

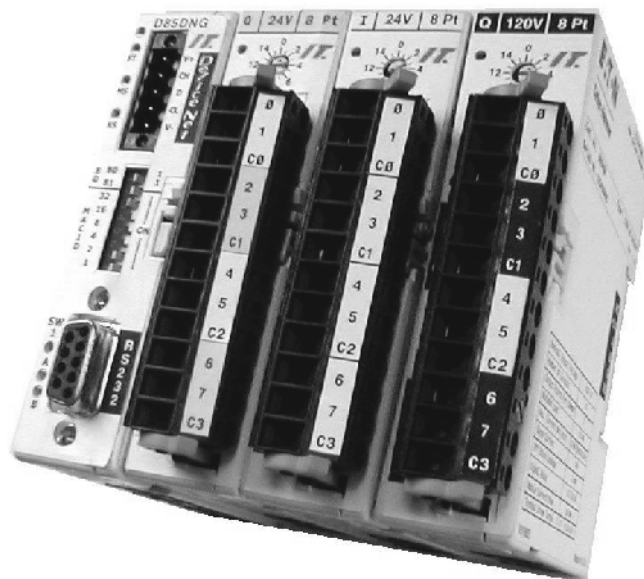


Cutler-Hammer

Intelligent Technologies (IT.) D77A I/O Module Products

Installation and User Manual

September 2005
Supersedes January 2004



Part Numbers

D77A-DI8
D77A-DI16
D77A-DQ8
D77A-DQ16
D77A-AI8
D77A-AI16
D77A-AQ8
D77A-AQ16

D77A-RQ8
D77A-RQ16
D77A-DI8DQ8
D77A-DI8RQ8
D77A-AI8AQ8
D77A-AI8RQ8
D77A-NI4
D77A-NQ2

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Safety




Servicing and operating this I/O system, like all industrial control components and systems, involves significant hazards. The most obvious hazard is that of electrical shock. These hazards are not limited to electrical shock. They also involve hazards related to managing energy that is converted from electricity into mechanical energy as motors, solenoids controlled valves and other equipment perform work. Every effort is made to provide the safest equipment possible. Every effort is made to provide the safest operating and servicing procedures possible. It is, however, the user's responsibility to ensure that the design and application are safe and appropriate.

Throughout this document are found various safety warnings. Observe these messages carefully. Each is described as follows:

Definitions and Symbols

 WARNING	 AVERTISSEMENT	 ADVERTENCIA
This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operating this equipment. Read the message and follow the instructions carefully.	Ce symbole indique la haute tension. Il sert à attirer votre attention aux articles et opérations qui pourraient vous être dangereux, ainsi qu'à tout autre personne utilisant cet équipement. Lisez ce message et suivez prudemment les instructions.	Este símbolo indica alto voltaje. Le llama su atención en cuanto a artículos u operaciones que pueden ser peligrosas para usted y otras personas que operan este equipo. Lea el mensaje y siga cuidadosamente las instrucciones.
 CAUTION	 PRÉCAUTION	 PRECAUCIÓN
Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the product. The situation described in the CAUTION may, if not avoided, lead to serious results. Important safety measures are described in CAUTION (as well as WARNING).	Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures à modérées ou de graves dégâts au produit. La situation décrite dans l'article intitulé PRÉCAUTION peut, si elle n'est pas évitée, mener à de sérieux résultats. Les mesures de sécurité importantes sont décrites dans les articles intitulés PRÉCAUTION (aussi bien que AVERTISSEMENT).	Indica que existe una situación potencialmente peligrosa, que si no es evitada, podrá resultar en heridas corporales menores o moderadas, o en serios daños al producto. La situación descrita en la PRECAUCIÓN podrá causar serios resultados si no es evitada. Medidas importantes de seguridad son descritas en la PRECAUCIÓN (como también en la ADVERTENCIA).

Hazardous High Voltage

 WARNING	 AVERTISSEMENT	 ADVERTENCIA
Some control equipment and electronic controllers are connected to hazardous line voltages. When servicing the I/O system, related starters and other electronic controllers, there may be exposure to components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock. Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic components or industrial machinery.	Des commandes électroniques et équipement de commande sont connectés à des lignes de tension dangereuse. Lors de l'entretien du système I/O, des démarreurs et des commandes électroniques connexes, vous pourrez être exposé à des composants dont le boîtier et les protubérances conduisent la tension de la ligne, voire même supérieure. Vous devriez faire extrêmement attention à vous protéger contre les électrochocs. Tenez-vous sur un tapis isolant et habituez-vous à n'utiliser qu'une main quand vous contrôlez des composants. Travaillez toujours en compagnie d'une autre personne en cas d'urgence. Coupez le courant avant de vérifier les commandes ou de réaliser l'entretien. Assurez-vous que l'équipement est correctement mis à la terre. Portez des lunettes de sécurité quand vous travaillez sur des composants électroniques ou la machinerie industrielle.	Algunos equipos de control y controladores electrónicos están conectados a tensiones de línea peligrosas. Al darle servicio al sistema de I/O, arranques relacionados y otros controladores electrónicos, pueda que hayan componentes expuestos con carcasas o protuberancias en el potencial de línea o más altos. Se deberá tener extremo cuidado para protegerse contra electrochoque. Párese sobre un tapete aislante y habitúese a usar sólo una mano al comprobar componentes. Siempre trabaje con otra persona en caso que ocurra una emergencia. Desconecte la energía antes de comprobar controladores o efectuar mantenimiento. Asegúrese de que el equipo esté conectado apropiadamente a tierra. Use gafas de seguridad cuando trabaje en componentes electrónicos o en maquinarias industriales.

General Safety

Notice	Avis	Aviso
Make sure you read and understand the installation procedures in this manual before you attempt to operate or set up the equipment.	Assurez-vous de lire et comprendre les procédures d'installation comprises dans ce manuel avant d'essayer d'utiliser ou d'installer l'équipement.	Asegúrese de leer y comprender los procedimientos de instalación dados en este manual antes de intentar operar o configurar el equipo.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
This instruction manual should be used for proper installation, setup and operation of the IT. D77A I/O modules. Improperly installing and maintaining this product can result in serious personal injury or property damage. Before attempting installation, setup or operation, read and understand this entire manual.	Ce mode d'emploi devrait être utilisé pour installer ou opérer correctement les modules IT. D77A I/O. Mal installer et maintenir ce produit peut entraîner de graves blessures corporelles ou de grands dégâts matériels. Avant d'essayer de l'installer ou de l'utiliser, lisez et comprenez ce manuel dans son intégralité.	Este manual de instrucciones deberá ser usado para instalar, configurar y operar apropiadamente el IT. Módulos I/O D77A El instalar y mantener impropriadamente este producto podrá resultar en serias heridas corporales o en daños a la propiedad. Antes de comenzar la instalación, configuración o la operación, lea y comprenda el manual completo.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
Hazardous voltage can cause electric shock and burns. Always disconnect power before proceeding with any work on this product.	La tension dangereuse peut causer des électrochocs et des brûlures. Coupez toujours le courant avant d'entreprendre tout travail sur ce produit.	Los voltajes peligrosos pueden causar electrochoque y quemaduras. Siempre desconecte la energía antes de proceder con cualquier trabajo en este producto.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
Only apply 24V DC to the I/O module power terminals. Use of any other voltage may result in personal injury, property damage and damage to the IT. D77A I/O module.	N'appliquez que du courant continu de 24 V aux bornes de courant des modules I/O. L'emploi de toute autre tension peut entraîner des blessures corporelles, des dégâts matériels et des dégâts au module IT. D77A I/O.	Sólo aplique 24V CD a los terminales de energía del módulo I/O. El uso de cualquier otro voltaje podrá resultar en heridas corporales, daños a la propiedad o daños al IT. Módulo I/O D77A.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
To provide continued protection against fire or shock hazard, the complete IT. D77A I/O modules must be replaced if they become inoperative.	Pour fournir une protection continue contre le risque d'incendie ou d'électrochoc, les modules IT. D77A I/O complets doivent être remplacés s'ils deviennent inopérables.	Con el fin de suministrar protección continua contra peligro de fuego o electrochoque, los módulos I/O D77A completos del IT. tendrán que ser reemplazados si se tornan inoperantes.

Introduction

Description

Cutler-Hammer® Intelligent Technologies (IT) D77A I/O Modules from Eaton Corporation® are part of the IT family of products that are best by design. These modules are designed and built for industrial applications with standard features including removable locking terminal blocks and connectivity to IT motor control. The size and features are a substantive engineering and marketing effort, involving extensive customer input. For more information on the IT family of products, visit our website: www.EatonElectrical.com

IT D77A I/O discrete modules are available in 8 and 16 point densities, and in AC or DC voltage configurations. Input modules have two points per isolated common. Output modules are available in relay and solid-state configurations with two points per isolated common.

The IT D77A I/O analog modules are available in variable voltage and current loop modules. Input modules support four analog channels and output modules support two analog channels.

D77A I/O products are designed for industrial applications, installed in a manner consistent with the guidelines outlined in this document. They are designed for clean, dry environments.

Component Characteristics

This section identifies special features engineered into the Cutler-Hammer IT D77A I/O modules.

All Modules

The IT D77A I/O modules have the following common features:

- LED Status — When the LED is illuminated the proper ON state signal is received at the input or at the output point.
- Removable Lockable Terminals — Terminals are easily removable for I/O module replacement and are lockable so they will not vibrate loose. Terminals are available in screw type, cage clamp and insulation displacement.
- Terminal Identification — Each terminal is marked for ease of wiring and troubleshooting.
- Isolation — Each module is optically isolated between the field I/O and the backplane communication.
- Securing Tabs — Each I/O module has a locking mechanism to secure it to the DIN rail.
- Barrier Type Terminals — Each terminal has a barrier to minimize shorting of field wiring.

Discrete Input Modules

The IT D77A Input modules have the following common feature:

- Adjustable Debounce — Each point has adjustable debounce from 1 to 65 ms.
- Sink/source — Each DC input module has back-to-back LEDs in the optical isolating circuit that can accept sinking or sourcing signals.

Discrete Output Modules

The IT D77A I/O Output modules have the following common features:

- Configurable Safe State — Each output point has a loss of communication safe state setting.
- Configurable Power ON State — Each output point has a power-up setting.

Discrete Combination Modules

The input and output features found in the input and output modules are also found in the combination modules.

Analog Input Modules

- Four Analog Channels — Each module has four analog input channels.
- Adjustable Input Filter — Each analog channel can be set for frequencies between 50 and 500 Hz.
- Type Selection — Each analog channel can be set as a voltage input or a current loop input.

Analog Output Modules

- Two Analog Channels — Each analog channel has two analog output channels.
- Type Selection — Each module can be set as a voltage output or a current loop output.

Approval Certifications

Table 1: Approvals/Certifications

Standard	Approval/Certifications
Agency Certifications	UL 508 CE (Low Voltage Directive, ATEX Directive) CUL (CSA C22.2 No. 14)
Radiated and Conducted Emissions	EN 5011 Class A

Electrical/EMC

ESD Immunity (IEC 61000-4-2)	±8 kV air, ±4 kV contact
Radiated Immunity (IEC 61000-4-3)	10 V/m 80 – 1000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	±2 kV supply and control ±1 kV communications
Surge (IEC 61000-4-5)	±1 kV line-to-line ±2 kV line-to-ground
RF Conducted (IEC 61000-4-6)	10V, 0.15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30 A/m, 50 Hz
Ingress Protection Code	IP20

Catalog Numbering System

Catalog numbers have three or five groups of characters, depending on the kind of module the catalog number represents. The catalog numbering system used for *IT*, D77A I/O modules is illustrated as follows:

For discrete digital and analog I/O, the first four positions in the first group indicate the product family. The next two places in the second group indicate the I/O type. The third group uses one or two places to indicate the number of points in the module. The last group is used only for combination modules.

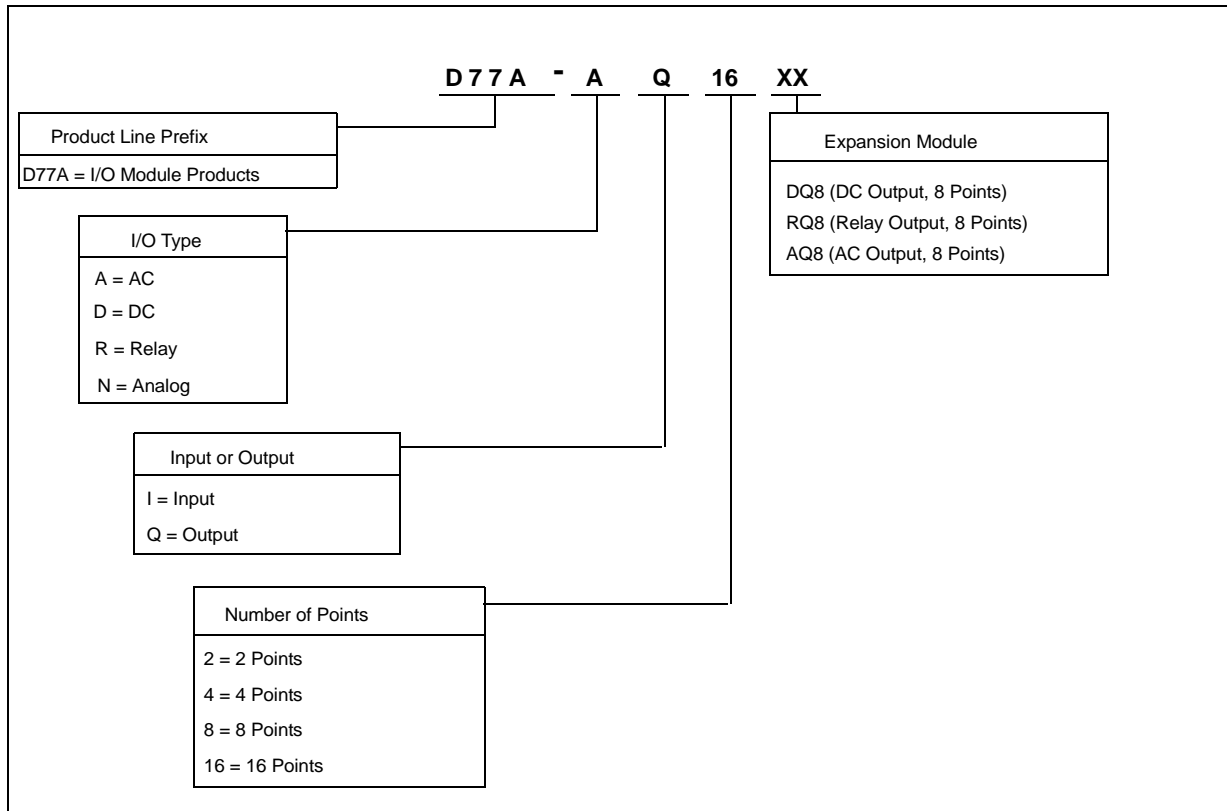


Figure 1: Catalog Numbering System

Specifications

Physical Description

Figure 2 illustrates the front and back of a typical *IT*. D77A I/O module.

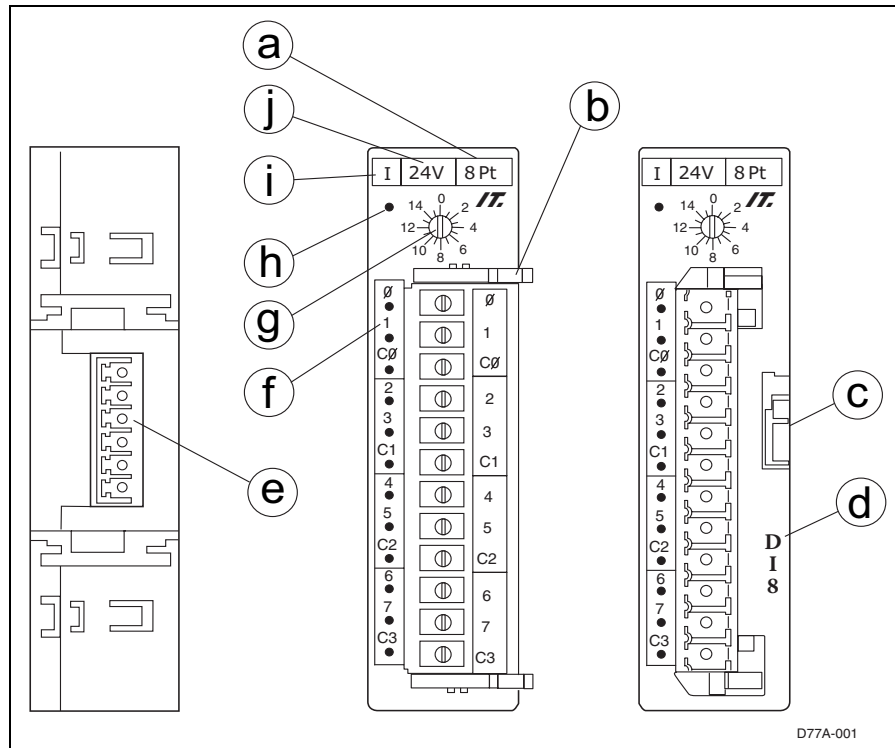


Figure 2: I/O Module Component Location

- a) Number of points
- b) Terminal Blocks (Removable)
- c) DIN Rail Locking Tab
- d) D77 Part Number
- e) QC Port, Backplane Connector
- f) I/O Status LED
- g) Group ID Selector Switch (Address)
- h) Status LED
- i) I/O Type ("I" for Input, "Q" for Output)
- j) Voltage (AC, DC, Relay, Analog)

Dimensional Data

Figure 3 illustrates the dimensional data of the IT. D77A I/O modules.

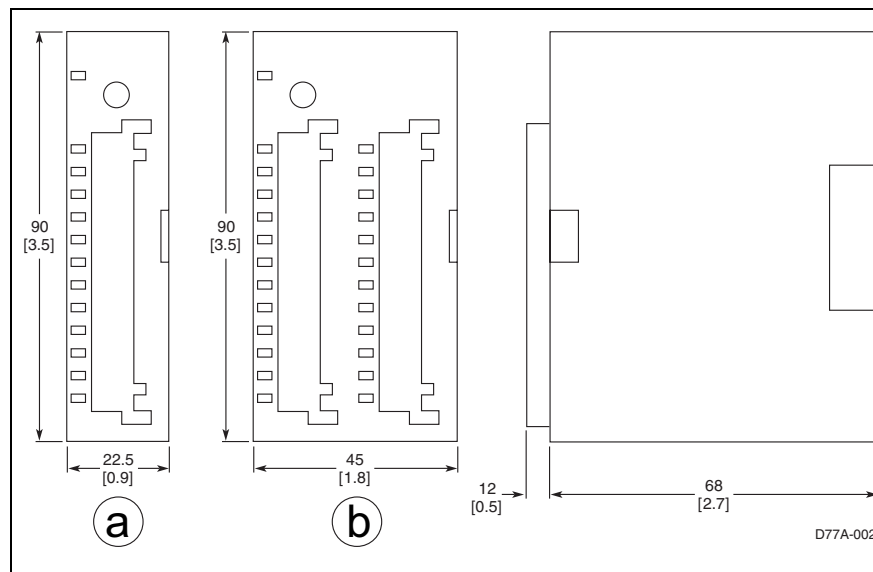


Figure 3: Module Physical Dimensions, mm [in]

a) Single Wide Module

b) Double Wide Module

Note: Ventilation requirements necessitate a minimum of 50 mm (2 in) on the top and bottom of each module and to each side of a module grouping.

Power Requirements

The current draw for the IT. D77A I/O modules can be found in the module specification table for each specific module type. When specifying the 24 volt DC power supply, the power rating must support the sum of all the modules' current draw added to the system power requirements.

For more information on the sizing of power supplies, refer to the *IT. QCPort System Install and Planning Guide* (Publication No. MN05001002E).

Surge Suppression

IT. D77A Discrete I/O output modules have built-in surge suppression (snubbers) to reduce the effects of transient voltages. When connecting output devices that have inductive loads (e.g., solenoids, relays, motor starters, etc.) additional surge suppression is recommended and should be added across the load. The addition of customer-supplied surge suppression for inductive loads prolongs the D77A output life.

Environmental Specifications

Table 2: Environmental Ratings

Category	Description	Specification
Transportation and Storage	Temperature	-50°C to 80°C [-58°F to 176°F]
	Humidity	5 – 95% non-condensing
Operating	Temperature	-25°C to 55°C [-13°F to 131°F] 0°C to 55°C [32°F to 131°F] (analog I/O only)
	Humidity	5% – 95% non-condensing
	Altitude	Above 2000 meters [6600 feet] consult factory
	Shock (IEC 68-2-27)	15G any direction for 11 milliseconds Relay Operation 8G any direction
	Vibration (IEC 68-2-6)	5 – 150 Hz, 5G, 0.7 mm maximum peak-to-peak Relay Operation 10 – 55 Hz, 3G, 0.7 mm maximum peak-to-peak

Device Default I/O Data

The following tables display the device default data mapping for D77A I/O modules as the data would appear on a network.

Table 3: 8 Point Discrete Input Module (Produced)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
I7	I6	I5	I4	I3	I2	I1	I0	0

Table 4: 8 Point Discrete Output Module (Consumed)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0	0

Table 5: 16 Point Discrete Input Module (Produced)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
I7	I6	I5	I4	I3	I2	I1	I0	0
I15	I14	I13	I12	I11	I10	I9	I8	1

Table 6: 16 Point Discrete Output Module (Consumed)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0	0
Q15	Q14	Q13	Q12	Q11	Q10	Q9	Q8	1

Table 7: 16 Point Discrete Combination Module (Produced)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
I7	I6	I5	I4	I3	I2	I1	I0	0

Table 8: 16 Point Discrete Combination Module (Consumed)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Byte
Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0	1

Table 9: 4 Channel Analog Input Module (Produced)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	WORD
SB *	Analog Input Data/Channel 0														N/A**	0
SB *	Analog Input Data/Channel 1														N/A**	1
SB *	Analog Input Data/Channel 2														N/A**	2
SB *	Analog Input Data/Channel 3														N/A**	3

*Sign Bit
1 = True (-)
0 = False (+)
**Not Used

Table 10: 2 Channel Analog Output Module (Consumed)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	WORD
SB *	Analog Output Data/Channel 0														N/A**	0
SB *	Analog Output Data/Channel 1														N/A**	1

*Sign Bit
 1 = True (-)
 0 = False (+)
 **Not Used

I/O Module Summary

Table 11: I/O Devices

	Part Number	Voltage (Current)	Type (I/O)	Description	Page
AC	D77A-AI8	120V AC	Input	AC Input Module	Page 8
	D77A-AI16	120V AC	Input	AC Input Module	Page 8
	D77A-AQ8	120V AC	Output	AC Output Module	Page 13
	D77A-AQ16	120V AC	Output	AC Output Module	Page 13
DC	D77A-DI8	24V DC	Input	DC Input Module	Page 9
	D77A-DI16	24V DC	Input	DC Input Module	Page 9
	D77A-DQ8	24V DC	Output	DC Sink Output Module	Page 14
	D77A-DQ16	24V DC	Output	DC Sink Output Module	Page 14
Relay	D77A-RQ8	0 – 30V DC	Output	Relay Output Module	Page 15
		0 – 125V AC			
	D77A-RQ16	0 – 30V DC	Output	Relay Output Module	Page 15
		0 – 125V AC			
Combo	D77A-DI8DQ8	24V DC	Input	Combination Module	Page 18
		24V DC	Output		
	D77A-DI8RQ8	24V DC	Input	Combination Module	Page 19
		Relay	Output		
	D77A-AI8AQ8	120V AC	Input	Combination Module	Page 20
		120V AC	Output		
	D77A-AI8RQ8	120V AC	Input	Combination Module	Page 21
		Relay	Output		
Analog	D77A-NI4	0 – 5V	Input	Analog Module	Page 10
		1 – 5V			
		0 – 10V			
		0 – 20 mA			
		4 – 20 mA			
	D77A-NQ2	0 – 5V	Output	Analog Module	Page 16
		1 – 5V			
		0 – 10V			
		0 – 20 mA			
		4 – 20 mA			

Input Specifications

AC Input Module Specifications

Table 12: AC Input Module Specifications

Catalog Number	D77A-AI8	D77A-AI16
Nominal Input Voltage	120V AC, 50/60 Hz	120V AC, 50/60 Hz
Operating Voltage	80 – 140V AC, 50/60 Hz	80 – 140V AC, 50/60 Hz
Number of Inputs	8	16
Points per Common	2	2
OFF State Voltage	0 – 30V AC *	0 – 30V AC *
ON State Voltage	80V AC – 140V AC	80V AC – 140V AC
Nominal Input Current	15 mA	15 mA
Signal Delay	8.33 ms @ 60 Hz / 10 ms @ 50 Hz	8.33 ms @ 60 Hz / 10 ms @ 50 Hz
QCPort Current Draw	33 mA	46 mA
Isolation	1.5kV	1.5kV
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	4.5 inch-pounds (0.51 Newton-meters)

* A 50V transition range exists between 30V and 80V.

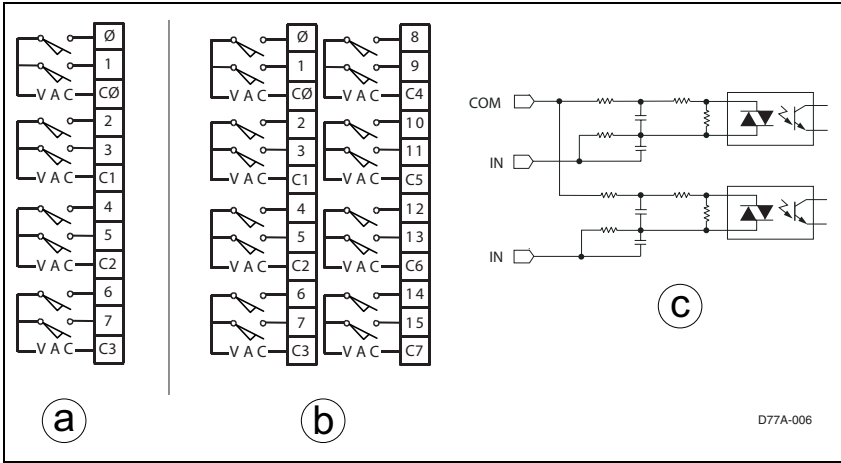


Figure 4: AC Input Module Diagrams

a) D77A-AI8, Eight-Point Module

b) D77A-AI16, Sixteen-Point Module

c) Internal Circuit

DC Input Module Specifications

Table 13: DC Input Module Specifications

Catalog Number	D77A-DI8	D77A-DI16
Type	Sink/Source	Sink/Source
Nominal Input Voltage	24V DC	24V DC
Operating Voltage	18 – 30V DC	18 – 30V DC
Number of Inputs	8	16
Points per Common	2	2
Signal Delay	5 ms	5 ms
OFF State Voltage	0 – 6V DC *	0 – 6V DC *
ON State Voltage	18V – 30V DC	18V – 30V DC
Nominal Input Current	5 mA	5 mA
QCPort Current Draw	35 mA	63 mA
Isolation	1.5kV	1.5kV
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	4.5 inch-pounds (0.51 Newton-meters)

* A 12V transition range exists between 6V and 18V.

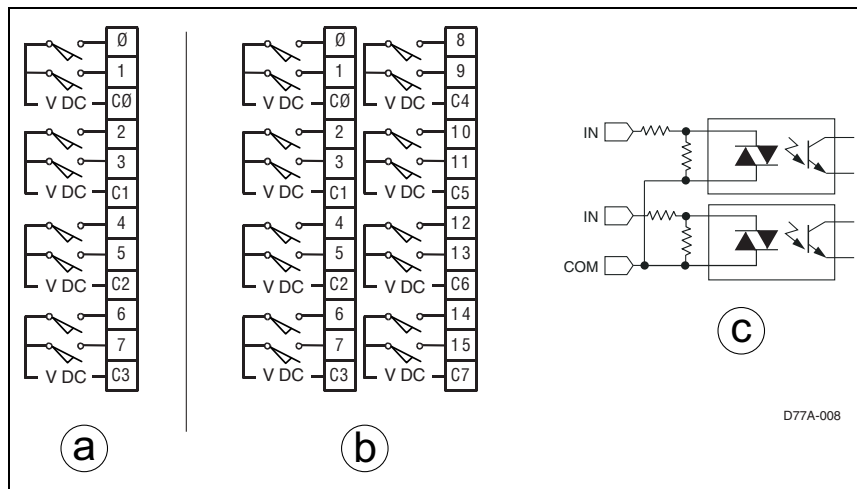


Figure 5: DC Input Module Diagrams

- a) D77A-DI8, Eight-point Module
- b) D77A-DI16, Sixteen-point Module
- c) Internal Circuit

Analog Input Module Specifications**Table 14: D77A-NI4 Analog Input Module Specifications**

Catalog Number		D77A-NI4				
		Voltage Input		Current Loop Input		
Voltage Input		0 – 5V, 1 – 5V, 0 – 10V DC		—		
Current Input		—		4 – 20 mA, 0 – 20 mA		
Input Type		Single End, Uni-polar				
Resolution Note: Input filter settings affect the effective resolution of the channels.	50Hz	Voltage	Resolution	Current	Resolution	
		0-5VDC	14 bit	0-20mA	14 bit	
		0-10VDC	14 bit	4-20mA	14 bit	
		1-5VDC	14 bit			
		60Hz	0-5VDC	14 bit	0-20mA	14 bit
			0-10VDC	14 bit	4-20mA	14 bit
	1-5VDC		14 bit			
	250Hz	0-5VDC	14 bit	0-20mA	12 bit	
		0-10VDC	13 bit	4-20mA	12 bit	
		1-5VDC	12 bit			
	500Hz	0-5VDC	9 bit	0-20mA	9 bit	
		0-10VDC	10 bit	4-20mA	9 bit	
1-5VDC		9 bit				
Input Full Scale Range		0 – 10.5V or 0 – 5.25V		0 – 21 mA		
Maximum Overload at Input Terminal		30VDC		32 mA		
Number of Channels		4				
Selectable Input Filter Frequency		50Hz, 60Hz, 250Hz, 500Hz				
Input Group-to-Bus Isolation		500 VAC for 60 seconds				
Common Mode Rejection		Greater than 60 db @ 50/60 Hz				
Normal Mode Rejection ratio		-50 db @ 50/60 Hz				
Accuracy		+/- 0.3% Full Scale @ 25°C +/- 0.4% Full Scale @ 0-55°C		+/- 0.45% Full Scale @ 25°C +/- 0.5% Full Scale @ 0-55°C		
Input Impedance		15M ohm		250 ohm		
Operating Temperature		0–55°C				
Status LED Indication		Module Status				
QCPort Current Draw		60 mA				
Terminal Screw Torque		4.5 inch-pounds (0.51 Newton-meters)				

(See Figure 6 for circuit diagram)

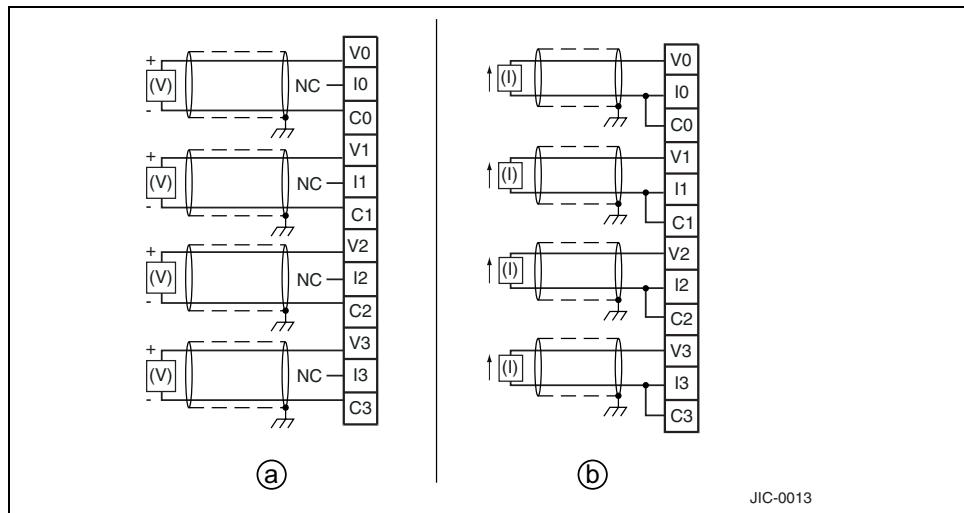


Figure 6: D77A-NI4 Analog Input Module Diagrams

a) D77A-NI4 Voltage Input Channels

b) D77A-NI4 Current Input Channels

(See D77A-NI4 Analog Input Module Specifications on page 10)

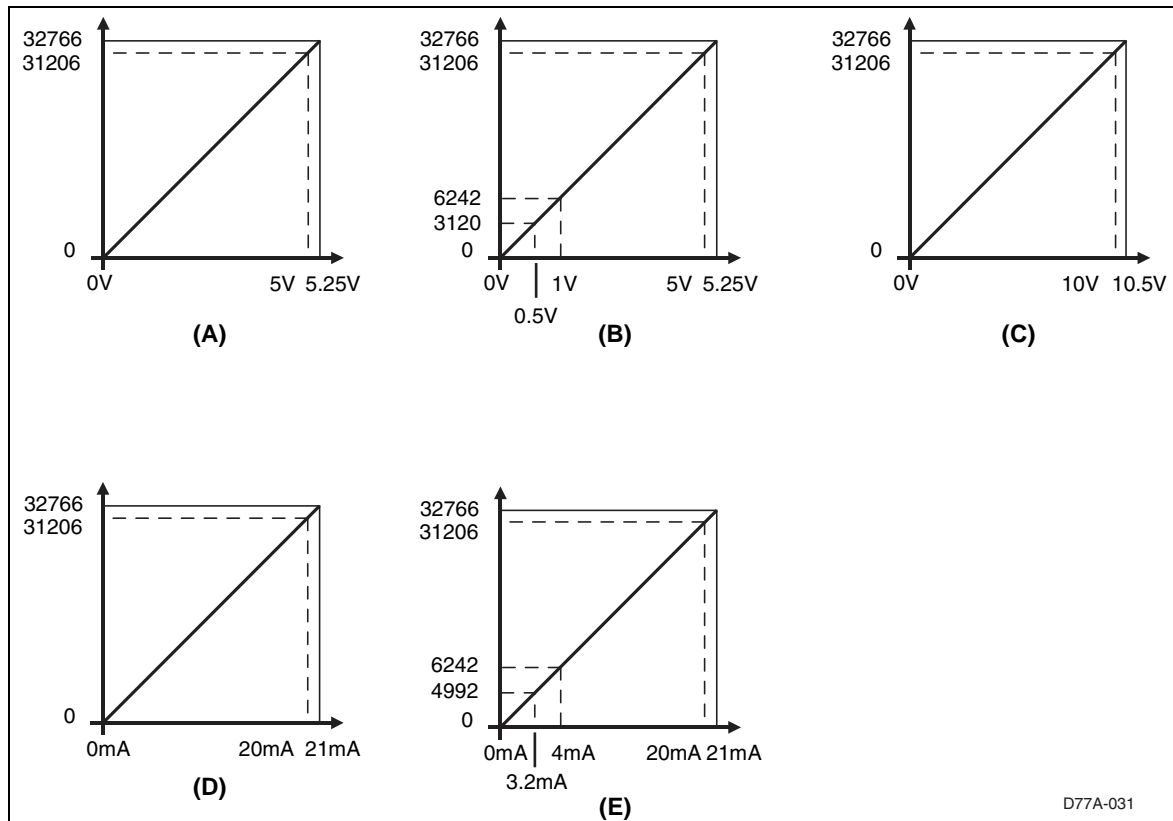


Figure 7: Analog Input Curves

- a) 0-5V Range Setting with Binary Values
- b) 1-5V Range Setting with Binary Values
- c) 0-10V Range Setting with Binary Values
- d) 0-20mA Range Setting with Binary Values
- e) 4-20mA Range Setting with Binary Values

14 Bit Resolution Equations

Vdc = Voltage input value

mA = Current input value

N = 14 bit value

0-5 Vdc, 1-5 Vdc

- $Vdc = (1/6241.2) \times N$

0-10 Vdc

- $Vdc = (1/3120.6) \times N$

4-20 mA, 0-20 mA

- $mA = (1/1560.2) \times N$

Output Specifications

AC Output Module Specifications

Table 15: AC Output Module Specifications

Catalog Number	D77A-AQ8	D77A-AQ16
Nominal Output Voltage	120V AC, 50/60 Hz	120V AC, 50/60 Hz
Operating Voltage	80 – 140V AC, 50/60 Hz	80 – 140V AC, 50/60 Hz
Number of Outputs	8	16
Points per Common	2	2
Minimum Load Current (Resistive)	15 mA	15 mA
Max. Current/Point (Resistive)	.5A @ 30°C .1A @ 55°C	.5A @ 30°C .1A @ 55°C
Max. Current/Module (Resistive)	.4A @ 30°C .8A @ 0-55°C	8A @ 30°C 1.6A @ 0-55°C
Surge Current (10 ms)	10A	10A
OFF State Leakage	2 mA	2 mA
Signal Delay	8.33 ms @ 60 Hz 10 ms @ 50 Hz	8.33 ms @ 60 Hz 10 ms @ 50 Hz
QCPort Current Draw	120 mA	220 mA
Isolation	1.5kV	1.5kV
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	4.5 inch-pounds (0.51 Newton-meters)

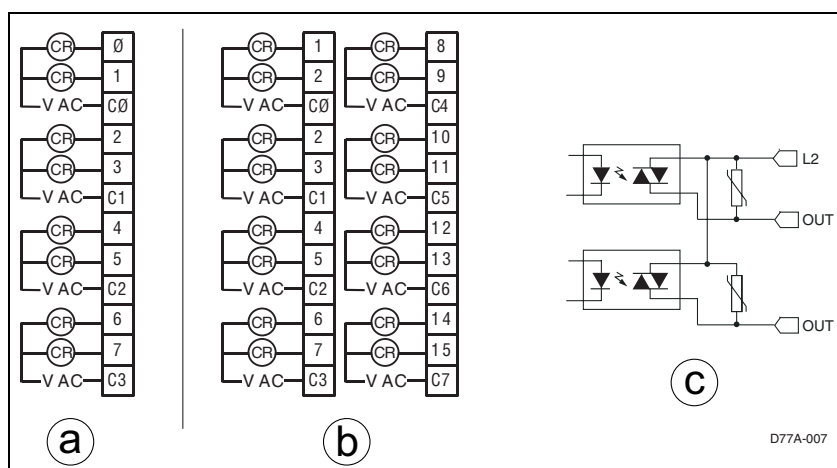


Figure 8: AC Output Module Diagrams

- a) D77A-AQ8, Eight-Point Module
- b) D77A-AQ16, Sixteen-Point Module
- c) Internal Circuit

DC Output Module Specifications

Table 16: DC Output Module Specifications

Catalog Number	D77A-DQ8	D77A-DQ16
Type	MOSFET Sink	MOSFET Sink
Nominal Output Voltage	24V DC	24V DC
Operating Voltage	18 – 30V DC	18 – 30V DC
Number of Inputs	8	16
Points per Common	4	4
Signal Delay	1 ms	1 ms
Max. Current/Point	0.75A	0.75A
Max. Current/Module (Resistive)	6A	12A
Surge Current (10 ms)	4A	4A
OFF State Leakage	1 mA	1 mA
QCPort Current Draw	85 mA	126 mA
Isolation	1.5kV	1.5kV
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	4.5 inch-pounds (0.51 Newton-meters)

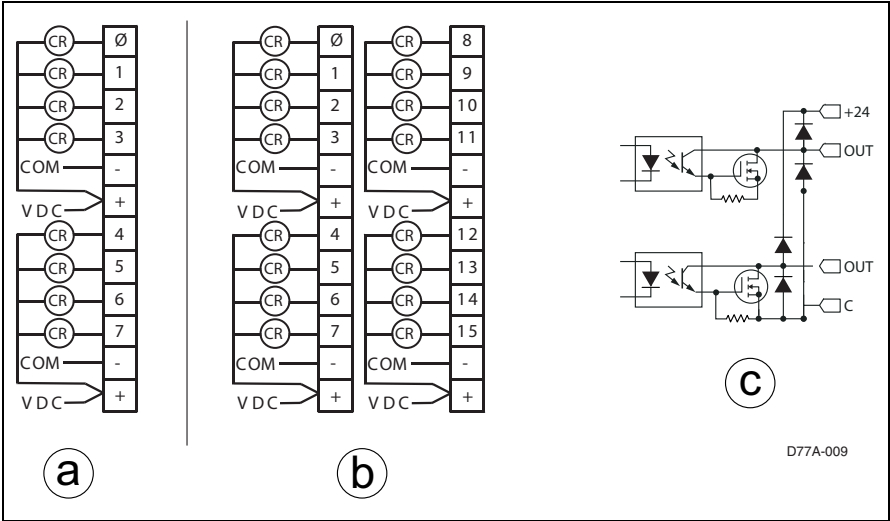


Figure 9: DC Output Module Diagrams

a) D77A-DQ8, Eight-Point Module

b) D77A-DQ16, Sixteen-Point Module

c) Internal Circuit

Relay Output Module Specifications

Table 17: Relay Output Module Specifications

Catalog Number	D77A-RQ8	D77A-RQ16
Nominal Output Voltage	0 – 140V AC 0 – 30V DC	0 – 140V AC 0 – 30V DC
Number of Outputs	8	16
Points per Common	2	2
Relay OFF Time	6 ms	6 ms
Relay ON Time	3 ms	3 ms
Max. Current/Point (Resistive)	3 A	3 A
Max. Current/Module (Resistive)	24 A	48 A
Electrical Life	100,000 Cycles	100,000 Cycles
Mechanical Life	1,000,000 Cycles	1,000,000 Cycles
QCPort Current Draw	92 mA	164 mA
Isolation	1.5 kV	1.5 kV
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	4.5 inch-pounds (0.51 Newton-meters)

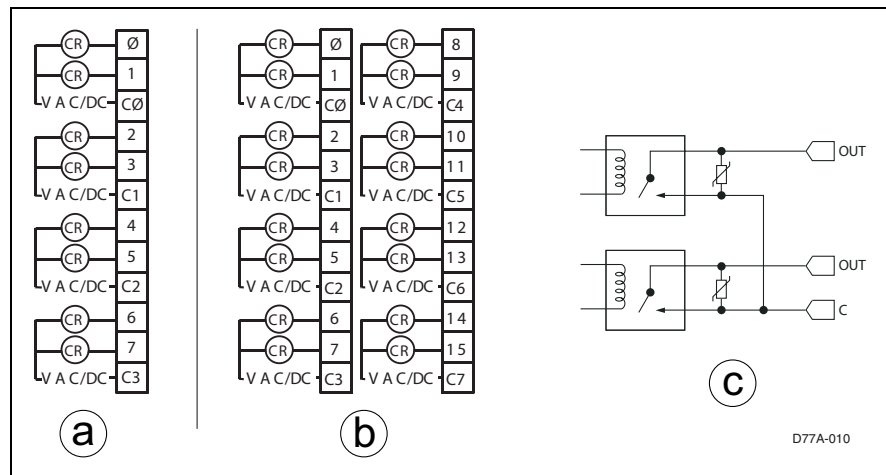


Figure 10: Relay Output Module Diagrams

- a) D77A-RQ8, Eight-point Module
- b) D77A-RQ16, Sixteen-point Module
- c) Internal Circuit

Analog Output Module Specifications

Table 18: D77A-NQ2 Analog Output Module Specifications

Catalog Number	D77A-NI4			
	Voltage Output		Current Loop Output	
Voltage Output	0 – 5V, 1 – 5V, 0 – 10V DC		—	
Current Output	—		4 – 20 mA, 0 – 20 mA	
Output Type	Single End, Uni-polar			
Resolution	Voltage	Resolution	Current	Resolution
	0-5VDC	13bit	0-20mA	14 bit
	0-10VDC	14 bit	4-20mA	14 bit
	1-5VDC	13 bit		
Output Full Scale Range	0 – 10.5V or 0 – 5.25V		0 – 21 mA	
Maximum Overload at Input Terminal	36V DC			
Number of Channels	2			
Resistive Load	—		Less than 500 ohms	
Load Range	Greater than 1k ohm		—	
Maximum Inductive Load	—		0.1 mH	
Maximum Capacitive Load	1 µF		—	
Accuracy	+/- 0.8% Full Scale @ 25°C +/- 1.0% Full Scale @ 0-55°C			
Update Rate	350 NS			
Output Impedance	10 ohm			
Output Ripple (0-50 Hz)	+/-0.1%			
Operating Temperature	0–55°C			
Status LED Indication	Module Status			
QCPort Current Draw	40 mA			
External Power	24 VDC, 60 mA Maximum			
Output group-to-bus Isolation	1.5kV for 60 Sec.			
Terminal	12 Pins (Pitch, 5.2 mm)			
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)			

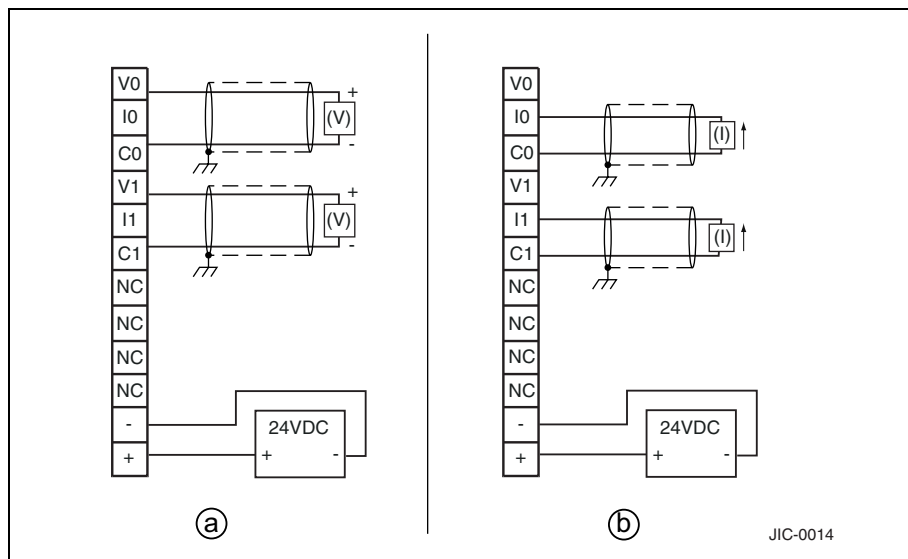


Figure 11: D77A-NQ2 Combination Module Diagrams

a) D77A-NQ2 Module, Voltage Output Channels

b) D77A-NQ2 Module Current Output Channels

See D77A-NQ2 Analog Output Module Specifications on page 16

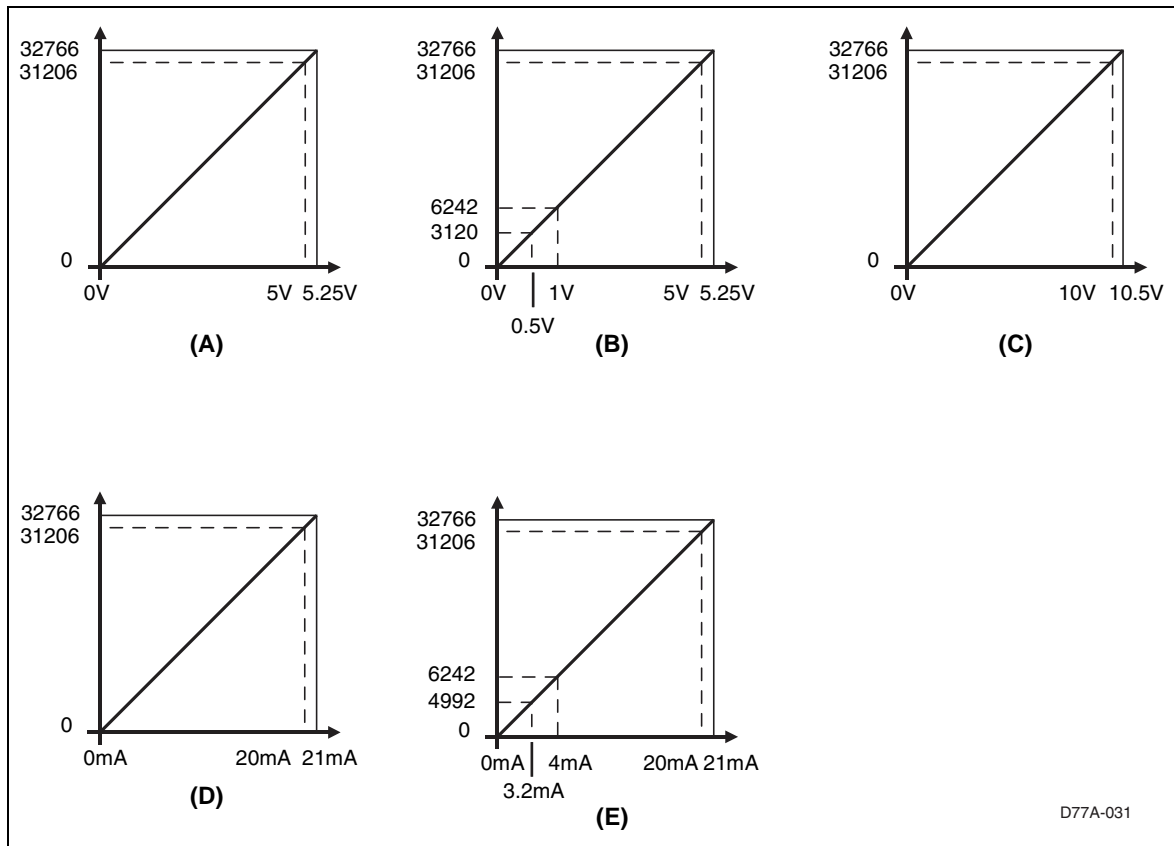


Figure 12: Analog Output Curves for 14 Bit Resolution

- a) 0-5V Range Setting
- b) 1-5V Range Setting
- c) 0-10V Range Setting
- d) 0-20mA Range Setting
- e) 4-20mA Range Setting

14 Bit Resolution Equations

Vdc = Voltage input value

mA = Current input value

N = 14 bit value

0-5 Vdc, 1-5 Vdc

- $Vdc = (1/6241.2) \times N$

0-10 Vdc

- $Vdc = (1/3120.6) \times N$

4-20 mA, 0-20 mA

- $mA = (1/1560.2) \times N$

Special I/O Specifications

Combination Module Specifications

Table 19: D77A-DI8DQ8 Combination Module Specifications

Catalog Number	D77A-DI8DQ8	
	DC Sink/Source Input	DC MOSFET Sink Output
Nominal Voltage	24V DC	24V DC
Operating Voltage	18 – 30V DC	18 – 30V DC
Number of Points	8	8
Points per Common	2	2
Signal Delay	5 ms	—
OFF State Voltage	0 – 6V DC *	—
ON State Voltage	18V – 30V DC	—
Nominal Current	5 mA	—
Signal Delay	—	1 ms
Max. Current/Point (Resistive)	—	0.75A
Max. Current/Module (Resistive)	—	6A
Surge Current (10 ms)	—	4A
OFF State Leakage	—	1 mA
QCPort Current Draw	99 mA	
Isolation	1.5kV	
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	

* A 12V transition range exists between 6V and 18V.

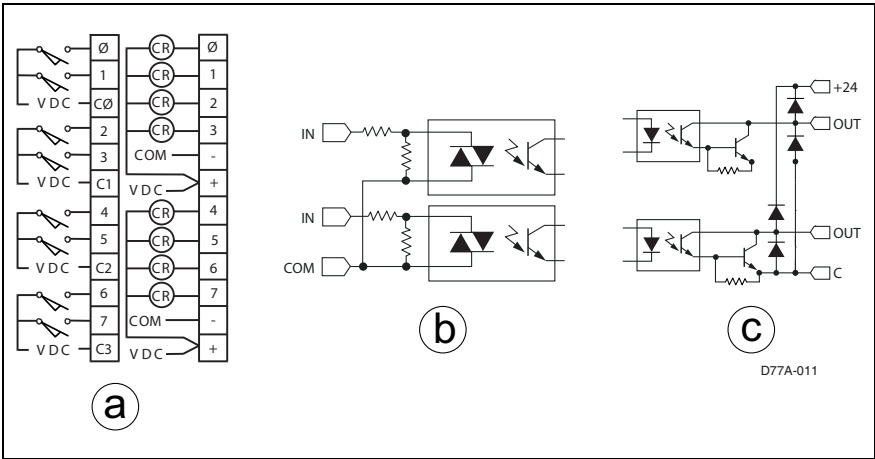


Figure 13: D77A-DI8DQ8 Combination Module Diagrams

- a) D77A-DI8DQ8 Module
- b) Internal DC Input Circuit
- c) Internal DC Output Circuit

Table 20: D77A-DI8RQ8 Combination Module Specifications

Catalog Number	D77A-DI8RQ8	
	DC Sink/Source Input	Relay Output
Nominal Voltage	24V DC	—
Operating Voltage	18-30V DC	0-140V AC 0-30V DC
Number of Points	8	8
Points per Common	2	2
Signal Delay	5 ms	—
OFF State Voltage	0-6V DC *	—
ON State Voltage	18V-30V DC	—
Nominal Current	5 mA	—
Signal Delay	—	Relay ON Time 3 ms Relay OFF Time 6 ms
Max. Current/Point (Resistive)	—	3A
Max. Current/Module (Resistive)	—	24A
Mechanical Life	—	1,000,000 Operations
Electrical Life	—	100,000 Operations
QCPort Current Draw	121 mA	
Isolation	1.5kV	
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	

* A 12V transition range exists between 6V and 18V.

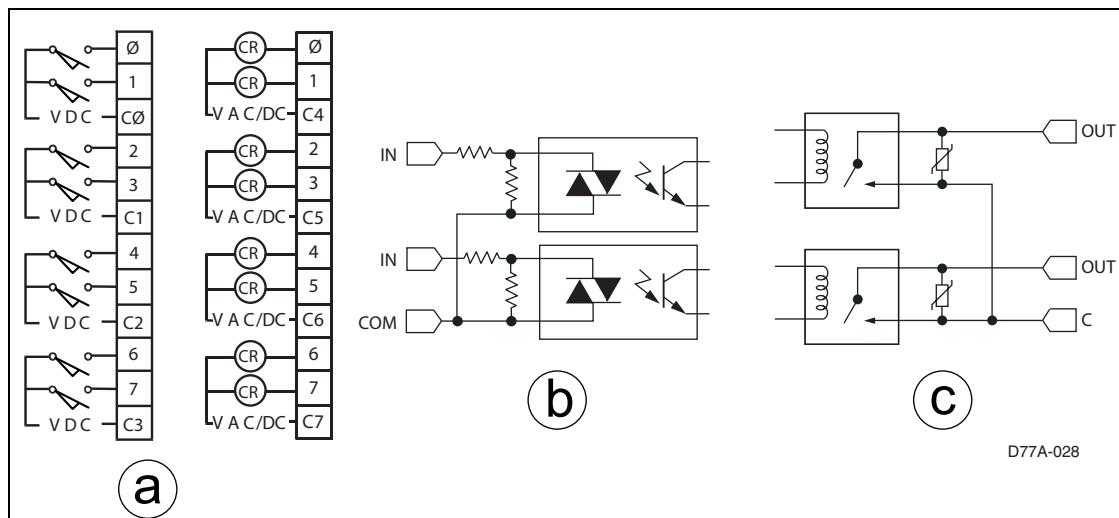


Figure 14: D77A-DI8RQ8 Combination Module Diagrams

- a) D77A-DI8RQ8 Module
- b) Internal DC Input Circuit
- c) Internal Relay Output Circuit

Table 21: D77A-AI8AQ8 Combination Module Specifications

Catalog Number	D77A-AI8AQ8	
	AC Input	AC Output
Nominal Voltage	120V AC, 50/60 Hz	120V AC, 50/60 Hz
Operating Voltage	80-140V AC	80-140 V AC
Number of Points	8	8
Points per Common	2	2
OFF State Voltage	0-30V AC *	—
ON State Voltage	80V-140V AC	—
Minimal Load Current (Resistive)	15 mA	—
Signal Delay	8.33 ms @ 60 Hz 10 ms @ 50 Hz	
Max. Current/Point (Resistive)	0.5A @ 30°C 0.1A @ 55°C	
Max. Current/Module (Resistive)	4A @ 30°C 0.8A @ 55°C	
Surge Current (10 ms)	10A	
OFF State Leakage	2 mA	
QCPort Current Draw	132 mA	
Isolation	1.5kV	
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	

* A 50V transition range exists between 30V and 80V.

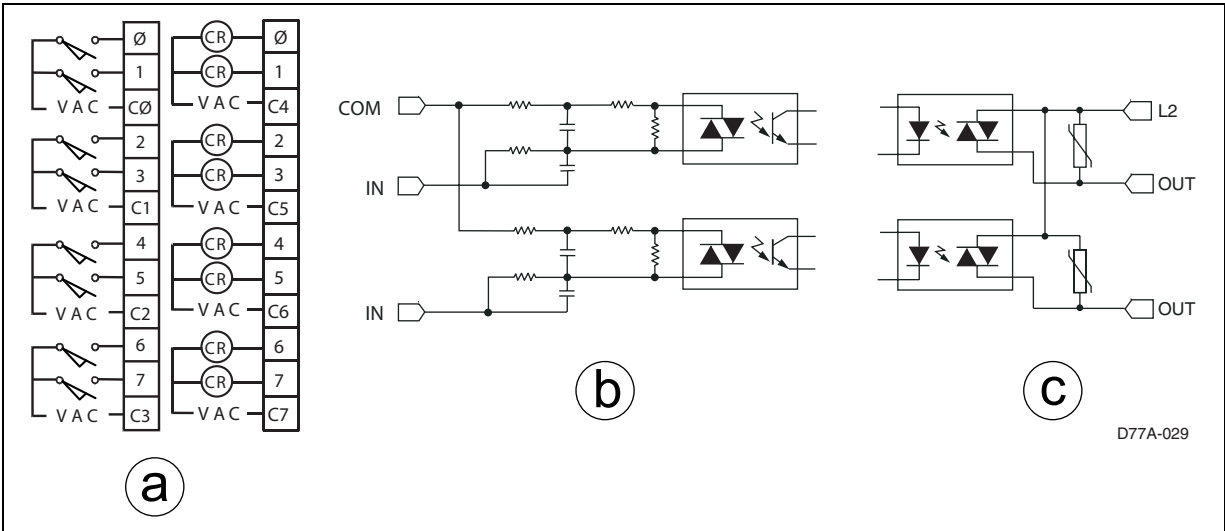


Figure 15: D77A-AI8AQ8 Combination Module Diagrams

- a) D77A-AI8AQ8 Module
- b) Internal AC Input Circuit
- c) Internal AC Output Circuit

Table 22: D77A-AI8RQ8 Combination Module Specifications

Catalog Number	D77A-AI8RQ8	
	AC Input	Relay Output
Nominal Voltage	120V AC, 50/60 Hz	—
Operating Voltage	80-140V AC	0-140V AC 0-30V DC
Number of Points	8	8
Points per Common	2	2
Signal Delay	5 ms	—
OFF State Voltage	0-80V AC*	—
ON State Voltage	180V-140V AC	—
Maximum Load Current (Resistive)	15 mA	—
Signal Delay	8.33 ms @ 60 Hz 10 ms @ 50 Hz	Relay ON Time 3 ms Relay OFF Time 6 ms
Max. Current/Point (Resistive)	—	3A
Max. Current/Module (Resistive)	—	24A
Mechanical Life	—	1,000,000 Operations
Electrical Life	—	100,000 Operations
QCPort Current Draw	104 mA	
Isolation	1.5kV	
Terminal Screw Torque	4.5 inch-pounds (0.51 Newton-meters)	

* A 60V transition range exists between 80V and 140V.

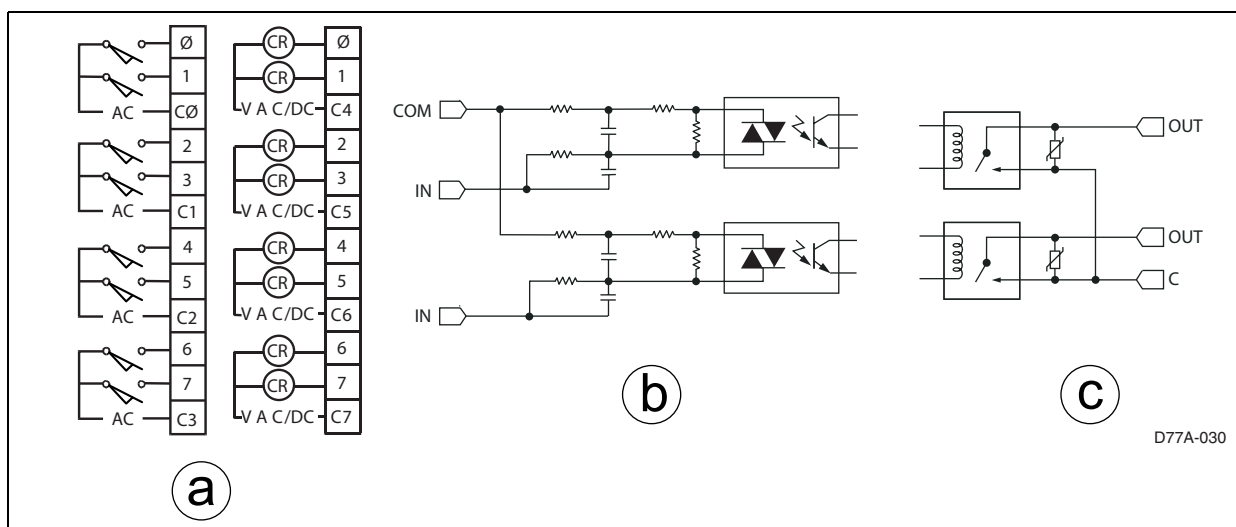


Figure 16: D77A-AI8RQ8 Combination Module Diagrams

- a) D77A-AI8RQ8 Module
- b) Internal DC Input Circuit
- c) Internal Relay Output Circuit

Theory of Operation

The IT D77A I/O system consists of a collection of input and output modules connected together by QCPort to a network adapter. The network adapter connects to the industrial network where the controller usually is a PLC or DCS. The input modules collect digital or linear signals from sensors (limit switches, proximity sensors, temperature transmitters, etc.) and deliver these data to the control device. In the control device, input data values are placed in data registers. Based on the input data, the control algorithm manipulates values in the output registers. With each scan of the network, the input and output data registers are updated. With this update, the output modules have their digital or linear data changed to reflect the control algorithm found in the control device software. The output devices (solenoid valves, motor starters, temperature gauges, etc.) effect changes to the machinery being controlled.

Out-of-box Default Operation

When the IT D77A I/O modules are properly installed and each has a properly configured Group ID (address), no additional configuration is needed for standard operation. To customize the configuration, refer to *Configuration on page 34*. After customizing the configuration, the system can be restored to the default out-of-box configuration without a software tool such as CH Studio by following these steps.

1. Using a screwdriver, rotate the Group ID Switch from the "0" position to the "1" position.
2. Repeat this action five times.

The status LED rapid flashes, signaling that the system is reset to the out-of-box default settings.

Typical Application

Figure 17 illustrates a typical D77A I/O module application this is integrated with a number of IT starters with QSNAPs. In this example, a D77A I/O is part of a larger system where motor control and I/O are required within a single panel. On the same QCPort connection, both the I/O and the motor control are connected to a single network Adapter. The network adapter then represents the D77A I/O and motor control as remote I/O, allowing for control and monitoring of the QCPort devices.

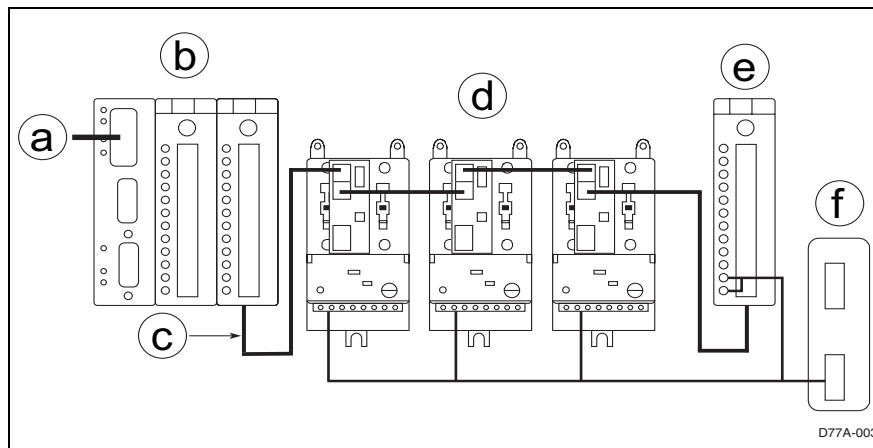


Figure 17: Panel Layout: Adapter, I/O and QSNAP

- a) PC or PLC Connection
- b) I/O Modules
- c) QCPort Connection
- d) IT Starters with QSNAPs
- e) Power Tap/Terminator Resistor
- f) 24 V DC Power Supply

I/O Function

Discrete Input Modules

Figure 18 illustrates the basic signal processing operation. When a signal is present at the input point, the module responds with the following sequence:

1. Optical Isolation — Optical isolation protects the I/O circuits and communication circuits from possible damage due to transients and over-voltage.
2. Debounce Logic/Control — A debounce circuit and software limits the effects of transients and electrical noise by requiring the input to be true for a certain period of time before the logic acknowledges a true signal. Once a true signal is achieved, the logic turns on the LED.
3. QCPort Com./Logic — The logic updates the QCPort communication on a regular, scheduled basis as to the status of the input point.

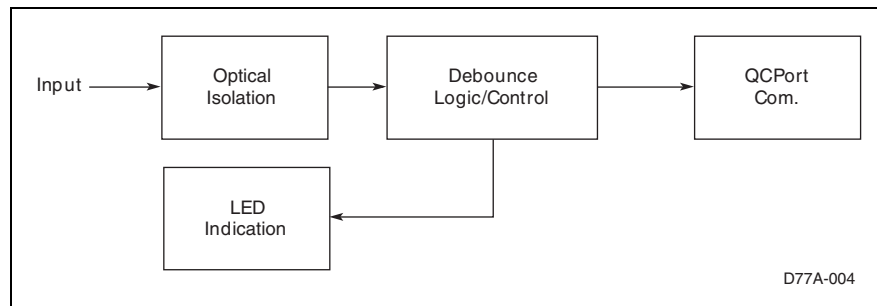


Figure 18: Discrete Input Module Operation

Discrete Output Modules

Figure 19 illustrates the basic logic processing operation. When the processor activates an output point, the module responds with the following sequence:

1. QCPort Com./Logic — QCPort communication updates the logic circuit on a regular, scheduled basis as to the status of the output points.
2. Optical Isolation — Optical isolation protects the I/O circuits and communication circuits from possible damage due to transients and over-voltage. Once an active signal is transmitted to the optical isolation circuit, the LED is forward-biased.
3. Output Drivers — The driver activates the output point.

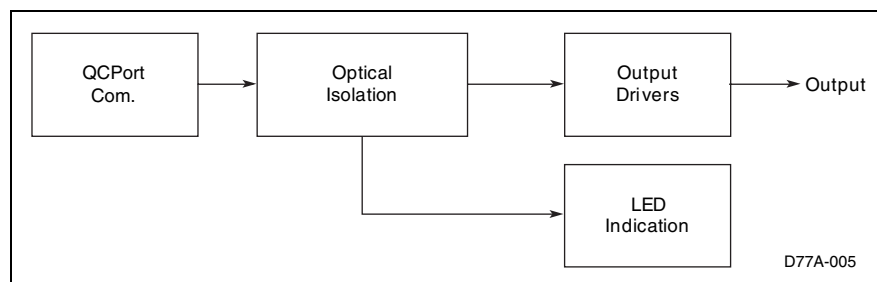


Figure 19: Discrete Output Module Operation

Discrete Combination Modules

Combination modules have the properties of both input and output points in a single module. The behavior of the combination module's input and output points are the same as those found in discrete input and output modules.

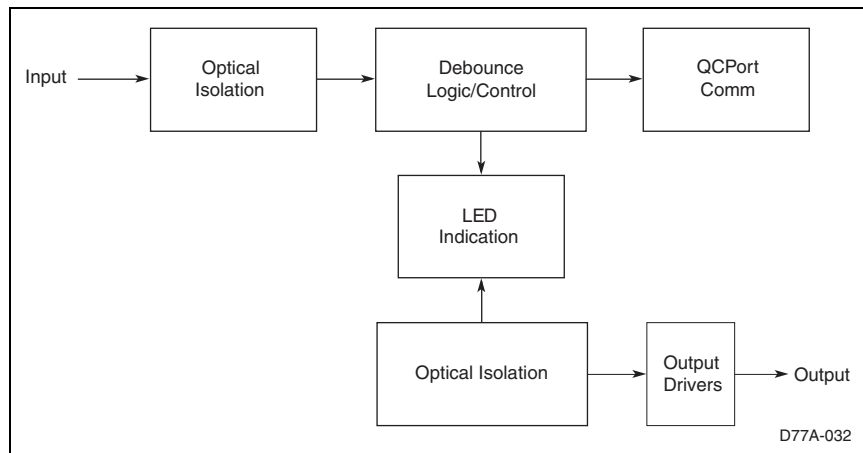


Figure 20: Discrete Combination Module Operation

Analog Input Modules

Figure 21 illustrates the basic signal processing operation. Analog signals from four separate channels are received by a multiplexer (MUX). The MUX sequentially transfers this data to an analog-to-digital converter (ADC). The ADC measures the analog signal and converts it to a digital value. This digital value is presented to the controller's central processes unit (CPU). This data is then presented to the QCPort for external processing.

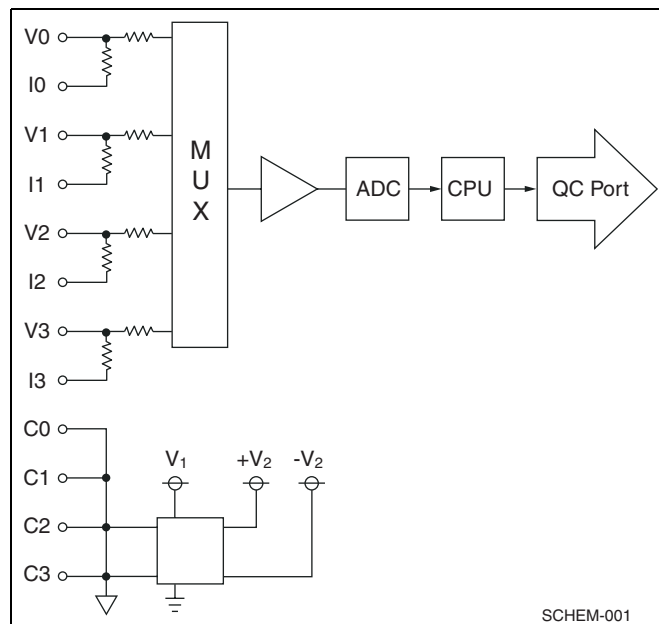


Figure 21: Analog Input Module Operation

Analog input signal delays are associated with multiplexer switching, channel updating and channel reconfiguration. These delays are all influenced by analog input filter frequency selection.

Table 23: Analog Input Signal Delays

Filter Setting	Total Update Time
50 Hz	336 ms
60Hz	283.2 ms
250 Hz	80 ms
500 Hz	44 ms

Analog Output Modules

Figure 22 illustrates the basic signal processing operation. Digital data from external sources are extracted from the QCPort and transferred to the controller's central processor unit (CPU). The digital data from the CPU is transferred to the digital-to-analog converters (DAC). The DAC system converts the digital values to linear signals and provides them to the output terminals.

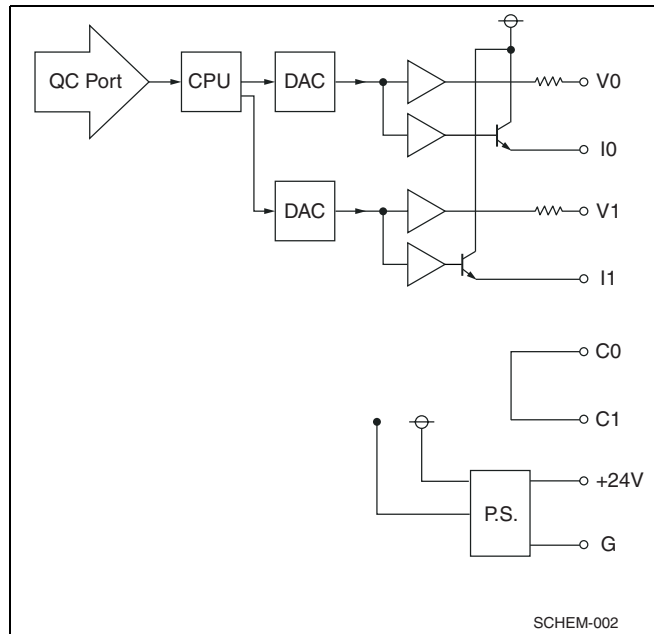


Figure 22: Analog Output Module Operation

Installation

⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.	Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner de graves blessures, voire la mort.	Indica que existe una situación potencialmente peligrosa, que si no es evitada, podrá resultar en serias heridas corporales o en la muerte.

Setting Group ID

A unique Group ID must be assigned to each module. The modules are shipped with a factory-set default setting of zero.

To set the Group ID, use a screwdriver to rotate the rotary switch located on the top of the module.

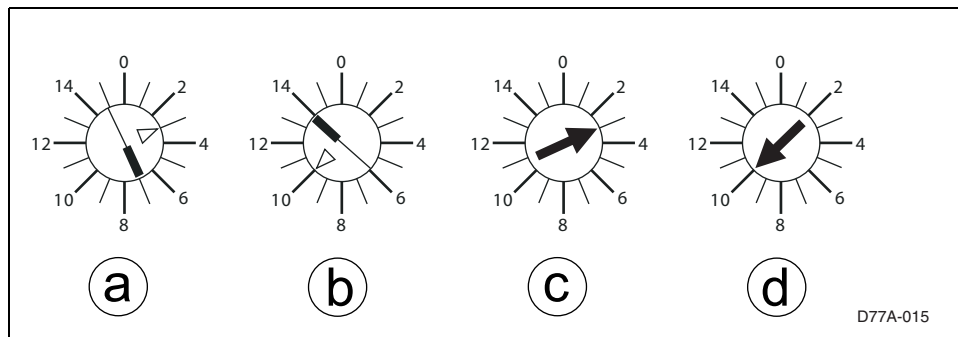


Figure 23: Group ID Switch

- a) Discrete I/O Group ID Three
- b) Discrete I/O Group ID Ten
- c) Analog I/O Group ID Three
- d) Analog I/O Group ID Ten

Notice	Avis	Aviso
In the examples above, the left module has a Group ID of 3 and the right a Group ID of 10. The arrow indicates the Group ID setting (not the line). Refer to the <i>IT. QCPort System Install and Planning Guide</i> (Publication No. MN05001002E) for more information on setting the Group ID.	Dans les exemples ci-dessus, le module de gauche porte un numéro d'identification de groupe n° 3 et celui de droite un de 10. La flèche indique le réglage du numéro d'identification de groupe (non pas la ligne). Reportez-vous au <i>Guide de planification et d'installation du système bâbord IT. QCPort</i> (publication n° MN05001002E) pour plus d'information sur les réglages du numéro d'identification de groupe.	En los ejemplos de arriba, el módulo izquierdo tiene una identificación de Grupo 3 y el de la derecha una identificación de Grupo 10. La flecha indica la configuración de identificación de Grupo (no la línea). Refiérase a la <i>Guía de Planificación e Instalación del Sistema QCPort del IT.</i> (Publicación No. MN05001002E) para obtener más información de cómo configurar la identificación de Grupo.

DIN rail installation requires one of two procedures:

- DIN Rail installation without Backplane
- DIN Rail installation with Backplane

Installation Without Backplane

Module Preparation

The DIN rail locking tab is located under the removable terminal on the front of the device. Remove the terminal to gain access to the locking tab.

1. Remove the terminal by unlocking the terminal tabs.

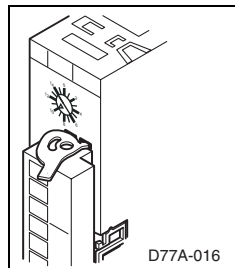


Figure 24: Removable Terminal Locking Tabs

2. Remove the terminal strip from the module.
3. Insert a screwdriver under the DIN rail locking tab and lift up to unlock the locking tab.

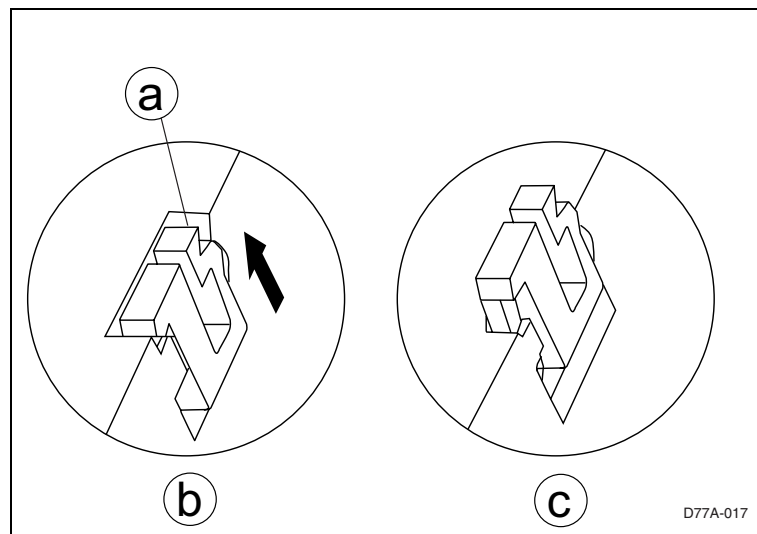


Figure 25: Unlock DIN Rail Locking Tab

- a) Tab
- b) Locking Tab Captured
- c) Locking Tab Released

Installing the Module

The module is now ready for installation on the DIN rail.

⚠ CAUTION	⚠ PRÉCAUTION	⚠ PRECAUCIÓN
Do no “rock” the module onto the DIN rail. The rocking action could damage the module.	Ne « basculez » pas le module sur le rail DIN. L'action de basculement pourrait endommager le module.	No “meza” el módulo sobre el riel DIN. El mecerlo podrá dañar el módulo.

1. The module must always be inserted perpendicular onto the DIN rail. Push the module straight back onto the DIN rail.
2. Depress the locking tab to secure the module to the DIN rail.

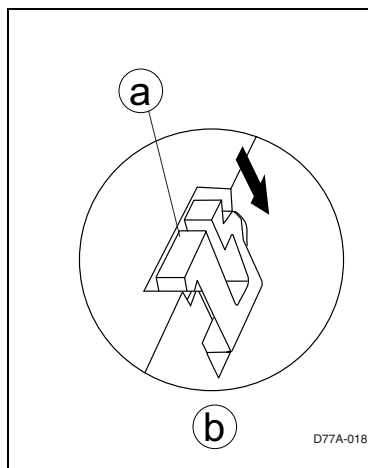


Figure 26: Lock DIN Rail Locking Tab

- a) Locking Tab
b) Locking Tab Captured

3. Install the terminal strip on the front of the module.
4. Lock the terminal strip into place using the locking tabs.

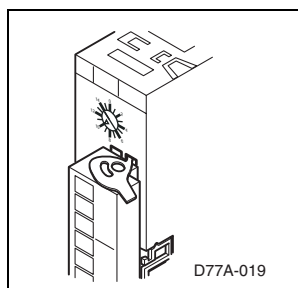


Figure 27: Removable Terminal Locking Tab

Notice	Avis	Aviso
After the strip is installed, install interconnects; see the <i>IT. QCPort System Install and Planning Guide</i> (Publication No. MN05001002E) for more information.	Après avoir installé la bande, installez les interconnecteurs : voyez le <i>Guide de planification et d'installation du système bâbord IT. QCPort</i> (publication n° MN05001002E) pour plus d'information.	Después de instalada la banda, instale los interconectores, vea la <i>Guía de Planificación e Instalación del Sistema QCPort del IT.</i> (Publicación No. MN05001002E) para obtener más información.

Installation With Backplane

Module Preparation

The DIN rail locking tab is underneath the removable terminal (on the front of the device). The terminal must be removed to gain access to the locking tab.

1. To remove the terminal, unlock the terminal tabs.

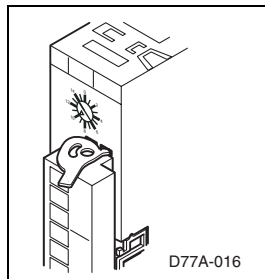


Figure 28: Removable Terminal Locking Tabs

2. Remove the terminal strip from the module.
3. Insert a screwdriver under the DIN rail locking tab and lift up to unlock the locking tab.

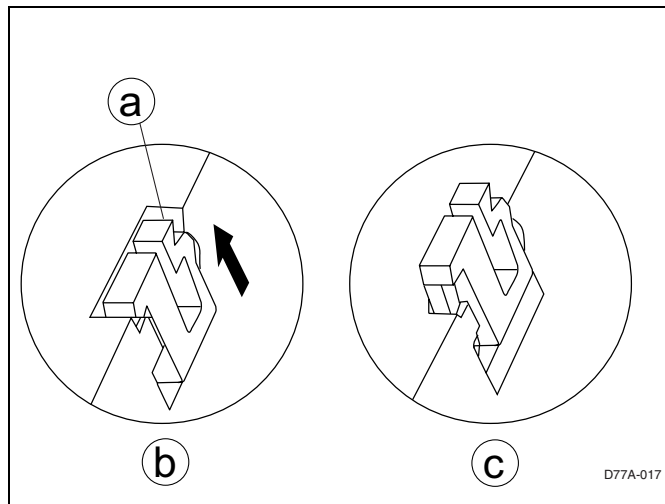


Figure 29: Unlock DIN Rail Locking Tab

- a) Tab
- b) Locking Tab Captured
- c) Locking Tab Released

Installing the Module

The module is now ready for installation on the DIN rail.

⚠ CAUTION	⚠ PRÉCAUTION	⚠ PRECAUCIÓN
Do not "rock" the module onto the DIN rail. The rocking action could damage the module.	Ne « basculez » pas le module sur le rail DIN. L'action de basculement pourrait endommager le module.	No "meza" el módulo sobre el riel DIN. El mecerlo podrá dañar el módulo.
<ol style="list-style-type: none"> 1. Line the center of the module up with the backplane connector on the DIN rail. Ensure the backplane connector is installed with the arrows up. The module must always be inserted perpendicular onto the DIN rail. 2. Push the module straight back onto the DIN rail and backplane connector. 3. Depress the locking tab to secure the module to the DIN rail. 		

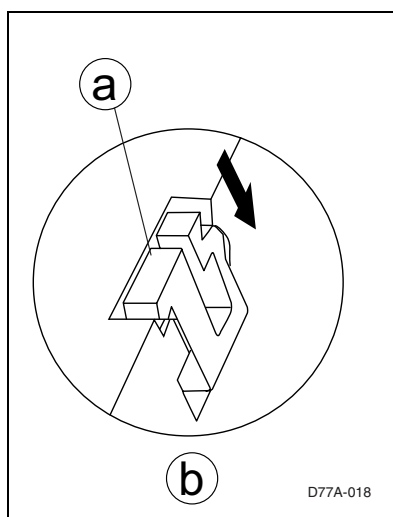


Figure 30: Lock DIN Rail Locking Tab

- a) Locking Tab
b) Locking Tab Captured

4. Install the terminal strip on the front of the module.
5. Lock the terminal strip into place using the locking tabs.

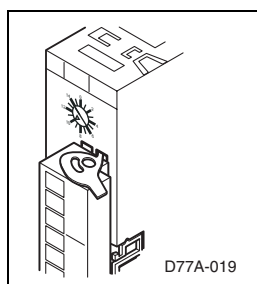





Figure 31: Removable Terminal Locking Tab

QCPort Connections

 WARNING	 AVERTISSEMENT	 ADVERTENCIA
Hazardous voltage can cause electric shock and burns. Always disconnect power before proceeding with any work on this product.	La tension dangereuse peut causer des électrochocs et des brûlures. Coupez toujours le courant avant d'entreprendre tout travail sur ce produit.	Los voltajes peligrosos pueden causar electrochoque y quemaduras. Siempre desconecte la energía antes de proceder con cualquier trabajo en este producto.

Interconnects/Connections

Connecting the I/O modules together and to other IT family products involves using one or more of the interconnect connectors. The I/O product family uses two types of connectors:

- The backplane interconnect
- The short run interconnect

These interconnects provide the I/O module with power and communications.

For more information on making interconnects, the use of interconnects and the restrictions placed upon interconnects, refer to the IT QCPort System Install and Planning Guide (Publication No. MN05001002E).

QCPort Backplane Interconnect

The QCPort backplane interconnect is used when connecting the Adapter and I/O modules on a DIN rail. The interconnect fits inside the channel of the DIN rail and provides for connection to power and communication to the Adapter and I/O products (Figure 32 and Figure 33).

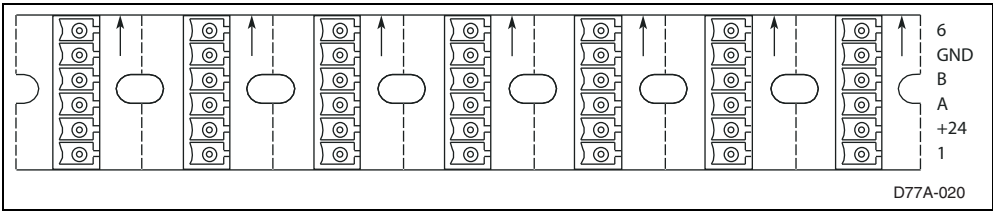


Figure 32: QCPort Backplane Interconnect

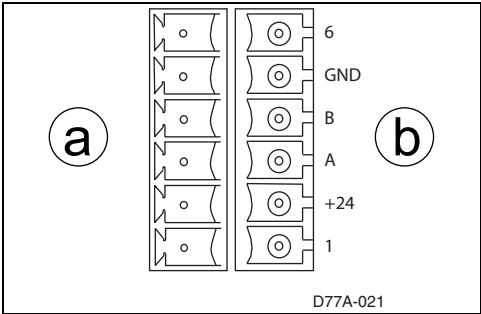


Figure 33: QCPort Interconnect Backplane Connectors

- a) Module Side
b) Backplane Side

Pre-manufactured QCPort Interconnect Cables

To connect the D77A I/O modules together without using a QCPort backplane, use the QCPort connectors that are located at the bottom of the D77A I/O module. There are two QCPort connections next to each other. They are configured parallel with each other so that they can be daisy chained together using QCPort Interconnect cables. There are standard sizes for the QCPort Interconnect cables. These sizes are listed in the "Renewal Parts" portion of "Troubleshooting and Maintenance."

When making this interconnect, refer to the *IT. QCPort System Install and Planning Guide* (Publication No. MN05001002E) for the recommended cable and connections.

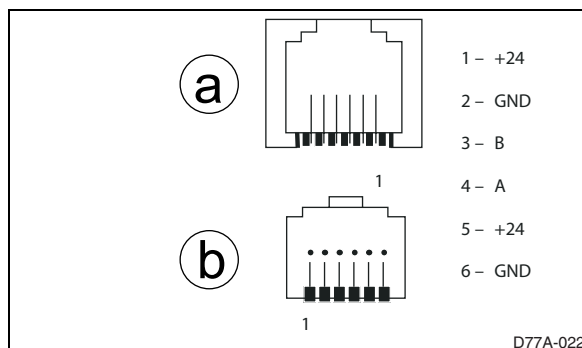


Figure 34: QCPort Connector

a) Connector Half

b) Keyed Insert

Configuration

There are parameters associated with the D77A I/O products that can be set using a software tool such as CH Studio to enhance the functionality of the D77A I/O products.

All of the enhanced features are selectable through CH Studio either in the Property Window or the Property Pages of the device.

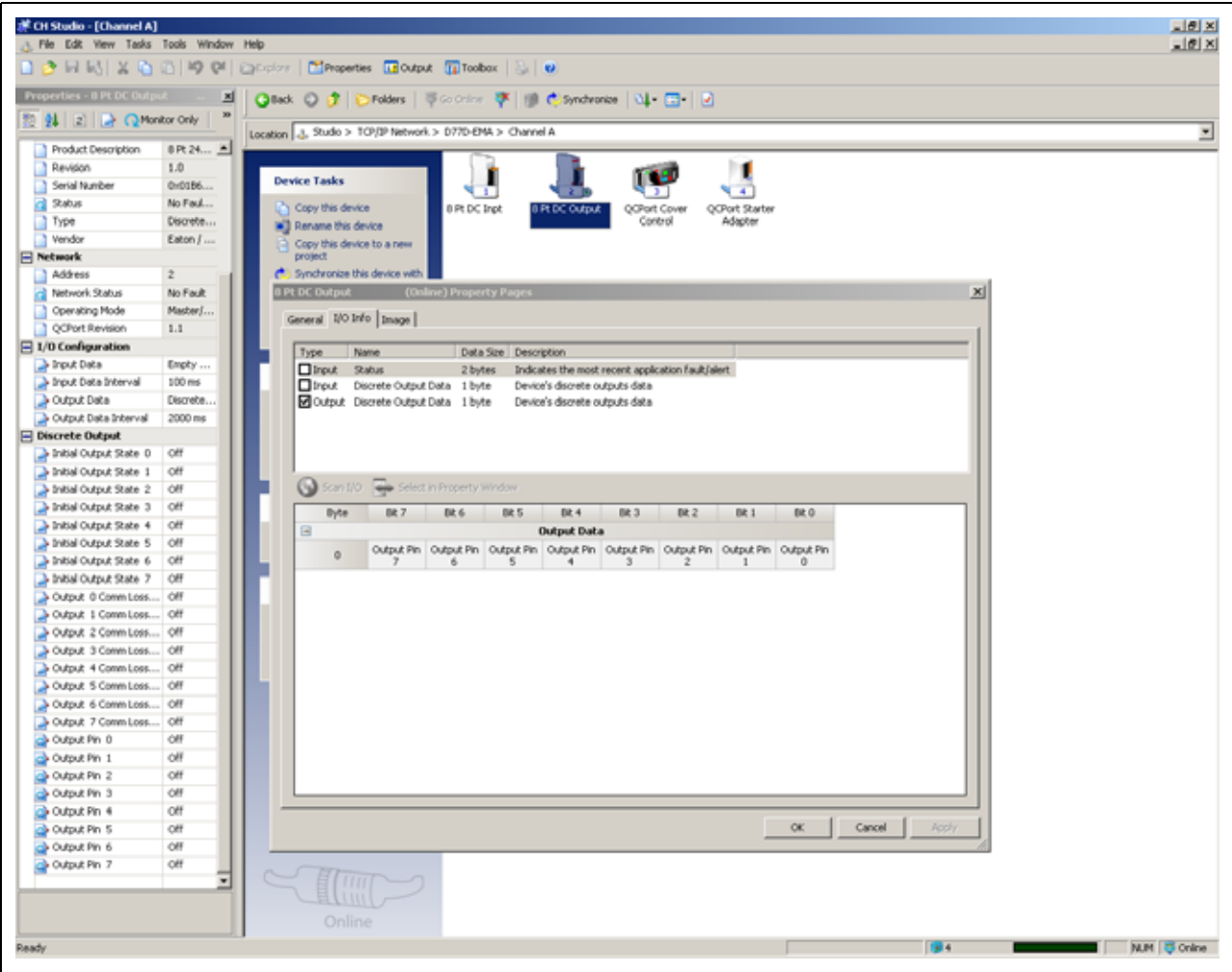
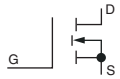

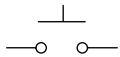
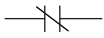
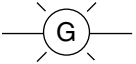






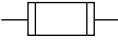





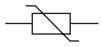
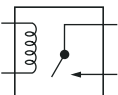
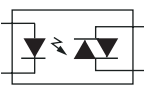
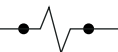
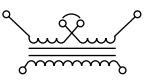
Figure 35: I/O Property Page

Field Wiring

Notice	Avis	Aviso
Install all field wiring on the modules in compliance with all applicable regularity codes.	Installez tout le câblage de terrain sur les modules en accord avec tous les codes de réglementation applicables.	Instale todo el cableado del inductor en los módulos cumpliendo con todos los códigos de regularidad que apliquen.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
Hazardous voltage can cause electric shock and burns. Always disconnect power before proceeding with any work on this product.	La tension dangereuse peut causer des électrochocs et des brûlures. Coupez toujours le courant avant d'entreprendre tout travail sur ce produit.	Los voltajes peligrosos pueden causar electrochoque y quemaduras. Siempre desconecte la energía antes de proceder con cualquier trabajo en este producto.
⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
Only apply 24V DC to the I/O module power terminals. Use of any other voltage may result in personal injury, property damage and damage to the IT. D77A I/O module.	N'appliquez que du courant continu de 24 V aux bornes de courant des modules I/O. L'emploi de toute autre tension peut entraîner des blessures corporelles, des dégâts matériels et des dégâts au module IT. D77A I/O.	Sólo aplique 24V CD a los terminales de energía del módulo I/O. El uso de cualquier otro voltaje podrá resultar en heridas corporales, daños a la propiedad o daños al IT. Módulo I/O D77A.

Table 24: Symbol Definitions

Symbol	Definition
	MOSFET
	Selector Switch
	Push Button
	Contact (normally closed)
	Pilot Light
	Overload
	Capacitor

Symbol	Definition
	Earth Ground
	Chassis Ground
	Fuse
	Control Relay
	Limit Switch
	Resistor
	Diode
	Contact (normally open)
	MOV
	Relay Module Output Point
	Optical Isolator AC Output Point
	Solenoid
	Control Transformer

AC Inputs

AC power is typically used to energize loads related to machinery function such as solenoid valves and motor starters. The same AC power source is often used as signal power for inputs as illustrated in Figure 36. The input devices to which AC inputs are wired are typically two-lead devices like push buttons, limit switches and selector switches. One side of the input device is wired to an AC power source while the other is wired to the input terminal. Another input terminal is wired to a grounded neutral wire. Refer to *AC Output Module Specifications* on page 13 for module details.

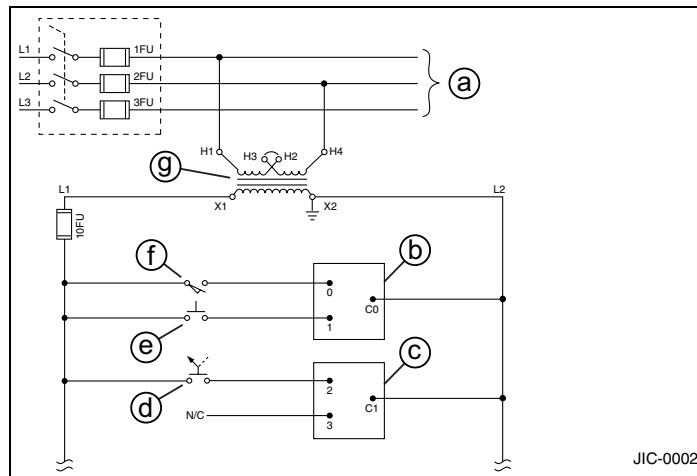


Figure 36: AC Input Wiring

- a) Three-phase Motor Circuits*
- b) First Point of Input Module*
- c) Second Point of Module*
- d) Selector Switch*
- e) Push Button*
- f) Limit Switch*
- g) Control Transformer*

DC Inputs

DC Input modules are designed to operate with either sinking or sourcing devices. They are typically used with proximity sensors and other solid-state devices. (Figure 37) Input modules may need to be installed relatively close to the sensor location. Refer to *DC Input Module Specifications* on page 9 for module details.

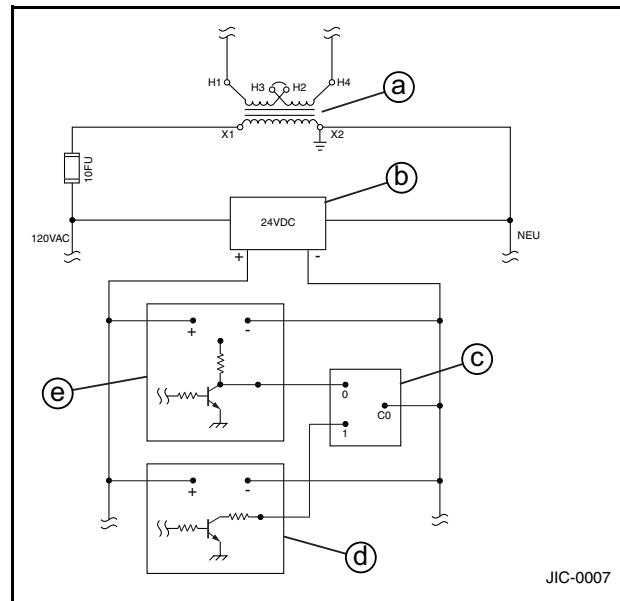


Figure 37: DC Input Wiring

- a) Control Transformer
- b) 24 VDC Power Supply
- c) DC Input Module
- d) Sinking Input Device
- e) DC Sourcing Device

Analog Inputs

Analog signals are typically used to transmit or indicate linear data like temperature, pressure or flow, as illustrated in Figure 38. The analog input devices to which analog inputs are wired are typically current loop or voltage range devices like 4-20 mA transmitters or 0-10V transmitters. Refer to *Analog Input Module Specifications on page 10* for module details.

Note: Ground the shield on one end only. It is recommended to limit the cable impedance by keeping the cable length as short as possible. Limiting the distance from ground to the shield is also recommended. The recommended cable is a Belden™ 8761 or equivalent.

Wire Type	Wire Size	Terminal Torque
Solid Cu-90°C	#14 - # 22 AWG	4.5 in-lbs
Stranded Cu-90°C	#16 - # 22 AWG	4.5 in-lbs

Note: When an input channel is not used, jumper from V to C eliminating noise from causing erroneous readings for that channel.

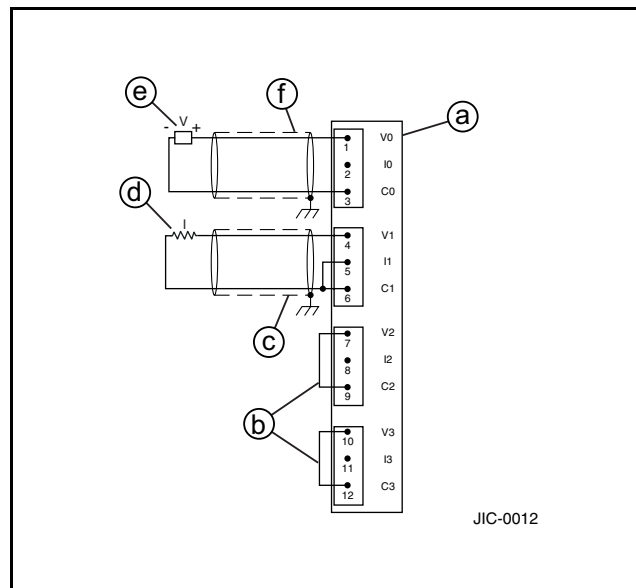


Figure 38: Analog Input Wiring

- a) Input Module
- b) Jumper
- c) Shield (Ground One End Only)
- d) Current Input Device
- e) Voltage Input Device
- f) Shield (Ground One End Only)

AC Outputs

AC power is typically used to energize loads related to machinery function such as solenoid valves and motor starters. These devices are generally two-lead devices as illustrated in Figure 39. One side is wired to a grounded neutral wire while the other is wired to the output terminal. Refer to *AC Output Module Specifications* on page 13 for module details.

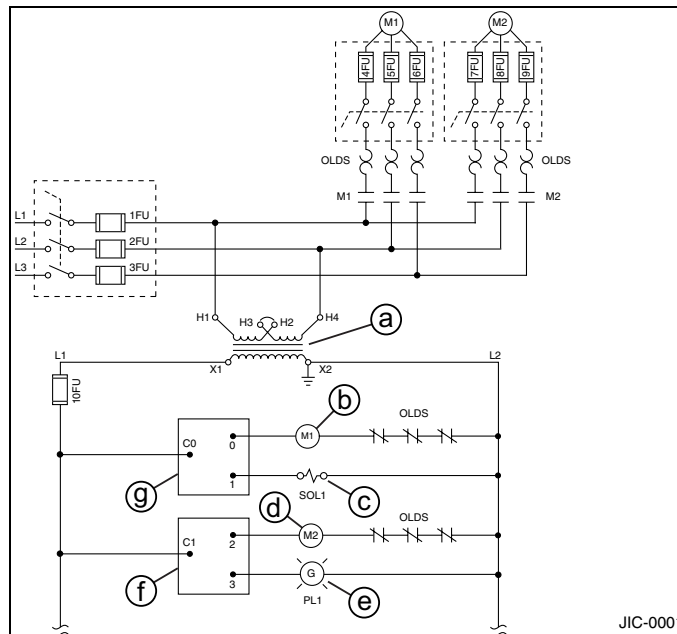


Figure 39: AC Output Wiring

- a) Control Transformer
- b) M1 Motor Starter Coil
- c) Solenoid Valve
- d) M2 Motor Starter Coil
- e) Pilot Light
- f) Second Point of Module
- g) First Point of Module

DC Outputs

DC power is typically used for instrumentation or light control circuits. Examples might be solenoid valves, indicator lamps or sinking or sourcing signals to other equipment. These devices are generally two-lead devices as illustrated in Figure 40. Refer to *DC Output Module Specifications* on page 14 for module details.

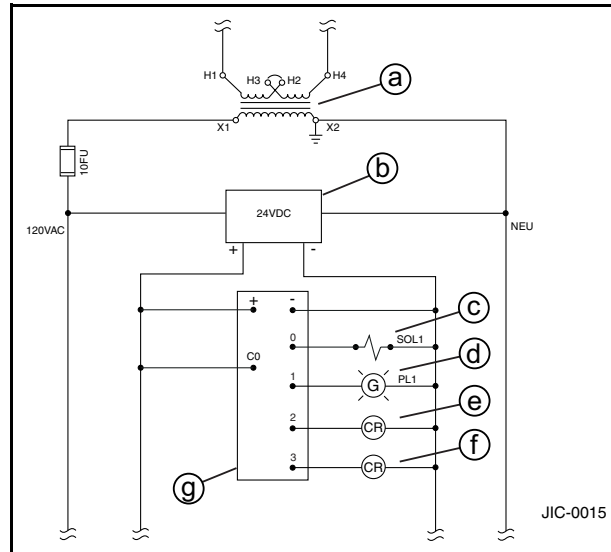


Figure 40: DC Output Wiring

- a) Control Transformer
- b) 24 VDC Power Supply
- c) Solenoid
- d) Pilot Light
- e) Control Relay 1
- f) Control Relay 2
- g) DC Output Module Points 2 and 3
- h) DC Output Module Points 0 and 1

Relay Outputs

Relay outputs can be used to control a variety of different loads. They can be used in AC or DC circuits or they can be used to provide a dry contact to other equipment. (Figure 41) Refer to *Relay Output Module Specifications* on page 15 for module details.

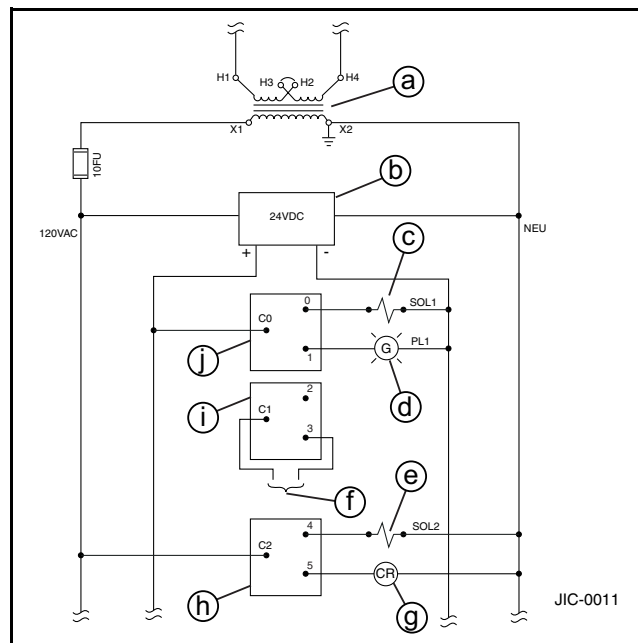


Figure 41: Relay Output Wiring

- a) Control Transformer
- b) 24 VDC Power Supply
- c) DC Solenoid
- d) DC Pilot Light
- e) AC Solenoid
- f) Dry Contact to Other Equipment
- g) AC Control Relay
- h) Relay Output Points 4 and 5
- i) Relay Output Points 2 and 3
- j) Relay Output Points 0 and 1

Analog Outputs

Analog signals are typically used to transmit or indicate linear data like pressure or linear actuation, as illustrated in Figure 42. The analog output devices to which analog outputs are wired are typically current loop or voltage range devices like 4-20 mA signals or 0-10V signals. Refer to *Analog Output Module Specifications* on page 16 for module details.

Note: Ground the shield on one end only. It is recommended to limit the cable impedance by keeping the cable length as short as possible. Limiting the distance from ground to the shield is also recommended. The recommended cable is a Belden™ 8761 or equivalent.

Wire Type	Wire Size	Terminal Torque
Solid Cu-90°C	#14 - # 22 AWG	4.5 in-lbs.
Stranded Cu-90°C	#16 - # 22 AWG	4.5 in-lbs.

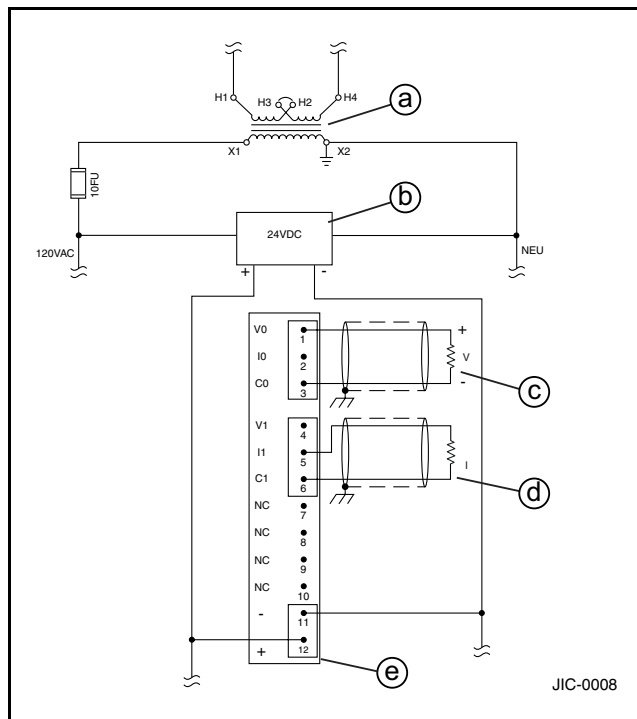


Figure 42: Analog Output Wiring

- a) Control Transformer
- b) 24 VDC Power Supply
- c) Voltage Output Device
- d) Current Output Device

Combination I/O

Combination I/O modules incorporate the features of input points and output points into a single module. Figure 43 illustrates a typical dual purpose module application. The advantage is improved I/O density and greater flexibility for many applications. Refer to *Combination Module Specifications* on page 18 for module details.

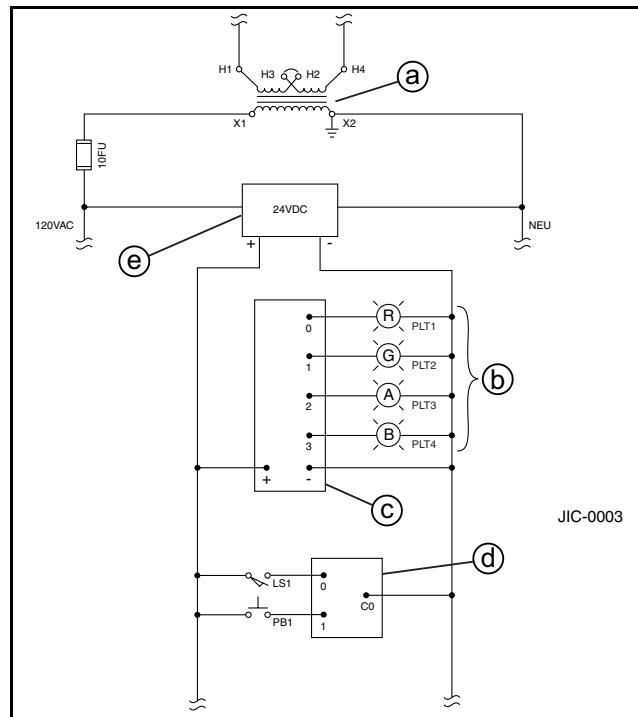


Figure 43: Combination I/O Wiring

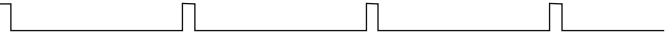

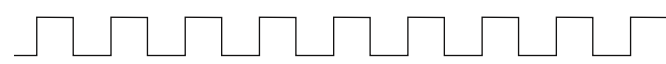


- a) Control Transformer
- b) DC Loads
- c) Output Points
- d) Inputs
- e) 24 VDC Power Supply

Troubleshooting and Maintenance

Status LED

The status LED is located on the upper left of the D77A I/O module as pictured in Figure 2, Module Component Location. The LED's status changes depending on the state of the I/O module.

Table 25: Status LED

State	LED Behavior
No Power	OFF
Power-Up Routine	OFF – CRC corrupt
Off-Line, OK (mostly off)	
On-Line (mostly on)	
Faulted (50%)	
Identify device (burst)	
Undiscovered	

Fault Codes

Table 26: Analog 10 Fault Codes

0 x 41 (65)	Analog input over range.
0 x 42 (66)	Analog input under range.
0 x 44 (68)	Analog input open.
0 x 45 (69)	Analog input shorted.

Troubleshooting

Table 27: Troubleshooting

Observation	Possible Cause/Corrective Action
The input LED will not illuminate.	Verify that the module is powered; the LED is controlled by the micro controller in the device.
	The power for the input itself may not be applied. Verify that there is a valid signal on the input point.
	The screws on the terminal may be loose; tighten the screws.
	Replace the device.
The output LED is illuminated but the output is not on.	Check that the switch closes on the output using a multi meter.
	The screws on the terminal may be loose; tighten the screws.
	Replace the device.
The status LED has a "fast blink" while all other device's status LEDs are "mostly on." See Table 25 Status LED.	The "fast blink" device may have the same Group ID as another device. Verify that all devices have unique Group IDs.
	The "fast blink" device was not accepted into the scan list. Reasons include it was replaced and the device is not the same as the original device (parameters are different or the product is different).
	An out-of-box device was inserted into an actively scanning QCPort; power will need to be cycled on QCPort to be accepted.
While On-Line with CH Studio the I/O Module disappears.	It may be that the controller is not allowing enough time for the CH Studio messages and the connection between CH Studio and the Network Adapter is timing out. You may have to take the system controller off-line to continue or add an interscan delay to the industrial network scan.
While looking at the I/O Module it is noticed that the status LED is solid on.	<p>If no other LED's are on it is possible the I/O Module was placed into a firmware download mode, cycle power to the I/O Module and see if the LED behaves properly.</p> <p>The module may have corrupt memory or damage to the circuit board and the module will need to be replaced.</p>

Renewal Parts

Table 28: I/O Module Renewal Parts

Description	Part Number
7-Position QCPort Backplane	D77E-BP7
12-Position QCPort Backplane	D77E-BP12
25-Position QCPort Backplane	D77E-BP20
QCPort RJ Terminator	D77E-TERRJ
25 cm Powered QCPort Interconnect	D77E-QPIP25
1 Meter QCPort Interconnect	D77E-QPIP100
2 Meter QCPort Interconnect	D77E-QPIP200
3 Meter QCPort Interconnect	D77E-QPIP300
QCPort Terminator and Power Tap	D77E-QPLR

Communication Troubleshooting Hints

Explanation of LED Duty Cycle States

Table 29: Explanation of LED Duty Cycle States

LED Duty Cycle State	Explanation
Mostly Off	One short blink ON every 2 seconds
Mostly On	One short blink OFF every 2 seconds
50%	ON and OFF blinking same amount of time; 1/2 second cycle
Rapid Flash	Strobe

Table 30: Status LED

Status LED	Description	Explanation
Mostly Off	Offline	Everything is OK with in the I/O Module and the I/O Module is not being scanned. Check that the Network Adapter is commanded to scan QCPort. This is generally done by setting bit 0 of byte 0, for channel A, in the output assembly.
Mostly On	Online	Everything is OK with in the I/O Module and the I/O Module is being scanned.
50%	Faulted	Internal memory fault (cycle power). Verify that there are not any duplicate Group ID's (address). Check that the address is unique for the QCPort system. The Group ID was changed and a reset is required. Buss fault. All the devices on the QCPort will have the same status LED behavior. A buss fault is caused by an open or QCPort shorted buss.
Rapid Flash	Unacquired	The I/O Module has not been discovered/acquired by the Network Adapter, verify that the node ID is set correctly for the system. The Network Adapter has not auto configured the QCPort system. In this case all the I/O Module's will have the same behavior of the status LED. Perform an auto configuration. CH Studio is identifying that device. When the device is highlighted in CH Studio this is a way to identify in the field which device is being highlighted. Remove the highlight from CH Studio and verify that the Rapid Flash disappears.
Solid On		It is possible the I/O Module is in firmware download mode, cycle power to exit that mode. If the LED stays solid On after the power cycle, it is possible that the I/O Module has in internal failure and will need to be replaced.
Off	No Power	The I/O Module is not powered or a memory fault in NV RAM has occurred that will require the I/O Module to be replaced.

Communication Hints

Table 31: Communication Hints

Problem	Solution
Are all the QCPort devices connected to one Network Gateway are not communicating? Are all the Status LED's either Rapid Flash or 50% On	<p>Check the Network Adapter, is the ST LED Green? – If the LED is green, then perform an auto configuration of the Network Adapter and see if the problem goes away.</p> <p>There may be a damaged I/O Module or a shorted QCPort communication wire that is prohibiting QCPort communications. Remove all the I/O Modules from the QCPort system.</p> <p>Unplug the Network Adapter from the industrial network.</p> <p>Cycle power to the Network Adapter.</p> <p>One by one plug the I/O Modules back in and verify that the status LED is mostly off as they are plugged back in.</p> <p>When the I/O Module the causes the system to fail is plugged in, the I/O Module's status LED will rapid flash or 50% flash only.</p> <p>Remove the I/O Module and check the QCPort connections for shorted or damaged wires or connections.</p> <p>When all the I/O Modules are online, plug the Network Adapter into the industrial Network.</p> <p>It is possible that the terminating resistors are damaged, replace the terminating resistors.</p>
Is there a single I/O Module in the system that is not communicating?	<p>The problem may be that the I/O Module has a fixable internal communication failure. Perform a reset by toggling the rotary switch from 0 to 1 five times, reset the rotary switch to the correct group ID (address).</p> <p>It is also possible the Group ID rotary switch was changed after auto configuration. Check the rotary switch and verify that they are in the correct position for that address. Physically move the rotary switch from one position to another to verify that it is in the correct position (there will be a "snap" when it reaches the next state). Unplug and replug the device and check that the problem disappears.</p> <p>It is possible that the communication connections are damaged or unplugged.</p> <p>It is possible that the terminating resistors are damaged, replace the terminating resistors.</p>
During auto configuration the Network Adapter will not detect any of the I/O Modules.	<p>Check the status LEDs on the I/O Module units, if the LEDs are rapid flashing or 50% On refer to the above problem for a solution.</p> <p>If the status LEDs on the I/O Module units are all slow flashing, the Network Adapter has already connected to the I/O Module units and the problem is that the CH Studio software is not displaying the I/O Module units. This can be because the scanner is not allowing CH Studio to send long messages.</p> <p>The Network Adapter cannot perform an auto configuration if the system controller is scanning the Network Adapter. Disconnect the Network Adapter from the industrial network and reattempt the auto configuration.</p>

Appendix A

Data Parameters

Table 32: 0x0001 (1) Production Data

Size	Description
Varies	This list contains the concatenated values of QCPort Parameters specified in QCPort Configuration Parameter 0x800C, Production List.

Table 33: 0x0002 (2) Consumption Data

Size	Description
Varies	This list contains the concatenated values of QCPort Parameters specified in QCPort Configuration Parameter 0x800D, Consumption List.

Table 34: 0x0003 (3) QCPort Status

Size	Description
1 Byte	This parameter indicates the QCPort fault condition that caused a device to enter the Fault Mode, as indicated below: 0x00 — No QCPort Fault 0x01 — Node ID Conflict 0x02 — Invalid Node ID in Master/Slave 0x03 — Physical Node ID does not match actual ID 0x04 — Duplicate configured nodes online 0x05 — Dynamic Node ID overflow 0x06 — Invalid baud rate selected 0x07 — Errant Device fault 0x08 — Problem with data in non-volatile memory

Table 35: 0x0004 (4) Application Status (Available in I/O As Control Elements)

Size	Description
2 Bytes	This parameter indicates the application status of the QCPort device. It reports the most recent fault or warning. If there have been no faults or warnings, it reports 0. Reset clears this parameter.

Table 36: 0x0005 (5) Discrete Data Input (Available in I/O As Control Elements)

Size	Description
n Bytes	A series of BYTES that represent discrete digital inputs on a device. This parameter is used in any input module having discrete inputs. The least significant bit of byte 0 corresponds to input point 0.

Table 37: 0x0006 (6) Discrete Data Output (Available in I/O As Control Elements)

Size	Description
n Bytes	A series of BYTES representing the state of the outputs of a discrete output device. This parameter is used in any module having discrete outputs. The least significant bit of byte 0 corresponds to output point 0. Parameter 0x8023, "Output Comm Loss Behavior" is used in conjunction with this parameter.

Table 38: 0x006B (107) Analog Input Status (Available in I/O As Control Elements)

Size	Description																											
n Bytes	<div>This provides channel status for the analog inputs. U = Under Range O = Over Range</div> <table><tr><th>Byte</th><th>Bit 7</th><th>Bit 6</th><th>Bit 5 *</th><th>Bit 4 *</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1 *</th><th>Bit 0 *</th></tr><tr><td>0</td><td></td><td></td><td>O1</td><td>U1</td><td></td><td></td><td>O0</td><td>U0</td></tr><tr><td>1</td><td></td><td></td><td>O3</td><td>U3</td><td></td><td></td><td>O2</td><td>U2</td></tr></table>	Byte	Bit 7	Bit 6	Bit 5 *	Bit 4 *	Bit 3	Bit 2	Bit 1 *	Bit 0 *	0			O1	U1			O0	U0	1			O3	U3			O2	U2
Byte	Bit 7	Bit 6	Bit 5 *	Bit 4 *	Bit 3	Bit 2	Bit 1 *	Bit 0 *																				
0			O1	U1			O0	U0																				
1			O3	U3			O2	U2																				

* Setting the bit from "0" to "1" indicates that the condition is true.

Table 39: 0x006C (108) Analog Output Status (Available in I/O As Control Elements)

Size	Description																		
n Bytes	<div>This provides channel status for the analog outputs. U = Under Range O = Over Range</div> <table><tr><th>Byte</th><th>Bit 7</th><th>Bit 6</th><th>Bit 5 *</th><th>Bit 4 *</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1 *</th><th>Bit 0 *</th></tr><tr><td>0</td><td></td><td></td><td>O1</td><td>U1</td><td></td><td></td><td>O0</td><td>U0</td></tr></table>	Byte	Bit 7	Bit 6	Bit 5 *	Bit 4 *	Bit 3	Bit 2	Bit 1 *	Bit 0 *	0			O1	U1			O0	U0
Byte	Bit 7	Bit 6	Bit 5 *	Bit 4 *	Bit 3	Bit 2	Bit 1 *	Bit 0 *											
0			O1	U1			O0	U0											

Table 40: 0x006F (111) 16 bit Signed Analog Input Data (Available in I/O As Control Elements)

Size	Description																																																																																																					
Word	<div>This provides the 16 bit signed analog input data for the module.</div> <table><tr><th rowspan="2">Word</th><th colspan="16">Bit Position</th></tr><tr><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>0</td><td>SB*</td><td colspan="14">Analog Input Data Channel 0</td><td>0</td></tr><tr><td>1</td><td>SB*</td><td colspan="14">Analog Input Data Channel 1</td><td>0</td></tr><tr><td>2</td><td>SB*</td><td colspan="14">Analog Input Data Channel 2</td><td>0</td></tr><tr><td>3</td><td>SB*</td><td colspan="14">Analog Input Data Channel 3</td><td>0</td></tr></table>	Word	Bit Position																15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	SB*	Analog Input Data Channel 0														0	1	SB*	Analog Input Data Channel 1														0	2	SB*	Analog Input Data Channel 2														0	3	SB*	Analog Input Data Channel 3														0
Word	Bit Position																																																																																																					
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																																																																																						
0	SB*	Analog Input Data Channel 0														0																																																																																						
1	SB*	Analog Input Data Channel 1														0																																																																																						
2	SB*	Analog Input Data Channel 2														0																																																																																						
3	SB*	Analog Input Data Channel 3														0																																																																																						

Sign Bit*

1 = True (-)
0 = False (+)

Table 41: 0x0070 (112) 16 bit Signed Analog Output Data (Available in I/O As Control Elements)

Size	Description																																																																			
Word	<div>This provides the 16 bit signed analog output data for the module.</div> <table><tr><th rowspan="2">Word</th><th colspan="16">Bit Position</th></tr><tr><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>0</td><td>SB*</td><td colspan="14">Analog Input Data Channel 0</td><td>0</td></tr><tr><td>1</td><td>SB*</td><td colspan="14">Analog Input Data Channel 1</td><td>0</td></tr></table>	Word	Bit Position																15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	SB*	Analog Input Data Channel 0														0	1	SB*	Analog Input Data Channel 1														0
Word	Bit Position																																																																			
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																																																				
0	SB*	Analog Input Data Channel 0														0																																																				
1	SB*	Analog Input Data Channel 1														0																																																				

Sign Bit*

1 = True (-)
0 = False (+)

Configuration Parameters

None of the Configuration Parameters support I/O data.

Table 42: 0x8001 (32769) Device Identity

Size	Description												
14 bytes	<p>This read-only parameter contains information that uniquely identifies a device, including the following elements:</p> <table> <tr> <td>Product Code (2 bytes)</td><td>A device's unique product code must be reported. Each vendor must maintain its own list of product codes.</td></tr> <tr> <td>Vendor ID (2 bytes)</td><td>Each QCPort vendor must use their unique ID as assigned by Eaton Electrical.</td></tr> <tr> <td>Serial Number (4 bytes)</td><td>A device's serial number must be reported. This value must be unique for a particular manufacturer across all device types.</td></tr> <tr> <td>Hardware Revision (2 bytes)</td><td>Major revision must be reported in the MSB. Minor revision must be reported in the LSB.</td></tr> <tr> <td>Firmware Revision (2 bytes)</td><td>Major revision must be reported in the MSB. Minor revision must be reported in the LSB.</td></tr> <tr> <td>QCPort Revision (2 bytes)</td><td>Major revision must be reported in the MSB. Minor revision must be reported in the LSB.</td></tr> </table>	Product Code (2 bytes)	A device's unique product code must be reported. Each vendor must maintain its own list of product codes.	Vendor ID (2 bytes)	Each QCPort vendor must use their unique ID as assigned by Eaton Electrical.	Serial Number (4 bytes)	A device's serial number must be reported. This value must be unique for a particular manufacturer across all device types.	Hardware Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.	Firmware Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.	QCPort Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.
Product Code (2 bytes)	A device's unique product code must be reported. Each vendor must maintain its own list of product codes.												
Vendor ID (2 bytes)	Each QCPort vendor must use their unique ID as assigned by Eaton Electrical.												
Serial Number (4 bytes)	A device's serial number must be reported. This value must be unique for a particular manufacturer across all device types.												
Hardware Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.												
Firmware Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.												
QCPort Revision (2 bytes)	Major revision must be reported in the MSB. Minor revision must be reported in the LSB.												

Table 43: 0x8002 (32770) Configuration CRC

Size	Description
2 bytes	Used for confirmation of a device's configuration. Normally, the initial values of selected configuration parameters would be included in the calculation. The product instruction leaflet should describe which parameters are actually included. To facilitate node replacement, Device Identity information should not be included in this calculation.

Table 44: 0x8003 (32771) Node ID

Size	Description
2 bytes	<p>This parameter specifies a device's Node ID. The Group ID is the Most Significant Byte and the Member ID is the Least Significant Byte.</p> <p>An Initial Value of 0x0000 indicates an unconfigured state. In this state, a device assumes a current value based on the level of switch support implemented in hardware.</p>

Table 45: 0x8004 (32772) Operating Mode

Size	Description																		
1 byte	<div>This parameter specifies a device's operating mode, as follows:</div> <table><tr><th>Mode</th><th>Description</th><th>Active/Passive</th></tr><tr><td>0x00</td><td>Unconfigured</td><td>Passive</td></tr><tr><td>0x01</td><td>Simple System</td><td>Passive</td></tr><tr><td>0x02</td><td>Master/Slave</td><td>Active</td></tr><tr><td>0x03</td><td>Wire Replacer</td><td>Passive</td></tr><tr><td>0x04</td><td>Faulted</td><td>Passive</td></tr></table>	Mode	Description	Active/Passive	0x00	Unconfigured	Passive	0x01	Simple System	Passive	0x02	Master/Slave	Active	0x03	Wire Replacer	Passive	0x04	Faulted	Passive
Mode	Description	Active/Passive																	
0x00	Unconfigured	Passive																	
0x01	Simple System	Passive																	
0x02	Master/Slave	Active																	
0x03	Wire Replacer	Passive																	
0x04	Faulted	Passive																	

Table 46: 0x8005 (32773) QCPort Baud Rate

Size	Description														
1 byte	<p>This parameter specifies the QCPort baud rate for a device as indicated below:</p> <table> <tr> <td>0x00</td><td>— 9,600</td></tr> <tr> <td>0x01</td><td>— 19,200</td></tr> <tr> <td>0x02</td><td>— 38,400</td></tr> <tr> <td>0x03</td><td>— 57,600</td></tr> <tr> <td>0x04</td><td>— 115,200</td></tr> <tr> <td>0x05</td><td>— 230,400</td></tr> <tr> <td>0x06</td><td>— 460,800</td></tr> </table> <p>Note that the current value of the baud rate cannot be directly modified. The current value is set to the initial value upon reset. Therefore, writing to the initial value and resetting the device sets a new current value.</p>	0x00	— 9,600	0x01	— 19,200	0x02	— 38,400	0x03	— 57,600	0x04	— 115,200	0x05	— 230,400	0x06	— 460,800
0x00	— 9,600														
0x01	— 19,200														
0x02	— 38,400														
0x03	— 57,600														
0x04	— 115,200														
0x05	— 230,400														
0x06	— 460,800														

Table 47: 0x8006 (32774) Slave Address

Size	Description
1 byte	This parameter specifies the address used by a Master for data transfers in the Master/Slave Data Protocol. The default value must be 0x00 (unconfigured), requiring a Master to set this value prior to using the Master/Slave Data Protocol.

Table 48: 0x8007 (32775) Production Destination

Size	Description
2 bytes	This parameter specifies the destination Node ID to be used by a device in either the Simple System or Wire Replacer Data Protocols. The MSB indicates the Group ID; the LSB indicates the Member ID. An Initial Value of 0x0000 indicates an unconfigured state. In this state, a device assumes a current value equal to its Group ID and a Member ID of 0x00. This results in its Production Data being targeted at all members of its Group.

Table 49: 0x8008 (32776) Device ID Tag

Size	Description
32 bytes	This parameter specifies the 32-character ASCII string ID tag assigned to a device, pre-assigned at the factory but can be set by the user.

Table 50: 0x8009 (32777) Production Interval

Size	Description
2 bytes	This parameter specifies the rate, in milliseconds, at which a producing device generates a Data Protocol message in either Simple System or Wire Replacer mode. A value of 0 disables this timer.

Table 51: 0x800A (32778) Consumption Interval

Size	Description
2 bytes	This parameter is the value to which the consumption timer is set whenever there is a set of the current value of any parameter on the consumption list. Expiration of this interval causes the module to execute communications loss behavior. A value of 0 disables this timer.

Table 52: 0x800B (32779) Parameter List

Size	Description
92 bytes	This read-only list specifies the n QCPort Parameters that a device supports.

Table 53: 0x800C (32780) Production List

Size	Description
2 bytes	This 2n-byte read-only list specifies the n QCPort Parameters included in a device's QCPort Data Parameter 0x0001, Production Data. Setting Parameter Attribute 0x09, "Production List Member" to TRUE, designates a Parameter's membership in this list. Only Parameters supporting Attribute 0x09 are eligible for inclusion in this list. Ordering of Parameter IDs in the Production List is based first on Parameter data size and then sequentially within Parameters of like size. For example, Parameters with an even number of bytes would appear first sequentially, followed by Parameters with an odd number of bytes.

Table 54: 0x800D (32781) Consumption List

Size	Description
2 bytes	This 2n-byte read-only list specifies the n QCPort Parameters included in a device's QCPort Data Parameter 0x0002, Consumption Data. Setting Parameter Attribute 0x0A, "Consumption List Member" to TRUE, designates a Parameter's membership in this list. Only Parameters supporting Attribute 0x0A are eligible for inclusion in this list. Ordering of Parameter IDs in the Consumption List is based first on Parameter data size and then sequentially within Parameters of like size. For example, Parameters with an even number of bytes would appear first sequentially, followed by Parameters with an odd number of bytes.

Table 55: 0x800E (32782) Languages Supported

Size	Description
n bytes	This is a list of languages supported in the product. It consists of a list of bytes, each representing a different language. 0x00 — English 0x01 — Spanish 0x02 — French 0x03 — German 0x04 — Italian

Table 56: 0x800F (32783) Language Selection

Size	Description
1 byte	Holds the currently selected language from the list in parameter 800E.

Table 57: 0x8010 (32784) Device Semaphore

Size	Description
4 bytes	<p>The purpose of this parameter is to provide a method for tools to access a QCPort node in a non-conflicting manner.</p> <p>This parameter consists of a field of 2 UNITs organized as follows:</p> <p>Byte</p> <p>Node ID Low byte</p> <p>Node ID High byte</p> <p>Lockout Time in tenths of seconds Low byte</p> <p>Lockout Time in tenths of seconds High byte</p> <p>If the above 4 bytes are 0, anyone can write to this parameter. This parameter is cleared by the Clear Semaphore command that can be sent by anyone. If all 4 bytes are not 0 and a write (other than a clear) to this parameter is attempted, an error message will be returned. The parameter will be cleared when the timer counts down to 0.</p> <p>If the node ID field is 0, all set parameters to the node will be accepted. If the node ID field is not 0, set parameter commands to the node will only be accepted from the device having the same node ID as that contained in this parameter. Note that if the node ID is set to zero at the same time that a non-zero value is loaded to the timer, the timer will not decrement.</p>

Table 58: 0x8023 (32803) Output Comm Loss Action

Size	Description
The n bytes	<p>Used in discrete output modules. Each bit of this parameter is associated with an output bit and defines the behavior of that output upon detection of communications loss.</p> <p>If a bit in this parameter is 1, the output bit holds the last state.</p> <p>If a bit is 0, the output bit is determined by the initial value.</p>

Table 59: 0x8024 (32804) Input Debounce

Size	Description
The n bytes	Used with discrete input devices. This parameter consists of a series of UNITs, two bytes for each discrete input and holds the debounce time for that input.

Table 60: 0x804D (32845) Physical Node ID Setting

Size	Description
2 bytes	This parameter may be used with modules having a hardware node ID switch and represents the actual setting of that switch.

Table 61: 0x80CF (32975) Analog Output Communication Loss Behavior

Size	Description
n Bytes	<p>Determines the communication loss behavior of the output module.</p> <p>0 = Hold last state</p> <p>1 = Use Communication Loss Value</p> <p>2 = Use Initial Value</p>

Table 62: 0x80D0 (32976) Analog Output Communication Loss Value

Size	Description
Word	Value that the output channel will go to if selected using the communication loss behavior. 1-32767

Table 63: 0x80D1 (32977) Input Range Setting

Size	Description
1 Word	<p>Determines analog input data range:</p> <p>0 = 0 - 10V</p> <p>1 = 0 - 5V</p> <p>2 = 1 - 5v</p> <p>3 = 0 - 20mA</p> <p>4 = 4 - 20mA</p>

Table 64: 0x80D2 (32978) Analog Output Range

Size	Description
1 Word	<p>Determines analog output data range.</p> <p>0 = 0 - 10V</p> <p>1 = 0 - 5V</p> <p>2 = 1 - 5v</p> <p>3 = 0 - 20mA</p> <p>4 = 4 - 20mA</p>

Analog Data Registers

Table 65: Register 1; Serial Number

Size	Description
4 bytes, read only	Serial number of module

Table 66: Register 2; Hardware Revision

Size	Description
2 bytes, read only	Hardware version of module

Table 67: Register 3; Analog Filter Setting

Size	Description
2 bytes, read only	Filter setting of analog input channel 0 = 50 Hz 1 = 60 Hz 2 = 250 Hz 3 = 500 Hz

IT. Publications and Support

Publications

Table 68: IT. Publications

Publication	Description
MN05002001E	IT. D77A I/O Module Products Installation and Users Manual
MN05001002E	IT. QCPort System Install and Planning Guide
MN05004002E	IT. DeviceNet Adapter Installation and User Manual

For copies of these and other publications please visit our website at www.EatonElectrical.com.

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