C440/XTOE Electronic Overload Relay, DeviceNet

User Manual

Effective March 2011
New Information

Powering Business Worldwide

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Safety

Definitions and Symbols

WARNING

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.

This symbol is the "Safety Alert Symbol." It occurs with either of two signal words: CAUTION or WARNING, as described below.

WARNING

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION

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).

Hazardous High Voltage

WARNING

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed 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 controllers or rotating machinery.

WARNING

Do not service with voltage applied—Lock-out Tags.

WARNING

Only apply 24 Vdc to the communication module fieldbus connection. Use of any other voltage may result in personal injury, property damage and damage to the module.

Introduction

System Overview

Eaton's new electronic overload relay (EOL) is the most compact, high-featured, economical product in its class. Designed on a global platform, the new EOL covers the entire power control spectrum including NEMA®, IEC, and DP contactors. The NEMA and DP versions are offered with the *C440* designation while the IEC offering has the ***XT*** designation. The electronic design provides reliable, accurate and value driven protection and communications capabilities in a single compact device. It is the flexible choice for any application requiring easy-to-use, reliable protection.

Eaton has a long history of innovations and product development in motor control and protection, including both traditional NEMA, as well as IEC control. It was from this experience that the C440 was developed, delivering new solutions to meet today's demands.

C440 is a self-powered electronic overload relay available up to 100A as a self contained unit. With external CTs, C440 can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules with I/O for DeviceNet™, PROFIBUS®, and Modbus®.

Features and Benefits

Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC, and DP power control

Size/Range

- Broad FLA range (0.33–1500A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA, IEC, and DP contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance, and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover
- Communications modules
  - Modbus RTU RS-485
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus RTU with I/O (Q4 2010)
  - Ethernet IP (planned)

Benefits

Reliability and Improved Uptime

- C440 provides the users with peace of mind knowing that their assets are protected with the highest level of motor protection and communication capability in its class
- Extends the life of plant assets with selectable motor protection features such as trip class, phase unbalance, and ground fault
- Protects against unnecessary downtime by discovering changes in your system (line/load) with remote monitoring capabilities
- Status LED provides added assurance that valuable assets are protected by indicating the overload operational status

Flexibility

- Available with NEMA, IEC and DP contactors
- Improves return on investment by reducing inventory carrying costs with wide FLA adjustment (5:1) and selectable trip class
- Design incorporates built-in ground fault protection thus eliminating the need for separate CTs and modules
- Flexible communication with optional I/O enables easy integration into plant management systems for remote monitoring and control
- Available as an open component and in enclosed control and motor control center assemblies

Monitoring Capabilities

- Individual phase currents rms
- Average three-phase current rms
- Thermal memory
- Fault indication (overload, phase loss, phase unbalance, ground fault)

Safety

- IP 20 rated terminal blocks
- Available in Eaton's industry leading FlashGard MCCs
- Tested to the highest industry standards such as UL, CSA, CE, and IEC
- RoHS compliant

Standards and Certifications

- UL®
- CSA®
- CE
- NEMA
- IEC/EN 60947 VDE 0660
- ISO® 13849-1 (EN954-1)
- RoHS
- ATEX directive 94/9/EC
- Equipment Group 2, Category 2

Electronic Overload Education

Description	Definition	Cause	Effect if Not Protected	C440/*XT* Protection
Motor Protection				
Thermal overload	Overload is a condition in which current draw exceeds 115% of the full load amperage rating for an inductive motor.	• An increase in the load or torque that is being driven by the motor • A low voltage supply to the motor causes the current to go high to maintain the power needed • A poor power factor causing above normal current draw	• Increase in current draw leads to heat and insulation breakdown, which can cause system failure • Increase in current can increase power consumption and waste valuable energy	• Thermal trip behavior is defined by UL, CSA, and IEC standards • Trip class is settable from 10A, 10, 20, 30
Ground fault	A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure, not to mention risk to equipment or personnel	Fixed protective setting that takes the starter offline if ground fault current exceeds 50% of the FLA dial setting, for example, if the FLA dial is set to 12A, the overload relay will trip if the ground current exceeds 6A.
Unbalanced phases (voltage and current)	Uneven voltage or current between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be unbalanced.	Unbalanced voltage causes large unbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.
Phase loss—current (single-phasing)	One of the three-phase voltages is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, and so on.	Single-phasing can lead to unwanted motor vibrations in addition to the results of unbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.

Technical Data and Specifications

Electronic Overload Relay Ratings

Electronic Overload Relays Up to 1500A—Ratings and Specifications

Description	Specification 45 mm	55 mm
Electrical Ratings	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range		
	0.33–1.65A; 1–5A; 4–20A; 9–45A	20–100A
Use with Contactors		
XT IEC frames	B, C, D	F, G
Freedom NEMA sizes	00, 0, 1, 2	3
Trip Class		
	10A, 10, 20, 30; selectable	10A, 10, 20, 30; selectable
Motor Protection		
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic
Indicators		
Trip status	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options		
Remote reset	Yes	Yes
Reset bar	Yes	Yes
Communication expansion module	Yes	Yes
Communication adapter	Yes	Yes
Capacity		
Load terminals		
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)
Input, auxiliary contact and remote reset terminals		
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	5.3 lb-in (0.8–1.2 Nm)	5.3 lb-in (0.8–1.2 Nm)

Electronic Overload Relays Up to 1500A—Ratings and Specifications, continued

Description	Specification 45 mm	55 mm
Voltages		
Insulation voltage U_i (three-phase)	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3
Auxiliary and Control Circuit Ratings		
Conventional thermal continuous current	5A	5A
Rated operational current—IEC AC-15		
Make contact (1800 VA)		
120V	15A	15A
240V	15A	15A
415V	0.5A	0.5A
500V	0.5A	0.5A
Break contact (180 VA)		
120V	1.5A	1.5A
240V	1.5A	1.5A
415V	0.9A	0.9A
500V	0.8A	0.8A
IEC DC-13 (L/R F 15 ms1)		
0–250V	1.0A	1.0A
Rated operational current—UL B600		
Make contact (3600 VA)		
120V	30A	30A
240V	15A	15A
480V	7.5A	7.5A
600V	6A	6A
Break contact (360 VA)		
120V	3A	3A
240V	1.5A	1.5A
480V	0.75A	0.75A
600V	0.6A	0.6A
R300— Vdc ratings (28 VA)		
0–120V	0.22A	0.22A
250V	0.11A	0.11A

Electronic Overload Relays Up to 1500A—Ratings and Specifications, continued

Description	Specification 45 mm	55 mm
Short-Circuit Rating without Welding		
Maximum fuse	6A gG/gL	6A gG/gL
Environmental Ratings		
Ambient temperature (operating)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity UL 991 (H3)	5% to 95% non-condensing	5% to 95% non-condensing
Altitude (no derating) NEMA ICS1	2000m	2000m
Shock (IEC 600068-2-27)	15g any direction	15g any direction
Vibration (IEC 60068-2-6)	3g any direction	3g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30
Electrical/EMC		
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 MHz to 1000 MHz	30 MHz to 1000 MHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10V/m 80 MHz–1000 MHz 3V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10V/m 80 MHz–1000 MHz 3V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10V rms) 150 kHz–100 MHz	140 dub (10V rms) 150 kHz–100 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method

Electronic Overload Relays Up to 1500A—Ratings and Specifications, continued

Description	Specification 45 mm	55 mm
Electrical/EMC, continued		
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30A/m, 50 Hz	30A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10V/m	10V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

Short Circuit Ratings

Short Circuit Ratings (North America CSA, cUL)

Changes to UL 508A and NEC in recent years have brought a focus to control panel safety with regard to short-circuit current ratings (SCCR). Eaton's C440 electronic overload relays combined with ***XT*** series IEC and Freedom Series NEMA contactors provide a wide variety of SCCR solutions needed for a variety of applications. The SCCR data in this document reflects the latest information as of April 2010.

C440/*XT* Standalone Overload Relays (*XT*, C440)

		Standard-Fault Short Circuit Data			High-Fault Short Circuit Data					
					Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Overload FLA Range	Maximum Operating Voltage	600V (kA)	Maximum Fuse Size (A) (RK5)	Maximum Breaker Size (A)	480V (kA)	600V (kA)	Maximum Fuse Size	480V (kA)	600V (kA)	Maximum Breaker Size
0.33–1.65A	600 Vac	1	6	15	—	—	—	—	—	—
1–5A	600 Vac	5	20	20	100	100	30	100	35	20
4–20A	600 Vac	5	80	80	100	100	100	100	35	80
9–45A	600 Vac	5	175	175	100	100	100	100	35	100/175 (480/600)
20–100A	600 Vac	10	400	400	100	100	200	150	35	250/400 (480/600)

NEMA Freedom Series Starters with C440 Electronic Overload Relays

NEMA Size	Maximum Operating Voltage	High-Fault Short Circuit Data Fuse (RK5, J, CC) 480V	600V	Maximum Fuse Size	Thermal-Magnetic Circuit Breakers 480V	600V	Maximum Breaker Size
00	0.33–1.65A	100	100	30	—	—	—
	1–5A	100	100	30	100	35	35
	4–20A	100	100	30	100	35	35
0	0.33–1.65A	100	100	60	—	—	—
	1–5A	100	100	60	100	35	70
	4–20A	100	100	60	100	35	70
1	0.33–1.65A	100	100	100	—	—	—
	1–5A	100	100	100	100	35	100
	4–20A	100	100	100	100	35	100
	9–45A	100	100	100	100	35	100
2	1–5A	100	100	100	100	35	175
	4–20A	100	100	100	100	35	175
	9–45A	100	100	100	100	35	175
3	20–100A	100	100	200	50	50	250

IEC *XT* Starters with *XT* Electronic Overload Relays

NEMA Size	Maximum Operating Voltage	High-Fault Short Circuit Data Fuse (RK5, J, CC) 480V	600V	Maximum Fuse Size	Thermal-Magnetic Circuit Breakers 480V	600V	Maximum Breaker Size
B	1–5A	100	100	30	—	—	—
	4–20A	100	100	30	—	—	—
C	1–5A	100	100	60	—	—	—
	4–20A	100	100	60	—	—	—
	9–45A	100	100	60	—	—	—
D	9–45A	100	100	200	65	35	175
	20–100A	100	100	200	65	35	175
F	20–100A	100	100	200	65	65	350
G	20–100A	100	100	200	65	65	350

Receipt/Unpacking

WARNING

Do not service with voltage applied—Lock-out Tags.

General

Upon receipt of the unit, verify that the catalog number and unit options stated on the shipping container match those stated on the order/purchase form.

Inspect the equipment upon delivery. Report any crate or carton damage to the carrier prior to accepting the delivery. Have this information noted on the freight bill. Eaton is not responsible for damage incurred in shipping.

Unpacking

Remove all packing material from the unit. Check the unit for any signs of shipping damage. If damage is found after unpacking, report it to the freight company. Retain the packaging materials for carrier to review.

Verify that the unit's catalog number and options match those stated on the order/purchase form.

Storage

It is recommended that the unit be stored in its original shipping box/crate until it is to be installed.

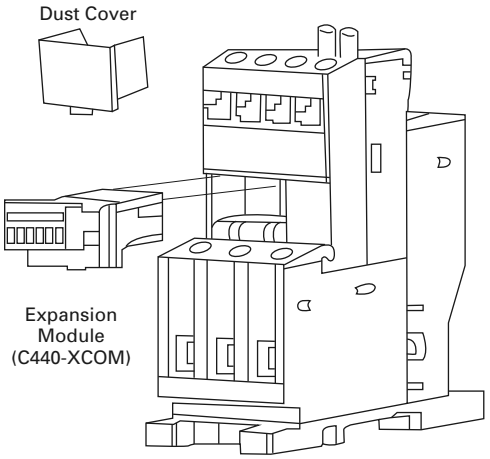
The unit should be stored in a location where:

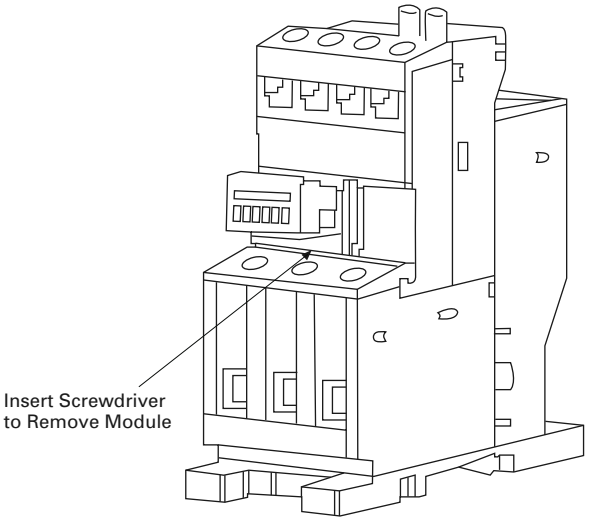
- The ambient temperature is –40° to 85°C
- The relative humidity is 5–95%, non-condensing
- The environment is dry, clean and non-corrosive
- The unit will not be subjected to high shock or vibration conditions

Mounting

The expansion module (C440-XCOM) needs to be wired to the C440/XTOE electronic overload relay as shown in the figure below.

Expansion Module Wiring





1. Remove dust cover.
2. Insert C440-XCOM module until detent is reached.
3. Pull terminal block from module.
4. Assure module was retained by overload.
5. Wire per **Page 10**, C440 to C440-COM-ADP Wiring.

C440-COM-ADP Communication Module

WARNING

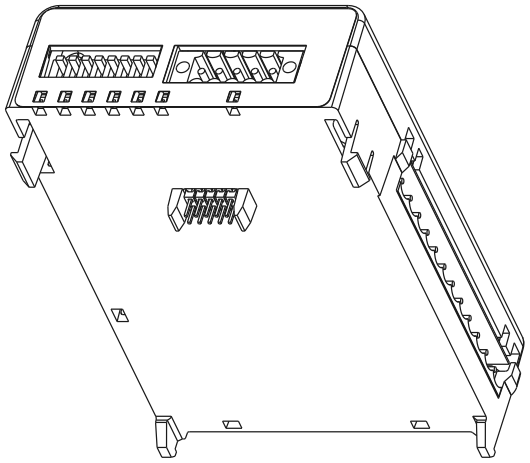
Only apply 24 Vdc to the communication module fieldbus connection. Use of any other voltage may result in personal injury, property damage and damage to the module.

Mounting and Wiring

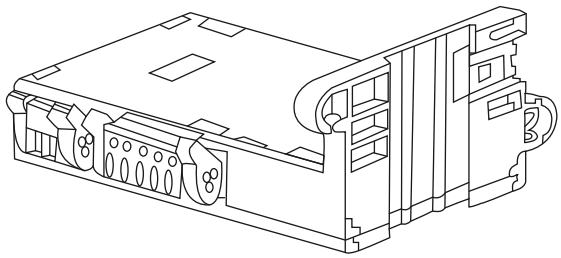
The DeviceNet modules are designed to be installed on the right side of the motor insight base unit or the C440-COM-ADP.

1. Align module with side of Motor Insight base unit or C440-COM-ADP.
2. Slide module bottom pegs into appropriate slots.
3. Rotate module up and gently click the base unit and module together.
4. Connect DeviceNet cable and IO connector if desired.

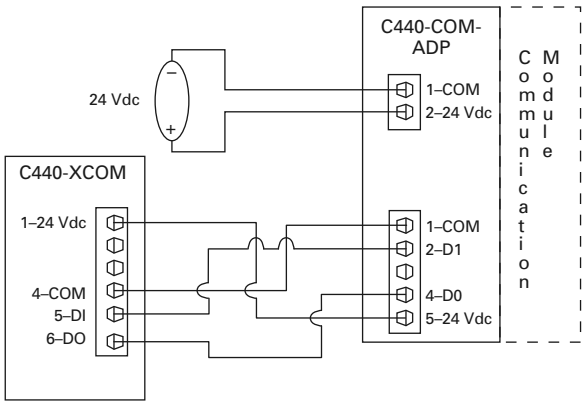
C441X Communication Module



C440-COM-ADP



C440 to C440-COM-ADP Wiring



Input Behavior

Each terminal of the field connection accepts two wires of the following size:

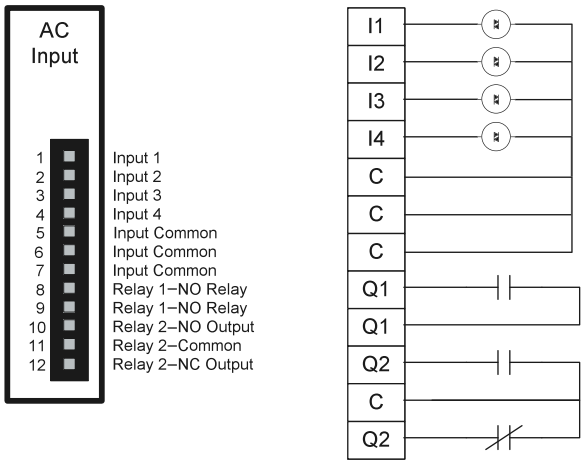
Field Terminal Wire Capability

Wire Type	Wire Size	Terminal Torque (in-lbs)
Solid Cu–90C	#14–#22	4.5
Stranded Cu–90C	#16–#22	4.5

120 Vac Input Requirements

The 120 Vac input is an isolated input. It requires an external AC supply to drive the inputs. There are three common tie points provided for the four inputs.

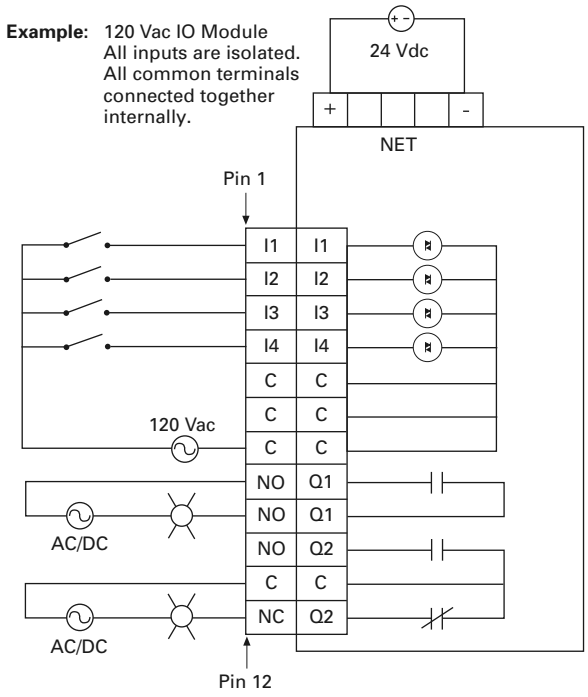
120 Vac Inputs



120 Vac Input Specifications

Specification	Value
Number of inputs	4
Nominal voltage	120 Vac
Nominal current	7mA
Operating range	80–140 Vac
Operating frequency	50/60 Hz
Signal delay maximum	30 ms
Input type	IEC 61131-2, type 1 digital

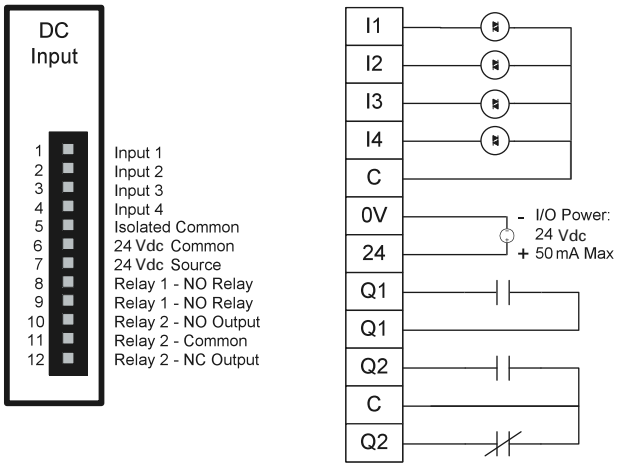
Example: 120 Vac IO Module



24 Vdc Input Requirements

The 24 Vdc input circuit is capable of both isolated and unisolated behavior. The isolated inputs share a single common tie point. A 24 Vdc current limited source/ground is provided in situations that require locally supplied input signal voltage. To use the unisolated inputs tie the 24 Vdc ground/ common to the isolated common.

24 Vdc Inputs

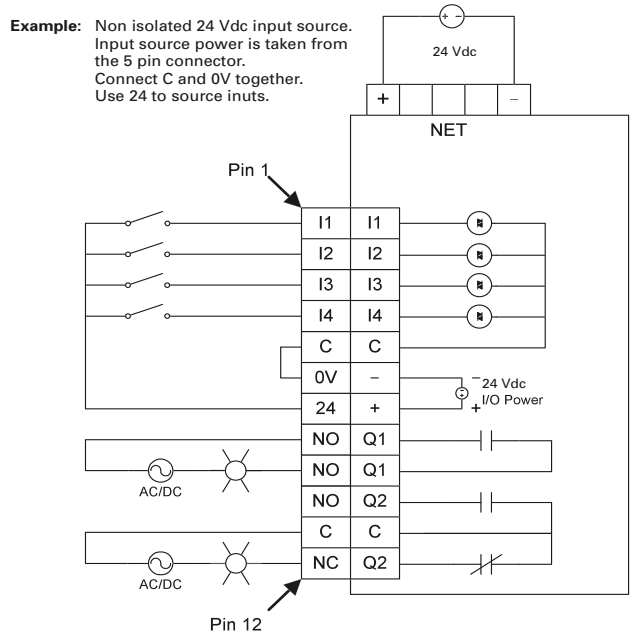


Note: Do not connect a 24 Vdc source to pins 6 and 7. The "I/O Power: 24 Vdc" is to be used only in conjunction with the inputs. It is a 24 Vdc output intended to only supply signal power for the inputs. When using the 24 Vdc input supply, pin 6 should only be connected to pin 5 (24 Vdc input supply common to input common). See example wiring diagrams. Any device using the provided 24 Vdc input supply must have 500V isolation from ground. Example devices include pushbuttons.

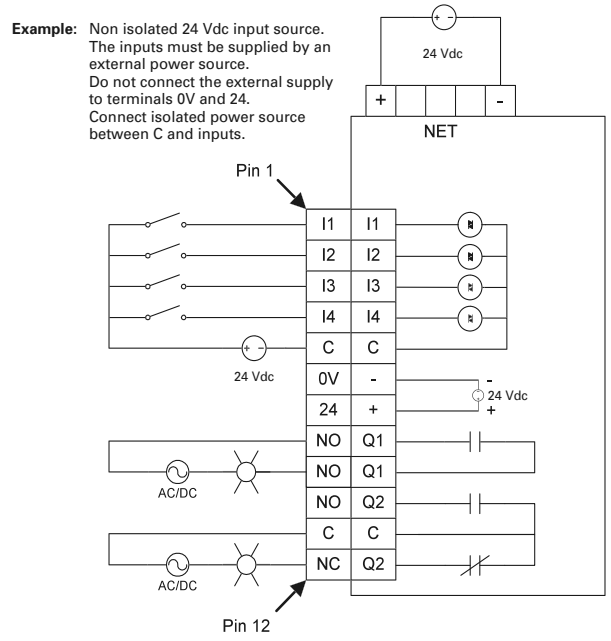
24 Vdc Input Specifications

Specification	Value
Number of inputs	4
Nominal voltage	24 Vdc
Nominal current	5 mA
Type	Current sinking
Input type	IEC 61131-2, type 1 digital
Maximum 24 Vdc source current	50 mA
Isolation voltage	250 Vac

Example: Non Isolated 24 Vdc Input Source



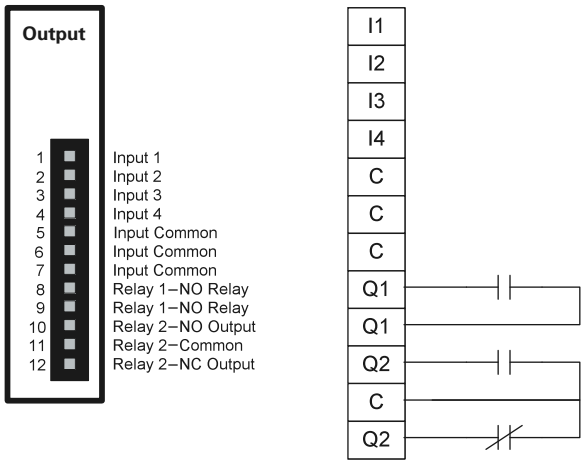
Example: Isolated 24 Vdc Input Source



Relay Output Behavior

Two relay outputs are provided, one Form A (NO) and one Form C (NO, NC). See wiring guide below.

NO, NC Output



Relay Specifications

Specification	Value
Number of contacts	2 independent relays (1 Form C, 1 Form A)
Thermal contact	5A
Rated insulation voltage	300 Vac
Max operating voltage	120 Vac
Max operating current	5A
Electrical life	1 x 10^5 operations
Mechanical life	1 x 10^7 operations

Pilot Duty Relays

Specification	Value
Pilot duty rating	B300
Thermal continuous test current	5A
Maximum current (120 Vac)—make/break	30A/3A
Maximum VA (volt-amperes)—make/break	3600 Va/360 Va

DeviceNet Configuration

DeviceNet Baud Rate Configuration DIP Switches 7, 8

The DeviceNet baud rate is configured using the DIP switches on the face of the device.

DIP Switch Baud Rate Selection

B0 (Sw7)	B1 (Sw8)	Baud
Off	Off	125k (default)
On	Off	250k
Off	On	500k
On	On	Software configuration

DeviceNet MAC ID Selection

The DeviceNet MAC ID is configured using the DIP switches on the face of the device.

DIP Switch Behavior

DIP Switch	Value
6	32
5	16
4	8
3	4
2	2
1	1
6	32

Note: To set a MAC ID of 25, DIP switches 5, 4 and 1 need to be turned on, with all others off. Default is Mac ID 63 (all on).

C440 DeviceNet Object Details

C440 DeviceNet Full Profile

Class	Object	Number of Instances
0x01	Identity	1
0x02	Message router	1
0x03	DeviceNet	1
0x04	Assembly	7 (See assembly object details)
0x05	Connection	3
0x08	Discrete input point	4
0x09	Discrete output point	2
0x29	Control supervisor	1
0x2C	Overload	1
0x94	DeviceNet interface	1

Identity Object, Class 0x01 (C440)

Identity Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x05	Reset	0	Instance 1: Initializes adapter to the power-up state
0x05	Reset	1	Instance 1: Writes default values to all instance attributes AND then saves all non-volatile attributes to flash memory and then performs the equivalent of a reset (0)
0x05	Reset	101	Vendor specific reset—perform Intercom divorce. If comm module is not connected to a C440, the comm module will assume the discrete IO profile. If the comm module is connected to a C440, it will marry to the C440 and assume the overload profile.
0x0E	Get_Attributes _Single	N/A	Returns the contents of the specified data
0x10	Set_Attributes _Single	Value	Modifies an attribute value

Identity Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description	Semantics
1	—	Get	Vendor ID	UINT	Identification of each vendor by number	The constant 68
2	—	Get	Device type	UINT	Indication of general type of product	The constant 3 for overload
3	—	Get	Product code	UINT	Identification of a particular product of an individual vendor	The constant 0 x 110 (C440 DeviceNet interface with 24 Vdc IO) or 0 x 1111 (C440 DeviceNet interface with 120 Vac IO)
4	—	Get	Revision	STRUCT of:	Revision of the item the Identity Object represents	—
			Major revision	USINT	—	The constant 0 x 02
			Minor revision	USINT	—	The constant 0 x 01
5	—	Get	Status	WORD	Summary status of device	See status section for details
6	—	Get	Serial number	UDINT	Serial number of comm device	32 bit vendor specific serial number
7	—	Get	Product name	SHORT_ STRING	Human readable identification	—
8	—	Get	State	USINT	Present state of the device as represented by the state transition diagram	0 = Nonexistent 1 = Device self testing 2 = Standby 3 = Operational 4 = Major recoverable fault 5 = Major unrecoverable fault
176 (0xB0)	NV	Get/ Set	User label (tag name)	SHORT_ STRING	User assigned ASCII string of 16 characters or less	—
177 (0xB1)	—	Get	C440 firmware version	UINT	Version of C440 base unit firmware	—
180 (0xB4)	—	Get	C440 expansion board ID	USINT	Returns a code to indicate what is in the C440 expansion port	0 = No expansion board 1 = 120 Vac 2 = RS-485
181 (0xB5)	—	Get	C440 serial number	UDINT	32 bit vendor specific serial number	—
182 (0xB6)	—	Get	C440 hardware revision	UINT	Hardware revision of C440 base unit; stored as a 2 byte number with a major and minor revision	—
183 (0xB7)	—	Get	C440 product code	UINT	Eaton product code. If the number is odd–it is ground fault capable	—
184 (0xB8)	—	Get	C440 firmware checksum	UDINT	The 32 bit checksum of the base C440 firmware	—
185 (0xB9)	—	Get	C440 firmware build number	UINT	—	—

Status

This attribute represents the current status of the entire device. Its value changes as the state of the device changes. The Status attribute is a WORD, with the following bit definitions:

Bit Definitions for Instance #1, Status Attribute of Identity Object (C440)

Bit(s)	Called	Definition
0	Owned	—
1	—	Reserved, set to zero.
2	Configured	TRUE indicates that the application of the device has been configured to do something different than the "out-of-box" default. This does not include configuration of the communications.
3	—	Reserved, set to zero.
4 – 7	—	Reserved, set to zero.
8	Minor recoverable fault	TRUE indicates that the device detected a problem with itself, which is thought to be recoverable. The problem does not cause the device to go into one of the faulted states.
9	Minor unrecoverable fault	TRUE indicates that the device detected a problem with itself, which is thought to be unrecoverable. The problem does not cause the device to go into one of the faulted states.
10	Major recoverable fault	TRUE indicates that the device detected a problem with itself, which caused the device to go into the "major recoverable fault" state.
11	Major unrecoverable fault	TRUE indicates that the device detected a problem with itself, which caused the device to go into the "major unrecoverable fault" state. See Behavior section.
12, 13	—	Reserved, set to zero.
14, 15	—	Reserved, set to zero.

State

This attribute is an indication of the present state of the device. Note that the nature of a major unrecoverable fault could be such that it may not be accurately reflected by the state attribute.

This attribute reflects the dynamic status of the adapter. The defined states are:

Defined States

Value	State Name	Description
0	Non-existent	This state will never be visible from within a device. This state is principally intended for a tool to be able to represent the lack of an instance in a physical device.
1	Device self testing	Power-up or reset operation. Will not be visible from within a device because communications are not active in this state.
2	Standby	This state is reported while needs commissioning due to an incorrect or incomplete configuration.
3	Operational	This state is reported when the adapter is powered up, configured and operating normally.
4	Major recoverable fault	—
5	Major unrecoverable fault	—

Message Router Object, Class 0x02 (C440)

Message Router Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attribute_Single	N/A	Returns the value of the specified attribute

Message Router Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description	Semantics
1		Get	Object list	STRUCT of:	A list of supported objects	Structure with an array of object class codes supported by the device
				UINT	Number of supported classes in the classes array	The number of class codes in the classes array
				ARRAY of UINT	List of supported class codes	The class codes supported by the device
2		Get	Number available	UINT	Maximum connections supported	Count the maximum number of connections supported
3		Get	Number active	UINT	Number of connections currently used by system components	Current count of the number of connections allocated to system communication

DeviceNet Object, Class 0x03 (C440)

DeviceNet Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attribute_Single	N/A	Returns the value of the specified attribute
0x4B	Allocate	values	Allocate_Master/Slave_Connection_Set
0x4C	Release	value	Release_Group_2_Identifier_Set

DeviceNet Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description	Semantics
5	—	Get	Allocation information	STRUCT of:	—	—
			Allocation choice byte	BYTE	Indicates which connections are active	Bit 0—Explicit Bit 1—Poll Bit 2—Bit strobe
			Master's MAC ID	USINT	MAC ID of Master (from allocate)	Range 0—63, 255 Modified via allocate only
6	—	Get	MAC ID switch changed	BOOL	The node address switches have changed since last power-up/reset	0 = No change 1 = Change since last reset or power-up
7	—	Get	Baud rate switch changed	BOOL	The baud rate switch(es) have changed since last power-up/reset	0 = No change 1 = Change since last reset or power-up
8	—	Get	MAC ID switch value	USINT	Actual value of node address switches	Range 0—63
9	—	Get	Baud rate switch value	USINT	Actual value of baud rate switches	Range 0—3

Assembly Object, Class 0x04 (C440)

The assembly object binds attributes of multiple objects, which allows data to or from each object to be sent or received over a single connection. Assembly objects can be used to bind input data or output data. The terms "input" and "output" are defined from the network's point of view. An input will produce data on the network and an output will consume data from the network. Various data sets can be exchanged using I/O messaging. The data set to be exchanged is determined by selecting an input and an output assembly.

The adapter is designed with 2 I/O connections (poll and bit strobe). These connections use the assemblies selected in the vendor specific DeviceNet Interface object (0x94).

Assembly Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attribute_Single	N/A	Returns the value of the specified attribute
0x10	Set_Attributes_Single	Value	Modifies an attribute value

Assembly Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Description of Attribute	Semantics of Values
3	—	Set	Data	ARRAY of BYTE	—	—

Assembly Instances (C440)

Type	Instance	Usage	Name
Input	50 (0x32)	Poll, bit strobe	Basic overload (ODVA overload profile)
Input	107 ① (0x6B)	Poll, bit strobe	Extended overload with discrete input and output points
Input	120 ① (0x78)	Poll	User defined input assembly short
Input	130 (0x82)	Poll	User defined input assembly long
Output	2 (0x02)	Poll	Basic overload (ODVA overload profile)
Output	105 ② (0x69)	Poll	Basic overload with discrete output points
Output	111 ① (0x6F)	Bit strobe	Accepts 8 bytes of bit strobe command to trigger bit strobe response

Input Assembly 50 (C440)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	—	—	—	—	—	—	—	Faulted

Input Assembly 107 (C440)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Input 4	Input 3	Input 2	Input 1	Output 2	Output 3	Reserved	Faulted

Notes

① Indicates default assembly instances used in poll connection.
② Indicates default assembly instances used in bit strobe connection.

Input Assembly 120 (C440 Short Assembly)

Values are selected from the list defined below.

C440 Short Assembly

Byte	Word	Value	Default Value
0	0	Value selected by DeviceNet interface object, attribute 7	Device status (low byte) (see control supervisor object)
1			Device status (high byte)
2	1	Value selected by DeviceNet interface object, attribute 8	Present fault bits current (low byte)
3			Present fault bits current (high byte)
4	2	Value selected by DeviceNet interface object, attribute 9	Average current (low byte)
5			Average current (high byte)
6	3	Value selected by DeviceNet interface object, attribute 10	Thermal memory percent current (low byte)
7			Thermal memory percent current (high byte)

Input Assembly 130 (C440 Long Assembly)

Values are selected from the list defined below.

C440 Long Assembly

Byte	Word	Value	Default Value
0	0	Value selected by DeviceNet interface object, attribute 12	Device status (low byte) (see control supervisor object)
1			Device status (high byte)
2	1	Value selected by DeviceNet interface object, attribute 13	L1 current (low byte)
3			L1 current (high byte)
4	2	Value selected by DeviceNet interface object, attribute 14	L2 current (low byte)
5			L2 current (high byte)
6	3	Value selected by DeviceNet interface object, attribute 15	L3 current (low byte)
7			L3 current (high byte)
8	4	Value selected by DeviceNet interface object, attribute 16	RMS current ave (low byte)
9			RMS current ave (high byte)
10	5	Value selected by DeviceNet interface object, attribute 17	Current as a percent of FLA (low byte)
11			Current as a percent of FLA (high byte)
12	6	Value selected by DeviceNet interface object, attribute 18	Overload thermal pile (low byte)
13			Overload thermal pile (high byte)
14	7	Value selected by DeviceNet interface object, attribute 19	Frequency (low byte)
15			Frequency (high byte)
16	8	Value selected by DeviceNet interface object, attribute 20	Phase imbalance percentage (low byte)
17			Phase imbalance percentage (high byte)
18	9	Value selected by DeviceNet interface object, attribute 21	Present fault bits (low byte)
19			Present fault bits (high byte)

Input Assembly 120 and 130 Selection List (C440)

Value	Description
0	Assembly terminator
1	Device status
2	RMS current IA
3	RMS current IB
4	RMS current IC
5	RMS current average
6	Current as a percent of FLA
7	Phase imbalance percentage
8	Frequency
9	Overload thermal pile memory percentage
10	Present fault bits (trip reason)
11	Feature status
12	Device temperature
13	Ground current (RMS)
14	Ground fault percentage

Output Assembly 2

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	—	—	—	—	—	Fault reset	—	—

Output Assembly 105

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	—	—	Test trip	—	—	Fault reset	Out 2	Out 1

Output Assembly 111—Bit Strobe Command (C440)

Sixty-four bits of strobe data, one per MAC ID. The data is ignored by the C440 DeviceNet adapter.

Connection Object, Class 0x05 (C440)

Connection Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x05	Reset	N/A	Resets the inactivity/watchdog timer Transitions from timed-out or deferred delete state to established
0x0E	Get_Attributes_Single	N/A	Returns the contents of the specified data
0x10	Set_Attributes_Single	Value	Modifies an attribute value

Connection Object Instance #1 Attributes (Explicit Messaging) (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description
1	—	Get	State	USINT	State of the object Default = 0x03
2	—	Get	Instance_Type	USINT	Indicates either I/O or messaging connection Default = 0x00
3	—	Get	TransportClass_Trigger	BYTE	Defines behavior of the connection Default = 0x83
4	—	Get	Produced_Connection_ID	UINT	Placed in CAN Identifier field when the connection transmits Default = 0x0000 (although this default will never be visible)
5	—	Get	consumed_Connection_ID	UINT	CAN Identifier field value that denotes message to be received Default = 0x0000 (although this default will never be visible)
6	—	Get	Initial_Comm_Characteristics	BYTE	Defines the message group(s) across which productions and consumptions associated with this connection occur Default = 0x21 This indicates that the slave's explicit messaging connection produces and consumes across message group 2. Additionally, this value indicates that the slave's MAC ID appears in the CAN Identifier fields of the group 2 messages that the slave consumes and produces.
7	—	Get	Produced_Connection_Size	UINT	Maximum number of bytes transmitted across this connection Default = 500
8	—	Get	Consumed_Connection_Size	UINT	Maximum number of bytes received across this connection Default = 500
9	—	Get/Set	Expected_Packet_Rate	UINT	Defines timing associated with this connection Default = 0x09C4 (2500 milliseconds)
10 _11	—	N/A	N/A	N/A	Not used. These attribute IDs have been obsoleted and are no longer defined for a connection object
12	—	Get/Set	Watchdog_Timeout_Action	USINT	Defines how to handle Inactivity/ watchdog timeouts Default = 0x01 (Auto_Delete)
13	—	Get	Produced_Connection_Path_Length	UINT	Number of bytes in the Produced_Connection_Path attribute Default = 0x0000
14	—	Get	Produced_Connection_Path	Packed EPATH	Specifies the Application Object(s) whose data is to be produced by this connection object. See DeviceNet Volume I, Appendix I. Default = Null PATH
15	—	Get	Consumed_Connection_Path_Length	UINT	Number of bytes in the Consumed_Connection_Path attribute Default = 0x00
16	—	Get	Consumed_Connection_Path	Packed EPATH	Specifies the application object(s) that are to receive the data consumed by this connection object. See DeviceNet Volume I, Appendix I. Default = Null PATH

Connection Object Instance #2 Attributes (Polled I/O) (C440)

Attr ID	Access Rule	NV	Name	Data Type	Attribute Description
1	Get	—	State	USINT	State of the object Default = 0x01
2	Get	—	Instance_Type	USINT	Indicates either I/O or messaging connection Default = 0x01
3	Get	—	TransportClass_Trigger	BYTE	Defines behavior of the connection Default = 0x83
4	Get	—	Produced_Connection_ID	UINT	Placed in CAN identifier field when the connection transmits
5	Get	—	Consumed_Connection_ID	UINT	CAN Identifier field value that denotes message to be received
6	Get	—	Initial_Comm_Characteristics	BYTE	Defines the message group(s) across which productions and consumptions associated with this connection occur Default = 0x01
7	Get	—	Produced_Connection_Size	UINT	Maximum number of bytes transmitted across this connection
8	Get	—	Consumed_Connection_Size	UINT	Maximum number of bytes received across this connection
9	Get/Set	—	Expected_Packet_Rate	UINT	Defines timing associated with this connection Default = 0x0000
10 _11	—	N/A	N/A	N/A	Not used. These attribute IDs have been obsoleted and are no longer defined for a connection object
12	Get/Set	—	Watchdog_Timeout_Action	USINT	Defines how to handle inactivity/watchdog timeouts Default = 0x00
13	Get	—	Produced_Connection_Path_Length	UINT	Number of bytes in the Produced_Connection_Path attribute Default and fixed as 0x03
14	Get/Set	NV	Produced_Connection_Path	Packed EPATH	Specifies the application object(s) whose data is to be produced by this connection object default assembly instance 120 “0x62 0x37 0x38” Allowed EPATHs: 50 (0x32): “0x62 0x33 0x32” 107 (0x6B): “0x62 0x36 0x42” 120 (0x78): “0x62 0x37 0x38” 130 (0x82): “0x62 0x38 0x32”
15	Get	—	Consumed_Connection_Path_Length	UINT	Number of bytes in the Consumed_Connection_Path attribute Default and fixed as 0x03
16	Get/Set	NV	Consumed_Connection_Path	Packed EPATH	Specifies the application object(s) that are to receive the data consumed by this connection object Default assembly instance 105 “0x62 0x36 0x39” Allowed EPATHs: 2 (0x02): “0x62 0x30 0x32” 105 (0x69): “0x62 0x36 0x39”

Connection Object Instance #3 Attributes (Bit strobe I/O) (C440)

Attr ID	Access Rule	NV	Name	Data Type	Attribute Description
1	Get	—	State	USINT	State of the object default = 0x01
2	Get	—	Instance_Type	USINT	Indicates either I/O or messaging connection Default = 0x01
3	Get	—	TransportClass_Trigger	BYTE	Defines behavior of the connection Default = 0x83
4	Get	—	Produced_Connection_ID	UINT	Placed in CAN Identifier field when the connection transmits
5	Get	—	Consumed_Connection_ID	UINT	CAN Identifier field value that denotes message to be received
6	Get	—	Initial_Comm_Characteristics	BYTE	Defines the message group(s) across which productions and consumptions associated with this connection occur Default = 0x02
7	Get	—	Produced_Connection_Size	UINT	Maximum number of bytes transmitted across this connection Default and Fixed as 0x08
8	Get	—	Consumed_Connection_Size	UINT	Maximum number of bytes received across this connection Default and fixed as 0x08
9	Get/Set	—	Expected_Packet_Rate	UINT	Defines timing associated with this connection Default = 0x0000
10_11	—	N/A	N/A	N/A	Not used. These attribute IDs have been obsoleted and are no longer defined for a connection object
12	Get/Set	—	Watchdog_Timeout_Action	USINT	Defines how to handle Inactivity/watchdog timeouts Default = 0x00
13	Get	—	Produced_Connection_Path_Length	UINT	Number of bytes in the Produced_Connection_Path attribute Default and fixed as 0x03
14	Get/Set	—	Produced_Connection_Path	Packed EPATH	Specifies the assembly instance whose data is to be produced by this connection object Default assembly instance 107 “0x62 0x36 0x42”
15	Get	—	Consumed_Connection_Path_Length	UINT	Number of bytes in the Consumed_Connection_Path attribute Default and fixed as 0x03
16	Get/Set	—	Consumed_Connection_Path	Packed EPATH	Specifies the application object(s) that are to receive the data consumed by this connection object Default and fixed as assembly instance 111 “0x62 0x36 0x46”

Discrete Input Object, Class 0x08 (C440)

Discrete Input Point Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attributes_Single	N/A	Returns the contents of the specified data
0x10	Set_Attributes_Single	Value	Modifies an attribute value

Discrete Input Point Object Instance #1–4 (C440)

Attr ID	Access Rule	NV	Name	Data Type	Attribute Description
3	Get	—	Value	BOOL	Input point value
101	Set	—	Debounce	UDINT	Debounce time

Input Point Value

The input point value reflects current state of the associated input terminal.

Discrete Output Object, Class 0x09 (C440)

The Discrete Output Point (DOP) Object models discrete outputs in a product. Note that the term "output" is defined from the network's point of view. An output will consume data from the network. The output is read from this object's VALUE attribute and applied to the output terminal.

Discrete Output Point Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attributes_Single	N/A	Returns the contents of the specified data
0x10	Set_Attributes_Single	Value	Modifies an attribute value

Discrete Input Point Object Instance #1–4 (C440)

Attr ID	Access Rule	NV	Name	Data Type	Attribute Description
3	Set	—	Value	BOOL	Output point value (see below for details)
5	Set	NV	Fault action	BOOL	Action taken on output's value in communication fault state (see below for details)
6	Set	NV	Fault value	BOOL	User-defined value for use with fault action attribute (see below for details)
7	Set	NV	Idle action	BOOL	Action taken on output's value in communication idle state (see below for details)
8	Set	NV	Idle value	BOOL	User-defined value for use with idle action attribute (see below for details)

Output Point Value

The output is read from this object's VALUE attribute and applied to the output terminal.

Communication Fault Action

Determines the action to be taken at the output terminal when a communications fault occurs.

If this attribute is set to "0," then output terminal will be set to the state determined by attribute "Communications fault value."

If the attribute is set to "1," then the output terminal is not changed due to a communications fault.

Default: "0"

Communication Fault Value

Determines the value to be applied to the output terminal if a communications fault occurs

AND the "Communication fault action" attribute is set to "0."

Default: 0.

Idle Action

Determines the action to be taken at the output terminal when communication idle occurs. If this attribute is set to "0," then output terminal will be set to the state determined by attribute "Idle value."

If the attribute is set to "1," then the output terminal is not changed due to a communications idle event.

Default: "0"

Idle Value

Determines the value to be applied to the output terminal if a communications idle event occurs AND the "Idle action" attribute is set to "0".

Default: 0.

Control Supervisor Object, Class 0x29 (C440)

Control Supervisor Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attributes_Single	N/A	Returns the contents of the specified data
0x10	Set_Attributes_Single	Value	Modifies an attribute value
0x05	Reset	N/A	Resets the device to start-up state

Control Supervisor Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description
10	—	Get	Faulted/Tripped	BOOL	1 = Fault occurred (latched) 0 = No faults present
12	—	Set	FaultRst	BOOL	0 ≥1 = Fault reset 0 = No action (overload reset)
17	—	Set	ForceFault	BOOL	0 ≥ 1 = Force Fault 0 = No action
101	—	Get	Device status	WORD	Device bit array Bit 0: Tripped Bit 1: Unused Bit 2: Output #1 Bit 3: Output #2 Bit 4: Input #1 Bit 5: Input #2 Bit 6: Input #3 Bit 7: Input #4 Bit 8: Overload power lost Bit 9: Comm adapter low voltage Bit 10: 1 = Running, 0 = Stopped or tripped Bit 11-15: Reserved
102	—	Get	Present fault bits	WORD	Present fault bits bit array Faults are cleared when the device is either reset by the network or detects current flowing. The fault bits are defined as follows: Bit Feature 0 Overload fault 1 Phase imbalance 2 Phase loss fault 3 Ground fault 4 Network trip command 5 NV memory failure 6-> Reserved
103	—	Get	Motor control state/ overload state	USINT	Motor control states: 0 = Stopped 1 = Running 2 = Tripped
105	NV	Set	Comm fault trip action	BOOL	Action taken on trip state in comm fault state 0 = Use comm fault trip value attribute 1 = No affect

Control Supervisor Instance Attributes (C440), continued

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description
106	NV	Set	Comm fault trip value	BOOL	User-defined value for use with comm fault trip action attribute 0 = No affect 1 = Trip
107	NV	Set	Idle trip action	BOOL	Action taken on trip state in communication idle state 0 = Use Idle trip value attribute 1 = No change
108	NV	Set	Idle trip value	BOOL	User-defined value for use with idle trip action attribute 0 = No affect 1 = Trip
130	—	Get	Device feature status	WORD	The feature status bits are defined as follows: Bit Feature 0,1: Class index (00 = Class 10a; 01 = Class 10; 10 = Class 20; 11 = Class 30) 2: Phase loss/imbalance enabled 3: Ground fault enabled 4: Auto reset enabled 5: Remote reset active 8: DIP switch position 0 9: DIP switch position 1 10: DIP switch position 2 11: DIP switch position 3 12-15: Reserved
131	—	Get	Device temperature in degrees	INT	Temperature as seen by the base device microcontroller, 10% accuracy
132	—	Get	Frequency	UINT	Line frequency measured by the device in deci Hz

Faulted/Tripped

A condition exists that is out of the normal operating range of the device. This condition has been configured to cause the device to enter the faulted or tripped state.

Fault Reset

Commands the device out of the faulted state. A transition from 0 to 1 will cause the fault reset.

Faulted State

Initial Value	Commanded Value	Result
0	0	No action
0	1	Reset fault
1	0	No action
1	1	No action

Overload Object, Class 0x2C (C440)

Overload Instance Service (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attribute_Single	N/A	Returns the contents of the specified data
0x10	Set_Attribute_Single	Value	Modifies an attribute value

Overload Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description
6	—	Get	%PhImbal	USINT	Percent phase imbalance
7	—	Get	%Thermal	USINT	Percent thermal capacity
100	NV	Get	TripClass	USINT	Trip class setting 5 to 30
105	—	Get	FLA Current	UINT	The present FLA setting. The potentiometer selects this value. The value is scaled by the multiplier.
140	—	Get	AvgCurrent	UINT	Average of the three phase currents, scaled by the current multiplier
141	—	Get	Current LI	UINT	Actual motor phase current L1, scaled by the current multiplier
142	—	Get	Current L2	UINT	Actual motor phase current L2, scaled by the current multiplier
143	—	Get	Current L3	UINT	Actual motor phase current L3, scaled by the current multiplier
144	—	Get	Ground current	UINT	RMS ground current, scaled by the current multiplier
150	—	Get	Maximum device FLA	UINT	This is the max FLA setting possible in this device. The value is scaled by the current multiplier.
151	—	Get	Minimum device FLA	UINT	This is the min FLA setting possible in this device. The value is scaled by the current multiplier.
152	—	Get	Current multiplier	UINT	This value indicates the multiplier applied to the current values. For example: If the multiplier is 10 then all currents are read out in deci-amps. 1A => 10; Divide the given current value (attribute 140, 141, 142, and so on) by the value in this location to convert to amps.
153	—	Get	Current as a % of FLA	UINT	Presents the average current as a percent of the FLA setting.
154	—	Get	Ground Fault %	USINT	Percent of ground fault measured. GF% = GFC / ([0.5]*FLA)

DeviceNet Interface Object, Class 0x94 (C440)

DeviceNet Interface Object Instance Services (C440)

Service Code	Service Name	Service Data	Description
0x0E	Get_Attribute_Single	N/A	Returns the value of the specified attribute
0x10	Set_Attributes_Single	Value	Modifies an attribute value

DeviceNet Interface Object Instance Attributes (C440)

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description	Value
1	NV	Set	MAC ID	USINT	MAC ID in use when baud rate switch is set to 3 (B0: on, B1: on)	Range: 0–63 Default = 63
2	NV	Set	Baud rate	USINT	Baud rate in use when baud rate switch is set to 3 (B0: on, B1: on)	0 = 125k 1 = 250k 2 = 500k Default = 0
3	NV	Set	Poll input assembly select	USINT	Poll connection input assembly instance that is active	Default = 120
4	NV	Set	Bit strobe input assembly select	USINT	Bit strobe connection input assembly instance that is active	Default = 107
5	NV	Set	Poll output assembly select	USINT	Poll connection output assembly instance that is active	Default = 105
6	—	Get	Short assembly user input, size	USINT	Total size of assembly 120 as determined by user selected input list items	Determined by the placement of the "0" below
7	NV	Set	Short assembly user input, Word 0 Param	USINT	Data item assigned to Word 0 of short user input assembly	Default = 1; device status (control supervisor attr 101)
8	NV	Set	Short assembly user input, Word 1 Param	USINT	Data item assigned to Word 1 of short user input assembly	Default = 10; present fault bits
9	NV	Set	Short assembly user input, Word 2 Param	USINT	Data item assigned to Word 2 of short user input assembly	Default = 5; average current
10	NV	Set	Short assembly user input, Word 3 Param	USINT	Data item assigned to Word 3 of short user input assembly	Default = 9; thermal memory percent
11	—	Get	Long assembly user input, size	USINT	Total size of assembly 130 as determined by user selected input list items	Determined by the placement of the "0" below
12	NV	Set	Long assembly user input, Word 0 Param	USINT	Data item assigned to Word 0 of long user input assembly	Default = 1; device status (control supervisor attr 101)
13	NV	Set	Long assembly user input, Word 1 Param	USINT	Data item assigned to Word 1 of long user input assembly	Default = 2; L1 current
14	NV	Set	Long assembly user input, Word 2 Param	USINT	Data item assigned to Word 2 of long user input assembly	Default = 3; L2 current
15	NV	Set	Long assembly user input, Word 3 Param	USINT	Data item assigned to Word 3 of long user input assembly	Default = 4; L3 current
16	NV	Set	Long assembly user input, Word 4 Param	USINT	Data item assigned to Word 4 of long user input assembly	Default = 5 Current avg
17	NV	Set	Long assembly user input, Word 5 Param	USINT	Data item assigned to Word 5 of long user input assembly	Default = 6 Current as a % of FLA

DeviceNet Interface Object Instance Attributes (C440), continued

Attr ID	NV	Access Rule	Name	Data Type	Attribute Description	Value
18	NV	Set	Long assembly user input, Word 6 Param	USINT	Data item assigned to Word 6 of long user input assembly	Default = 9 Thermal memory percent
19	NV	Set	Long assembly user input, Word 7 Param	USINT	Data item assigned to Word 7 of long user input assembly	Default = 8 Frequency
20	NV	Set	Long assembly user input, Word 8 Param	USINT	Data item assigned to Word 8 of long user input assembly	Default = 7 Phase unbalance percent
21	NV	Set	Long assembly user input, Word 9 Param	USINT	Data item assigned to Word 9 of long user input assembly	Default = 10 Faults latched

MAC ID and Baud Rate

The MAC ID and baud rate are determined by attributes 1 and 2 when the baud rate switches are set to value 3 (B0 = ON and B1 = ON). The switch values determine MAC ID and baud rate when the baud rate switches are not set to 3.

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Printed in USA
Publication No. MN04210002E / Z10843
March 2011

Powering Business Worldwide