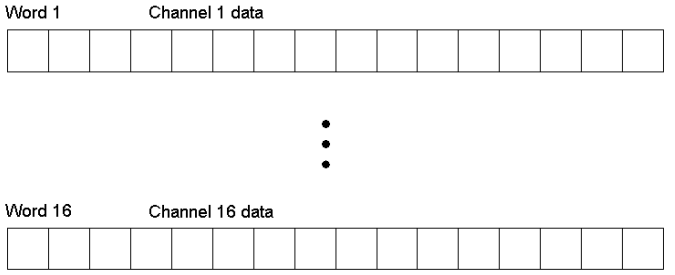
Fuses

Internal	None
External	User installed per local and national electrical codes

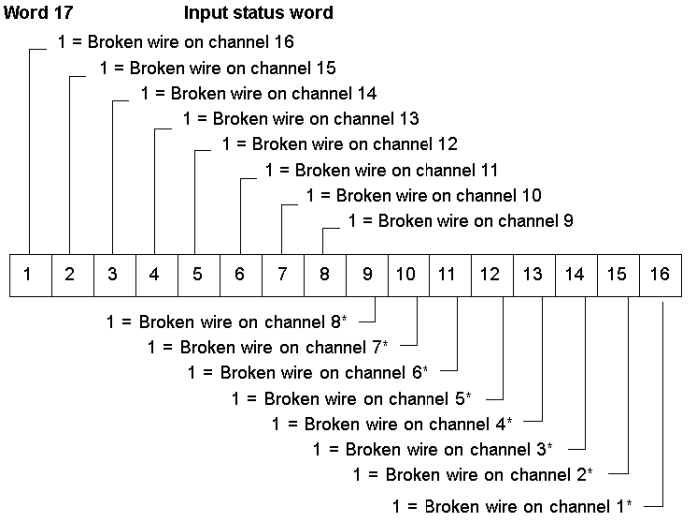
Addressing

Flat Addressing

This module requires 17 contiguous, 16-bit words—16 for input data and one for channel status. The data words formats are as follows.



The following shows the word 17.



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

Topological Addressing

Topological addresses for the 140 ACI 040 00 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Broken wire or under voltage
• • •		
Input 16	%IW[\b.e\]r.m.16	Value
	%I[\b.e\]r.m.16.1	Broken wire or under voltage
Status Word	%IW[\b.e\]r.m.17	Status of input channels

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 ACI 040 00 Input Module uses the `T_ANA_IN_VE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR

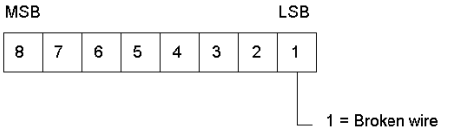
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

I/O Map Status Byte

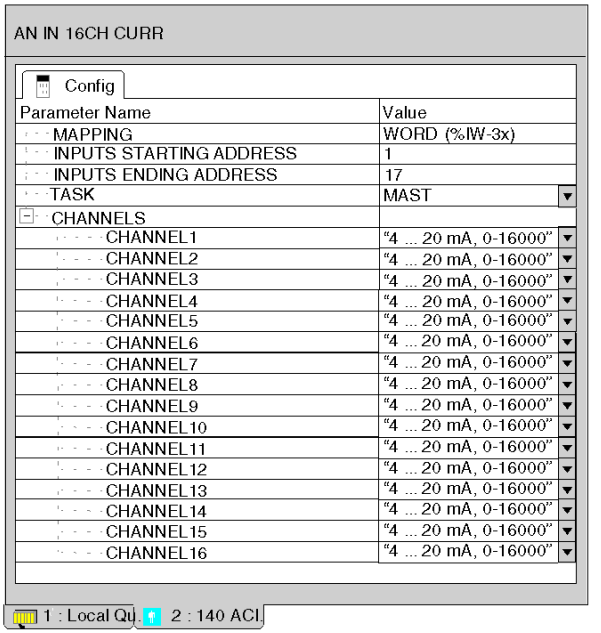
The I/O map status byte is used by the 140 ACI 040 00 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	17	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels			
Channel1-Channel16	"4 ... 20 mA, 0-16000"	"4 ... 20 mA, 0-4095" "0 ... 20 mA, 0-20000 "0 ... 25 mA, 0-25000	

Chapter 6
140 ARI 030 10: Analog RTD IN Module

About this Chapter

The following chapter provides information of the Quantum 140 ARI 030 10 Module.

What Is in This Chapter?

This chapter contains the following topics:

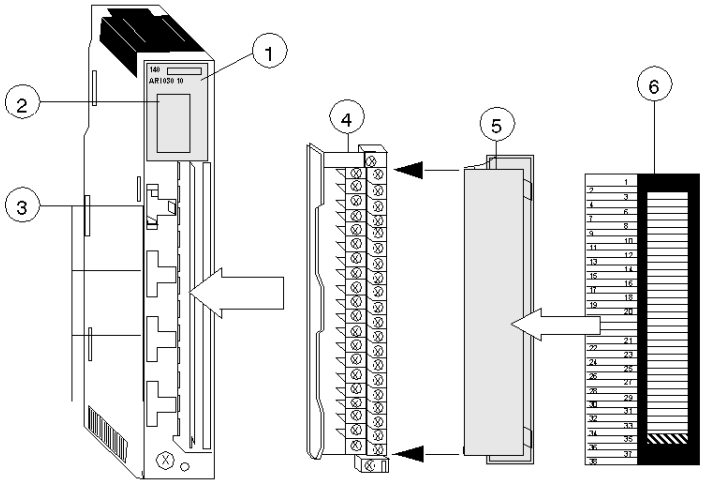
Presentation

Function

The Analog 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.

Illustration

The following figure shows the 140 ARI 030 10 module and its components.



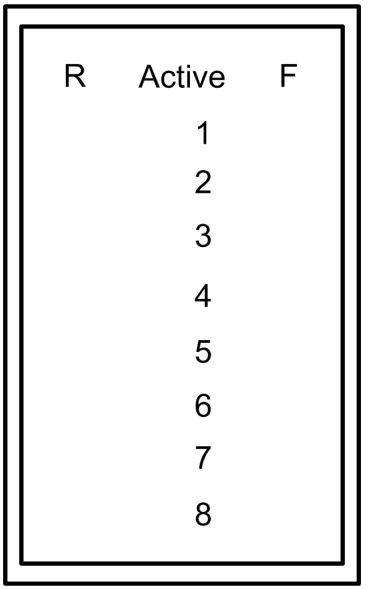
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ARI 030 10 module.



Description

The following table shows the LED descriptions for the 140 ARI 030 10 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
R	Green	Module has passed power up diagnostics
1 ... 8	Red	There is a detected error on the indicated point or channel. This includes broken wire and short circuit conditions.

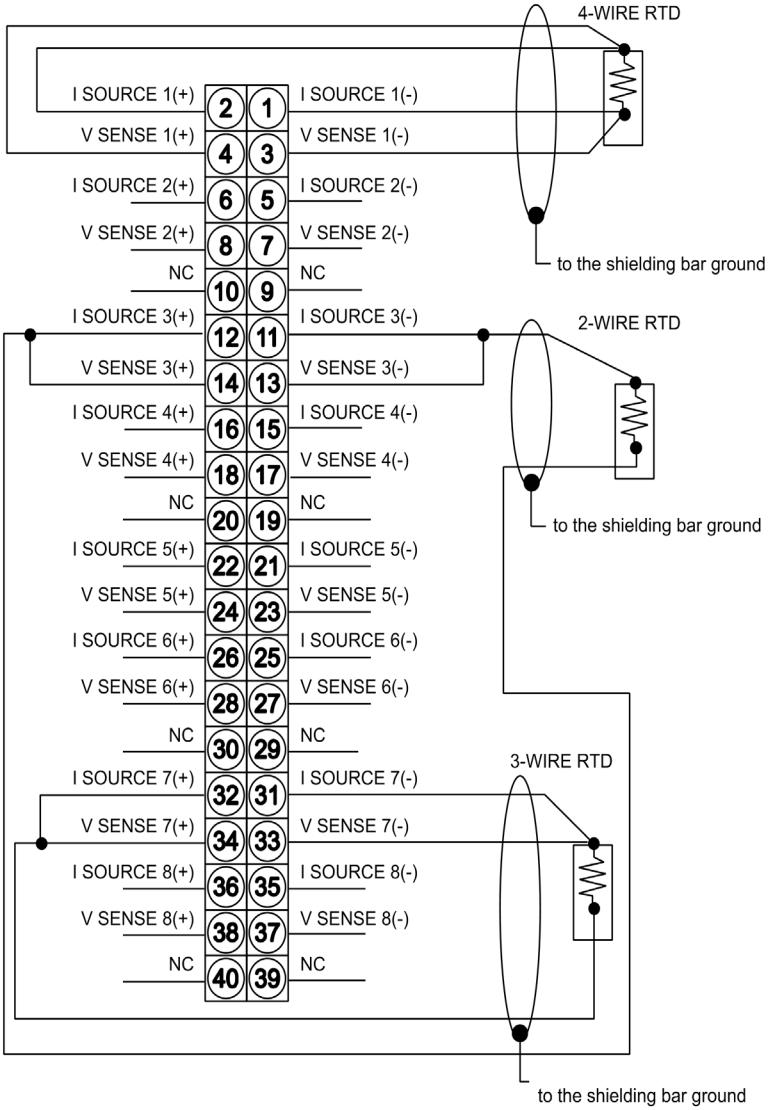
Diagnostic

1. When using **2-wire configurations**, the temperature equivalent of **twice** the lead resistance of one leg must be subtracted from the temperature reading

Wiring Diagram

Illustration

The following figure shows the wiring diagram of the 140 ARI 030 10.



External Wiring Recommendation

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

NOTE: When field wiring the I/O module, the maximum wire size is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

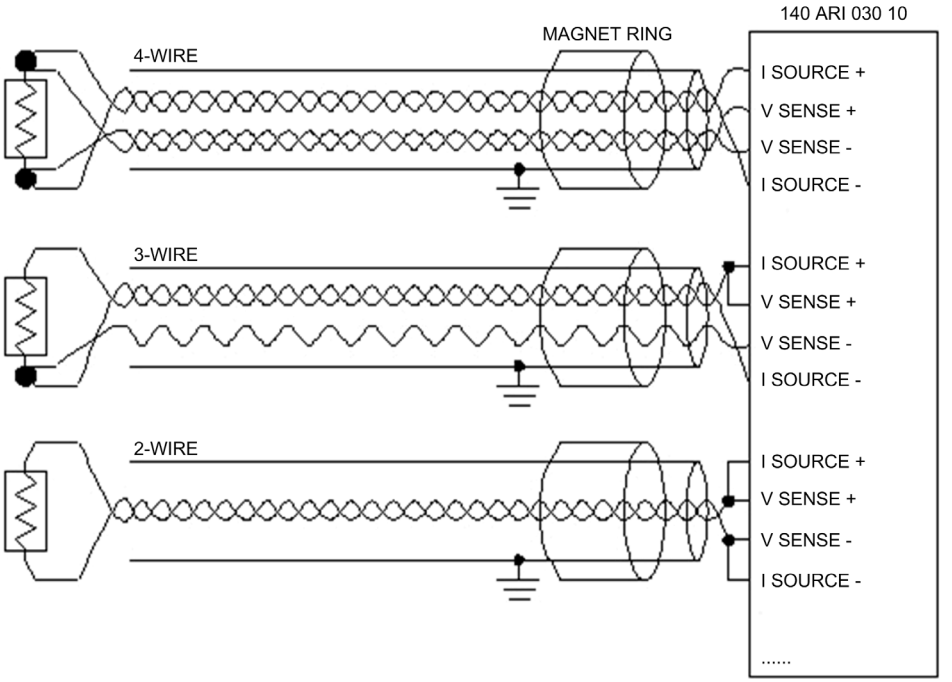
NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

EMC Instructions

Illustration

The following figure shows the wiring diagram of the 140 ARI 030 10 module in a high-interference environment.



Instruction Notes

- Use twisted-pair shielded cable in a high-interference environment.
- Ground the cable shield close to the module side.
- We recommend that you put the magnet ring close to the module side. When using twisted-pair is difficult (especially for 3-wire), use the magnet ring.

Follow the pattern in the table for twisted-pair:

Step	Mode	Description
1	4-wire	**ISOURCE+** twisted with **ISOURCE-** **VSENSE+** twisted with **VSENSE-**
2	3-wire	**ISOURCE+/VSENSE+** twisted with **ISOURCE-** **VSENSE+** go alone — or — **ISOURCE+/VSENSE+** twisted with **VSENSE-** **ISOURCE+** go alone
3	2-wire	**ISOURCE+/VSENSE+** twisted with **ISOURCE-/VSENSE-**

140 ARI 030 10 Specifications

General Specifications

Module Type	8 Channel IN (RTD)
External Power	Not required
Bus Current required (Module)	200 mA
Power Dissipation	1 W
I/O map	9 input words
Input Impedance	> 10 MΩ
Error Detection	Out of range or 8 red LEDs to indicate broken wire conditions.

RTD-Types / Range

IEC Platinum: PT 100, PT 200, PT 500, PT 1000	-200 ... +850 degrees C
American Platinum: PT 100, PT 200, PT 500, PT 1000	-100 ... +450 degrees C
Nickel: N 100, N 200, N 500, N 1000	-60 ... +180 degrees C

Measurement Current

PT 100, PT 200, N100, N200	2.5 mA
PT 500, PT 1000, N 500, N 1000	0.5 mA

Resolution / Conversion

Resolution	0.1 degree C
Absolute Accuracy Error	+/- 0.5 degrees C (25 degrees C) +/- 0.9 degrees C (0 ... 60 degrees C)
Linearity (0 to 60 degrees C)	+/- 0.01% of full scale (0 ... 60 degrees C)

Isolation

Channel to Channel	300 Vpp
Channel to Bus	1780 VAC @ 47 ... 63 Hz for 1 minute 2500 VDC

Update Time (all channels)

2-wire 4-wire	640 ms
3-wire	1.2 s

Overvoltage Protection

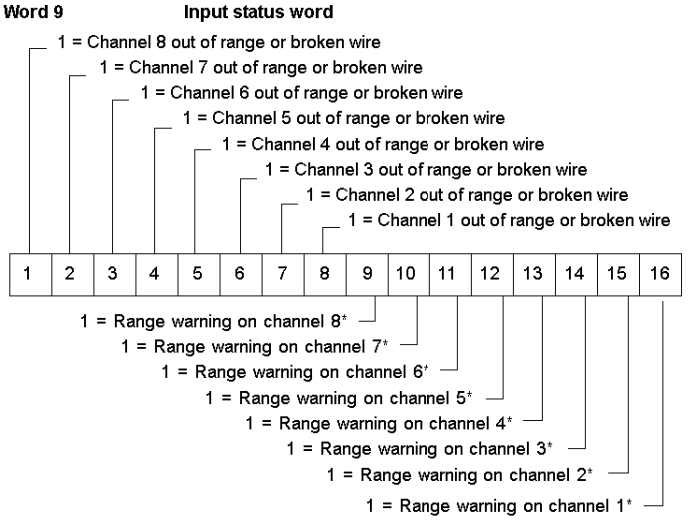
Maximum input voltage (destruction limits)	Differential voltage of 50 Vdc or 30 Vac

Addressing

Flat Addressing

This module requires nine contiguous, 16-bit words—eight for input data and one for channel status. The data word 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. 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 (if set) when the out-of-range bit is set.

Topological Addressing

Topological addresses for the 140 ARI 030 10 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Broken wire or Out of range
	%I[\b.e\]r.m.1.2	Range warning
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Broken wire or Out of range
	%I[\b.e\]r.m.8.2	Range warning
Status Word	%IW[\b.e\]r.m.9	Status of input channels

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 ARI 030 10 Input Module uses the `T_ANA_IN_VE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR
	%Ir.m.c.2	Bool	.WARNING

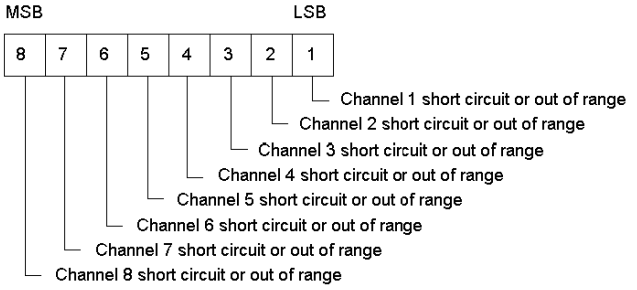
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

I/O Map Status Byte

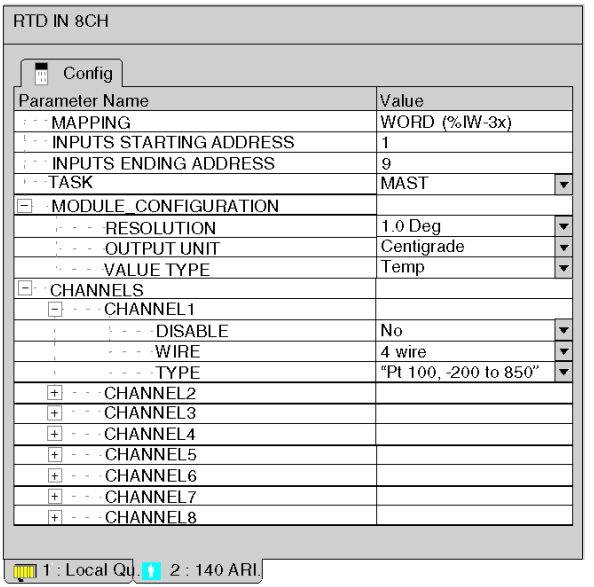
The I/O map status byte is used by the 140 ARI 030 10 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	9	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Module_Configuration			
Resolution	1.0 Deg	0.1 Deg	
Output Unit	Centigrade	Fahrenheit	
Value Type	Temp	Raw Value	
Channels Channel1			

Name	Default Value	Options	Description
Disable	No	Yes	
Wire	4 wire	2 wire 3 wire	
Type	"Pt 100, -200 to 850"	"Pt 200, -200 to 850" "Pt 500, -200 to 850" "Pt 1000, -200 to 850" "Ni 100, -200 to 850" "Ni 200, -200 to 850" "Ni 500, -200 to 850" "Ni 1000, -200 to 850" "R, 0 to 766,66 ohms" "R, 0 to 4000 ohms" "Apt 100, -100 to 450" "Apt 200, -100 to 450" "Apt 500, -100 to 450" "Apt 1000, -100 to 450"	
Channel2-Channel8			see Channel1

Chapter 7
140 ATI 030 00: Analog TC IN Module

About this Chapter

The following chapter provides information on the Quantum 140 ATI 030 00 module.

What Is in This Chapter?

This chapter contains the following topics:

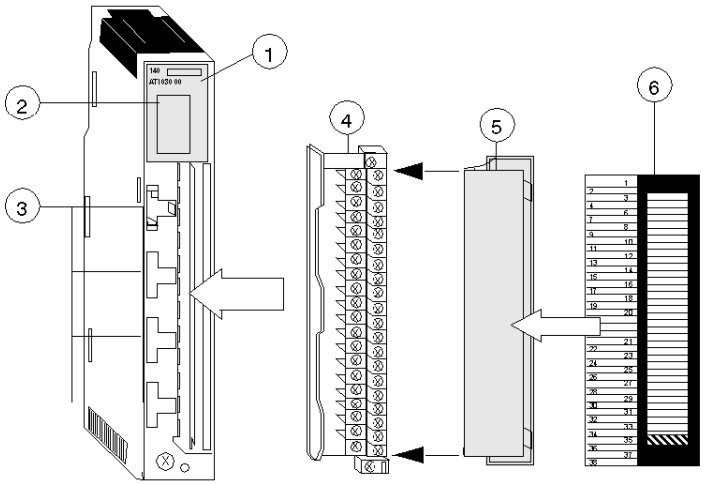
Presentation

Function

The140 ATI 030 00 is an 8-channel thermocouple input module.

Illustration

The following figure shows the 140 ATI 030 00 module and its components.



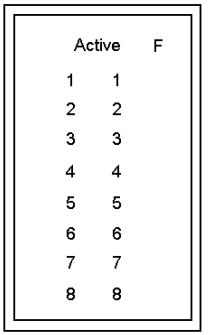
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ATI 030 00 module.



Description

The following table shows the LED descriptions for the 140 ATI 030 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
1 ... 8	Green	The indicated point or channel is turned ON.
1 ... 8	Red	Indicated channel is out of range. Broken wire condition is detected

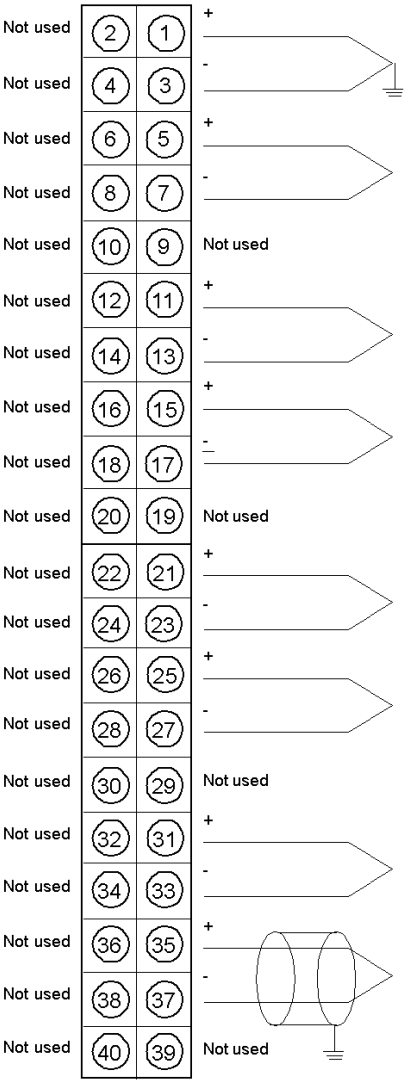
Diagnostic

1. All TC ranges have an open TC detect and upscale output. This results in a reading of 7FFF hexadecimal (32767 decimal) when an open TC is detected.

Wiring Diagram

Illustration

The following figure shows the wiring diagram of the 140 ATI 030 00.



External Wiring Recommendation

1. Use shielded TCs. (The user should consider using shielded wire in a noisy environment.)
2. Shielded types should be connected to the PLC's ground.
3. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*
4. 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.
5. The 140 CFA 040 00 CableFast block can be used. However it can create a temperature variation up to 35.6 °F (2 °C). For more information, refer to the Modicon Quantum Automation Series Hardware Reference Guide (840 USE 100).

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

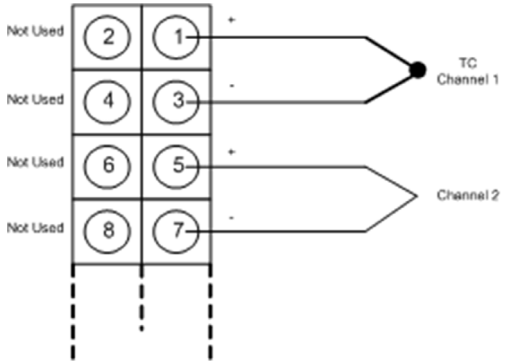
Using Cold Junction Compensation (CJC)

For temperature measurements, the 140 ATI 030 00 provides an internal CJC. However, a remote CJC can be used with the following TC types: J,K and T. The TC must be connected to Channel 1.

NOTE:
Recomendation when using remote CJC:

- To obtain the best accuracy when using a remote CJC, connect it as close as possible from the 140 ATI 030 00 module.
- The distance between the external CJC and the module affects the temperature measurement accuracy.
- The usage of CableFast with a remote CJC is not recommended.

The following diagram shows how to connect a remote Cold Junction Compensation using a temperature compensation on the 140 ATI 030 00:



For more information on the 140 ATI 030 00 please refer to the Modicon Quantum Automation Series Hardware Reference Guide (840 USE 100).

Specifications

General Specifications

General Specifications

Module Type	8 Channel IN TC
External Power	Not required
Operating Voltage (Channel to Channel)	220 VAC @ 47 ... 63 Hz or 300 VDC max.
Bus Current required (Module)	280 mA
Power Dissipation	1.5 W
I/O map	10 input words
Error Detection	8 red LEDs to indicate out of range or broken wire conditons

Range

Range

TC Types: J K E T S R B	Range (degrees C): -210 ... +760 -270 ... +1370 -270 ... +1000 -270 ... +400 -50 ... +1665 -50 ... +1665 +130 ... +1820
Millivolt Ranges (Open circuit detect can be disabled on these ranges)	-100 mV ... +100 mV -25 mV ... +25 mV

Resistance / Filter

Resistance / Filter

TC Resistance / Max. Source Resistance	200 ohms for rated accuracy
Input Impedance	> 1 Mohms
Input Filter	Single low pass @ nominal 20 Hz plus notch filter at 50 / 60 Hz

Noise Rejection / CJC

Noise Rejection / CJC

Normal Noise Rejection	120 dB min. @ 50 or 60 Hz
Cold Junction Compensation (CJC)	Internal CJC operates 0 ... 60 degrees 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.

Resolution

Resolution

TC Ranges	1 degree C (default) 0.1 degree C 1 degree F 0.1 degree F
Millivolt Ranges	100 mV range , 3.05 µV (16 bit) 25 mV range , 0.76 µV (16 bit)

Absolute Accuracy, Update and Configuration Time

⚠ CAUTION

RISK OF TEMPORARY INVALID INITIAL INPUT TEMPERATURE VALUE.

Delay the temperature input processing by 2 seconds in the application:

- after the 140 ATI 030 00 health bit has changed from 0 to 1
- after a power cycle (warm restart) if the 140 ATI 030 00 is in the local rack

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

RISK OF TEMPORARY INVALID INITIAL INPUT STATUS INFORMATION.

Delay the channel status information processing by 2 seconds in the application:

- after the 140 ATI 030 00 health bit has changed from 0 to 1
- after a power cycle (warm restart) if the 140 ATI 030 00 is in the local rack

Failure to follow these instructions can result in injury or equipment damage.

NOTE: The 140 ATI 030 00 temperature input processing hardware requires a relatively long time to configure. This effect must be taken into account during special cases:

- When the PLC is in RUN mode and the module becomes power-cycled,
- When the PLC is in RUN mode and the module is hot swapped.

In these cases, the module becomes healthy before the input hardware initialization has completed. During this time, invalid temperature values and status information could be received from the module (see input words 1-10 and I/O map status byte).

Absolute accuracy, update and configuration time

TC Absolute Accuracy (see Note 1)	Types J, K, E, T (see Note 2): +/- 2 degrees C plus +/- 0.1% reading Types S, R, B (see Note 3): +/- 4 degrees C plus +/- 0.1% reading
Millivolt Absolute Accuracy @ 25 degrees C	+/- 20 microV +/- 0.1% of reading
Accuracy Drift with Temperature	0.15 µV / degrees C + 0.0015% of reading / degrees C max.
Update Time	1 s (all channels)
Configuration Time	2 s (all channels)

Isolation

Isolation

Channel to Bus	1780 VAC @ 47 ... 63 Hz or 2500 VDC for 1 minute

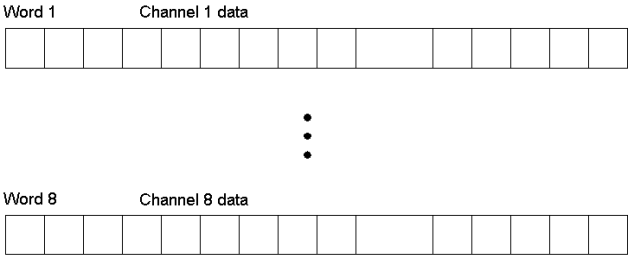
Notes on Specifications

- Absolute accuracy includes errors from the internal CJC, TC – curvature, offset plus gain, for module temperature of 0 ... 60 degrees C. User supplied TC errors not included.
- For Type J and K, add 1.5 degrees C inaccuracy for temperatures below -100 degrees C.
- Type B cannot be used below 130 degrees C.

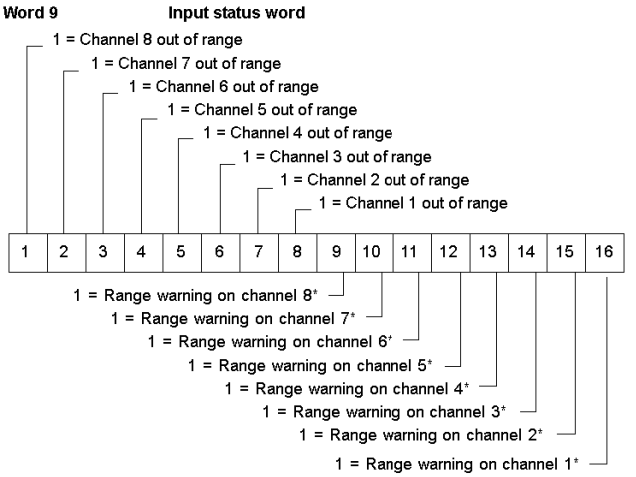
Addressing

Flat Addressing

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.

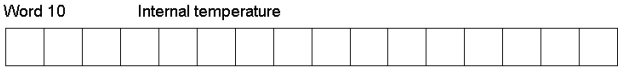


The following shows the word 9 register.



* A range warning is issued when a channel input exceeds the rated input value. 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 (if set) when the out-of-range bit is set.

The following figure shows the word 10 register.



Topological Addressing

Topological addresses for the 140 ATI 030 00 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Out of range
	%I[\b.e\]r.m.1.2	Range warning
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Out of range
	%I[\b.e\]r.m.8.2	Range warning
Status Word	%IW[\b.e\]r.m.9	Status of input channels
Internal Temperature	%IW[\b.e\]r.m.10	Internal module temperature

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140ATI03000 Input Module uses the `T_ANA_IN_VWE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VWE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR
	%Ir.m.c.2	Bool	.WARNING

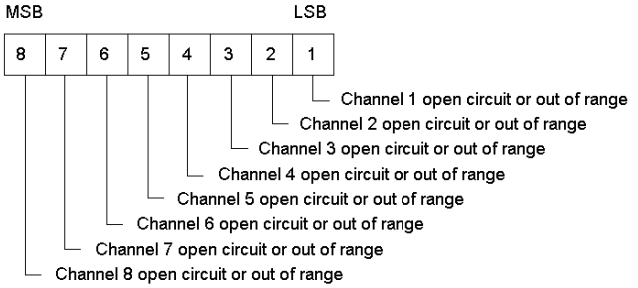
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for **%I** and **%Q**.

I/O Map Status Byte

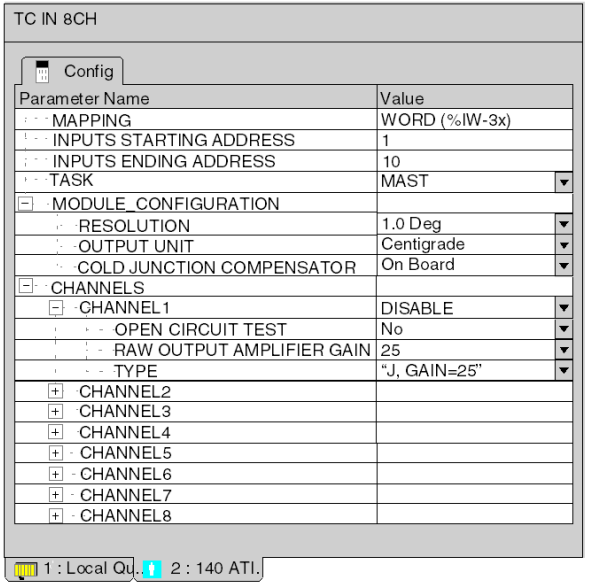
The I/O map status byte is used by the 140 ATI 030 00 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	10	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Module_Configuration			
Resolution	1.0 Deg	0.1 Deg	
Output Unit	Centigrade	Fahrenheit	
Cold Junction Compensator	On Board	Channel 1	
Channels			

Name	Default Value	Options	Description
Channel1	DISABLE	ENABLE	
Open Circuit Test	No	Yes	
Raw Output Amplifier Gain	25	100	
Type	"J, Gain=25"	"K, Gain=25" "E, Gain=25" "T, Gain=100" "S, Gain=100" "R, Gain=100"	
Channel2-Channel8			see Channel1

Chapter 8
140 AVI 030 00: Analog Mixed Current/Voltage IN Module

About this Chapter

The following chapter provides information on the Quantum 140 AVI 030 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

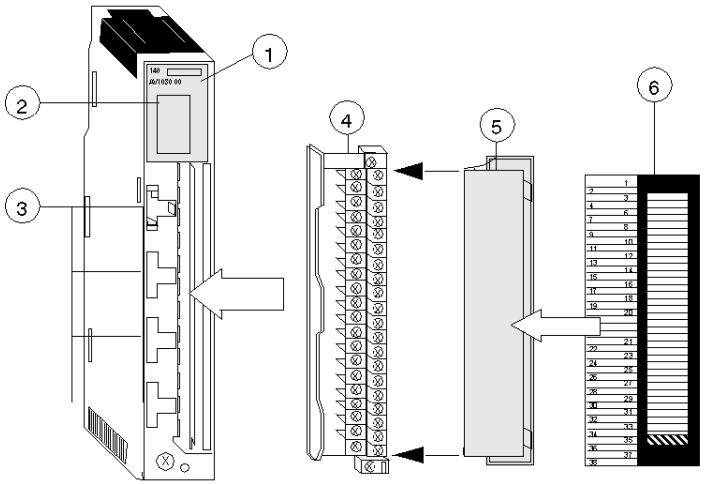
Function

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.

NOTE: This module is not HART compatible

Illustration

The following figure shows the 140 AVI 030 00 module and its components.



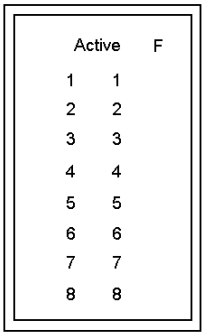
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 AVI 030 00 module.



Description

The following table shows the LED descriptions for the 140 AVI 030 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
1 ... 8	Red	Indicated channel is out of range (1 ... 5 V) Broken wire condition is detected (4 ... 20 mA)

Diagnostic

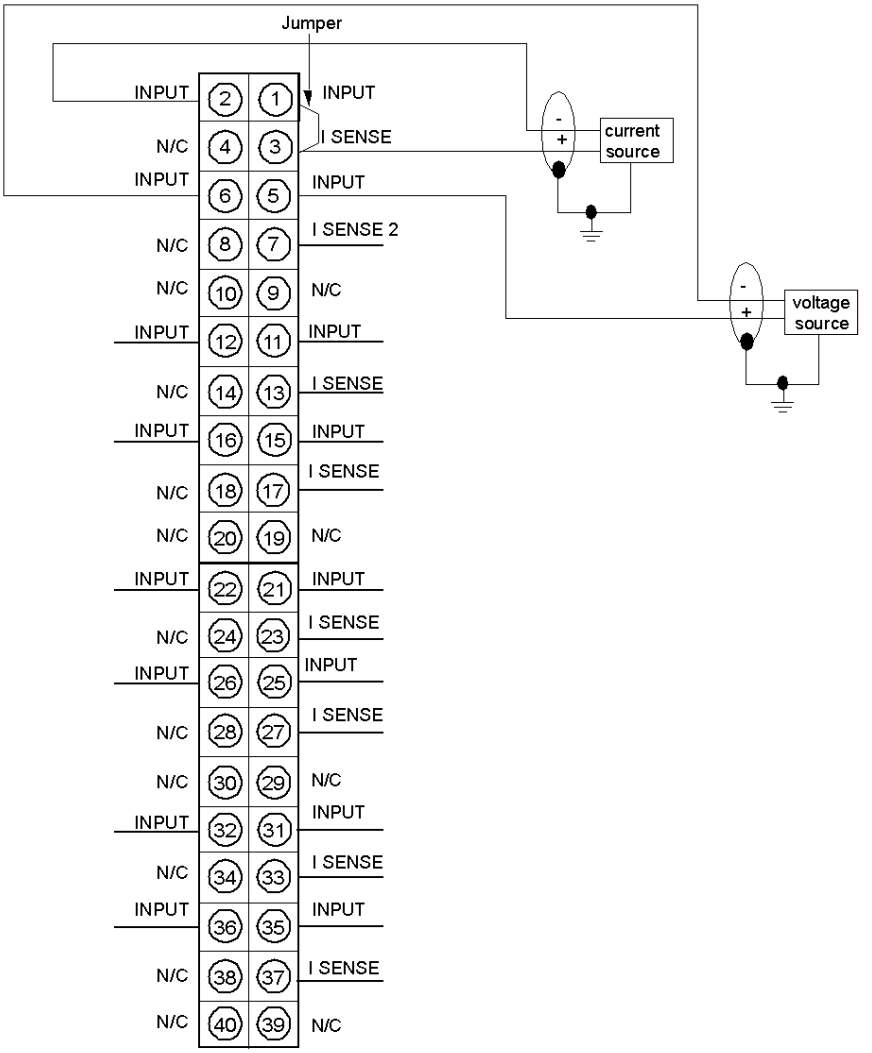
1. To prevent improper fault indications, unused inputs should have the + (plus) and – (minus) inputs tied together and be configured for a bipolar input range.

Wiring Diagram

Illustration

⚠ CAUTION
UNWIRED INPUTS CAUSE INVALID READINGS 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. The field wiring terminal strip must not be removed when the module is operating. **Failure to follow these instructions can result in injury or equipment damage.**

The following figure shows the 140 AVI 030 00 wiring diagram.



External Wiring Recommendation

1. The user supplies the current and voltage sources (installation and calibration of fuses are at the discretion of the user).
2. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommended.
3. Shielded cables should be connected to the PLC's ground.
4. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
5. N / C = Not connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	8 Channel IN Differential
External Power	Not required
Operating Voltage (Channel to Channel)	200 VDC 135 VAC rms max.
Bus Current required (Module)	280 mA
Power Disssipation	2.2 W
I/O map	9 input words
Error Detection	Broken wire in 4 ... 20 mA mode, Out of range

Operating Ranges

Operating Ranges

Bipolar	+/- 10 VDC +/- 5 VDC +/- 20 mA
Unipolar	0 ...10 VDC 0 ... 5 VDC 0 ... 20 mA
Unipolar with Offset	1 ... 5 VDC 4 ... 20 mA

NOTE: The Operating Ranges are selectable on a per-channel base.

Voltage / Input

Voltage / Input

Absolute Voltage (max.)	50 VDC
Linear Mesuring Range	(Input range) x 1.024
Input Impedance	> 20 Mohms

Current / Input

Current / Input

Absolute Current (max.)	25 mA
Linear Measuring Range	Input range) x 1.024
Input Impedance	250 ohms +/- 0.01%

Resolution / Conversion

Resolution / Conversion

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
Accuracy Error @ 25 degrees C	Voltage Mode: Typical: +/- 0.03% of full scale (+-10V, 0..10V) Maximum: +/- 0.05% of full scale (+-10V, 0..10V) Current Mode: Add an extra +/- 0.03%
Accuracy Drift with Temperature	Typical: +/- 0.0015% of full scale / degrees C Maximum: +/- 0.004% of full scale / degrees C
Linearity	+/- 0.008%
Common Mode Rejection	> -80 dB @ 60 Hz
Input Filter	Single pole low pass, -3 dB @ 847 Hz, +/- 20%
Update Time	10 ms for all channels

Accuracy Error @ 25 degrees C:

Input range	Typical (Absolute error)	Maximum (Absolute Error)
+/- 10 VDC, +/- 5 VDC	+/- 6 mV	+/- 10 mV
0...10 VDC, 0...5 VDC, 1...15VDC	+/- 3 mV	+/- 5 mV
+/- 20 mA	+/- 48 µA	+/- 64 µA
0...20 mA, 4...20 mA	+/- 24 µA	+/- 32 µA

Isolation

Isolation

Channel to Bus	500 VAC rms for 1 minute 750 VDC rms for 1 minute

NOTE: Calibration is not required for this module.

Linear Measuring Ranges Table

The following table shows the linear measuring ranges for the 140 AVI 030 00 Analog Input Module.

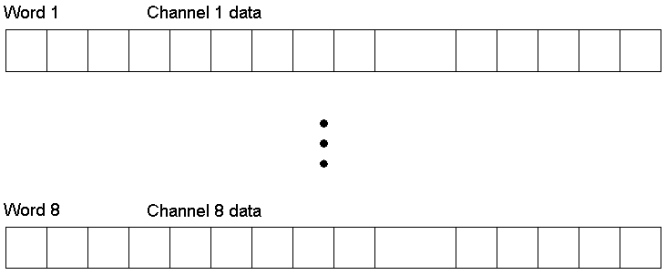
Data Format	Input	Under Range	Normal	Over Range
16-bit Format	+/- 10 V	< 768	768 ... 64768	> 64768
	+/- 5 V, +/- 20 mA	< 16768	16768 ... 48768	> 48768
	0 ... 10 V		0 ... 64000	> 64000
	0 ... 5 V, 0 ... 20 mA		0 ... 32000	> 32000
	1 ... 5 V, 4 ... 20 mA	<6400	6400 ... 32000	> 32000
Voltmeter* Format	+/- 10 V	< -10000	-10000 ... 10000	> 10000
	+/-5 V	< -5000	-5000 ... 5000	> 5000
	0 ... 10 V		0 ... 10000	> 10000
	0 ... 5 V		0 ... 5000	> 5000
	1 ... 5 V	< 1000	1000 ... 5000	> 5000
	+/- 20 mA	< 1000	-20000 ... 20000	> 20000
	0 ... 20 mA		0 ... 20000	> 20000
	4 ... 20 mA	< 4000	4000 ... 20000	> 20000
12-bit Format	+/- 10 V	0	0 ... 4095	4095
	+/- 5 V, +/- 20 mA	0	0 ... 4095	4095
	0 ... 10 V		0 ... 4095	4095
	0 ... 5 V, 0 ... 20 mA		0 ... 4095	4095
	1 ... 5 V, 4 ... 20 mA	0	0 ... 4095	4095

* The Voltmeter ranges are listed in Modsoft signed format.

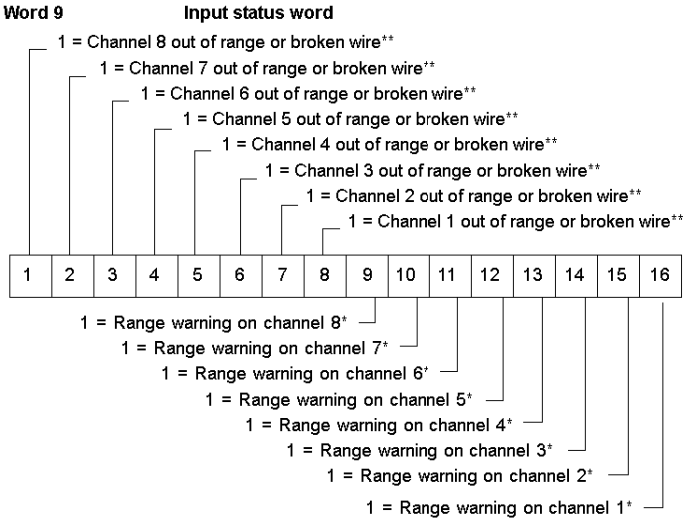
Addressing

Flat Addressing

This module requires nine contiguous, 16-bit words—eight for input data and one for channel status. 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. Warning bit 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% or when a broken wire (4 ... 20 mA or 1 ... 5 V mode) is sensed on the channel. 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).

Topological Addressing

Topological addresses for the 140 AVI 030 00 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Out of range
	%I[\b.e\]r.m.1.2	Range warning
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Out of range
	%I[\b.e\]r.m.8.2	Range warning
Status Word	%IW[\b.e\]r.m.9	Status of input channels

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140AVI03000 Input Module uses the `T_ANA_IN_VWE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VWE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR
	%Ir.m.c.2	Bool	.WARNING

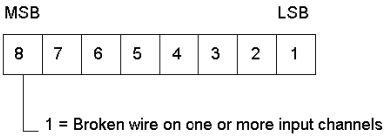
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for **%I** and **%Q**.

I/O Map Status Byte

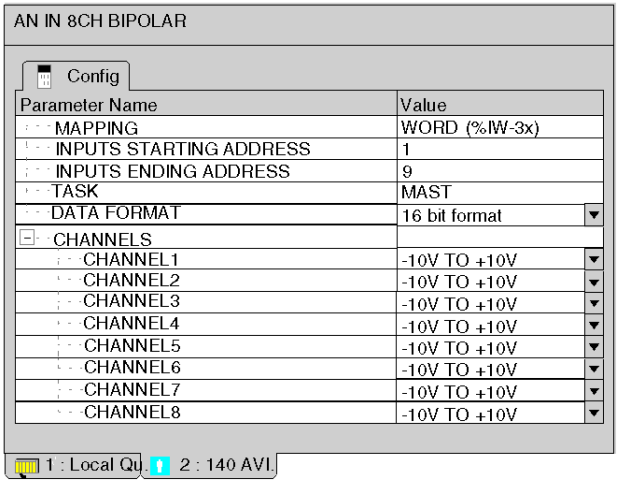
The I/O map status byte is used by the 140 AVI 030 00 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	9	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Data Format	16 bit format	Volt Meter 12 bit format	
Channels			
Channel1	-10 TO +10V	-10V TO +10V 0V TO +10V -5V TO +5V 0V TO +5V +1V TO +5V -20 mA TO +20mA	
Channel2-Channel8			see Channel1

Part III
Analog OUT Modules

Introduction

The following part provides information on the Quantum Analog OUT modules.

What Is in This Part?

This part contains the following chapters:

Chapter 9
140 ACO 020 00: Analog Current OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 ACO 020 00 module.

What Is in This Chapter?

This chapter contains the following topics:

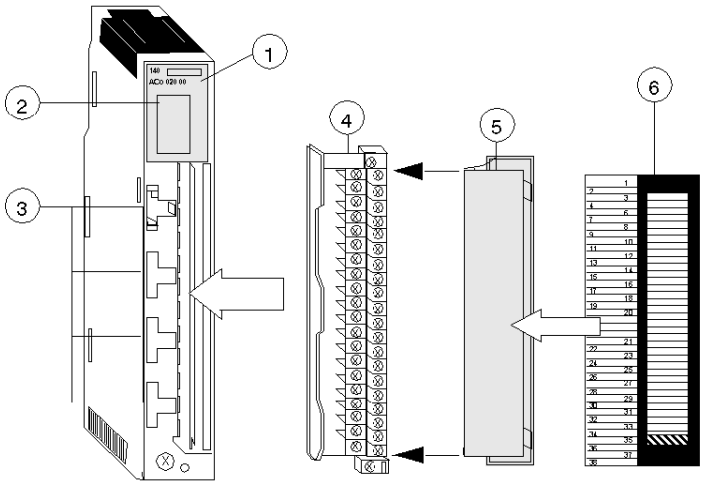
Presentation

Function

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

Illustration

The following figure shows the 140 ACO 020 00 module and its components.



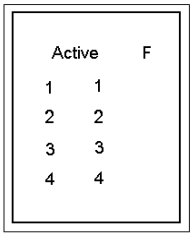
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ACO 020 00 module.



Description

The following table shows the LED descriptions for the 140 ACO 020 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
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 .

Diagnostic

1. 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.

Wiring Diagram

Illustration

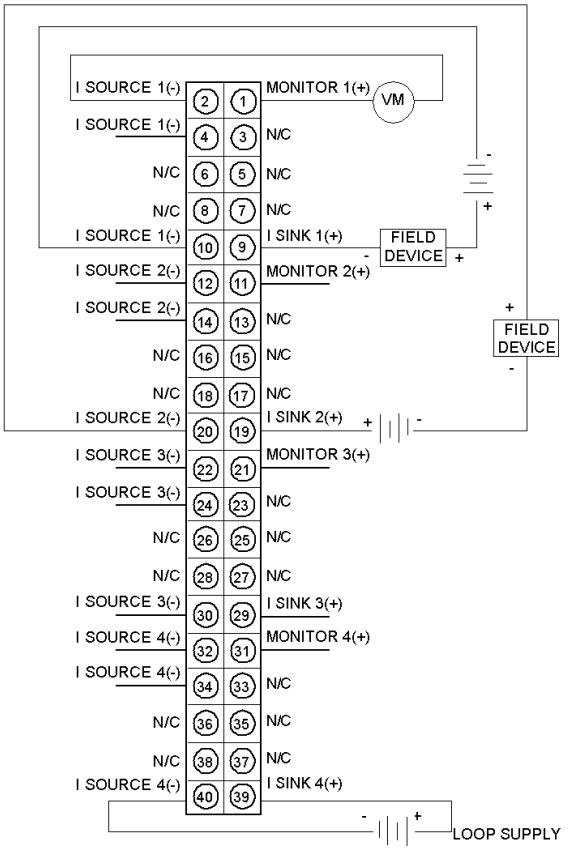
⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Before removing the connector, remove the field power or ensure that the pre-actuator wiring can remain in an open circuit condition.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following figure shows the wiring diagram for the 140 ACO 020 00 module.



External Wiring Recommendation

1. The user supplies the current and voltage sources (installation and calibration of fuses are at the discretion of the user).
2. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommended.
3. Shielded cables should be connected to the PLC's ground.
4. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
5. Unused channels 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
6. The wiring example shows Channel 1 acting as a current sink and Channel 2 acting as a current source for their respective field devices.
7. N / C = Not Connected.

NOTE: 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.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	4 Channel OUT
External Power	Loop Voltage:12 ... 30 VDC, up to 60 VDC with an external loop resistor
Bus Current required (Module)	480 mA
Power Dissipation	5.3 W max.
I/O map	4 output words
Error Detection	Open circuit in 4 ... 20 mA mode. Specific channel is identified when an open circuit is detected through the red channel LED.

Voltage

Voltage

Loop Voltage	12 ... 30 VDC, up to 60 VDC with an external loop resistor
Loop Resistance	R_{MIN} * = (V_{LOOP} - 30 VDC) / 0.02 A R_{MAX} = (V_{LOOP} - 7 VDC) / 0.02 A * No R_{MIN} is required for loop voltage less than 30 VDC
Internal Voltage Drop	7 VDC min., 30 VDC max. @ 20 mA

Resolution / Conversion

Resolution

Resolution	12 bit
Accuracy Error at 25 degrees C	+/- 0.20% of full scale
Accuracy Drift with Temperature	Typical: 0.004% of full scale / degrees C. Maximum: 0.007% of full scale / degrees C.
Linearity	+/- 1 LSB
Update Time	3 ms for all Channels (simultaneous update)
Settling time	900 µs to +/- 0.1 % of final value

Isolation

Isolation

Channel to Bus	1780 VAC @ 47 ... 63 Hz or 2500 VDC for 1 minute
Channel to Channel	500 VAC @ 47 ... 63 Hz or 750 VDC for 1 minute

Fuses

Fuses

Internal	Not required
External	-

NOTE: When the green channel status LEDs are off, the loop current is 0 mA.

Voltmeter Monitor Specifications Table

The following table shows the 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	300 ohms Typical
Wiring Length	1 m max.

Addressing

Flat Addressing

This module requires four contiguous, 16-bit words (%MW) for output data. The data words formats are as follows.

Topological Addressing

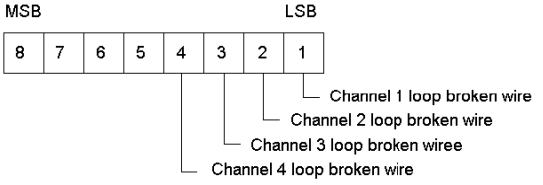
Topological addresses for the 140 ACO 020 00 Output Module:

Point	I/O Object	Comment
Output 1	%QW[\b.e\]r.m.1	Value
Output 2	%QW[\b.e\]r.m.2	Value
Output 3	%QW[\b.e\]r.m.3	Value
Output 4	%QW[\b.e\]r.m.4	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

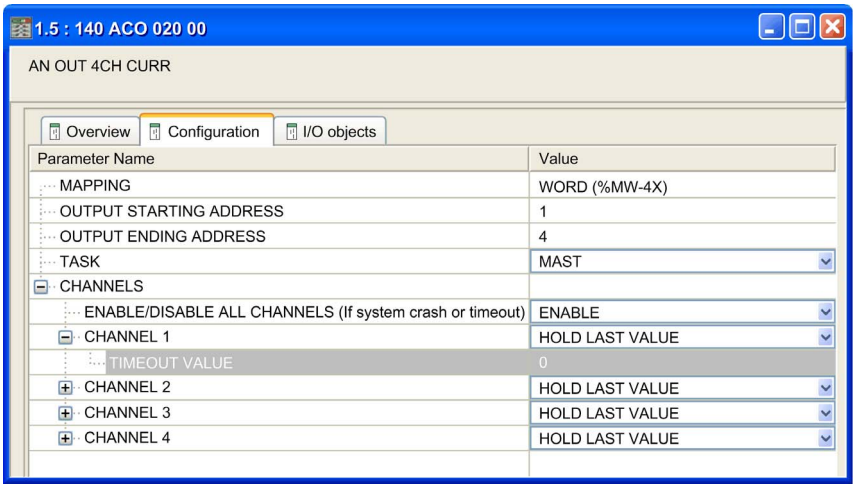
The I/O map status byte is used by the 140 ACO 020 00 Output Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%MW-4X)	-	
Outputs Starting Address	1	-	
Outputs Ending Address	4	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels			
ENABLE/DISABLE ALL CHANNELS...	ENABLE	DISABLE	DISABLE all channels in case of system crash or timeout
Channel1	HOLD LAST VALUE	DISABLE USER DEFINED	DISABLE option is displayed but not available.
Timeout Value	0	0-4095	only enabled if Channel = USER DEFINED
Channel2-Channel4			see Channel1

Chapter 10
140 ACO 130 00: Analog Mixed Current OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 ACO 130 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

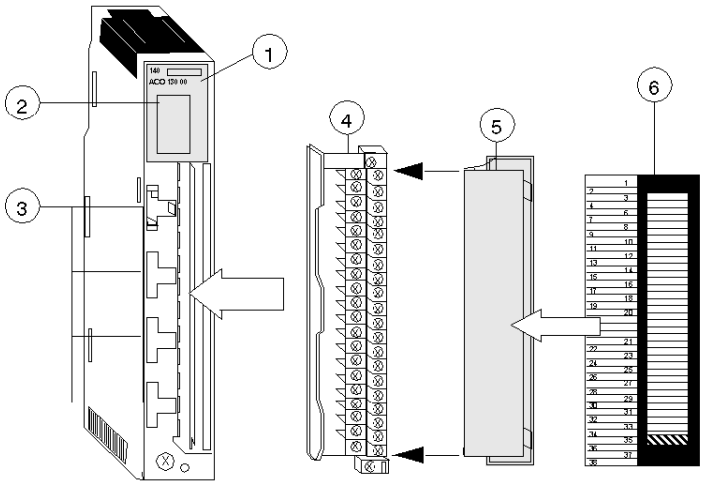
Function

The 140 ACO 130 00 is an 8 channel analog output module used to control and monitor current in 4 ... 20 mA, 0 ... 20 mA, and 0 ... 25 mA loops.

NOTE: This module is not HART compatible.

Illustration

The following figure shows the 140 ACO 130 00 module and its components.



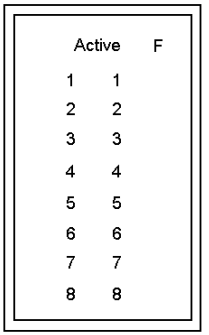
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 ACO 130 00 module.



Description

The following table shows the LED descriptions for the 140 ACO 130 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
1 ... 8	Green	Module outputs switched ON.
1 ... 8	Red	Broken wire on indicated channels.

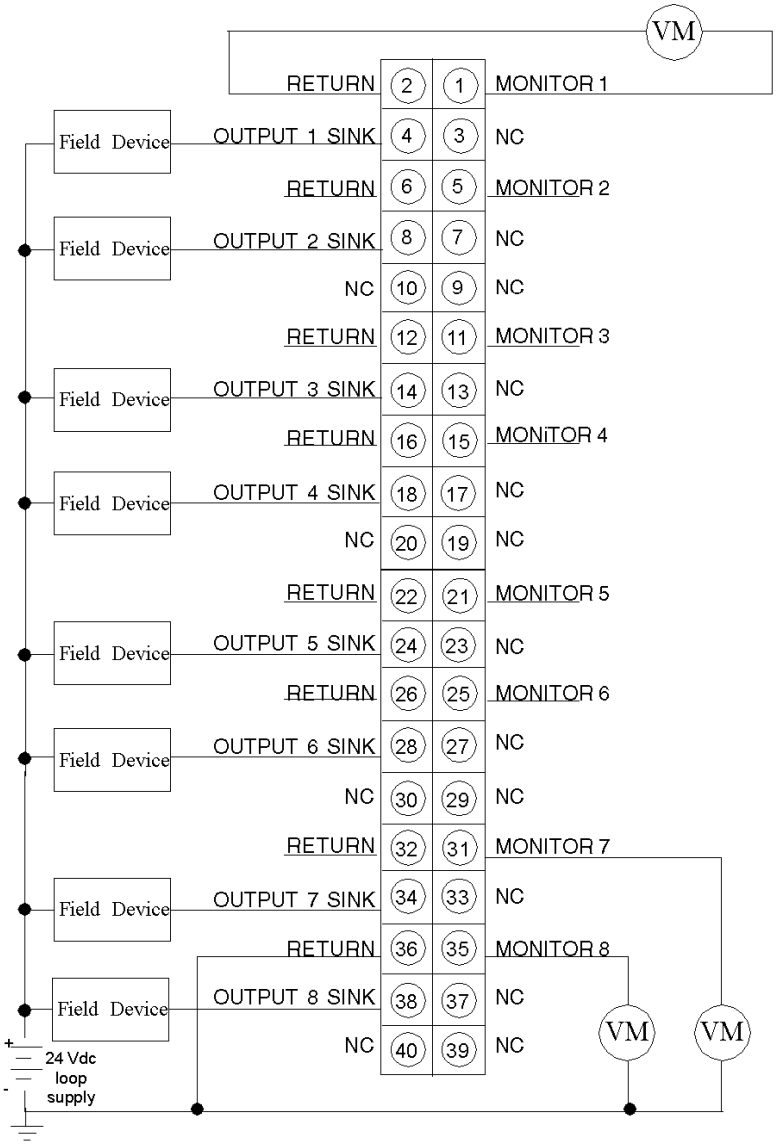
Diagnostic

1. 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.
2. At power up, channel outputs are all at zero current (0 mA).

Wiring Diagram

Illustration

The following figure shows the wiring diagram of the 140 ACO 130 00 module:



External Wiring Recommendation

1. The user supplies the current and voltage sources (installation and calibration of fuses are at the discretion of the user).
2. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommended.
3. Shielded cables should be connected to the PLC's ground.
4. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
5. All terminals labeled 'RETURN" are common inside the module.
6. N / C = Not connected.

NOTE: 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.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	8 Channel OUT
External Power	Loop Voltage: 6 ... 30 VDC max.
Bus Current required (Module)	550 mA
Power Dissipation	5.0 W max.
I/O map	8 output words
Error Detection	Open circuit in 4 ... 20 mA mode. The open channel is indicated through the red channel LED and is also reported back to the controller in the I/O Map status byte

Voltage

Voltage

Loop Voltage	6 ... 30 VDC max.
Internal Voltage Drop	6 VDC min., 30 VDC max. @ 25 mA

Range / Resolution

Range / Resolution

0 ... 25 mA	0 ... 25,000 counts
0 ... 20 mA	0 ... 20,000 counts
4 ... 20 mA	0 ... 16,000 counts
4 ... 25 mA	0 ... 4,095 counts

Accuracy

Accuracy

Accuracy Error @ 25 degrees C	+/- 0.20% of full scale
Accuracy Drift with Temperature	Typical: 0.004% of full scale / degrees C. Maximum: 0.007% of full scale / degrees C.

Linearity

Linearity

0 ... 25 mA 0 ... 20 mA 4 ... 20 mA	+/- 4 µA
4 ... 25 mA	+/- 12 µA

Times

Times

Update Time	5 ms for all Channels
Settling Time Full Scale	1.6 ms to 5% of the final value
Step Change	3.2 ms to 5% of the final value

Isolation

Isolation

Field to Bus	1780 VAC for 1 minute
Channel to Channel	None

Fuses

Fuses

Internal	None
External	None

Addressing

Flat Addressing

This module requires eight contiguous, 16-bit words (`%MW`) for output data. The data words formats are as follows.

Topological Addressing

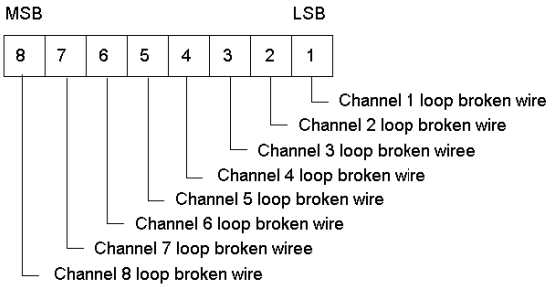
Topological addresses for the 140 ACO 130 00 Output Module:

Point	I/O Object	Comment
Output 1	%QW[\b.e\]r.m.1	Value
Output 2	%QW[\b.e\]r.m.2	Value
• • •		
Output 7	%QW[\b.e\]r.m.7	Value
Output 8	%QW[\b.e\]r.m.8	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

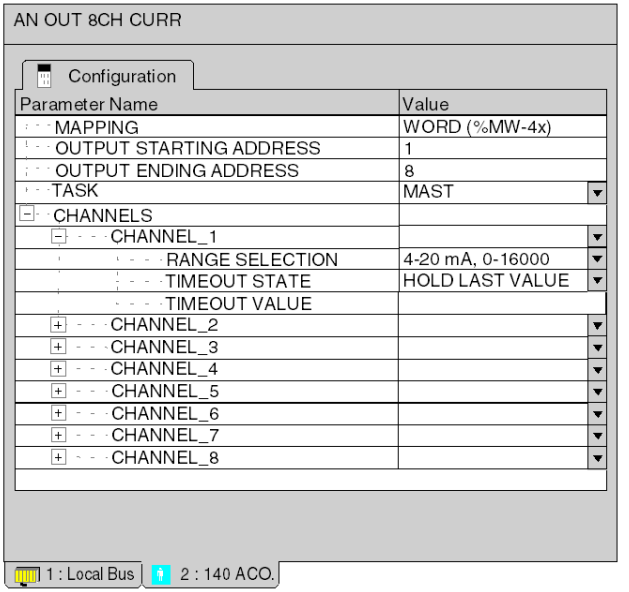
The I/O map status byte is used by the 140 ACO 130 00 Output Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%MW-4X)	-	
Outputs Starting Address	1	-	
Outputs Ending Address	8	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels Channel_1			

Name	Default Value	Options	Description
Range Selection	"4-20 mA, 0-16000"	"4-20 mA, 0-4095" "0-20 mA, 0-20000" "0-25 mA, 0-25000"	
Timeout State	HOLD LAST VALUE	MINIMUM OUTPUT USER DEFINED	
Timeout Value	0	0-32767	only enabled if Timeout State = USER DEFINED
Channel_2 - Channel_8			see Channel1

Chapter 11
140 AVO 020 00: Analog Mixed Voltage OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 AVO 020 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

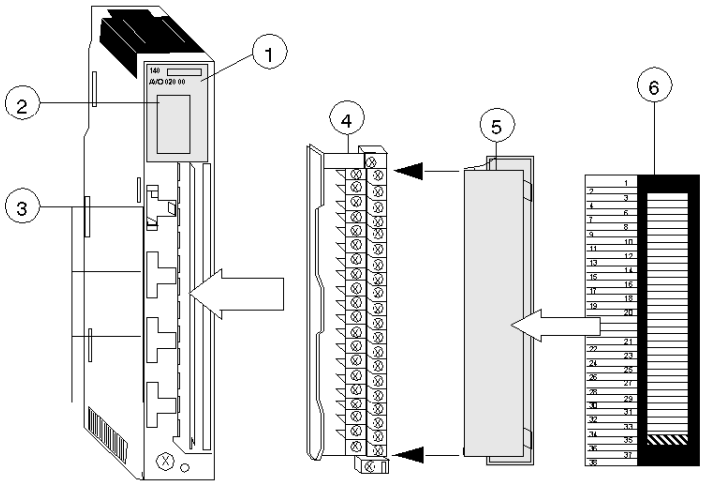
Function

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

NOTE: This module is not HART compatible.

Illustration

The following figure shows the 140 AVO 020 00 module and its components.



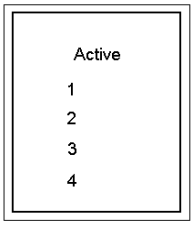
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 AVO 020 00 module.



Diagnostic

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 output values are set 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.

Wiring Diagram

Illustration

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Before removing the connector, remove the field power or ensure that pre-actuator wiring can remain in an open circuit condition.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

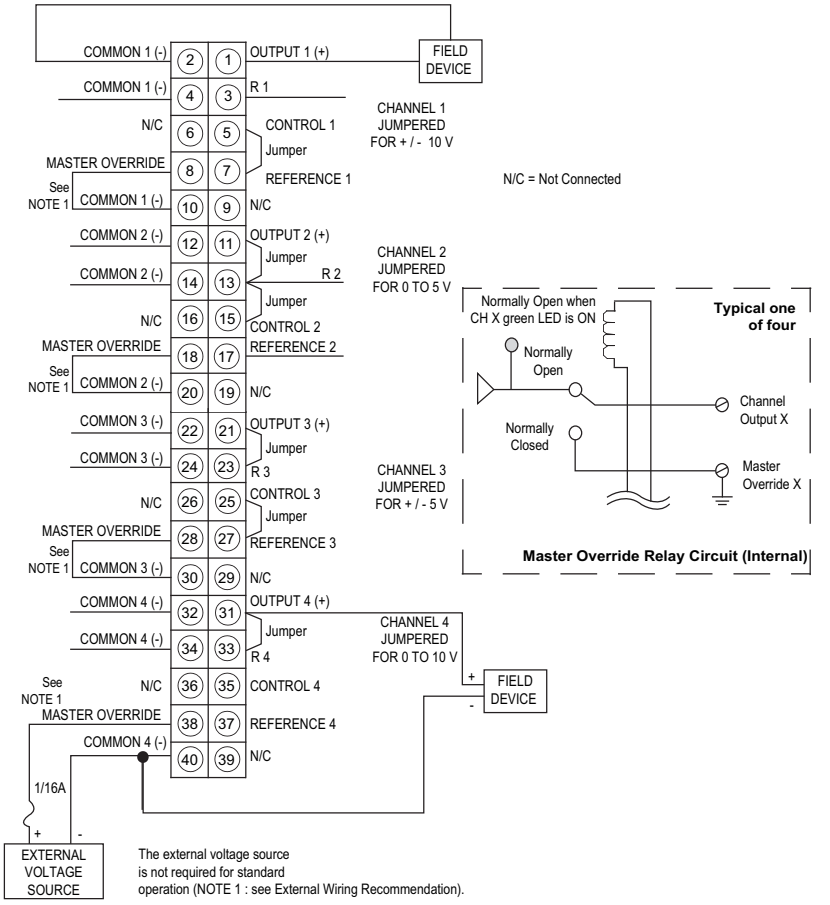
⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Avoid erroneous outputs in this module by connecting the master override to an external source through a 1/16 amp in-line fuse or connecting to circuit common.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following figure shows the wiring diagram for the 140 AVO 020 00 module.



External Wiring Recommendation

1. 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.
2. Master override is an input connected via an internal relay contact to the output when the module is not active. If connected to an external source, the master override input must be fused by a 1/16 A fuse.
3. If the master override is not connected to an external source, then it must be connected to common of that channel.The master override relay transition time is typically 2 ms.
4. 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.

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

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.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	4 Channel OUT
External Power	Not required
Bus Current required (Module)	700 mA
Power Dissipation	4.5 W max.
I/O map	4 output words
Error Detection	None
Wiring length	400 m max.

Output Ranges*

Output Ranges*

Voltages (Bipolar)	+/- 10 VDC (Min. load resistance = 1 kohms) +/- 5 VDC (Min. load resistance = 500 ohms)
Voltages (Unipolar)	0 ...10 VDC (Min. load resistance = 1 kohms) 0 ... 5 VDC (Min. load resistance = 500 ohms)
Output Current	+/- 10 mA max. (any range) Outputs are shortcut proof
Source Resistance	0.1 ohms

NOTE: *The range is determined by Jumpers (see wiring diagram)

Resolution / Accuracy

Resolution / Accuracy

Resolution	12 bit
Accuracy Error @ 25 degrees C	+/- 0.15% of full scale
Linearity	+/- 1 LSB

Accuracy Drift with Temperature

Accuracy Drift with Temperature

Unipolar Ranges	Typical: 0.003% of full scale / degrees C Maximum: 0.005% of full scale / degrees C
Bipolar Ranges	Typical: 0.004% of full scale / degrees C Maximum: 0.007% of full scale / degrees C

Times

Times

Max. Settling Time	700 µs to +/- 0.1% of the final value
Update Time	3 ms for all channels

Isolation

Isolation

Channel to Bus	1780 VAC rms for 1 minute
Channel to Channel	500 VAC rms for 1 minute

Fuses

Fuses

Internal	Not required
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: 3 AG Fast acting 1/16 A, 250 V Fuse Holder: 3 AG Fuse type The external fuse is not required if master override is connected to common

Addressing

Flat Addressing

This module requires four contiguous, 16-bit words (%MW) for output data. The data words formats are as follows.

Topological Addressing

Topological addresses for the 140 AVO 020 00 Output Module:

Point	I/O Object	Comment
Output 1	%QW[\b.e\]r.m.1	Value
Output 2	%QW[\b.e\]r.m.2	Value
Output 3	%QW[\b.e\]r.m.3	Value
Output 4	%QW[\b.e\]r.m.4	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

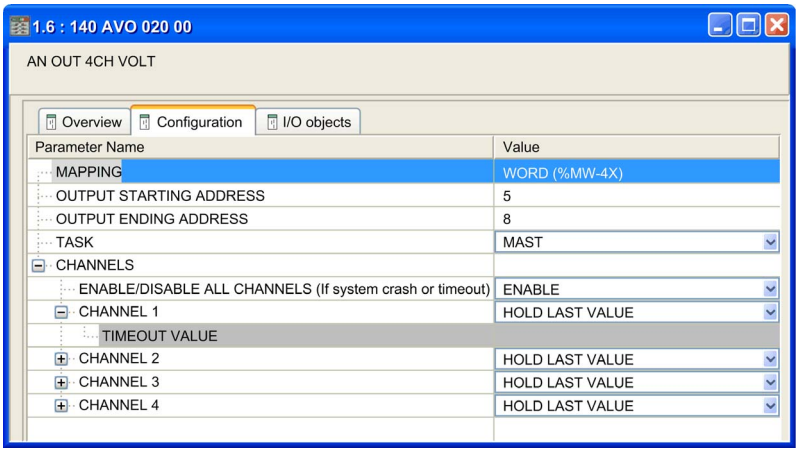
I/O Map Status Byte

There is no I/O map status byte used by the 140 AVO 020 00 Output Module.

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%MW-4X)	-	
Outputs Starting Address	1	-	
Outputs Ending Address	4	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels			
ENABLE/DISABLE ALL CHANNELS...	ENABLE	DISABLE (1)	DISABLE all channels in case of system crash or timeout
Channel1	HOLD LAST VALUE	DISABLE USER DEFINED	DISABLE option is displayed but not available.
Timeout Value	0	0-4095	only enabled if Channel = USER DEFINED
Channel2-Channel4			see Channel1
Legend			
(1): Output LEDs 1-4 go out when DISABLE is selected and the module goes to the inactive state.			

Part IV
Analog IN / OUT Modules

Chapter 12
140 AMM 090 00: Analog Mixed Current/Voltage IN / OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 AMM 090 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

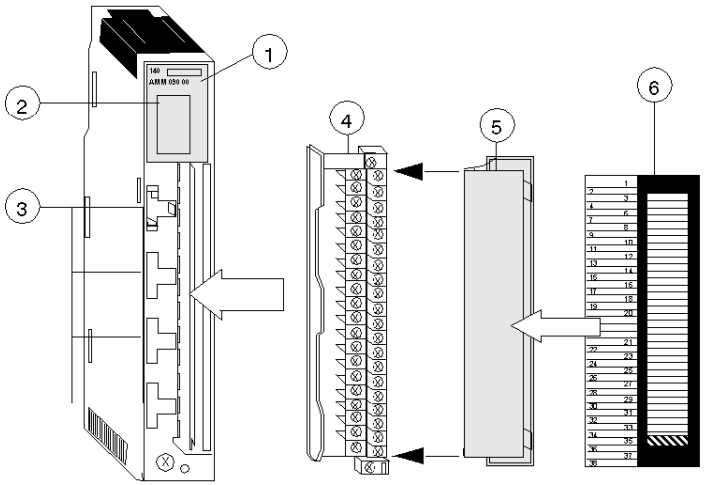
Function

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.

NOTE: This module is HART compatible

Illustration

The following figure shows the 140 AMM 090 00 module and its components.



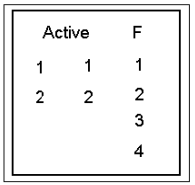
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 AMM 090 00 module.



Descriptions

The following table shows the LED descriptions for the 140 AMM 090 00 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 ... 2	Green (left column)	Module outputs switched ON.
1 ... 2	Red (middle column)	Broken wire on indicated output channels.
1 ... 4	Red (right column)	Indicates input status: under/over range

Diagnostic

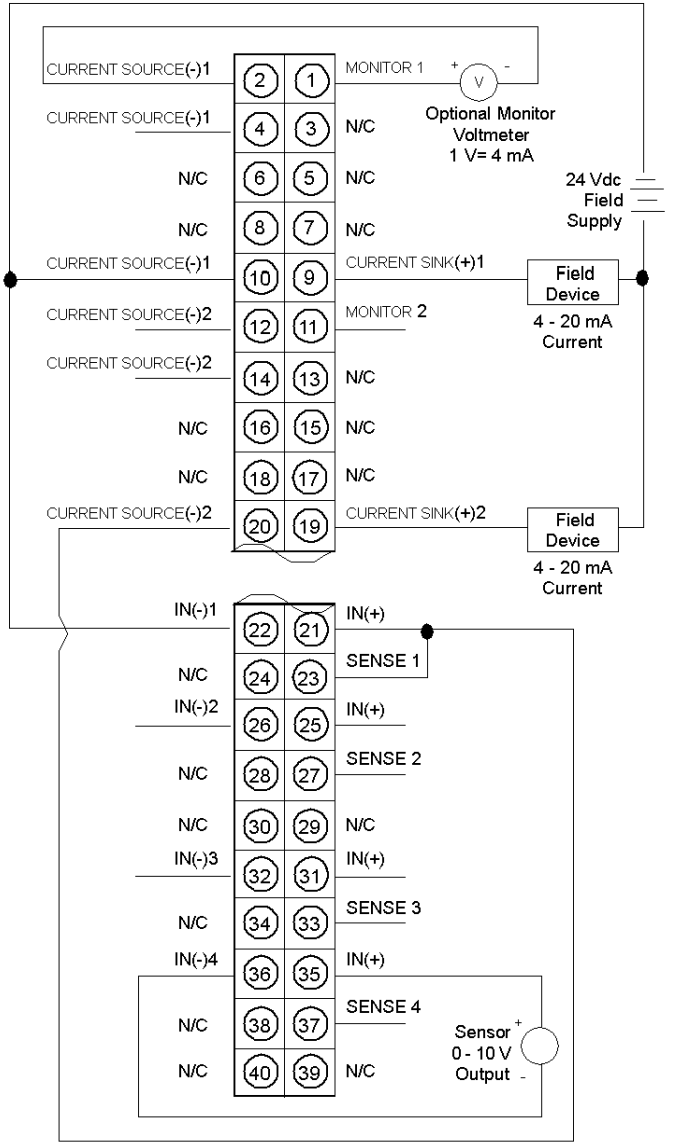
To prevent improper fault indications, unused inputs should have the + (plus) and - (minus) inputs tied together and be configured for a bipolar input range.

Wiring Diagram

Illustration

⚠ CAUTION
UNWIRED INPUTS CAUSE INVALID READINGS 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 these instructions can result in injury or equipment damage.**

The following figure shows the wiring diagram for the 140 AMM 090 00 analog input/output module.



External Wiring Recommendation

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.

1. Jumpers are required between IN (+) and SENSE terminals for all current input ranges.
2. Pins 1 ... 20 are outputs.
   Pins 21 ... 40 are inputs.
3. Use shielded signal cable. In noisy environnements, twisted shielded cable is recommended.
4. Shielded cables should be connected to the PLC's ground.
5. A Shield Bar (STB XSP 3000 and STB XSP 3010/3020) should be used to connect the shielded cable to ground *(see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual)*.
6. For Inputs, the maximum channel to channel working voltage cannot exceed 30 Vdc.
7. N / C = Not Connected.

NOTE: V is an optional voltmeter that can connected to read voltage that is proportional to the current. Wiring to this terminal must not exceed 1 m.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	4 Channel IN 2 Channel OUT (isolated)
External Power	Loop Voltage:... 30 VDC, up to 60 VDC with an external resistor
Bus Current required (Module)	350 mA
Error Detection	Open circuit in 4 ... 20 mA range, or over range, or under range in bipolar modes only.

Operating Ranges

Operating Ranges

Bipolar	+/- 10 VDC +/- 5 VDC +/- 20 mA
Unipolar	0 ...10 VDC 0 ... 5 VDC 0 ... 20 mA
Unipolar with Offset	1 ... 5 VDC 4 ... 20 mA

Voltage / Input

Voltage / Input

Operating Voltage (Channel to Channel)	+/- 40 VDC (max.)
Absolute Voltage (max.)	+/- 50 VDC
Linear Mesuring Range	2.4% over and under range
Input Impedance in Range	> 10 Mohms
Input Impedance over Range	< 0.5 Mohms

Current / Input

Current / Input

Absolute Current (max.)	+/- 25 mA
Linear Measuring Range	2.4% over and -9.6% under range.
Input Impedance	250 ohms

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, error LEDs and warning/out of range are displayed.

Resolution / Conversion

Resolution / Conversion

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 degrees C	Voltage mode: ● Typical: +/- 0.03% of full scale ● Maximum: +/- 0.05% of full scale Current mode: ● Add an extra +/- 0.03% to voltage specification
Linearity	Monotonic +/- 1 LSB
Offset 0 ... 60 degrees C	+/- 0.0014% of full scale max.
Gain Shift 0 ... 60 degrees C	+/- 0.002% of full scale max.
Common Mode Rejection	Better than 80 dB @ 50 or 60 Hz
Input Filter	Single pole low pass, -3 dB @ 21 Hz, +/- 20%
Update Time	320 ms for 4 channels

Isolation

Isolation

Channel to Bus	500 VAC rms for 1 minute 750 VDC rms for 1 minute
Channel to Channel	500 VAC rms for 1 minute 750 VDC rms for 1 minute

Linear Measuring Ranges Table

The following table shows the linear measuring ranges for the Inputs.

Data Format	Input	Under Range	Normal	Over Range
16-bit Format	+/- 10 V	< 768	768 ... 64768	> 64768
	+/- 5 V, +/- 20 mA	< 16768	16768 ... 48768	> 48768
	0 ... 10 V		0 ... 64000	> 64000
	0 ... 5 V, 0 ... 20 mA		0 ... 32000	> 32000
	1 ... 5 V, 4 ... 20 mA	<6400	6400 ... 32000	> 32000
Voltmeter* Format	+/- 10 V	< -10000	-10000 ... 10000	> 10000
	+/-5 V	< -5000	-5000 ... 5000	> 5000
	0 ... 10 V		0 ... 10000	> 10000
	0 ... 5 V		0 ... 5000	> 5000
	1 ... 5 V	< 1000	1000 ... 5000	> 5000
	+/- 20 mA	< 1000	-20000 ... 20000	> 20000
	0 ... 20 mA		0 ... 20000	> 20000
	4 ... 20 mA	< 4000	4000 ... 20000	> 20000
12-bit Format	+/- 10 V	0	0 ... 4095	4095
	+/- 5 V, +/- 20 mA	0	0 ... 4095	4095
	0 ... 10 V		0 ... 4095	4095
	0 ... 5 V, 0 ... 20 mA		0 ... 4095	4095
	1 ... 5 V, 4 ... 20 mA	0	0 ... 4095	4095

* The Voltmeter ranges are listed in Modsoft signed format.

Fuses

Fuses

Internal	Not required
External	User installed per local and national electrical codes

Output Specifications

Output Specifications

Loop Voltage	... 30 VDC, up to 60 VDC with an external resistor
Loop Resistance	R_{MIN} * = (V_{LOOP} - 30 VDC) / 0.020 A R_{MAX} = (V_{LOOP} - 7 VDC) / 0.020 A * No R_{MIN} is required for loop voltage less than 30 VDC
Internal Voltage Drop	7 VDC min., 30 VDC max. @ 20 mA
Fault Detection	Open circuit in 4 ... 20 mA range, or over range, or under range in bipolar modes only.

Resolution / Conversion

Resolution / Conversion

Resolution	12 bit
Accuracy Error at 25 degrees C	+/- 0.20% of full scale
Accuracy Error @ 0 ...60 degrees C (voltage mode)	Typical: +/- 0.004% of full scale Maximum: +/- 0.07% of full scale
Linearity	Monotonic +/- 1 LSB
Update Time	15 ms for 2 Channels
Settling time	900 micro sec to +/- 0.1 % of final value
Fault Detection	Open circuit indicator light and status byte

A range warning is issued when a channel input is outside the rated input value. 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)

Isolation

Isolation

Channel to Bus	500 VAC rms for 1 minute 750 VDC rms for 1 minute
Channel to Channel	500 VAC rms for 1 minute 750 VDC rms for 1 minute

Voltmeter Monitor Specifications Table

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

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

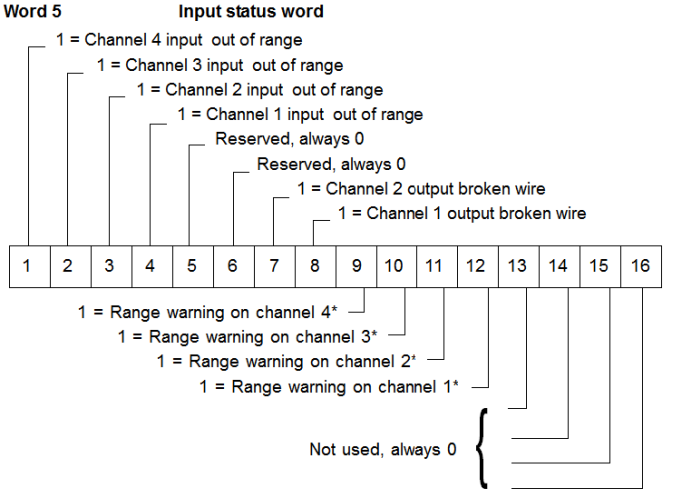
Addressing

Flat Addressing

This module requires five contiguous, 16-bit input words (%IW)—four for input data, one for channel status, and 2 contiguous, 16-bit output words (%QW)— for output data. The data word formats are as follows.

The following shows the input words 1 ... 4:

The following shows the input word 5:



*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 2.4% or when a broken wire (4 ... 20 mA mode) is sensed on the channel.

The following shows the output words 1 and 2:

Topological Addressing

Topological addresses for the 140 AMM 090 00 Input/Output Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Out of range
	%I[\b.e\]r.m.1.2	Range warning
• • •		
Input 4	%IW[\b.e\]r.m.4	Value
	%I[\b.e\]r.m.4.1	Out of range
	%I[\b.e\]r.m.4.2	Range warning
Status Word	%IW[\b.e\]r.m.5	Status of in/out channels
Output 1	%QW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.3	Broken wire
Output 2	%QW[\b.e\]r.m.2	Value
	%I[\b.e\]r.m.2.3	Broken wire

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 AMM 090 00 Input/Output Module uses the `T_ANA_BI_VWE` IODDT for the first 2 input and output channels and the `T_ANA_IN_VWE` for the input channels 3 and 4:

IODDT Name	Object	Data Type	Name
T_ANA_BI_VWE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE_IN
	%IQr.m.c.0	Int	.VALUE_OUT
	%Ir.m.c.1	Bool	.ERROR_IN
	%Ir.m.c.2	Bool	.WARNING_IN
	%Ir.m.c.3	Bool	.ERROR_OUT
T_ANA_IN_VWE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR
	%Ir.m.c.2	Bool	.WARNING

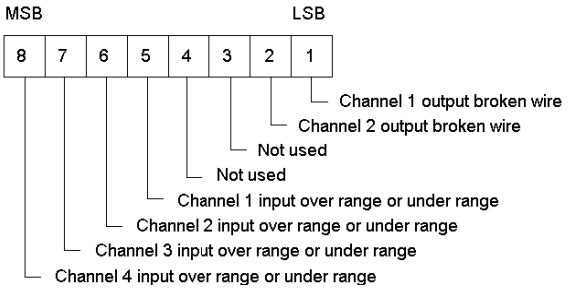
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

I/O Map Status Byte

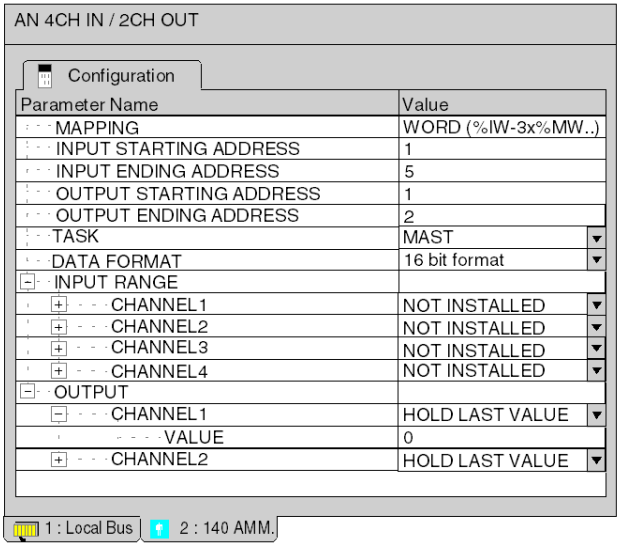
The I/O map status byte is used by the 140 AMM 090 00 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X%MW-4X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	4	-	
Outputs Starting Address	1	-	
Outputs Ending Address	2	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

Name	Default Value	Options	Description
Data Format	16 bit format	Volt meter 12 bit format	
Input Range			
Channel1	NOT INSTALLED	-10V TO +10V 0V TO 10V -5V TO +5V 0V TO +5V +1V TO +5V -20 mA TO +20 mA 0 mA TO +20 mA +4 mA TO +20 mA	
Channel2-Channel4			see Channel1
Output			
Channel1	HOLD LAST VALUE	NOT INSTALLED USER DEFINED	
Value	0	0-4095	only enabled if Channel = USER DEFINED
Channel2			see Channel1

Part V
Discrete IN Modules

Introduction

The following part provides information on the Quantum Discrete IN modules.

What Is in This Part?

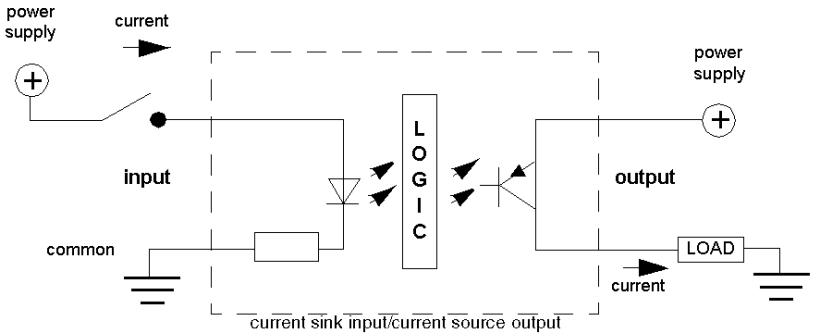
This part contains the following chapters:

Chapter 13
General Information

Discrete I/O Logic Circuits

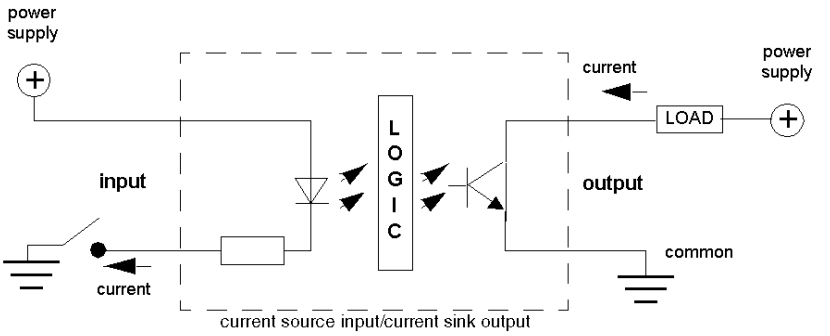
Discrete I/O True High Figure

The following is the true high/current sink input/current source output schematic.



Discrete I/O True Low Figure

The following is the true low/current source input/current sink output schematic.



Current Sinking

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

Current Sourcing

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

Chapter 14
140 DDI 153 10: 5 VDC 4x8 Source IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 153 10 module.

What Is in This Chapter?

This chapter contains the following topics:

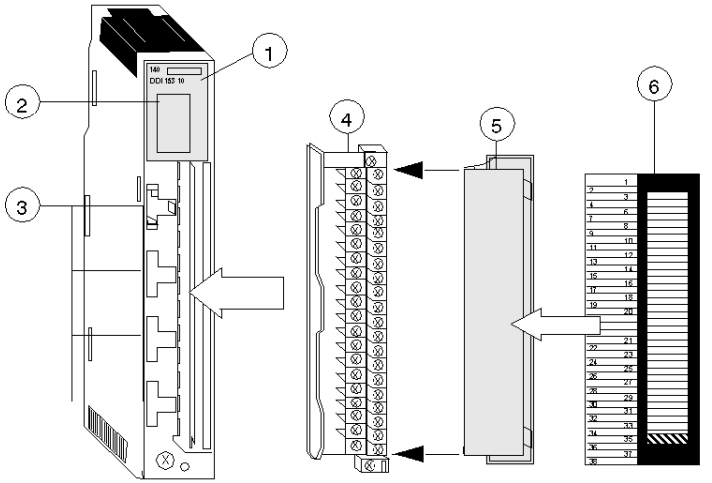
Presentation

Function

The DC Input 5 V 4x8 Source module accepts 5 VDC inputs. It is for use with shared input common wired to 0 V and is compatible with TTL, -LS, -S, and CMOS logic.

Illustration

The following figure shows the 140 DDI 153 10 module and its components.



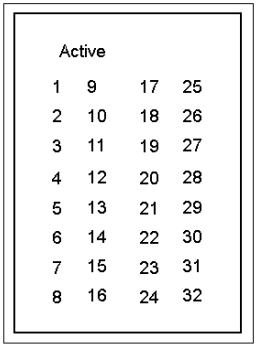
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 153 10 module.



Descriptions

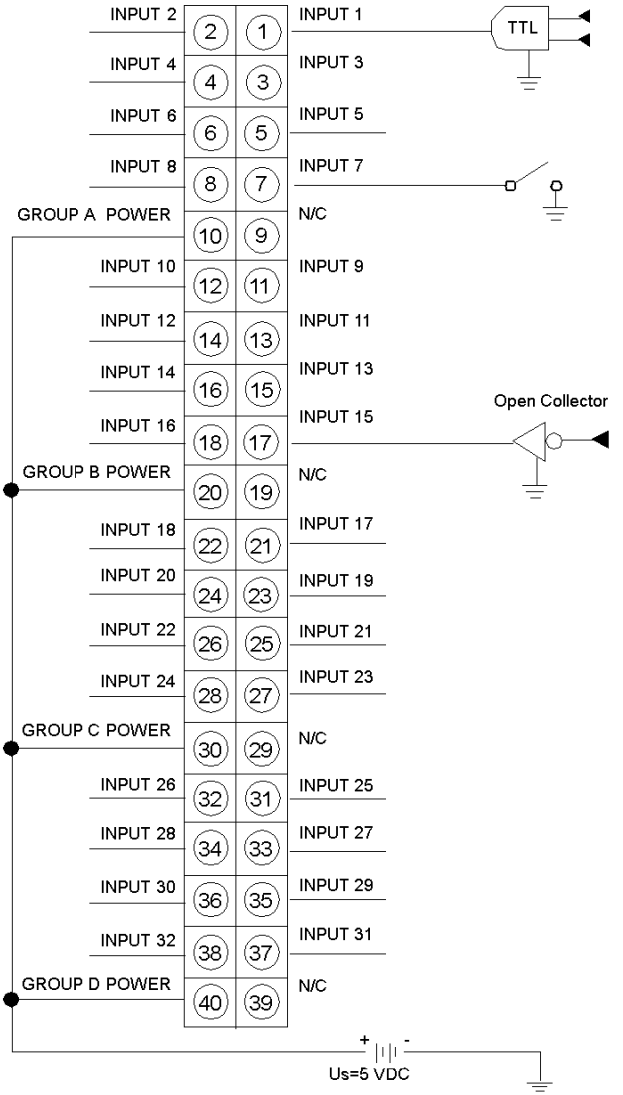
The following table shows the LED descriptions for the 140 DDI 153 10 modul.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDI 153 10 wiring diagram.



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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
Logic	True Low
External Power (Us)	4.5 ... 5.5 VDC
Bus Current required (Module)	170 mA
Power Dissipation	5 W
I/O map	2 input words
Fault Detection	None

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute

Input Rating

Input Rating

ON Level voltage	0.8 VDC maximum
ON Level current	4.0 mA @ Us = 5.5 V and Uin = 0 V
OFF Level voltage	4 VDC (min) @ Us = 5.5 V 3 VDC (min) @ Us = 4.5 V
OFF Leakage	200 µA @ Us = 5.5 V and Uin = 4 VDC
Internal Pullup Resistor	7.5 kohm
Input Protection	Resistor limited

Absolute Maximum Inputs

Absolute Maximum Inputs

Continuous	5.5 VDC
1.3 ms	15 VDC decaying pulse

Response

Response

OFF - ON	250 µs (max)
ON - OFF	500 µs (max)

Fuses

Fuses

Internal	Not required
External	User installed per local and national electrical codes

Logic States Table

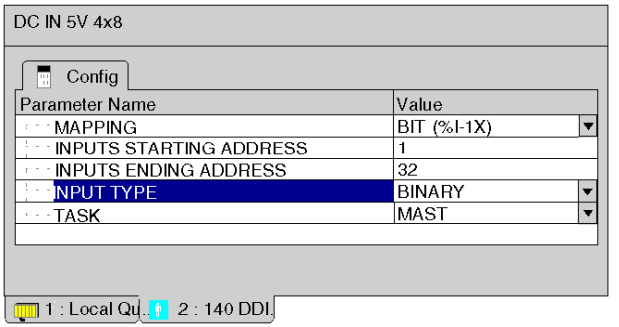
The following tables shows the logic states for the DDI 153 10 module.

Input Voltage	Input State	LED
≤ 0.8 VDC	ON	ON
≥ 4.0 VDC @ 5.5 Us ≥ 3.0 VDC @ 4.5 Us	OFF	OFF
No Connection	OFF	OFF

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 15
140 DDI 353 00: 24 VDC 4x8 Sink IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 353 00 module.

What Is in This Chapter?

This chapter contains the following topics:

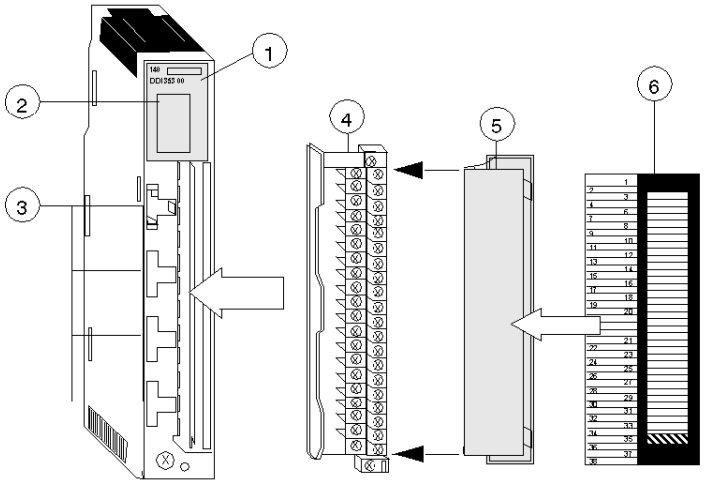
Presentation

Function

The DC Input 24 VDC 4x8 Sink module accepts 24 VDC inputs and is for use with shared input common wired to positive potential.

Illustration

The following figure shows the 140 DDI 353 00 module and its components.



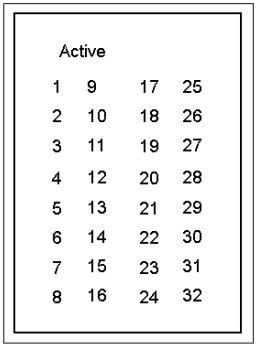
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 353 00 module.



Descriptions

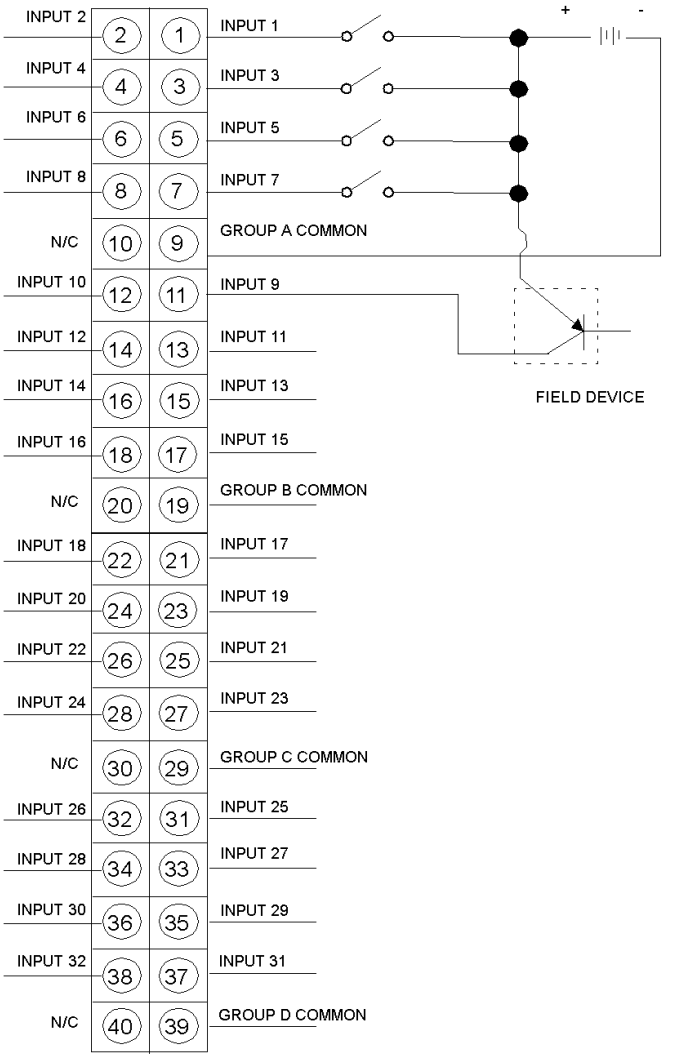
The following table shows the LED descriptions for the 140 DDI 353 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDI 353 00 wiring diagram.



NOTE: N / C = Not Connected

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
Logic	True High
External Power	Not required for this module
Power Dissipation	1.7 W + 0.36 W x the number of points ON
Bus Current Required	330 mA
I/O map	2 input words
Fault Detection	None

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute

Fuses

Fuses

Internal	Not required
External	User installed per local and national electrical codes

Input Rating

Input Rating

ON Level voltage	+15 ... +30 VDC
OFF Level voltage	-3 ... +5 VDC
ON Level current	2.0 mA (min.)
OFF Level current	0.5 mA (max.)
Internal Resistance	2.5 kohms
Input Protection	Resistor Limited

Absolute Maximum Inputs

Absolute Maximum Inputs

Continuous	30 VDC
1.3 ms	56 VDC decaying pulse

Response

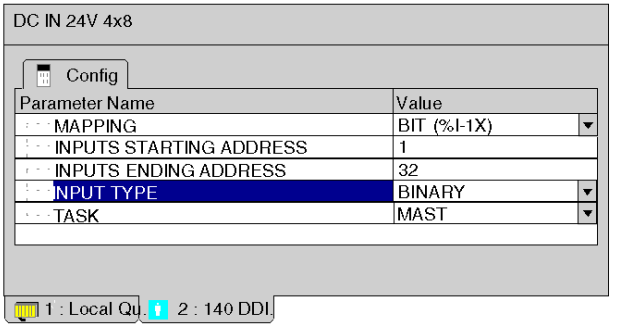
Response

OFF - ON	1 ms (max.)
ON - OFF	1 ms (max.)

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 16
140 DDI 353 10: 24 VDC 4x8 Source IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 353 10 module.

What Is in This Chapter?

This chapter contains the following topics:

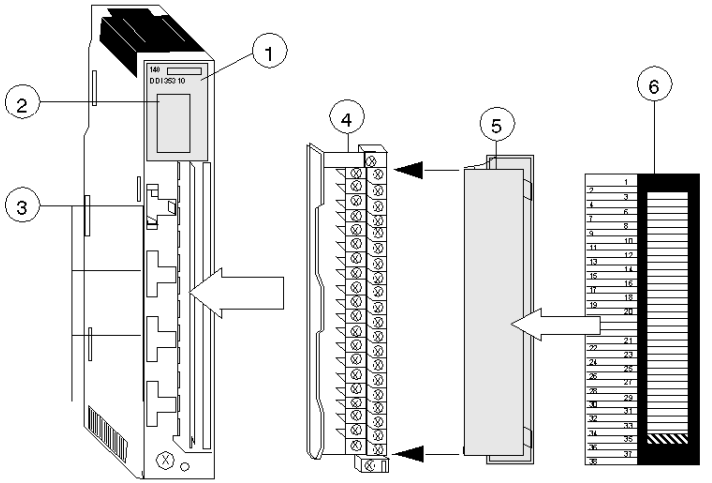
Presentation

Function

The 24 VDC 4x8 Source Input module accepts 24 VDC inputs and is for use with shared input common wired to 0 V.

Illustration

The following figure shows the 140 DDI 353 10 module and its components.



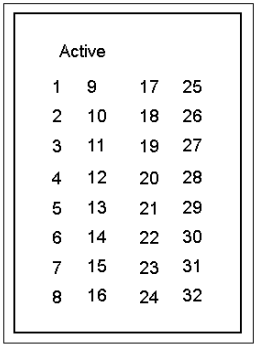
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 353 10 module.



Descriptions

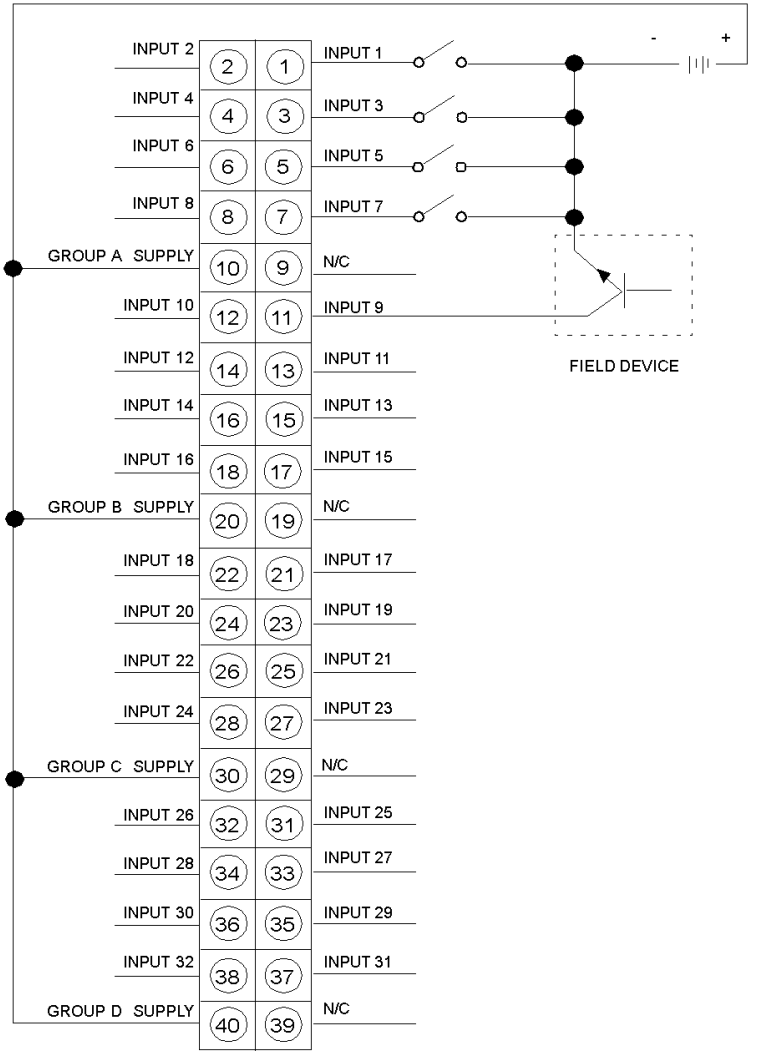
The following table shows the LED descriptions for the 140 DDI 353 10 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDI 353 10 wiring diagram.



NOTE: N / C = Not Connected

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
Logic	True Low
External Power	19.2 ... 30 VDC
Power Dissipation	1.5 W + 0.26 W x the number of points ON
Bus Current required	330 mA max.
I/O map	2 input words
Fault Detection	None

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute

Input Rating

Input Rating

ON Level voltage	-15 ... -30 VDC (reference from group supply)
OFF Level voltage	0 ... -5 VDC (reference from group supply)
ON Level current	2.0 mA min; 14 mA max
OFF Level current	0.5 mA max
Internal Resistance	2.4 kohm
Input Protection	Resistor Limited

Absolute Maximum Inputs

Absolute Maximum Inputs

Continuous	30 VDC
1.3 ms	50 VDC decaying pulse

Response

Response

OFF - ON	1 ms (max)
ON - OFF	1 ms (max)

Fuses

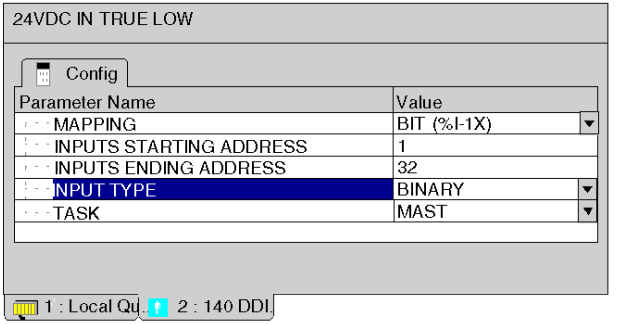
Fuses

Internal	None
External	User installed per local and national electrical codes

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 17
140 DDI 364 00: 24 VDC 6x16 Telefast IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 364 00 module.

What Is in This Chapter?

This chapter contains the following topics:

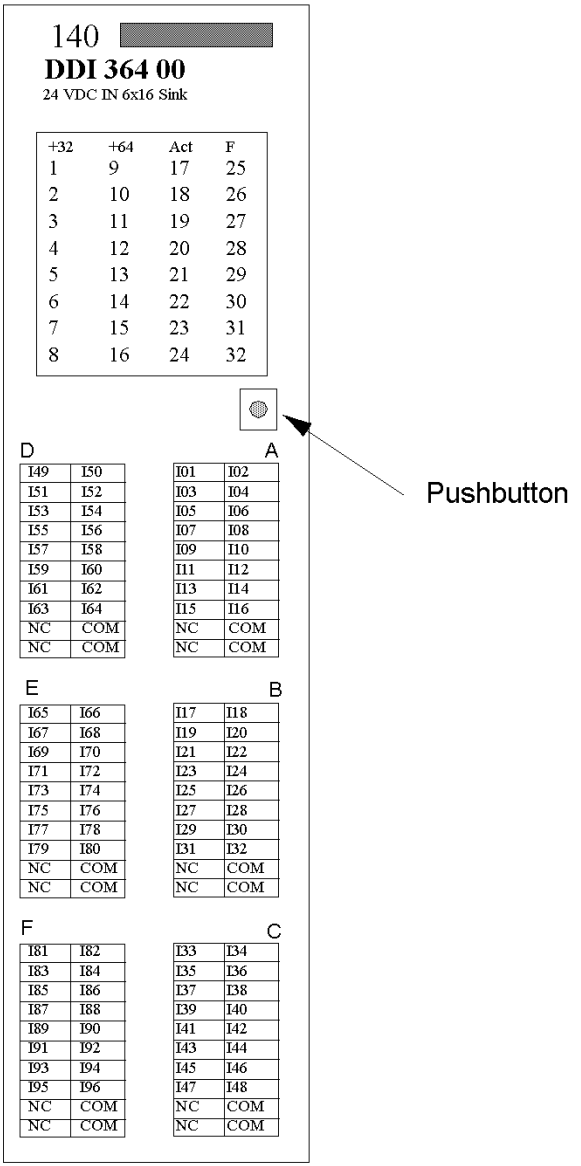
Presentation

Function

The 140 DDI 364 00 sink module accepts 24 VDC inputs.

Illustration

The front view of the 140 DDI 364 00 input module including terminal assignment numbers:



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

Compatible Connection Sub-Bases

The following tables shows the compatible connections sub-bases.

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	

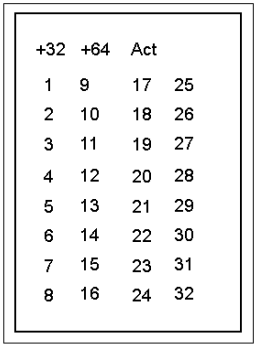
Compatible Input Adapter Sub-Base

16 Channels, ABE-7S16E2xx/7P16F3xx

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 364 00 module.



Descriptions

The following table shows the LED descriptions for the 140 DDI 364 00 module.

LEDs	Color	Indication when ON
Act	Green	Bus communication is present.
+32	Green	Points 33 to 64 displayed on LED matrix.
+64	Green	Points 65 to 96 displayed on LED matrix.

Pushbutton

Use the pushbutton to select input 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

Color Codes

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

Specifications

General Specifications

General Specifications

Module Type	96 IN (6 groups x 16 points)
Power Dissipation	1.35 W + 0.13 W x the number of points ON
Bus Current required	270 mA (max.)
I/O map	6 input words

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	-

Input Rating

Input Rating

ON Level voltage	+15 VDC
OFF Level voltage	+5 VDC
ON Level current	2.5 mA (min.)
OFF Level current	0.7 mA
Internal Resistance	6.7 kohm
Input Protection	Resistor Limited

Absolute Maximum Inputs

Absolute Maximum Inputs

Continuous	30 VDC
1.0 ms	50 VDC

Response

Response

OFF - ON	2.0 ms (max.)
ON - OFF	3.0 ms (max.)

Fuses

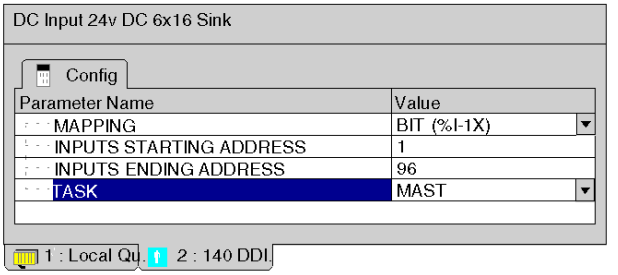
Fuses

Internal	-
External	User installed per local and national electrical codes

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	96	6	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 43)*.

Chapter 18
140 DDI 673 00: 125 VDC 3x8 Sink IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 673 00 module.

What Is in This Chapter?

This chapter contains the following topics:

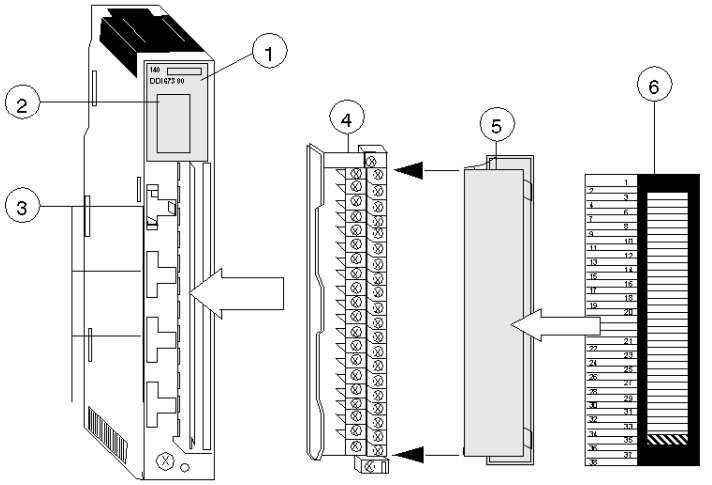
Presentation

Function

The DC Input 125 VDC 3x8 Sink module accepts 125 VDC inputs and is for use with shared input common wired to positive potential. The module has software-selectable response time to provide additional input filtering.

Illustration

The following figure shows the 140 DDI 673 00 module and its components.



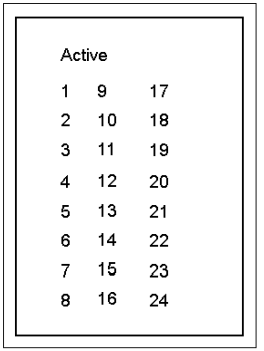
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 673 00 module.



Descriptions

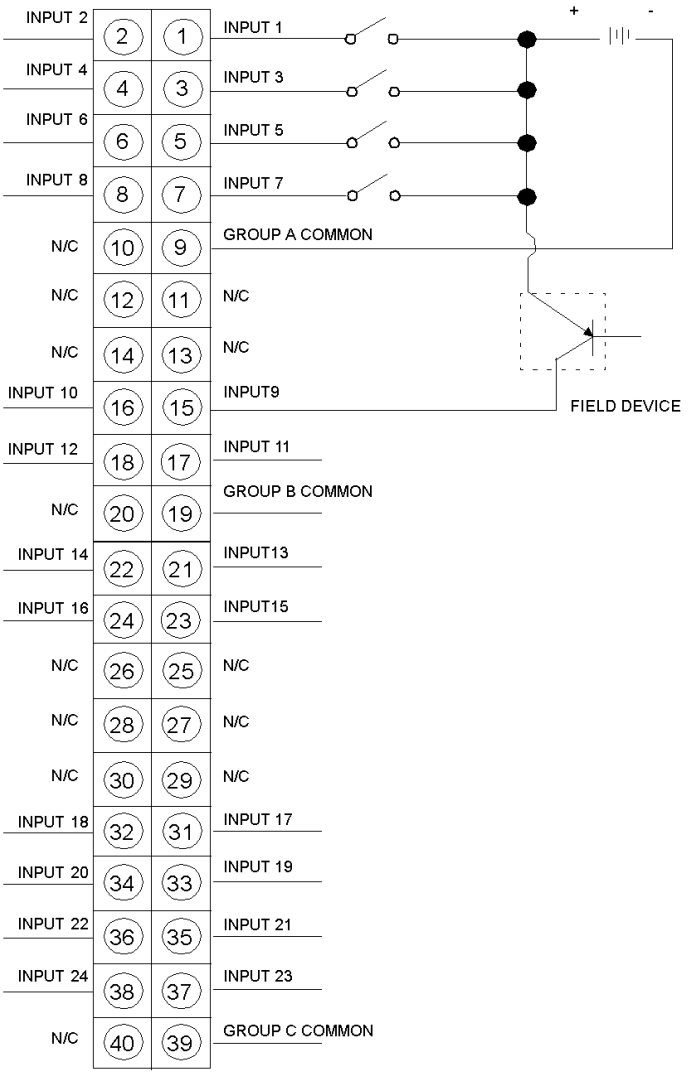
The following table shows the LED descriptions for the 140 DDI 673 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 24	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the DDI 673 00 wiring diagram.



NOTE: N / C = Not Connected

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	24 IN (3 groups x 8 points)
Logic	True High
External Power	Not required for this module
Power Dissipation	1.0 W + 0.62 W x the number of points ON
Bus Current required	200 mA (max.)
I/O map	2 input words
Error Detection	None

Isolation

Isolation

Group to Group	1780 VAC rms for 1 minute
Group to Bus	2500 VAC rms for 1 minute

Input Rating

Input Rating

ON Level voltage	+88 ... +150 VDC
OFF Level voltage	0 ... +36 VDC
ON Level current	2.0 mA (min.)
OFF Level current	0.5 mA (max.)
Internal Resistance	OFF State: 73.8 kohms (nominal) ON State: 31.6 kohms (nominal)
Input Protection	Resistor Limited
Absolute Voltage (max.)	Continuous : 156 VDC including ripple

Response

Response

OFF - ON	0.7 ms (Default filter) 1.5 ms (Non default filter)
ON - OFF	0.7 ms (Default filter) 1.5 ms (Non default filter)

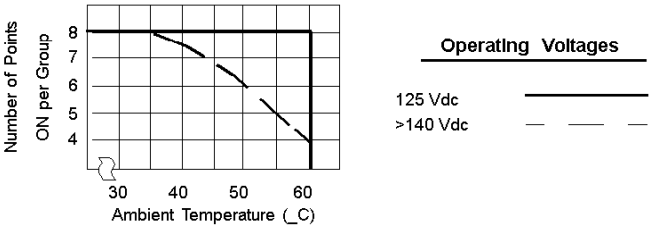
Fuses

Fuses

Internal	None
External	User installed per local and national electrical codes

Operating Curve Figure

The following figure shows the 140 DDI 673 00 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 level for the module products.

Products	Minimum Version Level (see label illustration below	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 > V02.10
	> V02.20	None
DIOs	< V02.10	Module upgrade
	≥ V02.10	None

⚠ CAUTION

SOFTWARE INCOMPATIBILITY CAUSES INVALID INPUT READINGS

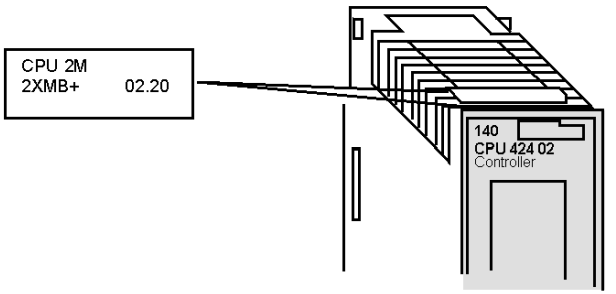
Ensure that the minimum version levels are met as identified in the table above. When using a DIO drop, and the CPU and NOM executive software is not per the compatibility chart, channels 17 ... 24 of this module will be seen as zeroes in the controller when configured as discretes.

Failure to follow these instructions can result in injury or equipment damage.

The procedure to update the version level on your module product is decribed in the OS Loader user manual

Version Label Figure

The following figure shows the version label.

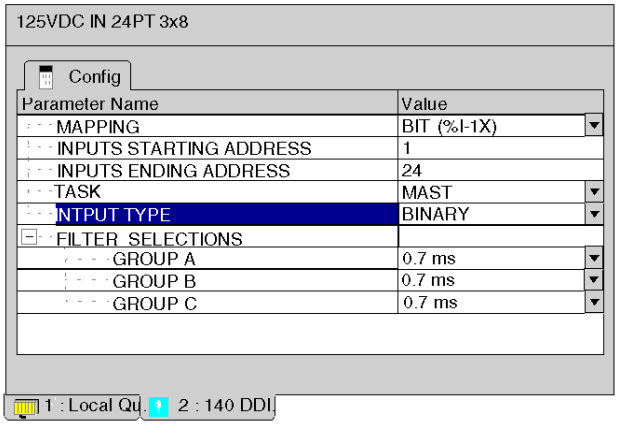


NOTE: The version label is found on the top front of the module.

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Intputs Starting Address	1	1	
Intputs Ending Address	24	2	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
FILTER_SELECTION			
Input Type	BINARY	BCD	
Group A	0.7 ms	1.5 ms	
Group B, Group C			see Group A

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 41)*.

Chapter 19
140 DDI 841 00: 10 ... 60 VDC 8x2 Sink IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 841 00 module.

What Is in This Chapter?

This chapter contains the following topics:

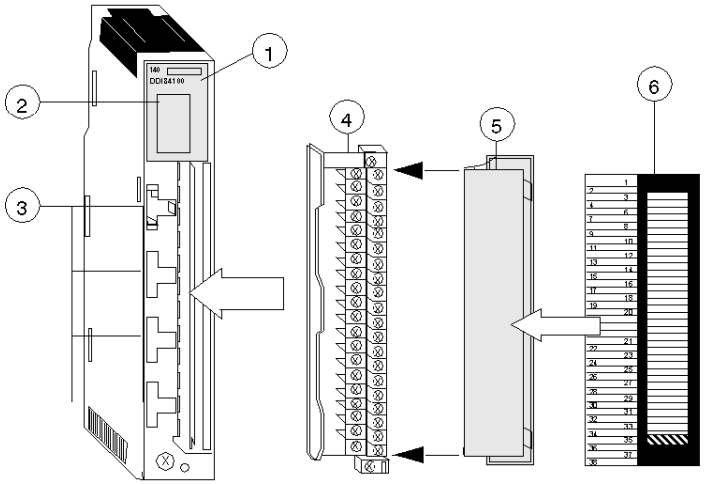
Presentation

Function

The DC Input 10 ... 60 VDC 8x2 Sink module accepts 10 ... 60 VDC inputs and is for use with shared input common wired to positive potential. ON-OFF levels are dependent on the reference voltage selected. Different reference voltages may be used for different groups.

Illustration

The following figure shows the 140 DDI 841 00 module and its components.



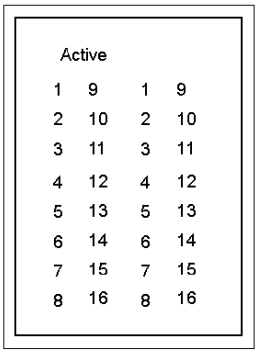
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 841 00 module.



Descriptions

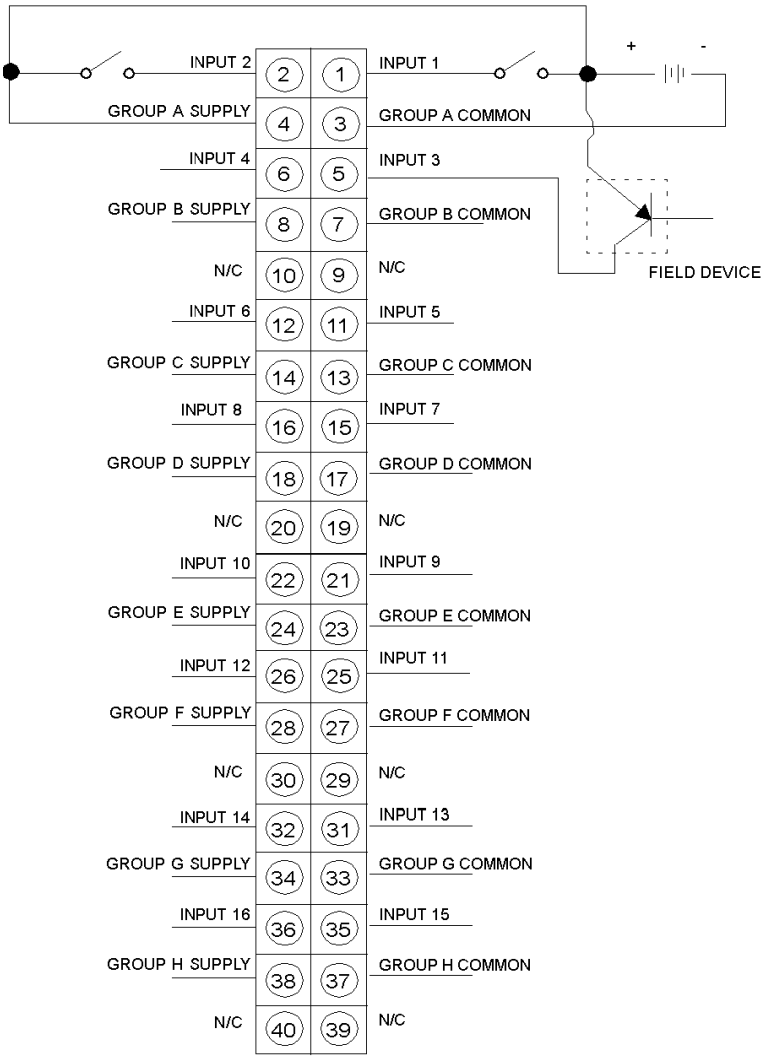
The following table shows the LED descriptions for the 140 DDI 841 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDI 841 00 wiring diagram.



NOTE: N / C = Not Connected

NOTE: The module reads 0V if the polarity is reversed i.e. digital input is off if zero volt is given in place of 24V input channel.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 IN (8 groups x 2 points)
Logic	True High
External Power	10 ... 60 VDC (group supply)
Power Dissipation	1.0 W + 0.25 W x the number of points ON
Bus Current required	200 mA
I/O map	1 input word

Group Supply / Tolerance

Group Supply / Tolerance

Group supply / Tolerance	ON* State	OFF* State
12 VDC / +/-5%	9 ... 12 VDC	0 ... 1.8 VDC IEC 57 Class2
24 VDC / -15% ... +20%	11 ... 24 VDC	0 ... 5 VDC IEC 65A Type 2
48 VDC / -15% ... +20%	34 ... 48 VDC	0 ... 10 VDC IEC 65A Type 1
60 VDC / -15% ... +20%	45 ... 60 VDC	0 ... 9 VDC IEC 57 Class1 *ON / OFF state ranges are specified at nominal reference voltages.

Isolation

Isolation

Group to Group	700 VDC for 1 minute
Group to Bus	2500 VDC for 1 minute

Fuses

Fuses

Internal	None
External	User installed per local and national electrical codes

Input Rating

Input Rating

Absolute Maximum Input	75 VDC
Input Protection	Resistor Limited

ON State Current

ON State Current

@ 12 VDC	5 ... 10 mA
@ 24 VDC	6 ... 30 mA
@ 48 VDC	2 ... 15 mA
@ 60 VDC	1 ... 5 mA

Response / Switching Frequency

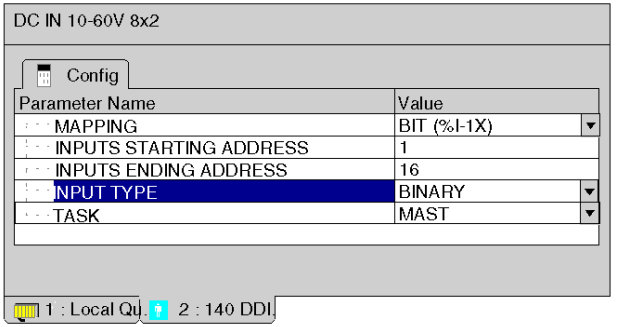
Response / Switching Frequency

OFF - ON	4 ms
ON - OFF	4 ms
Switching Frequency	< 100 Hz

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 20
140 DDI 853 00: 10 ... 60 VDC 4x8 Sink IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DDI 853 00 module.

What Is in This Chapter?

This chapter contains the following topics:

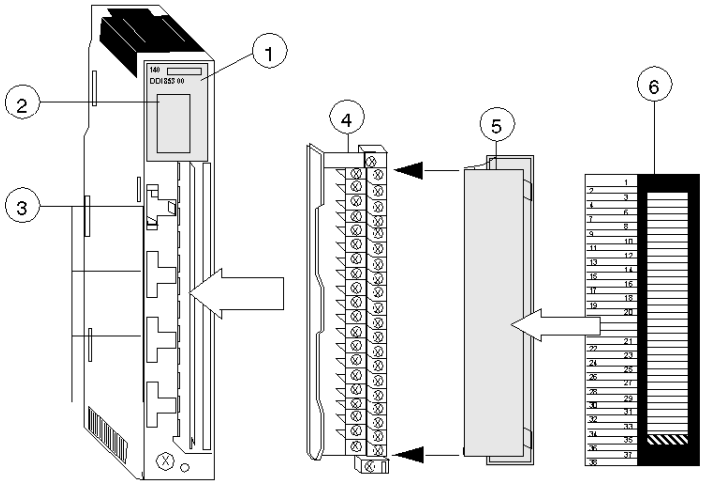
Presentation

Function

The DC Input 10 ... 60 VDC 4x8 Sink module accepts 10 ... 60 VDC inputs and is for use with shared input common wired to positive potential. ON-OFF levels are dependent on the reference voltage selected. Different reference voltages may be used for different groups.

Illustration

The following figure shows the 140 DDI 853 00 module and its components.



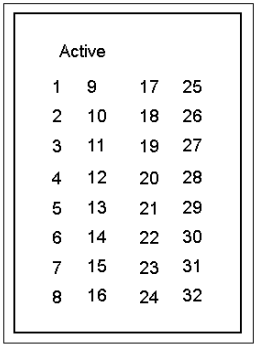
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDI 853 00 module.



Descriptions

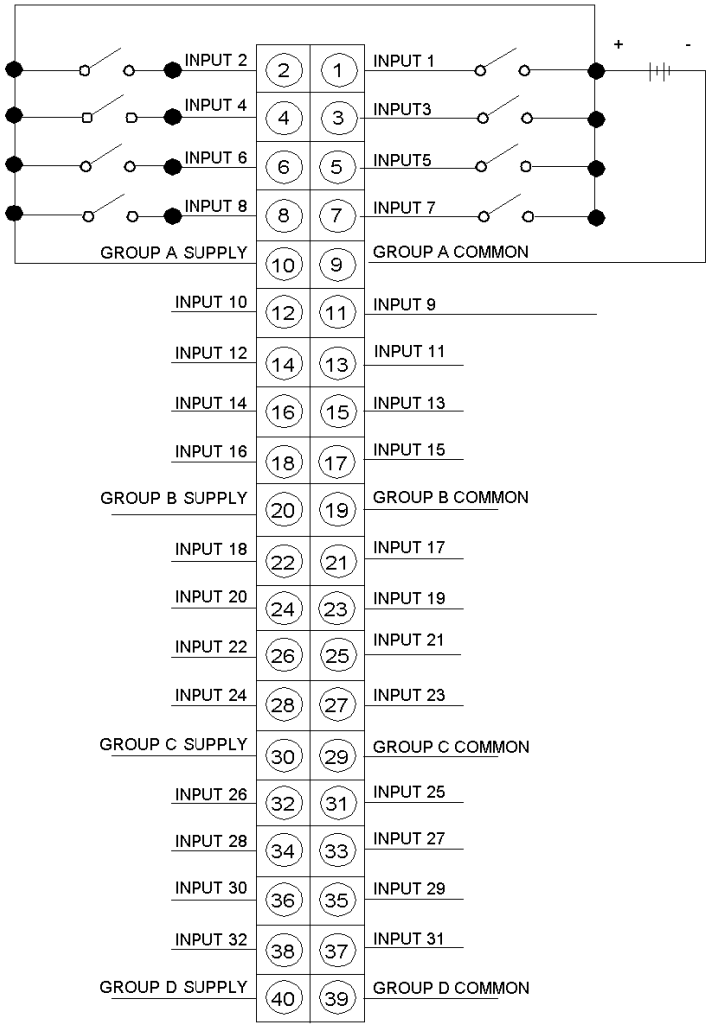
The following table shows the LED descriptions for the 140 DDI 853 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDI 853 00 wiring diagram.



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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
Logic	True High
External Power	10 ... 60 VDC (group supply)
Power Dissipation	1.0 W + 0.25 W x the number of points ON
Bus Current required	300 mA
I/O map	2 input words
Fault Detection	None

Group supply / Tolerance

Group supply / Tolerance

Group supply / Tolerance	ON* State	OFF* State
12 VDC / +/-5%	9 ... 12 VDC	0 ... 1.8 VDC
24 VDC / -15% ... +20%	11 ... 24 VDC	0 ... 5 VDC IEC61131
48 VDC / -15% ... +20%	34 ... 48 VDC	0 ... 10 VDC IEC61131
60 VDC / -15% ... +20%	45 ... 60 VDC	0 ... 12.5 VDC *ON / OFF state ranges are specified at nominal reference voltages.

Isolation

Isolation

Group to Group	700 VDC for 1 minute
Group to Bus	2500 VDC for 1 minute

Input Rating

Input Rating

Absolute Maximum Input	75 VDC
Input Protection	Resistor Limited

ON State Current

ON State Current

@ 12 VDC	5 ... 10 mA
@ 24 VDC	6 ... 30 mA
@ 48 VDC	2 ... 15 mA
@ 60 VDC	1 ... 5 mA

Response / Switching Frequency

Response / Switching Frequency

OFF - ON	4 ms
ON - OFF	4 ms
Switching Frequency	< 100 Hz max.

Fuses

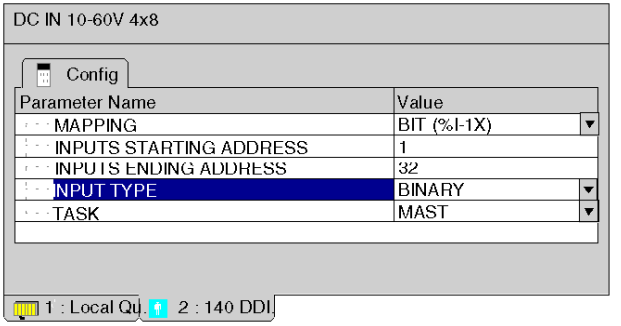
Fuses

Internal	None
External	User installed per local and national electrical codes

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 21
140 DAI 340 00: 24 VAC 16x1 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 340 00 module.

What Is in This Chapter?

This chapter contains the following topics:

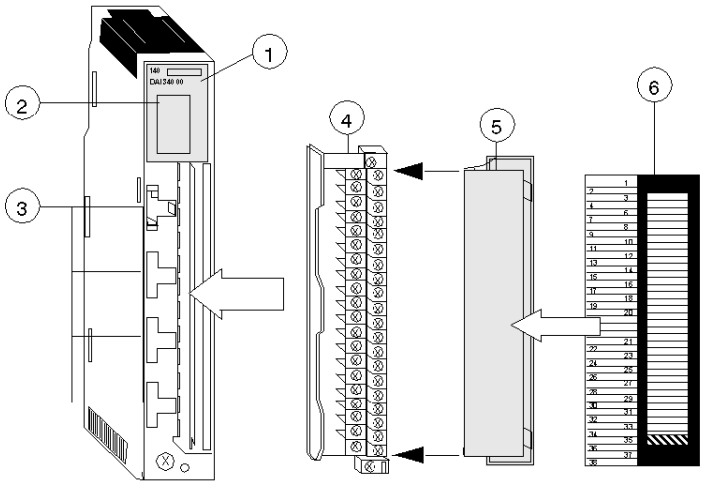
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 340 00 module and its components.



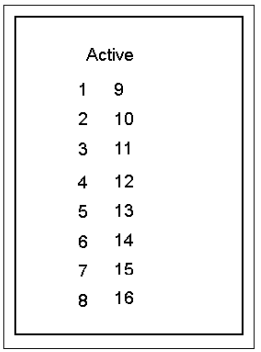
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 340 00 module.



Descriptions

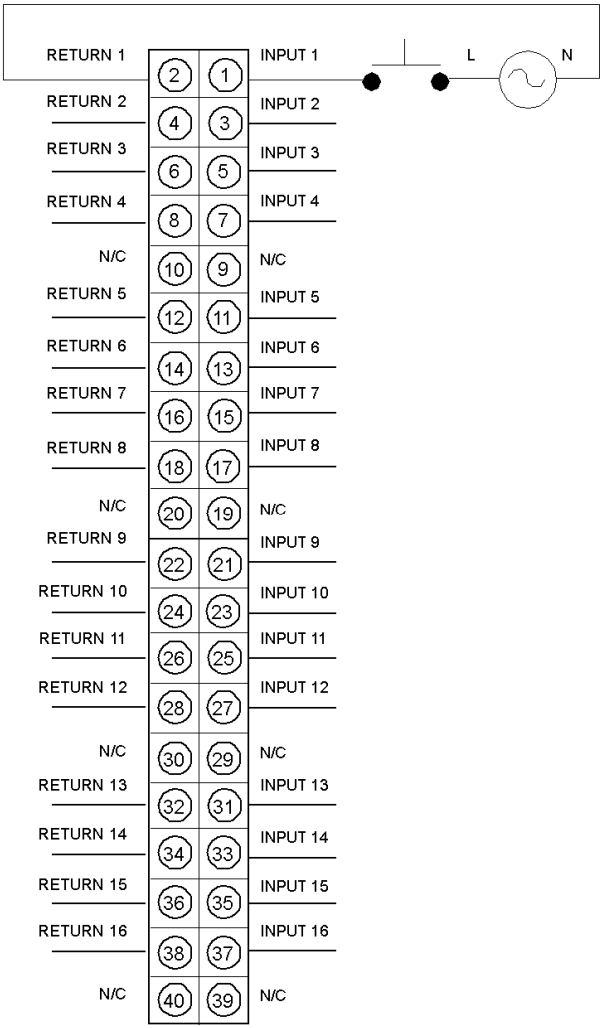
The following table shows the LED descriptions for the 140 DAI 340 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 340 00 wiring diagram.



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

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 IN (16 groups x 1 point) individually isolated
External Power	Not required for this module
Power Dissipation	5.5 W (max.)
Bus Current required	180 mA
I/O map	1 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

47 - 53 Hz	ON: 18 ... 30 VAC (10.7 mA max.) OFF: 0 ... 5 VAC
57 - 63 Hz	ON: 16 ... 30 VAC (12 mA max.) OFF: 0 ... 6 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	3.1 kohms capacitive
60 Hz	2.6 kohms

Isolation

Isolation

Input to Input	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	30 VAC
10 s	32 VAC
1 Cycle	50 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

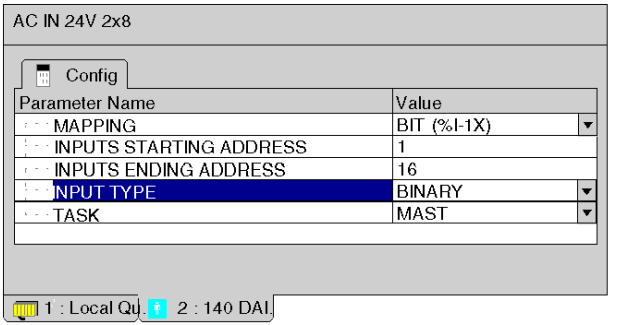
Fuses

Internal	None
External	User installed per local and national electrical codes

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 22
140 DAI 353 00: 24 VAC 4x8 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 353 00 module.

What Is in This Chapter?

This chapter contains the following topics:

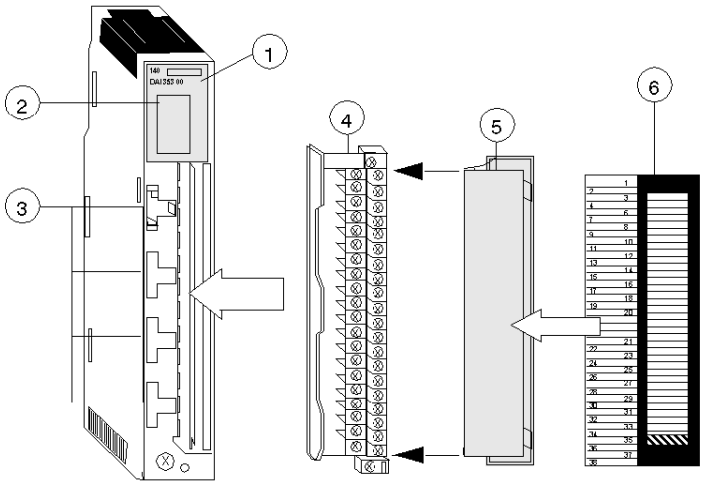
Presentation

Function

The AC Input 24 VAC 4x8 module accepts 24 VAC inputs.

Illustration

The following figure shows the 140 DAI 353 00 module and its components.



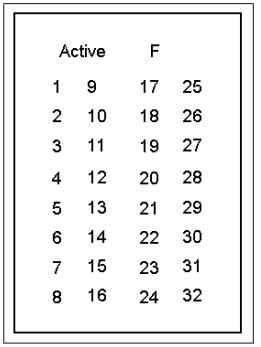
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 353 00 module.



Descriptions

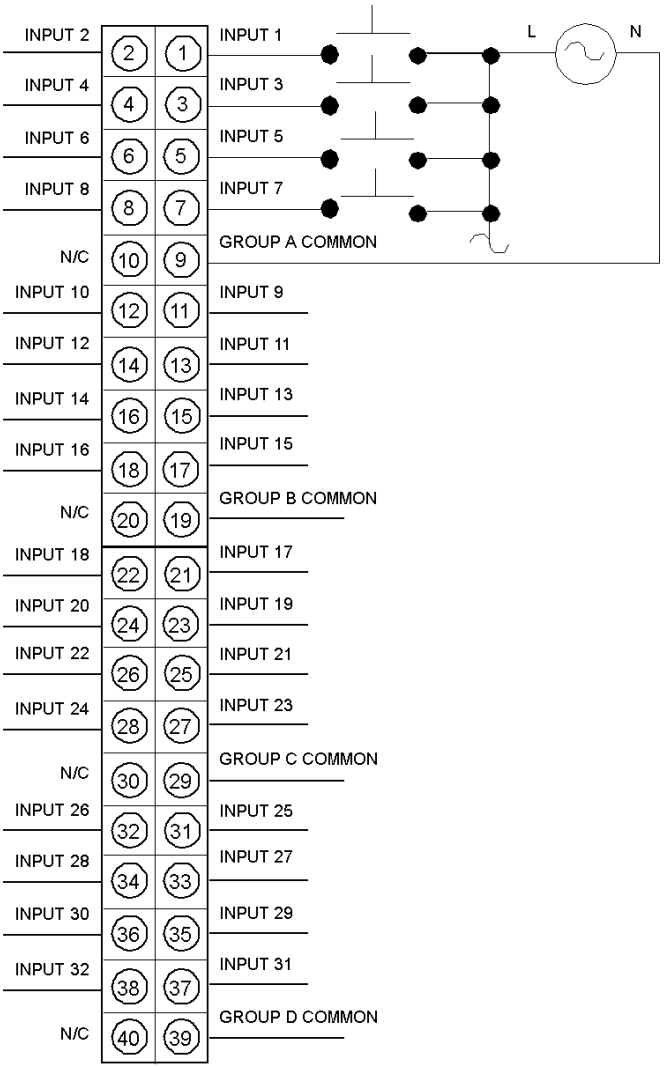
The following table shows the LED descriptions for the 140 DAI 353 00 module.

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.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 353 00 wiring diagram.



NOTE: This module is not polarity sensitive.

N / C = Not Connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
External Power	Not required for this module
Power Dissipation	10.9 W (max.)
Bus Current required	250 mA
I/O map	2 input words
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 14 ... 30 VAC (11.1 mA max) OFF: 0 ... 5 VAC
60 Hz	ON: 12 ... 30 VAC (13.2 mA max) OFF: 0 ... 5 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	3.1 kohms capacitive
60 Hz	2.6 kohms capacitive

Isolation

Isolation

Group to Group	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Fuses

Fuses

Internal	None
External	User installed per local and national electrical codes

Absolute Maximum Input

Absolute Maximum Input

Continuous	30 VAC
10 s	32 VAC
1 Cycle	50 VAC

Response

Response

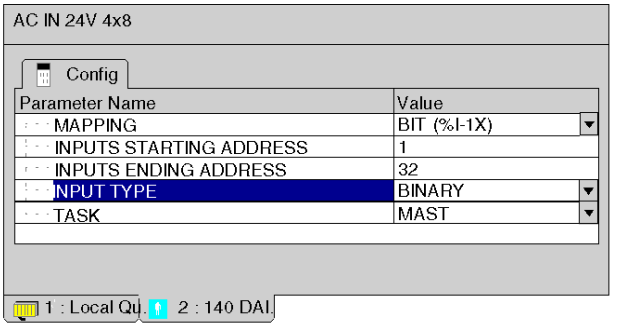
OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 23
140 DAI 440 00: 48 VAC 16x1 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 440 00 module.

What Is in This Chapter?

This chapter contains the following topics:

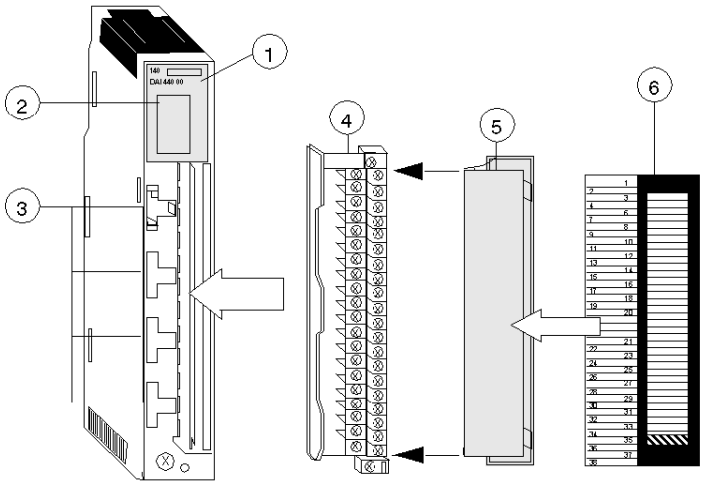
Presentation

Function

The AC Input 48 VAC 16x1 module accepts 48 VAC inputs.

Illustration

The following figure shows the 140 DAI 440 00 module and its components.



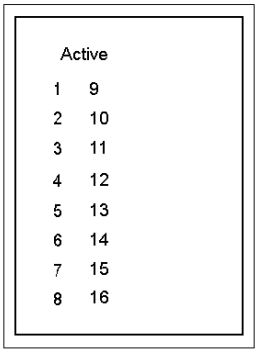
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 440 00 module.



Descriptions

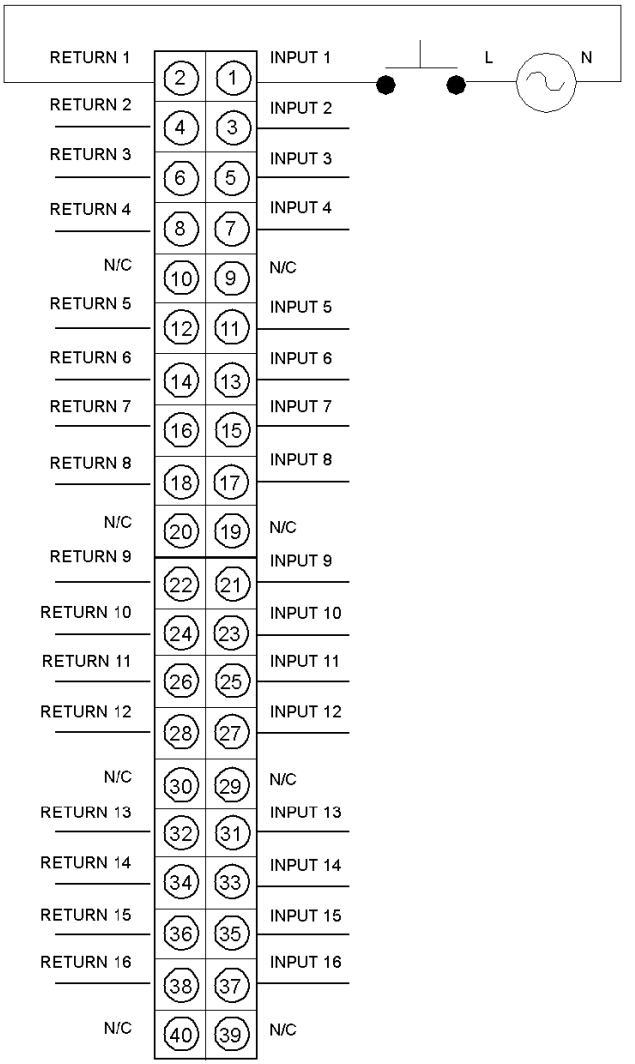
The following table shows the LED descriptions for the 140 DAI 440 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 440 00 wiring diagram.



NOTE: This module is not polarity sensitive.

N / C = Not Connected

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 individually isolated
External Power	Not required for this module
Power Dissipation	5.5 W (max.)
Bus Current required	180 mA
I/O map	1 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

47 - 53 Hz	ON: 36 ... 56 VAC (9.3 mA max) OFF: 0 ... 10 VAC
57 - 63 Hz	ON: 34 ... 56 VAC (11 mA max) OFF: 0 ... 10 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	6.8 kohms capacitive
60 Hz	5.6 kohms capacitive

Isolation

Isolation

Group to Group	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	56 VAC
10 s	63 VAC
1 Cycle	100 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

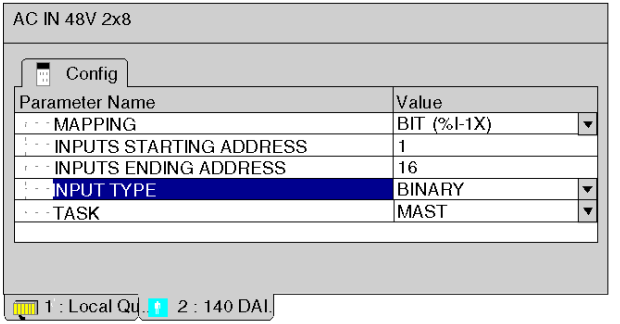
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 24
140 DAI 453 00: 48 VAC 4x8 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 453 00 module.

What Is in This Chapter?

This chapter contains the following topics:

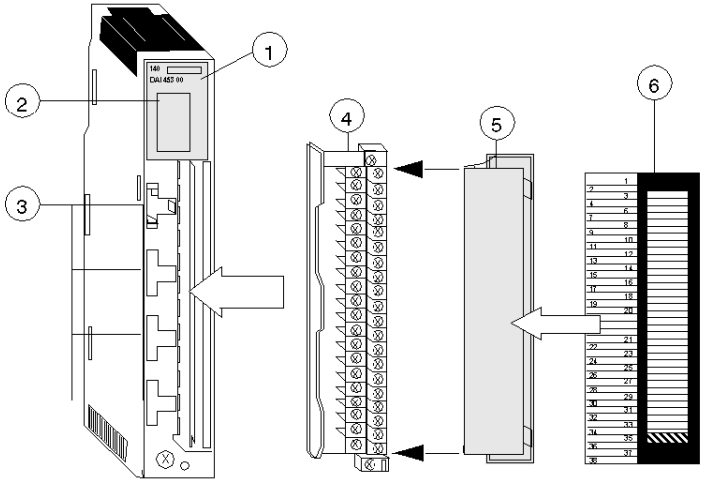
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 453 00 module and its components.



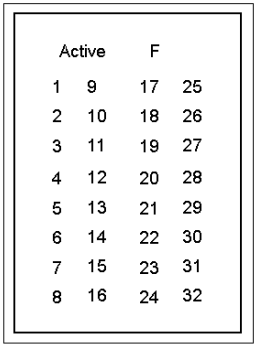
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 453 00 module.



Descriptions

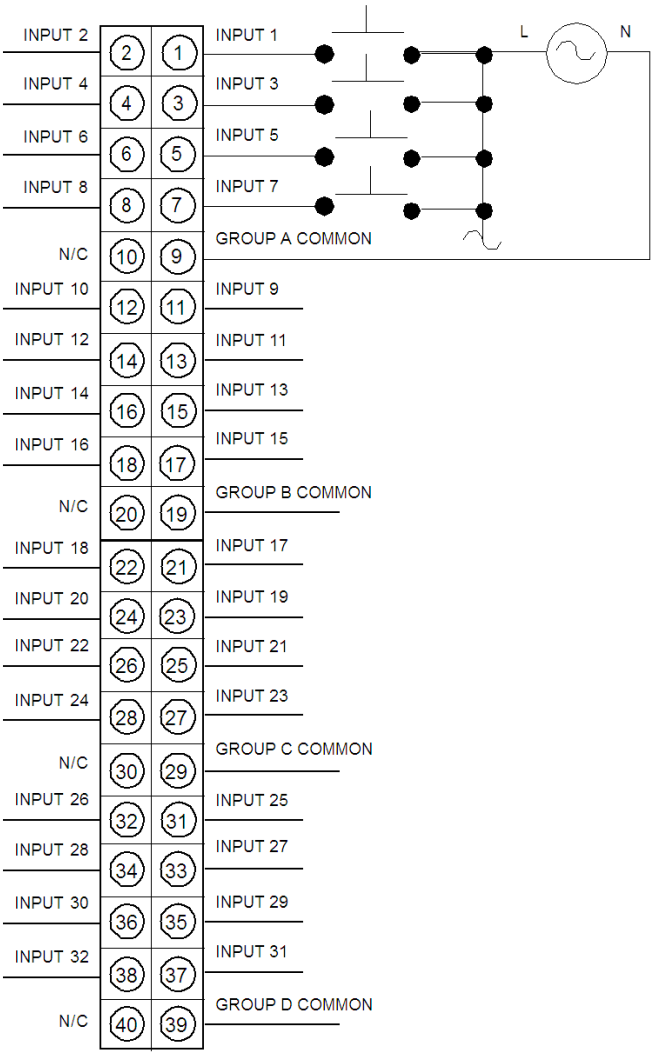
The following table shows the LED descriptions for the 140 DAI 453 00 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DAI 453 00 wiring diagram.



NOTE: This module is not polarity sensitive.

N / C = Not Connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
External Power	Not required for this module
Power Dissipation	10.9 W (max.)
Bus Current required	250 mA
I/O map	2 input words
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 34 ... 56 VAC (9.8 mA max) OFF: 0 ... 10 VAC
60 Hz	ON: 29 ... 56 VAC (11.7 mA max) OFF: 0 ... 10 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	6.8 kohms capacitive
60 Hz	5.6 kohms capacitive

Isolation

Isolation

Group to Group	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	56 VAC
10 s	63 VAC
1 Cycle	100 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

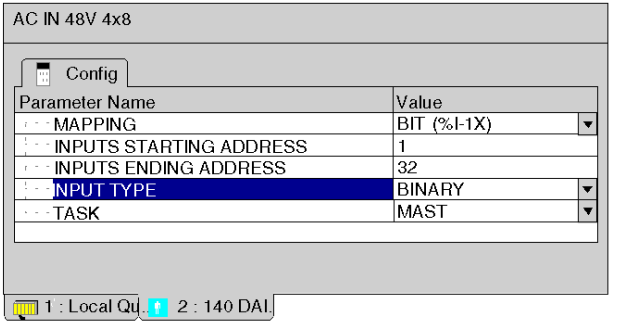
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 25
140 DAI 540 00: 115 VAC 16x1 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 540 00 module.

What Is in This Chapter?

This chapter contains the following topics:

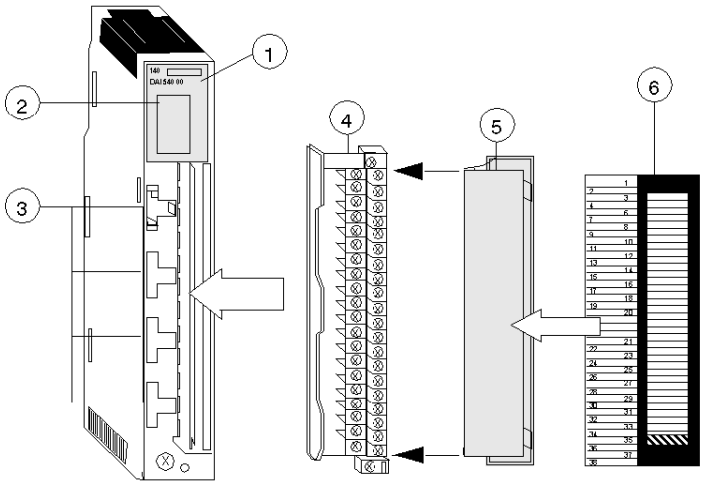
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 540 00 module and its components.



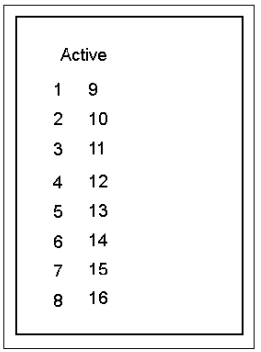
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 540 00 module.



Descriptions

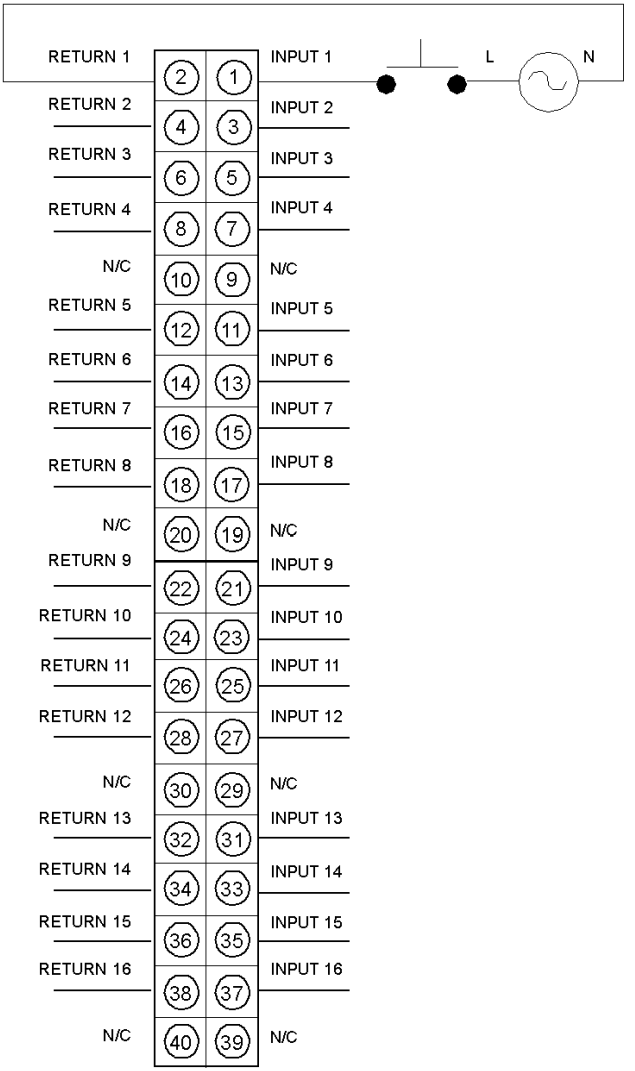
The following table shows the LED descriptions for the 140 DAI 540 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 540 00 wiring diagram.



1. N / C = Not Connected.
2. This module is not polarity sensitive.
3. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that all inputs in a group are from the same phase of line input voltage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	16 IN (16 groups x 1 point)
External Power	Not required for this module
Power Dissipation	5.5 W (max.)
Bus Current required	180 mA
I/O map	1 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 85 ... 132 VAC (11.1 mA max) OFF: 0 ... 20 VAC
60 Hz	ON: 79 ... 132 VAC (13.2 mA max) OFF: 0 ... 20 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	14.4 kohms capacitive
60 Hz	12 kohms capacitive

Isolation

Isolation

Input to Input	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	132 VAC
10 s	156 VAC
1 Cycle	200 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

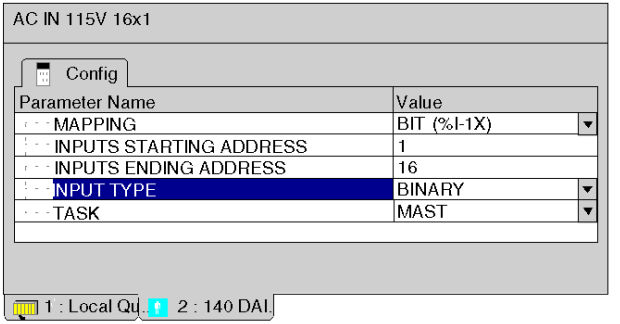
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 26
140 DAI 543 00: 115 VAC 2x8 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 543 00 module.

What Is in This Chapter?

This chapter contains the following topics:

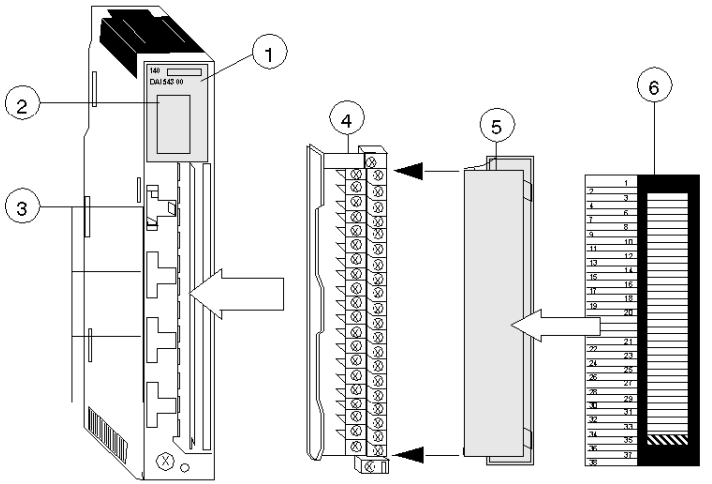
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 543 00 module and its components.



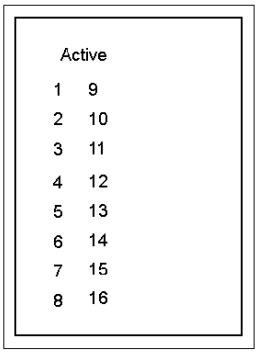
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 543 00 module.



Descriptions

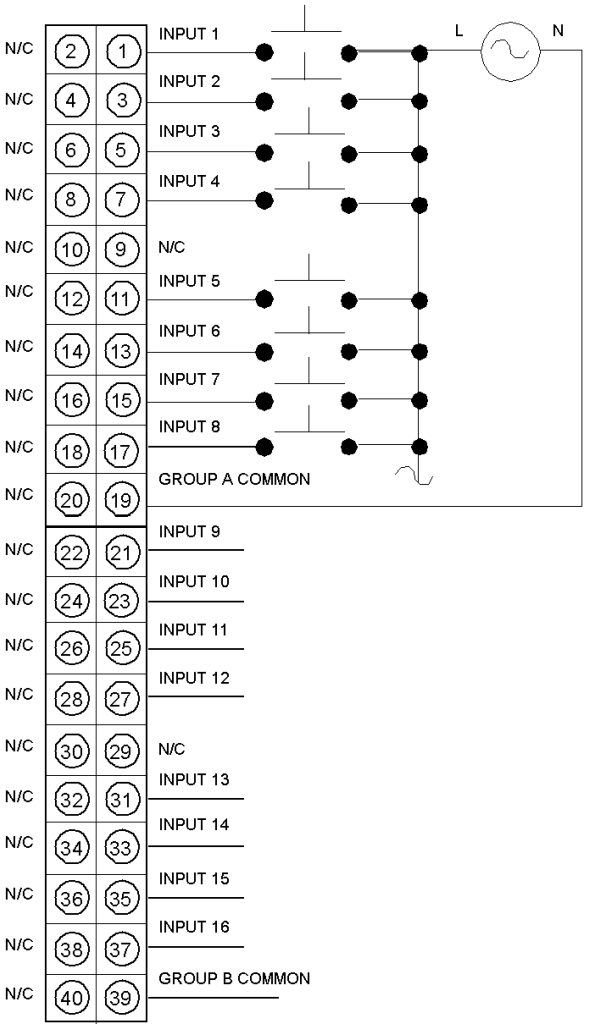
The following table shows the LED descriptions for the 140 DAI 543 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 543 00 wiring diagram.



NOTE: All inputs in a group must be from the same phase of line-input voltage. This module is not polarity sensitive.

N / C = Not Connected.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that all inputs in a group are from the same phase of line input voltage

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	16 IN (2 groups x 8 points)
External Power	Not required for this module
Power Dissipation	5.5 W (max)
Bus Current required	180 mA
I/O map	1 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 85 ... 132 VAC (11.1 mA max) OFF: 0 ... 20 VAC
60 Hz	ON: 79 ... 132 VAC (13.2 mA max) OFF: 0 ... 20 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	14.4 kohms capacitive
60 Hz	12 kohms capacitive

Isolation

Isolation

Group to Group	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	132 VAC
10 s	156 VAC
1 Cycle	200 VAC
1.3 ms	276 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

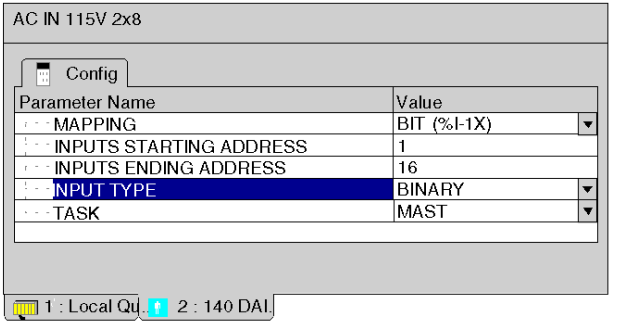
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 27
140 DAI 553 00: 115 VAC 4x8 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 553 00 module.

What Is in This Chapter?

This chapter contains the following topics:

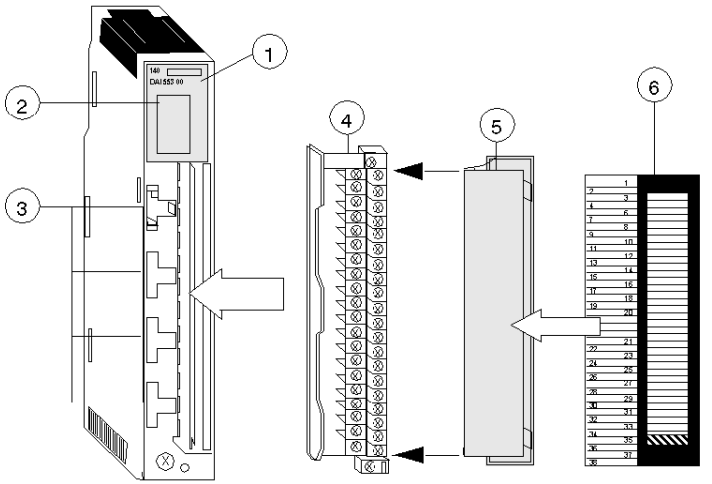
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 553 00 module and its components.



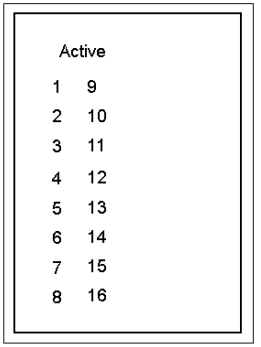
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 553 00 module.



Descriptions

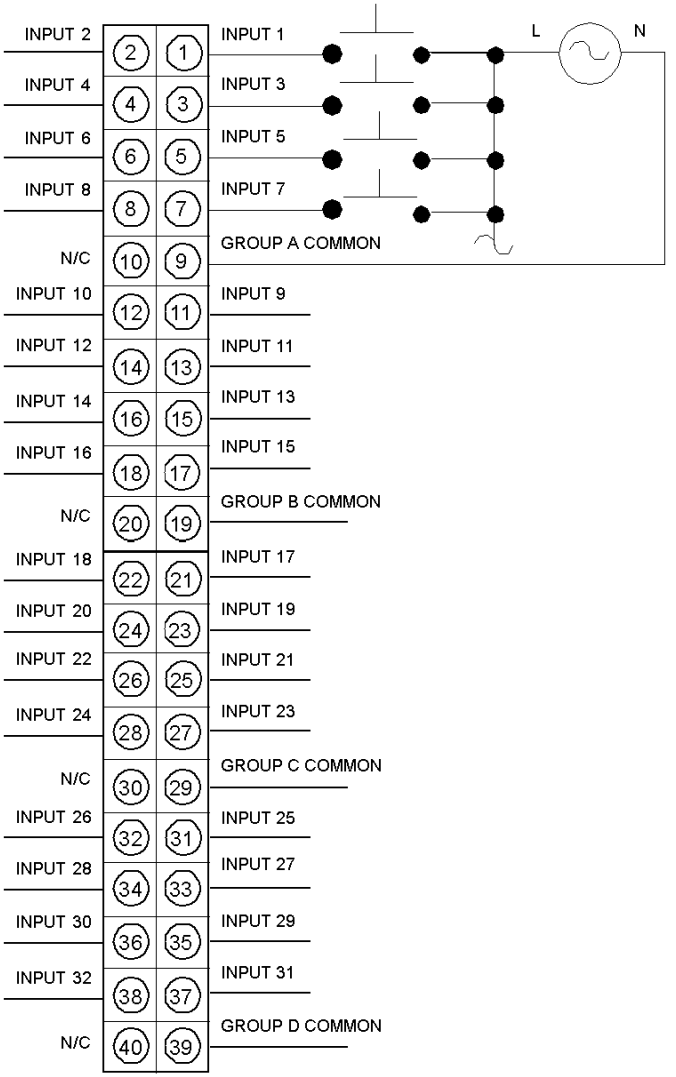
The following table shows the LED descriptions for the 140 DAI 553 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 553 00 wiring diagram.



1. N / C = Not Connected.
2. This module is not polarity sensitive.
3. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that all inputs in a group are from the same phase of line input voltage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points)
External Power	Not required for this module
Power Dissipation	10.9 W (max)
Bus Current required	250 mA
I/O map	2 input words
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 85 ... 132 VAC (11.1 mA max) OFF: 0 ... 20 VAC
60 Hz	ON: 79 ... 132 VAC (13.2 mA max) OFF: 0 ... 20 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	14.4 kohms capacitive
60 Hz	12 kohms capacitive

Isolation

Isolation

Group to Group	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	132 VAC
10 s	156 VAC
1 Cycle	200 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

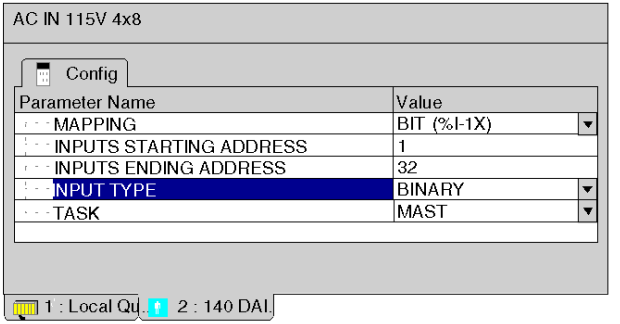
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 28
140 DAI 740 00: 230 VAC 16x1 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 740 00 module.

What Is in This Chapter?

This chapter contains the following topics:

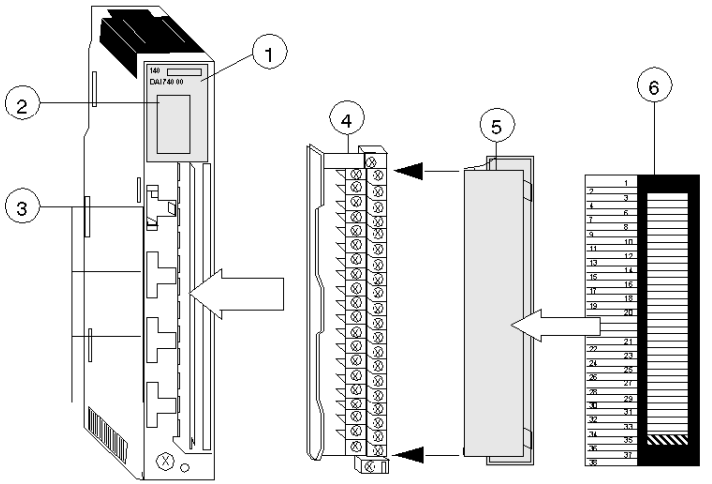
Presentation

Function

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

Illustration

The following figure shows the 140 DAI 740 00 module and its components.



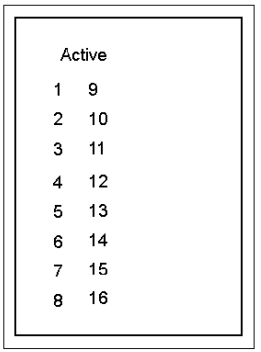
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 740 00 module.



Descriptions

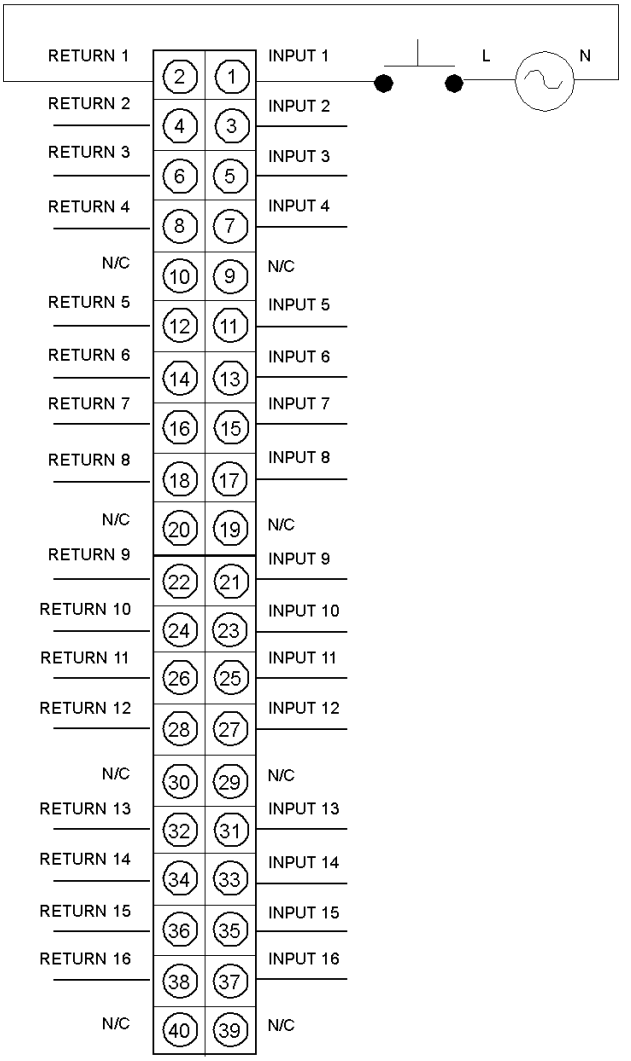
The following table shows the LED descriptions for the 140 DAI 740 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 740 00 wiring diagram.



NOTE: This module is not polarity sensitive.

N / C = Not Connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 IN (2 groups x 8 points) individually isolated
External Power	Not required for this module
Power Dissipation	5.5 W (max)
Bus Current required	180 mA
I/O map	1 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 175 ... 264 VAC (9.7 mA max) OFF: 0 ... 40 VAC
60 Hz	ON: 165 ... 264 VAC (11.5 mA max) OFF: 0 ... 40 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	31.8 kohms capacitive
60 Hz	26.5 kohms capacitive

Isolation

Isolation

Input to Input	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	264 VAC
10 s	300 VAC
1 Cycle	400 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

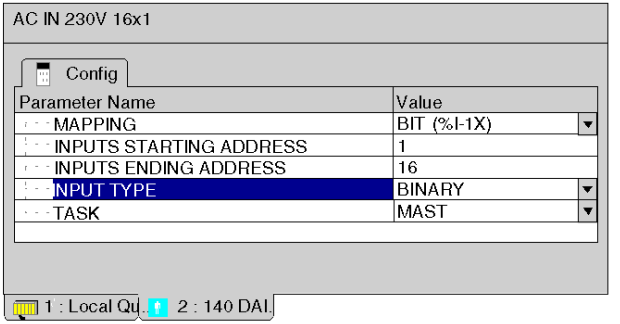
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 40)*.

Chapter 29
140 DAI 753 00: 230 VAC 4x8 IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DAI 753 00 module.

What Is in This Chapter?

This chapter contains the following topics:

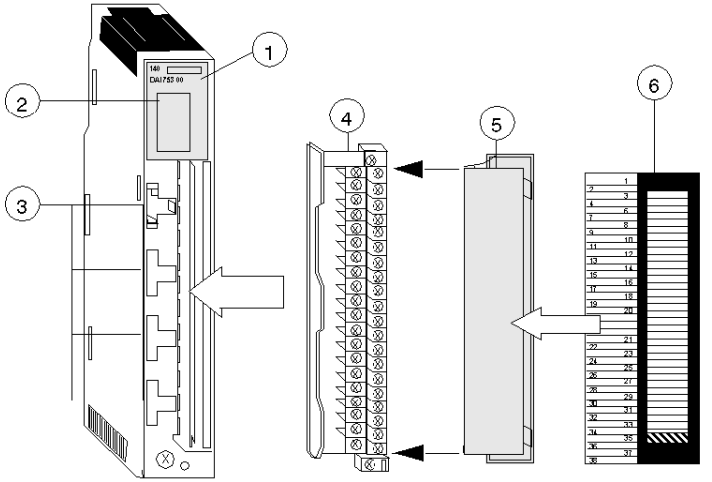
Presentation

Function

The AC Input 230 VAC 4x8 module accepts 230 VAC inputs.

Illustration

The following figure shows the 140 DAI 753 00 module and its components.



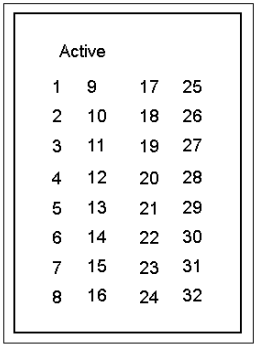
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAI 753 00 module.



Descriptions

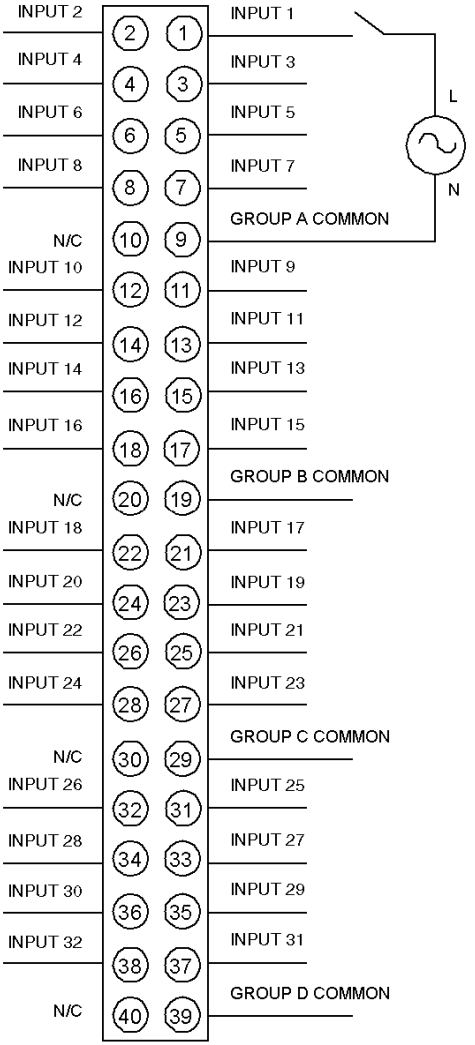
The following table shows the LED descriptions for the 140 DAI 753 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAI 753 00 wiring diagram.



1. N / C = Not Connected.
2. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that all inputs in a group are from the same phase of line input voltage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	32 IN (4 groups x 8 points) individually isolated
External Power	Not required for this module
Power Dissipation	9 W (max)
Bus Current required	250 mA
I/O map	2 input word
Fault Detection	None

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 175 ... 264 VAC (9.7 mA max) OFF: 0 ... 40 VAC
60 Hz	ON: 165 ... 264 VAC (11.5 mA max) OFF: 0 ... 40 VAC * 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

Typical Input Impedance

Typical Imput Impedance

50 Hz	32 kohms capacitive
60 Hz	27 kohms capacitive

Isolation

Isolation

Input to Input	1780 VAC for 1 minute
Input to Bus	1780 VAC for 1 minute

Absolute Maximum Input

Absolute Maximum Input

Continuous	264 VAC
10 s	300 VAC
1 Cycle	400 VAC

Response

Response

OFF - ON	Min: 4.9 ms. Max: 0.75 line cycle.
ON - OFF	Min: 7.3 ms. Max: 12.3 ms.

Fuses

Fuses

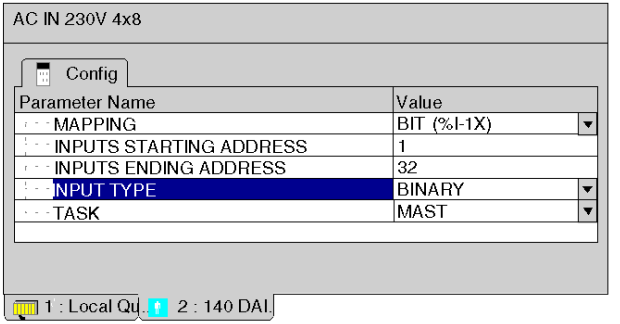
Internal	None
External	User installed per local and national electrical codes

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

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	32	2	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 42)*.

Chapter 30
140 DSI 353 00: 24 VDC 2x16 Supervised IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DSI 353 00 module.

What Is in This Chapter?

This chapter contains the following topics:

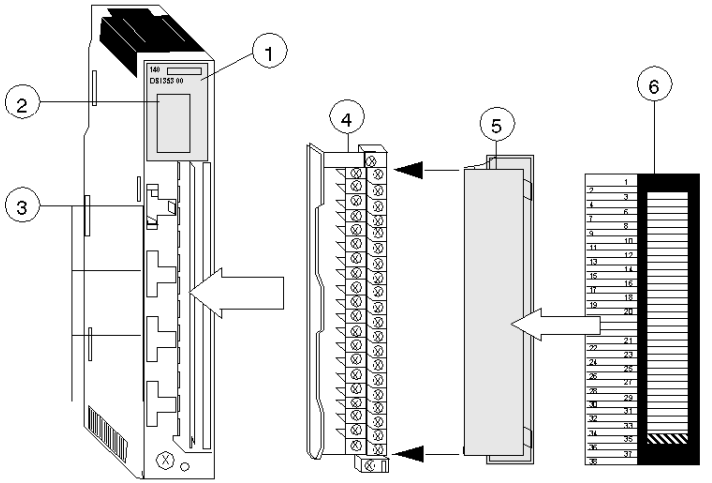
Presentation

Function

The 140 DSI 353 00 module is used with source output devices. It accepts 24 VDC inputs. It has 32 input points (four groups of 8), and has broken wire detection for each unit.

Illustration

The following figure shows the 140 DSI 353 00 module and its components.



1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

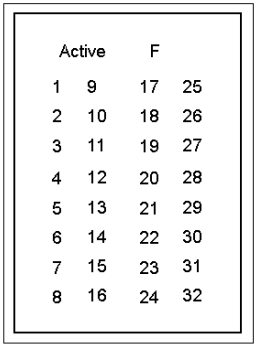
NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

NOTE: Do not use the 140 DSI 353 00 module in a DIO rack containing a 140 CRA 211 x0 module.

Indicators

Illustration

The following table shows the LED indicators for the 140 DSI 353 00 module.



Descriptions

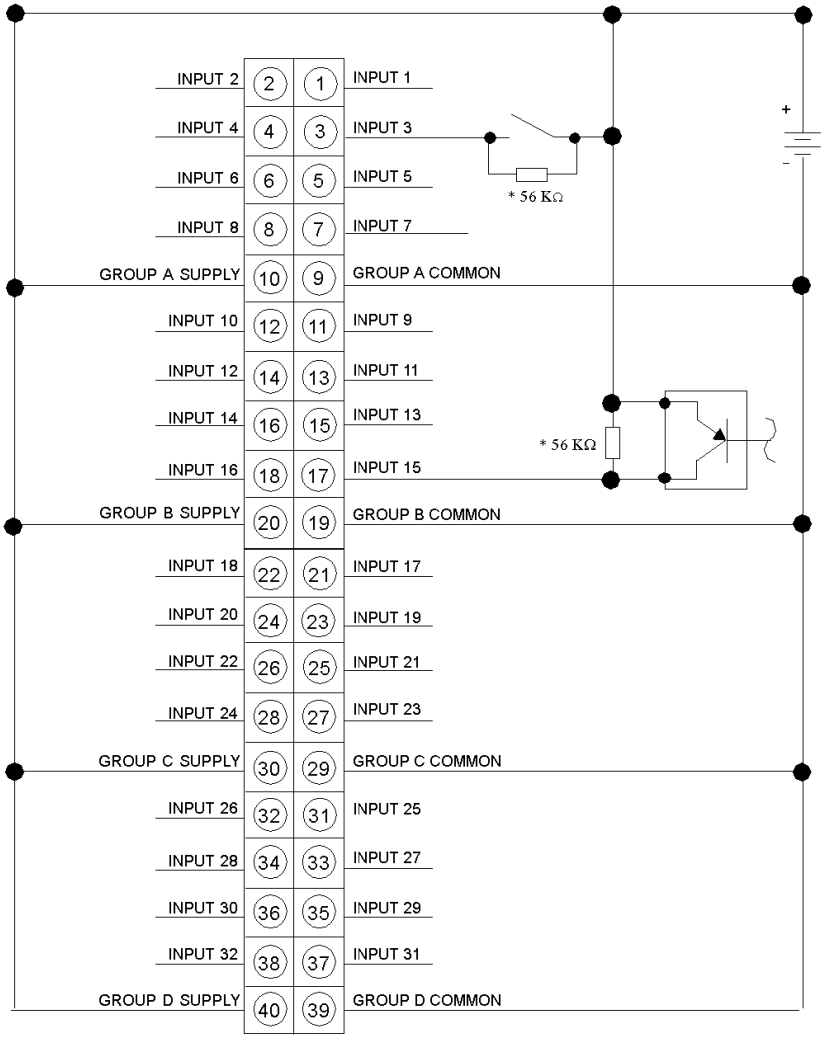
The following table shows the LED descriptions for the 140 DSI 353 00 module.

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

Wiring Diagram

Wiring Diagram

Wiring diagram for the 140 DSI 353 00 Module:



* Recommended resistor value for 24V DC

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 IN (2 groups x 16 points)
External Power	+20 ... +30 VDC / 20 mA each group
Power Dissipation	7 W (all points on)
Bus Current required (Module)	250 mA

Operating Voltage and Current

Operating Voltage and Current

ON level current	2.5 mA (min.)
OFF level voltage	+5 VDC
OFF level current	min. 0.3 mA ... 1.2 mA

Response

Response

OFF - ON	2.2 ms
ON - OFF	3.3 ms

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute

Open Circuit Monitoring

Open Circuit Monitoring

Broken wire detection	OFF Current < 0.15 mA
Shunt resistor	56 kohms recommended

Fuses

Fuses

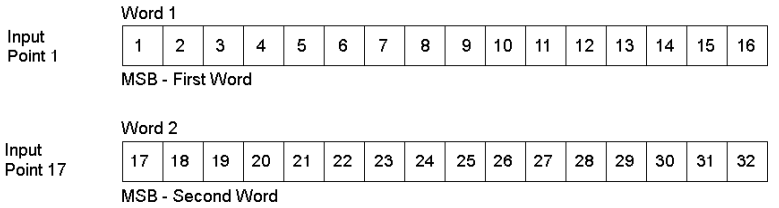
Internal	None
External	User installed per local and national electrical codes

Addressing

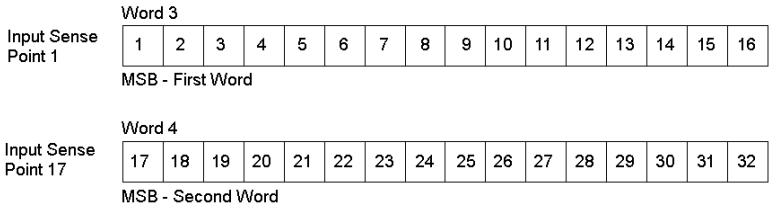
Flat Addressing

This module requires 64 contiguous, input references (%I) - 32 for input data and 32 for broken wire signal or 4 contiguous input words (%IW) 2 for input data and 2 for broken wire signal. The data word formats are as follows.

Input Words (Data):



Input Words (Sense):



Topological Addressing

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1.1	Value
Input 2	%I[\b.e\]r.m.2.1	Value
• • •		
Input 31	%I[\b.e\]r.m.31.1	Value
Input 32	%I[\b.e\]r.m.32.1	Value
Broken Wire 1	%I[\b.e\]r.m.1.2	Value
Broken Wire 2	%I[\b.e\]r.m..2.2	Value
• • •		
Broken Wire 31	%I[\b.e\]r.m.31.2	Value
Broken Wire 32	%I[\b.e\]r.m.32.2	Value

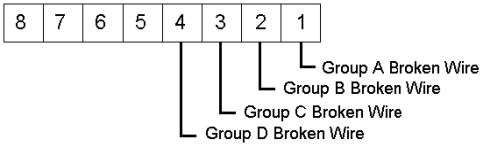
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Inputword 2	%IW[\b.e\]r.m.1.2	Value
Inputword 3	%IW[\b.e\]r.m.1.3	Broken Wire Flag
Inputword 4	%IW[\b.e\]r.m.1.4	Broken Wire Flag

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

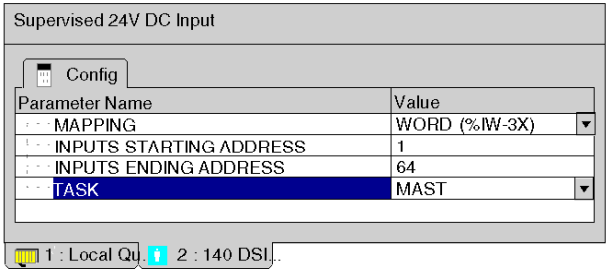
The eight bits in the I/O map status byte are used as follows:



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	64	4	
Task (Grayed if module in other than local)	Mast	Fast	fixed to Mast if module in other than local

Part VI
Discrete OUT Modules

Introduction

The following part provides information on the Quantum Discrete OUT modules.

What Is in This Part?

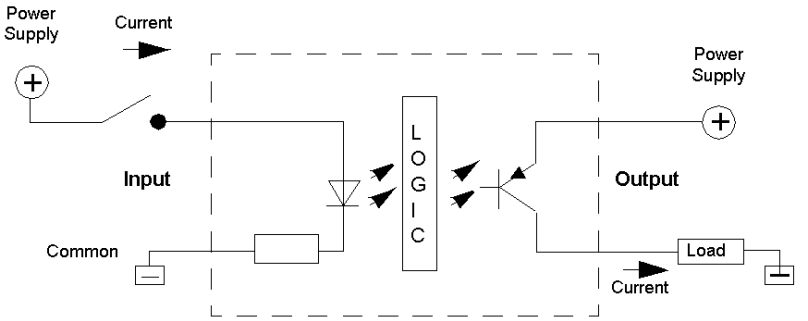
This part contains the following chapters:

Chapter 31
General Information

Discrete I/O Logic Circuits

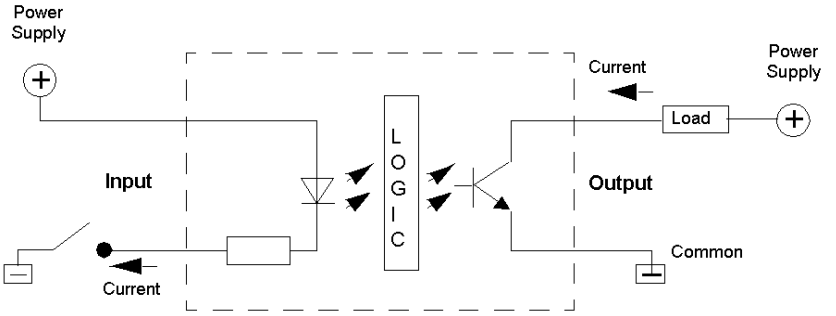
Discrete I/O True High Figure

The following figure shows true high/current sink input/current source output schematic.



Discrete I/O True Low Figure

The following figure shows true low/current source input/current sink output schematic.



Current Sinking

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

Current Sourcing

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

Chapter 32
140 DDO 153 10: 5 VDC 4x8 Sink OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 153 10 module.

What Is in This Chapter?

This chapter contains the following topics:

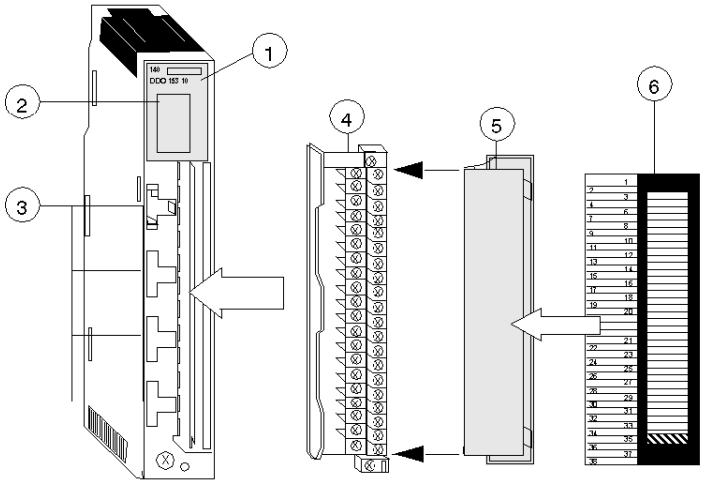
Presentation

Function

The DC Output 5 V 4x8 Sink module switches 5 VDC loads. It is for use with shared output common wired to positive potential and is compatible with TTL, -LS, -S, and CMOS logic.

Illustration

The following figure shows the 140 DDO 153 10 module and its components.



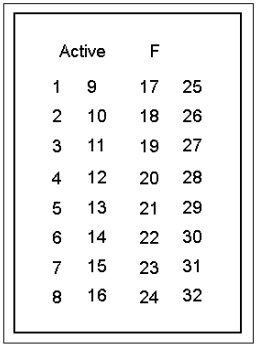
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 153 10 module.



Descriptions

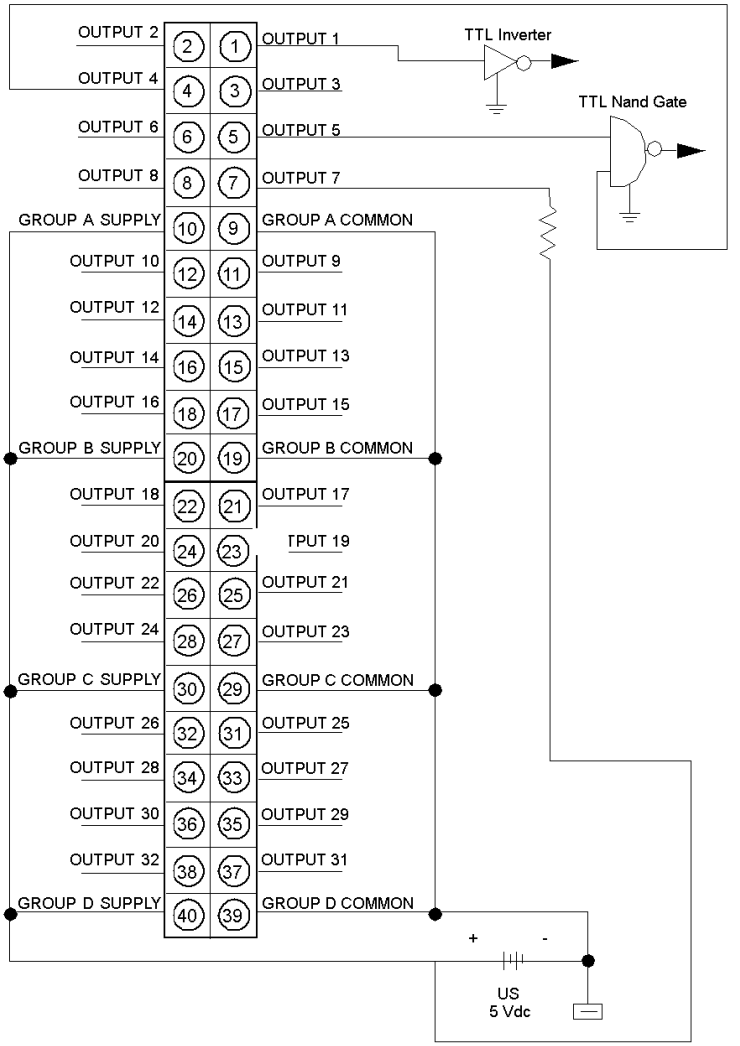
The following table shows the LED descriptions for the 140 DDO 153 10 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DDO 153 10 wiring diagram.



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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
Logic	True Low
External Power (Us)	4.5 ... 5.5 VDC continuous
Absolute Voltage (Us)	15 VDC for 1.3 ms decaying pulse
Power Dissipation	4 W
Supply Current	400 mA + Load Current per Point
Bus Current required (Module)	350 mA
I/O map	2 output word
Fault Detection	Output: Blown fuse detect, loss of field power.

Input Rating

Input Rating

ON level voltage	0.2 VDC (max.) @ 75 mA sinking
OFF level voltage	Vout = Us - 1.25 V @ 1 mA source Vout = 3.2 V (min.) @ 1 mA, Us = 4.5 V
Internal Pullup Resistor	440 ohm

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	75 mA (sinking)
Each Group	600 mA
Per Module	2.4 A
Surge Current (max.)	Each Point: 75 mA @ 500 ms duration (no more than 6 per minute)

Isolation / Protection

Isolation / Protection

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute
Output Protection	Transient Voltage Suppression (internal)

Response

Response

OFF - ON	250 µs (max) - (resistive load)
ON - OFF	250 µs (max) - (resistive load)

Maintenance

Fuses

Fuses

Internal	1 A fuse for each group. For the location of the fuses see figure below.
External	None

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

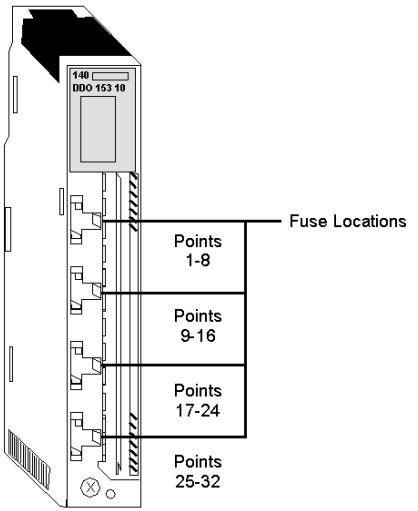
Before accessing the fuses,

- Remove the power to the module (sensors and pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

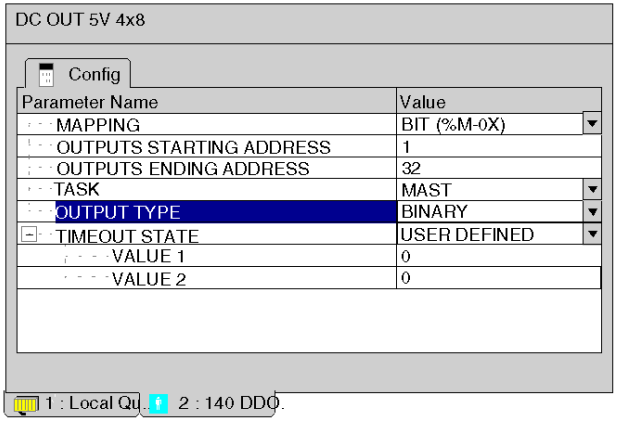
Illustration

The following figure shows the locations of the fuses for the 140 DDO 153 10 module.



140 DDO 153 10 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	32	2	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USERDEFINED	Hold Last Value	
Value 1, Value 2	0	0-65535	only if Timeout State=USERDEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 49)*.

Chapter 33
140 DDO 353 00: 24 VDC 4x8 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 353 00 module.

What Is in This Chapter?

This chapter contains the following topics:

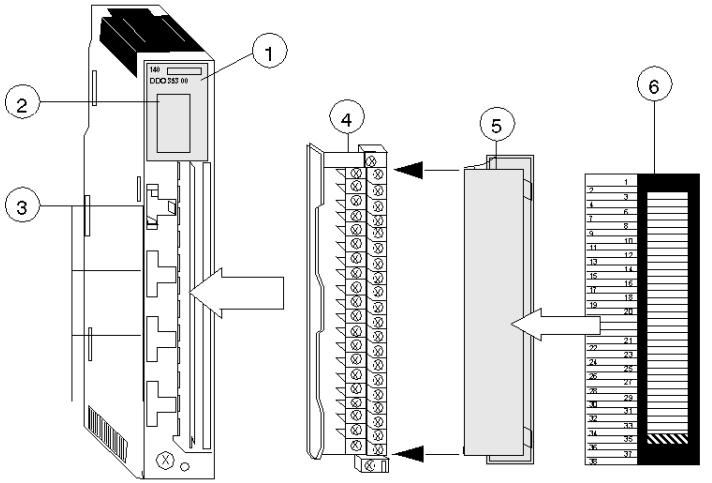
Presentation

Function

The DC Output 24 VDC 4x8 Source module switches 24 VDC powered loads and is for use with shared ouput common wired to 0 V.

Illustration

The following figure shows the 140 DDO 353 00 module and its components.



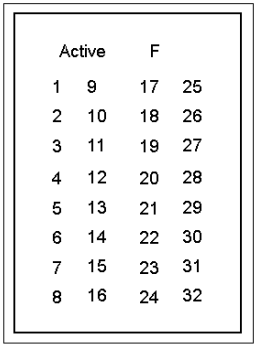
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 353 00 module.



Descriptions

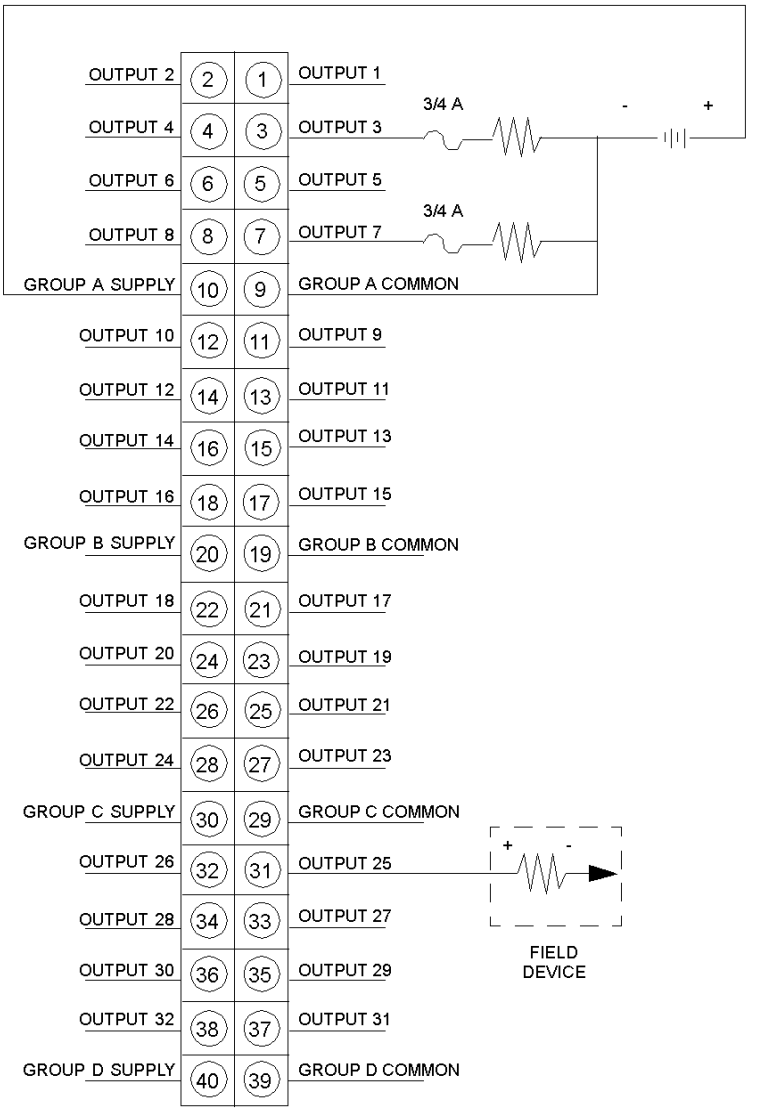
The following table shows the LED descriptions for the 140 DDO 353 00 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DDO 353 00 wiring diagram.



⚠ CAUTION
OVER CURRENT TO OUTPUTS Protect each point with a 3/4 A, 250 V fuse. **Failure to follow these instructions can result in injury or equipment damage.**

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
Logic	True High
External Power	19.2 ... 30 VDC
Power Dissipation	1.75 W + 0.4 V x Total module load Current
Bus Current required (Module)	330 mA
I/O map	2 output word
Fault Detection	Output: Blown fuse detect, loss of field power.

Voltage

Voltage

Operating Voltage (max.)	19.2 ... 30 VDC
Absolute Voltage (max.)	56 VDC for 1 ms decaying pulse
ON State Drop / Point	0.4 VDC @ 0.5 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Surge Current (max.)	Each Point: 5 mA @ 500 ms duration (no more than 6 per minute)
OFF State Leakage / Point	0.4 mA @ 30 VDC

Isolation / Protection

Isolation / Protection

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute
Output Protection	Transient Voltage Suppression (internal)

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	1 ms (max.)
ON - OFF	1 ms (max.)

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	50 µF

Maintenance

Fuses

Fuses

Internal	5 A fuse for each group. (Part # 043502405) or equivalent). For the location of the fuses see figure below.
External	The internal fuse protects a group but not each output switch for all possible overload conditions. The user must protect each point with a 3/4 A, 250 V fuse.

⚠ CAUTION

OVER CURRENT TO OUTPUTS

Protect each point with a 3/4 A, 250 V fuse

Failure to follow these instructions can result in injury or equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

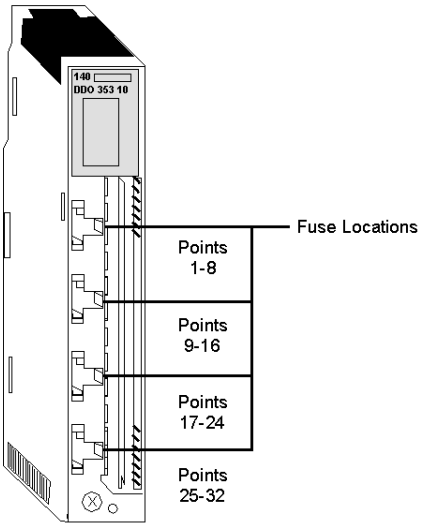
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

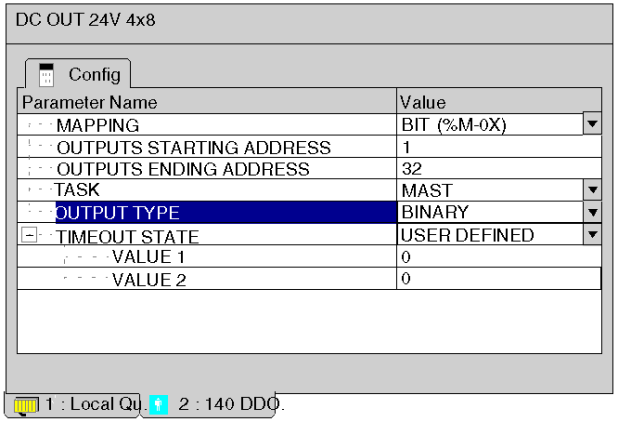
Illustration

The following figure shows the fuse locations for the 140 DDO 353 00 module.



140 DDO 353 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	32	2	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USERDEFINED	HOLD LAST VALUE	
Value 1, Value 2	0	0-65535	only if Timeout State=USERDEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 49)*.

Chapter 34
140 DDO 353 01: 24 VDC 4x8 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 353 01 module.

What Is in This Chapter?

This chapter contains the following topics:

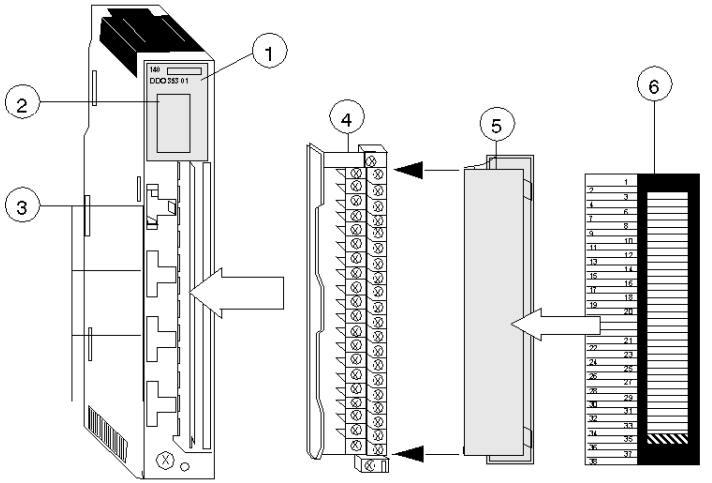
Presentation

Function

The 140 DDO 353 01 source module switches 24 VDC powered loads, and is short circuit and overload resistant.

Illustration

The following figure shows the 140 DDO 353 01 module and its components.



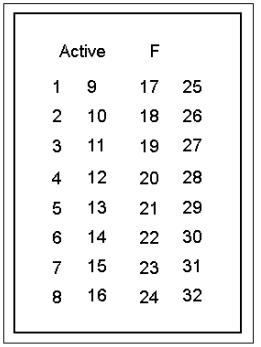
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 353 01 module.



Descriptions

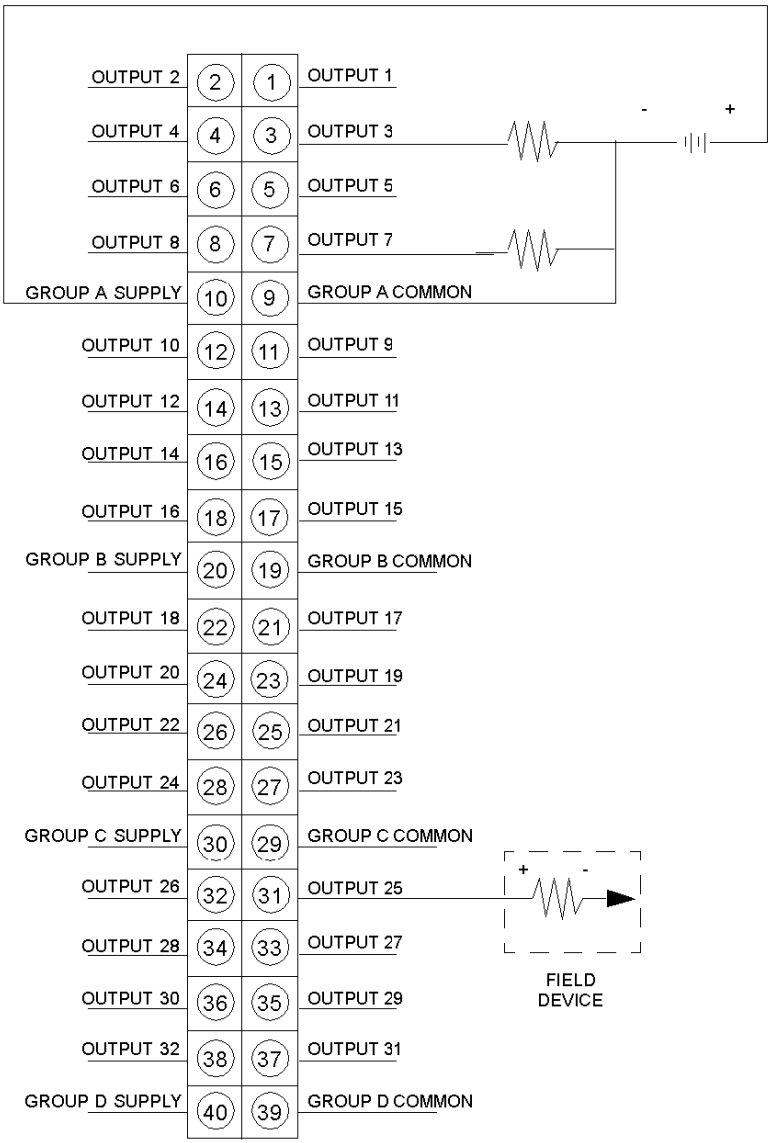
The following table shows the LED descriptions for the 140 DDO 353 01 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DDO 353 01 wiring diagram.



⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
External Power	19.2 ... 30 VDC
Power Dissipation	5 W (all points ON)
Bus Current required (Module)	250 mA (max.)
I/O map	2 output word
Fault Detection	Group indication: loss of field power.

Voltage

Voltage

Operating Voltage (max.)	19.2 ... 30 VDC
ON State Drop / Point	0.5 VDC @ 0.5 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Surge Current (max.)	2 A each point (internally limited)
OFF State Leakage / Point	< 0.1 mA @ 24 VDC

Isolation / Protection

Isolation / Protection

Group to Group	500 VAC rms for 1 minute
Output to Bus	500 VAC rms for 1 minute
Output Protection (internal)	Thermal overload and short circuit.

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	< 0.1 ms
ON - OFF	< 0.1 ms

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	50 µF

Maintenance

Fuses

Fuses

Internal	5 A fuse for each group. (Part # 043502405) or equivalent). For the location of the fuses see figure below.
External	User installed per local and national electrical codes

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

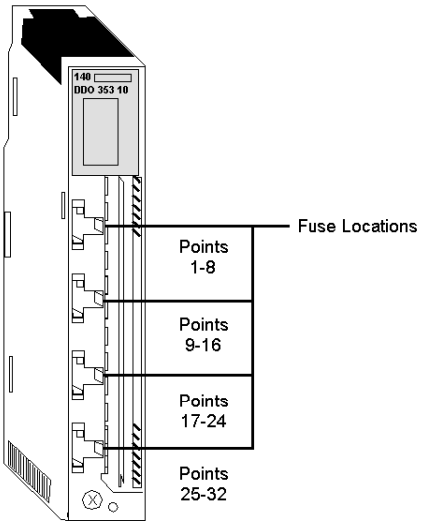
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

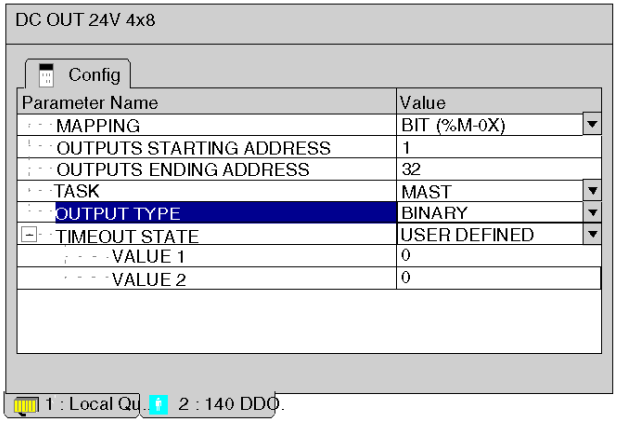
Illustration

The following figure shows the fuse locations for the 140 DDO 353 00 module.



140 DDO 353 01 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	32	2	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USERDEFINED	HOLD LAST VALUE	
Value 1, Value 2	0	0-65535	only if Timeout State=USERDEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 49)*.

Chapter 35
140 DDO 353 10: 24 VDC 4x8 Sink OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 353 10 module.

What Is in This Chapter?

This chapter contains the following topics:

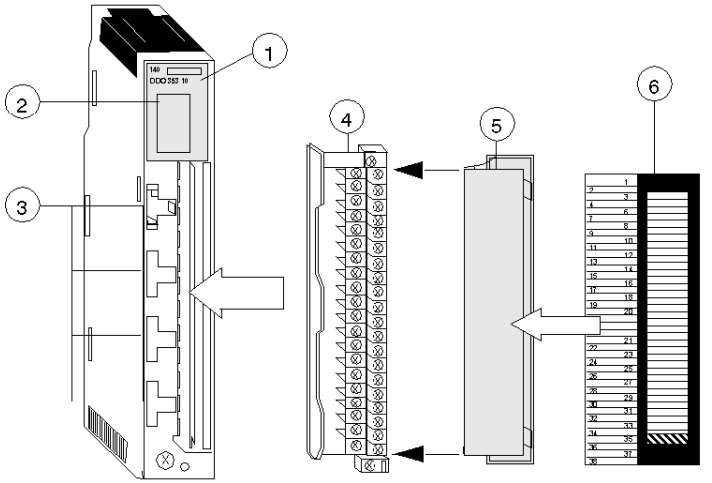
Presentation

Function

The 24 VDC Sink 4x8 Output module switches 24 VDC loads capable of driving displays, logic, and other loads up to 500 mA with shared output common wired to positive potential, in the ON state.

Illustration

The following figure shows the 140 DDO 353 10 module and its components.



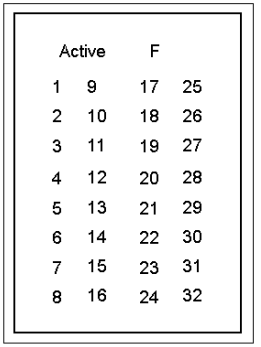
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 353 10 module.



Descriptions

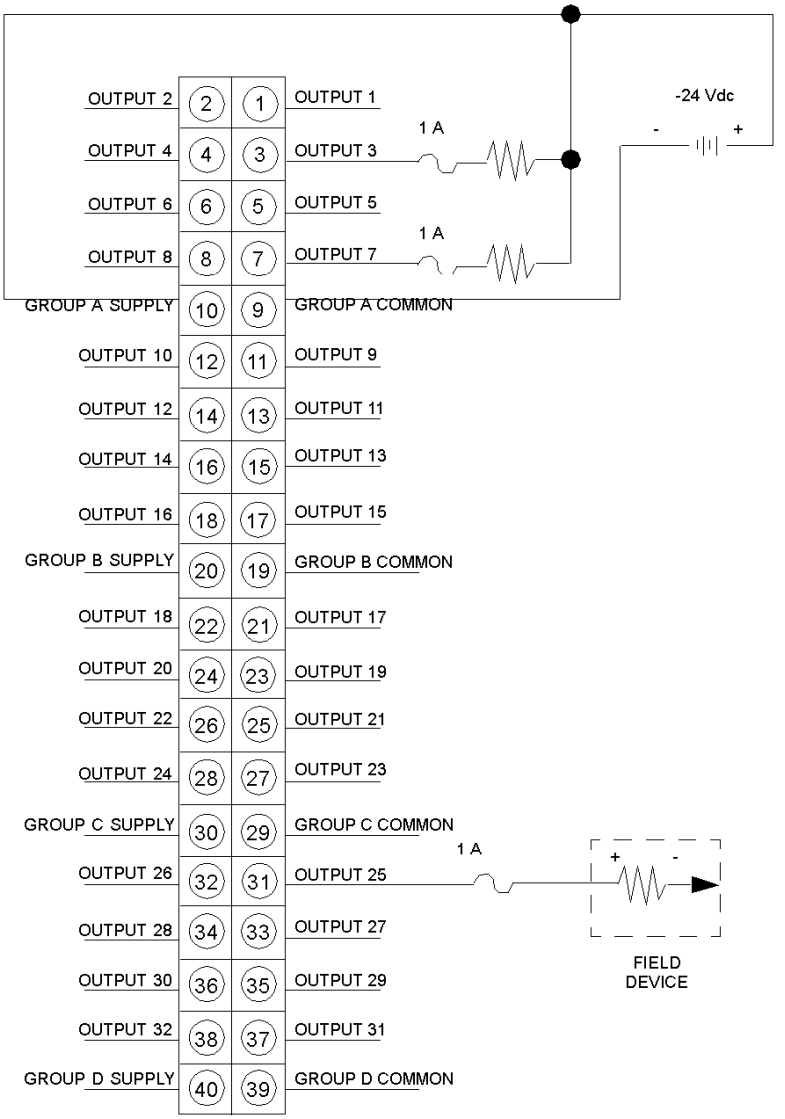
The following table shows the LED descriptions for the 140 DDO 353 10 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DDO 353 10 wiring diagram.



⚠ CAUTION
OVER CURRENT TO OUTPUTS Protect each point with a 3/4 A, 250 V fuse. **Failure to follow these instructions can result in injury or equipment damage.**

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
Logic	True Low
External Power	19.2 ... 30 VDC
Power Dissipation	2.0 W + (0.4 V x Total load Current)
Bus Current required (Module)	330 mA (max.)
I/O map	2 output word
Fault Detection	Blown fuse detect, loss of field power.

Voltage

Voltage

Operating Voltage (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 / Surge Current

Maximum Load Current / Surge Current

Each Point	0.5 A
Each Group	4 A
Per Module	16 A
Surge Current (max.)	5 A @ 1 ms duration (no more than 6 per miute)
OFF State Leakage / Point	0.4 mA @ 30 VDC

Isolation / Protection

Isolation / Protection

Group to Group	500 VAC rms for 1 minute
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	Transient voltage suppression: 36 V

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	1 ms (max.)
ON - OFF	1 ms (max.)

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	50 µF
Tungsten Load (max.)	12 W @ 24 V

Maintenance

Fuses

Fuses

Internal	5 A fuse for each group. For the location of the fuses see figure below.
External	The internal fuse protects a group but not each output switch for all possible overload conditions. The user must protect each point with a 3/4 A, 250 V fuse.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each point with a 3/4 A, 250 V fuse

Failure to follow these instructions can result in injury or equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

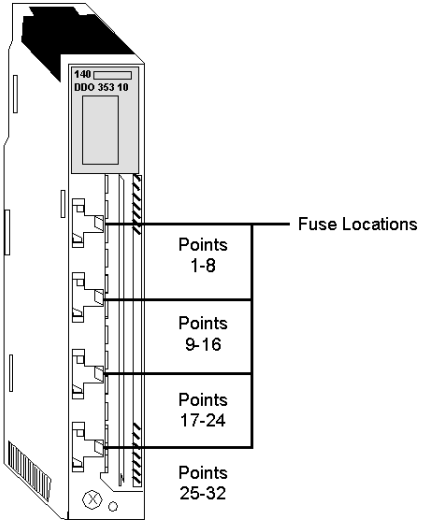
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

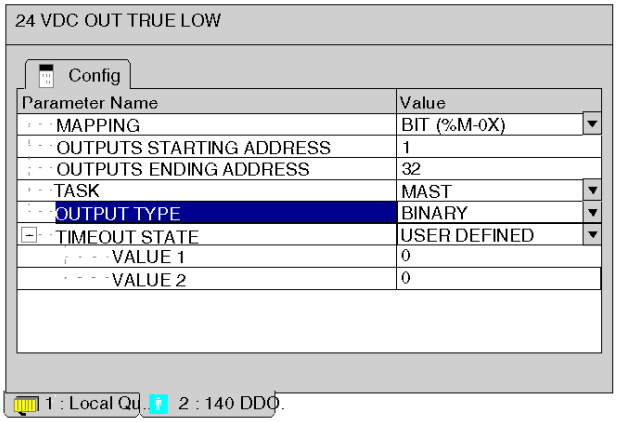
Fuses Location Figure

The following figure shows the locations of the fuses for the 140 DDO 353 10 module.



140 DDO 353 10 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	32	2	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to Mast if module in other than local
Timeout State	USERDEFINED	HOLD LAST VALUE	
Value 1, Value 2	0	0-65535	only enabled if Timeout State=Userdefined

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 49)*.

Chapter 36
140 DDO 364 00: 24 VDC 6x16 Telefast OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 364 00 Module.

What Is in This Chapter?

This chapter contains the following topics:

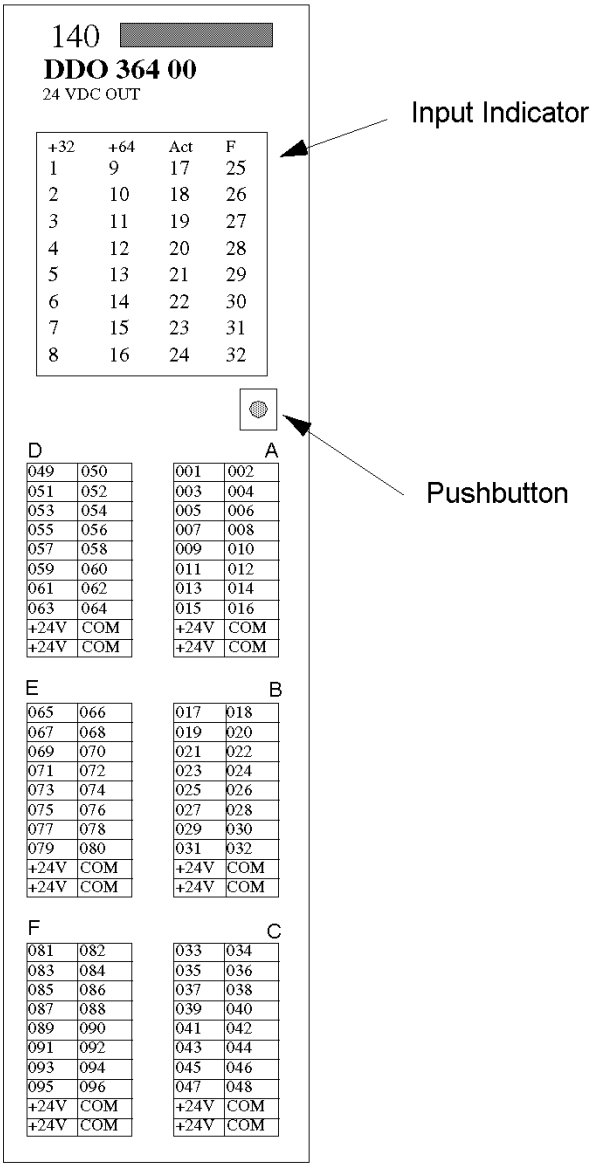
Presentation

Function

The 140 DDO 364 00 module switches 24 VDC powered loads. Outputs are thermally protected.

Illustration

The front view of the 140 DDO 364 00 output module



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

Compatible Output Adapter Sub-Bases

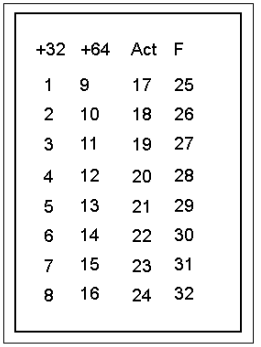
The following tables shows the compatible output adapter sub-bases..

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	

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 364 00 module.



Descriptions

The following table shows the LED descriptions for the 140 DDO 364 00 module.

LEDs	Color	Indication when ON
Act	Green	Bus communication is present.
F	Red	Group power missing, short circuit or overload.
+32	Green	Points 33 to 64 displayed on LED matrix.
+64	Green	Points 65 to 96 displayed on LED matrix.

Pushbutton

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

140 DDO 364 00 Cable Color Codes

Cable 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

Specifications

General Specifications

General Specifications

Module Type	96 OUT (6 groups x 16 points)
External Power	19.2 ... 30 VDC 19.2 A max. (determined by load)
Power Dissipation	7.0 W
Bus Current required (Module)	250 mA (max.)
I/O map	6 output word
Fault Detection	Group indication about loss of field power, short circuit or overload.

Voltage

Voltage

Operating Voltage (max.)	19.2 ... 30 VDC
ON State Drop / Point	0.5 VDC @ 0.5 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	0.5 A
Each Group	3.2 A
Per Module	19.2 A
Surge Current (max.)	2 A each point (internally limited)
OFF State Leakage / Point	< 1 mA @ 24 VDC

Isolation / Protection

Isolation / Protection

Output to Bus	500 VAC rms for 1 minute
Output Protection (internal)	Thermal overload and short circuit

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	< 1 ms
ON - OFF	< 1 ms

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	50 µF

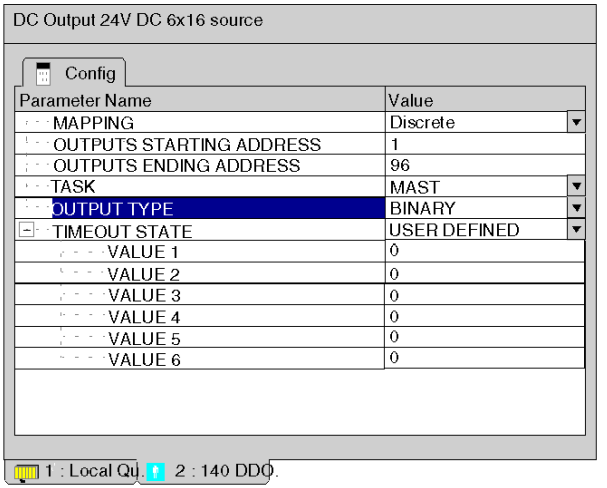
Fuses

Fuses

Internal	-
External	User installed per local and national electrical codes

140 DDO 364 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	Discrete	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	96	6	
Output Type	BINARY	–	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value 1, Value 2,...	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 50)*.

Chapter 37
140 DDO 843 00: 10 ... 60 VDC 2x8 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 843 00 module.

What Is in This Chapter?

This chapter contains the following topics:

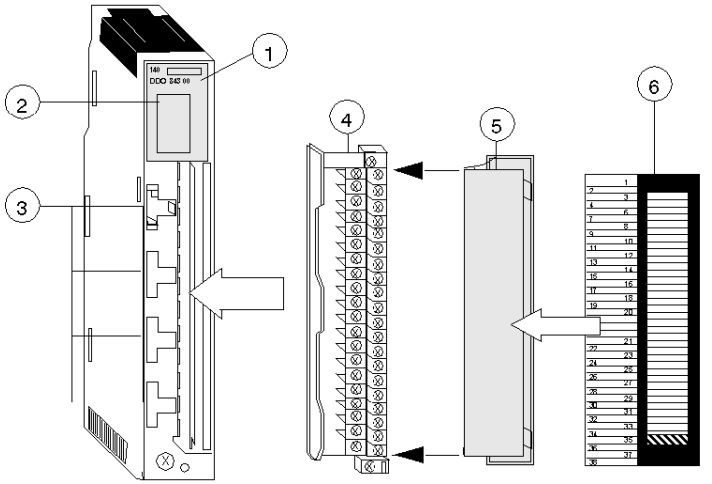
Presentation

Function

The DC Output 10 ... 60 VDC 2x8 Source module switches 10 ... 60 VDC powered loads and is for use with shared ouput common wired to 0 V. External power supplies may be mixed between groups.

Illustration

The following figure shows the 140 DDO 843 00 module and its components.



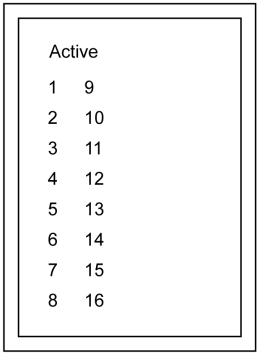
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 843 00 module.



Descriptions

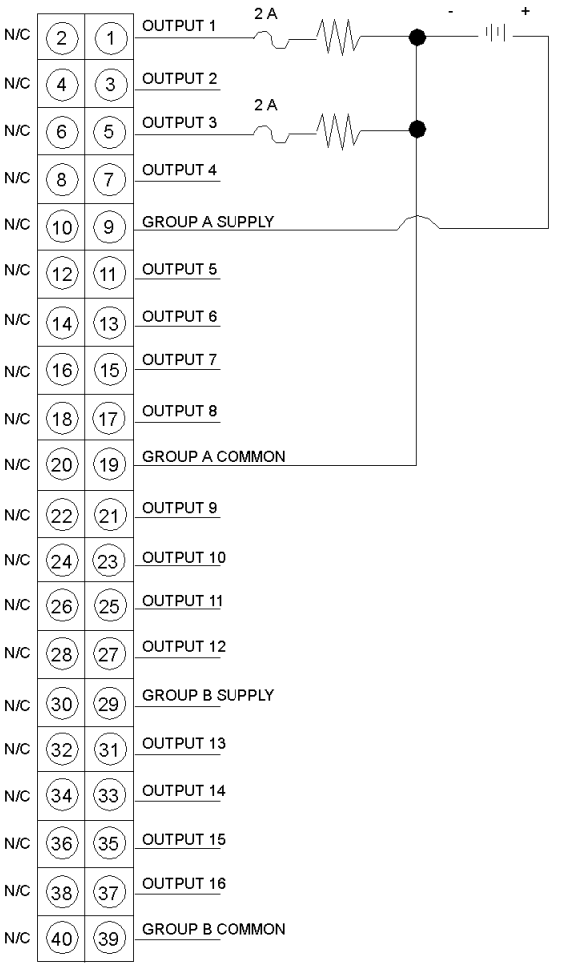
The following table shows the LED descriptions for the 140 DDO 843 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DDO 843 00 wiring diagram.



NOTE: N / C = Not Connected

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

If GROUP A SUPPLY or GROUP B SUPPLY are supplied and GROUP A COMMON or GROUP B COMMON are not connected, the state of the digital output channels of the corresponding group can be “1”, regardless of the state specified via the user program.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Ensure that GROUP A COMMON and GROUP B COMMON are always properly connected.
- Verify that the terminals for GROUP A COMMON and GROUP B COMMON are tightened with the tightening torque of 7.0 N.m.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Each output group is equipped with an internal, replaceable 8 A fuse (250 V, 5x20 mm, Time Delay/Slow Blow).

The individual outputs must be fused separately.

⚠ CAUTION

INCORRECT OR MISSING FUSING

Provide a separate, external 2 A fuse for each individual output.

Failure to follow these instructions can result in injury or equipment damage.

Specifications

General Specifications

General Specifications

Module Type	16 OUT (2 groups x 8 points)
Logic	True High
External Power	10 ... 60 VDC
Power Dissipation	1.0 W + 1 V x Total module load Current
Bus Current required (Module)	160 mA (max.)
I/O map	1 output word

Voltage

Voltage

Operating Voltage (max.)	10.2 ... 72 VDC
Absolute Maximum Voltage	72 VDC (continuous)
ON State Drop / Point	1 VDC @ 2 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	2 A
Each Group	6 A
Per Module	12 A
Surge Current (max.)	7.5 A @ 50 ms duration (no more than 20 per minute) each point
OFF State Leakage / Point	1 mA @ 60 VDC

Isolation / Protection

Isolation / Protection

Group to Group	700 VDC for 1 minute
Group to Bus	2500 VDC for 1 minute
Output Protection (internal)	Over voltage (suppression diode)

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	1 ms
ON - OFF	1 ms

Maintenance

Fuses

Fuses

Internal	8A fuse time-lag for each group.
External	The internal fuse protects a group but not each output switch for all possible overload conditions. The user must protect each point with a 2 A, 250V, fast-acting fuse

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each point with a 2 A, 250V, fast-acting fuse

Failure to follow these instructions can result in injury or equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

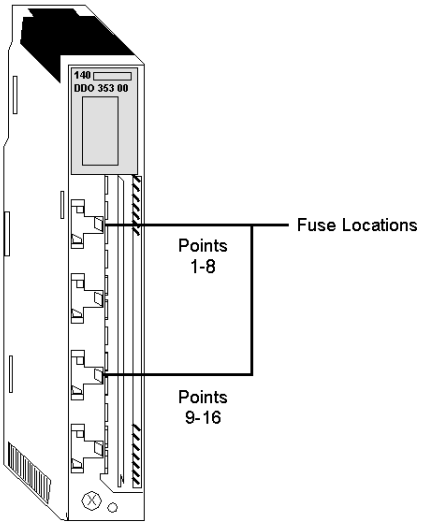
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

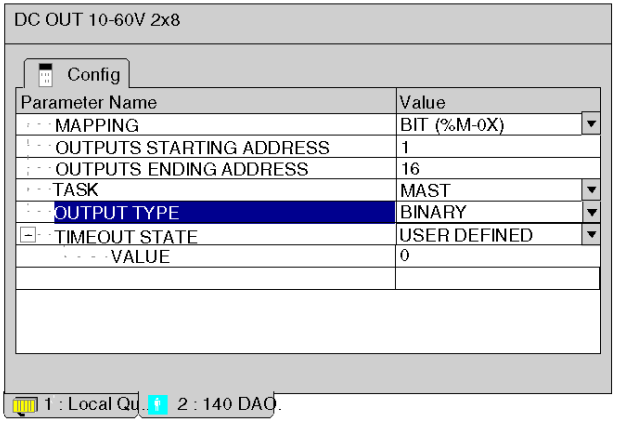
Illustration

The following figure shows fuse locations for the 140 DDO 843 00 module.



140 DDO 843 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 38
140 DDO 885 00: 24 ... 125 VDC 2x6 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDO 885 00 module.

What Is in This Chapter?

This chapter contains the following topics:

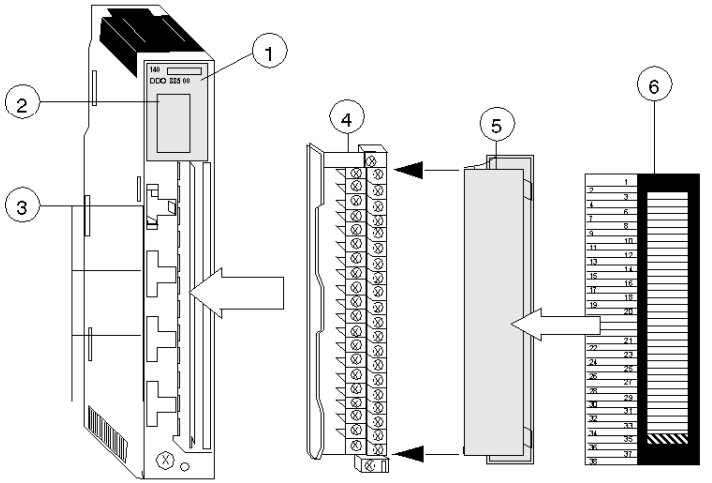
Presentation

Function

The DC Output 24 ... 125 VDC 2x6 Source module switches 24 ... 125 VDC powered loads and is for use with shared ouput common wired to 0 V.

Illustration

The following figure shows the 140 DDO 885 00 module and its components.



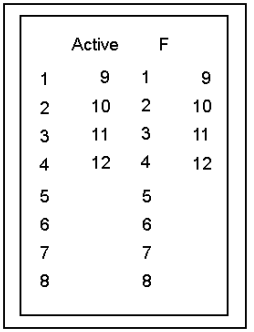
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DDO 885 00 module with status indication.



Descriptions

The following table shows the LED descriptions for the 140 DDO 885 00 module

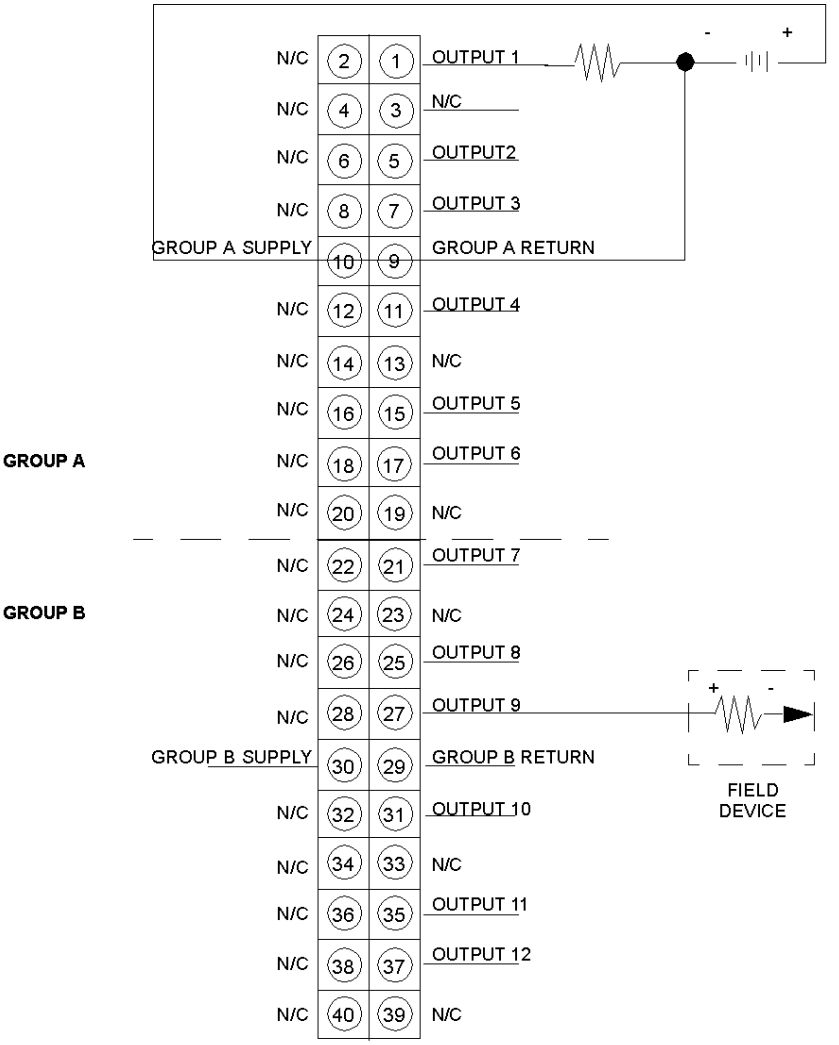
LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An over current condition on any point has been detected.
1 ... 12	Green	The indicated point or channel is turned ON.
1 ... 12	Red	The indicated output point has an over current condition.

NOTE: To clear an error indication, the point must be commanded OFF in user logic.

Wiring Diagram

Illustration

The following figure shows the 140 DDO 885 00 wiring diagram.



⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

This module is not protected against reverse polarity. Follow these precautions to avoid equipment damage:

- Do not reverse the polarity of the field power supply.
- To help protect the module against polarity miswiring, add an external diode in series with each group supply line. This diode must be able to support the group load current.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: N / C = Not Connected.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	12 OUT (2 groups x 6 points)
External Power	None
Power Dissipation	1.0 W + 0.77 W x points ON
Bus Current required	6 points ON: 375 mA 12 points ON: 650 mA
I/O map	1 input word 1 output word
Fault Detection	Over Current (see note below)

Voltage

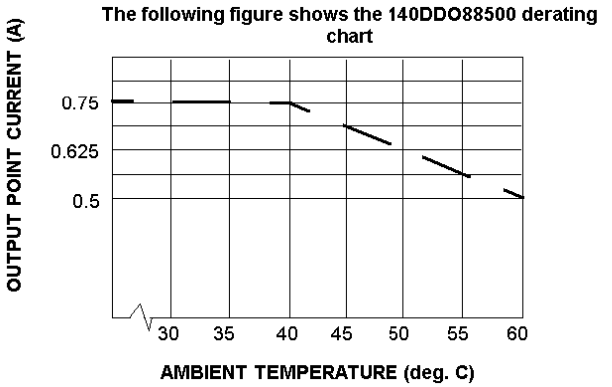
Voltage

Operating Voltage (max.)	19.2 ... 156.2 VDC including ripple
ON State Drop / Point	0.75 VDC @ 0.5 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	0.75 A < 40 degrees C (see the operating curve)
Each Group	3 A, 0 ... 60 degrees C
Per Module	6 A, 0 ... 60 degrees C
Surge Current (max.)	4 A @1 ms duration (no more than 6 per minute)
Peak Load Current	4 A for T ≤ 1 ms
OFF State Leakage / Point	0.5 mA @ 150 VDC



NOTE: Each group: 3 A, 0 ... 60 degrees C. Per module: 6 A, 0 ... 60 degrees C

Maximum Tungsten

Maximum Tungsten

@ 130 VDC	46 W per point
@ 115 VDC	41 W per point
@ 24 VDC	8 W per point

Inductance and Switching Frequency

Inductance and Switching Frequency

Inductance	Internal Diode protected, no limit on Inductance
Switching Frequency	50 Hz (max.)

Isolation / Protection

Isolation / Protection

Field to Bus	2500 VAC rms for 1 minute
Group to Group	1200 VAC rms for 1 minute
Output Protection (internal)	Group varistor and individual point over Current sense

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	1 ms
ON - OFF	1 ms

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.

Maintenance

Fuses

Fuses

Internal	4 A for 3 outputs, 250 V (See figure below for the location of the fuses.)
External	Required to protect each output.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each output with a 1 A, 250 V fuse.

Failure to follow these instructions can result in injury or equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

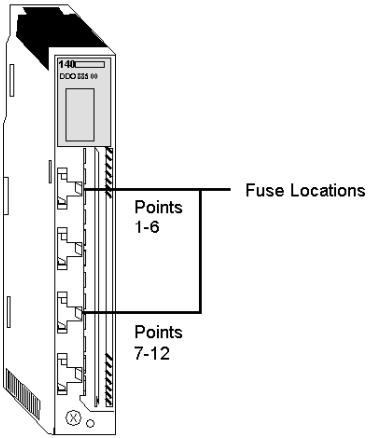
Before accessing the fuses:

- remove the power to the module (pre-actuators).
- disconnect the terminal block
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm that the power is off

Failure to follow these instructions will result in death or serious injury.

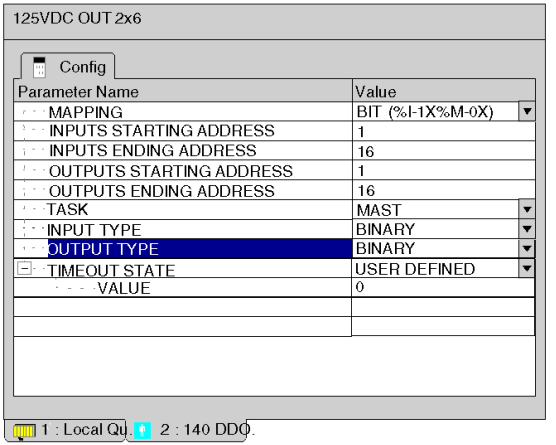
Illustration

The following figure shows the fuse locations for the 140 DDO 885 00 module.



140 DDO 885 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Outputs Starting Address	1	1	
Outputs Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Input Type	BINARY	BCD	
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 46)*.

Chapter 39
140 DAO 840 00: 24 ... 230 VAC 16x1 OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DAO 840 00 module.

What Is in This Chapter?

This chapter contains the following topics:

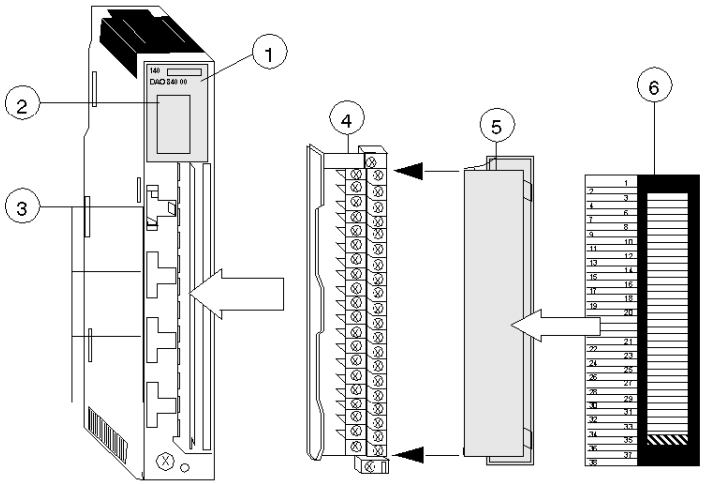
Presentation

Function

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

Illustration

The following figure shows the 140 DAO 840 00 module and its components.



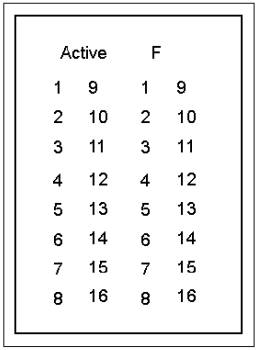
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAO 840 00 module.



Descriptions

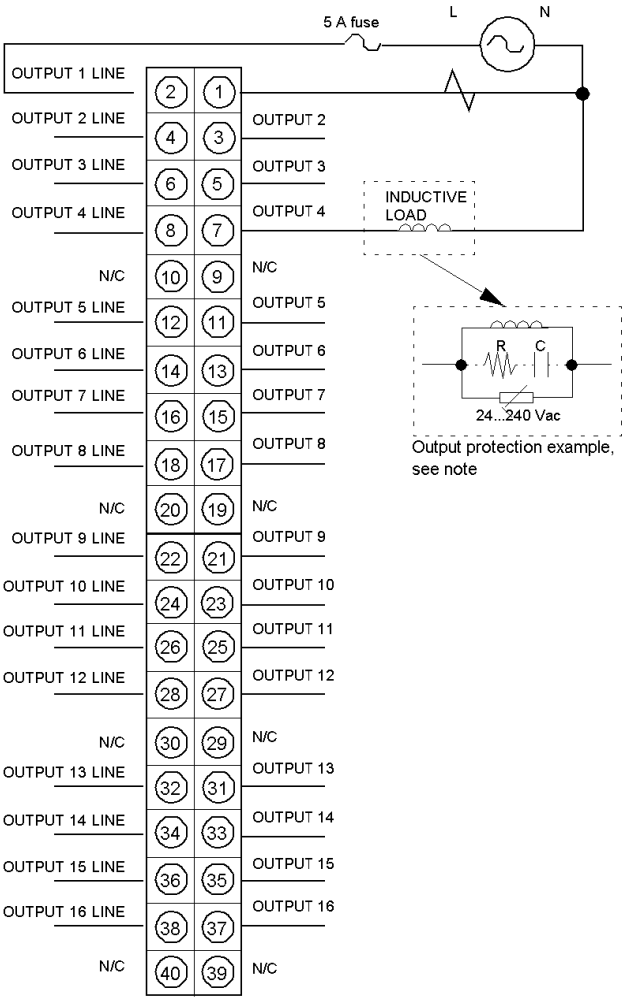
The following table shows the LED descriptions for the 140 DAO 840 00 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DAO 840 00 wiring diagram.



1. This module is not polarity sensitive.
2. N / C = Not Connected.
3. Voltages up to 133V may be different phases on adjacent output points.
4. 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.
5. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

EQUIPMENT DAMAGE

Protect each output point with an external fuse. Schneider Electric recommends a 5 A fuse with an I2T rating of less than 87.

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

- Ensure that the AC power energizing each group is from a common, single-phase AC power source.
- Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

NOTE:

The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	16 OUT isolated
External Power	Not required for this module
Power Dissipation	1.85 W + 1.1 V x Total module load Currents
Bus Current required (Module)	350 mA
I/O map	1 output words

Absolute Maximum Input

Absolute Maximum Input

10 s	300 VAC
1 Cycle	400 VAC

Voltage

Voltage

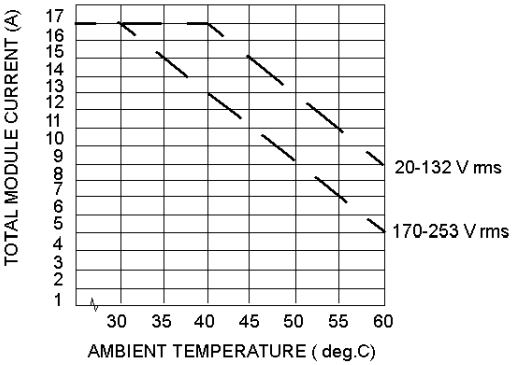
Operating Voltage (max.)	20 ... 253 VAC
ON State Drop / Point	1.5 VAC

Maximum Load Current

Maximum Load Current

Each Point	24 to 115 VAC, 4 Amps per output 200 to 230 VAC, 3 Amps per output
Any four contiguous Points	4.0 A max. continuous for the sum of the four points.
Per Module	16 A continuous (see chart below)

The following figure shows the 140 DAO 840 00 operating curve.



*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.

Frequency and Minimum Load Current

Frequency and Minimum Load Current

Frequency	47 ... 63 Hz
Minimum Load Current	5 mA

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)	2.5 mA @ 230 VAC 2 mA @ 115 VAC 1 mA @ 48 VAC 1 mA @ 24 VAC

Surge Current (max. rms)

Surge Current (max. rms)

One Cycle	30 A per point
Two Cycles	20 A per point
Three Cycles	10 A per point
Applied DV/DT	400 V / µs

Isolation / Protection

Isolation / Protection

Output to Output	1500 VAC rms for 1 minute
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	RC snubber suppression

Response

Response

OFF - ON	0.5 of one line cycle max.
ON - OFF	0.5 of one line cycle max.

Fuses

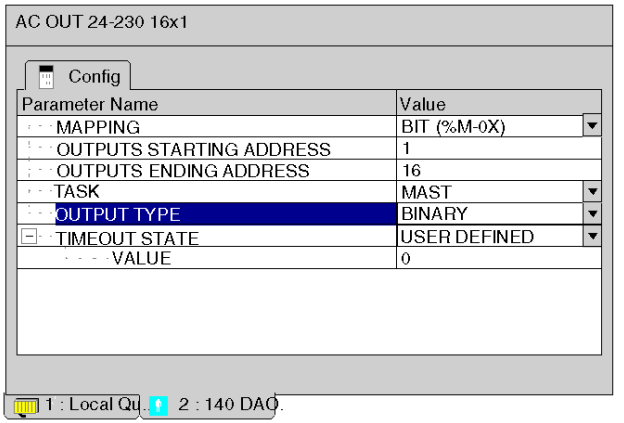
Fuses

Internal	None
External	Protect each output with an external 5 amp fuse with an I2T rating of less than 87.

⚠ CAUTION
OVER CURRENT TO OUTPUTS Protect each point with a 5 A, 250 V fuse **Failure to follow these instructions can result in injury or equipment damage.**

140 DAO 840 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	16	1	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USERDEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USERDEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 40
140 DAO 840 10: 24 ... 115 VAC 16x1 OUT Module

About this Chapter

The following chapter provides information of the Quantum 140 DAO 840 10 module.

What Is in This Chapter?

This chapter contains the following topics:

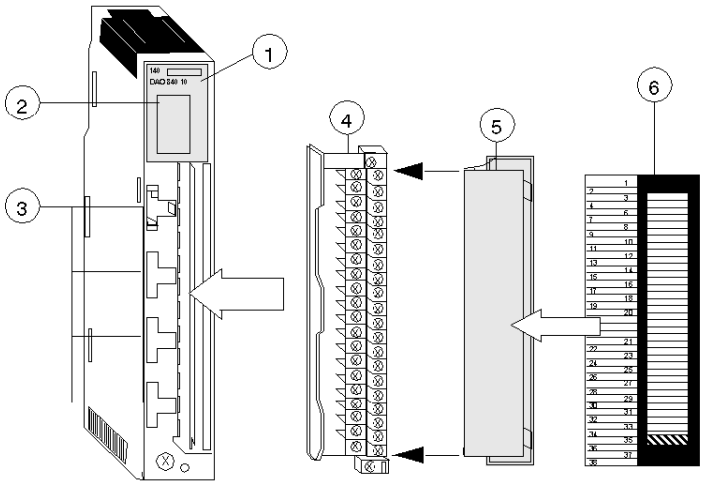
Presentation

Function

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

Illustration

The following figure shows the 140 DAO 840 10 module and its components.



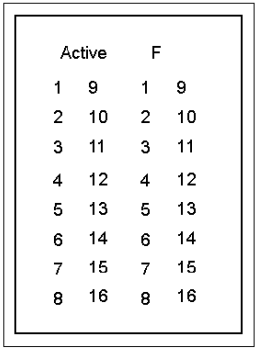
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAO 840 10 module.



Descriptions

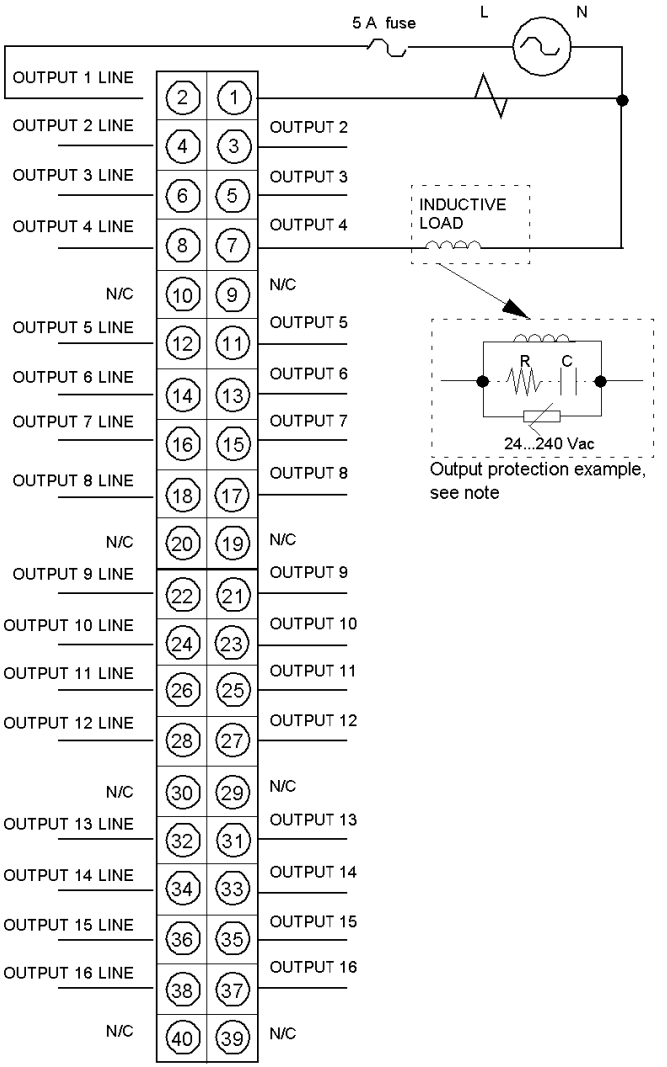
The following table shows the LED descriptions for the 140 DAO 840 10 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DAO 840 10 wiring diagram.



1. This module is not polarity sensitive.
2. N / C = Not Connected.
3. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each output with an external 5 A fuse with an I2T rating of less than 87.

Failure to follow these instructions can result in injury or equipment damage.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

- Ensure that the AC power energizing each group is from a common, single-phase AC power source.
- Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

NOTE:

The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	16 OUT isolated
External Power	Not required for this module
Power Dissipation	1.85 W + 1.1 V x Total module load Currents
Bus Current required (Module)	350 mA
I/O map	1 output word

Absolute Maximum Input

Absolute Maximum Input

10 s	156 VAC
1 Cycle	200 VAC

Voltage

Voltage

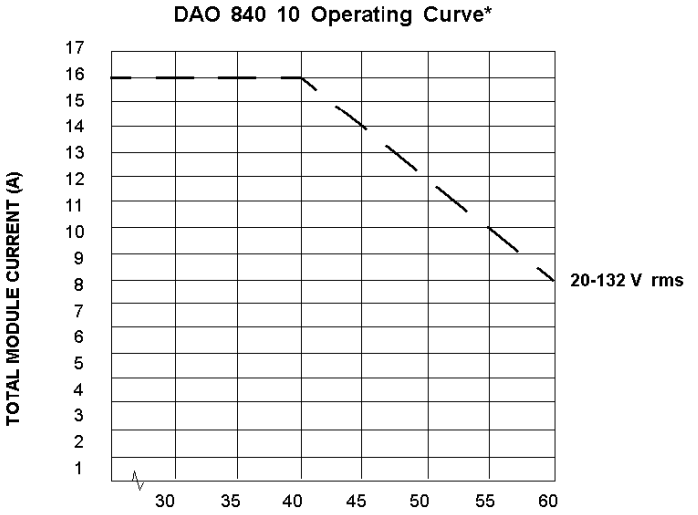
Operating Voltage (max.)	20 ... 132 VAC
ON State Drop / Point	1.5 VAC

Maximum Load Current

Maximum Load Current

Each Point	4.0 A continuous, 20 ... 132 VAC rms
Any four contiguous Points	4.0 A max. continuous for the sum of the four points.
Per Module	16 A continuous (see the chart below)

The following figure shows the 140 DAO 840 10 operating curve.



Frequency and Minimum Load Current

Frequency	47 ... 63 Hz
Minimum Load Current	5 mA

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)	2.5 mA @ 230 VAC 2 mA @ 115 VAC 1 mA @ 48 VAC 1 mA @ 24 VAC

Surge Current (max. rms)

Surge Current (max. rms)

One Cycle	30 A per point
Two Cycles	20 A per point
Three Cycles	10 A per point
Applied dV/dT	400 V / µs

Isolation / Protection

Isolation / Protection

Output to Output	1500 VAC rms for 1 minute
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	RC snubber suppression

Response

Response

OFF - ON	0.5 of one line cycle max.
ON - OFF	0.5 of one line cycle max.

Fuses

Fuses

Internal	None
External	Protect each output with an external 5 A fuse with an I2T rating of less than 87.

⚠ CAUTION

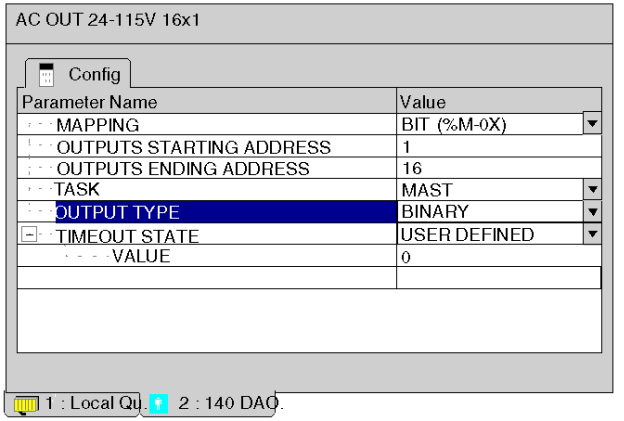
OVER CURRENT TO OUTPUTS

Protect each point with an external 5 A, 250 V fuse with an I2T rating of less than 87..

Failure to follow these instructions can result in injury or equipment damage.

140 DAO 840 10 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 41
140 DAO 842 10: 100 ... 230 VAC 4x4 OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DAO 842 10 module.

What Is in This Chapter?

This chapter contains the following topics:

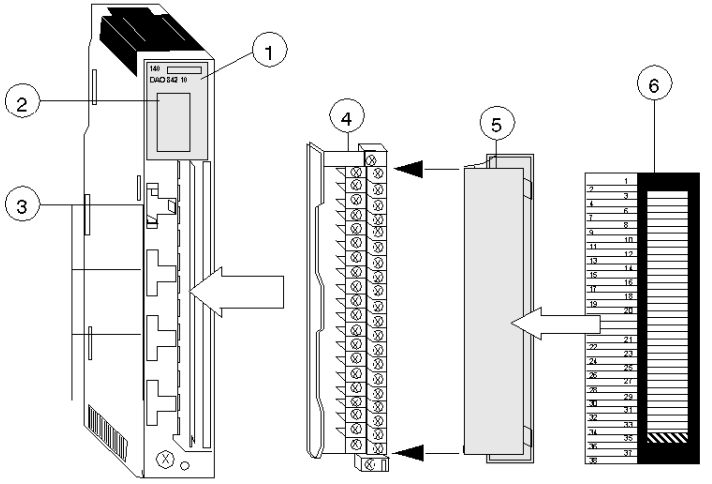
Presentation

Function

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

Illustration

The following figure shows the 140 DAO 842 10 module and its components.



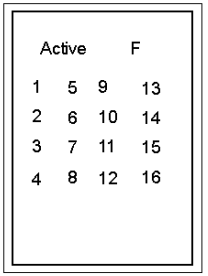
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAO 842 10 module.



Descriptions

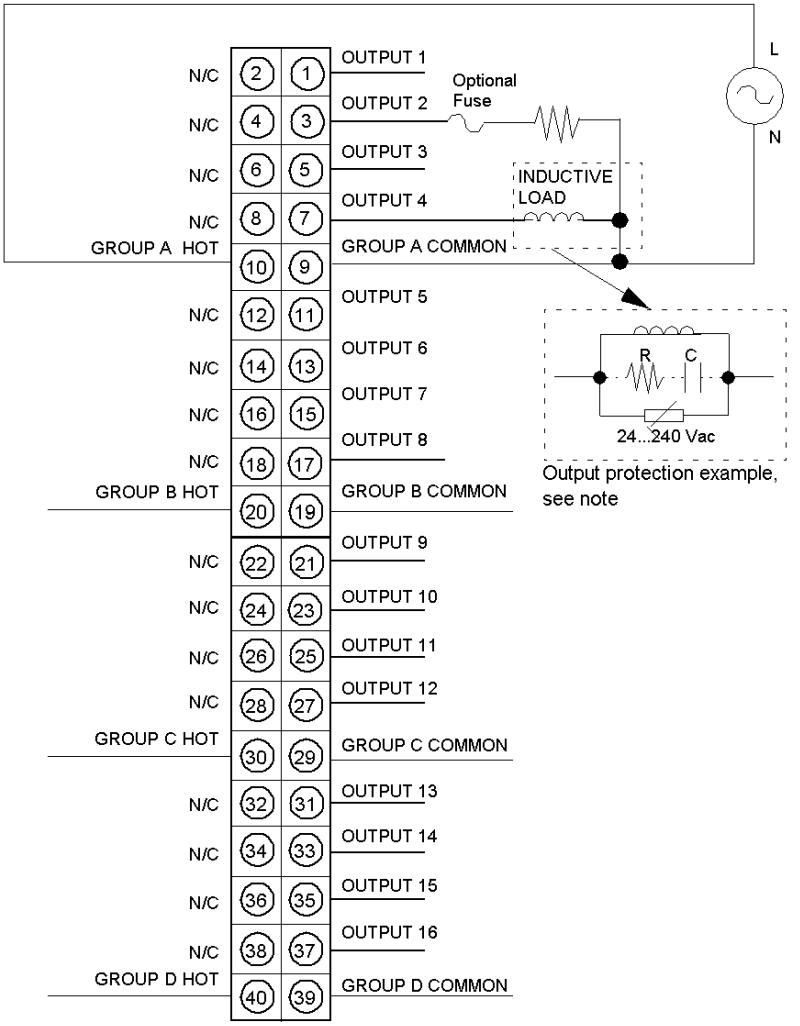
The following table shows the LED descriptions for the 140 DAO 842 10 module.

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 ... 4 5 ... 8 9 ... 12 13 ... 16	Red	The indicated group has a blown fuse or no field power.

Wiring Diagram

Illustration

The following figure shows the wiring diagram for the 140 DAO 842 10 module.



1. N / C = Not Connected
2. This module is not polarity sensitive.
3. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

MODULE OUTPUT DAMAGE

- Ensure that the AC power energizing each group is from a common, single-phase AC power source.
- Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

NOTE:
The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	16 OUT (4 groups x 4 points)
External Power	85 ... 253 VAC
Power Dissipation	1.85 W + 1.1 V x Total module load Currents
Bus Current required (Module)	350 mA
I/O map	1 output words
Fault Detection	Blown fuse detect, loss of field power

Absolute Maximum Input

Absolute Maximum Input

10 s	300 VAC
1 Cycle	400 VAC

Voltage

Voltage

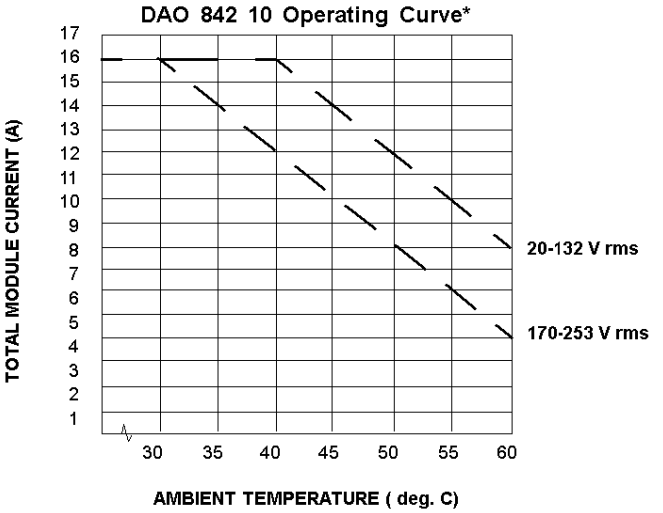
Operating Voltage (max.)	85 ... 253 VAC
ON State Drop / Point	1.5 VAC

Maximum Load Current

Maximum Load Current

Each Point	4.0 A continuous, 85 ... 132 VAC rms 3.0 A continuous, 170 ... 253 VAC rms
Each Group	4.0 A continuous
Per Module	16 A continuous (see the chart below)

The following figure shows the 140 DAO 842 10 Operating Curve.



*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.

Frequency and Minimum Load Current

Frequency	47 ... 63 Hz
Minimum Load Current	5 mA

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)	2.5 mA @ 230 VAC 2 mA @ 115 VAC

Surge Current (max. rms)

Surge Current (max. rms)

One Cycle	30 A per point, 45 A per group
Two Cycles	20 A per point, 30 A per group
Three Cycles	10 A per point, 25 A per group
Applied dV/dT	400 V / µs

Isolation / Protection

Isolation / Protection

Group to Group	1000 VAC rms for 1 minute, galvanically isolated
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	RC snubber suppression

Response

Response

OFF - ON	0.5 of one line cycle max.
ON - OFF	0.5 of one line cycle max.

Maintenance

Fuses

Fuses

Internal	None
External	Protect each output point with an external fuse. Schneider Electric recommends a 5 A fuse with an I^2 T rating of less than 87.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

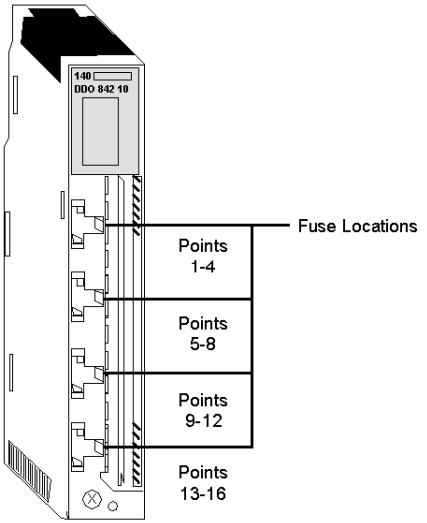
OVER CURRENT TO OUPUTS

Protect each point with a 5 A, 250 V fuse.

Failure to follow these instructions can result in injury or equipment damage.

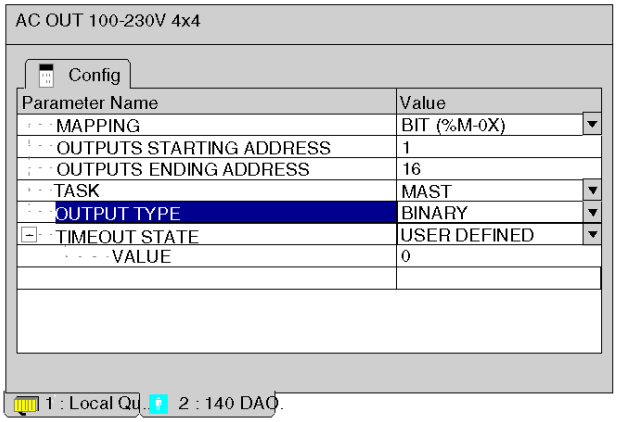
Illustration

The following figure shows the fuse locations for the 140 DAO 842 10 module.



140 DAO 842 10 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 42
140 DAO 842 20: 24 ... 48 VAC 4x4 OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DAO 842 20 module.

What Is in This Chapter?

This chapter contains the following topics:

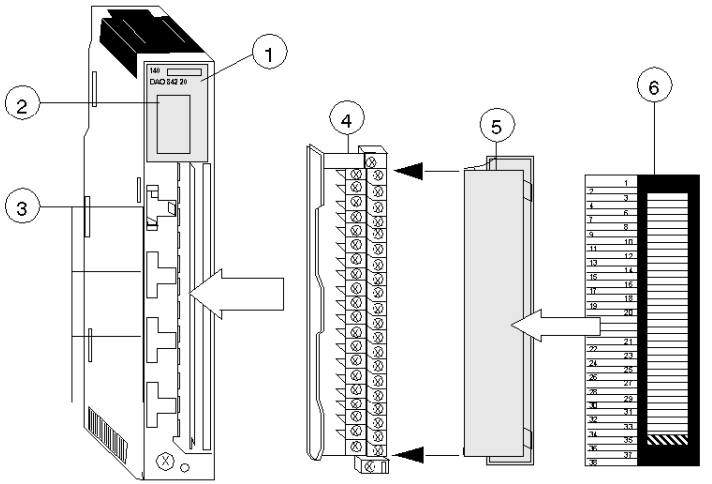
Presentation

Function

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

Illustration

The following figure shows the 140 DAO 842 20 module and its components.



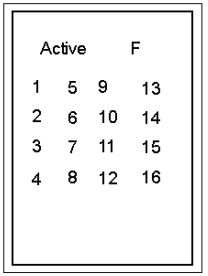
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAO 842 20 module.



Descriptions

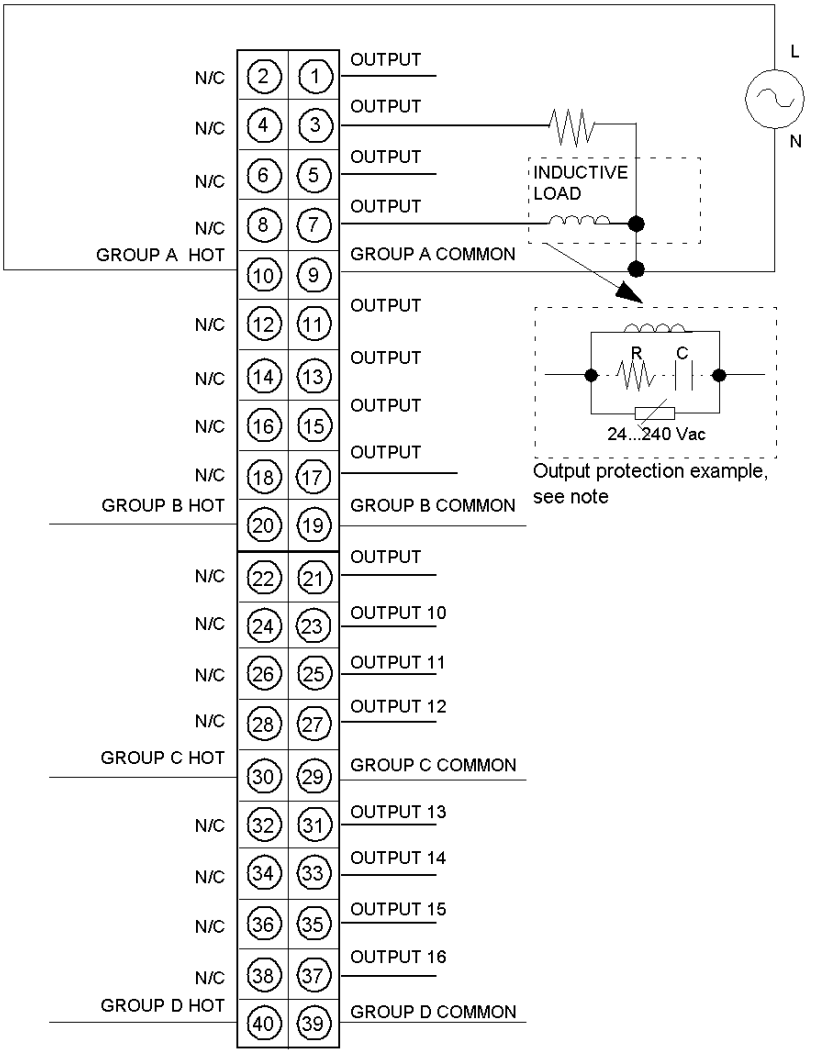
The following table shows the LED descriptions for the 140 DAO 842 20 module.

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 ... 4 5 ... 8 9 ... 12 13 ... 16	Red	The indicated group has a blown fuse or no field power.

Wiring Diagram

Illustration

The following figure shows the 140 DAO 842 20 wiring diagram.



1. N / C = Not Connected
2. This module is not polarity sensitive.
3. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

- Ensure that the AC power energizing each group is from a common, single-phase AC power source.
- Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

NOTE:
The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	16 OUT (4 groups x 4 points)
External Power	20 ... 56 VAC
Power Dissipation	1.85 W + 1.1 V x Total module load Currents
Bus Current required (Module)	350 mA
I/O map	1 output words
Fault Detection	Blown fuse detect, loss of field power

Absolute Maximum Input

Absolute Maximum Input

10 s	63 VAC
1 Cycle	100 VAC
1.3 ms	111 VAC peak

Voltage

Voltage

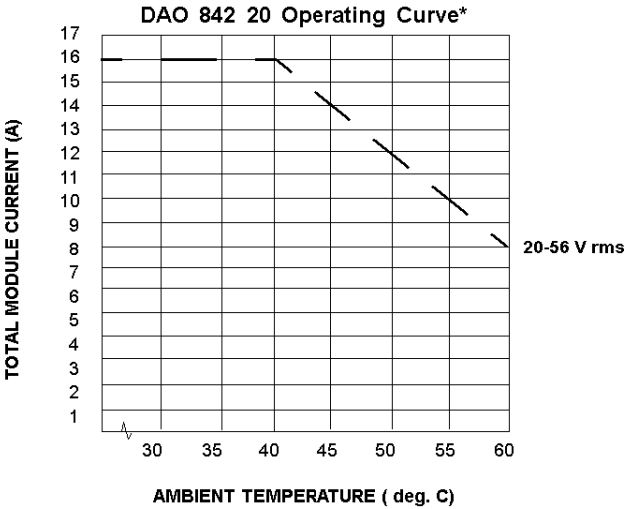
Operating Voltage (max.)	20 ... 56 VAC
ON State Drop / Point	1.5 VAC

Maximum Load Current

Maximum Load Current

Each Point	4.0 A continuous, 20 ... 56 VAC rms
Each Group	4.0 A continuous
Per Module	16 A continuous (see the chart below)

The following figure shows the 140 DAO 842 20 Operating Curve.



Frequency and Minimum Load Current

Frequency	47 ... 63 Hz
Minimum Load Current	5 mA

Surge Current (max. rms) / Leakage

Surge Current (max. rms) / Leakage

One Cycle	30 A per point, 45 A per group
Two Cycles	20 A per point, 30 A per group
Three Cycles	10 A per point, 25 A per group
Applied dV/dT	400 V / µs
OFF State Leakage / Point	1 mA max.

Isolation / Protection

Isolation / Protection

Group to Group	1000 VAC rms for 1 minute, galvanically isolated
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	RC snubber suppression

Response

Response

OFF - ON	0.5 of one line cycle max.
ON - OFF	0.5 of one line cycle max.

Maintenance

Fuses

Fuses

Internal	5 A fuse for each group. For the location of the fuses see the figure below.
External	User installed per local and national electrical codes.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

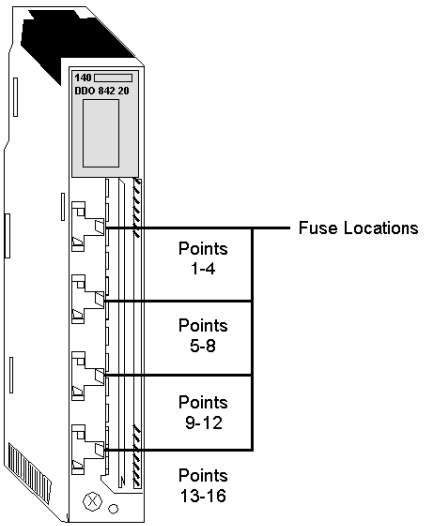
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

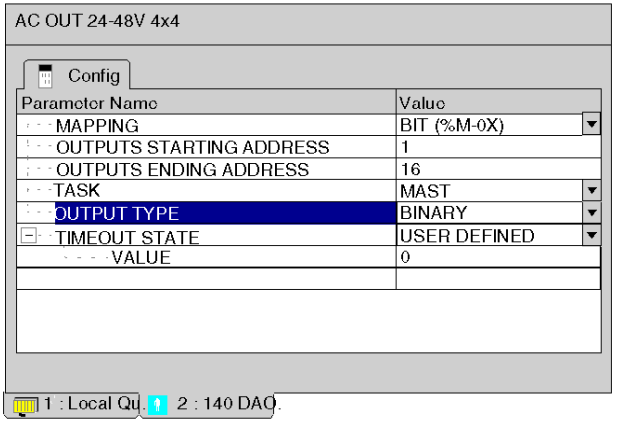
Illustration

The following figure shows the 140 DAO 842 20 fuse locations.



140 DAO 842 20 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 43
140 DAO 853 00: 230 VAC 4x8 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DAO 853 00 module.

What Is in This Chapter?

This chapter contains the following topics:

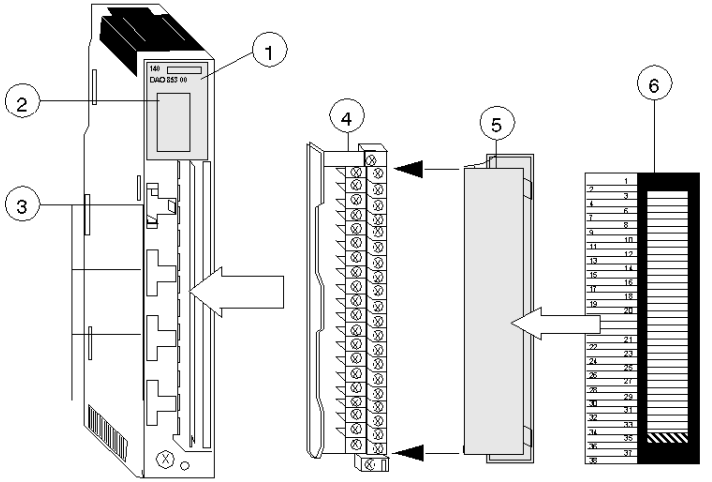
Presentation

Function

The AC Output 230 VAC 4x8 module accepts 230 VAC powered loads.

Illustration

The following figure shows the 140 DAO 853 00 module and its components.



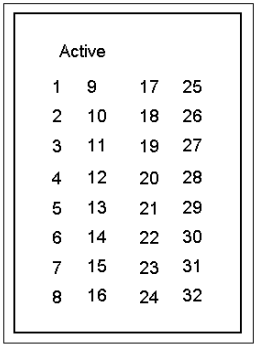
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAO 853 00 module.



Descriptions

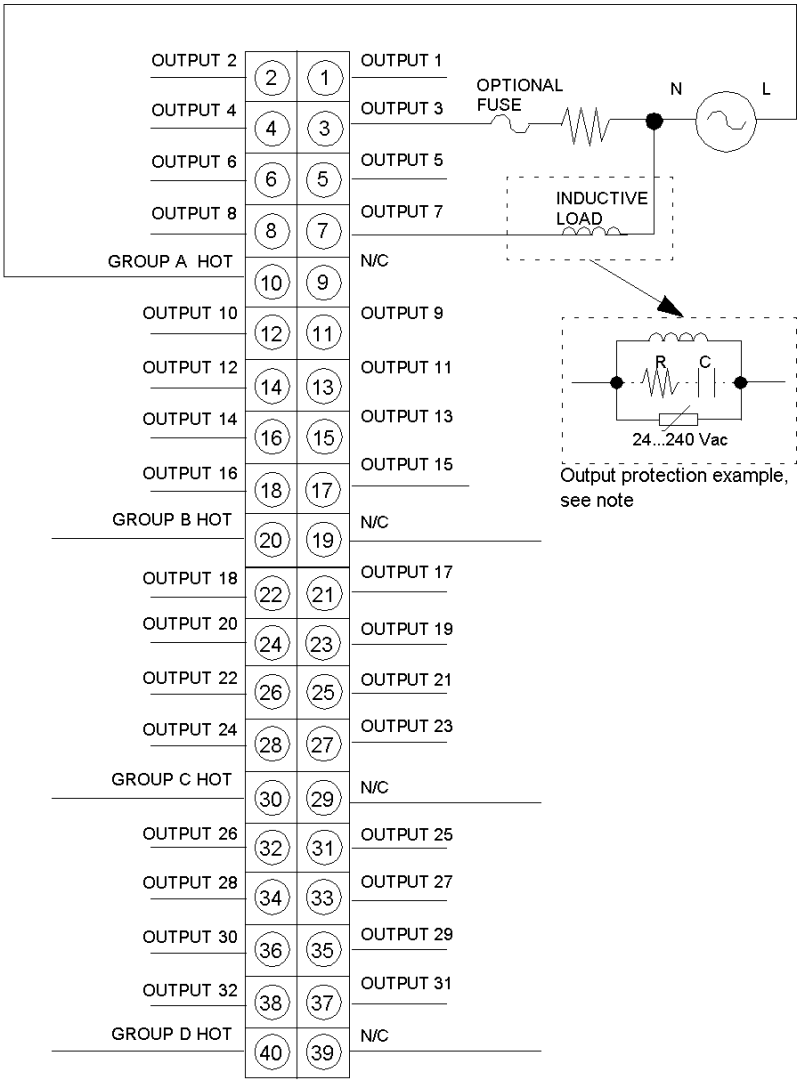
The following table shows the LED descriptions for the 140 DAO 853 00 modul.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 32	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DAO 853 00 wiring diagram.



1. N / C = Not Connected
2. When field wiring the I/O module, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

- Ensure that the AC power energizing each group is from a common, single-phase AC power source.
- Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

NOTE:
The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
Logic	True High
External Power	Not required for this module
Power Dissipation	1.60 W + 1.0 V x Total module load Currents
Bus Current required (Module)	320 mA
I/O map	2 output words

Absolute Maximum Input

Absolute Maximum Input

10 s	300 VAC
1 Cycle	400 VAC

Voltage

Voltage

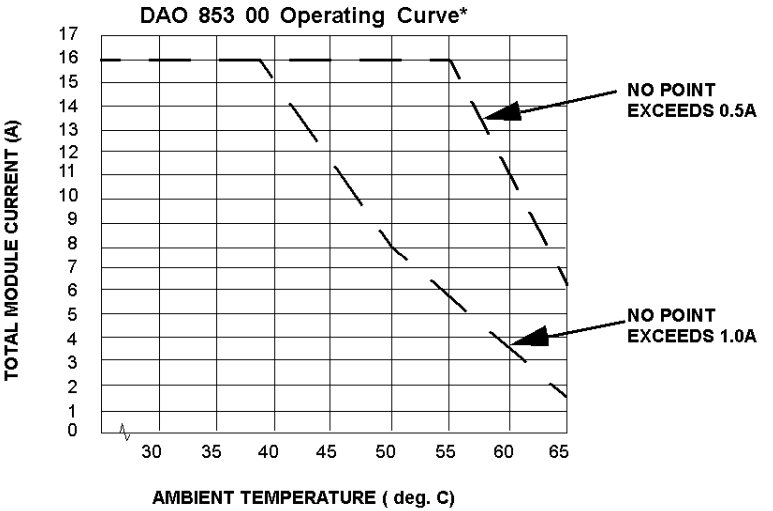
Operating Voltage (max.)	20 ... 253 VAC
ON State Drop / Point	1.5 VAC

Maximum Load Current

Maximum Load Current

Each Point	1.0 A continuous, 20 ... 253 VAC rms
Each Group	4.0 A (max.)
Per Module	16 A continuous (see chart below)

The following figure shows the 140 DAO 853 00 Operating Curve.



Frequency and Minimum Load Current

Frequency	47 ... 63 Hz
Minimum Load Current	30 mA

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)

OFF State Leakage / Point (max.)	0.88 mA @ 230 VAC 0.44 mA @ 115 VAC 0.18 mA @ 48 VAC 0.06 mA @ 24 VAC

Surge Current (max. rms)

Surge Current (max. rms)

One Cycle	30 A per point
Two Cycles	20 A per point
Three Cycles	10 A per point
Applied dV/dT	400 V / µs

Isolation / Protection

Isolation / Protection

Group to Group	1780 VAC rms for 1 minute
Output to Bus	1780 VAC rms for 1 minute
Output Protection (internal)	RC snubber protection

Response

Response

OFF - ON	0.5 of one line cycle max.
ON - OFF	0.5 of one line cycle max.

Maintenance

Fuses

Fuses

Internal	4 A, 250 V fuse. For location of fuses see below
External	User installed per local and national electrical codes

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

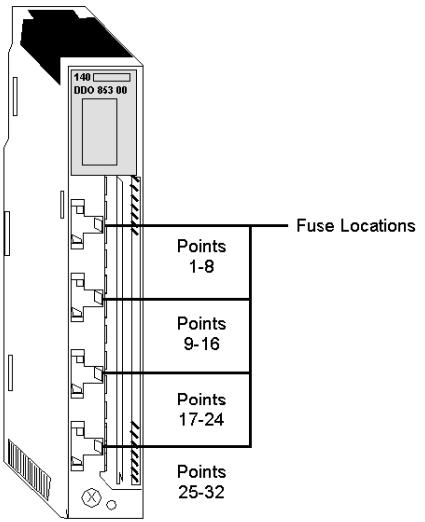
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

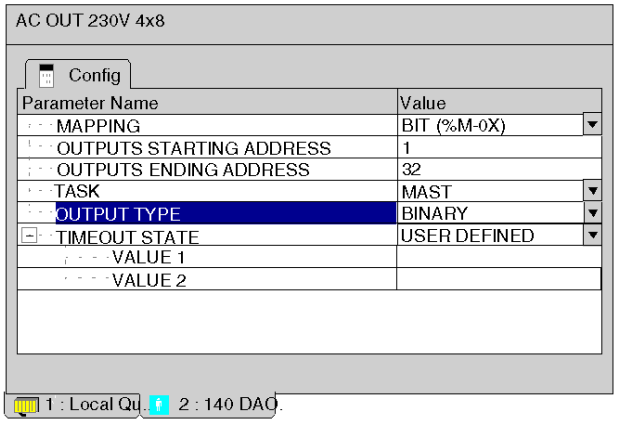
Illustration

The following figure shows the fuse locations for the DAO 853 00 module.



140 DAO 853 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	32	2	
Output Type	BINARY	BCD	
Task (Grayed if module in other than local)	Mast	Fast	fixed to Mast if module in other than local
Timeout State	Userdefined	Hold Last Value	
Value 1, Value 2	0	0-65535	only if Timeout State=Userdefined

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 49)*.

Chapter 44
140 DRA 840 00: Relay 16x1 Normally Open OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DRA 840 00 module.

What Is in This Chapter?

This chapter contains the following topics:

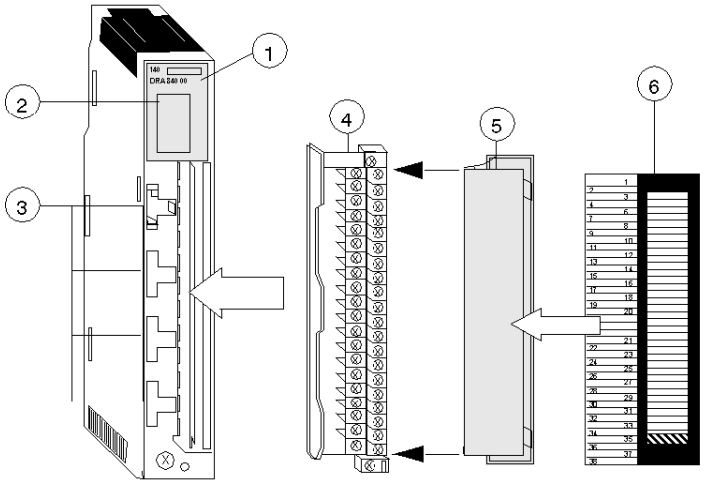
Presentation

Function

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

Illustration

The following figure shows the 140 DRA 840 00 module and its components.



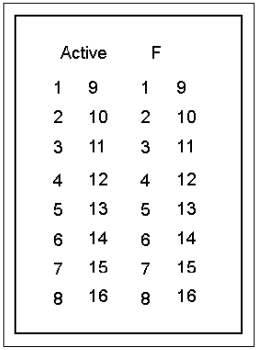
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DRA 840 00 module.



Descriptions

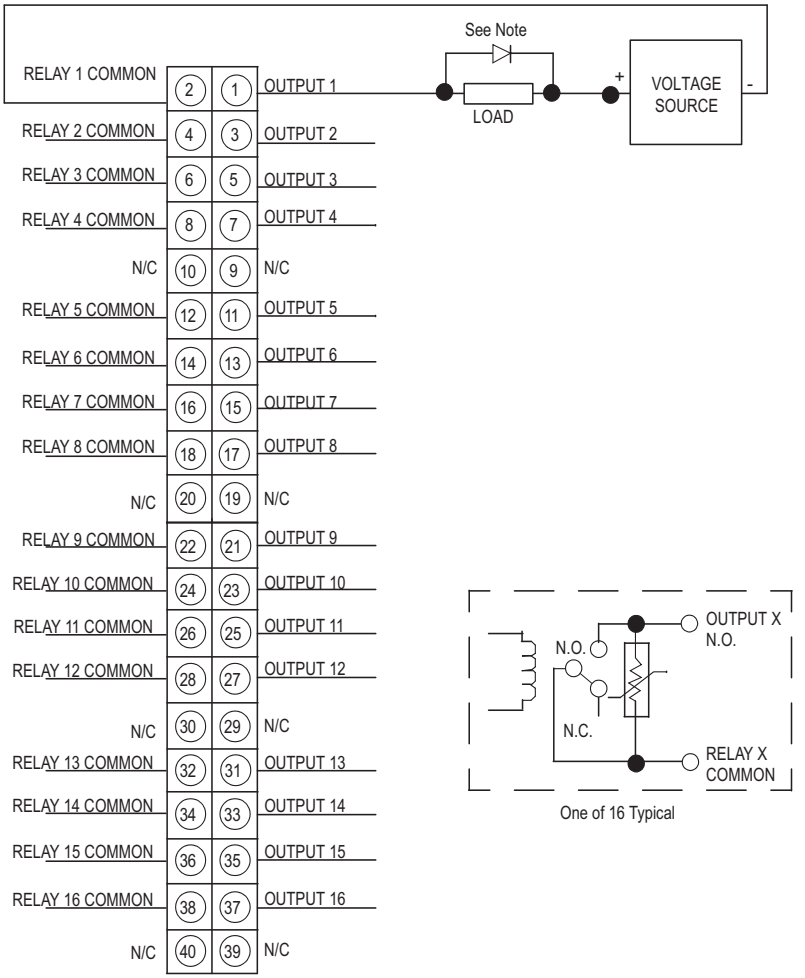
The following table shows the LED descriptions for the 140 DRA 840 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
1 ... 16	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DRA 840 00 wiring diagram.



Notes on Wiring Diagram

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

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	16 OUT (normaly open)
External Power	Not required for this module
Power Dissipation	5.5 W + 0.5 W x input points ON
Bus Current required (Module)	1100 mA
I/O map	1 output word

Operating Voltage

Operating Voltage

AC	20 ... 250 VAC
DC	5 ... 30 VDC 30 ... 150 VDC (reduced load Current)

Maximum Load Current

Maximum Load Current

Each Point	2 Amps per point maximum at 250 VAC, 30 VDC at 60 deg C ambient. 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 (restive load) 100 mA (L/R = 10 msec)
Surge Current (max.)	10 A capacitive load @ t = 10 ms

Minimum Load Current

Minimum Load Current

Each Point	50 mA Note: Minimum load Current if the contact is used at rated loads of 5 ... 150 VDC or 20 ... 250 VDC
OFF State Leakage	< 100 µA

Isolation

Isolation

Output to Output	1780 VAC rms for one minute
Field to Bus	1780 VAC rms for one minute 2500 for one minute

Response

Response

OFF - ON	10 ms (max.)
ON - OFF	20 ms (max.)

Relay

Relay

Relay type	Form A
Contact Protection	Varistor 275 V (internal)
Mechanical Operations	10,000,000
Electrical Operations	200,000 (resistive load @ max. Voltage and Current)
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)
Switching Capability	500 VA (resistive load)

Fuses

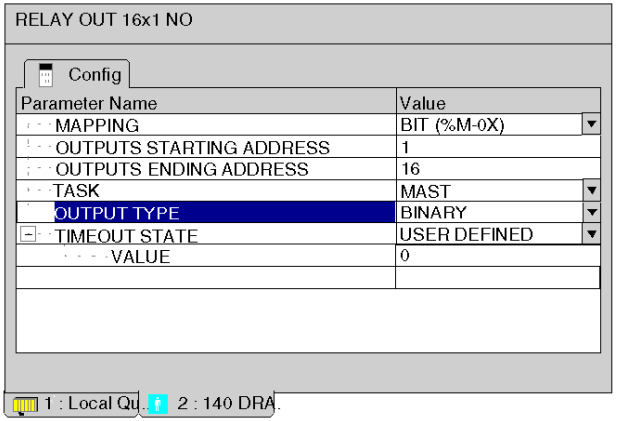
Fuses

Internal	None
External	User installed per local and national electrical codes

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

140 DRA 840 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	16	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 47)*.

Chapter 45
140 DRC 830 00: Relay 8x1 Normally Open / Normally Closed OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DRC 830 00 module.

What Is in This Chapter?

This chapter contains the following topics:

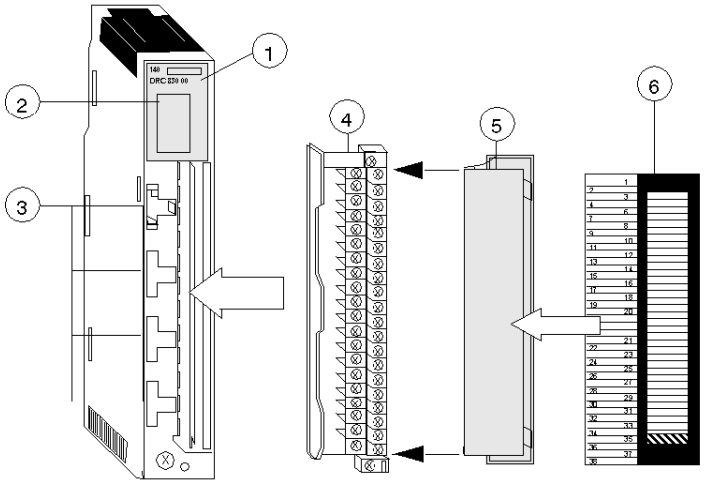
Presentation

Function

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.

Illustration

The following figure shows the 140 DRC 830 00 module and its components.



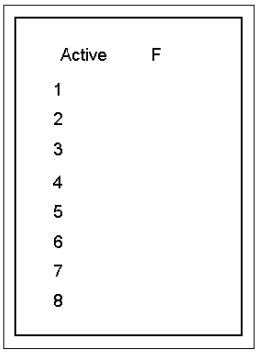
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DRC 830 00 module.



Descriptions

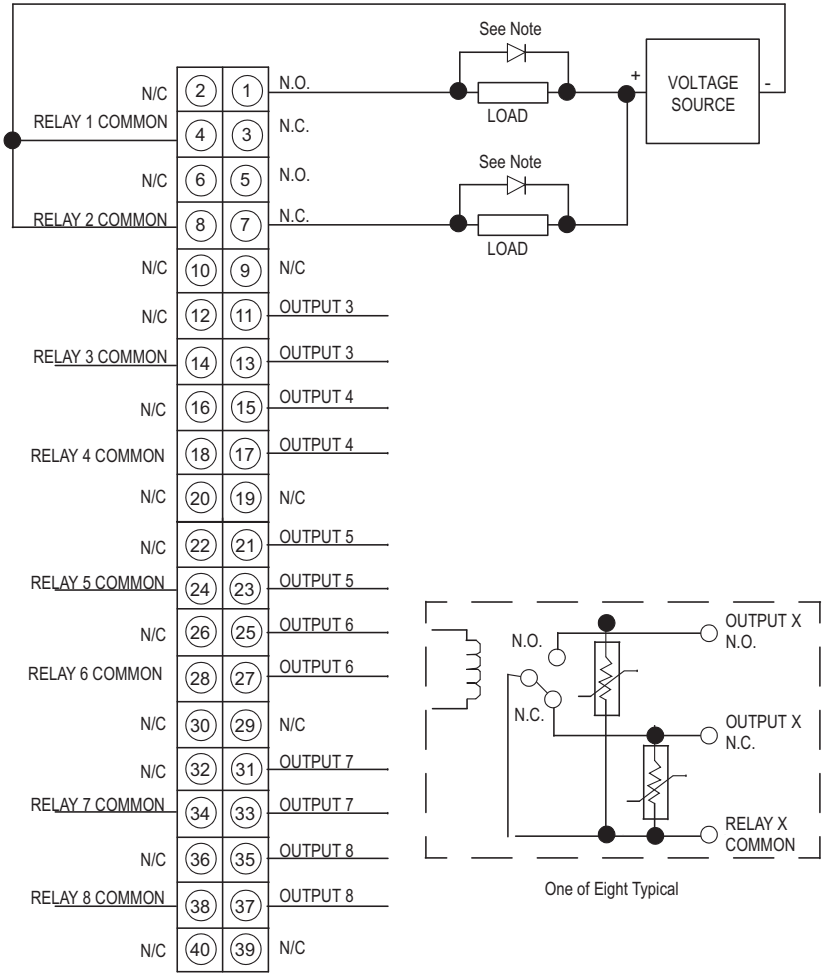
The following table shows the LED descriptions for the 140 DRC 830 00 module.

LEDs	Color	Indication when ON
Active	Green	Bus communication is present.
F	Red	An error (external to the module) has been detected.
1 ... 8	Green	The indicated point or channel is turned ON.

Wiring Diagram

Illustration

The following figure shows the 140 DRC 830 00 wiring diagram.



One of Eight Typical

Notes on Wiring Diagram

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

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	8 OUT (Normally Open / Normally Closed)
External Power	Not required for this module
Power Dissipation	2.75 W + 0.5 W x input points ON
Bus Current required (Module)	560 mA
I/O map	0.5 output word

Operating Voltage

Operating Voltage

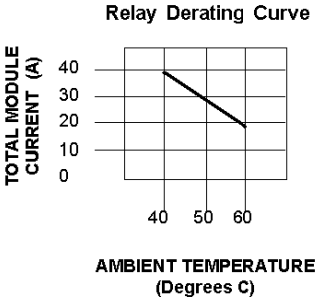
AC	20 ... 250 VAC
DC	5 ... 30 VDC 30 ... 150 VDC (reduced load Current)

Maximum Load Current

Maximum Load Current

Each Point	2 A max. @ 250 VAC @ 60 degrees C ambient, resistive load, 5A @ 40°C : see the derating curve below 2 A Tungsten lamp load 3 A @ a power factor of 0.4 1/4 hp @ 125 / 250 VAC
Each Point (30 ... 150 VDC)	300 mA (restive load) 100 mA (L/R = 10 msec)
Maximum module Current	40 A (see the derating curve below)
Surge Current (max.)	20 A capacitive load @ t = 10 ms

The following figure shows the relay derating curve.



Minimum Load Current

Minimum Load Current

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
OFF State Leakage	< 100 µA

Isolation

Isolation

Output to Output	1780 VAC rms for one minute
Field to Bus	1780 VAC rms for one minute 2500 for one minute

Response

Response

OFF - ON	10 ms (max.)
ON - OFF	20 ms (max.)

Relay

Relay

Relay type	Form C, NO / NC contacts
Contact Protection	Varistor 275 V (internal)
Mechanical Operations	10,000,000
Electrical Operations	200,000 (resistive load @ max. Voltage and Current)
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)
Switching Capability	500 VA (reistive load)

Fuses

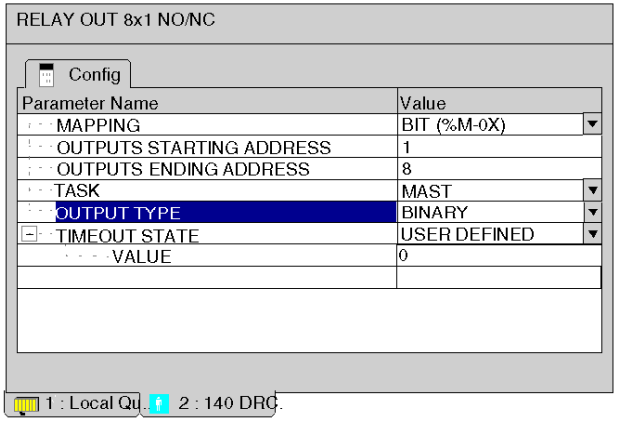
Fuses

Internal	None
External	User installed per local and national electrical codes

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

140 DRC 830 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Outputs Starting Address	1	1	
Outputs Ending Address	8	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Output Type	BINARY	–	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 45)*.

Chapter 46
140 DVO 853 00: 10 ... 30 VDC 32x1 Verified OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DVO 853 00 module.

What Is in This Chapter?

This chapter contains the following topics:

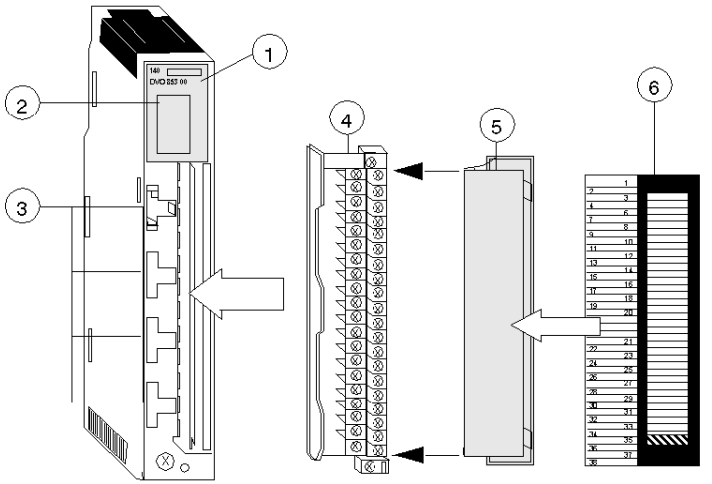
Presentation

Function

The Quantum 140 DVO 853 00 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 outputs.

Illustration

The following figure shows the 140 DVO 853 00 module and its components.



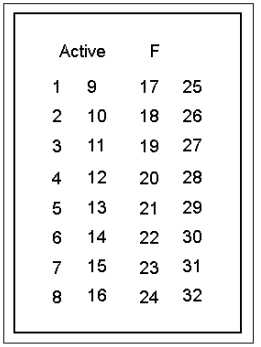
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DVO 853 00 module.



Descriptions

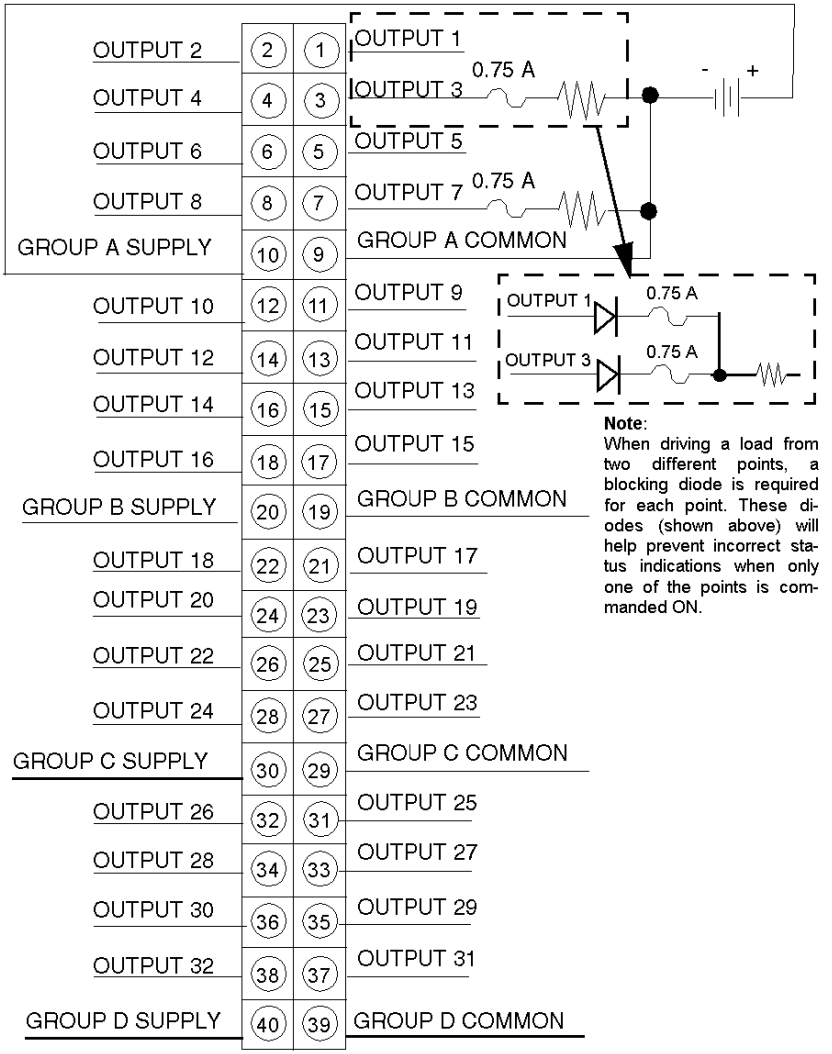
The following table shows the LED descriptions for the 140 DVO 853 00 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DVO 853 00 wiring diagram.



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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Specifications

General Specifications

General Specifications

Module Type	32 OUT (4 groups x 8 points)
External Power	10 ... 30 VDC
Power Dissipation	2.5 W + 0.1 W x input points ON + 0.4 V x total load Currents
Bus Current required (Module)	500 mA
I/O map	2 input word 2 output word
Fault Detection	Blown fuse detect, loss of field power, incorrect output state.

Voltage

Voltage

Operating Voltage (max.)	10 ... 30 VDC
Absolute Voltage (max.)	50 VDC for 1.0 ms decaying voltage pulse
ON State Drop / Point	0.4 VDC @ 0.5 A

Maximum Load Current

Maximum Load Current

Each Point	0.5 A
Each Group	4.0 A
Per Module	16 A
OFF State Leakage / Point	0.4 mA @ 30 VDC
Surge Current (max.)	Each Point: 2.5 A @ 1 ms duration (no more than 6 per minute)

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	75 mF
Tungsten Load (max.)	2.5 W @ 10 VDC 3 W @ 12 VDC 6 W @ 24 VDC

Isolation / Protection

Isolation / Protection

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute
Output Protection	Transient Voltage Suppression (internal), overload (short circuit) protecton

Response

Response

OFF - ON	1 ms (typical), 2 ms (max.)
ON - OFF	1 ms (typical), 2 ms (max.)

Maintenance

Fuses

Fuses

Internal	5.0 Amp fuse per group
External	If desired, a 3/4 A, 250 V fuse

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

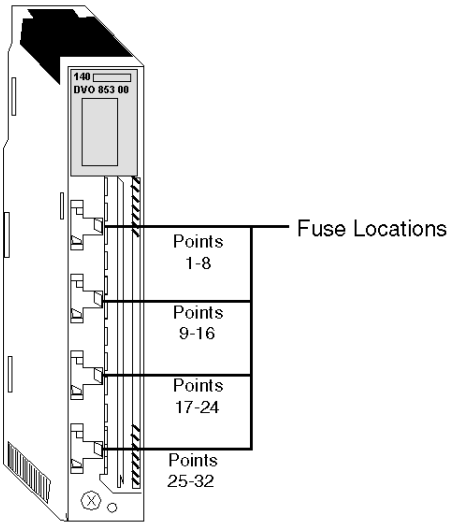
Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

Illustration

The following figure shows the 140 DVO 853 00 module Fuse Locations.

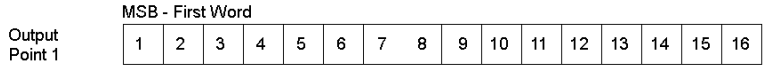


Addressing

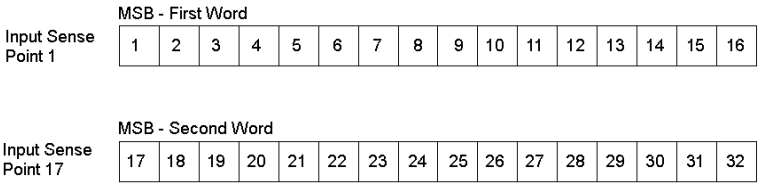
Flat Addressing

This module requires 32 contiguous, output references (%M) or 2 contiguous output words (%MW) for output data and 32 contiguous, input references (%I) or 2 contiguous input words (%IW) for verification input data. For a description of how to access the input points, please refer to *Discrete I/O Bit Numbering, page 34*.

Output Words:



Input Words:



Topological Addressing

Topological addresses in Bit Mapping format:

Point	I/O Object	Comment
Input 1	%I[\b.e\]r.m.1	Value
Input 2	%I[\b.e\]r.m.2	Value
• • •		
Input 31	%I[\b.e\]r.m.31	Value
Input 32	%I[\b.e\]r.m.32	Value
Output 1	%Q[\b.e\]r.m.1	Value
Output 2	%Q[\b.e\]r.m.2	Value
• • •		
Output 31	%Q[\b.e\]r.m.31	Value
Output 32	%Q[\b.e\]r.m.32	Value

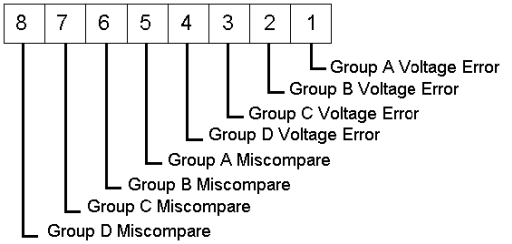
Topological addresses in Word Mapping format:

Point	I/O Object	Comment
Inputword 1	%IW[\b.e\]r.m.1.1	Value
Inputword 2	%IW[\b.e\]r.m.1.2	Value
Outputword 1	%QW[\b.e\]r.m.1.1	Value
Outputword 2	%QW[\b.e\]r.m.1.2	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

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



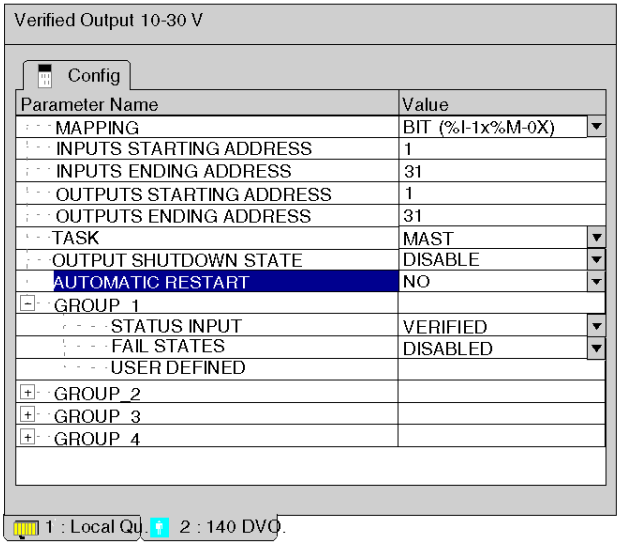
The voltage error bit is set when the field supply is not present, or the group fuse is blown.

The miscompare bit is set when any point within the group does not match its commanded state.

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x%M-0x)	WORD (%MW-4X)	
Inputs Starting Address	1	1	
Inputs Ending Address	31	2	
Outputs Starting Address	1	1	
Outputs Ending Address	31	2	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

Name	Default Value	Options	Description
Output Shutdown State	DISABLE	FAILE STATES	
Automatic Restart	No	Yes	
Group_1			
Status Input	VERIFIED HEALTH	VERIFIED FAULT INPUT ONLY ACTUAL	
Fail States	DISABLE	LAST VALUE USER DEFINED	
User Defined	0	0-255	only enabled if Fail States=USER DEFINED
Group_2 Group_3 Group_4			see Group_1

Part VII
Discrete IN / OUT Modules

Introduction

The following part provides information on the Quantum Discrete IN / OUT modules.

What Is in This Part?

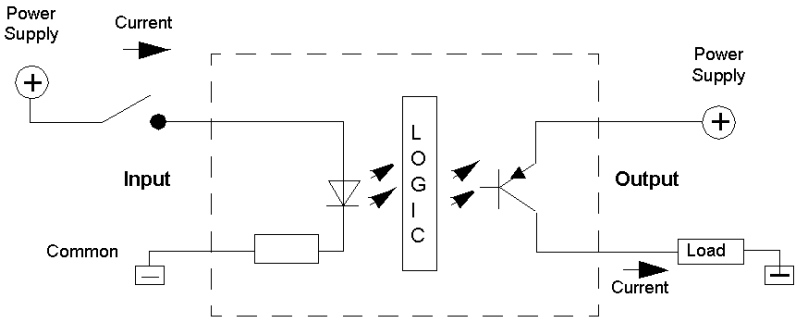
This part contains the following chapters:

Chapter 47
General Information

Discrete I/O Logic Circuits

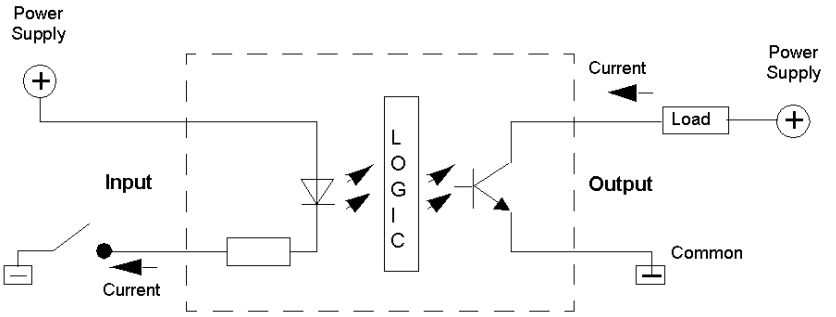
Discrete I/O True High Figure

The following figure shows true high/current sink input/current source output schematic.



Discrete I/O True Low Figure

The following figure shows true low/current source input/current sink output schematic.



Current Sinking

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

Current Sourcing

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

Chapter 48
140 DDM 390 00: 24 VDC 2x8 Sink IN / 2x4 Source OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDM 390 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

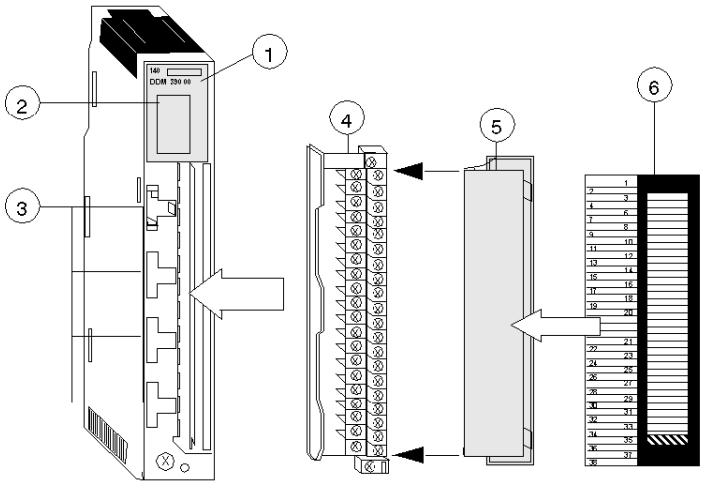
Function

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.

Illustration

This section contains a photograph of the front panel of the 140 DDM 390 00 module

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



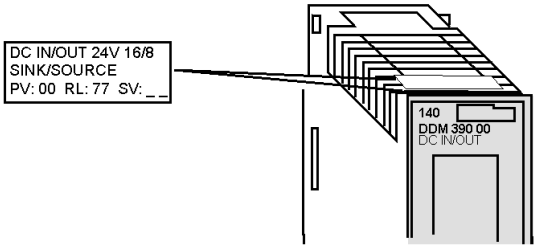
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

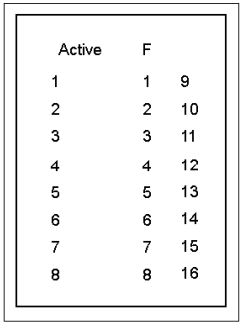
Version Label Figure

The following figure shows the location of the version label.



Illustration

The following table shows the LED indicators for the 140 DDM 390 00 module.



Descriptions

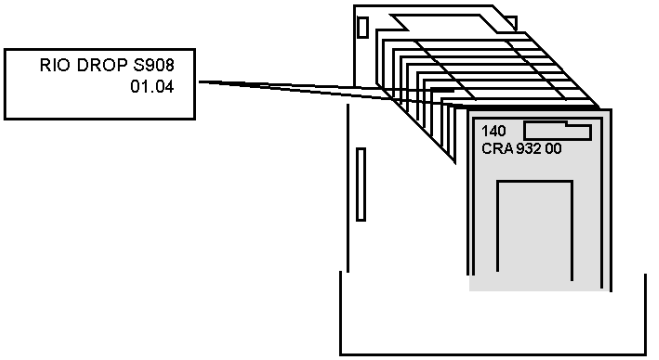
The following table shows the LED descriptions for the 140 DDM 390 module.

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

RIO Drop Location

RIO Drop Location Figure

The following figure shows the RIO drop location.

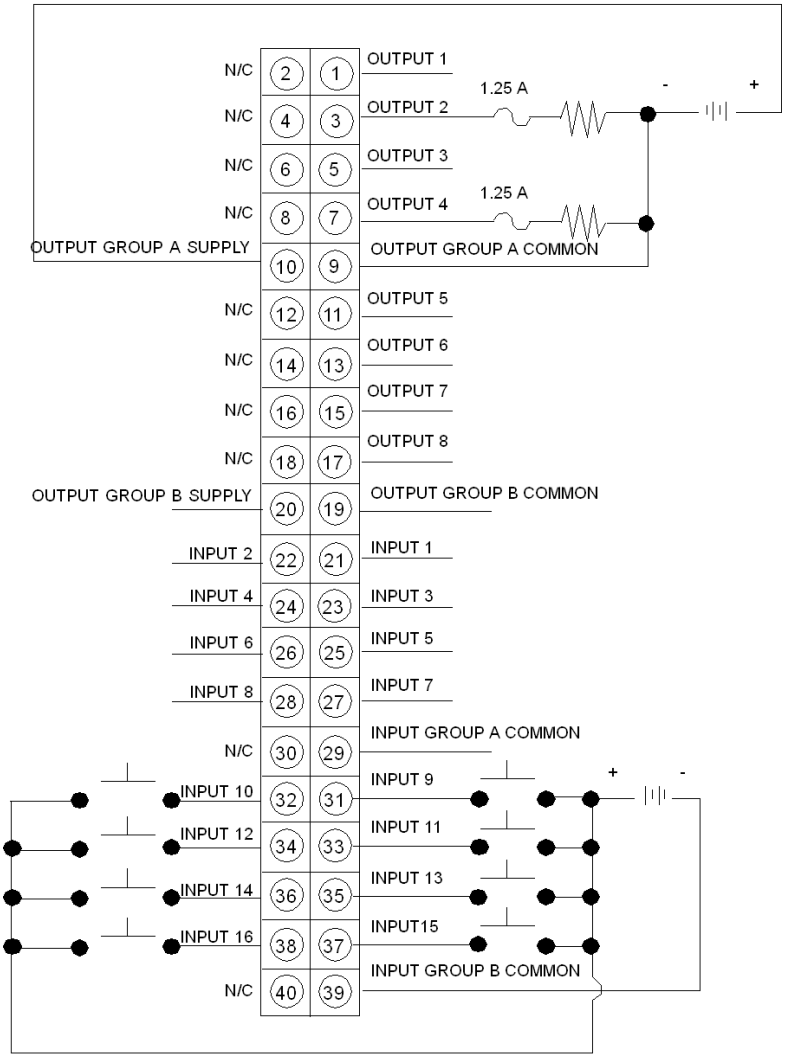


NOTE: If the 140 DDM 390 00 module is used in a RIO drop, the 140 CRA 93X 00 RIO Drop must be Version 1.04 at a minimum. Check the version label (see above) on the top front of the 140 CRA 93X 00 module and ensure that it is at the proper revision level

Wiring Diagram

Illustration

The following figure shows the 140 DDM 390 00 wiring diagram.



1. N / C = Not Connected
2. When field wiring the I/O modules, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (pre-actuators), and
- Disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each point with a 1.25 A fuse (Littlefuse 3121.25, 1.25 A, 250 V).

Failure to follow these instructions can result in injury or equipment damage.

Specifications

General Specifications

General Specifications

Module Type	16 IN (2 groups x 8 points) 8 OUT (2 groups x 4 points)
External Power	Not required for this module
Power Dissipation	1.75 W + 0.36 x input points ON + 1.1 V x total outputs load Currents
Bus Current required (Module)	330 mA
I/O map	1 input word 0.5 output word
Fault Detection	Input: None Output: Blown fuse detect, loss of field power.

Input Rating

Input Rating

ON level voltage	+15 ... +30 VDC
ON level current	2.0 mA (min.)
OFF leve voltage	+3 ... +5 VDC
OFF level current	0.5 mA (max.)
Internal Resistance	2.5 kohm

Absolute Maximum Input

Absolute Maximum Input

Continuous	30 VAC
1.3 ms	56 VAC decaying pulse

Voltage (Output)

Voltage (Output)

Operating Voltage (max.)	19.2 ... 30 VDC
Absolute Voltage (max.)	56 VDC for 1.3 ms decaying voltage pulse
ON State Drop / Point	0.4 VDC @ 0.5 A

Maximum Load Current

Maximum Load Current

Each Point	0.5 A
Each Group	2.0 A
Per Module	4 A
OFF State Leakage / Point	0.4 mA @ 30 VDC
Surge Current (max.)	Each Point: 5 A @ 500 ms duration (no more than 6 per minute)

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	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 (max.)	50 microF

Isolation

Isolation

Group to Group	500 VAC rms for 1 minute
Group to Bus	1780 VAC rms for 1 minute

Response (Input and Output)

Response (Input and Output)

OFF - ON	1 ms (max) - (resistive load output)
ON - OFF	1 ms (max) - (resistive load output)

Module Protection

Module Protection

Input Protection	Resistor limited
Output Protection	Transient Voltage Suppression (internal)

Maintenance

Fuses

Fuses

Input	Internal - None External - User installed per local and national electrical codes
Output	Internal - 5 A fuse for each group. For the location of the fuses, see figure below. External - 1.25 A fuse (Littlefuse 3121.25, 1.25 A, 250 V).

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (sensors and pre-actuators), and
- disconnect the terminal block.
- always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

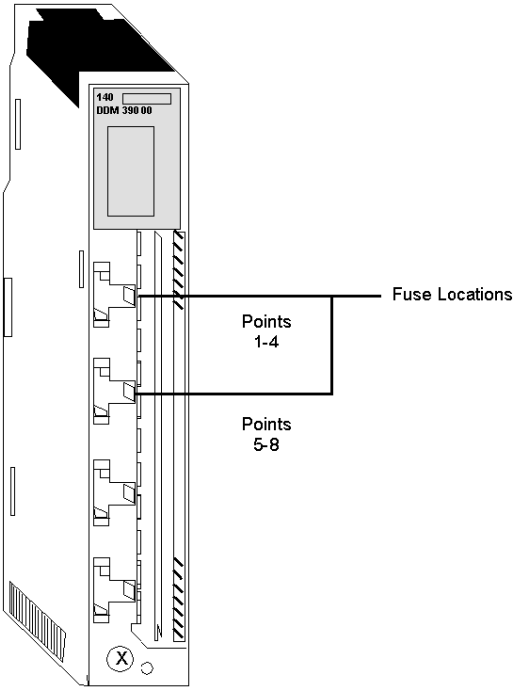
DAMAGE TO MODULE OUTPUTS

Protect each point with a 1.25 A, 250 V fuse.

Failure to follow these instructions can result in injury or equipment damage.

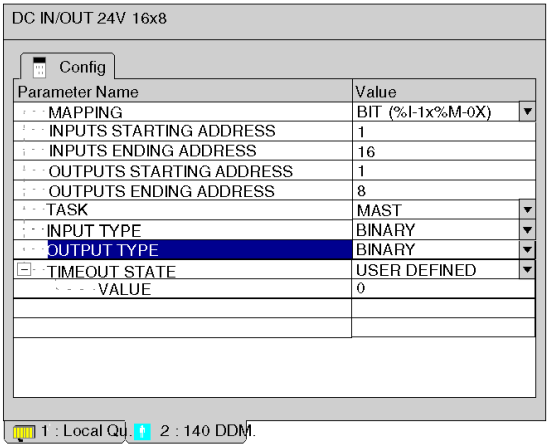
Illustration

The following figure shows the fuse locations of the 140 DDM 390 00 module.



140 DDM 390 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%I-1x%M-0x)	WORD (%IW-3x%MW-4X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Outputs Starting Address	1	1	
Outputs Ending Address	8	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Input Type	BINARY	BCD	
Output Type	BINARY	BCD	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 54)*.

Chapter 49
140 DDM 690 00: 125 VDC High Power IN/OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DDM 690 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

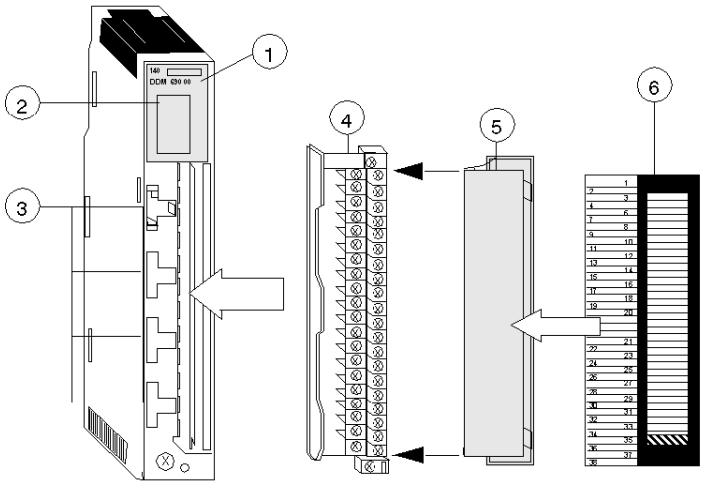
Function

The 125 VDC High Power IN/OUT 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.

Illustration

This section contains a photograph of the front panel of the 140 DDM 690 00 module

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



1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

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

Indicators

Version Levels Table

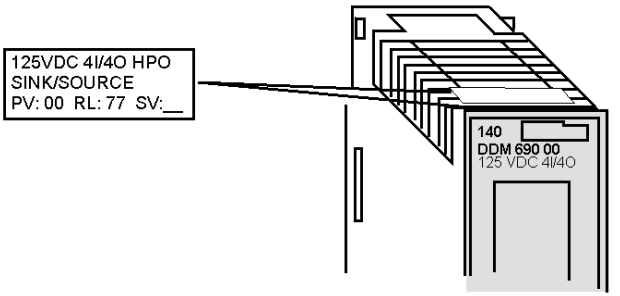
The following table shows the version levels for the Module Types.

Products	Minimum Version Level (see label illustration below)	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

NOTE: The version label, see figure, is found on the top front of the module.

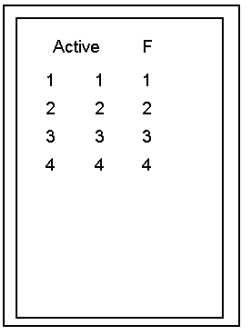
Version Label Figure

The following figure shows the version number location.



Illustration

The following table shows the LED indicators for the 140 DDM 690 00 module.



Descriptions

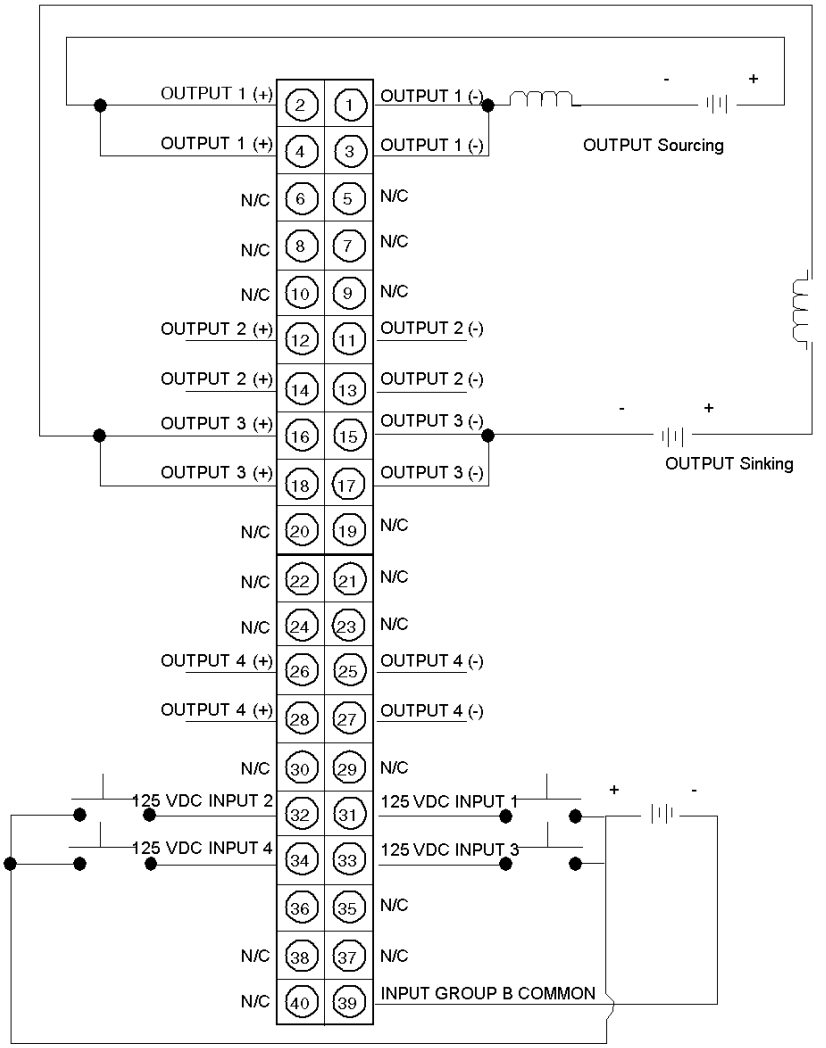
The following table shows the LED descriptions for the 140 DDM 690 module.

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

Wiring Diagram

Illustration

The following figure shows the 140 DDM 690 00 wiring diagram.



1. N / C = Not Connected.
2. Each output has two terminals for multiple wire connections.
3. When field wiring the I/O modules, the maximum wire size that should be used is 1-14 AWG or 2-16 AWG; the minimum size is 20 AWG.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not reverse polarities of the output points. Reverse polarity will turn an output point ON.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Specifications

General Specifications

General Specifications

Module Type	4 IN (4 groups x 1 point) 4 OUT isolated
External Power	Not required for this module
Power Dissipation	0.4 W x (1.0) x number of input points ON + (0.75) x total module outputs Currents
Bus Current required (Module)	350 mA
I/O map	1 input word 1 output word
Fault Detection	Input: None Over Current - each point

Input Rating

Input Rating

ON level voltage	+88 ... +156 VDC including ripple
ON level current	2.0 mA (min.)
OFF leve voltage	0 ... +36 VDC
OFF level current	1.2 mA (max.)
Internal Resistance	24 kohms (nominal)
Absolute Voltage (max.)	Continuous: 156.2 VDC including ripple

Input Response (OFF-ON, ON-OFF)

Input Response (OFF-ON, ON-OFF)

Default Filter	0.5 ms
Non-Default Filter	1.5 ms

Voltage (Output)

Voltage (Output)

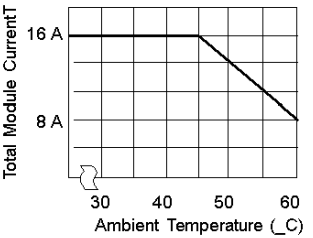
Operating Voltage (max.)	19.2 ... 156.2 VDC including ripple
ON State Drop / Point	0.75 VDC @ 4 A

Maximum Load Current

Maximum Load Current

Each Point	4 A continuous
Per Module	16 A continuous (see the derating curve)
OFF State Leakage / Point	1.2 mA @ 150 VDC
Surge Current (max.)	Each Point: 30 A @ 500 ms duration
Output Response (OFF-ON, ON-OFF)	0.2 ms (max.) (resistive load output

The following figure shows the 140 DDM 690 00 Derating Curve.



Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	For switching intervals ≥ 15 seconds per ANSI/IEEE C37.90- 1978/1989): $L \leq \frac{9}{I^2}$ For repetitive switching: $L \leq \frac{9}{I^2 F}$ where: L = Load Inductance (Henry). I = Load Current (A). F = Switching Frequency (Hz)
Load Capacitance (max.)	0.1 microF @ 150 VDC 0.6 microF @ 24 VDC

Isolation

Isolation

Input Group to Output	1780 VAC rms for 1 minute
Output to Output	2500 VAC rms for 1 minute

Module Protection

Module Protection

Input Protection	Resistor limited
Output Protection	Transient Voltage Suppresion (internal)

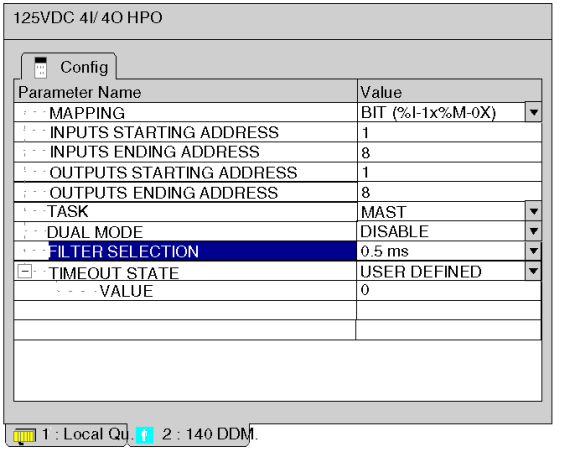
Fuses

Fuses

Input	Internal - None External - User installed per local and national electrical codes
Output	Each output is protected by an electronic shutdown: For current output surges between 4 A and 30 A, the input point will shutdown after 0.5 s. For current surges greater than 30 A, the output will shutdown immediately.

140 DDM 690 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%I-1x%M-0x)	WORD (%IW-3x%MW-4X)	
Inputs Starting Address	1	1	
Inputs Ending Address	8	1	
Outputs Starting Address	1	1	
Outputs Ending Address	8	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Dual Mode	DISABLE	ENABLE	
Filter Selection	0.5 ms	1.5 ms	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-15	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 52)*.

Chapter 50
140 DAM 590 00: 115 VAC 2x8 IN / 2x4 OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DAM 590 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

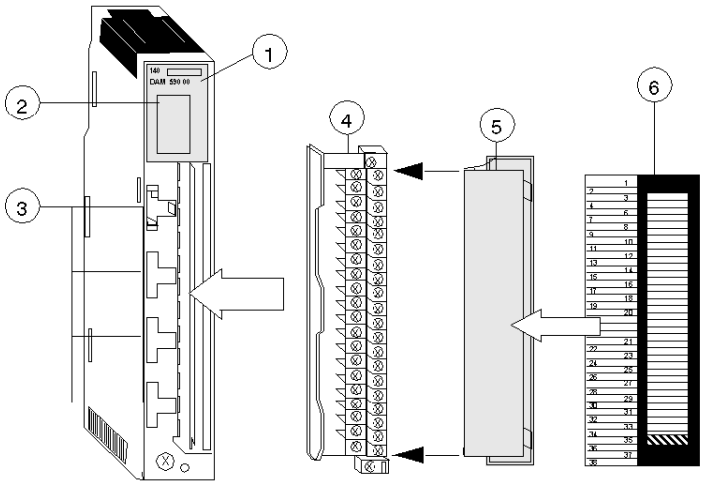
Function

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

Illustration

This section contains a photograph of the front panel of the 140 DAM 590 00 module

The following figure shows the 140 DAM 590 00 module and its components.



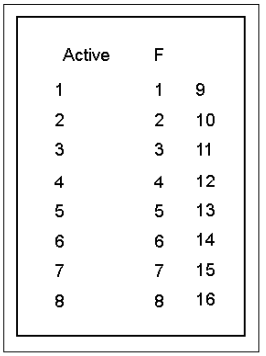
1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

NOTE: The field wiring terminal strip (Modicon #140 XTS 002 00) must be ordered separately. (The terminal strip includes the removable door and label.)

Indicators

Illustration

The following table shows the LED indicators for the 140 DAM 590 00 module.



Descriptions

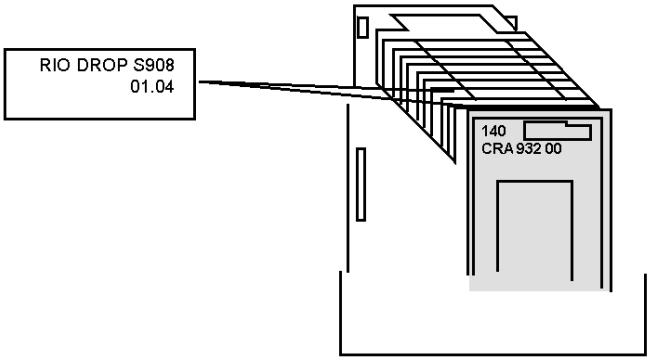
The following table shows the LED descriptions for the 140 DAM 590 module.

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

RIO Drop Location

RIO Drop Location Figure

The following figure shows the RIO drop location.

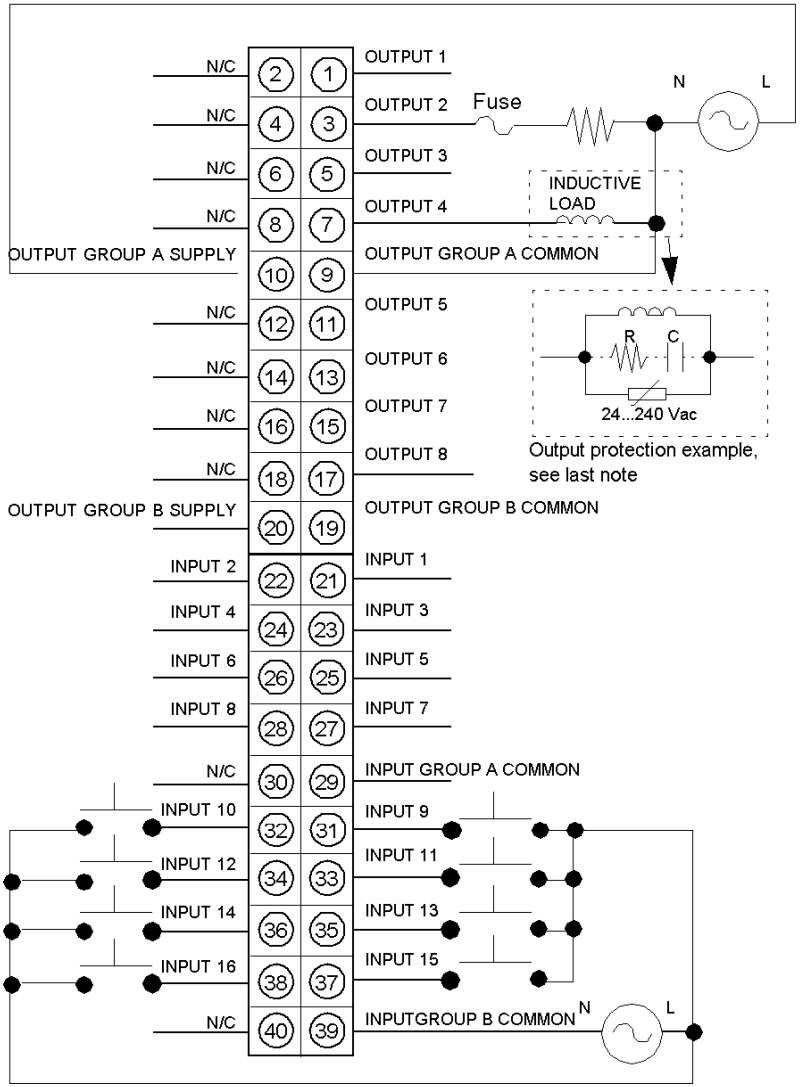


NOTE: If the 140 DAM 590 00 module is used in a RIO drop, the 140 CRA 93X 00 RIO Drop must be Version 1.04 at a minimum. Check the version label (see below) on the top front of the 140 CRA 93X 00 module and ensure that it is at the proper revision level

Wiring Diagram

Illustration

The following figure shows the 140 DAM 590 00 wiring diagram.



⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- cut-off the power to the module (sensors and pre-actuators), and
- disconnect the terminal block.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect the module output when an external switch is used to control an inductive load in parallel with the module output. Use an external varistor (Harris V390ZA05 or equivalent) in parallel with the switch.

Failure to follow these instructions can result in injury or equipment damage.

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

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

NOTE:
The output protection is composed of an RC filter (snubber filter) and a varistor:

- The snubber filter is optional. The values of R and C are not provided as they depend on the device used.
- Choose the varistor with appropriate electronic characteristics depending on the voltage required by the device used.

Specifications

General Specifications

General Specifications

Module Type	16 IN (2 groups x 8 points) 8 OUT (2 groups x 4 points)
External Power	85 ... 132 VAC required for output groups
Power Dissipation	5.5 W + 1.1 V x Total module load current
Bus Current required	250 mA
I/O map	1 input word 0.5 output word
Fault Detection	Input: None Output: Blown fuse detect, loss of field power.

Operating Voltage and Input Current*

Operating Voltage and Input Current*

50 Hz	ON: 85 ... 132 VAC (11.1 mA max) OFF: 0 ... 20 VAC
60 Hz	ON: 79 ... 132 VAC (13.2 mA max) OFF: 0 ... 20 VAC * 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

Typical Input Impedance

Typical Input Impedance

50 Hz	14.4 kohms capacitive
60 Hz	12 kohms capacitive

Absolute Maximum Input

Absolute Maximum Input

Continuous	132 VAC
10 s	156 VAC
1 Cycle	200 VAC

Response (Inputs)

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.

Maximum Voltage (Output)

Maximum Voltage (Output)

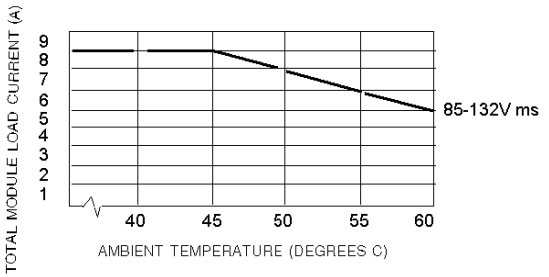
Continuous	85 ... 132 VDC
10 sec	156 VDC
1 Cycle	200 VDC
ON State Drop / Point	1.5 VDC

Maximum Load Current / OFF State Leakage

Maximum Load Current / OFF State Leakage

Each Point	4 A continuous
Each Group	4 A continuous
Per Module	8 A continuous (see chart below for derating above 50 degree)
OFF State Leakage / Point	2 mA @ 115 VDC

The following figure shows the 140 DAM 590 00 Operating Curve.



Maximum Surge Current / Min. Load Current

Maximum Surge Current / Min. Load Current

One Cycle	30 A per point, 45 A per group
Two Cycle	20 A per point, 30 A per group
Three Cycle	10 A per point, 25 A per group
Min. Load Current	5 mA

Response

Response

OFF - ON / ON - OFF	0.5 of one line cycle max.
Applied DV / DT	400 V / micro sec

Isolation

Isolation

Group to Group	1000 VAC for 1 minute
Input or Output to Bus	1780 VAC for 1 minute

Maintenance

Fuses

Fuses

Input	Internal - None External - User installed per local and national electrical codes
Output	Internal - 5 A fuse for each group. For the location of the fuses, see figure below. External - User installed per local and national electrical codes

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before accessing the fuses,

- Remove the power to the module (sensors and pre-actuators), and
- disconnect the terminal block.
- always use a properly rated voltage sensing device at all line and load fuse clips to confirm power is off.

Failure to follow these instructions will result in death or serious injury.

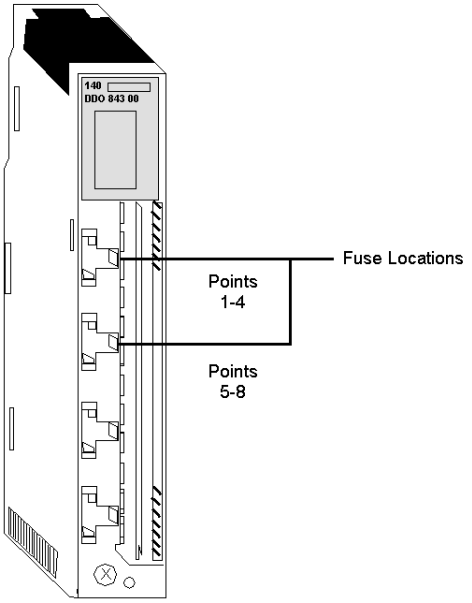
⚠ CAUTION

DAMAGE TO MODULE OUTPUTS

Protect each group with a 5 A, 250 V fuse.

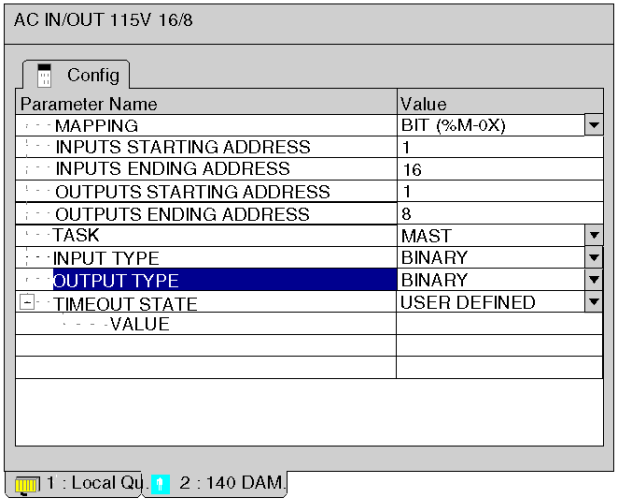
Failure to follow these instructions can result in injury or equipment damage.

The following figure shows the fuse locations for the 140 DAM 590 00 module.



140 DAM 590 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%I-1x%M-0x)	WORD (%IW-3x%MW-4X)	
Inputs Starting Address	1	1	
Inputs Ending Address	16	1	
Outputs Starting Address	1	1	
Outputs Ending Address	8	1	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

Name	Default Value	Options	Description
Input Type	BINARY	–	
Output Type	BINARY	–	
Timeout State	USER DEFINED	HOLD LAST VALUE	
Value	0	0-65535	only enabled if Timeout State=USER DEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 54)*.

Part VIII
Quantum Intrinsically Safe Analog/Digital Modules

Introduction

The following part provides information on the Quantum Intrinsically Safe Analog/Digital Modules.

What Is in This Part?

This part contains the following chapters:

Chapter 51
General Information

Purpose

This chapter provides general information on Intrinsically Safe Modules.

What Is in This Chapter?

This chapter contains the following topics:

Purpose and Considerations

Purpose

Intrinsic safety is a technique for ensuring that electrical energy supplied to circuits in a hazardous area is too low to ignite volatile gases either by spark or thermal means. Intrinsically safe circuits use energy limiting devices known as intrinsically safe barriers to prevent excess electrical energy from being applied to electrical equipment located in the hazardous area.

Module Location

The Quantum Intrinsically Safe family of modules are entity certified to be installed in safe areas to monitor/control intrinsically safe apparatus located In hazardous areas.

Intrinsically Safe Barriers

All Quantum Intrinsically Safe modules use galvanic isolation to provide the intrinsically safe barrier between them and the field devices located in hazardous areas. Galvanic isolation in the form of an opto-isolator and DC/DC converter is provided between the field side output circuitry and the Quantum bus circuitry. The maximum agency specified intrinsically safe parameters are:

$V_{oc} \leq 28$ VDC and $I_{sc} \leq 100$mA

Intrinsically Safe Power Supply

DC/DC converters in Quantum Intrinsically Safe modules provide intrinsically safe power to field devices located in hazardous areas. No external field power is required where these modules are installed.

Installation of Quantum Intrinsically Safe Modules

Quantum Intrinsically Safe modules are designed to fit into a standard 140 XBP OXX 00 Quantum rack. The modules can be installed in any slot position in the rack. (The first slot is normally reserved for the power supply module.)

Hot Swapping

⚠ WARNING

LOSS OF ABILITY TO PERFORM SAFETY FUNCTIONS

Do not attempt to hot swap a Quantum Intrinsically Safe module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Practices

Safe Area Wiring Practices

Intrinsically safe wiring between Quantum Intrinsically Safe modules and the field devices located in the hazardous area must be separated from all other wiring. This can be accomplished by the following methods:

- Separate blue wire ducts, raceways or conduits,
- Grounded metal or insulated partitions between the intrinsically safe and non- intrinsically safe wiring,
- A separation of two inches (50 mm) of air space between the intrinsically safe and non-intrinsically safe wiring. With this method, the intrinsically safe and non-intrinsically safe wires must be tied down in separate bundles to maintain the required separation.

Identification and Labeling

Intrinsically safe wiring must be properly identified and labeled. Light blue color coding should be used for all intrinsically safe wiring. The terminal strip wiring connector on all Quantum Intrinsically Safe modules is colored blue to distinguish it from all non-intrinsically safe modules.

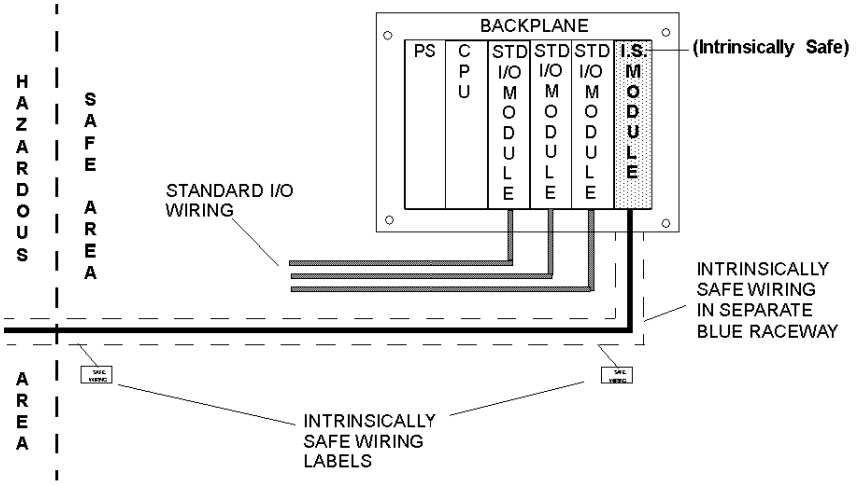
All wire ducts, raceways, cable trays, and open wiring must be labeled "Intrinsically Safe Wiring" with a maximum spacing of 25 feet between labels.

Wiring Type and Grounding

Shielded twisted pair wires shall be used for each of the input or output pairs connected to the Quantum Intrinsically Safe module blue terminal strip. The wire gauge size can be between AWG 20 and AWG 12. Each twisted pair wire shield must be connected to the ground screws on the rack, at the module end, and left open at the field device connection end in the hazardous area. The instruction sheet packaged with each Quantum Intrinsically Safe module contains a wiring diagram applicable to that type of module.

Intrinsically Safe Wiring Diagram

The following diagram illustrates a Quantum Intrinsically Safe module using a separate raceway to isolate its external wiring to the hazardous area. This is just one of the possible ways of field wiring the module. Other methods would include bundling and laying the intrinsically safe wires in the same wiring trough with the bundled non-intrinsically safe wires, with each bundle tied down and separated by minimum of two inches of air space through out the wiring runs.



Questions Regarding Intrinsically Safe Wiring Practices

The information concerning intrinsic safety wiring practices is general and is not intended to cover installation requirements for any specific site. Questions regarding intrinsic safety wiring requirements for your site should be referred to the approval agencies listed

Chapter 52
140 AII 330 00: Safe Analog IN Module

About this Chapter

The following chapter provides information on the Quantum 140 AII 330 00 module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

Function

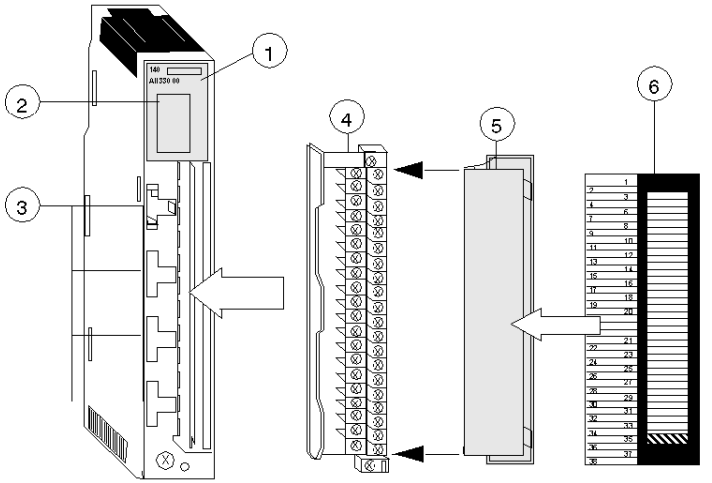
The Quantum 140 AII 330 00 Intrinsically Safe Analog Input module will interface with eight intrinsically safe analog inputs, which are software-configurable on a module basis with either RTD/Resistance or thermocouple/millivolt inputs.

When it is configured as an RTD/Resistance Input module, it supports 100W, 200W, 500W, and 1000W platinum (American or European) and nickel sensors. The module also allows any mix and match of sensor type or resistance inputs that can be configured by the software.

When it is configured as a Thermocouple/Millivolt Input module, it accepts B, J, K, E, R, S and T type thermocouples. The module also allows any mix and match of thermocouple or millivolt inputs that can be configured by the software.

Illustration

The following figure shows the 140 AII 330 00 Intrinsically Safe module and its components.

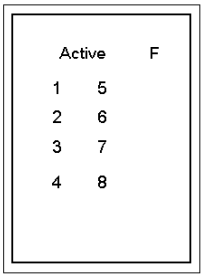


1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

Indicators

Illustration

The following table shows the LED indicators for the 140 AII 330 00 module.



Descriptions

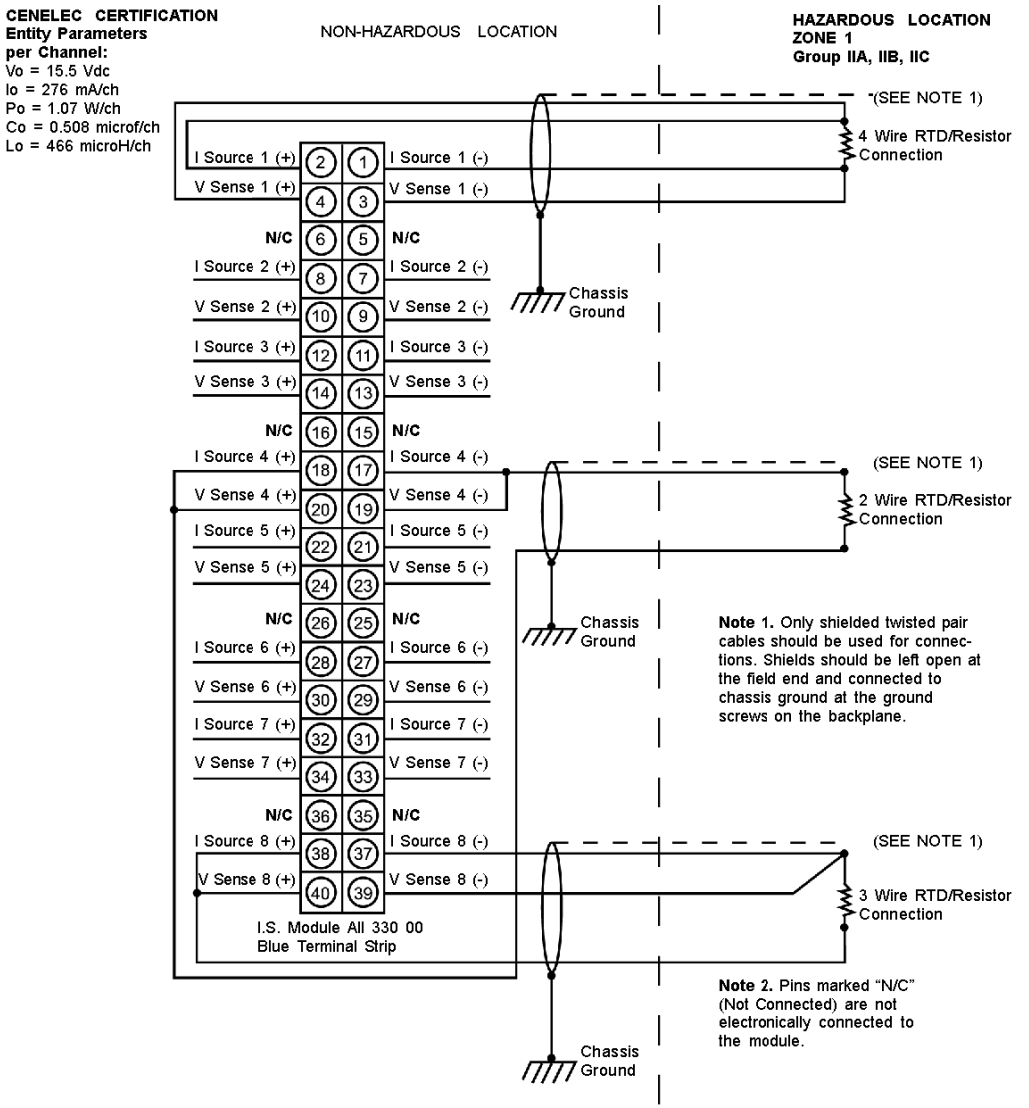
The following table shows the LED descriptions for the 140 AII 330 00 module.

LEDs	Color	Indication When On
Active	Green	Communicating with the PLC
F	Red	A broken wire (4 ... 20 mA, only), out-of-range condition or short circuit on any channel
1 .. 8	Red	A broken wire, out-of-range condition or short circuit on the indicated channel

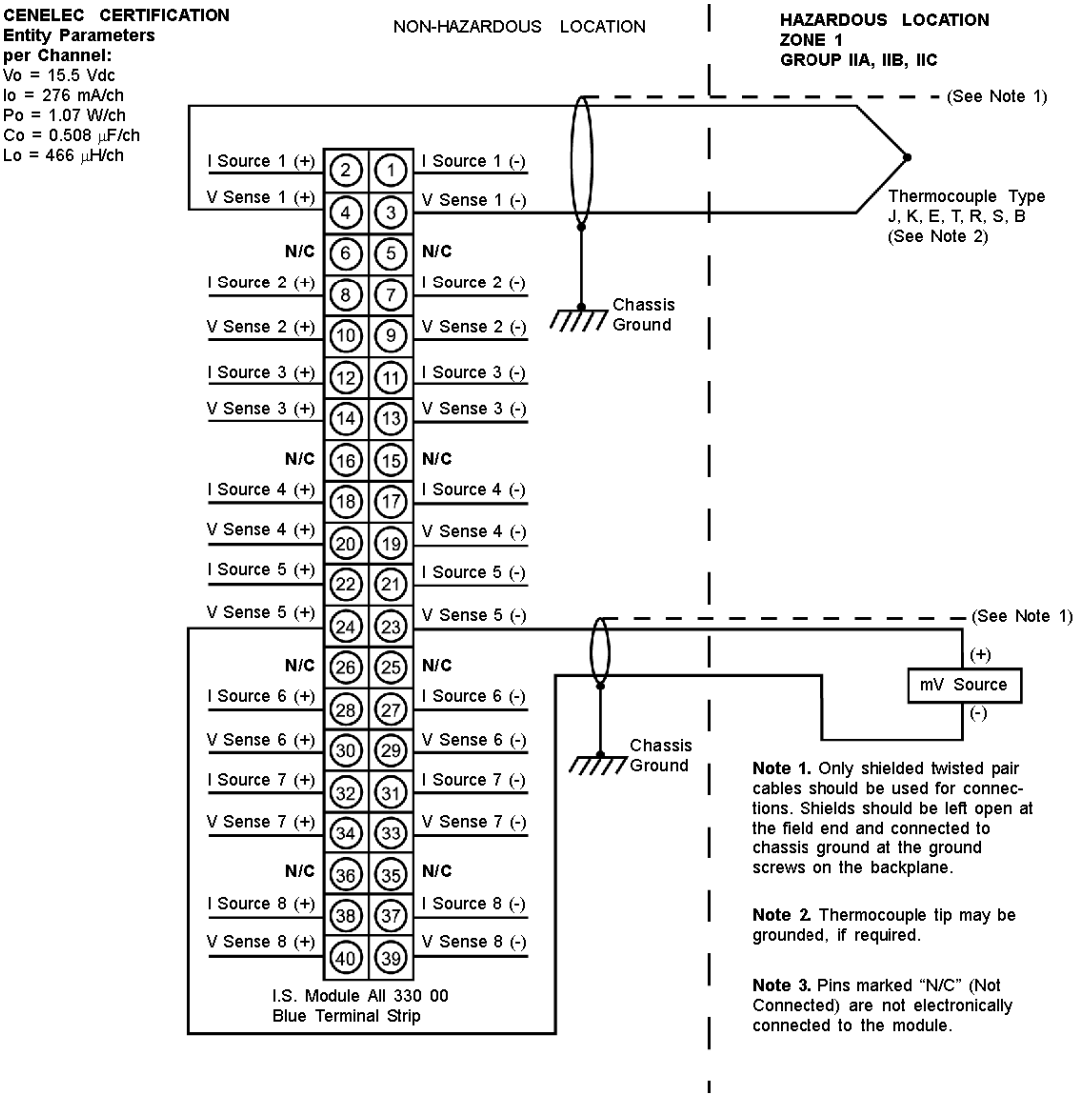
Wiring Diagrams

Cenelec Approved Wiring Diagrams

The following is a Cenelec certified wiring diagram for this module configured with an RTD/Resistance connection.

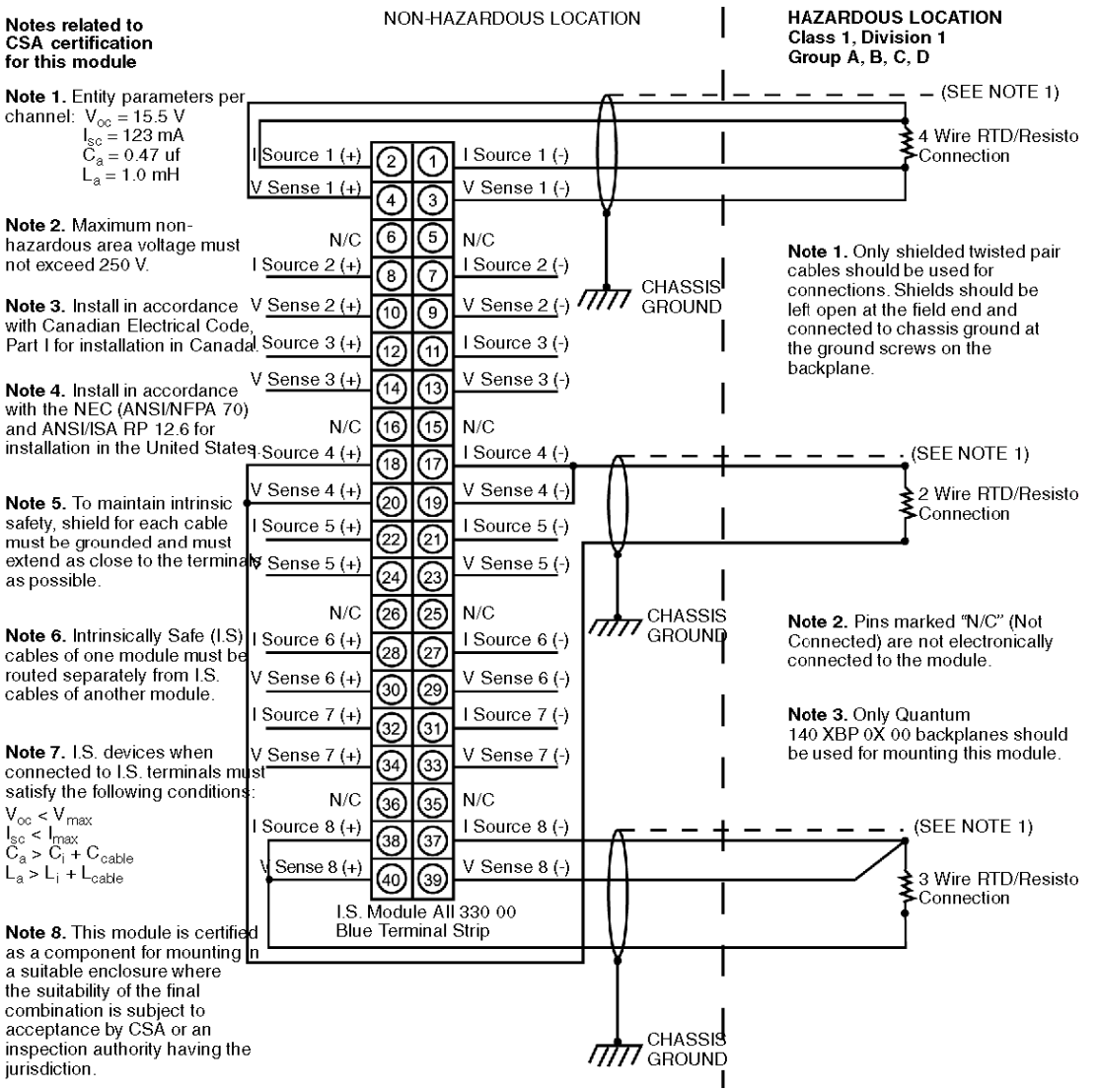


The following is a Cenelec certified wiring diagram for this module when configured with a Thermocouple connection.

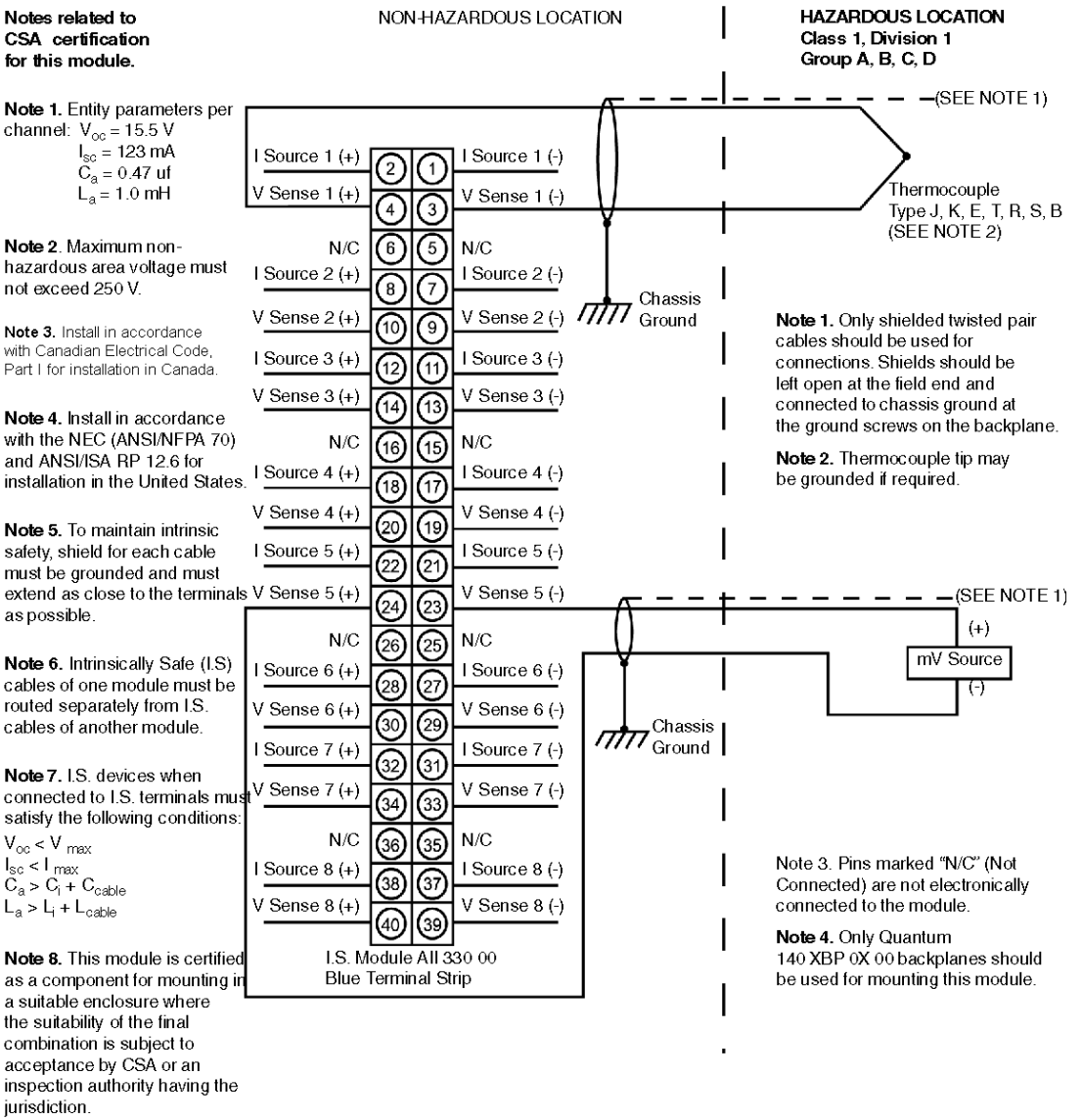


CSA Approved Wiring Diagrams

The following is a CSA certified wiring diagram for this module when configured with an RTD/resistor connection.

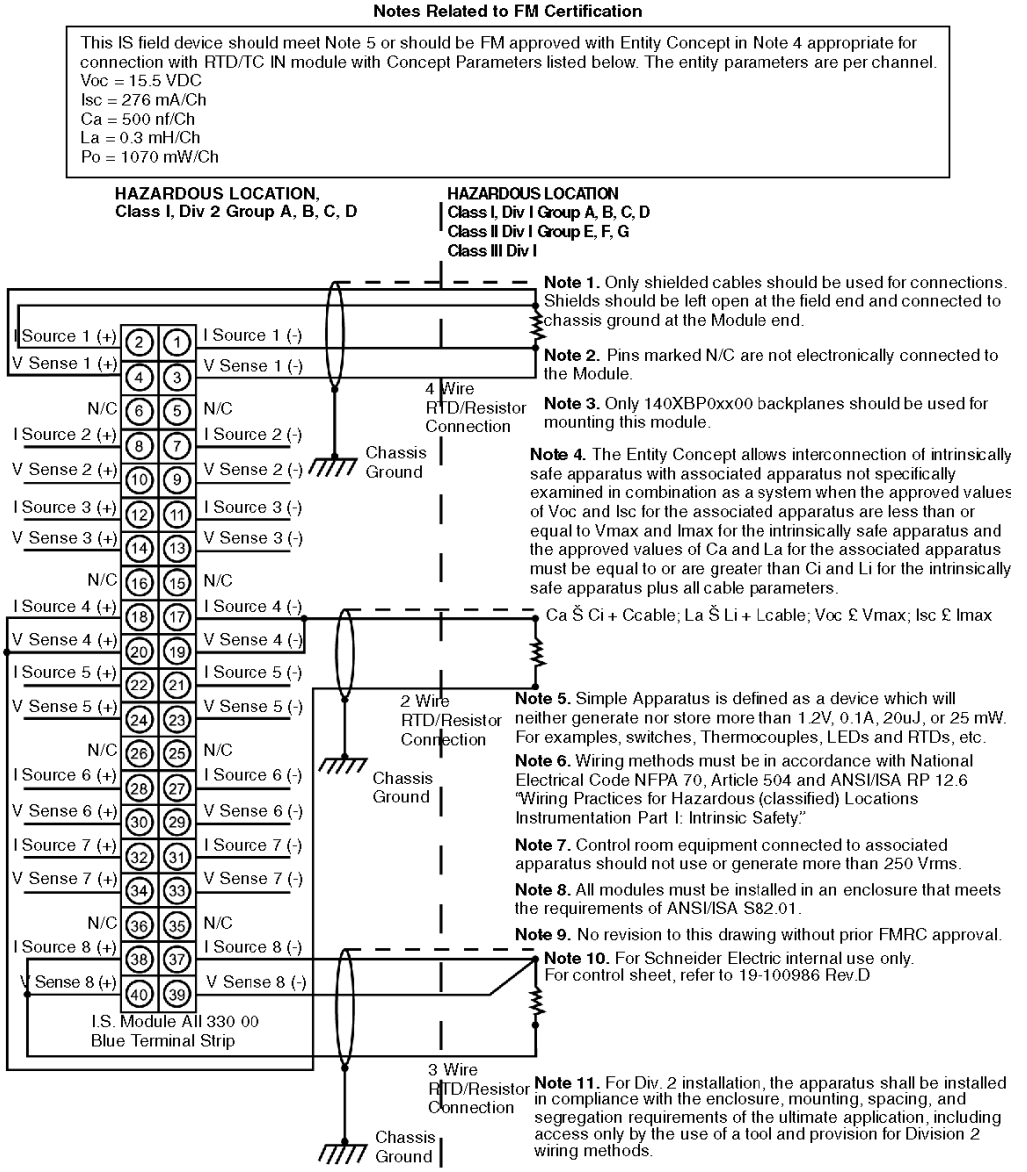


The following is a CSA certified wiring diagram for this module when configured with a thermocouple connection.



FM Approved Wiring Diagrams

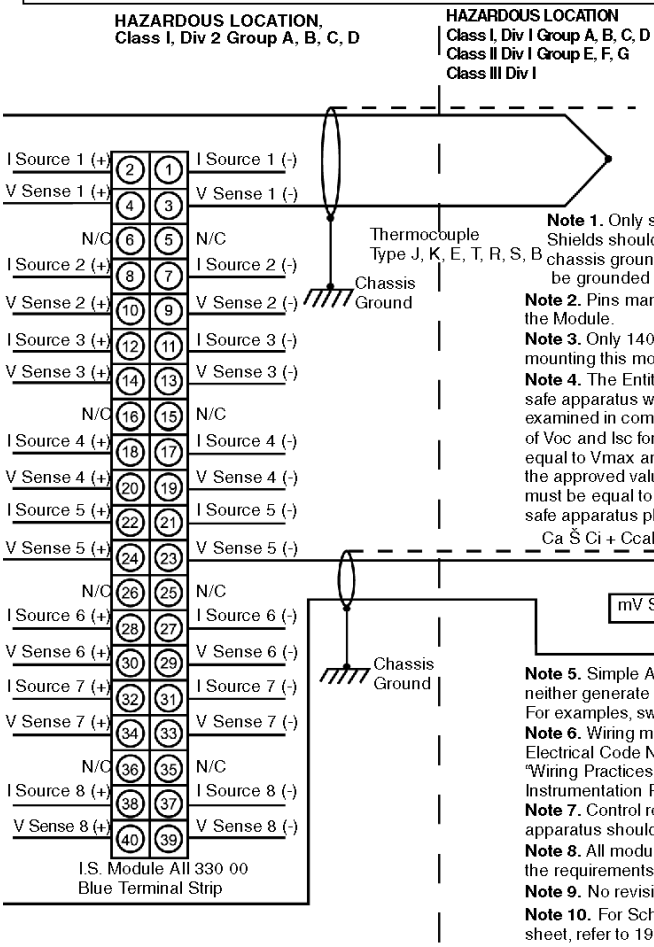
The following is a FM certified wiring diagram for this module when configured as a RTD/resistor connection.



The following is a FM certified wiring diagram for this module when configured with a thermocouple connection.

Notes Related to FM Certification

This IS field device should meet Note 5 or should be FM approved with entity concept in Note 4 appropriate for connection with IS RTD/TC IN Module with Concept Parameters listed below. The entity parameters are per Channel.
Voc = 15.5 VDC
Isc = 276 mA/Ch
Ca = 500 nf/Ch
La = 0.3 mH/Ch
Po = 1070 mW/Ch



Note 1. Only shielded cables should be used for connections. Shields should be left open at the field end and connected to chassis ground at the Module end. Thermocouple tips may be grounded if required.

Note 2. Pins marked N/C are not electronically connected to the Module.

Note 3. Only 140 XBP 0xx 00 backplanes should be used for mounting this module.

Note 4. The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of Voc and Isc for the associated apparatus are less than or equal to Vmax and Imax for the intrinsically safe apparatus and the approved values of Ca and La for the associated apparatus must be equal to or are greater than Ci and Li for the intrinsically safe apparatus plus all cable parameters.

Ca Š Ci + Ccable; La Š Li + Lcable; Voc £ Vmax; Isc £ Imax

Note 5. Simple Apparatus is defined as a device which will neither generate nor store more than 1.2V, 0.1A, 20uJ, or 25 mW. For examples, switches, Thermocouples, LEDs and RTDs, etc.

Note 6. Wiring methods must be in accordance with National Electrical Code NFPA 70, Article 504 and ANSI/ISA RP 12.6 "Wiring Practices for Hazardous (classified) Locations Instrumentation Part I: Intrinsic Safety."

Note 7. Control room equipment connected to associated apparatus should not use or generate more than 250 Vrms.

Note 8. All modules must be installed in an enclosure that meets the requirements of ANSI/ISA S82.01.

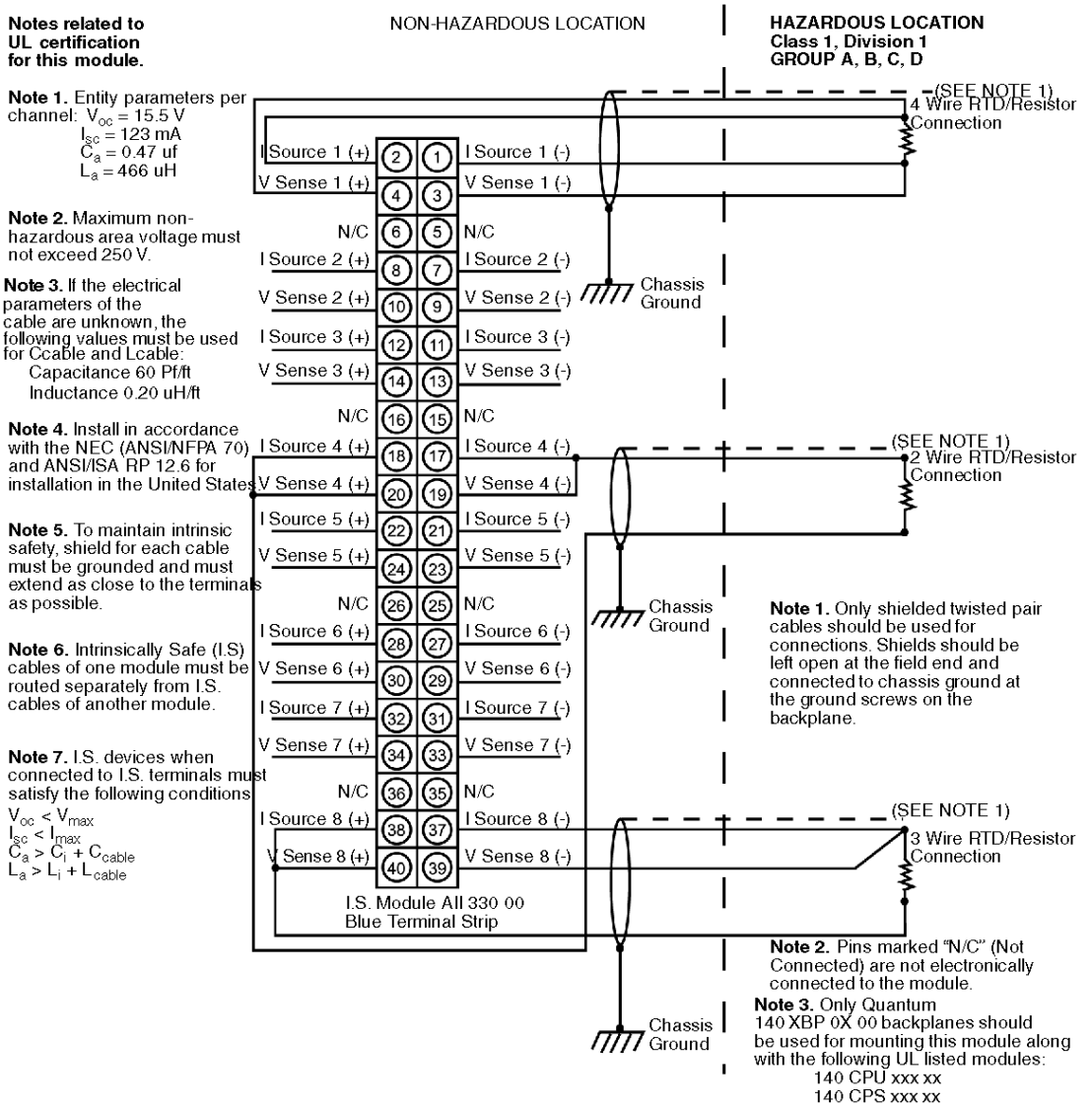
Note 9. No revision to this drawing without prior FMRC approval.

Note 10. For Schneider Electric internal use only. For control sheet, refer to 19-100986 Rev 1.

Note 11. For Division 2 installation, the apparatus shall be installed in compliance with the enclosure, mounting, spacing, and segregation requirements of the ultimate application, including access only by the use of a tool and provision for Div 2 wiring methods.

UL Approved Wiring Diagrams

The following is a UL certified wiring diagram for this module when configured with an RTD/resistor connection.



The following is a UL certified wiring diagram for this module when configured with a thermocouple connection.

Notes related to UL certification for this module.

Note 1. Entity parameters per channel: V_{oc} = 15.5 V
I_{sc} = 123 mA
C_a = 0.47 uf
L_a = 466 mH

Note 2. Maximum non-hazardous area voltage must not exceed 250 V.

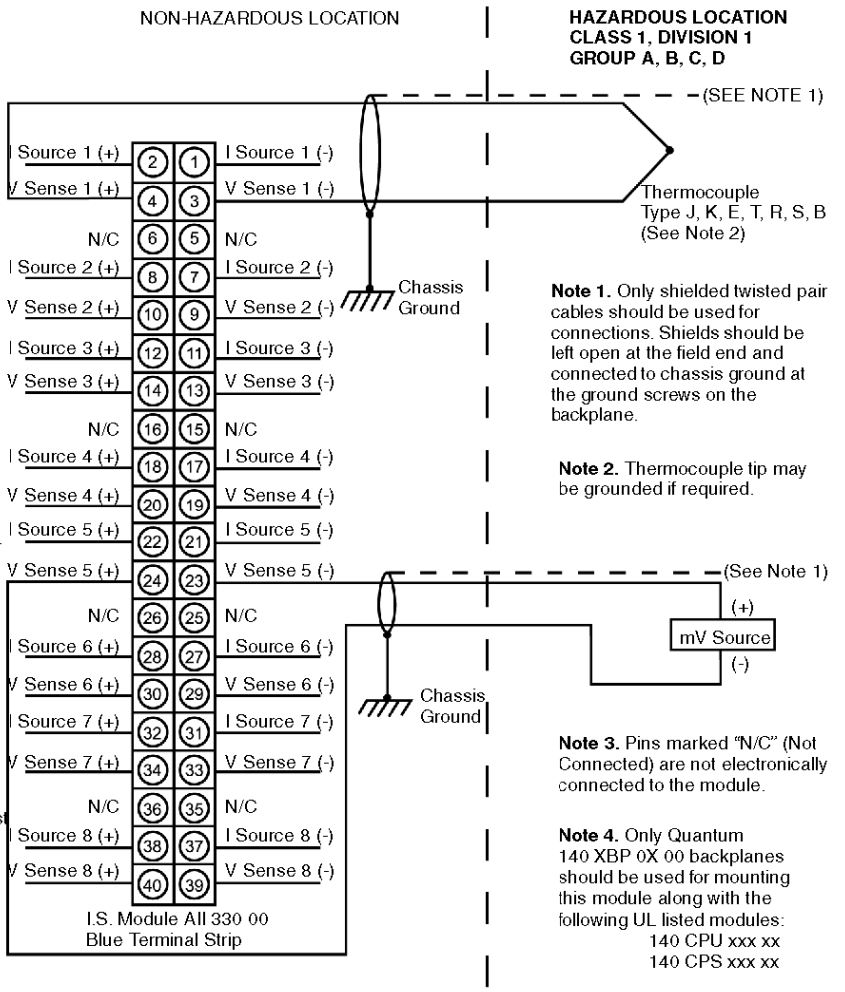
Note 3. If the electrical parameters of the cable are unknown, the following values must be used for Ccable and Lcable:
Capacitance60 Pf/ft
Inductance0.20 uH/ft

Note 4. Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP 12.6 for installation in the United States.

Note 5. To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminal as possible.

Note 6. Intrinsically Safe (I.S) cables of one module must be routed separately from I.S. cables of another module.

Note 7. I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{oc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$



Field Wiring

Field wiring to the module shall consist of separate shielded twisted pair wires. The acceptable field wire gauge shall be AWG 20 to AWG 12. In a 2-wire field configuration, the maximum field wire length is a function of the required accuracy. Wiring between the module and the intrinsically safe field device should follow intrinsically safe wiring practices to avoid the transfer of unsafe levels of energy to the hazardous area.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

RTD/Resistance Input Wiring

When the Universal Input module is configured as a RTD/Resistance Input module, the maximum wire length (distance to a sensor) for a 3 or 4-wire configuration is 200 meters.

Thermocouple/Millivolt Input Wiring

When the module is configured as a Thermocouple/Millivolt Input module, the sum of thermocouple source or voltage source impedance and wire resistance should not exceed 200 ohms for rated accuracy.

Fixed Wiring System

The Quantum140 AII 330 00 Intrinsically Safe Analog Input module is designed with a fixed wiring system where the field connections are made to a 40-pin, fixed position, blue terminal strip which is plugged into the module.

Terminal Strip Color and Keying Assignment

The module's 140 XTS 332 00 field wiring terminal strip is color-coded blue to identify it as an intrinsically safe connector.

The terminal strip is keyed to prevent the insertion of an inappropriate connector in the module. The following table provides the keying assignment.

Module Class	Module Part Number	Module Coding	Terminal Strip Coding
Intrinsically Safe	140 AII 330 00	CDF	ABE

Specifications

RTD/Resistance Module Specifications

Specifications for the Quantum140 AII 330 00 module configured as an Intrinsically Safe RTD/Resistance input module are as follows.

Number of Channels	8 IN
RTD Types (Configurable)	
Platinum (American and European) – PT100, PT200, PT500, PT1000	-200 °C to +850 °C
Nickel – N100, N200, N500, N1000	-60 °C to +180 °C
Measurement Current	
PT100, PT200, N100, N200 PT500, PT1000, N500, N1000	2.5 mA 0.5 mA
Input Impedance	>10M ohms
Linearity	+/- 0.003% of full scale (0 ... 60°C)
Resolution	12 bits plus sign (0.1°C)
Absolute Accuracy	+/- 0.5 °C (25 °C) +/- 0.9 °C (0 .. 60 °C)
Accuracy Error @ 25°C	Typical: +/- 0.05% of full scale Maximum: +/- 0.1% of full scale
Isolation	
Channel to Channel	None
Channel to Bus	> 100 dB @ 50/60 Hz
Input Filter	1780 VAC @ 47-63 Hz or 2500 VDC for 1 min.
Update Time (All Channels)	
3-wire 2 or 4-wire	1.35 sec. 750 m sec.
Bus Current Required	400 mA
Power Dissipation	2 W
External Power	Not required for this module
Fault Detection	Out of range or broken wire conditions
Hot Swap	Not allowed per intrinsic safety standards
Fusing	Internal-not user accessible

Thermocouple/Millivolt Module Specifications

The following table shows the specifications for the Thermocouple/Millivolt module.

Number of Channels	8 IN
TC Types and Ranges	
Types J K E T S R B	Ranges (°C) -210 ... +760 -270 ... +1370 -270 ... +1000 -270 ... +400 -50 ... +1665 -50 ... +1665 +130 ... +1820
Millivolt Ranges	-100 mV ... +100 mV* -25 mV ... +25 mV* *Open circuit detect can be disabled on these ranges
TC Circuit Resistance/Max Source Resistance	200 ohms max for rated accuracy
Input Impedance	>1M ohms
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 the TC (which monitors the external junction block temperature) to channel 1. Types J, K, and T are recommended for best accuracy.
Resolution	
TC Ranges	Choice of: 1 degree C (Default) 0.1 degree C 1 degree F 0.1 degree F
Millivolt Ranges	+/- 100 mV range, 3.05 microvolts (16 bits) +/- 25 mV range, 0.76 microvolts (16 bits)
TC Absolute Accuracy (see Note 1)	
Types J, K, E, T (see Note 2)	+/- 2°C +/- 0.1% of reading
Types S, R, B (see Note 3)	+/- 4°C +/- 0.1% of reading
Millivolt Absolute Accuracy	
@ 25°C	+/- 20 microvolts +/- 0.1% of reading
Accuracy Drift w/ Temperature	0.15 microvolts/°C + 0.0015% of reading/°C max.

Isolation	
Channel to Channel	None
Channel to Bus	1780 VAC @ 47-63 Hz or 2500 VDC for 1 min.
Update Time	1 sec. (all channels)
Fault Detection	Out of range or broken wire conditions
Bus Current Required	400 mA
Power Dissipation	2 W
External Power	Not required for this module
Hot Swap	Not allowed per intrinsic safety standards
Fusing	Internal - not user accessible

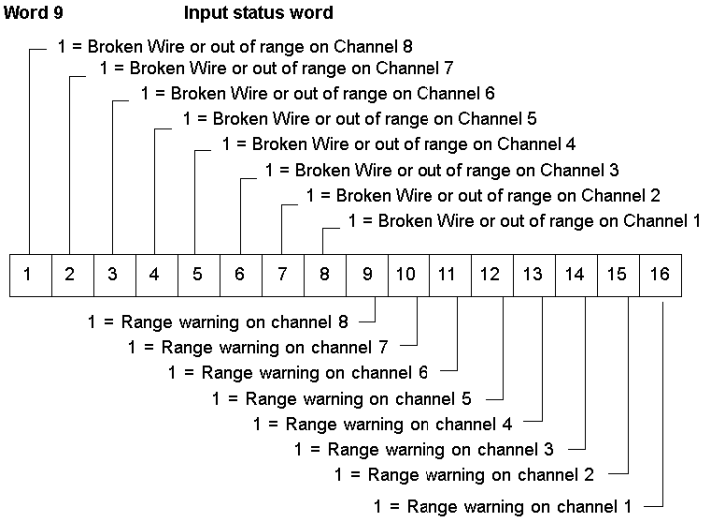
NOTE: 1. Absolute accuracy includes all errors from the internal CJC, TC curvature, offset plus gain, for module temperature of 0 ... 60 degrees C. User supplied TC errors not included.
2. For type J and K, add 1.5 degrees C inaccuracy for temperatures below -100 degrees C. Type B cannot be used below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

Addressing

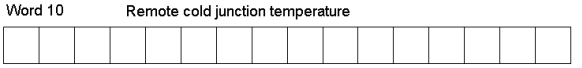
Flat Addressing

This module requires ten contiguous, 16-bit input words (%IW)—eight for input data, one for channel status, and one for the remote cold junction temperature. The data words formats are as follows.

The following shows the word 9 register.



The following figure shows the word 10 register.



Topological Addressing

Topological addresses for the 140 AII 330 00 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Out of range
	%I[[\b.e\]r.m.1.2	Range warning
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Out of range
	%I[\b.e\]r.m.8.2	Range warning
Status Word	%IW[\b.e\]r.m..9	Status of input channels
Cold Junction Temperature	%IW[\b.e\]r.m.10	Remote Cold Junction Temperature

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 AII 330 00 Input Module uses the `T_ANA_IN_VWE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VWE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR
	%Ir.m.c.2	Bool	.WARNING

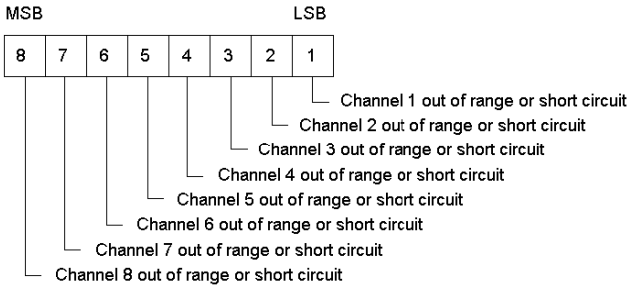
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

I/O Map Status Byte

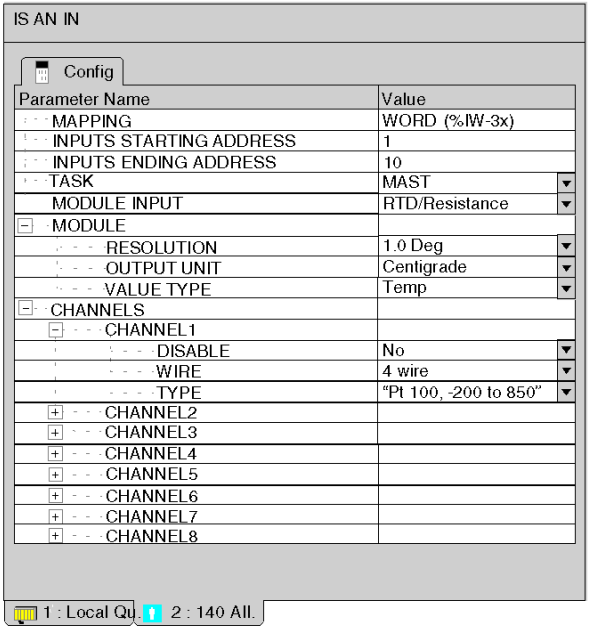
The I/O map status byte is used by the 140 AII 330 00 Input Module as follows.



Parameter Configuration

Parameter and Default values (RTD)

Parameter Configuration Window (RTD)

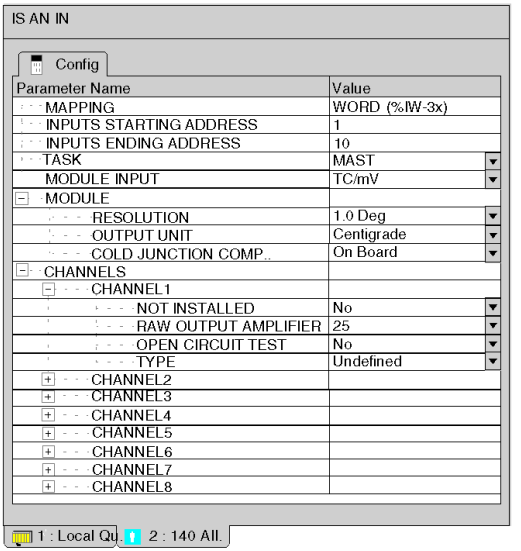


Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	10	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

Name	Default Value	Options	Description
Module Input	RTD/Resistance	TC/mV	for Module Input=TC/mV see *Parameter and Default values (TC), page 545*
Module			
Resolution	1.0 Deg	0.1 Deg	
Output Unit	Centigrade	Fahrenheit	
Value Type	Temp	Raw Value	
Channel1			
Disable	No	Yes	
Wire	4 wire	2 wire 3 wire	
Type	"Pt 100, -200 to 850"	"Pt 200, -200 to 850" "Pt 500, -200 to 850" "Pt 1000, -200 to 850" "Ni 100, -60 to 180" "Ni 200, -60 to 180" "Ni 500, -60 to 180" "Ni 1000, -60 to 180" "R, 0 to 766,66 ohms" "R, 0 to 4000 ohms" "Apt 100, -100 to 450" "Apt 200, -100 to 450" "Apt 500, -100 to 450" "Apt 1000, -100 to 450"	
Channel2-Channel8			see Channel1

Parameter and Default values (TC)

Parameter Configuration Window (TC)



Name	Default Value	Options	Description
Module Input	RTD/Resistance	TC/mV	for Module Input=RTD/Resistance see *Parameter and Default values (RTD), page 543*
Module			
Resolution	1.0 Deg	0.1 Deg	
Output Unit	Centigrade	Fahrenheit	
Cold Junction Compensator	On board	Channel 1	
Channel1			
Not installed	No	Yes	
Raw Output Amplifier	25	100	
Open Circuit Test	No	Yes	
Type	Undefined	J, Gain=25 K, Gain=25 E, Gain=25 T, Gain=100 S, Gain=100 R, Gain=100 B, Gain=100	
Channel2-Channel8			see Channel1

Chapter 53
140 AII 330 10: Safe Analog IN Module

About this Chapter

The following chapter provides information on the Quantum 140 AII 330 10 module.

What Is in This Chapter?

This chapter contains the following topics:

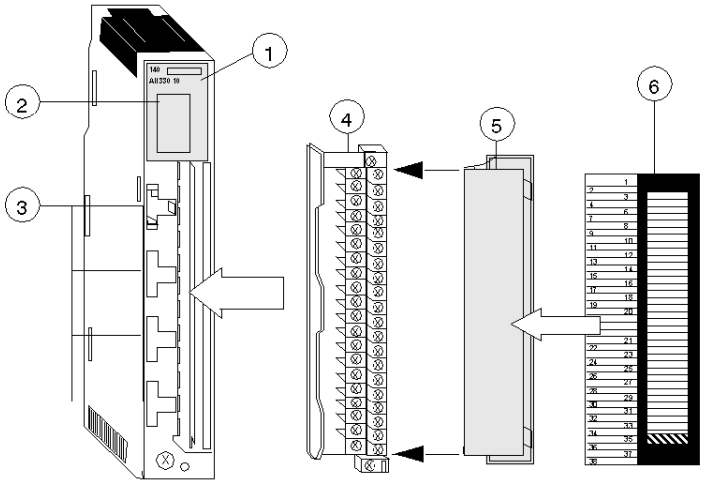
Presentation

Function

The Quantum 140 AII 330 10 Intrinsically Safe Current Input module interfaces with eight intrinsically safe analog inputs which are software-configurable. The module accepts 0 ... 20 mA, 0 ... 25 mA, and 4 ... 20 mA inputs. The module allows any mix and match of current input ranges that can be configured by the software. The module provides power to intrinsically safe transmitters located in hazardous areas.

Illustration

The following figure shows the 140 AII 330 10 Intrinsically Safe module and its components.

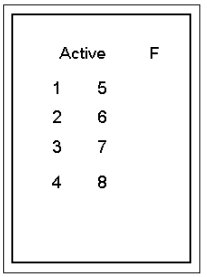


1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

Indicators

Illustration

The following table shows the LED indicators for the 140 AII 330 10 module.



Descriptions

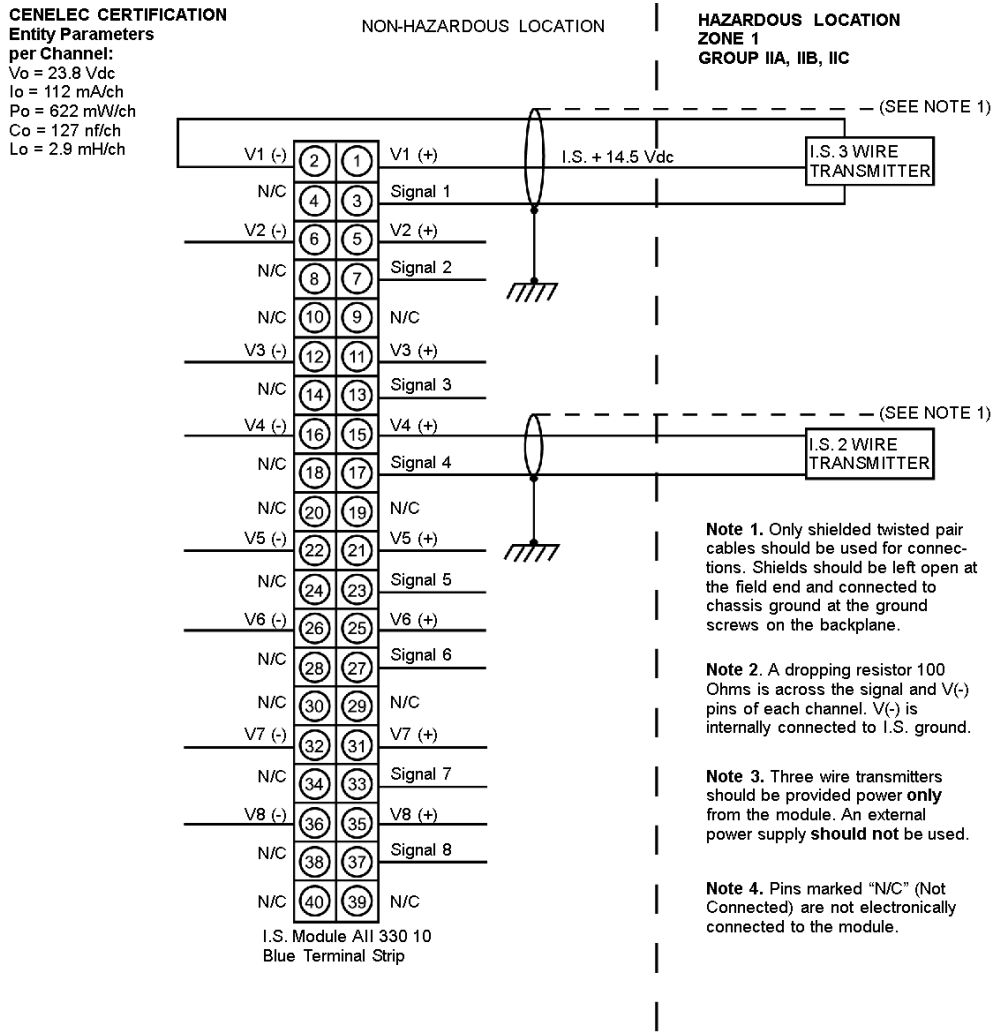
The following table shows the LED descriptions for the 140 AII 330 10 module.

LEDs	Color	Indication When On
Active	Green	Communicating with the PLC
F	Red	A broken wire (4 ... 20 mA, only) or out-of-range condition on any channel
1 .. 8	Red	A broken wire or out-of-range condition on the indicated channel

Wiring Diagrams

Cenelec Approved Wiring Diagrams

The following is a Cenelec certified wiring diagram for the 140 AII 330 10 instrinsically safe current input module.



31001363 Rev 00 140 AII 330 10 Wiring Diagram

CSA Approved Wiring Diagram

The following is a CSA certified wiring diagram for this module.

Notes related to CSA certification for this module.

Note 1. Entity parameters per channel:
V_{oc} = 23.8 V
I_{sc} = 112 mA
C_a = 127nf
L_a = 1.0 mH

Note 2. Maximum non-hazardous area voltage must not exceed 250 V.

Note 3. Install in accordance with Canadian Electrical Code, Part I for installation in Canada.

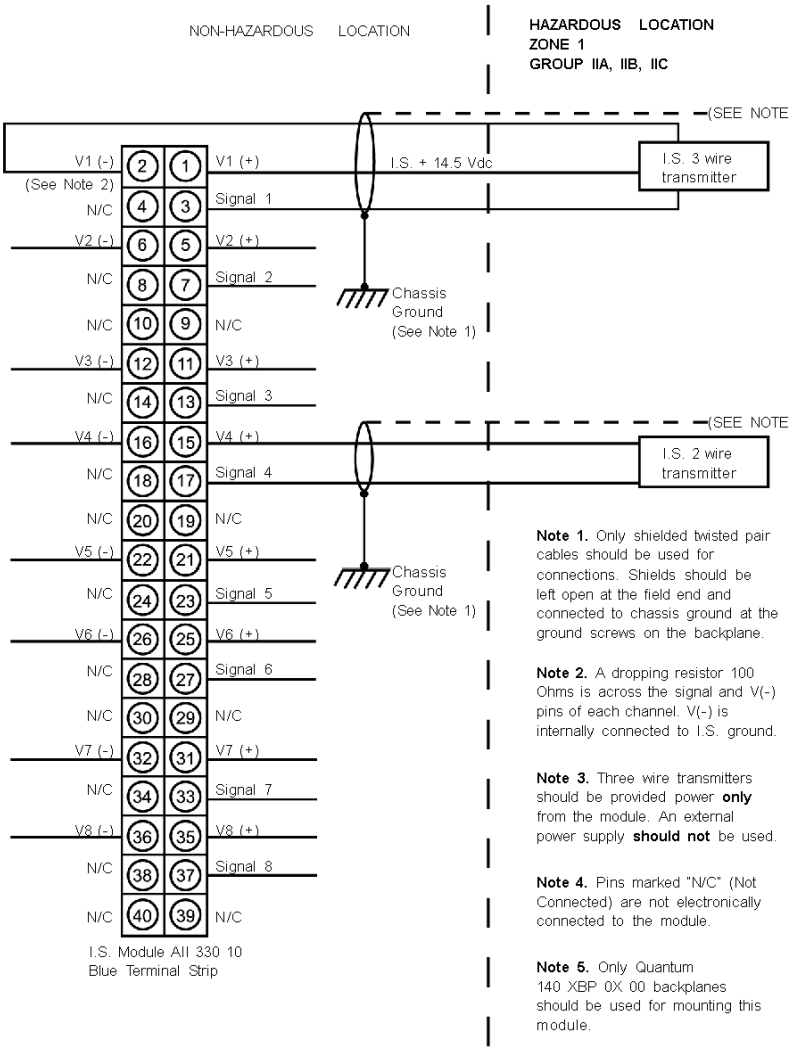
Note 4. Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP 12.6 for installation in the United States.

Note 5. To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6. intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7. I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{oc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$

Note 8. This module is certified as a component for mounting in a suitable enclosure where the suitability of the final combination is subject to acceptance by CSA or an inspection authority having the jurisdiction.



Note 1. Only shielded twisted pair cables should be used for connections. Shields should be left open at the field end and connected to chassis ground at the ground screws on the backplane.

Note 2. A dropping resistor 100 Ohms is across the signal and V(-) pins of each channel. V(-) is internally connected to I.S. ground.

Note 3. Three wire transmitters should be provided power **only** from the module. An external power supply **should not** be used.

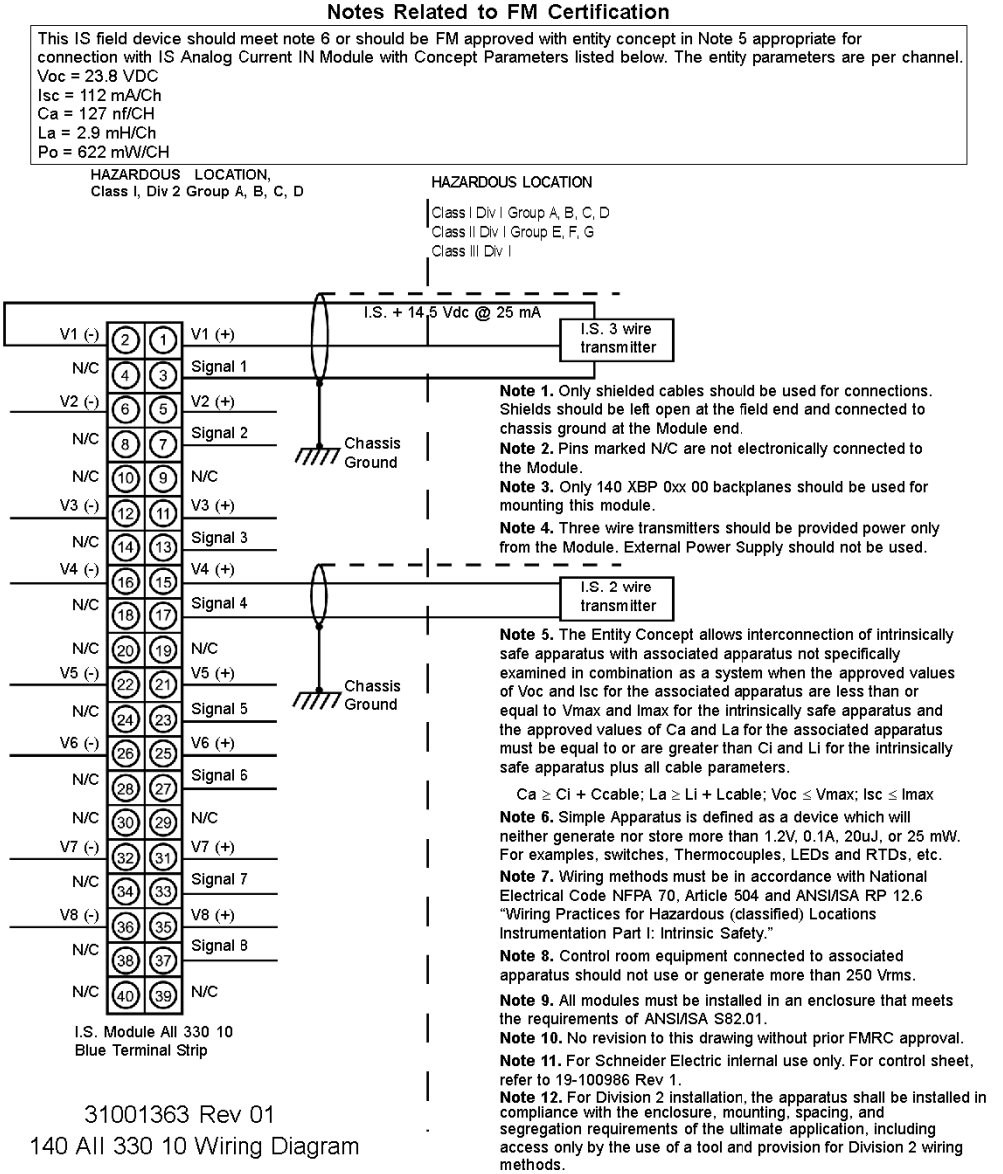
Note 4. Pins marked "N/C" (Not Connected) are not electronically connected to the module.

Note 5. Only Quantum 140 XBP 0X 00 backplanes should be used for mounting this module.

31001363 Rev 00 140 AII 330 10 Wiring Diagram

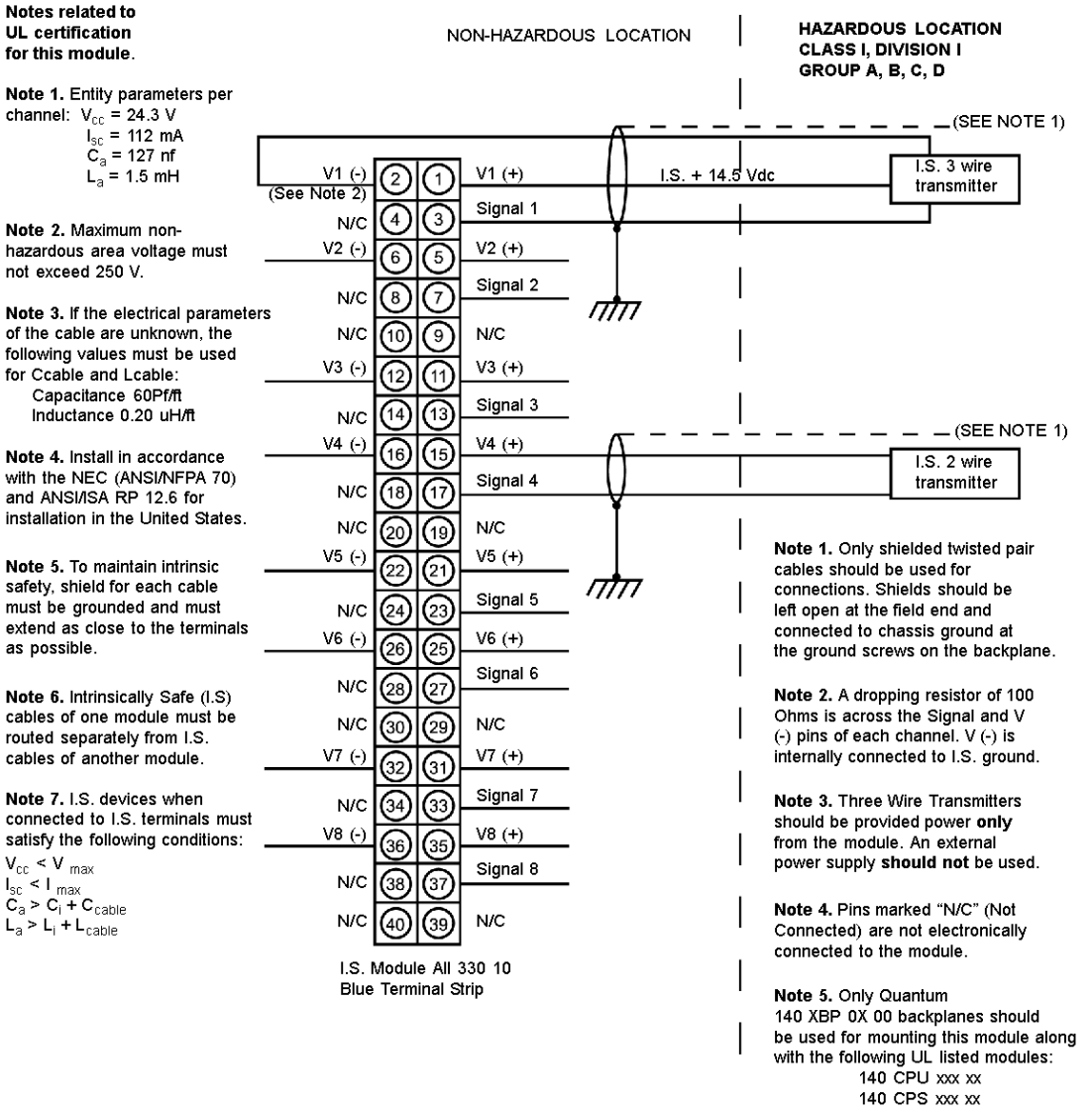
FM Approved Wiring Diagrams

The following is a FM certified wiring diagram for this module.



UL Approved Wiring Diagram

The following is a UL certified wiring diagram for this module.



31001363 Rev 00 140 AII 330 10 Wiring Diagram

Field Wiring

Field wiring to the module consists of separate shielded, twisted pair wires. The acceptable field wire gauge is AWG 20 to AWG 12. Wiring between the module and the intrinsically safe field device should follow intrinsically safe wiring practices to avoid the transfer of unsafe levels of energy to the hazardous area.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Fixed Wiring System

The Quantum 140 AII 330 10 Intrinsically Safe Current Input module is designed with a fixed wiring system, where the field connections are made to a 40-pin, fixed position, blue terminal strip which is plugged into the module.

Terminal Strip Color and Keying Assignment

The module's 140 XTS 332 00 field wiring terminal strip is color-coded blue to identify it as an intrinsically safe connector.

The terminal strip is keyed to prevent the wrong connector from being applied to the module. The keying assignment is given below.

Module Class	Module Part Number	Module Coding	Terminal Strip Coding
Intrinsically Safe	140 AII 330 10	CEF	ABD

Specifications

General Specifications

Specifications for the Quantum 140 AII 330 10 Intrinsically Safe Current Input module are as follows.

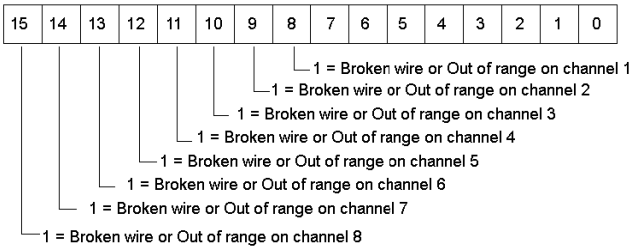
Number of Channels	8 IN
Current Input	
Linear Measuring Range	4 ... 20 mA 0 ... 20 mA 0 ... 25 mA
Absolute Maximum Input	25 mA internally limited
Input Impedance	100 ohms +/- 0.1% between V- and signal terminals
Resolution	4 ... 20 mA, 0 to 4,095 counts 4 ... 20 mA0 to 16,000 counts 0 ... 20 mA, 0 to 20,000 counts 0 ... 25 mA, 0 to 25,000 counts
Available Voltage	Terminals V+, V- :~ 14.5 Vdc at 25 mA Terminals V+, Signal : ~ 13.6 Vdc at 20 mA
Accuracy Error @ 25°C	Typical: +/- 0.05% of full scale Maximum: +/- 0.1% of full scale
Linearity	+ 0.003% of full scale
Accuracy Drift w/ Temperature	Typical: +/- 0.0025% of full scale /°C Maximum: +/- 0.005% of full scale /°C
Common Mode Rejection	> 100 dB @ 50/60 Hz
Input Filter	Single pole low pass, -3 dB cutoff @ 15 Hz, +/- 20%
Isolation	
Channel to Channel	None
Channel to Bus	1780 Vac @ 47-63 Hz or 2500 Vdc for 1 min.
Update Time	750 ms for all channels
Fault Detection	Broken wire (4 ... 20 mA mode)
Bus Current Required	1.5 A
Power Dissipation	7.5 W
External Power	Not required
Hot Swap	Not allowed per intrinsic safety standards
Fusing	Internal, not accessible

Addressing

Flat Addressing

This module requires nine contiguous, 16-bit input words (`%IW`)—eight for input data and one for channel status. The data words formats are as follows.

The following shows the word 9 register.



NOTE: The word 9 register is the status of input channels. This status works for all configurations beginning PV04 and for any version (PV) with configuration 4... 20 mA. But the status doesn't work for PV<04 with configurations 0...20 mA or 0...25 mA.

Topological Addressing

Topological addresses for the 140 AII 030 10 Input Module:

Point	I/O Object	Comment
Input 1	%IW[\b.e\]r.m.1	Value
	%I[\b.e\]r.m.1.1	Broken wire or Out of range
• • •		
Input 8	%IW[\b.e\]r.m.8	Value
	%I[\b.e\]r.m.8.1	Broken wire or Out of range
Status Word	%IW[\b.e\]r.m.9	Status of input channels

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

IODDT

The 140 AII 030 10 Input Module uses the `T_ANA_IN_VE` IODDT:

IODDT Name	Object	Data Type	Name
T_ANA_IN_VE	%CH[\b.e\]r.m.c	ANA_IN_VWE	userdefined
	%IWr.m.c.0	Int	.VALUE
	%Ir.m.c.1	Bool	.ERROR

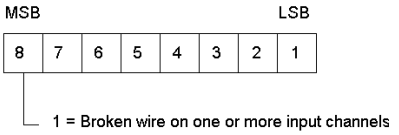
Used abbreviations: **r** = rack, **m** = module slot, **c** = channel, **b** = bus, **e** = equipment (drop).

Bus and Drop default to 1 if not specified and can be left off.

NOTE: In Quantum IODDTs for analog modules and expert modules the data type **Bool** is used for `%I` and `%Q`.

I/O Map Status Byte

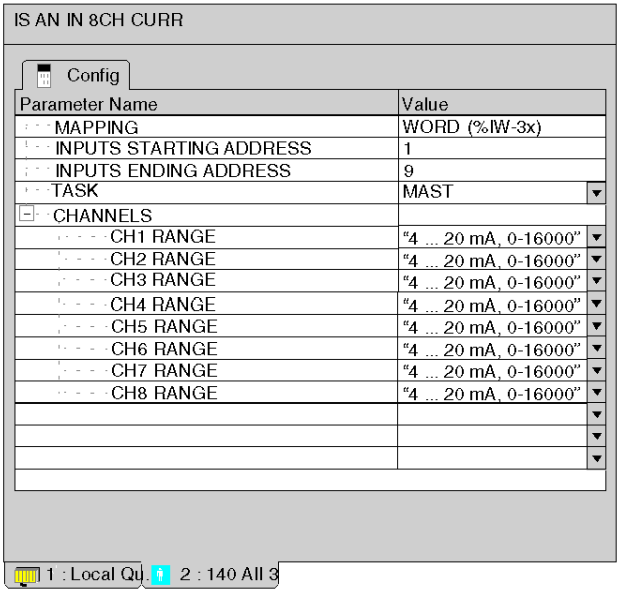
The I/O map status byte is used by the 140 AII 030 10 Input Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%IW-3X)	-	
Inputs Starting Address	1	-	
Inputs Ending Address	9	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels			
CH1 Range	"4 ... 20 mA, 0-16000"	"0... 25 mA, 0-25000" "0 ... 20 mA, 0-20000" "4 ... 20 mA, 0-4095"	
CH2 Range-CH8 Range			see CH1 Range

Chapter 54
140 AIO 330 00: Safe Analog OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 AIO 330 00 module.

What Is in This Chapter?

This chapter contains the following topics:

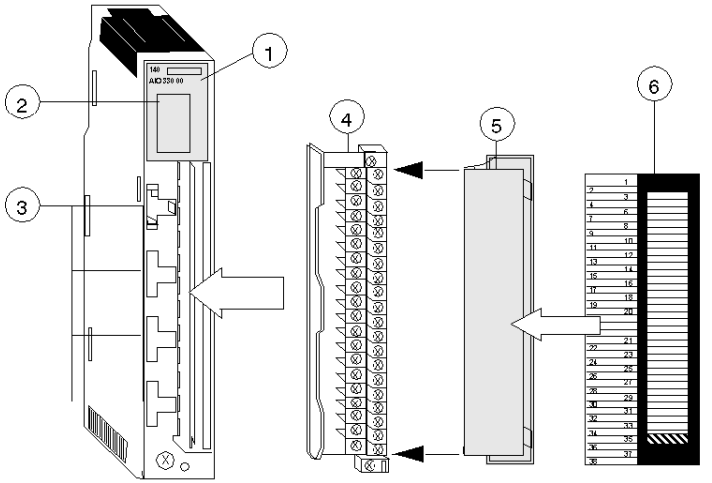
Presentation

Function

The Quantum 140 AIO 330 00 Intrinsically Safe Analog Output module controls and monitors current loops in intrinsically safe applications. The module provides 8 dual-ended output channels that are referenced over sense resistors to a single Common. The output ranges are 4 ... 20 mA, 0 ... 20 mA, and 0 ... 25 mA. This module detects broken wires on a per-channel basis indicates their location on the front panel LEDs, and transmits the status to the PLC.

Illustration

The following figure shows the140 AIO 330 00 module and its components.

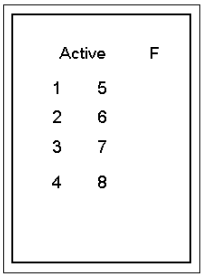


1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

Indicators

Illustration

The following table shows the LED indicators for the 140 AIO 330 00 module.



Descriptions

The following table shows the LED descriptions for the 140 AIO 330 00 module.

LEDs	Color	Indication When On
Active	Green	Communicating with the PLC
F	Red	A broken wire (4 ... 20 mA, only) or out-of-range condition on any channel
1 .. 8	Red	A broken wire or out-of-range condition on the indicated channel

Wiring Diagrams

CSA Approved Wiring Diagram

The following is a CSA certified wiring diagram for this module.

Notes related to CSA certification for this module.

Note 1. Entity parameters per channel: V_{cc} = 29.42 V
I_{sc} = 93 mA
C_a = 71 nf
L_a = 2.0 mH

Note 2. Maximum non-hazardous area voltage must not exceed 250 V.

Note 3. Install in accordance with Canadian Electrical Code, Part I for installation in Canada.

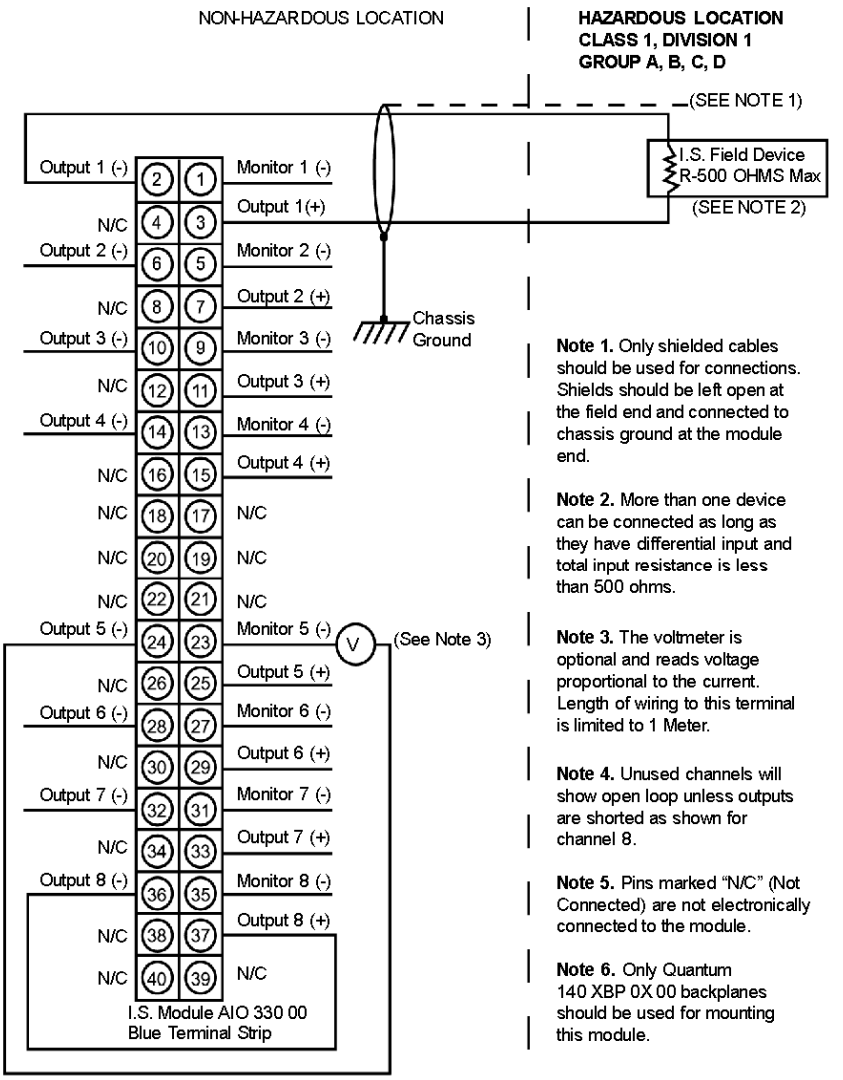
Note 4. Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP 12.6 for installation in the United States.

Note 5. To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6. Intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7. I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{cc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$

Note 8. This module is certified as a component for mounting in a suitable enclosure where the suitability of the final combination is subject to acceptance by CSA or an inspection authority having the jurisdiction.



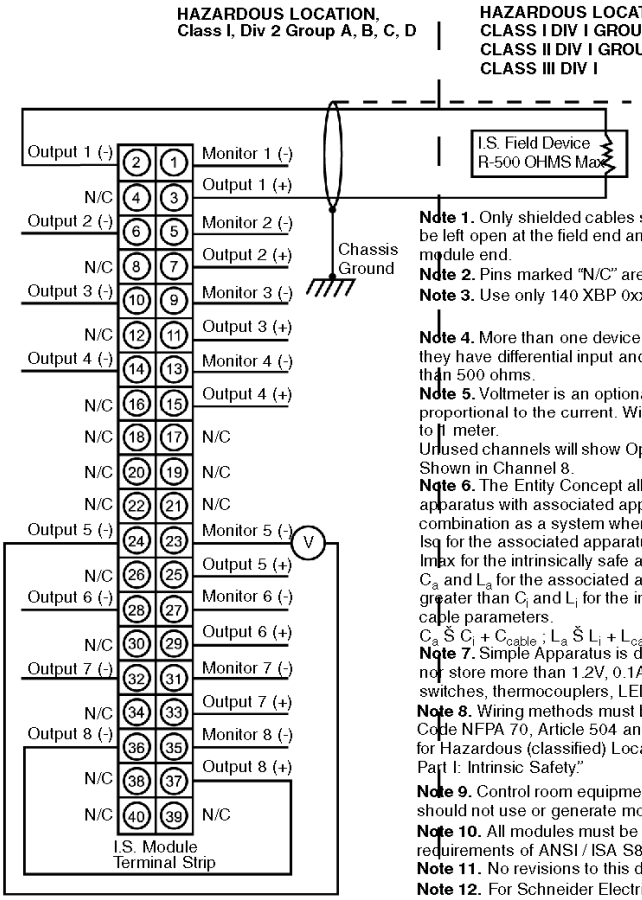
31001364 Rev 00 140 AIO 330 00 Wiring Diagram

FM Approved Wiring Diagram

The following is a FM certified wiring diagram for this module.

Notes Related to FM Certification

This IS field device should meet Note 7 or should be FM approved with entity concept in Note 6 appropriate for connection with IS RTD/TC IN Module with concept parameters listed below. The entity parameters listed are per channel.
Voc = 29.5 VDC
Isc = 94 mA/Ch
Ca = 68 nf/Ch
La = 4.2 mH/Ch
Po = 520 mW/Ch



140 AIO 330 00 Wiring Diagram
31001364 Rev 01

Note 1. Only shielded cables should be used for connections. Shields should be left open at the field end and connected to chassis ground at the module end.
Note 2. Pins marked "N/C" are not electronically connected to the module.
Note 3. Use only 140 XBP 0xx 00 backplanes to mount this module.

Note 4. More than one device can be connected in serieS, as long as they have differential input and total load resistance is less than 500 ohms.
Note 5. Voltmeter is an optional Voltmeter shown to read voltage proportional to the current. Wiring to this terminal is limited to 1 meter.
Unused channels will show Open Loop unless shorted as Shown in Channel 8.
Note 6. The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of V_{oc} and Isc for the associated apparatus are less than or equal to V_{max} and Imax for the intrinsically safe apparatus and the approved values of C_a and L_a for the associated apparatus must be equal to or are greater than C_i and L_i for the intrinsically Safe apparatus plus all cable parameters.
C_a Š $C_i + C_{cable}$; L_a Š $L_i + L_{cable}$; V_{oc} £ V_{max} ; I_{sc} £ I_{max}
Note 7. Simple Apparatus is defined as a device which will neither generate nor store more than 1.2V, 0.1A, 20µJ, or 25 mW. For example: switches, thermocouplers, LEDs, RTDs, etc.
Note 8. Wiring methods must be in accordance with National Electrical Code NFPA 70, Article 504 and ANSI/ISA RP12.6, "Wiring Practices for Hazardous (classified) Locations Instrumentation, Part I: Intrinsic Safety."
Note 9. Control room equipment connected to associated apparatus should not use or generate more than 250 Vrms.
Note 10. All modules must be installed in an enclosure that meets the requirements of ANSI / ISA S82.01
Note 11. No revisions to this drawing without prior FMRC Approval.
Note 12. For Schneider Electric internal use only. For control sheet, refer to 19-100986 Rev 1.
Note 13. For Division 2 installation, the apparatus shall be installed in compliance with the enclosure, mounting, spacing, and segregation requirements of the ultimate application, including access only by the use of a tool and provision for Division 2 wiring methods.

UL Approved Wiring Diagrams

The following is a UL certified wiring diagram for this module.

Notes related to UL certification for this module.

Note 1. Entity parameters per channel: V_{cc} = 29.5 V
I_{sc} = 93 mA
C_a = 68 nf
L_a = 2.0 mH

Note 2. Maximum non-hazardous area voltage must not exceed 250 V.

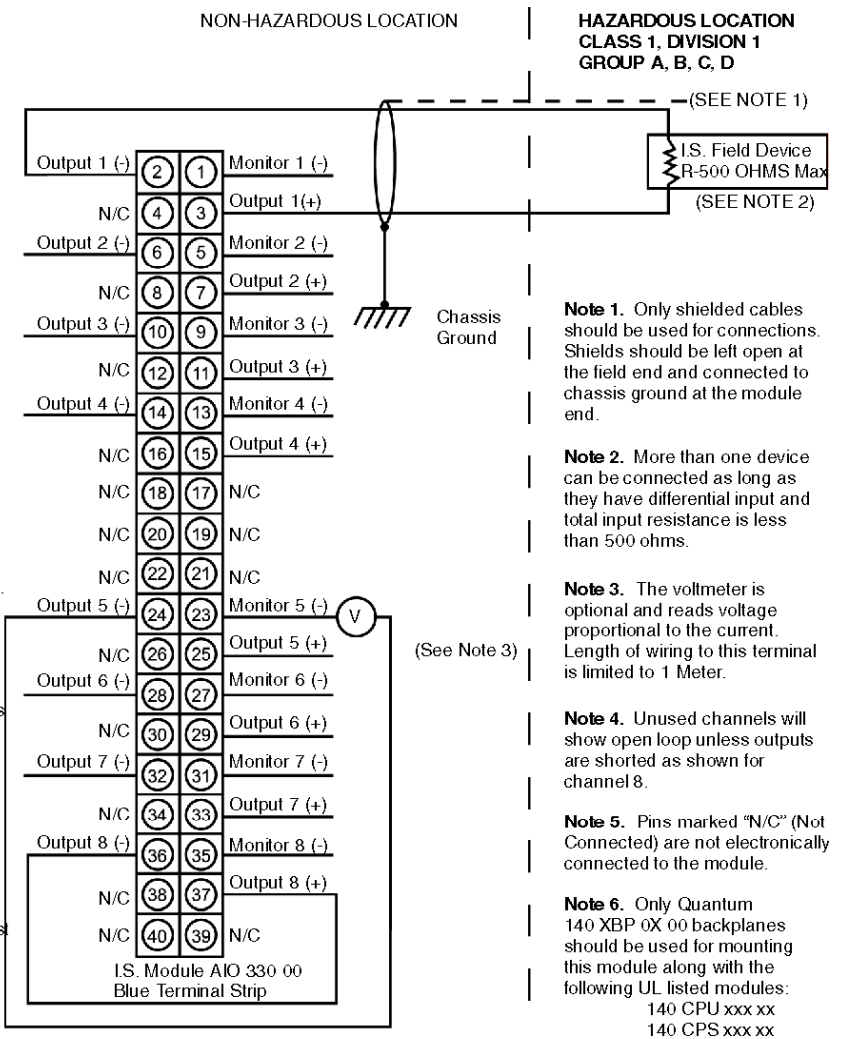
Note 3. If the electrical parameter of the cable are unknown, the following values must be used for Ccable and Lcable:
Capacitance 60 Pf/ft
Inductance 0.20 uH/ft

Note 4. Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP 12.6 for installation in the United States.

Note 5. To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6. Intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7. I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{cc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$



Note 1. Only shielded cables should be used for connections. Shields should be left open at the field end and connected to chassis ground at the module end.

Note 2. More than one device can be connected as long as they have differential input and total input resistance is less than 500 ohms.

Note 3. The voltmeter is optional and reads voltage proportional to the current. Length of wiring to this terminal is limited to 1 Meter.

Note 4. Unused channels will show open loop unless outputs are shorted as shown for channel 8.

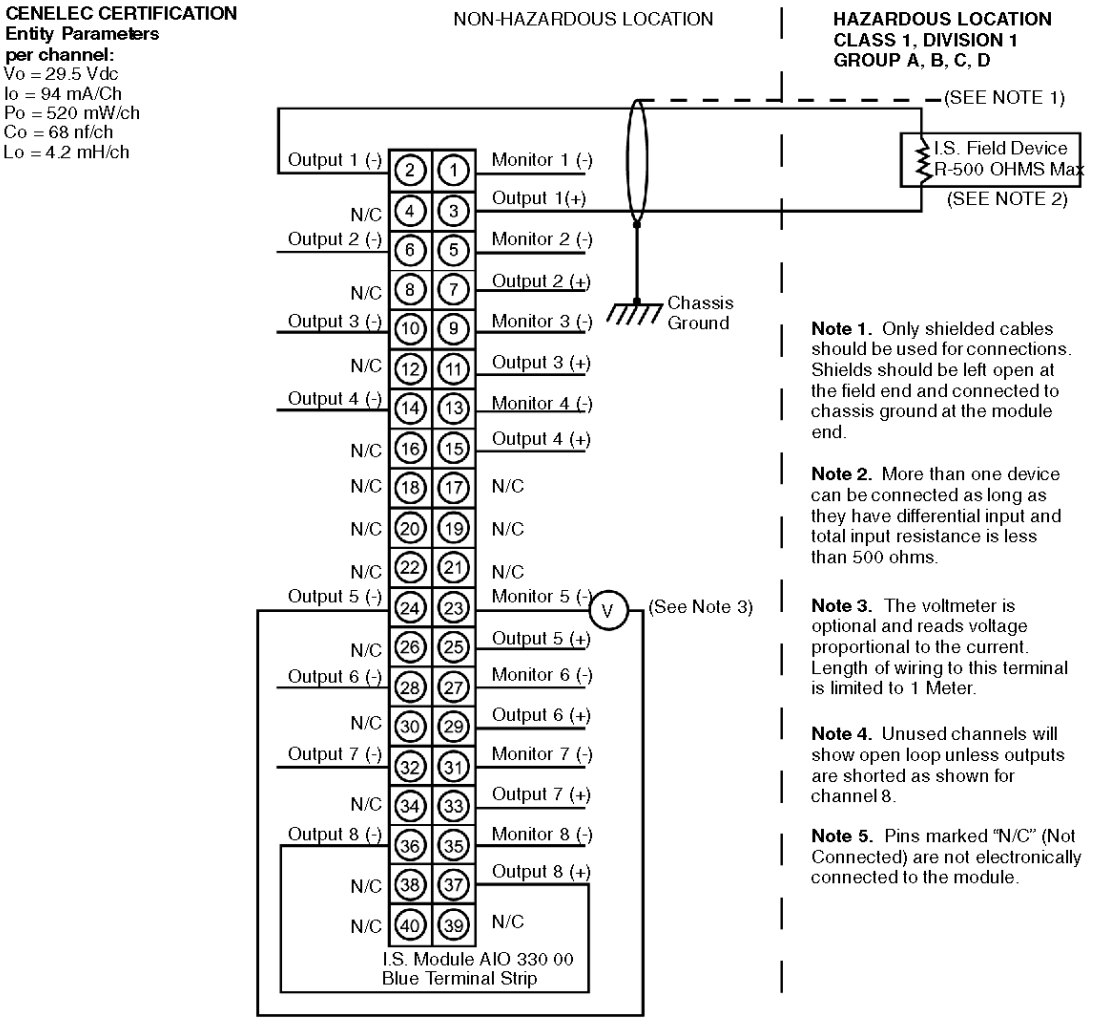
Note 5. Pins marked "N/C" (Not Connected) are not electronically connected to the module.

Note 6. Only Quantum 140 XBP 0X 00 backplanes should be used for mounting this module along with the following UL listed modules:
140 CPU xxx xx
140 CPS xxx xx

31001364 Rev 00 140 AIO 330 00 Wiring Diagram

Cenelec Approved Wiring Diagram

The following is a Cenelec certified wiring diagram for this module.



31001364 Rev 00

AIO 330 00 Wiring Diagram (Analog Output)

Field Wiring

Field wiring to the module should consist of separate shielded, twisted pair wires. The acceptable field wire gauge should be AWG 30 to AWG 18. Wiring between the module and the intrinsically safe field device should follow intrinsically safe wiring practices to avoid the transfer of unsafe levels of energy to the hazardous area.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Fixed Wiring System

The Quantum140 AIO 330 00 Intrinsically Safe Analog Output module is designed with a fixed wiring system where the field connections are made to a 40-pin, fixed position, blue terminal strip which is plugged into the module.

Terminal Strip Color and Keying Assignment

The module's 140 XTS 332 00 field wiring terminal strip is color-coded blue to identify it as an intrinsically safe connector.

The terminal strip is keyed to prevent the wrong connector from being applied to the module. The keying assignment is given below.

Module Class	Module Part Number	Module Coding	Terminal Strip Coding
Intrinsically Safe	140 AIO 330 00	CEF	ABD

Specifications

General Specifications

Specifications for the Quantum 140 AIO 330 00 Intrinsically Safe Analog Output module are as follows.

Number of Channels	8 OUT
Loop Resistance	500 ohms maximum
Ranges	4 ... 20 mA (0 to 4095) 4 ... 20 mA (0 to 16000) 0 ... 20 mA (0 to 20000) 0 ... 25 mA (0 to 25000)
Resolution	15 bits within 4 ... 20 mA
Accuracy Drift w/Temperature	Typical: 40 PPM/°C. Maximum: 70 PPM/°C
Accuracy Error @ 25°C	+/- 0.2% of full scale
Linearity	+/- 1 LSB
Isolation	
Channel to Channel	None
Channel to Bus	1780 VAC RMS for 1 minute
Update Time	4 ms - for all channels
Settling Time	1 ms to +/- 0.1% of the final value
Bus Current Required	2.5 Amps
Power Dissipation	12.5 W
External Power	Not required for this module
Fault Detection	Open circuit in 4 ... 20 mA range
Voltmeter Monitor Specifications	
Range	0.250 ... 1.250 V
Scaling	V_{OUT} (Volts) = I_{LOOP} (mA) x 0.0625
Output Impedance	62.5 W Typical
Wire Length	1 m maximum
Hot Swap	Not allowed per intrinsic safety standards
Fusing	Internal - not user accessible

Addressing

Flat Addressing

This module requires eight contiguous, 16-bit words (%MW) for output data. The data words formats are as follows.

Topological Addressing

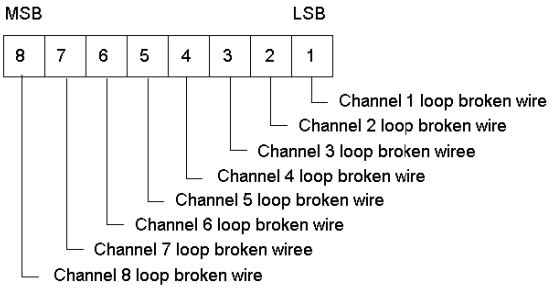
Topological addresses for the 140AIO33000 Output Module:

Point	I/O Object	Comment
Output 1	%QW[\b.e\]r.m.1	Value
Output 2	%QW[\b.e\]r.m.2	Value
• • •		
Output 7	%QW[\b.e\]r.m.7	Value
Output 8	%QW[\b.e\]r.m.8	Value

Used abbreviations: **b** = bus, **e** = equipment (drop), **r** = rack, **m** = module slot.

I/O Map Status Byte

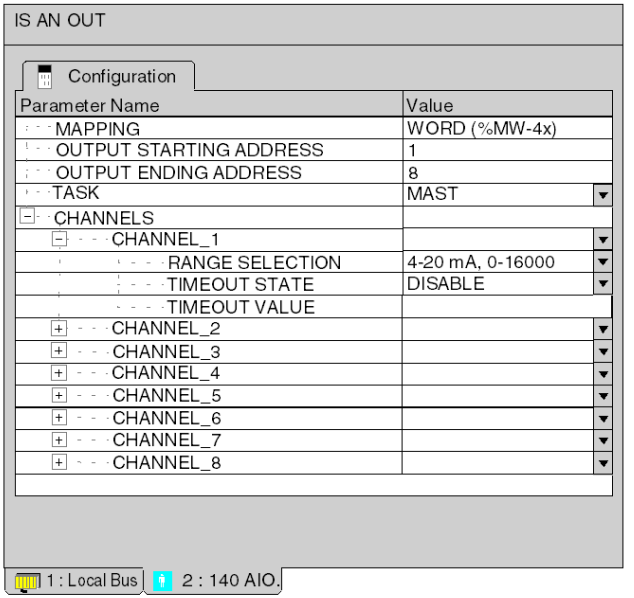
The I/O map status byte is used by the 140AIO33000 Output Module as follows.



Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	WORD (%MW-4X)	-	
Outputs Starting Address	1	-	
Outputs Ending Address	8	-	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Channels Channel1			

Name	Default Value	Options	Description
Range Selection	"4-20 mA, 0-16000"	"4-20 mA, 0-4095" "0-20 mA, 0-20000" "0-25 mA, 0-25000"	
Timeout State	DISABLE	HOLD LAST VALUE USER DEFINED	
Timeout Value	0	0-32767	only enabled if Timeout State = USER DEFINED
Channel2-Channel8			see Channel1

Chapter 55
140 DII 330 00: Safe Discrete IN Module

About this Chapter

The following chapter provides information on the Quantum 140 DII 330 00 module.

What Is in This Chapter?

This chapter contains the following topics:

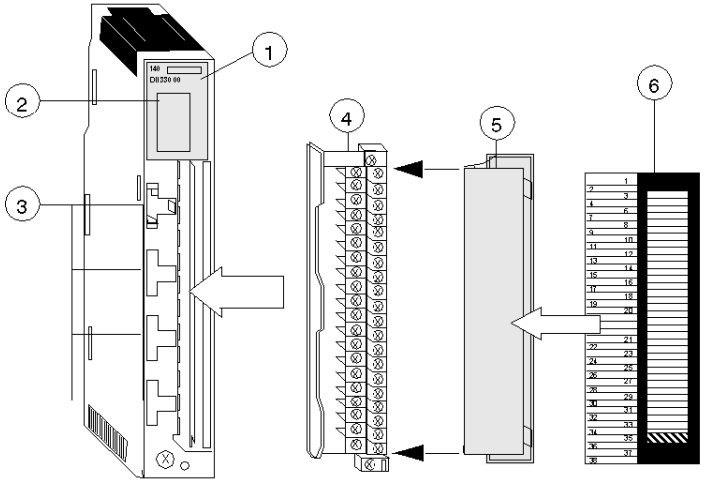
Presentation

Function

The Quantum 140 DII 330 00 Intrinsically Safe Digital Input module provides safe power to dry contact closures e.g., push buttons, selector switches, float switches, flow switches, limit switches, etc., in a hazardous area, and receives the proportional current to indicate an on/off state. The received current is converted into digital signals that is transferred to the PLC.

Illustration

The following figure shows the 140 DII 330 00 module and its components.

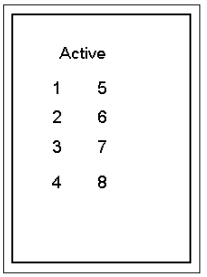


1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

Indicators

Illustration

The following table shows the LED indicators for the 140 DII 330 00 module.



Descriptions

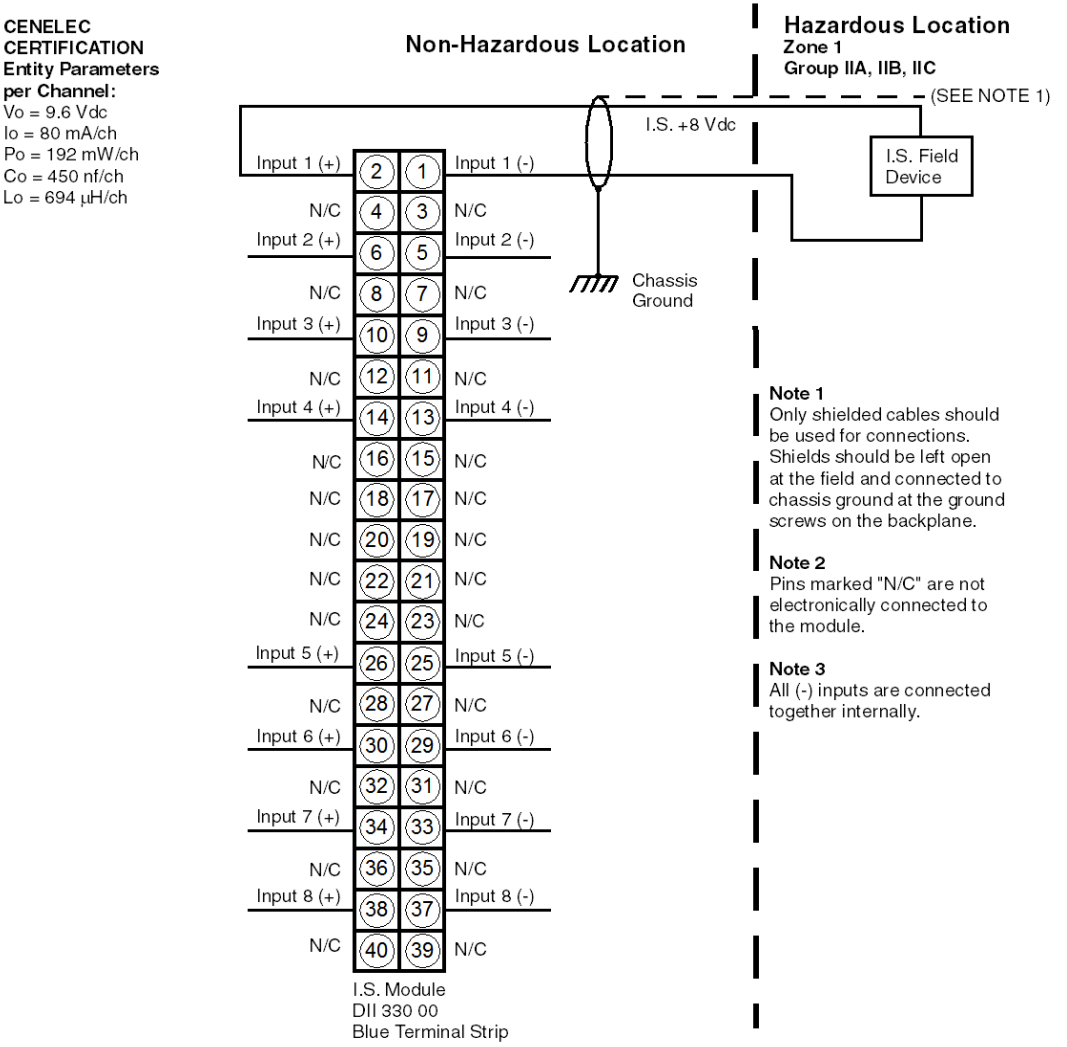
The following table shows the LED descriptions for the 140 DII 330 00 module.

LEDs	Color	Indication When On
Active	Green	Bus communication is present
1 .. 8	Green	The indicated point or channel is on

Wiring Diagrams

Celenec Approved Wiring Diagram

The following is a Celenec certified wiring diagram for this module.



140 DII 330 00 Wiring Diagram

CSA Approved Wiring Diagram

The following is a CSA certified wiring diagram for this module.

Notes Related to CSA Certification for this module

Note 1
Entity parameters are provided per channel:
V_{oc} = 9.5 V
I_{sc} = 80 mA
C_a = 450 nf
L_a = 694 mH

Note 2
Maximum non-hazardous area voltage must not exceed 250 V.

Note 3
In Canada, install in accordance with Canadian Electrical Code, Part I.

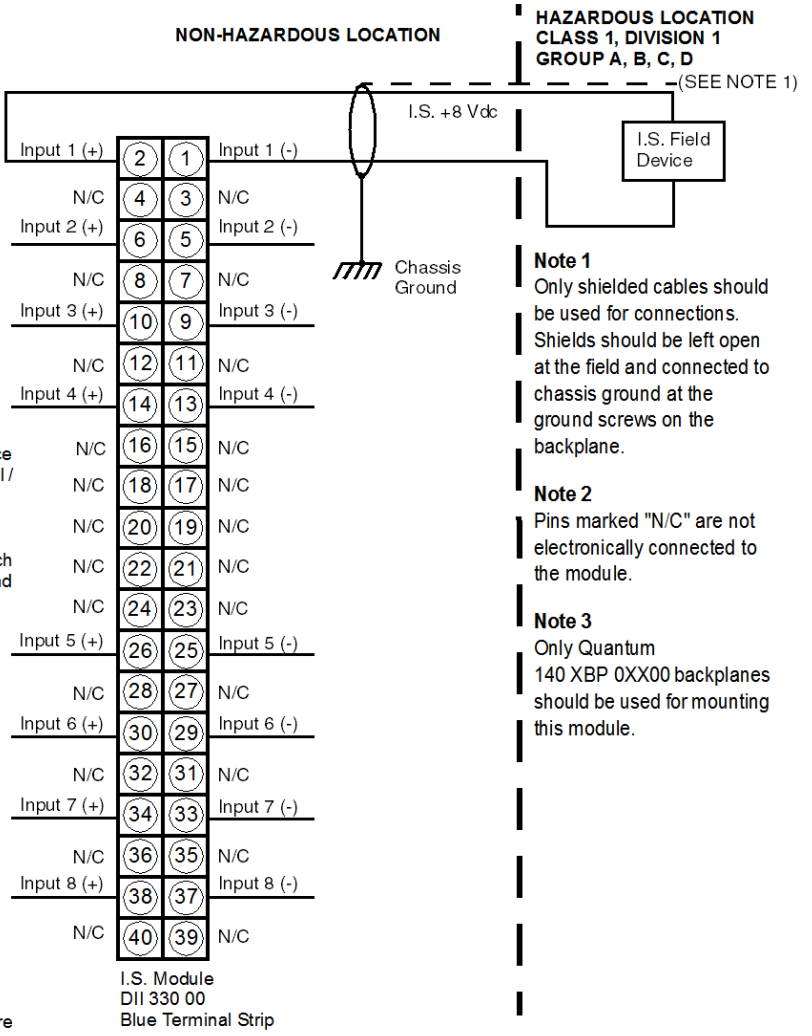
Note 4
In the United States, install in accordance with the NEC (ANSI/NFPA 70) and ANSI / ISA RP 12.6.

Note 5
To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6
Intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7
I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{cc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$

Note 8
This module is certified as a component for mounting in a suitable enclosure where the suitability of the final combination is subject to acceptance by CSA or an inspection authority having the juridiction.



Note 1
Only shielded cables should be used for connections. Shields should be left open at the field and connected to chassis ground at the ground screws on the backplane.

Note 2
Pins marked "N/C" are not electronically connected to the module.

Note 3
Only Quantum 140 XBP 0XX00 backplanes should be used for mounting this module.

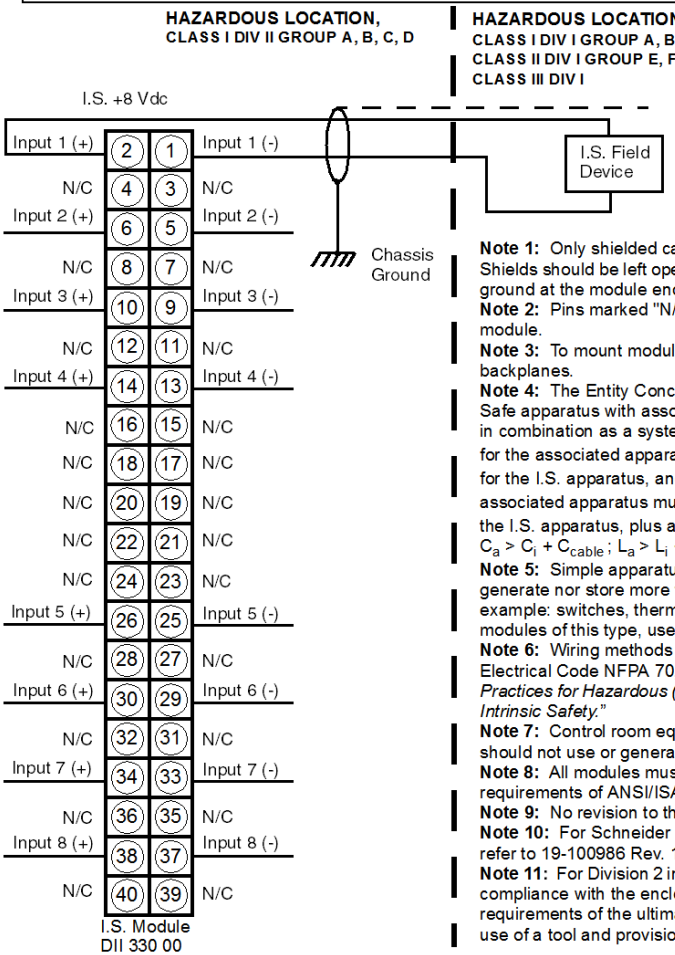
31001365 Rev 00 140 DII 330 00 Wiring Diagram

FM Approved Wiring Diagram

The following is a FM certified wiring diagram for this module.

Notes Related to FM Certification

This IS field device should meet Note 5 or should be FM approved with entity concept in Note 4 appropriate for connection with IS RTD/TC IN Module with Concept Parameters LIsted below. The entity parameters are per Channel.
V_{oc} = 27.9 VDC
I_{sc} = 121 mA/Ch
C_a = 84 nf/Ch
L_a = 2.2 mH/Ch
P_o = 840 mW/Ch

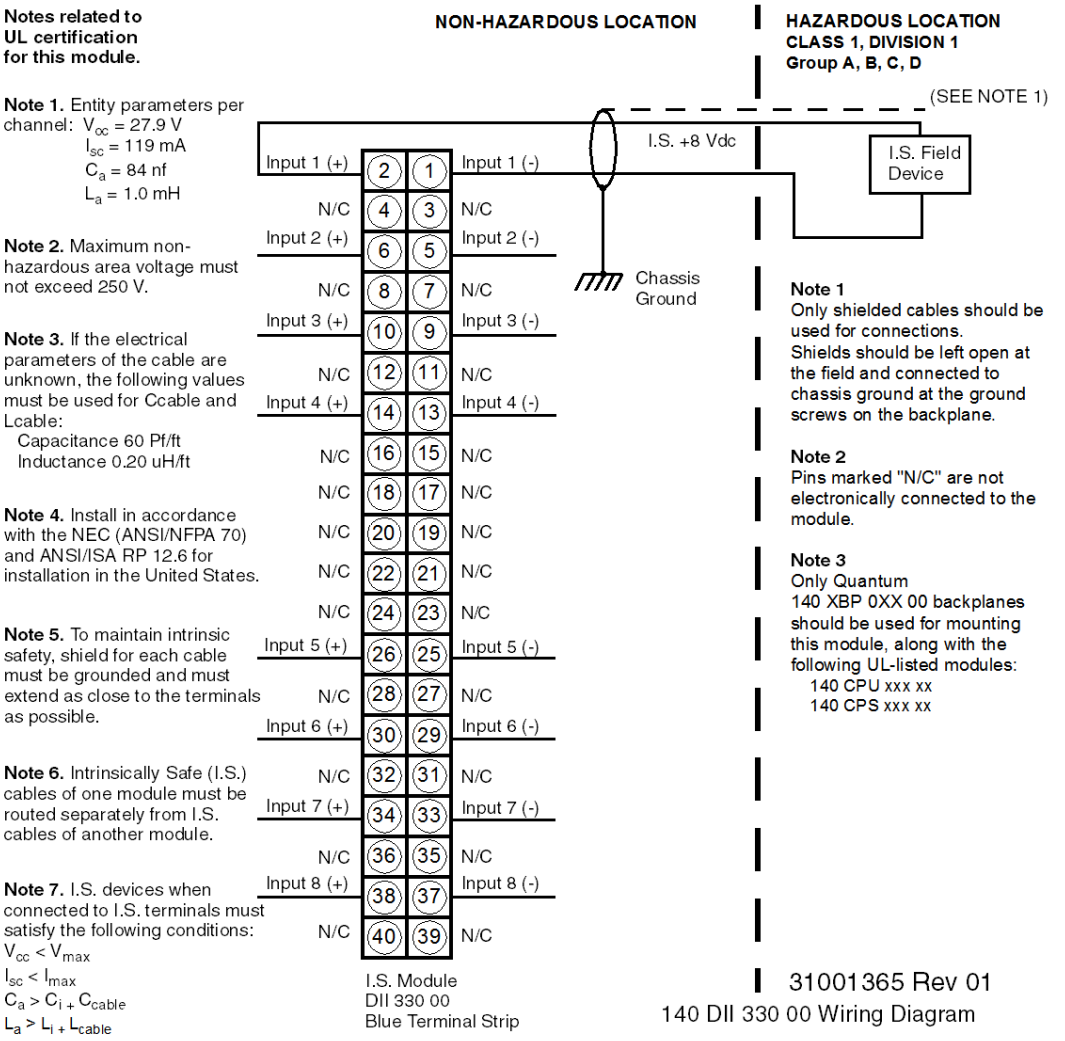


Note 1: Only shielded cables should be used for connections. Shields should be left open at the field end, and connected to chassis ground at the module end.
Note 2: Pins marked "N/C" are not electronically connected to the module.
Note 3: To mount modules of this type, use only 140 XBP 0xx 00 backplanes.
Note 4: The Entity Concept allows interconnection of Intrinsically Safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of V_{oc} and I_{sc} for the associated apparatus are less than or equal to V_{max} and I_{max} for the I.S. apparatus, and the approved values of C_a and L_a for the associated apparatus must be equal to or greater than C_i and L_i for the I.S. apparatus, plus all cable parameters.
$C_a > C_i + C_{cable}$; $L_a > L_i + L_{cable}$; $V_{oc} < V_{max}$; $Isc < I_{max}$
Note 5: Simple apparatus is defined as a device which will neither generate nor store more than 1.2 V, 0.1 A, 20 µJ, or 25 mW; for example: switches, thermocouplers, LEDs, RTDs, etc. mount modules of this type, use only 140 XBP 0xx 00 backplanes.
Note 6: Wiring methods must be in accordance with National Electrical Code NFPA 70, Article 504 and ANSI/ISA RP12.6, "*Wiring Practices for Hazardous (classified) Locations Instrumentation, Part I: Intrinsic Safety.*"
Note 7: Control room equipment connected to associated apparatus should not use or generate more than 250 Vrms.
Note 8: All modules must be installed in an enclosure that meets the requirements of ANSI/ISA S82.01.
Note 9: No revision to this drawing without prior FMRC approval.
Note 10: For Schneider Electric internal use only. For control sheet, refer to 19-100986 Rev. 1.
Note 11: For Division 2 installation, the apparatus shall be installed in compliance with the enclosure, mounting, spacing, and segregation requirements of the ultimate application, including access only by the use of a tool and provision for Division 2 wiring methods.

31001365 Rev 01 140 DII 330 00 Wiring Diagram

UL Approved Wiring Diagram

The following is a UL certified wiring diagram for this module.



Fixed Wiring System

The Quantum 140 DII 330 00 Intrinsically Safe Digital Input module is designed with a fixed wiring system where the field connections are made to a 40-pin, fixed position, blue terminal strip which is plugged into the module.

Field Wiring

Field wiring to the module consists of separate shielded twisted pair wires. The acceptable field wire gauge is AWG 20 to AWG 12. Wiring between the module and the intrinsically safe field device should follow intrinsically safe wiring practices, to avoid the transfer of unsafe levels of energy to the hazardous area.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Terminal Strip Color and Keying Assignment

The module's 140 XTS 332 00 field wiring terminal strip is color-coded blue to identify it as an intrinsically safe connector.

The terminal strip is keyed to prevent the wrong connector from being applied to the module. The keying assignment is given below.

Module Class	Module Part Number	Module Coding	Terminal Strip Coding
Intrinsically Safe	140 DII 330 00	CDE	ABF

Specifications

General Specifications

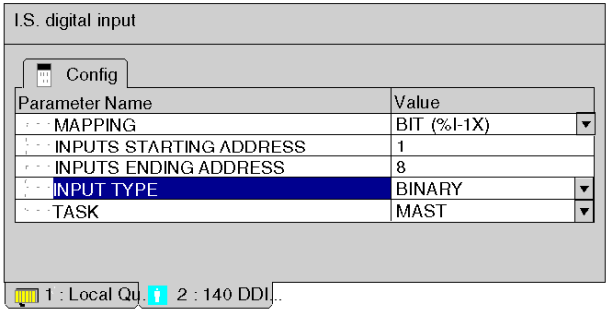
Specifications for the Quantum140 DII 330 00 Intrinsically Safe Digital Input module are as follows.

Number of Input Points	8 IN
Operating Voltages and Currents	
No load voltage (between input + and input -)	8 VDC
Short circuit current	8 mA
Switching point	1.2 mA ... 2.1 mA
Switching hysteresis	0.2 mA
Switching Frequency	100 Hz maximum
Response	
OFF-ON	1 ms
ON-OFF	1 ms
Isolation	
Channel to Channel	None
Channel to Bus	1780 VAC, 47-63 Hz or 2500 VDC for 1 min.
Internal Resistance	2.5 K ohms
Input Protection	Resistor limited
Fault Detection	None
Bus Current Required	400 mA
Power Dissipation	2 W
External Power	Not required
Hot Swap	Not allowed per intrinsic safety standards
Fusing	Internal - not user accessible

Parameter Configuration

Parameter and Default values

Parameter Configuration Window



Name	Default Value	Options	Description
Mapping	BIT (%I-1x)	WORD (%IW-3X)	
Inputs Starting Address	1	1	
Inputs Ending Address	8	1	
Input Type	BINARY	BCD	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 39)*.

Chapter 56
140 DIO 330 00: Safe Discrete OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 DIO 330 00 module.

What Is in This Chapter?

This chapter contains the following topics:

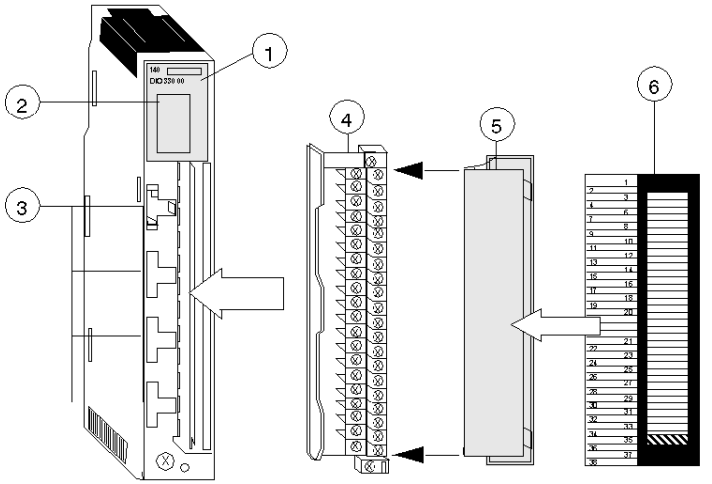
Presentation

Function

The Quantum 140 DIO 330 00 Intrinsically Safe Digital Output module provides intrinsically safe power to a variety of components such as solenoid valves, LEDs, etc., located in a hazardous area. This module is for use with sink devices only.

Illustration

The following figure shows the 140 DIO 330 00 module and its components.

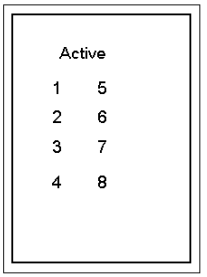


1 Model Number, Module Description, Color Code
2 LED Display
3 Fuse Cutouts
4 Field Wiring Terminal Strip
5 Removable Door
6 Customer Identification Label (Fold label and place it inside door)

Indicators

Illustration

The following table shows the LED indicators for the 140 DIO 330 00 module.



Descriptions

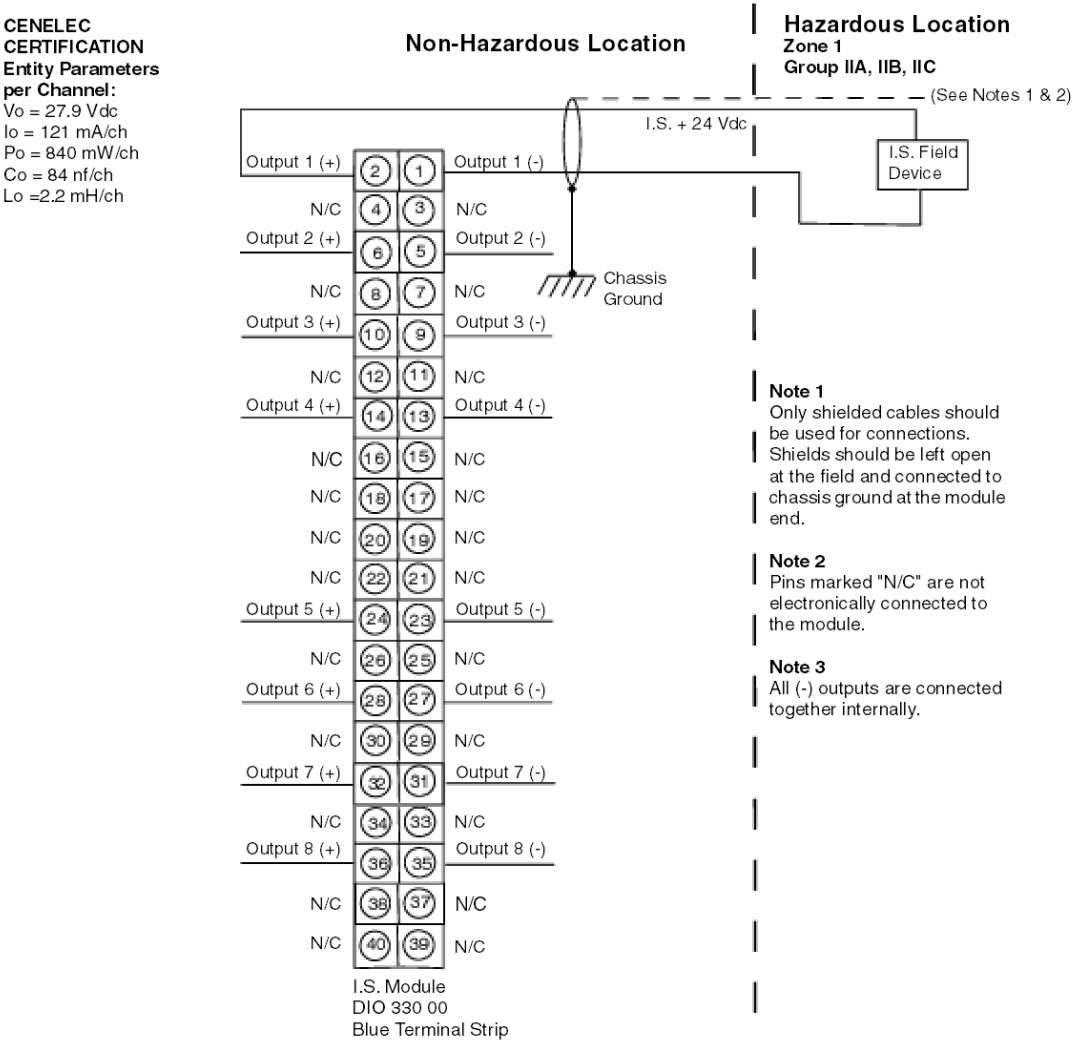
The following table shows the LED descriptions for the 140 DIO 330 00 module.

LEDs	Color	Indication When On
Active	Green	Bus communication is present
1 .. 8	Green	The indicated point or channel is on

Wiring Diagrams

Celenec Approved Wiring Diagram

The following is a Celenec certified wiring diagram for this module.



140 DIO 330 00 Wiring Diagram

CSA Approved Wiring Diagram

The following is a CSA certified wiring diagram for this module.

Notes Related to CSA Certification for this module

Note 1
Entity parameters are provided per channel:
V_{oc} = 27.9 V
I_{sc} = 119 mA
C_a = 84 nf
L_a = 1.0 mH

Note 2
Maximum non-hazardous area voltage must not exceed 250 V.

Note 3
In Canada, install in accordance with Canadian Electrical Code, Part I.

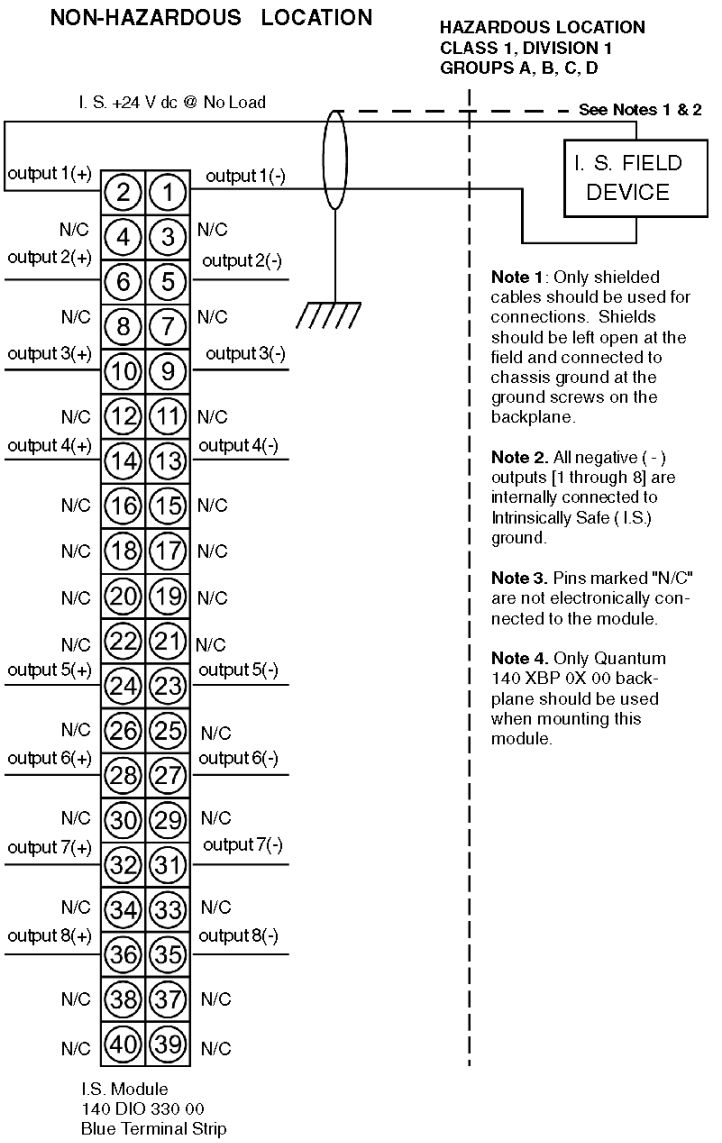
Note 4
In the United States, install in accordance with the NEC (ANSI/NFPA 70) and ANSI / ISA RP 12.6.

Note 5
To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6
Intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7
I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{oc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$

Note 8
This module is certified as a component for mounting in a suitable enclosure where the suitability of the final combination is subject to acceptance by CSA or an inspection authority having the juridiction.



Note 1: Only shielded cables should be used for connections. Shields should be left open at the field and connected to chassis ground at the ground screws on the backplane.

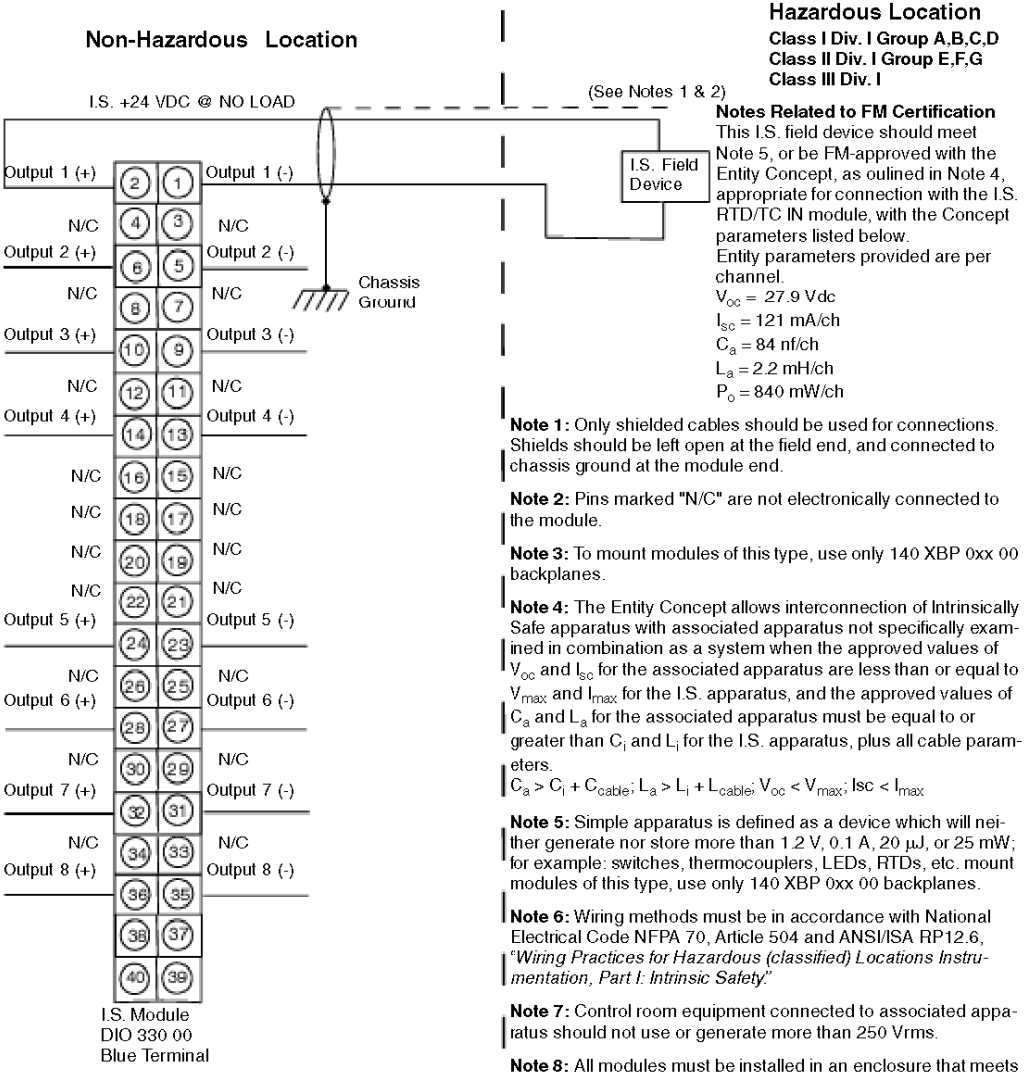
Note 2. All negative (-) outputs [1 through 8] are internally connected to Intrinsically Safe (I.S.) ground.

Note 3. Pins marked "N/C" are not electronically connected to the module.

Note 4. Only Quantum 140 XBP 0X 00 backplane should be used when mounting this module.

FM Approved Wiring Diagram

The following is a FM certified wiring diagram for this module.



Notes Related to FM Certification

This I.S. field device should meet Note 5, or be FM-approved with the Entity Concept, as oulined in Note 4, appropriate for connection with the I.S. RTD/TC IN module, with the Concept parameters listed below.

Entity parameters provided are per channel.

V_{oc} = 27.9 Vdc

I_{sc} = 121 mA/ch

C_a = 84 nf/ch

L_a = 2.2 mH/ch

P_o = 840 mW/ch

Note 1: Only shielded cables should be used for connections. Shields should be left open at the field end, and connected to chassis ground at the module end.

Note 2: Pins marked "N/C" are not electronically connected to the module.

Note 3: To mount modules of this type, use only 140 XBP 0xx 00 backplanes.

Note 4: The Entity Concept allows interconnection of Intrinsically Safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of V_{oc} and I_{sc} for the associated apparatus are less than or equal to V_{max} and I_{max} for the I.S. apparatus, and the approved values of C_a and L_a for the associated apparatus must be equal to or greater than C_i and L_i for the I.S. apparatus, plus all cable parameters.

$C_a > C_i + C_{cable}$; $L_a > L_i + L_{cable}$; $V_{oc} < V_{max}$; Isc < I_{max}

Note 5: Simple apparatus is defined as a device which will neither generate nor store more than 1.2 V, 0.1 A, 20 µJ, or 25 mW; for example: switches, thermocouplers, LEDs, RTDs, etc. mount modules of this type, use only 140 XBP 0xx 00 backplanes.

Note 6: Wiring methods must be in accordance with National Electrical Code NFPA 70, Article 504 and ANSI/ISA RP12.6, *"Wiring Practices for Hazardous (classified) Locations Instrumentation, Part I: Intrinsic Safety."*

Note 7: Control room equipment connected to associated apparatus should not use or generate more than 250 Vrms.

Note 8: All modules must be installed in an enclosure that meets the requirements of ANSI/ISA S82.01.

Note 9: No revision to this drawing without prior FMRC approval.

Note 10: For Schneider Electric internal use only. For control sheet, refer to 19-100986 Rev. 0.

UL Approved Wiring Diagram

The following is a UL certified wiring diagram for this module.

Notes Related to UL Certification for this module

Note 1
Entity parameters are provided per channel:
V_{oc} = 27.9 V
I_{sc} = 119 mA
C_a = 84 nf
L_a = 1.0 mH

Note 2
Maximum non-hazardous area voltage must not exceed 250 V.

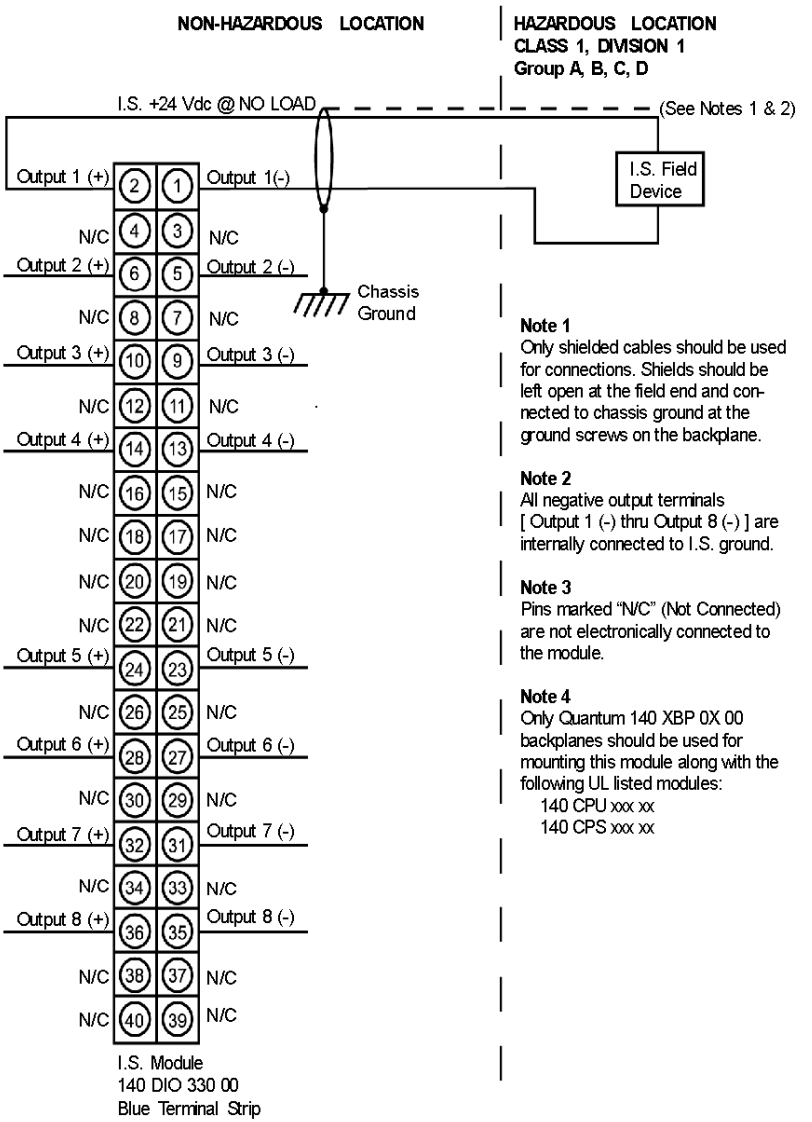
Note 3
If the electrical parameters of the cable are unknown, the following values must be used for Ccable and Lcable:
Capacitance: 60 Pf/ft
Inductance: 0.20 uH/ft

Note 4
Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP 12.6 for installation in the United States.

Note 5
To maintain intrinsic safety, shield for each cable must be grounded and must extend as close to the terminals as possible.

Note 6
Intrinsically Safe (I.S.) cables of one module must be routed separately from I.S. cables of another module.

Note 7
I.S. devices when connected to I.S. terminals must satisfy the following conditions:
$V_{cc} < V_{max}$
$I_{sc} < I_{max}$
$C_a > C_i + C_{cable}$
$L_a > L_i + L_{cable}$



31001366 Rev 00 140 DIO 330 00 Wiring Diagram

Fixed Wiring System

The Quantum 140 DIO 330 00 Intrinsically Safe Digital Output module is designed with a fixed wiring system where the field connections are made to a 40-pin, fixed position, blue terminal strip, which is plugged into the module.

Field Wiring

Field wiring to the module consists of separate shielded, twisted pair wires. Acceptable field wire gauges go from AWG 20 to AWG 12. Wiring between the module and the intrinsically safe field device should follow intrinsically safe wiring practices, to avoid the transfer of unsafe levels of energy to the hazardous area.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Terminal Strip Color and Keying Assignment

The module's 140 XTS 332 00 field wiring terminal strip is color-coded blue to identify it as an intrinsically safe connector.

The terminal strip is keyed to prevent the wrong connector from being applied to the module. The keying assignment is given below.

Module Class	Module Part Number	Module Coding	Terminal Strip Coding
Intrinsically Safe	140 DIO 330 00	CDE	ABF

Specification

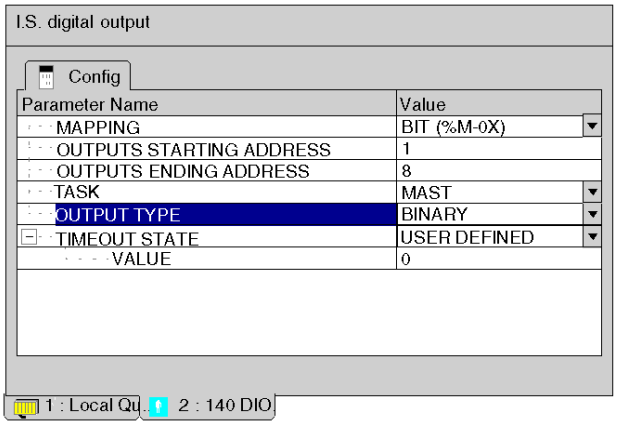
Specifications Table

Specifications for the Quantum 140 DIO 330 00 Intrinsically Safe Digital Output module are as follows.

Number of Output Points	8 OUT
Output Voltage	24 V (open)
Maximum Load Current	
Each Point	45 mA
Per Module	360 mA
Off State Leakage/Point	0.4 mA
Response (Resistive Loads)	
OFF-ON	1 ms
ON-OFF	1 ms
Output Protection (Internal)	Transient voltage suppression
Isolation	
Channel to Channel	None
Channel to Bus	1780 VAC, 47-63 Hz or 2500 VDC for 1 min.
Fault Detection	None
Bus Current Required	2.2 Amp (full load)
Power Dissipation	5 W (full load)
External Power	Not required
Hot Swap	Not allowed per intrinsic safety requirements
Fusing	Internal - not user accessible

140 DIO 330 00 Parameter Configuration

Parameter Configuration Window



Parameter and Default Values

Name	Default Value	Options	Description
Mapping	BIT (%M-0x)	WORD (%MW-4X)	
Output Starting Address	1	1	
Output Ending Address	8	1	
Output Type	BINARY	–	
Task (Grayed if module in other than local)	MAST	FAST AUX0 AUX1 AUX2 AUX3	fixed to MAST if module in other than local
Timeout State	USERDEFINED	HOLD LAST VALUE	
Value	0	0-255	only enabled if Timeout State=USERDEFINED

I/O Mapping

More information on the I/O mapping is provided in the general information on Quantum addressing modes *(see page 45)*.

Part IX
Quantum Safety I/O Modules

Introduction

The following part provides information on Quantum Safety Analog/Digital I/O Modules.

What Is in This Part?

This part contains the following chapters:

Chapter 57
General Information

Purpose

This chapter provides general information on Safety Modules. Read thoroughly the *Quantum Safety PLC - Safety Manual* (part number 33003879) to build a safety PLC according to the safety certifications.

What Is in This Chapter?

This chapter contains the following topics:

General Information on the Safety I/O Modules

Introduction

The following 3 Quantum Safety I/O modules are certified for use in safety applications:

- 140 SAI 940 00S (Analog Input)
- 140 SDI 953 00S (Digital Input)
- 140 SDO 953 00S (Digital Output)

The 3 Safety I/O modules allow you to connect the Safety PLC to the sensors and actuators, which are part of the Safety loop. All of them are composed of 2 micro controller systems running the same program, sharing the same information and checking each other periodically. You can install these I/O modules in the local backplane or in remote I/O drops.

Description of the CPU-I/O Communication

In general, the Quantum Safety CPU masters all backplane exchanges whereas the other modules are slaves. Between Safety CPU and Safety I/Os, data are exchanged through a dual port RAM, located in the I/O module.

For the communication between CPU and remote I/Os (RIOs), you must use the following 2 non-interfering modules:

- 140 CRP 932 00 (RIO head adapter), located in the local rack
- 140 CRA 932 00 (RIO drop adapter), located in the RIO drop

Optionally, you can use Fiber Optic repeater modules (140 NRP 954 00, 140 NRP 954 01C). Those modules enhance remote I/O network noise immunity and increase cable distance while maintaining the full dynamic range of the network and the safety integrity level.

The communication protocol between the Safety I/O and CPU secures their exchanges. It allows both to check the correctness of received data, and detect any failure of the transmitter or during the transmission. Thus, a safety loop may include any non-interfering RIO adapters and backplane. For details on this topic, see Safety I/O Modules Diagnostics *(see page 595)*.

The Safety I/O modules provide features for line monitoring, see Safety I/O Modules Diagnostics *(see page 595)*.

NOTE: Use the red labels provided with the Quantum Safety /IO modules to clearly indicate the Safety modules.

Safety I/O Modules Diagnostics

Description of the I/O Diagnostics

The following table lists the field diagnostics of the Safety I/O modules:

Diagnostics	Analog Input	Digital Input	Digital Output
Out of Range	yes	–	–
Broken Wire	yes	yes	–
Field Power	–	yes	yes
Overload	–	–	yes

NOTE: Short circuit of the wiring is not detected for the input modules. It is your responsibility to make sure that the modules are wired correctly.

In addition, the Quantum Safety PLC provides diagnostics of the communication between Safety CPU and Safety I/O modules, for instance a CRC. Thus, it is not only checked that the data received are the data sent but also that the data are updated. To handle disturbances, for example by EMC effects, which may temporarily corrupt your data, you can configure a maximum accepted consecutive CRC error for each module (ranging from 1 to 3). For a detailed procedure, see the chapter “Configuring I/O Modules for Safety Projects” in the *Unity Pro XLS Operating Mode Manual Safety PLC Specifics* .

NOTE: Unity Pro is the old name of Control Expert for versions ≤ V13.1.

Diagnostics at Power Up

At power up, the I/O modules perform an extended self-test during about 30 seconds. If these tests are unsuccessful, the modules are not considered to be healthy and do not start. The inputs and outputs are then set to 0.

If the 24 VDC external power supply is not connected to the digital input or digital output modules, the power up self-tests do not take place and the modules does not start.

Runtime Diagnostics

During runtime, the I/O modules perform self-tests. The input modules verify that they are able to read data from the sensors over the complete range. The output modules perform pulse tests on their switches with a duration lower than 1 ms.

Description of the General Over Voltage Diagnostics

Because the electronics may not work up to the theoretical maximum output voltage of the power supplies, the I/O modules must supervise the backplane power supply voltage.

The following table describes the supervision of the power supply:

The power supply of ...	Is monitored by ...
the backplane, which has a theoretical maximum output voltage of 18.5 V,	2 over voltage supervisors, that is 1 for each micro processor system. Each supervisor is able to handle a possible over voltage by opening its power switch and triggering its reset block, which manages transitions between the states of power on and power off and resets both processors when active.
the field side, which is generated by DC-to-DC converters,	2 over and under voltage supervisors, that is 1 for each micro processor system. If the 2 isolated DC-to-DC converters generating the power supply to the field side electronics experience a fault, the supervisors signal this condition to its particular processor through an isolator.
the process, which is one of the PELV type with a maximum output voltage of 60 V,	2 over and under voltage supervisors, that is 1 for each micro processor system, in the same way as they monitor the DC-to-DC converters. In case of a fault, the supervisors signal this condition to the user logic by setting a status bit in order to warn the system of possible inconsistent inputs.

⚠ DANGER

LOSS OF THE ABILITY TO PERFORM SAFETY FUNCTIONS

Use the correct process power supply, which is a PELV type with a maximum output of 60 V.

Failure to follow these instructions will result in death or serious injury.

Chapter 58
140 SAI 940 00S: Analog IN Module

About this Chapter

The following chapter provides information on the Quantum 140 SAI 940 00S module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

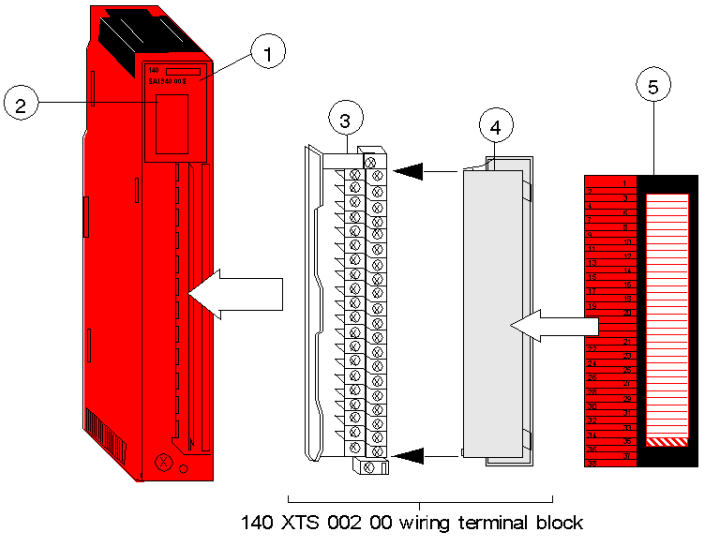
Function

140 SAI 940 00S is a 16 bits 4-20 mA, 8-channel current analog input module.

NOTE: If an error is detected during power-up self tests, the module is unable to start any communication with the host until the error disappears.

Illustration

The following figure shows the 140 SAI 940 00S module and its components.

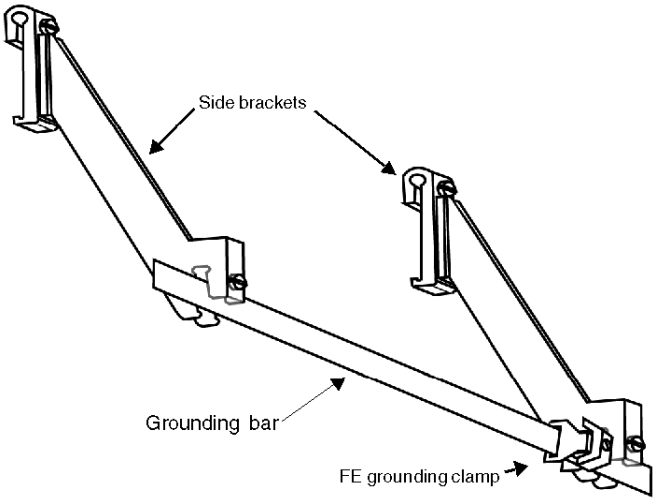


1 Model Number, Module Description, Color Code
2 LED Display
3 Field Wiring Terminal Block (not provided with the module)
4 Removable Door (not provided with the module)
5 Red Customer Identification Label (Fold label provided with the module and place it inside the door)

NOTE: The housing of safety modules is red and a red customer identification label is provided with Quantum Safety I/O modules. It shall be placed on the terminal block.

Grounding Kit

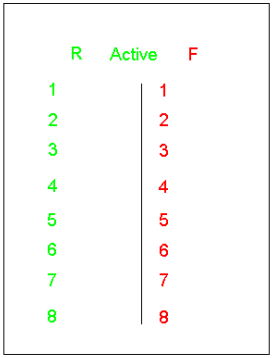
It is recommanded to use the STB XSP 3000 earthing kit and the (STB XSP 3010 or STB XSP 3020) grounding clips. The following figure shows those elements.

Kit	Comes with...
STB XSP 3000	two side brackets, one 1 m grounding bar and one FE grounding clamp 
STB XSP 3010	10 small cable clamps for 1.5mm to 6.5mm cable 
STB XSP 3020	10 medium cable clamps for 5mm to 11mm cable 

Indicators

Illustration

The following table shows the LED indicators for the 140 SAI 940 00S module.



NOTE: The 140 SAI 940 00S module does not use the 9 to 16 red and green channel LEDs.

Description

The following table shows the LED descriptions for the 140 SAI 940 00S module.

Type of LED	LED Id	Color	State	Meaning
System State LED	R	Green	ON	Power ON
			OFF	Power OFF
	Active	Green	ON	The module is communicating with the host.
			OFF	The module is not communicating with the host.
	F	Red	ON	An internal diagnostic error is detected.
			OFF	No internal diagnostic error is detected.
Channel LED	1 .. 8	Green	ON	The input current on the channel is in the 3.75 ... 20.25 mA range.
			OFF	The input current on the channel is out of the 3.75 ... 20.25 mA range.
		Red	ON	The channel is not operational.
			OFF	The channel is operational.

NOTE: The 140 SAI 940 00S module has only 8 channels. LEDs 9 to 16 are never lit.

Wiring Diagram

Precautions

Grounding:

Connect each end of the cable shields, as follows:

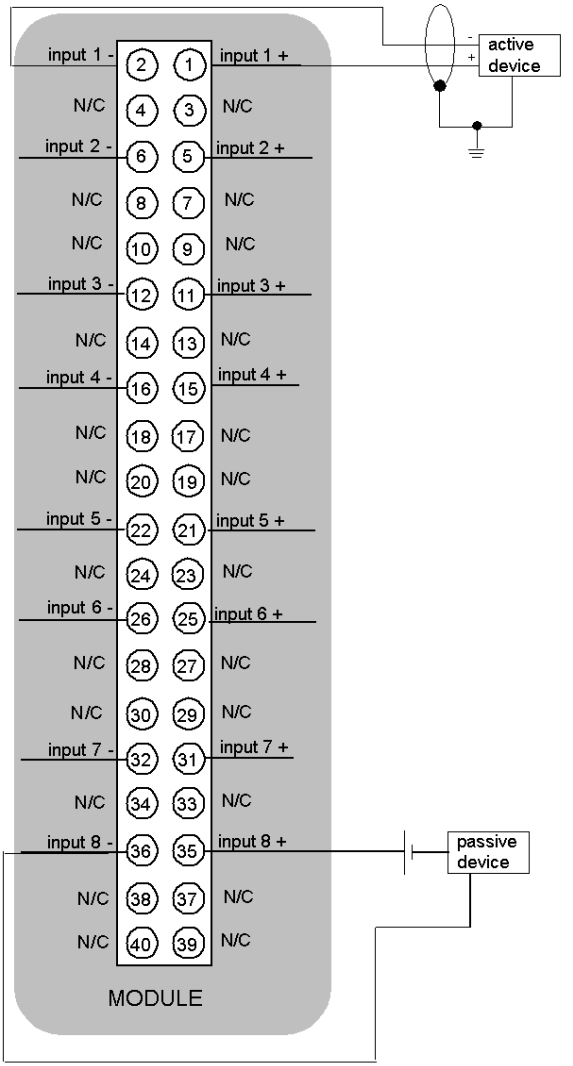
- **on the sensors side:** connect to the shield continuation terminals (ground terminals),
- **on the module side:** clamp the shielding to the ground using grounding equipment STB XSP 3000 grounding kit *(see page 599)* and grounding clips (STB XSP 3010 or STB XSP 3020).

Field wiring:

Field wiring to the module consists of separate shielded twisted pair wires.

Illustration

The following figure shows the wiring diagram for the 140 SAI 940 00S module.



N/C: No Connection
internal input impedance: 287 ohms
Rmin (of the passive device): 913 ohms
Rmax (of the passive device): 7713 ohms

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	8 Channel IN
External Power	Not required
Bus Current required (Module)	400 mA
Power Dissipation	3,5 W max
I/O map	13 input words
Fault Detection	• out of 4 .. 20 mA range • internal invalid channel • system inoperative
Isolation (channel to Bus)	1500 VAC eff for 1 minute
Isolation (channel to channel)	500 VAC eff for 1 minute

Current / Input

Current / Input

Absolute Current (max.)	35 mA
Linear Measuring Range	0 .. 25 mA, 0 .. 64 800 counts
Internal input impedance	287 ohms nominal

Linear Measuring Ranges Table

Linear measuring range

Data Format	Input	Normal	Warning
16-bit Format	0 .. 25 mA	0 .. 64 800 counts (2 592 pt/mA)	< 9 720 (3.75 mA) > 52 488 (20.25 mA)

Resolution / Conversion

Resolution / Conversion

Resolution	16 bits (0 ... 65 536 counts)
Absolute Accuracy Error	+/- 0,3% @ 25 degrees C° (77 F) +/- 0,35% Full Temperature Range
Linearity (0 to 60 degrees C)	+/- 2 µA
Common Mode Rejection	?
Input Filter	Single pole low pass, -3 dB cutoff @ 15 Hz
Update Time	15 ms for all channels

Fuses

Fuses

Internal	None
External	User installed per local and national electrical codes

Addressing

Overview

The following information describes how the data exchanged between the 140 SAI 940 00S module and the processor module are mapped.

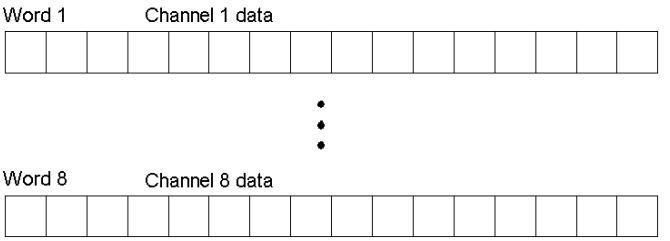
Except for the health word, the data described here are transferred from the 140 SAI 940 00S module using the Quantum global backplane communication access mechanism which is common to all Quantum modules.

NOTE:
13 words are necessary for this module:

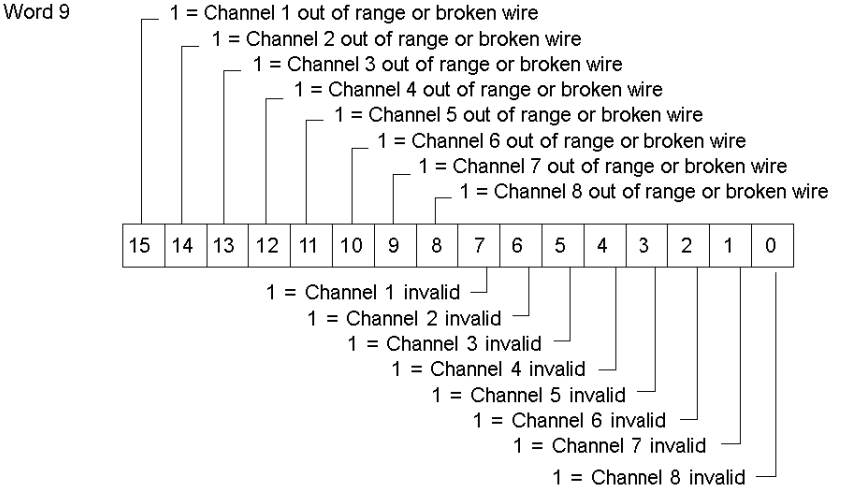
- 8 words dedicated to channel values, to obtain a full scale value each analog value have to be mapped on an `UINT` variable.
- 1 word dedicated to errors and warnings
- 3 words used by the module (module status, exchange number, CRC)
- 1 health word (this word is accessible by the processor module only)

Flat Addressing

The following diagram shows the register of words 1 to 8. On word 1, you read the analog value sampled by channel 1, and so on.



The following diagram shows the register of word 9. If bit 15 is set to 1, it means that channel 1 is out of range. If bit 7 is set to 1, it means that channel 1 is invalid. See the following diagram for the other channels.



Bit 15 to bit 8: These 8 bits are set to 1 if the input current of the corresponding channel is out its functional limits (under 3.75 mA or over 20.25 mA).

Bit 7 to bit 0: These 8 bits are set to 1 if internal diagnostics detects an invalid channel inside the module.

Words 10, 11 and 12 are used by the module for internal checking.

- **module status:** reserved for future use
- **Exchange number:** serial number of the set of data
- **Cyclic Redundancy Check (CRC)**: function used to detect errors after transmission

Health Word

The health word is an extra system control generated by the processor module, using the data read from the input module.

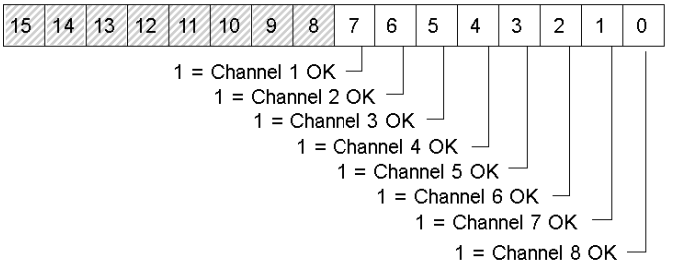
Any of these errors activates the health word:

- invalid channel (activates only the corresponding bit of the health word)
- out of range current on channel (activates only the corresponding bit)
- CRC
- incorrect exchange number

If an unhealthy input is detected (if a bit on word 13 is set to 0), the value of the corresponding channel is set to 0 (word 1 to 8) except in case of out of range (the out-of-range value is not set to zero).

The following diagram shows the register of word 13.

Word 13



Bit 15 to bit 8: Those bits are not used in word 13.
Bit 7 to bit 0: These 8 bits are set to 1 when no error is detected.

Topological Addressing

Topological addresses for the 140 SAI 940 00S Input Module.

Point	I/O Object	Comment
Input 1	%IWr.m.1	Analog value
	%Ir.m.1.1	Invalid channel
	%Ir.m.1.2	Out of range or broken wire
	%Ir.m.1.3	Health bit
• • •		
Input 8	%IWr.m.8	Analog value
	%Ir.m.8.1	Invalid channel
	%Ir.m.8.2	Out of range or broken wire
	%Ir.m.8.3	Health bit
Module Status and Exchange number	%IWr.m.9.2	(internal use)
CRC LSW	%IWr.m.9.3	Less significant word of 32-bit CRC (internal use)
CRC MSW	%IWr.m.9.4	Most significant word of 32-bit CRC (internal use)
Health word	%IWr.m.9.5	

Used abbreviations: **r** = rack, **m** = module slot.

Parameter Configuration

Modes of Operation

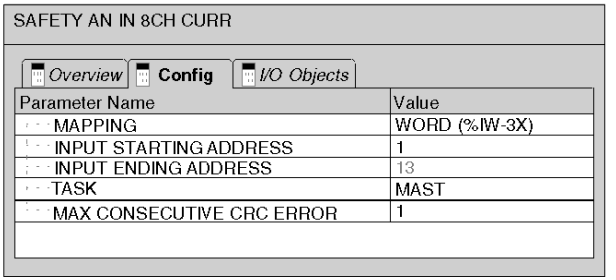
The 140 SAI 940 00S module is configurable.

The configuration includes:

- Maximum consecutive CRC errors before declaring the module unhealthy.

Parameter and Default Values

Parameter Configuration Window.



Name	Default Value	Options	Description
Mapping	WORD (%IW-3x)	-	-
Input Starting Address	1	-	Depends on the number of modules
Input Ending Address	13	-	
Task	MAST	-	-
Max Consecutive CRC Error	1	-	Define the number of communication errors necessary to declare the module unhealthy.

Chapter 59
140 SDI 953 00S: Digital IN Module

About this Chapter

The following chapter provides information on the Quantum 140 SDI 953 00S module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

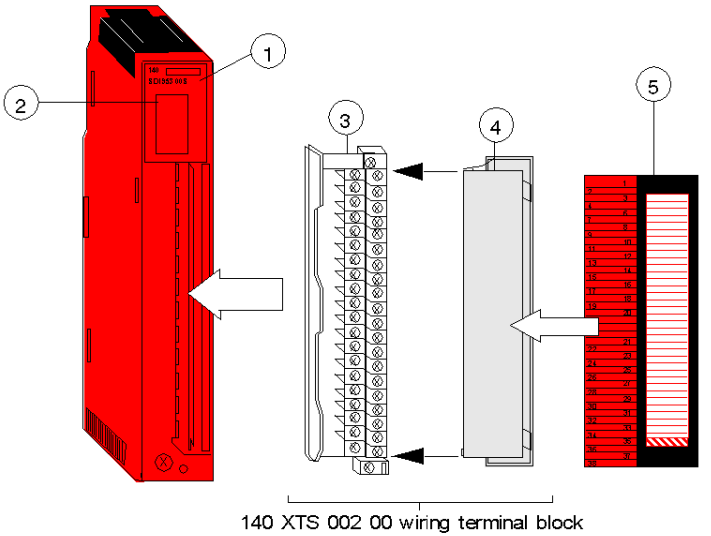
Function

140 SDI 953 00S is a 24VDC 16-channel digital input module.

NOTE: If an error is detected during power-up self tests, the module is unable to start any communication with the host until the error disappears. If the 24V external power supply is not connected to the module, an error is detected on the channels and the module will not start.

Illustration

The following figure shows the 140 SDI 953 00S module and its components.



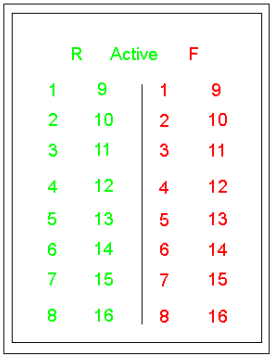
1 Model Number, Module Description, Color Code
2 LED Display
3 Field Wiring Terminal Block (not provided with the module)
4 Removable Door (not provided with the module)
5 Red Customer Identification Label (Fold label provided with the module and place it inside the door)

NOTE: The housing of safety modules is red and a red customer identification label is provided with Quantum Safety I/O modules. It shall be placed on the terminal block.

Indicators

Illustration

The following table shows the LED indicators for the 140 SDI 953 00S module.



Description

The following table shows the LED descriptions for the 140 SDI 953 00S module.

Type of LED	LED Id	Color	State	Meaning
System State LED	R	Green	ON	Power ON
			OFF	Power OFF
	Active	Green	ON	The module is communicating with the host.
			OFF	The module is not communicating with the host.
	F	Red	ON	An internal diagnostic error is detected.
			OFF	No internal diagnostic error is detected.
Channel LED	1 .. 16	Green	ON	The channel is ON.
			OFF	The channel is OFF.
		Red	ON	Inoperative channel or broken wire detected.
			OFF	Operative channel and wire.

Wiring Diagram

Precautions

It is recommended to use a process power supply which does not recover automatically after a disjunction. Use for instance 24VDC 10A ABL8 RPS24100 in manual mode.

⚠ CAUTION

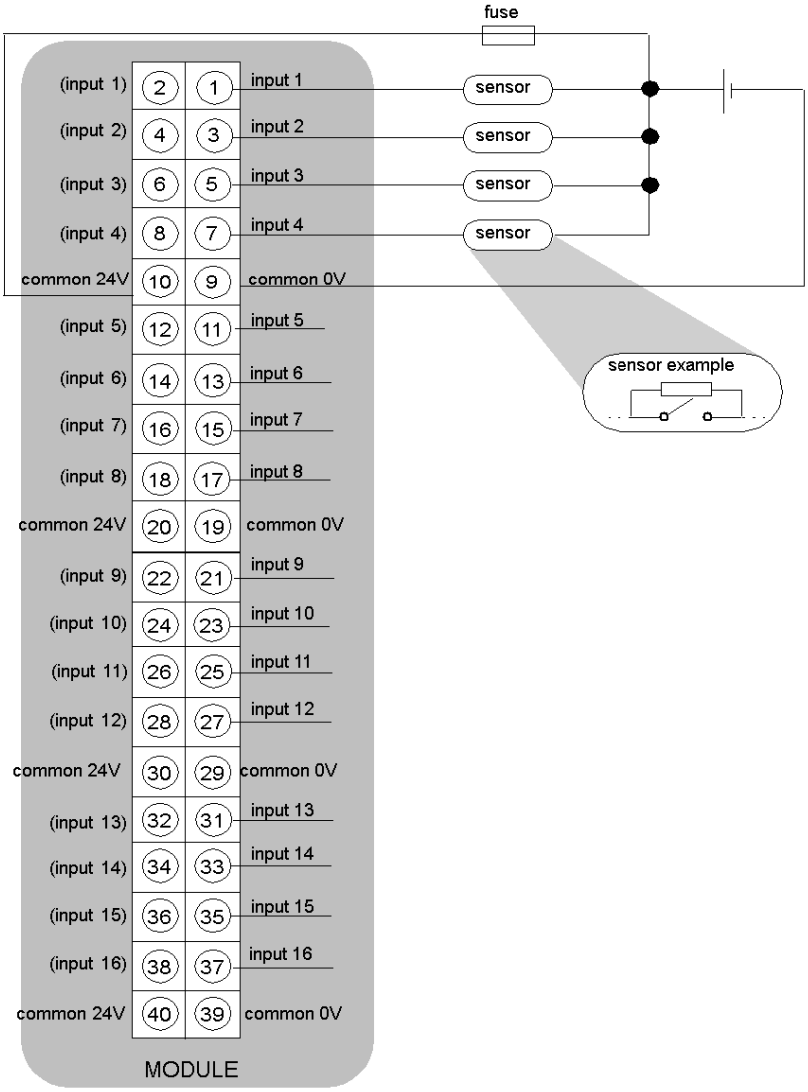
OVERCURRENT TO THE INPUTS

Use fast acting fuses to protect the electronic components of the module from overcurrent. Improper fuse selection could result to damage to the module.

Failure to follow these instructions can result in injury or equipment damage.

Illustration

The following figure shows the wiring diagram for the 140 SDI 953 00S module.



power supply: 24 VDC
fuse: 1 A fast blow fuse
pull-up resistor (in sensor example): 15 kOhms

NOTE: There is only one group of 16 inputs. All common 24 V are internally connected and all common 0 V are also internally connected. The two pins of a same input (e. g: pin 1 and 2 for input 1) are internally connected too so that you can use either the right pin or the left one.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE
DESTRUCTION OF ADAPTER ● Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector. ● During tightening, be sure to maintain the connector securely. ● Do not tighten the right-angle F adapter beyond the specified torque. **Failure to follow these instructions can result in equipment damage.**

Understanding and Using Cut Wire Detection

If the electrical current between the input and the sensor is more than 1 mA, the wire is detected as not cut. If this current is less than 1 mA, the wire is detected as broken and the corresponding input's red LED is lit.

If you install dry contact sensors, the corresponding input's red LED will be lit whenever the contact is open and the current will be at 0 mA. To solve this and use cut wire detection properly, Schneider Electric recommends installing a pull-up resistor on the sensors so that the minimum current of 1 mA will be reached. You can use a 15 kohms pull-up resistor or work out the value you need. See the sensor example in the illustration above.

Specifications

General Specifications

General Specifications

Module Type	16 IN (1 group x 16 points)
Logic	True High
External Power	24 VDC (19.2 .. 30 VDC)
Power Dissipation	2.75 W + 0.25 W x the number of ON points
Bus Current Required	550 mA
I/O map	7 input words
Fault Detection	• broken wire (below 1mA) • internal invalid channel diagnostic • system inoperative
Update Time	15 ms for all channels

Isolation

Isolation

Group to Group	N/A
Group to Bus	1 500 VAC rms for 1 minute

Input Rating

Input Rating

ON Level voltage	+11 ... +30 VDC
OFF Level voltage	-3 ... +5 VDC
ON Level current	3.0 mA (min.)
OFF Level current	1.5 mA (max.)
Internal input impedance	3.675 kohms
Input Protection	By internal rectifier

Absolute Maximum Inputs

Absolute Maximum Inputs

Continuous	30 VDC

Response

Response

OFF - ON	25 ms (max.)
ON - OFF	25 ms (max.)

Fuses

Fuses

Internal	None
External	1 A fast blow fuse mandatory

⚠ CAUTION

OVERCURRENT TO THE INPUTS

Use fast acting fuses to protect the electronic components of the module from overcurrent. Improper fuse selection could result to damage to the module.

Failure to follow these instructions can result in injury or equipment damage.

Addressing

Overview

The following information describes how the data exchanged between the 140 SDI 953 00S module and the processor module are mapped.

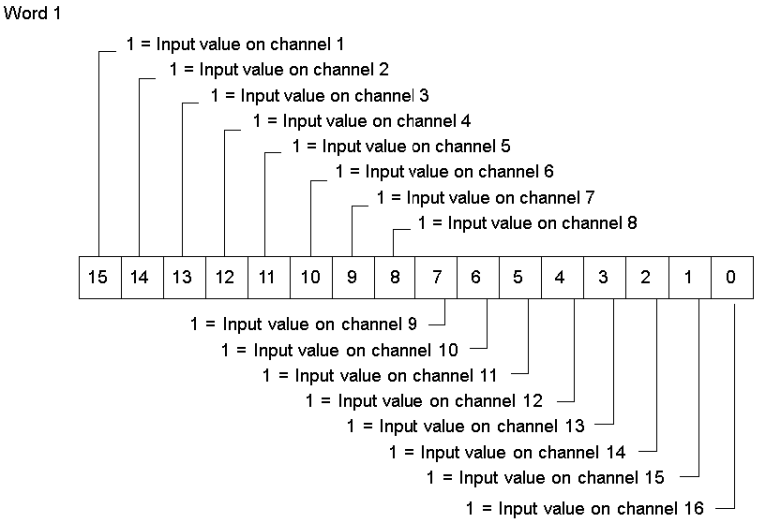
Except for the health word, the data described here are transferred from the 140 SDI 953 00S module using the Quantum global backplane communication access mechanism which is common to all Quantum modules.

NOTE:
7 words are necessary for this module:

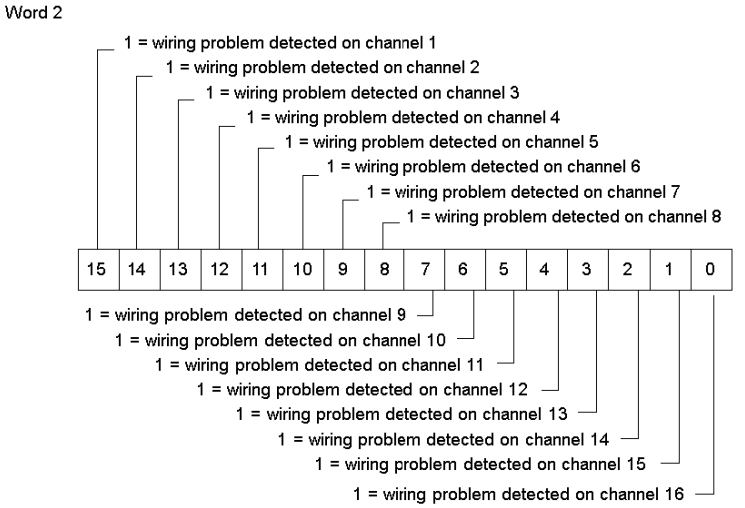
- 1 word dedicated to channel values
- 1 word dedicated to wiring problems
- 1 word dedicated to channel state (valid/invalid channel)
- 1 word dedicated to power supply status (and exchange number which is used by the module)
- 2 words used by the module (CRC)
- 1 health word (this word is accessible by the processor module only)

Flat Addressing

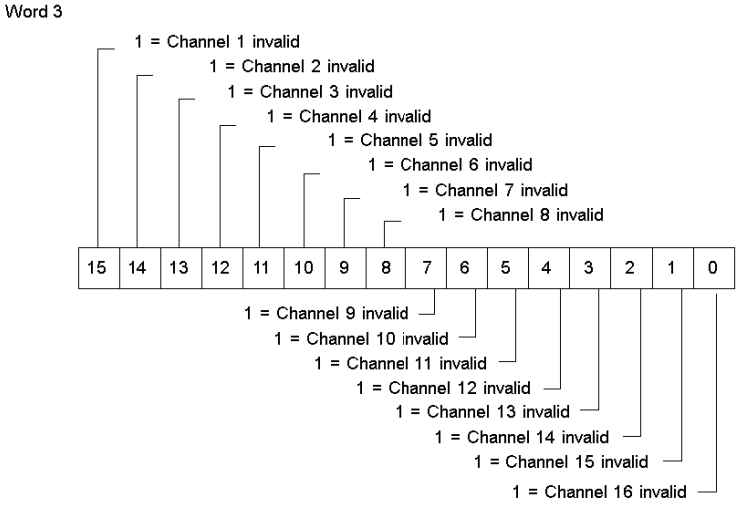
The following diagram shows the register of word 1. On bit 15, you read the input value of channel 1, on bit 14, you read the input value of channel 2, and so on.



The following diagram shows the register of word 2. Bit 15 is set to 1 if no leakage current is detected on the sensor of channel 1, bit 14 for channel 2, and so on.



The following diagram shows the register of word 3. If bit 15 is set to 1, it means that channel 1 has detected an invalid channel, bit 14 is for channel 2, and so on.



On word 4, bit 15 is dedicated to the **Process Power supply status**. It is set to 1 if the external power supply is no longer detected.

The other bits on word 4 and words 5 and 6 are used by the module for internal checking:

- **Exchange number:** serial number of the set of data
- **Cyclic Redundancy Check (CRC)**: function used to detect errors after transmission

Health Word

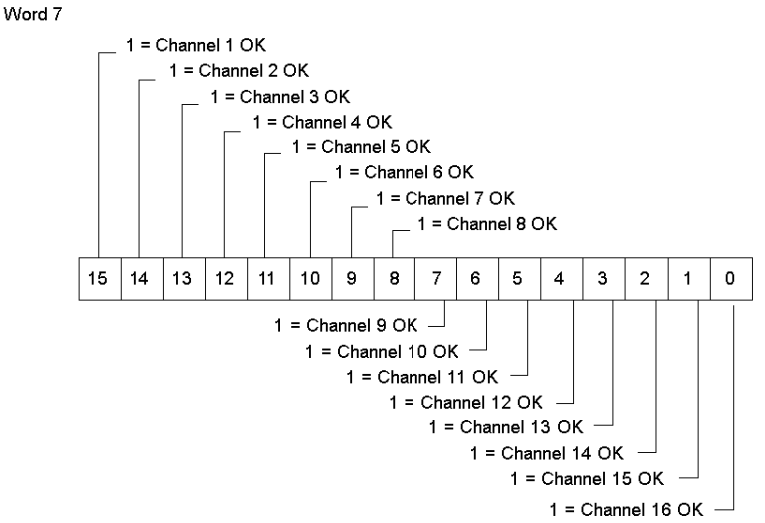
The health word is an extra system control generated by the processor module, using the data read from the input module.

Any of these errors activates the health word:

- broken wire (activates only the corresponding bit of the health word)
- invalid channel (activates only the corresponding bit of the health word)
- process power supply not detected
- CRC error
- incorrect exchange number

If an unhealthy input is detected (if a bit on word 7 is set to 0), the value of the corresponding channel is set to 0 (on word 1).

The following diagram shows the register of word 7.



Bit 15 to bit 0: These 16 bits are set to 1 when no error is detected.

Parameter Configuration

Modes of Operation

The 140 SDI 953 00S module is configurable.

The configuration includes:

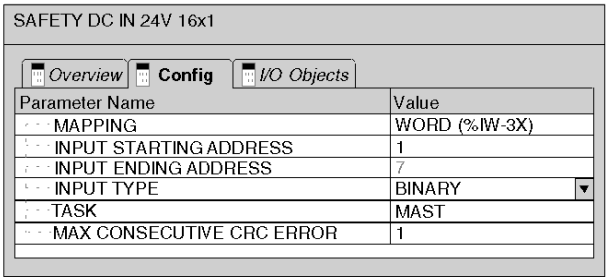
- Drop and Slot number (automatically filled by Control Expert)
- Maximum consecutive CRC errors before declaring the module unhealthy

If an unhealthy input is detected (i.e. a bit on word 7 is set to 0), the value of the corresponding channel is set to 0 on word 1.

The module provides process side diagnostics helping the customer to debug the process interface during setup (process power supply detection and open circuit detection).

Parameter and Default Values

Parameter Configuration Window.



Name	Default Value	Options	Description
Mapping	WORD (%IW-3x)	-	-
Input Starting Address	1	-	Depends on the number of modules
Input Ending Address	7	-	
Input Type	BINARY	-	-
Task	MAST	-	-
Max Consecutive CRC Error	1	-	Define the number of communication errors necessary to declare the module unhealthy.

Chapter 60
140 SDO 953 00S: Digital OUT Module

About this Chapter

The following chapter provides information on the Quantum 140 SDO 953 00S module.

What Is in This Chapter?

This chapter contains the following topics:

Presentation

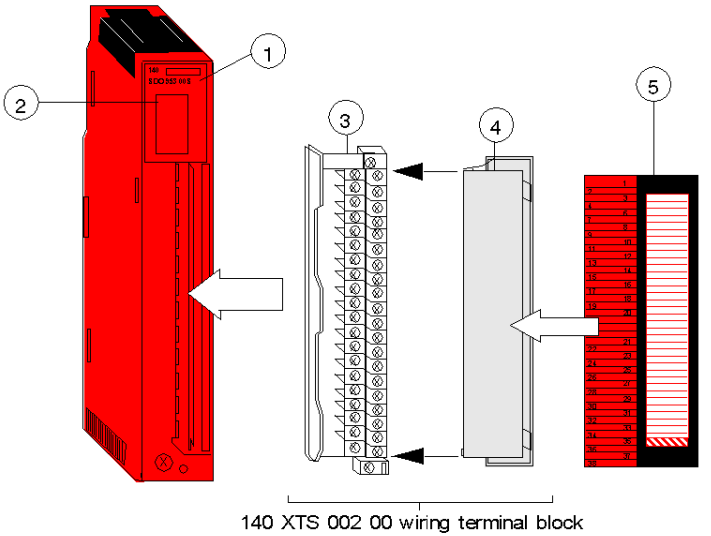
Function

24 VDC 0,5 A Source overload detection 16-channel Digital Output module.

NOTE: If an error is detected during power-up self tests, the module is unable to start any communication with the host until the error disappears. If the 24 V external power supply is not connected to the module, an error is detected on the channels and the module will not start.

Illustration

The following figure shows the 140 SDO 953 00S module and its components.



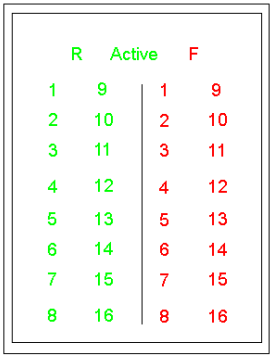
1 Model Number, Module Description, Color Code
2 LED Display
3 Field Wiring Terminal Block (not provided with the module)
4 Removable Door (not provided with the module)
5 Red Customer Identification Label (Fold label provided with the module and place it inside the door)

NOTE: The housing of safety modules is red and a red customer identification label is provided with Quantum Safety I/O modules. It shall be placed on the terminal block.

Indicators

Illustration

The following table shows the LED indicators for the 140 SDO 953 00S module.



Description

The following table shows the LED descriptions for the 140 SDO 953 00S module.

Type of LED	LED Id	Color	State	Meaning
System State LED	R	Green	ON	Power ON
			OFF	Power OFF
	Active	Green	ON	The module is communicating with the host.
			OFF	The module is not communicating with the host.
	F	Red	ON	An internal diagnostic error is detected and/or the module is in fallback state
			OFF	No internal diagnostic error is detected and the module is not in fallback state
Channel LED	1 .. 16	Green	ON	The channel is ON.
			OFF	The channel is OFF.
		Red	ON	Inoperable channel and/or overload detected on the channel.
			OFF	Channel operative.

Wiring Diagram

Precautions

It is mandatory to use a process power supply which does not recover automatically after a disjunction. Use for instance 24 VDC 10 A ABL8 RPS24100 in manual mode.

⚠ CAUTION

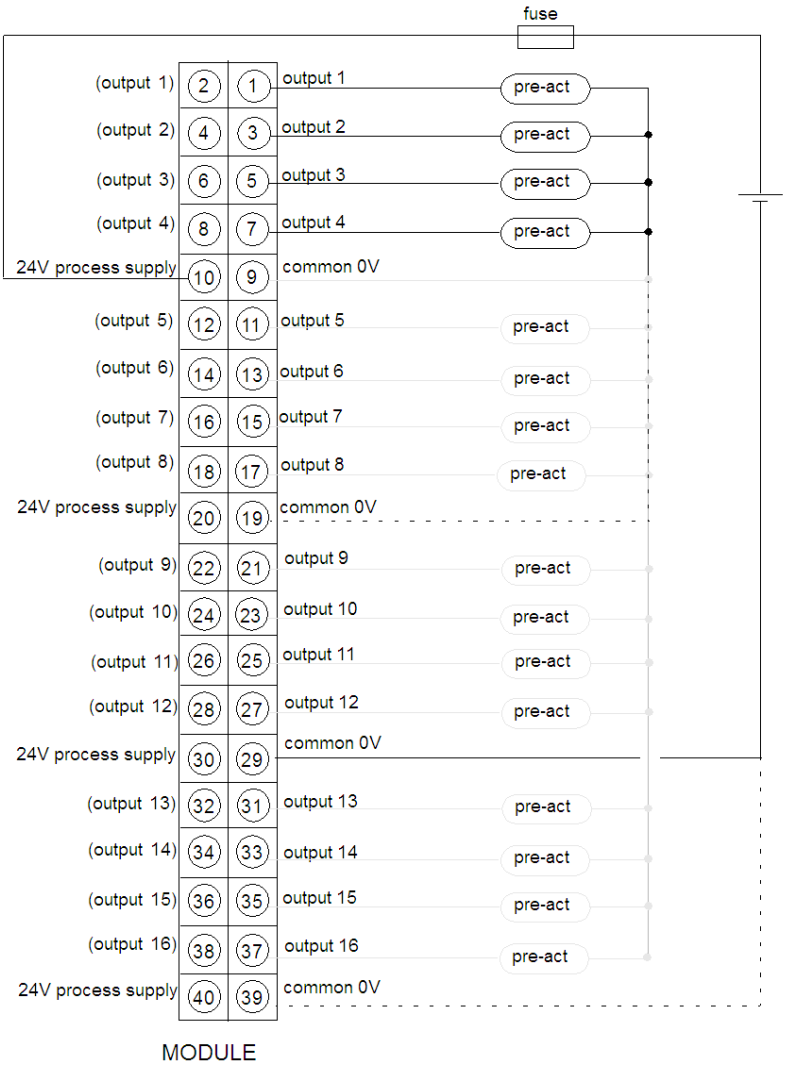
OVERCURRENT TO THE OUTPUTS

Use fast acting fuses to protect the electronic components of the module from overcurrent. Improper fuse selection could result to damage to the module.

Failure to follow these instructions can result in injury or equipment damage.

Illustration

The following figure shows the wiring diagram for the 140 SDO 953 00S module.



power supply: 24 VDC
fuse: 10 A max (determined by the module load current), fast blow
pre-act: pre-actuator

NOTE: There is only one group of 16 outputs. All common 24 V are internally connected and all common 0V are also internally connected. For safety applications, it is recommended to connect at least 2 ground lines (common 0V) to the field wiring terminal block. The two pins of a same input (e. g: pin 1 and 2 for input 1) are internally connected too so that you can use either the right pin or the left one.

NOTE: The tightening torque must be between 0.5 Nm and 0.8 Nm.

NOTICE

DESTRUCTION OF ADAPTER

- Before tightening the locknut to the torque 0.50...0.80 Nm, be sure to properly position the right-angle F adapter connector.
- During tightening, be sure to maintain the connector securely.
- Do not tighten the right-angle F adapter beyond the specified torque.

Failure to follow these instructions can result in equipment damage.

Specifications

General Specifications

General Specifications

Module Type	16 OUT (1 group x 16 channels)
Logic	True High
Pre-actuator Power Supply	24 VDC
Power Dissipation	1.9 W + 0.65 V x I^2
Bus Current required (Module)	350 mA
I/O map	4 output words and 7 input words
Fault Detection	• overload • 24 V process supply problem • system inoperable
Update Time	15 ms for all channels

Voltage

Voltage

Operating Voltage (max.)	19.2 ... 30 VDC
Absolute Voltage (max.)	34 VDC
ON State Drop / Point	0.3 VDC @ 0.5 A

Maximum Load Current / Surge Current

Maximum Load Current / Surge Current

Each Point	0.65 A
Per Module	10.4 A
Surge Current (max.)	2 A @ 10 ms once (internal current limitation)
OFF State Leakage / Point	0.5 mA @ 30 VDC

Isolation / Protection

Isolation / Protection

Group to Group	N/A
Group to Bus	1500 VAC rms for 1 minute
Output Protection	• transient voltage suppression (internal) • overload • disjunction (0.7 A @ 10 ms) • current limitation (2 A)

Response (Resistive Loads)

Response (Resistive Loads)

OFF - ON	20 ms (max.)
ON - OFF	20 ms (max.)

Load Inductance / Capacitance (max.)

Load Inductance / Capacitance (max.)

Load Inductance (max.)	0.5 Henry @ 11 Hz switch frequency, or: $L_{Max} = \frac{?}{I^2 F}$ where: L = Load inductance (henry) I = Load current (A) F = Switching Frequency (Hz)
Load Capacitance (max.)	50 µF

Fuses

Fuses

Internal	None
External	Mandatory (fast blow, max 10 A, determined by the module load current)

⚠ CAUTION

OVERCURRENT TO THE OUPUTS

Use fast acting fuses to protect the electronic components of the module from overcurrent. Improper fuse selection could result to damage to the module.

Failure to follow these instructions can result in injury or equipment damage.

Addressing

Overview

The following information describes how the data exchanged between the 140 SDO 953 00S module and the processor module are mapped.

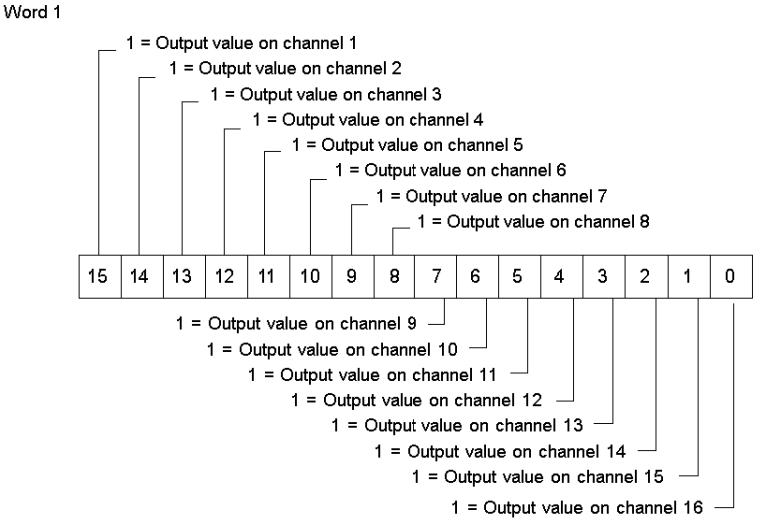
Except for the health word, the data described here are transferred to and from the 140 SDO 953 00S module using the Quantum global backplane communication access mechanism which is common to all Quantum modules.

NOTE: The words "input" and "output" used here are defined with respect to the processor module.
11 words are necessary for this module:

- 4 words dedicated to output data
  - 1 dedicated to channel values
  - 3 words used by the module (exchange number, CRC)
- 6 words dedicated to inputs data:
  - 1 dedicated to energized/de-energized channel detection
  - 1 dedicated to overload errors
  - 1 dedicated to unsafe channel errors
  - 1 dedicated to process power supply status, malfunction from the host (and exchange number which is used by the module)
  - 2 words used by the module (CRC)
- 1 health word (this word is accessible by the processor module only)

Flat Addressing (Output words)

The following diagram shows the register of the first output word. On bit 15, you read the output value of channel 1, on bit 14, you read the output value of channel 2, and so on.

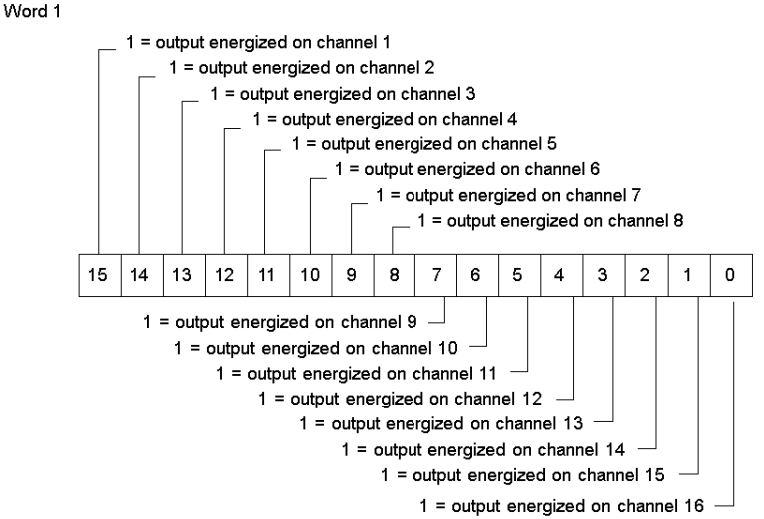


Words 2, 3 and 4 are used by the module for internal checking:

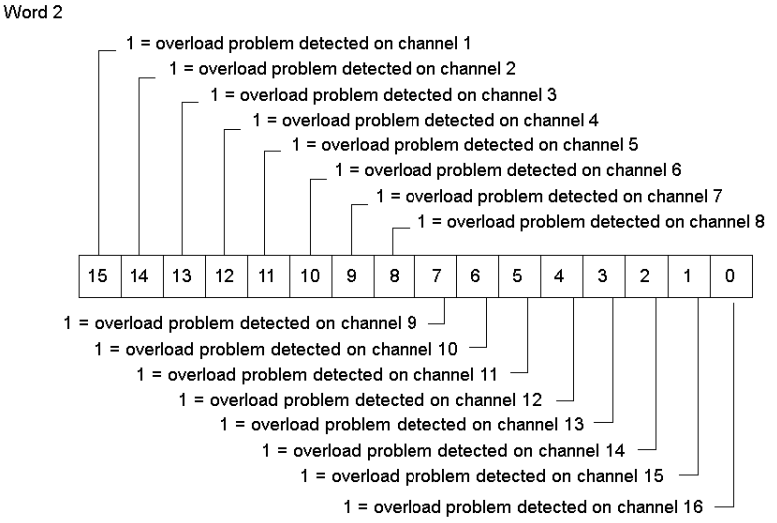
- **Exchange number:** serial number of the set of data
- **Cyclic Redundancy Check (CRC)**: function used to detect errors after transmission

Flat Addressing (Input words)

The following diagram shows the register of the first input word. If bit 15 is set to 1, it means that the output is energized on channel 1. If bit 14 is set to 1, it means that the output is energized on channel 2, and so on.

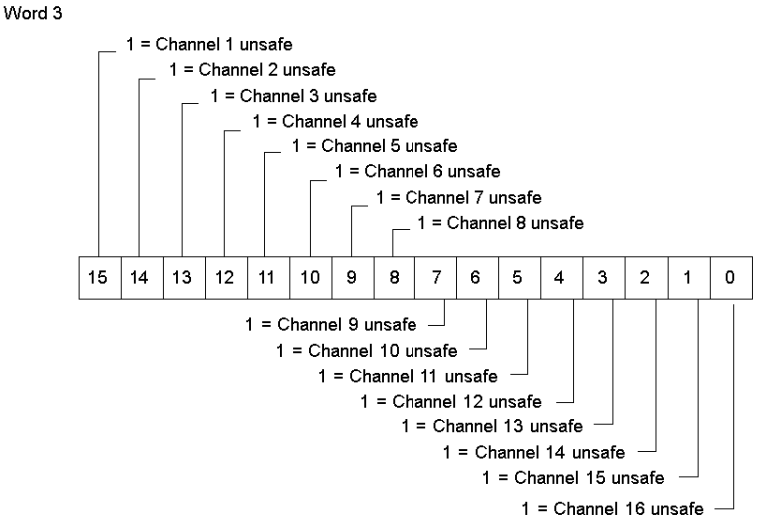


The following diagram shows the register of the second input word. Bit 15 set to 1 means that there is an overload problem on channel 1, bit 14 set to 1 means that there is an overload problem on channel 2, and so on.



NOTE: In case of activation of the overload bit, the corresponding output is automatically switched to the OFF state by the module (disjunction) and maintained OFF during at least 10 seconds. To recover the control of the output, it is necessary to set by application the overloaded output command of the module to the OFF state.

The following diagram shows the register of the third input word. If bit 15 is set to 1, it means that f the internal checks have detected a malfunction of channel 1, etc.



On word 4, bit 15 is dedicated to the **Process Power supply Error**. It is set to 1 if the external power supply is no longer detected.

On word 4, bit 14 is dedicated to the **System Shut Down**. It is set to 1 if the module has detected a malfunction from its host. In that case, the module is safe and shuts down.

The other bits on word 4 and words 5 and 6 are used by the module for internal checking:

- **Exchange number:** serial number of the set of data
- **Cyclic Redundancy Check (CRC)**: function used to detect errors after transmission

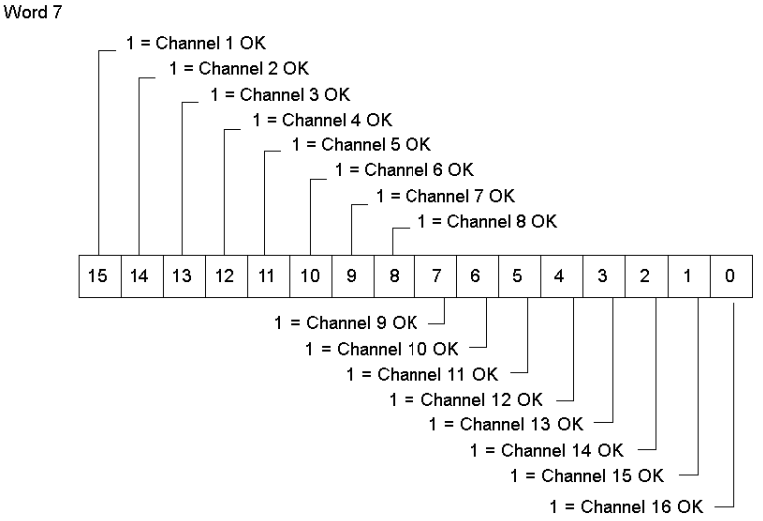
Health Word

The health word is an extra system control generated by the processor module, using the data read from the output module.

Any of these errors activates the health word:

- overload problem (activates only the corresponding bit of the health word)
- unsafe channel (activates only the corresponding bit of the health word)
- malfunction of the host (SSD)
- process power supply problem
- CRC error
- incorrect exchange number

The following diagram shows the register of word 7.



Bit 15 to bit 0: These 16 bits are set to 1 when no error is detected.

Parameter Configuration

Modes of Operation

The configuration of the 140 SDO 953 00S includes:

- Drop and Slot number (automatically filled by Control Expert)
- Maximum consecutive CRC errors before declaring the module unhealthy
- Timeout before modules goes to fallback state
- Fallback state (user defined or hold last value)

NOTE: The module only uses the word interface (%QW-4x). Although the module is a digital output, it cannot be configured to use the bit interface (%Q-0x).

During normal operation, the 140 SDO 953 00S module cyclically tests its internal process side electronics so that the module detects the status of the output channels. It also runs a set of diagnostic tests on its internal system and on its internal process side electronics.

Output Fallback State Configuration

In case the 140 SDO 953 00S module detects a discrepancy in the data from the host, the module sets its outputs to configured fall back state.

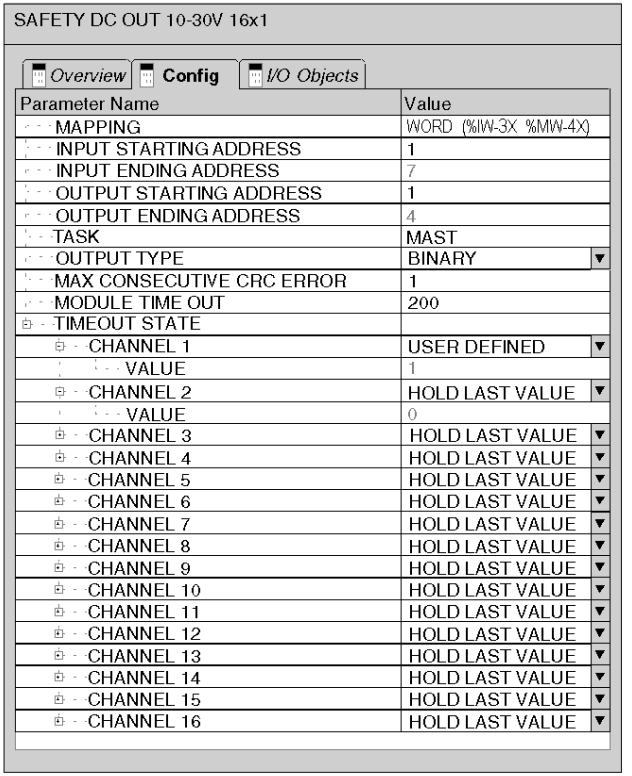
The outputs of the 140 SDO 953 00S module have three states.

- energized
- de-energized
- "maintain last state" (fall back state)

In the parameter configuration screen of the Control Expert, you can configure the output position in case the module is no more serviced by the processor module. You can either maintain last value or define another value.

Parameter and Default Values

Parameter Configuration Window.



Name	Default Value	Options	Description
Mapping	WORD (%IW-3x %MW-4x)	-	-
Input Starting Address	1	-	Depends on the number of modules
Input Ending Address	7	-	
Output Starting Address	1	-	Depends on the number of modules
Output Ending Address	4	-	
Task	MAST	-	-
Output Type	BINARY	-	-
Max Consecutive CRC Error	1	-	Define the number of communication errors necessary to declare the module unhealthy.

Name	Default Value	Options	Description
Module TimeOut	200 ms	-	Define how long the outputs last before going to their fallback position in case no communication from the processor module is detected.
Time Out State			
Channel 1	HOLD LAST VALUE	USER DEFINED	Position in case of time out
...			
Channel 16	HOLD LAST VALUE	USER DEFINED	Position in case of time out

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