



Cutler-Hammer

Intelligent Technologies

DeviceNet Starter Network Adapter Product (D77B-DSNAP)

Installation and User Manual

January 2004
Supersedes September 2002

Note: This manual supports versions
2.001 through 2.005 of the
D77B-DSNAP.

Certain features apply only to version
2.005; these features are marked
within this document.



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Cover Photo: Cutler-Hammer® *IT*. D77B-DSNAP

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Product Overview

Description

Cutler-Hammer® Intelligent Technologies (*IT*.) D77B-DSNAP (**DeviceNet Starter Network Adapter Product**) by Eaton Electrical® is the result of a substantive engineering and marketing effort, involving extensive customer input. This product has greatly increased functionality of the *IT*. Electromechanical Starter with the addition of enhanced features. This front-mount device is a single DeviceNet node providing control and monitoring of an *IT*. Electromechanical Starter application.

The D77B-DSNAP provides a communication interface to the following *IT*. Electromechanical Starters.

Table 1: D77B-DSNAP Electromechanical Starter Connectivity Table

IEC E101, FVNR E501, FVR	NEMA N101, FVNR N501, FVR	Frame Width
B	00 0	45 mm
C	1	54 mm
D	2	76 mm
E	3 4	105 mm
F	5	140 mm

Table 2: D77B-DSNAP S751 Connectivity Table

S751 Soft Start
All V1.04 and Later

This manual specifically addresses the DeviceNet Starter Network Adapter Product (D77B-DSNAP). The D77B-DSNAP provides connectivity to DeviceNet supporting Group 2 slave, I/O poll and explicit messaging.

For further information on the *IT*. family of devices, visit our Web site at:
www.eatonelectrical.com/it

Notice

The D77B-DSNAP can only be applied with the *IT*. family of starters.

Notice

The features described within this manual reflect D77B-DSNAPs with version 2.005 and greater.

Features and Benefits

The **IT** D77B-DSNAP includes the following significant features:

- Communication to DeviceNet consuming one DeviceNet MAC ID
- Control of non-reversing and reversing **IT** Starters and S751 Soft Start
- Monitoring of non-reversing and reversing **IT** Starters and S751 Soft Start
- Easy direct mounting to the front of **IT** Starters and S751 Soft Start
- Optional ground fault detector
- No special software application required for normal setup. MAC ID and baud rate are set with DIP switches
- Warning levels that are user-settable
- Auxiliary field inputs (2 points)
- HAND/OFF/AUTO option

Note: The auxiliary field inputs and HAND/OFF/AUTO option features are supported only in version 2.005 of the D77B-DSNAP.

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Safety

The following safety statements relate to the installation, setup and operation of the Cutler-Hammer **IT.** D77B-DSNAP and Starter from Eaton Electrical.

Notice

Make sure you read and understand the installation procedures in this manual before you attempt to set up or operate the equipment.

WARNING

This instruction manual should be used for proper installation, setup and operation of the **IT.** D77B-DSNAP. 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.

WARNING

Hazardous voltage can cause electric shock and burns. Always disconnect power before proceeding with any work on this product.

WARNING

Only apply 24V DC to the Terminal Adapter power terminals. Use of any other voltage may result in personal injury, property damage and damage to the **IT.** D77B-DSNAP.

WARNING

To provide continued protection against fire or shock hazard, the complete **IT.** D77B-DSNAP must be replaced if it becomes inoperative.

WARNING

Unplug the D77B-DSNAP from DeviceNet prior to mounting it to another **IT.** Starter.

Environmental Ratings

The following environmental ratings apply to the D77B-DSNAP.

Table 3: Environmental Ratings

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

Approvals/Certifications

The following approvals and certifications apply to the D77B-DSNAP.

Table 4: Approvals/Certifications

Standard	Approval/Certification
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-ground ±2 kV line-to-line
RF Conducted (IEC 61000-4-6)	10V, 0.15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30 A/m, 50 Hz
Other Standards	
Ingress Protection Code	IP20
Radiated and Conducted Emissions	EN 5011 Class A
Agency Certifications	UL 508 CUL (CSA C22.2 No. 14) CE (Low Voltage Directive)
ODVA	Group 2 slave only, no UCMM

Catalog Numbering System

The D77B-DSNAP is ordered as an assembly, the assembly includes all components for normal operation.

Table 5: Catalog Numbers

Description	Catalog Number
D77B-DSNAP Assembly of terminal adapter, jumper and D77B-DSNAP for FVNR applications	D77B-DSNAP-X1
D77B-DSNAP Assembly of terminal adapter, jumper, D77B-DSNAP and second contactor sensor for FVR applications	D77B-DSNAP-X2
D77B-DSNAP Assembly of HOA adapter, jumper and D77B-DSNAP for FVNR applications	D77B-DSNAP-X3
D77B-DSNAP Assembly of HOA adapter, jumper, D77B-DSNAP and second contactor sensor for FVR applications	D77B-DSNAP-X4
Required DSNAP Adapter Kit for the 140 mm (Size 5 and F) Starter	D77B-140A

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Physical Features

Physical Description

Figure 1 illustrates the front and back of the *IT.* D77B-DSNAP and its various features.

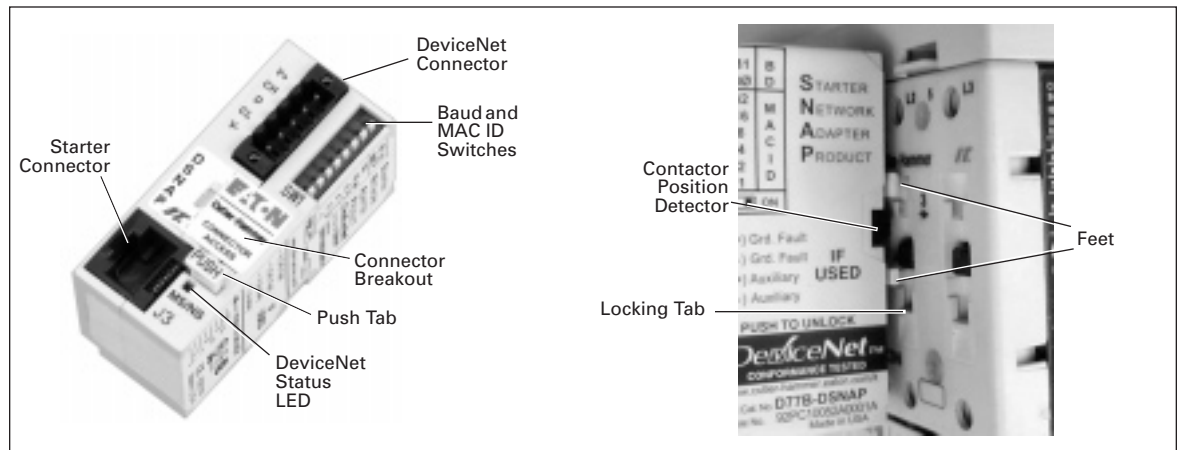


Figure 1: D77B-DSNAP Features

Dimensions

Figure 2 illustrates the dimensions of the *IT.* D77B-DSNAP.

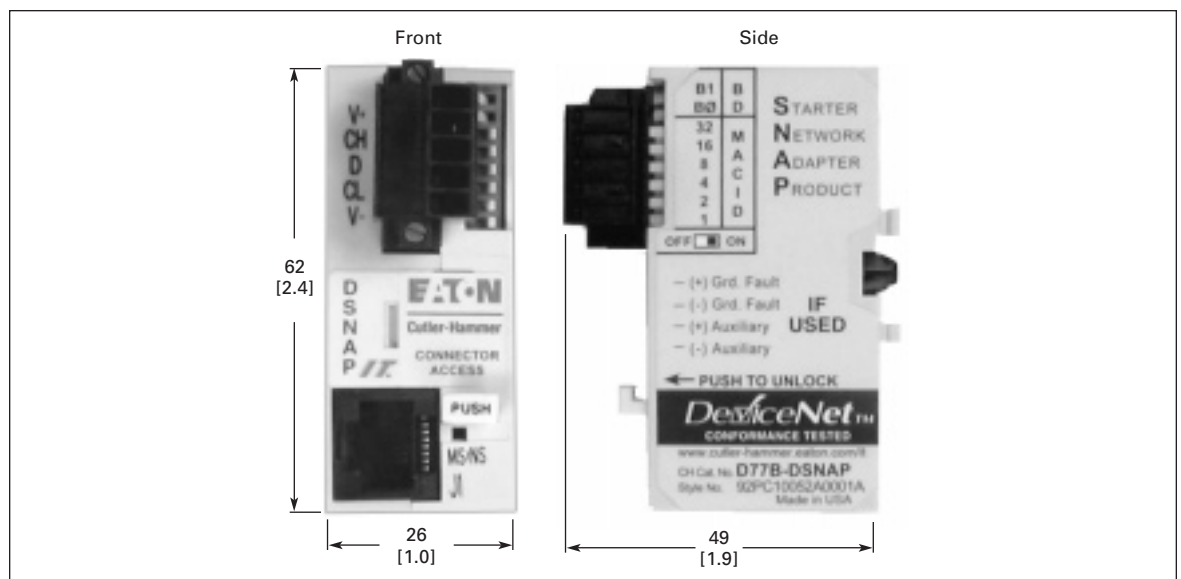


Figure 2: D77B-DSNAP Dimensions, mm [in]

Power Source

The **IT.** D77B-DSNAP is designed for use with 24V DC power. The D77B-DSNAP uses power from two sources, the DeviceNet subnet and the Cutler-Hammer **IT.** Starter from Eaton Electrical. This allows the D77B-DSNAP to indicate to the user that the **IT.** Starter does not have 24V DC power, signaling a fault or an E-Stop.

Power for DeviceNet communication CPU comes from DeviceNet, as illustrated in **Table 6.** Some power is required from the starter for communication to be present between the **IT.** Starters and the D77B-DSNAP.

The power for the **IT.** Starter must be connected to the Starter Terminal Adapter.

Table 6: Power Requirements

Current Source	Load
DeviceNet	90 mA
IT. Starter	Less than 1 mA

When a power supply is chosen for the starter(s), size it for the load of the starter(s) and the D77B-DSNAP using the appropriate **IT.** contactor and starter user manual.

The power for the Cutler-Hammer **IT.** Starter must be connected to the **IT.** Starter terminal, as illustrated in **Figure 3.**

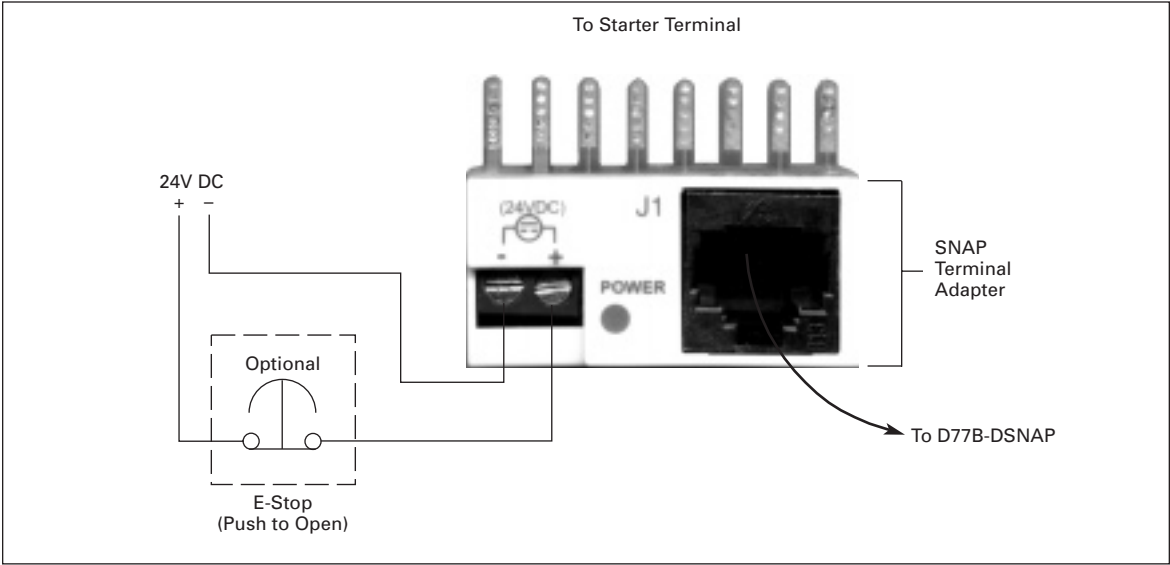


Figure 3: Starter Terminal Adapter Connection

CAUTION

Only apply 24V DC to the D77B-DSNAP. Use of any other voltage may result in personal injury, property damage and damage to the D77B-DSNAP.

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Installation

Mount the D77B-DSNAP to the Starter

The **IT.** D77B-DSNAP is designed to be installed in the auxiliary contact locations of the **IT.** family of starters. On all starters, one or more auxiliaries can be used along with the D77B-DSNAP. The following table lists starters and indicates the number of available auxiliary locations for each.

Table 7: Starter Size/Available Auxiliary Locations on Mounted D77B-DSNAP

Starter Frame Size (mm)	Number of Available Auxiliary Locations with Center Mounted D77B-DSNAP
45	1 single Auxiliary
54	1 single or 1 dual Auxiliary
76	2 single or 2 dual Auxiliary
105	2 single or 2 dual Auxiliary
140	2 single or 2 dual Auxiliary

Use the following steps and illustration in **Figure 4** to mount the D77B-DSNAP:

1. Align and insert both the D77B-DSNAP feet into the auxiliary starter contact mounting slots on the starter, as illustrated in **Figure 4**.

Recommendation: Use the middle auxiliary contact mounting slot on the starter contact block when mounting the D77B-DSNAP.

2. Slide the D77B-DSNAP down until a “click” is heard. This ensures that the D77B-DSNAP is mounted securely to the starter.

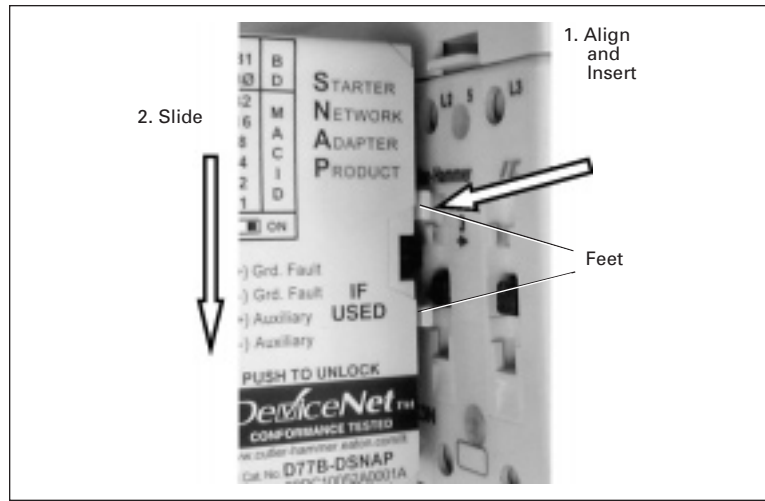


Figure 4: D77B-DSNAP Alignment and Mounting

Use the following steps and illustration in **Figure 5** to remove the D77B-DSNAP:

1. Press the **PUSH** tab protruding from the D77B-DSNAP front.
2. Slide the D77B-DSNAP up.
3. Pull the D77B-DSNAP away from the starter contact block.

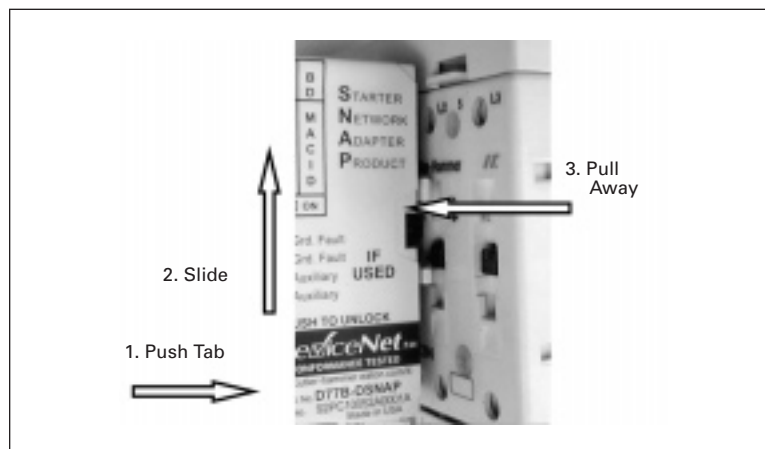


Figure 5: D77B-DSNAP Removal

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Connect the Starter Terminal Adapter to the Starter

Loosen the screws on the removable terminal block of the starter and insert the Starter Terminal Adapter into the removable terminal block. Tighten the screws on the terminal block (4.5 in-lb or 0.5 Nm) securing the Starter Terminal Adapter into the removable terminal block. Install the removable terminal block into the starter.

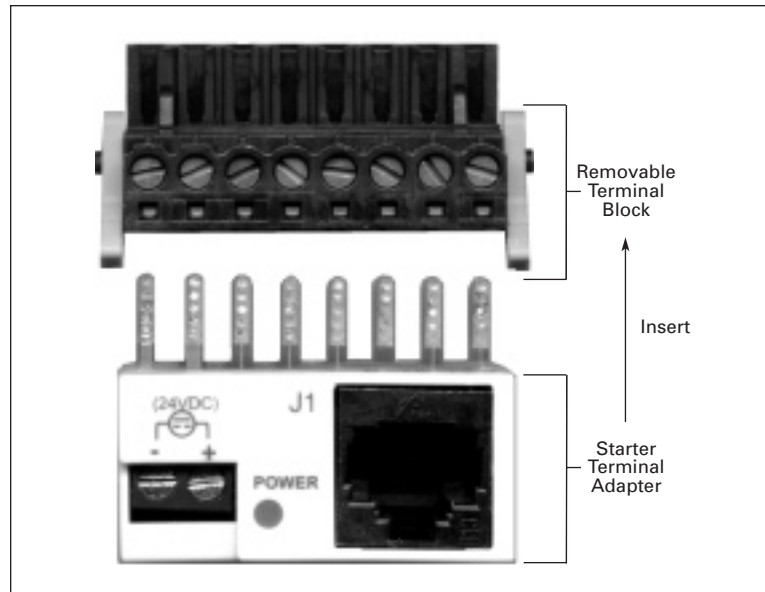


Figure 6: Connecting Starter Terminal Adapter

Insert one end of the Starter Adapter Jumper into J1 on the Starter Terminal Adapter and the other end into J1 on the D77B-DSNAP.

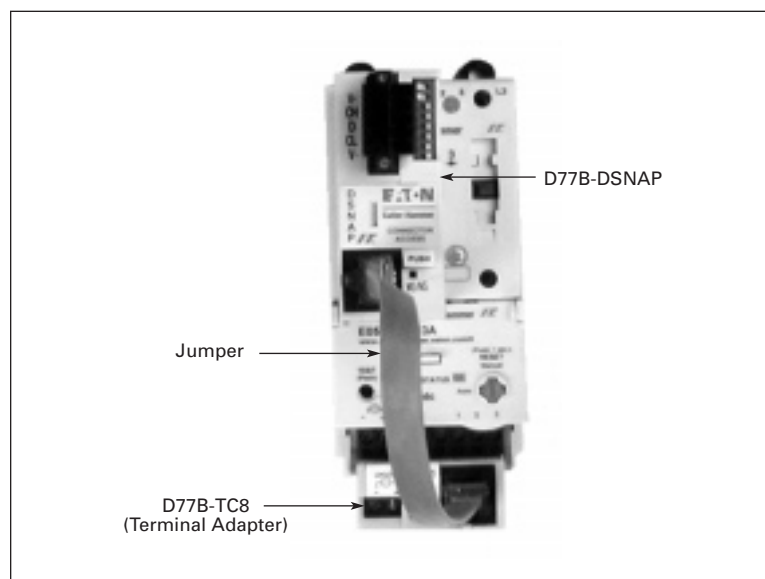


Figure 7: Jumper Installation

Connect the D77B-DSNAP to DeviceNet

Connect the DeviceNet cable to the 5-position DeviceNet Connector located at the top of the D77B-DSNAP.

- The 5-position DeviceNet Connector has screws for positive retention that need to be loosened to remove the terminal block.
- The D77B-DSNAP will work with thick and thin media.
- The DeviceNet cable is color-coded and matches the colors on the DeviceNet connector.
- Use only one wire per terminal.
- It is recommended that a slim .1 inch blade (2.5 mm) screwdriver is used for the DeviceNet terminal block screws.
- Tighten the screws to 0.5 Nm (4.5 lb-in).

For further information on DeviceNet wiring practices and power considerations, refer to the *DeviceNet Installation Planning Guide*, Publication Number SA-370.

Table 8: DeviceNet Connection

Connector Legend	DeviceNet Wire	Signal
V+	Red	+24V DC
CH	White	CAN High
D	Shield	Shield
CL	Blue	CAN Low
V-	Black	Signal Common

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Note: The ability to change the D77B-DSNAP's address (MAC ID) and baud rate with a software configuration tool (such as CH Studio) is supported only in version 2.004 and later of the device.

Set the DeviceNet MAC ID and Baud Rate

The MAC ID and baud can be set using the DIP switches on the front of the D77B-DSNAP and also by using a software tool such as CH Studio.

Refer to the following instructions, figure and table when setting the MAC ID and baud rate.

- Moving a DIP switch to the right is ON and moving the switch to the left is OFF. The MAC ID is in binary with the major units numbered to the right of the switch on the side label. Adding up the major units set to ON determines the MAC ID of the D77B-DSNAP.

Example: To set the MAC ID to 25, start from the top (or 32) and set the switches to OFF, ON, ON, OFF, OFF, ON (16+8+1=25).

- The baud rate is set using the configuration switches B0 and B1.

Most significant bit to be at top or left end of switch block.

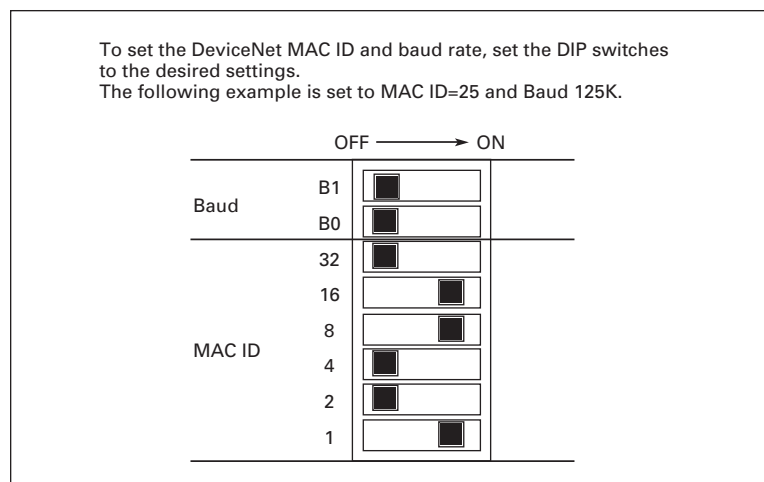


Figure 8: DIP Switch Setting Example

Network Configuration Option

When the baud rate switches B0 and B1 are set to ON (Network Configurable) and the MAC ID switches are set to OFF, the MAC ID and baud rate are set using a software tool over DeviceNet. The default MAC ID is 63 and the default baud is 125K.

Table 9: Baud Rate Configuration Switches

B1	B0	Baud
OFF	OFF	125K
OFF	ON	250K
ON	OFF	500K
ON	ON	Network Configurable

Auxiliary Inputs

Using the Auxiliary Inputs as Field Inputs

Note: The features described in the "Auxiliary Inputs" section are supported only in version 2.005 of the D77B-DSNAP.

The auxiliary inputs, Ground Fault input and Second Contactor Auxiliary input can be used as general purpose inputs for applications where those inputs are not being used. Since the inputs are not isolated, it is suggested that an interposing relay is used when connecting to field inputs. The interposing relay contacts are required to be rated for 24V DC.

Table 10: Auxiliary Input Specifications

Description	Rating
Rated Voltage	24V DC
ON-State Voltage	8V DC
ON-State Current	1 mA @ 24V DC

Table 11: Predefined Auxiliary Functions

Inputs	Functions
Aux 1	Second Auxiliary for Reversing Contactor
Aux 2	Ground Fault Relay

Connect the interposing relay as shown.

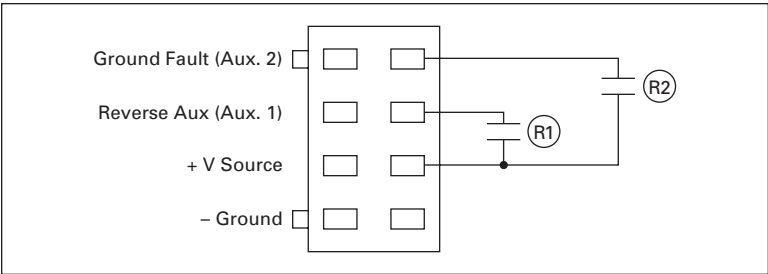


Figure 9: Auxiliary I/O for DSNAP

Note: Wire leads from the auxiliary I/O connector to the interposing relays should be as short as possible and should not have any contact with AC wires or the motor leads.

Note: If the application requires a ground fault relay, the ground fault relay will be connected to Aux 2 and only Aux 1 will be available for the field input. If the application requires a Full Voltage Reversing (FVR) starter, the second contact will be connected to Aux 1 and only Aux 2 will be available for the field input. If the application requires both a ground fault relay and an FRV, then no field inputs will be available.

CAUTION

The +V Source pin is a positive 24V DC source that is only rated for the load of Aux 1 and Aux 2. Damage of the D77B-DSNAP will occur if that source voltage is used for powering secondary devices.

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Activating the Inputs Within the Input Assembly

Once the field input(s) and the interposing relay(s) are connected, Aux 1 will be displayed in bit 3 of byte 0 of the input assembly, no other configuration is required. Aux 1 can only be displayed in FVNR Input Assemblies.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference	Reserved	Ctrl From Net	Ready	Aux 1	Running 1	Warning	Fault

The Aux 2 input will require that the At Select attribute be changed from a 1 to a 0. The At Select bit is located in the Assembly Object 0x04, Instance 0x01 and attribute 0x64 (100 dec) as described in **Table 34** on **Page 42**. The location of the Aux 2 bit will be bit 7 of byte 0 of the input assembly (At Reference bit). The At Reference bit will be replaced by the Aux 2 bit. Aux 2 can be displayed in both FVR and FVNR Input Assemblies. When the Aux 2 input is open, the Aux 2 bit will be true, and when the Aux 2 input is closed, the Aux 2 bit will be false.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Aux 2	Reserved	Ctrl From Net	Ready	Running 2	Running 1	Warning	Fault

Operation

This section provides details about the following features and functions of D77B-DSNAP operation:

- “Out-of-Box” operation
- Quick Start
- Typical application
- Enhanced features
- DeviceNet input/output assemblies
- DeviceNet Status LED
- Functional Description

“Out-of-Box” Operation

Note: Before applying power to the D77B-DSNAP for the first time, make sure it is properly mounted on the starter and that all connections are made (DeviceNet, terminal adapter and auxiliary connector).

When the D77B-DSNAP is properly installed on an **IT** Starter, and has a properly set baud and MAC ID, per the “Installation” section on **Page 11**, the following tables in the Quick Start section indicate the information to expect for I/O assemblies on DeviceNet.

To reset the D77B-DSNAP to the “Out-of-Box” operation once it has been associated to a starter, follow the instructions on **Page 39**.

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Quick Start

This part of the section provides the information necessary to install and operate the D77B-DSNAP on a Full Voltage Non-reversing (FVNR) *IT.* Starter, Full Voltage Reversing (FVR) *IT.* Starter and an S751 Soft Start motor controller. Detailed information is available in Appendix A for setup of enhanced parameters and extended Input and Output data (assemblies).

FVNR Motor Controller

First, follow the instructions on how to mount the D77B-DSNAP as outlined in **Mount the D77B-DSNAP to the Starter** on **Page 7**.

Second, follow the instruction on how to connect the Starter Terminal Adapter to the starter as outlined in **Connect the Starter Terminal Adapter to the Starter** on **Page 9**.

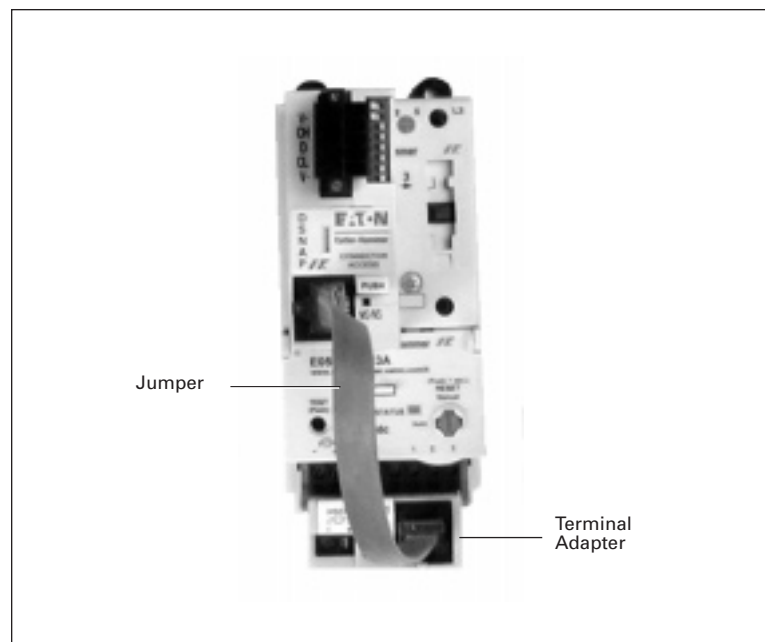


Figure 10: D77B-DSNAP-X1 on FVNR *IT.* Starter

Third, follow the instructions on how to set the MAC ID and Baud Rate as outlined in **Set the DeviceNet MAC ID and Baud Rate** on **Page 11**.

Fourth, follow the instructions on how to wire the D77B-DSNAP to DeviceNet as outlined in **Connect the D77B-DSNAP to DeviceNet** on **Page 10**.

The D77B-DSNAP will auto configure to the FVNR *IT.* Starter when the D77B-DSNAP and the *IT.* Starter are first powered (together). After the auto configuration is complete, the D77B-DSNAP is "associated" to that specific size, type and overload range of *IT.* Starter. Any attempt to install an already "associated" D77B-DSNAP onto another *IT.* Starter without first performing a reset (Appendix A, **Page 39**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED). In this state the D77B-DSNAP will still operate the *IT.* Starter.

Default Input Assembly

The out of box input assembly (data mapped to the input registers within the system controller) is the following:

Table 12: Input Assembly for Non-reversing Starter (E101, N101)

Assembly 105 (0x69) – Input (Producing) – D77B-DSNAP Abbreviated Motor Starter 1								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warning	Fault
1	% Thermal Capacity							
2	% FLA							
3	Fault Code (Low byte only)							

Default Output Assembly

The out of box output assembly (data mapped to the output registers within the system controller) is the following:

Table 13: Output Assembly for Non-reversing Starter (E101, N101)

Instance 3: Basic Motor Starter								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	FaultReset	Reserved	Run1

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FVR Motor Controller

First, follow the instructions on how to mount the D77B-DSNAP as outlined in **Mount the D77B-DSNAP to the Starter on Page 7.**

Note: The 45 mm and 54 mm frame *IT.* Starters will require the user to depress the fanning strip cover locking tab while installing the D77B-DSNAP. Simply depress the tab while inserting the D77B-DSNAP feet into the slot on the *IT.* Starter to ease installation.

Second, follow the instruction on how to connect the Starter Terminal Adapter to the starter as outlined in **Connect the Starter Terminal Adapter to the Starter on Page 9.**

Third, the secondary contactor sensor (D77C-A1) needs to be installed. Install the secondary contactor sensor on the second contactor just as you would install an auxiliary (align the feet and slide towards the bottom). Using a screwdriver, pry up the connector access breakout (Figure 1, Page 5) and remove the breakout. Insert the green connector that is connected via a wire to the second contactor sensor into the breakout making sure to take notice of the alignment tabs for proper orientation.

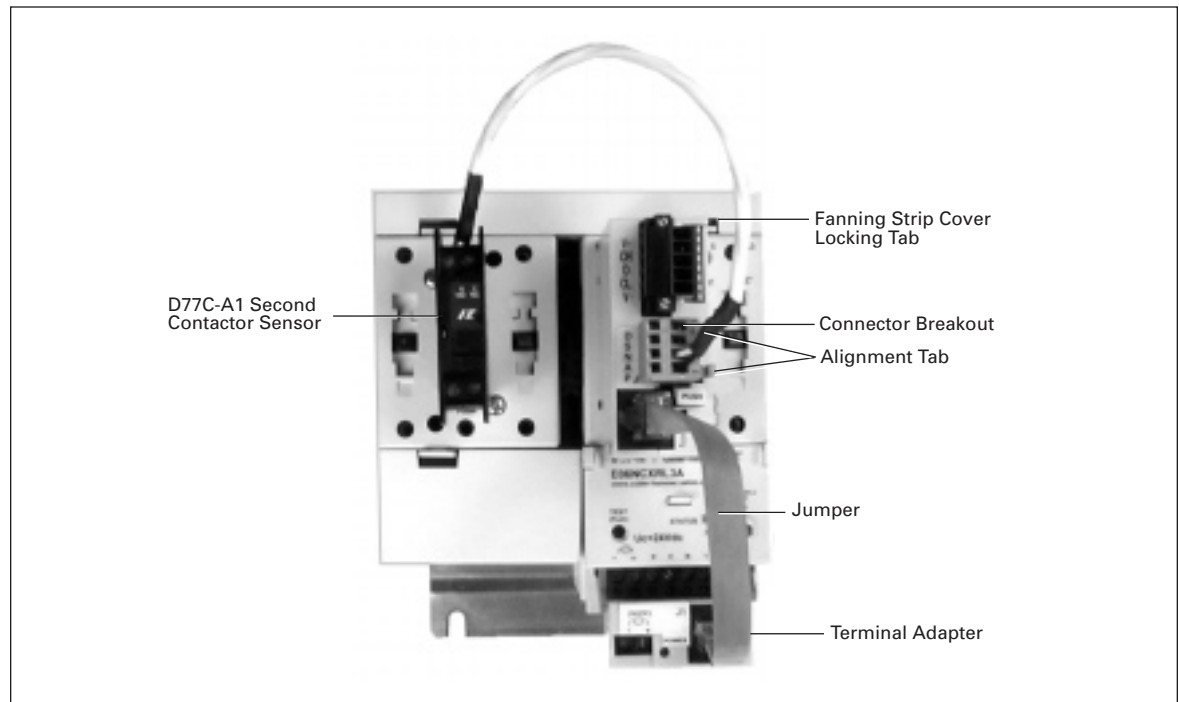


Figure 11: D77B-DSNAP-X2 on FVR *IT.* Starter

Fourth, follow the instructions on how to set the MAC ID and Baud Rate as outlined in **Set the DeviceNet MAC ID and Baud Rate on Page 11.**

Fifth, follow the instructions on how to wire the D77B-DSNAP to DeviceNet as outlined in **Connect the D77B-DSNAP to DeviceNet on Page 10.**

The D77B-DSNAP will auto configure to the FVR *IT* Starter when the D77B-DSNAP and the *IT* Starter are first powered (together). It is important that the second contactor sensor is installed (D77C-A1) and that the green connector is installed into the breakout. If this is not performed, the auto configuration will not set the D77B-DSNAP up for an FVNR *IT* Starter. After the auto configuration is complete, the D77B-DSNAP is “associated” to that specific size, type and overload range of *IT* Starter. Any attempt to install an already “associated” D77B-DSNAP onto another *IT* Starter without first performing a reset (Appendix A, **Page 39**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED). In this state the D77B-DSNAP will still operate the *IT* Starter.

Default Input Assembly

The out of box input assembly (data mapped to the input registers within the system controller) is the following:

Table 14: Input Assembly for Reversing Starter (E501, N501)

Assembly 106 (0x6A) – Input (Producing) – D77B-DSNAP Abbreviated Motor Starter 2								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warning	Fault
1	% Thermal Capacity							
2	% FLA							
3	Fault Code (Low byte only)							

Default Output Assembly

The out of box output assembly (data mapped to the output registers within the system controller) is the following:

Table 15: Output Assembly for Reversing Starter (E501, N501)

Instance 5: Extended Motor Starter								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	FaultReset	Run2	Run1

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S751 Soft Starter

First, follow the instructions on how to mount the D77B-DSNAP as outlined in **Mount the D77B-DSNAP to the Starter on Page 7** (mounts in the same position as an FVNR starter).

Second, follow the instruction on how to connect the Starter Terminal Adapter to the starter as outlined in **Connect the Starter Terminal Adapter to the Starter on Page 9**.

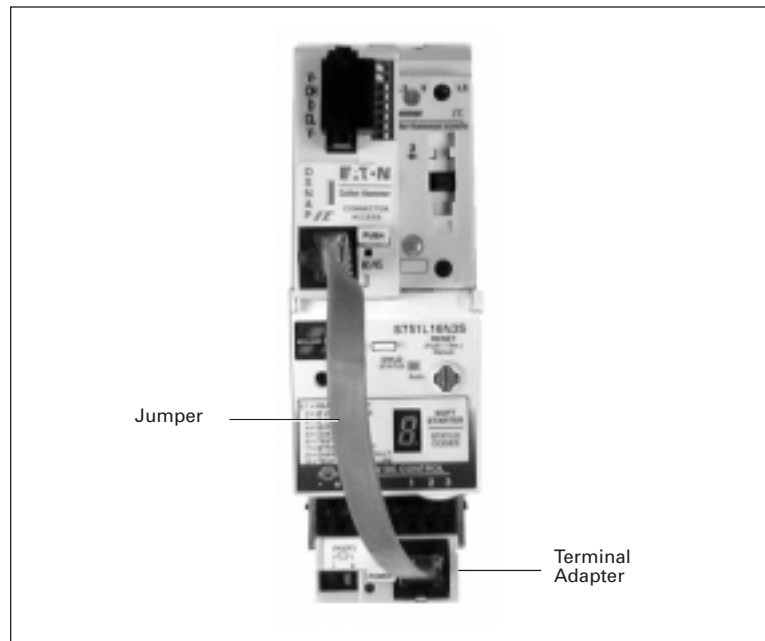


Figure 12: D77B-DSNAP-X1 on S751 IT. Soft Starter

Third, follow the instructions on how to set the MAC ID and Baud Rate as outlined in **Set the DeviceNet MAC ID and Baud Rate on Page 11**.

Fourth, follow the instructions on how to wire the D77B-DSNAP to DeviceNet as outlined in **Connect the D77B-DSNAP to DeviceNet on Page 10**.

The D77B-DSNAP will auto configure to the S751 IT. Soft Starter when the D77B-DSNAP and the IT. Soft Starter are first powered (together). After the auto configuration is complete, the D77B-DSNAP is “associated” to that specific size, type and overload range of IT. Soft Starter. Any attempt to install an already “associated” D77B-DSNAP onto another IT. Starter without first performing a reset (Appendix A, **Page 39**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED). In this state the D77B-DSNAP will still operate the IT. Starter.

Default Input Assembly

The out of box input assembly (data mapped to the input registers within the system controller) is the following:

Table 16: Input Assembly for S751 Soft Start

Assembly 105 (0x69) – Input (Producing) – D77B-DSNAP Abbreviated Motor Starter 1								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warning	Fault
1	% Thermal Capacity							
2	% FLA							
3	Fault Code (Low byte only)							

Default Output Assembly

The out of box output assembly (data mapped to the output registers within the system controller) is the following:

Table 17: Output Assembly for S751 Soft Start

Instance 5: Extended Motor Starter								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	FaultReset	Run2	Run1

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Note: The features described in the "HOA Terminal Adapter Option" section are supported only in version 2.005 of the D77B-DSNAP.

HOA Terminal Adapter Option

The HOA option allows the user to connect hard wire controls to the D77B-DSNAP for a true HAND/OFF/AUTO operation. Typically, pushbuttons will be connected to the D77B-HOA8 terminals. This option also provides for an alarm output to provide status of a starter trip.

First, follow the instructions on how to mount the D77B-DSNAP as outlined in **Mount the D77B-DSNAP** to the Starter on **Page 7**.

Second, connect the D77B-HOA8 HOA Terminal Adapter to the starter as outlined in **Connect the Starter Terminal Adapter to the Starter** on **Page 9**.

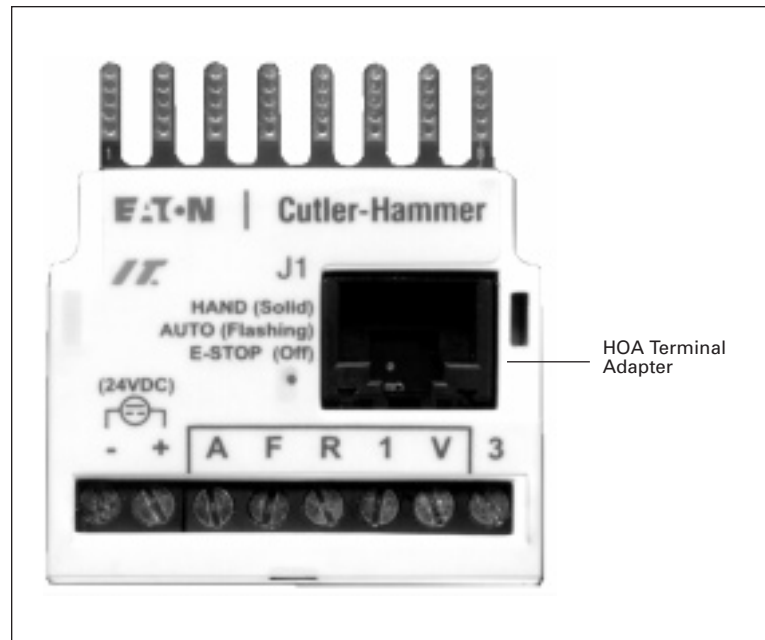


Figure 13: HOA Starter Terminal Adapter

Third, follow the instructions on how to set the MAC ID and Baud Rate as outlined in **Set the DeviceNet MAC ID and Baud Rate** on **Page 11**.

Fourth, follow the instructions on how to wire the D77B-DSNAP to DeviceNet as outlined in **Connect the D77B-DSNAP to DeviceNet** on **Page 10**.

The D77B-DSNAP will auto configure to the *IT*. Starter when the D77B-DSNAP and the *IT*. Starter are first powered (together). After the auto configuration is complete, the D77B-DSNAP is "associated" to that specific size, type and overload range of *IT*. Starter. Any attempt to install an already "associated" D77B-DSNAP onto another *IT*. Starter without first performing a reset (Appendix A, **Page 39**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED). In this state the D77B-DSNAP will still operate the *IT*. Starter.

Fifth, follow the wiring directions below to properly wire the D77B-HOA8 for HAND/OFF/AUTO (HOA) control. The HOA will connect to FVNR, FVR and S751 Soft Starter *IT*. Starters.

Wiring the D77B-HOA8

There are eight terminals on the front of the D77B-HOA8. They are:

1. Power Negative (-)
2. Power Positive (+) 24V DC
3. Auto (A) — Auto = 1/Hand = 0
4. Forward (F) — When in Hand, F = Forward/Run
5. Reverse (R) — When in Hand, R = Reverse
6. Remote Reset (1) — Remote reset always active
7. Source (V) — Source power for A, F, R and 1
8. Alarm Out (3) — Indication of starter trip (OL, Phase Loss, Phase Imbalance)

Connect the **IT.** Starter/Soft Starter power supply to terminals (-) and (+); the wiring for the HOA will connect to A, F, R, 1, and V. An E-Stop circuit should be wired through the (+) terminal when used. Refer to **Figure 3** for details on wiring the E-Stop.

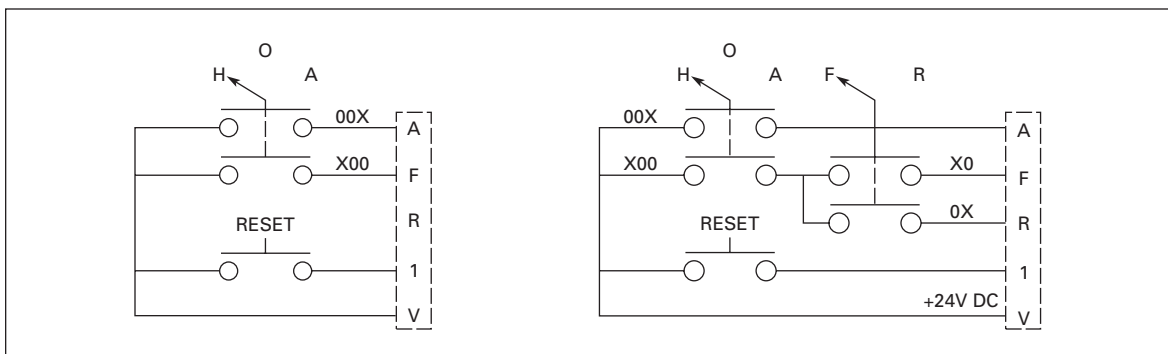


Figure 14: Full Voltage Non-reversing and Full Voltage Reversing 2-Wire Control

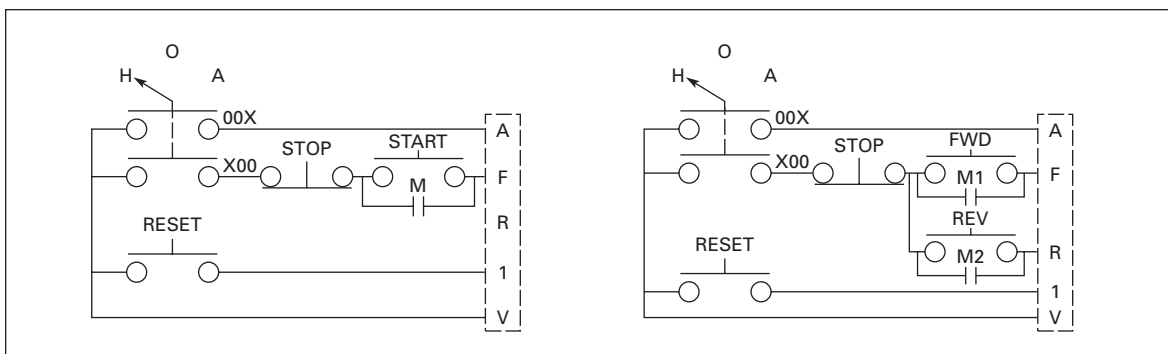


Figure 15: Full Voltage Non-reversing and Full Voltage Reversing 3-Wire Control

There are many ways to wire the HOA, in all cases the control will be two-wire mode. One can use PLC outputs (solid-state or relay), switches or pushbuttons to activate the input devices. For your convenience non-isolated source power is provided at the V terminal for all the inputs. The total power available is less than 50 mA and is not intended to be used to power external pilots or actuators. **Damage of the device can occur if the preceding wiring guidelines are not adhered to.**

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D77B-HOA8 LED Indication

There is an LED on the D77B-HOA8; this LED is multifunction to alert the user to the mode of operation.

LED = Solid ON = HAND Mode

LED = Mostly ON (Blinking) = AUTO Mode

LED = Rapid Flash (Fast Blink) = H0A8 Communication Error

LED = OFF = E-Stop/No Power

D77B-HOA8 Alarm Output

The D77B-HOA8 has a single alarm output for indication of starter trip including thermal overload, phase imbalance, phase loss and test trip. The output is current sourcing, any annunciating device must be wired between the 3 terminal and the (-) terminal. The intended use for this output is for connecting to a pilot device or PLC input. Inductive loads are not recommended for use with this output. **The output is rated at 250 mA and is not current limited.**



Figure 16: Alarm Output Wiring

Operation of the D77B-HOA8

When the D77B-HOA8 is operating in AUTO, the starter will operate via Network control sent to the D77B-DSNAP. The F and R terminals are inactive when in AUTO. When the D77B-HOA8 is in Hand, the starter is controlled from the D77B-HOA8 terminals. In HAND the F and R terminals will command the starter to operate in Run/Forward or Reverse. The D77B-DSNAP will still monitor the status of the starter (including current and fault codes) and relay back to DeviceNet when the D77B-HAO8 is in HAND mode. At all times the Remote Reset (1) terminal is active. **The D77B-DSNAP does not need to be powered or present for the D77B-HOA8 to operate the starter in HAND mode.**

Addition of the D77B-HOA8 will not affect the default IO assemblies for the D77B-DSNAP. Refer to the proper Quick Start example for the default IO assembly on **Pages 15 to 20**. The Control from Net (CtrlFromNet) bit (bit 5 of byte 0) will reflect the state of the D77B-HOA8. When the bit is true (1), the HOA is in AUTO mode; when the bit is false (0), the HOA is in HAND mode.

Safe State Behavior

The safe state behavior of the D77B-DSNAP is factory set to Fault and Stop. Refer to **Page 46, Table 40** Control Supervisor Object (0x29) Instance 0x10 (Attribute 16) for more information. Safe State is defined as the state in which the D77B-DSNAP will place the motor controller when a communication loss is detected. The D77B-DSNAP will be in a safe state when the unit is powered but does not have a valid I/O connection established.



WARNING

If the Safe State value is set to Run1 or Run2, **any time** the D77B-DSNAP is powered **and does not** have a valid I/O connection, the motor controller will be commanded to the Safe State value. This includes first powering up the DeviceNet system (D77B-DSNAP) and not having the controller on-line.

Input and Output Assemblies

An I/O assembly is an ordered collection of data that the system controller exchanges with the D77B-DSNAP for monitoring and control. The input assembly is the data that is sent from the D77B-DSNAP to the system controller for monitoring of the D77B-DSNAP. The output assembly is the data that is sent from the system controller to the D77B-DSNAP for control of the D77B-DSNAP.

The D77B-DSNAP offers a variety of input and output assemblies, as indicated in the following table. The tables in this part of the section provide data definitions and details on these assemblies.

Table 18: Allowable DeviceNet I/O Assemblies

Motor Controller	Allowable Input Assemblies	Allowable Output Assemblies
Non-reversing (E101, N101)	52, 53, 102, 105*, 108, 114	3*
Reversing (E501, N501)	54, 103, 106*, 109, 114	5*
Soft Start (S751)	52, 53, 60, 102, 105*, 108, 114	3*

* Indicates the default

Use a DeviceNet configuration tool to select the assemblies of the D77B-DSNAP. The CH Studio configuration tool provides the means to configure the assemblies quickly and easily, as described in the "Configuration" section of this manual. When using a generic DeviceNet tool, use the tables within this section to set up the assemblies. An EDS is available on the Cutler-Hammer Web site (www.cutler-hammer.eaton.com/it).

Refer to Appendix A on **Page 53** for all input and output assembly information.

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Input Assembly Data Definition

Use the following tables when setting up the D77B-DSNAP input assemblies.

Table 19: Input Assembly Data Definitions

Data	Description
Fault/Trip	The motor controller is faulted or tripped, this bit is latched and requires a reset. Note: A "Faulted" motor controller may still respond to a Run1 or Run2 command
Warning	The motor controller has a warning of an impending trip
Running 1	Primary contactor is being commanded to run
Running 2	Secondary contactor is being commanded to run
Ready	The motor controller is configured and communicating with starter
CtrlFrom Net	The motor controller is controlled from DeviceNet
At Reference	This states that the motor controller is in the state that it is commanded to be in, or that the S751 is in bypass. For FVR applications, a D77C-A1 is required for this bit to be active while in reverse.
% Thermal Capacity	% thermal capacity of the motor from 0 to 100%
Average Current	Average RMS current of the motor
% FLA	The ratio of the running current divided by the FLA setting on the overload
Fault Codes	Code for the latest fault or warning of the motor controller. Refer to Table 44 on Page 51 for fault codes and Table 45 on Page 51 for warning codes.

Output Assembly Data Definition

Use the following table when setting up the D77B-DSNAP output assemblies.

Table 20: Output Assembly Data Definitions

Data	Description
Run 1	Energize the primary contactor/Soft Starter
Run 2	Energize the secondary contactor
Fault Reset	Reset the fault

Note: The features described in the "Fault Log" section are supported only in version 2.005 of the D77B-DSNAP.

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Fault Log

The D77B-DSNAP has a built-in 16 event log that holds fault and warning codes. The log is first-in, first-out and will scroll so that the most recent fault or warning is never lost.

Table 21: Fault Log

Location	Event
16	
15	
14	N (latest fault/warning)
13	M
3	C
2	B
1	A (earliest fault/warning)

The format of the data with in the log is as follows.

Table 22: Log Data Format

Byte	Attribute	Description
0	Class	The class the fault or warning originated from, this is a one byte value.
1	Instance	The instance of the class the fault or warning originated from, this is a one byte value.
2	Descriptor	Defines if the code refers to a fault (0xD3) or a warning (0xD2), this is a one byte value.
3	Code	The warning or fault code, this is a one byte value.
4 and 5	Element Number	A number from 1 to 16 to describe the location within the log for the fault or warning, this is a two byte value.

How to Implement the Fault Log

The fault log is 16 elements deep, and reading the Event Log Size attribute will return a value equal to the length of the log. To perform this task, read the Event Log Size attribute.

Service	Class	Instance	Attributes
0x0E (Get Attribute Single)	0x6A (Table)	0x01	0x0D

The value that is returned will determine the last element used, for example if a value of 0x0A is returned, there are 10 elements that have fault or warning codes in them. This returned value is then used while reading the fault log. Perform a Remove Member service (0x1B) of the first element (0x01). Each time the remove member is performed, the element will both be returned to the user and deleted in the log. Once the element is removed, all the elements will shift down by one; 2 will be in 1, 3 will be in 2 and so on.

Service	Class	Instance	Attributes	Member
0x0B (Remove Member)	0x6A (Table)	0x01	0x0D	0x01

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For tools that do not support the Member services, another method exists to read the fault log elements. Perform a get attribute single (0x0E) on the assembly object (0x04) instance 0xC7 (199) attribute 0x03.

Service	Class	Instance	Attributes
0x0E (Get Attribute Single)	0x04 (Assembly)	0xC7	0x03

The returned element will be in the following format.

Table 23: Log Data Format Without Member Services

Byte	Attribute	Description
0	Flags	Bit 0 = Device Fault Bit 1 = User Fault Bit 2 = System Fault Bit 3 = Event Flag Bit 4 = Major (any major fault) Bit 5 = reserved Bit 6 = reserved Bit 7 = Fresh (true if element has not been read before)
1	Class	The class the fault or warning originated from, this is a one byte value.
2	Instance	The instance of the class the fault or warning originated from, this is a one byte value.
3	Descriptor	Defines if the code refers to a fault (0xD3) or a warning (0xD2), this is a one byte value.
4	Code	The warning or fault code, this is a one byte value. See Tables 44 and 45 .

The earliest fault/warning will be presented (element 0x01) each time the attribute is read. In addition to reading the element, the element will be removed from the fault log (just like the remove member service) and all the elements will shift down one location. Continue reading this attribute until the data returned is 00 00 00 00 00, this will be your indication that the log is empty.

Typical Application

The following figure illustrates a typical D77B-DSNAP application, where a single D77B-DSNAP is connected to a single motor controller and where the motor controllers are distributed throughout the DeviceNet subnet. The subnet is then being controlled by a PC or PLC, which scans the D77B-DSNAP for control and monitoring information.

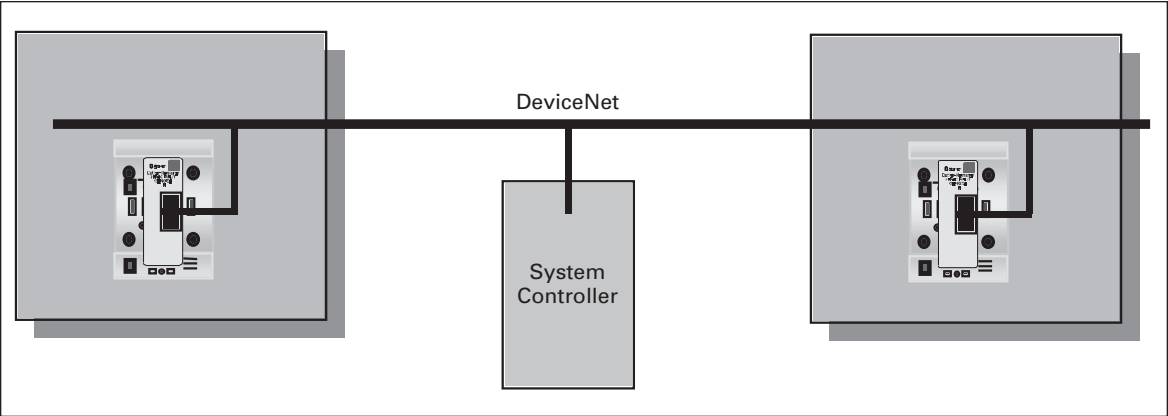


Figure 17: Typical D77B-DSNAP Application

Note: Such an application typically has more devices on DeviceNet than are shown in this illustration, such as drives, I/O and user interface units.

Features

Table 24: Standard Protective Features

Trip	Definition
Phase Current Unbalance/Phase Loss	A phase current unbalance trip will occur if one or two of the line currents are 40 – 60% or less of the remaining line(s) for longer than 10 seconds. A phase loss trip will occur with a load current of at least 75% of the minimum FLA if one of the two input line voltages is lost, with the line current going to zero for longer than 10 seconds.
Thermal Overload	While the motor is running and depending on the FLA and trip class settings, when the FLA is exceeded for a period of time (depending on the trip class setting), a thermal overload trip will occur. For more information on this feature, see the <i>Contactors and Starter User Manual</i> (Publication No. 49400).

Note: The threshold values for Thermal Overload and Phase Current Unbalance can not be modified.

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Table 25: Enhanced Features

Fault	Definition
Ground Fault	With the addition of a Ground Fault module, the D77B-DSNAP will trip when the module detects a ground fault. The level of the trip is adjusted on the Ground Fault Module. The Ground Fault Module is connected to the D77B-DSNAP through the Auxiliary opening on the front of the D77B-DSNAP.
Low Current Warning	While the motor is running, a warning will be activated when the current falls below a user-settable % of overload's FLA pot setting.
High Current Warning	While the motor is running, a warning will be activated when the current rises above a user-settable % of overload's FLA pot setting.
SCR Over Temperature	To protect the SCRs from premature damage, a temperature sensor monitors the SCR temperature. If the monitored temperature is too high, the S751 will trip on SCR overtemperature.
Contactor Dropout	The contactor dropped out when it was commanded to be energized.

DeviceNet Status LED

The combined module status/network status (MS/NS) LED is located on the lower right of the D77B-DSNAP as pictured in **Figure 1: D77B-DSNAP Features**.

The following table describes the state of the MS/NS LED.

Table 26: Combined MS/NS LED

State	LED
Non-existent	OFF
Standby	Flashing Green
Operational	Not connected: Flashing Green
Operational	Connected: Green
Recoverable Fault	Flashing Red
Unrecoverable Fault	Red
Initializing	Red/Green Flash
Manual Out-of-Box Reset	OFF, Green, OFF, Green, Red, Repeat

Functional Description

Table 27: Truth Table

Old State	Fieldbus Inputs			Event	New State	Action
	Run 1	Run 2	Reset			
FAULTED	–	–	1	RESET	OFF	FAULT = 0
OFF	0	0	–	NONE	OFF	NONE
OFF	1	0	–	RUN 1	RUNNING 1	RUNNING 1 = 1
OFF	0	1	–	RUN 2	RUNNING 2	RUNNING 2 = 1
OFF	1	1	–	RUN 1/RUN 2	OFF	NONE
RUNNING 1	1	1	–	RUN 2	RUNNING 1	NONE
RUNNING 2	1	1	–	RUN 1	RUNNING 2	NONE
RUNNING 1	1	0	–	FAULT	FAULTED	RUNNING 1 = 0 FAULT = 1
RUNNING 2	0	1	–	FAULT	FAULTED	RUNNING 2 = 0 FAULT = 1
RUNNING 1	1	0	–	WARNING	RUNNING 1	WARNING = 1
RUNNING 2	0	1	–	WARNING	RUNNING 2	WARNING = 1

– = state not important

1 = state true (energized)

0 = state false (de-energized)

WARNING = any warning in **Table 45**

RUNNING 1 = Run/FWD/SLOW

RUNNING 2 = REV/FAST

FAULT = any fault in **Table 44**

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Configuration

The only configuration that is necessary for normal operation of the D77B-DSNAP is setting the MAC ID and baud rate, as described in the “Installation” section, **Page 11**. However, the D77B-DSNAP offers a variety of enhanced features. When these features are required, use the CH Studio software suite or a generic DeviceNet tool to perform the configuration.

This section includes the following configuration procedures, and related instructions and information:

- Using CH Studio
 - View D77B-DSNAP General Properties
 - Configure Enhanced Features
 - Monitor the D77B-DSNAP Status
 - Change the I/O Assemblies
- Using a generic DeviceNet tool

Using CH Studio Component Manager

The CH Studio software application is designed for programming and configuring industrial automation systems. The application simplifies the monitoring and configuration of entire networks as well as the enhanced features of individual **IT.** communicating devices within those networks.

CH Studio takes advantage of the Windows graphical interface to present a suite of tools that is easy to learn and efficient to use, while meeting the requirements for developing complex network configurations.

CH Studio performs the following configuration functions for DeviceNet networks:

- Discover network devices
- Display device properties
- Monitor and configure network devices
- Save existing network configurations
- Configure networks off-line
- Configure devices off-line

General Properties

The general properties of the D77B-DSNAP are located in the General Tab of the Property Pages for the device. The general properties include the firmware version, serial number, status and much more.

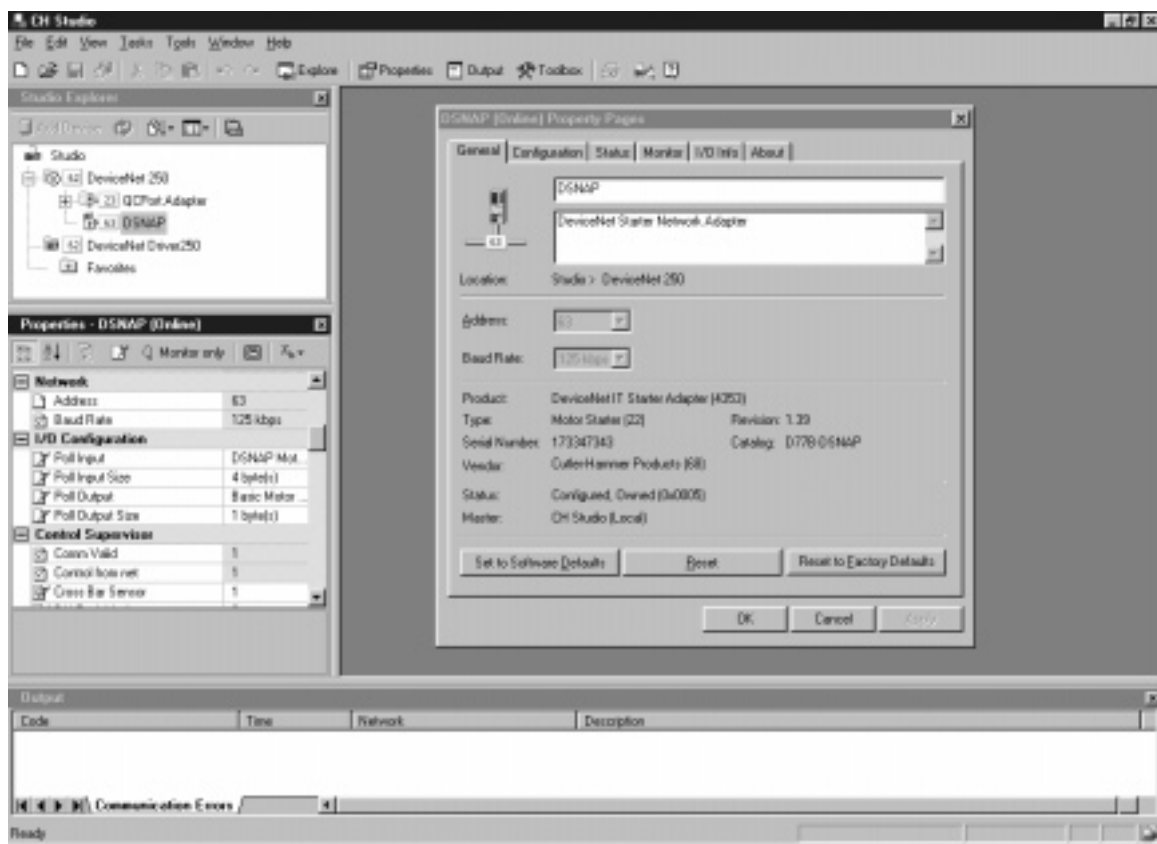


Figure 18: General Properties

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Configuring Enhanced Features

The enhanced features of the D77B-DSNAP are configured using the Property Window and the Property Pages. A complete list of all the features and settable attributes are available in the Properties Window.

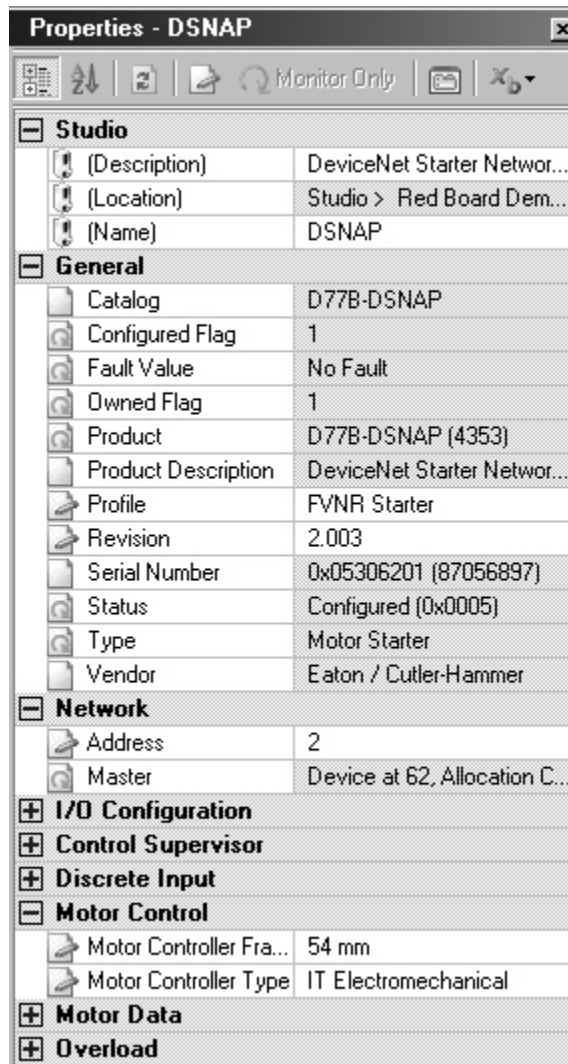


Figure 19: Properties Window

Monitor the D77B-DSNAP

The running values of the D77B-DSNAP (current, thermal capacity and 24V DC control voltage) can be monitored from the Monitor Tab of the Property Pages. Switching to the Status Tab, all operational status can be monitored.

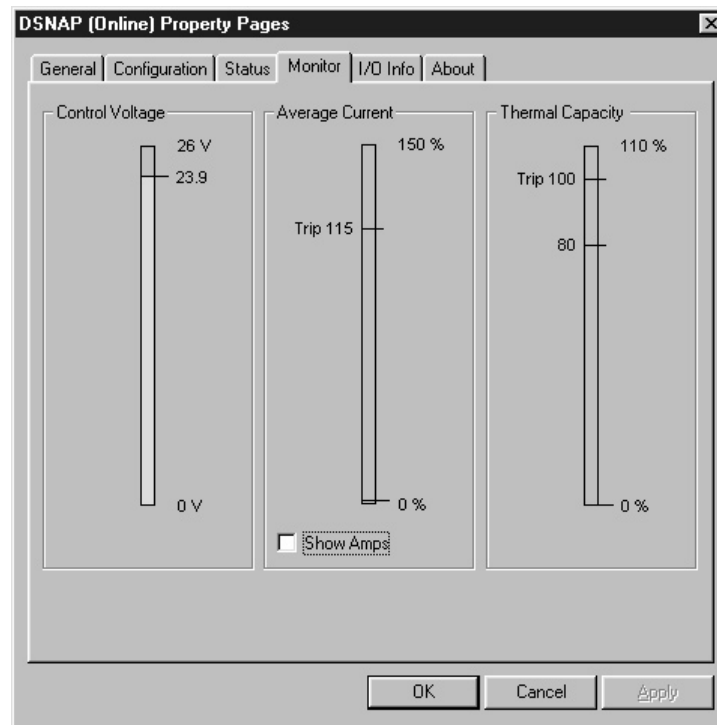


Figure 20: Monitor Properties

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Change the I/O Assemblies of the D77B-DSNAP

All of the I/O assemblies are viewable and settable from the I/O Info Tab of the Property Pages. The assembly can be changed by simply selecting on the new assembly and pressing Apply in the lower right of the page. After the new assembly is chosen, a representation of the data format and structure for the new I/O assembly is created.

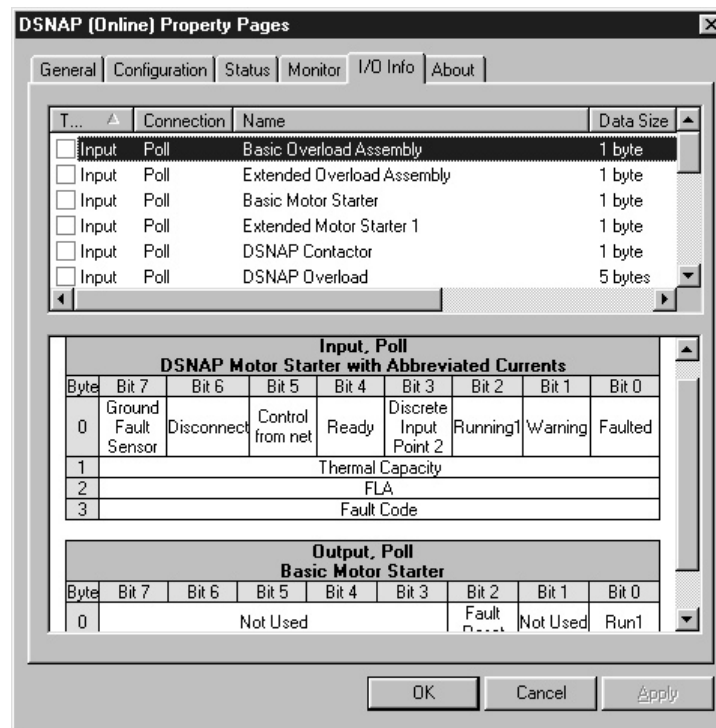


Figure 21: I/O Info Properties

Using a Generic DeviceNet Tool

When configuring the D77B-DSNAP with a DeviceNet management tool other than CH Studio, refer to the tables in Appendix A: Supported DeviceNet Objects for the definitions of individual attributes. In addition, an Electronic Data Sheet (EDS) file is available at the Web site www.eatonelectrical.com/it for use with tools that can use an EDS file.

Follow these steps to configure a D77B-DSNAP through a generic DeviceNet tool:

1. Search for EDS and download the D77B-DSNAP EDS file from the Eaton Electrical Web site: www.eatonelectrical.com/it

Note: There are multiple EDS files for the D77B-DSNAP, depending on whether it is used with an FVR, FVNR or S751 configuration.

2. Open/start the tool.
3. Load the EDS file into the tool.
4. Go on-line and connect to the D77B-DSNAP you wish to configure.
5. Open the EDS for the D77B-DSNAP and edit the attributes. For a full list of attributes and definitions, see Appendix A: Supported DeviceNet Objects.
6. Send the changed attributes to the D77B-DSNAP.
7. Close the tool.

Autoconfiguring the D77B-DSNAP for the Starter

1. Verify the D77B-RJJ1 is installed between J1 on the D77B-DSNAP and J1 on the Starter Terminal Adapter.
2. Connect the “out-of-box” D77B-DSNAP to a powered DeviceNet network.
3. Apply power to the starter terminal adapter, the MS/NS LED should change from blinking red to blinking green.
4. If possible, verify that the configuration has occurred by reading the device type from the Identity Object (instance 1 attribute 2)
0x000C — Configuration has not occurred
0x0016 — Starter
0x0017 — S751 Soft Start

Note: It can take as long as 15 seconds for the autoconfiguration to be performed on an S751 and 7 seconds for an **IT** Starter.

Note: The autoconfiguration is a one-time event. To autoconfigure the D77B-DSNAP for another motor controller, an out-of-box reset must be performed. Refer to **Page 39** for details on how to perform an “Out-of-Box” reset.

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Troubleshooting and Maintenance

Renewal Parts

The following table lists the renewal parts for the *IT.* D77B-DSNAP.

Table 28: D77B-DSNAP Renewal Parts

Description	Catalog Number
D77B-DSNAP Kit for FVNR Starters	D77B-DSNAP-X1
D77B-DSNAP Kit for FVR Starters	D77B-DSNAP-X2
D77B-DSNAP Kit for FVNR Starters and HOA	D77B-DSNAP-X3
D77B-DSNAP Kit for FVR Starters and HOA	D77B-DSNAP-X4
Required DSNAP Adapter Kit for the 140 mm (Size 5 and F) Starter	D77B-140A

Troubleshooting

Table 29: Troubleshooting

Observation	Possible Cause	Corrective Action
MS/NS LED flashing red after power-up	D77B-DSNAP is not communicating to the <i>IT.</i> Starter	Check the D77B-RJJ1 jumper between the D77B-DSNAP and the D77B-TC8 terminal adapter. Also check that the terminal adapter is properly secured and plugged into the <i>IT.</i> Starter.
	The D77B-DSNAP was configured or "associated" to another <i>IT.</i> Starter	Perform a reset (Appendix A Page 39) to "re-associate" the D77B-DSNAP to the <i>IT.</i> Starter.
	The D77B-DSNAP is powered but the <i>IT.</i> Starter is not	Power the <i>IT.</i> Starter.
The MS/NS LED starts flashing green and then turns to a flashing red after power-up	D77B-DSNAP is not communicating to the <i>IT.</i> Starter	Check the D77B-RJJ1 jumper between the D77B-DSNAP and the D77B-TC8 terminal adapter. Also check that the terminal adapter is properly secured and plugged into the <i>IT.</i> Starter.
<i>IT.</i> Starter will not energize	<i>IT.</i> Starter is not powered	Verify that the <i>IT.</i> Starter has 24V DC on the + and - of the terminal block, the Power LED should be green on the D77B-TC8 terminal adapter.
	<i>IT.</i> Starter may be tripped	Reset the trip.
	Improper bit set in output assembly	Check the output assembly data position and verify with the control logic.
Second Contactor will not energize	During the "marriage" the wrong configuration was detected	Verify that the product code (Table 32 instance 3) is 0x1102 (4354 dec.). If the product code is not correct, verify that the second contact sensor is installed and wired, that the <i>IT.</i> Starter is powered and perform a Reset to Out-of-Box (Appendix A, Page 39).
	Improper bit set in output assembly	Check the output assembly data position and verify with the control logic. Verify the correct output assembly is being used.
	Mechanical interlock is jammed	
	The primary contactor is already energized	Only one contactor can be energized at a time.
A "failed to close" fault is generated when the second contactor is energized	The wiring between the D77C-A1 and the D77B-DSNAP is faulty.	Verify all connections on the D77C-A1 and the D77B-DSNAP. Verify that the D77C-A1 is properly connected to the second contactor.

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Note: Some of the information in "Appendix A" is supported only in version 2.005 of the D77B-DSNAP.

Appendix A: Supported DeviceNet Object

Notice

The features described within this manual reflect D77B-DSNAPs with version 2.05 and greater.

DeviceNet Objects

Table 30: Supported Objects

Object	Object ID	Page
Identity	0x01	Page 40
DeviceNet	0x03	Page 42
DeviceNet Connection	0x05	Page 43
Assembly	0x04	Page 42
Connection	0x05	Page 43
Discrete Input Point	0x08	Page 44
Motor Data	0x28	Page 45
Control Supervisor	0x29	Page 46
Overload	0x2C	Page 48
Soft Start	0x2D	Page 49
Table	0x6A	Page 50
Supported DeviceNet I/O Assemblies		Page 53

Table 31: DeviceNet Object Common Services

Service Code	Service Name
0x0E	Get_Attribute_Single
0x10	Set_Attribute_Single
0x17	Nop
0x18	Get_Member
0x4B	Allocate_Master/Slave_Connection_Set
0x4C	Release_Master/Slave_Connection_Set
0x05	Reset

Reset to Out-of-Box

Service = Reset (0x05)

Class = Identity (0x01)

Instance = 0x01

Data = 01

OR

Set all the DIP switches (all 8) to ON and power cycle the D77B-DSNAP, remove power, reset the DIP switches to the current positions and reapply power.

Table 32: Identity Object 0x01

Attribute	Access	Data Type	Name	Value
Instance 1				
0x01(1)	Get	UINT	Vendor Id	68 [0x44] = Cutler-Hammer
0x02(2)	Get	UINT	Device Type	12 [0x0C] = Communication Adapter 22 [0x16] = Motor Starter 23 [0x17] = Soft Starter
0x03(3)	Get	UINT	Product Code	[01 11] DSNAP, FVNR or S751 [02 11] DSNAP, FVR [0D 11] DSNAP + HOA, FVNR or S751 [0E 11] DSNAP + HOA, FVR
0x04(4)	Get	ARRAY	Revision	Byte 0 = Major Revision Byte 1 = Minor Revision
0x05(5)	Get	Word	Status	XX YY
				XX
				7 6 5 4 3 2 1 0
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Owned
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Reserved
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Configured
				<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> User Fault
				<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Node Fault
				<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> System Fault
				YY
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Minor Recoverable Fault
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Minor Unrecoverable Fault
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Major Recoverable Fault
				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Major Unrecoverable Fault
0x06(6)	Get	UDINT	Serial Number	Serial Number of D77B-DSNAP
0x07(7)	Get/Set	SHORT STRING	Product Name	DeviceNet IT . Starter Adapter
0x08(8)	Get	USINT	State	0 = Nonexistent 1 = Device Self Testing 2 = Standby 3 = Operational 4 = Major Recoverable Fault 5 = Major Unrecoverable Fault
0x09(9)	Get	UINT	Configuration Consistency Value	CRC on configuration values
0xB0(176)	Set	SHORT STRING	User Label or Tag Name	A user established ASCII string of 16 characters or less
0xB1(177)	Get	USINT	Fault Value	Same as Attribute 13 of the Control Supervisor (0x29) Object — Instance 1

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Table 32: Identity Object 0x01, continued

Attribute	Access	Data Type	Name	Value
Instance 2 (Overload)				
0x03(3)	Get	UINT	Product Code	3Y 11
				3 (IT. Overload) Y (Frame Size)
				1 = 27 mm 2 = 45 mm 3 = 54 mm 4 = 76 mm 5 = 105 mm 6 = 140 mm
0x04(4)	Get	ARRAY	Revision	Byte 0 = Major Revision of Overload Byte 1 = Minor Revision of Overload
0x06(6)	Get	UDINT	Serial Number	Serial Number of Overload
Instance 3 (S751 Soft Start)				
0x03(3)	Get	UINT	Product Code	6Y 11
				6 (S751 Soft Start) Y (Frame Size)
				1 = 27 mm 2 = 45 mm 3 = 54 mm 4 = 76 mm 5 = 105 mm 6 = 140 mm
0x04(4)	Get	ARRAY	Revision	Byte 0 = Major Revision of S751 Byte 1 = Minor Revision of S751
0x06(6)	Get	UDINT	Serial Number	Serial Number of S751
Instance 4 (D77B-HOA8)				
0x03(3)	Get	UINT	Product Code	03 11
0x04(4)	Get	ARRAY	Revision	Byte 0 = Major Revision of Overload Byte 1 = Minor Revision of Overload
0x06(6)	Get	UDINT	Serial Number	Serial Number of Overload

Table 33: DeviceNet Object 0x03 — Instance 1

Attribute	Access	Data Type	Name	Value
0x01(1)	Get	USINT	MAC ID	0 – 63
0x02(2)	Get	USINT	Baud Rate	0 = 125K 1 = 250K 2 = 500K
0x03(3)	Get	BOOL	BOI	
0x04(4)	Get	USINT	Bus Off Counter	0 – 255
0x09(9)	Get	USINT	Baud Rate Switch	
0xB2(178)	Get	USINT	Internal State	0 = Nonexistent 1 = Idle 2 = Waiting 3 = Standby 4 = Active 5 = Disabled 6 = Resetting 7 = Recursion 8 = Major Unrecoverable Fault 9 = Lost Comm 1 10 = Lost Comm 2 11 = Memory CRC 12 = Minor Unrecoverable Fault 13 = Major Recoverable Fault

Table 34: Assembly Object 0x04 — Instance 1

Attribute	Access	Data Type	Name	Value
0x64(100)	Get/Set	BOOL	At Select	0 = Ground Fault Input (default) 1 = At Reference

Table 35: Assembly Object 0x04 — Instance 0xC7 (199)

Attribute	Access	Data Type	Name	Value	Table
0x03(3)	Get	ARRAY	Data	Error Code (Byte 0) Descriptor (Byte 1) Instance (Byte 2) Class (Byte 3) Flags (Byte 4)	44, 45 23 23

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Table 36: Connection Object 0x05 — Instance 1 (Explicit Connection)

Attribute	Access	Data Type	Name	Value
0x01(1)	Get	USINT	State	0 = nonexistent 1 = configured 3 = established 4 = timed out
0x02(2)	Get	USINT	Instance Type	0 = Explicit
0x03(3)	Get	BYTE	Transport Class Trigger	131 [0x83]
0x04(4)	Get	UINT	Produced Connection Id	10[MAC ID]011
0x05(5)	Get	UINT	Consumed Connection Id	10[MAC ID]100
0x06(6)	Get	BYTE	Initial Comm Characteristics	33 [0x21]
0x07(7)	Get	UINT	Produced Connection Size	37
0x08(8)	Get	UINT	Consumed Connection Size	37
0x09(9)	Get/Set	UINT	Expected Packet Rate	Timer Resolution of 10 mSec.
0x0C(12)	Get	USINT	Watchdog Timeout Action	1 = Auto Delete

Table 37: Connection Object 0x05 — Instance 2 (I/O Message)

Attribute	Access	Data Type	Name	Value
0x01(1)	Get	USINT	State	0 = nonexistent 1 = configured 3 = established 4 = timed out
0x02(2)	Get	USINT	Instance Type	1 = I/O Message
0x03(3)	Get	BYTE	Transport Class Trigger	131 [0x83]
0x04(4)	Get	UINT	Produced Connection Id	01111[MAC ID]
0x05(5)	Get	UINT	Consumed Connection Id	10[MAC ID]101
0x06(6)	Get	BYTE	Initial Comm Characteristics	1 [0x01]
0x07(7)	Get	UINT	Produced Connection Size	1 – 7
0x08(8)	Get	UINT	Consumed Connection Size	1
0x09(9)	Get	UINT	Expected Packet Rate	Timer Resolution of 10 mSec.
0x0C(12)	Get	USINT	Watchdog Timeout Action	1 = Auto Delete
0x0E(14)	Get/Set	EPATH	Produced Connection Path	20 04 24 XX 30 03 XX = Instance
0x10(16)	Get/Set	EPATH	Consumed Connection Path	20 04 24 XX 30 03 XX = Instance
0x64(100)	Get/Set	USINT	Production ID (Input Assembly)	See DeviceNet I/O Assemblies, Page 53
0x65(101)	Get/Set	USINT	Consumption ID (Output Assembly)	See DeviceNet I/O Assemblies, Page 53

Table 38: Discrete Input Object 0x08

Attribute	Access	Data Type	Name	Value
Instance 1 (Primary Contact Block)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 2 (Secondary Contact Block)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 3 (Ground Fault Detect)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 13 (IT. Starter Permissive)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 14 (HOA Reset)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 15 (IT. Starter Run1)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 16 (IT. Starter Run2)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 17 (HOA Auto)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 18 (HOA Run1)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 19 (HOA Run2)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On
Instance 20 (HOA Alarm Output State)				
0x03(3)	Get	BOOL	Data	0 = Off 1 = On

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Table 39: Motor Data Object 0x28 — Instance 1

Attr ID	Access Rule	DeviceNet Data Type	Name	Value
0x03(3)	Set	USINT	MotorType	0 = Non-standard motor 3 = PM Synchronous Motor 6 = Wound Rotor Induction Motor 7 = Squirrel Cage Induction Motor
0x04(4)	Set	SHORT STRING	CatNumber	Manufacturer's Motor Catalog Number (Nameplate number) 32 characters max
0x05(5)	Set	SHORT STRING	Manufacturer	Manufacturer's Name 32 characters max
0x06(6)	Set	UINT	RatedCurrent	Rated Stator Current Units: [100mA]
0x07(7)	Set	UINT	RatedVoltage	Rated Base Voltage Units: [V]
0x08(8)	Set	UDINT	RatedPower	Rated Power at Rated Freq Units: [W]
0x09(9)	Set	UINT	RatedFreq	Rated Electrical Frequency Units: [Hz]
0x0A(10)	Set	UINT	RatedTemp	Rated Winding Temperature Units: [degrees C]
0x0B(11)	Set	UINT	MaxSpeed	Maximum allowed motor speed Units: [RPM]
0x0C(12)	Set	UINT	PoleCount	Number of poles in the motor
0x0D(13)	Set	UDINT	TorqConstant	Motor torque constant Units: [0.001 x Nm/A]
0x0E(14)	Set	UDINT	Inertia	Rotor Inertia Units: [10^{-6} x kg.m ²]
0x0F(15)	Set	UINT	BaseSpeed	Nominal speed at rated frequency from nameplate Units: [RPM]
0x13(19)	Set	USINT	ServiceFactor	Units: [%] Range: 0 ... 255

Note: Attribute IDs 06 – 19 only available when attribute ID 03 is 3, 6 or 7.

Table 40: Control Supervisor Object 0x29 — Instance 1

Attribute	Access	Data Type	Name	Value
0x03(3)	Set	BOOL	Run 1	0 = False
0x04(4)	Set	BOOL	Run 2	0 = False
0x05(5)	Set	BOOL	Net Control	0 = Local Control 1 = Network Control
0x07(7)	Get	BOOL	Running 1	0 = Other State 1 = Enabled and Run 1
0x08(8)	Get	BOOL	Running 2	0 = Other State 1 = Enabled and Run 2
0x09(9)	Get	BOOL	Ready	0 = Other State 1 = Ready or Enabled or Stopping
0x0A(10)	Get	BOOL	Faulted	0 = No Faults 1 = Fault Occurred
0x0B(11)	Get	BOOL	Warning	0 = No Warning 1 = Warning
0x0C(12)	Set	BOOL	Fault Reset	0 > 1 = Fault Reset 0 = No Action
0x0D(13)	Get	UINT	Fault Code	Refer to Table 44 on Page 51 for Fault Codes.
0x0E(14)	Get	UINT	Warning Code	Refer to Table 45 on Page 51 for Warning Codes.
0x0F(15)	Get	UINT	Control from Net	Status of Control Source 0 = Local 1 = Network
0x10(16)	Set	USINT	DeviceNet Fault Mode (See Warning)	0 = Fault + Stop 1 = Hold Last State 3 = Run 1 4 = Run 2
0x16(22)	Get/Set	UDINT	Cycle Count	Number of times the motor has been started
0x65(101)	Get	DWORD	Local Signals	Byte 0 (Consuming Assemble Data) Bit 0 = Run1 Bit 1 = Run2 Bit 3 = Fault Reset Bit 5 = Control From Net Byte 1 (N/A) Byte 2 (Motor Control Status) Bit 0 = Run1 Bit 1 = Run2 Bit 2 = Reset Bit 3 = Permissive Bit 4 = Ready Bit 5 = Net Control Bit 6 = Disconnect Handle Bit 7 = At Reference Byte 3 (N/A)

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Table 40: Control Supervisor Object 0x29 — Instance 1, continued

Attribute	Access	Data Type	Name	Value
0x69(105)	Get/Set	BOOL	Hand	0 = Auto 1 = Hand
0x6E(110)	Get/Set	USINT	Number of Contactors	1 = 1 Contactor (FVNR) 2 = 2 Contactor (FVR)
0x6F(111)	Get/Set	BOOL	Communication Valid	0 = Starter Communication Fault 1 = Valid Starter Communication
0x72(114)	Get/Set	BOOL	Net Select	0 = Control is Local 1 = Control is From Network
0x73(115)	Get/Set	BOOL	Sensor Power	For version 2.03 only 0 = Disable Sensor Power 1 = Enable Sensor Power
0x76(118)	Get	BOOL	Plugged	1 = Plug detected (transition from forward to reverse or from reverse to forward without going through a stop)
0x77(119)	Get/Set	BOOL	Plug Enable	0 = No PLUG Detect (default) 1 = PLUG Detect enabled
0x78(120)	Get/Set	USINT	Plug Timer	Value in seconds to wait before automatically clearing a PLUG condition. A value of zero (default) disables the timer. The range is from 0 to 255 seconds.

**WARNING**

If the DeviceNet Fault Mode value is set to Run1 or Run2, **any time** the D77B-DSNAP is powered **and does not** have a valid I/O connection, the motor controller will be commanded to the DeviceNet Fault Mode value. This includes first powering up the DeviceNet system (D77B-DSNAP) and not having the controller on-line.

Table 41: Overload Object 0x2C — Instance 1

Attribute	Access	Data Type	Name	Value
0x03(3)	Get	INT	Trip Class Setting	Setting of the overloads FLA attribute = (INT)*(0.1 Amps)/2^CS
0x04(4)	Get	USINT	Trip Class	0 – 200
0x05(5)	Get	INT	Average of 3 Phase Current	Average Current of 3 Phase (RMS) = (INT)*(0.1 Amps)/2^CS
0x07(7)	Get	USINT	%Thermal Capacity	0 – 100%
0x0C(12)	Get	SINT	Current Scale (CS)	Current Scaling Factor Scaled Current = (INT)*(0.1 Amps)/2^CS
0x67(103)	Get/Set	BOOL	Ground Fault Enable	0 = Disabled (default) 1 = Enabled Changing this from a 1 to a 0 will clear a ground fault if one exists.
0x69(105)	Get/Set	USINT	Ground Fault Time	Length of time the ground fault must be true for a trip 0 – 255 seconds default = 1 second
0x6A(106)	Get/Set	USINT	Ground Fault Delay	Length of time to delay tripping on a ground fault from motor controller start 0 – 255 seconds default = seconds
0x6B(107)	Get	BOOL	Ground Fault	0 = No ground fault 1 = Ground fault
0x6C(108)	Get	BOOL	High Current Enable	0 = Disabled (default) 1 = Enabled
0x6D(109)	Get/Set	USINT	High Current Percent	% of FLA setting to set current threshold 0 – 255%
0x6E(110)	Get	BOOL	High Current Warning	0 = No Warning (default) 1 = Warning
0x6F(111)	Get/Set	BOOL	Low Current Enable	0 = Disabled (default) 1 = Enabled
0x70(112)	Get/Set	USINT	Low Current Percent	% of FLA setting to set underload 0 – 255%
0x71(113)	Get	BOOL	Low Current Warning	0 = No Warning (default) 1 = Warning
0x72(114)	Get	UINT	Starter 24V DC Value	Value of 24V DC connected to the starter 235 = 23.5V DC
0x73(115)	Get	BYTE	Overload Status Bits	0 = Current Trip 1 = Phase Loss 2 = Phase Imbalance 3 = Receiving Run1 4 = Receiving Run2 5 = Ground Fault 6 = Test 7 = Thermal Overload
0x74(116)	Get	BOOL	Impending Trip Warning	0 = current < 115% FLA 1 = current > 115% FLA
0x75(117)	Get	USINT	%FLA	% Running Current divided by the FLA setting on the overload (0 – 255%)
0x79(121)	Get	UDINT	Max FLA	Amps * 256

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Table 42: Soft Start Object 0x2D — Instance 1

Attribute	Access	Data Type	Name	Value
0x03(3)	Get	BOOL	AtReference	Starting/stopping output voltage reference status 0 = Not At Reference 1 = Output At Voltage Reference
0x04(4)	Get	USINT	StartMode	1 = Voltage Ramp No Current Limit The DSNAP will always return the value 1 when accessing this attribute.
0x05(5)	Get	USINT	StopMode	1 = Ramp Down The DSNAP will always return the value 1 when accessing this attribute.
0x07(7)	Get	UINT	RampTime1	Tenths of Seconds
0x10(16)	Get	UINT	DecelTime	Tenths of Seconds
0x64(100)	Get	USINT	Start Torque	Starting Torque Pot reading
0x65(101)	Get	WORD	Status Bits	Status bits

Table 43: Table Object 0x6A — Instance 0x01

Attribute	Access	Data Type	Name	Value
0x02(2)	Get	USINT	State	0 = non-existent 1 = Stopped 2 = Idle 3 = Active 4 = overwrite (Full) 5 = Halted (Full)
0x0A(10)	Get/Set	USINT	Log Full Action	0 = Halt 1 = Scroll (default)
0x0B(11)	Get	USINT	Duplicate Event Action	0 = overwrite (default)
0x0C(12)	Get	UINT	Event Log Maximum Size	16
0x0D(13)	Get	UINT	Event Log Size	0 = Empty
0x0E(14)	GetMmbr Remove Mbr	ARRAY	Event Log	Element Number (byte 5 and 4) Code (byte 3) – fault/warning code Descriptor (byte 2) D2 = Warning D3 = Fault Instance (byte 1) Class (byte 0)
0x13(19)	Get	BOOL	Log Full	0 = Not full 1 = Full
0x14(20)	Get	BOOL	Log Not Empty	0 = Log is empty 1 = At least one entry exists
0x15(21)	Get	BOOL	Log Overrun	0 = Not Overrun 1 = Overrun
0x16(22)	Get	UINT	Assembly Instance	199
0x17(23)	Get/Set	USINT	Startup Behavior	0 = Auto Active 1 = Start service required 2 – 255 = Reserved
0x18(24)	Get	USINT	Log Entry Form	0 = 32-bit object form 1 = 48-bit object form 2 = Caterpillar style 3 – 254 = Reserved 255 = Vendor specific
0x64(100)	Get	BOOL	Fresh Log Entry	1 = Fresh element to read 0 = No fresh elements to read

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Table 44: Fault Codes

Code Value	Meaning
0	No Fault
10	Test Trip (button on Overload)
21	Thermal Overload
22	Phase Loss
26	Phase Imbalance
27	Ground Fault
62	Memory Fault The DSNAP has detected a CRC error within the EEPROM. This condition only can occur at power-up/reset and results in an "UNRECOVERABLE" fault state (Module Status LED solid RED). Recovery procedure is to initialize the EEPROM via an out-of-box reset.
102	SCR Over temperature fault
106	micro-Softstarter Temp sensor fault

Table 45: Warning Codes

Code Value	Meaning
0	No Warning
20	High Current Warning User settable value for high current warning.
21	Impending Trip (% FLA > 115%)
29	Low Current Warning User settable value for low current warning.
41	Control Undervoltage +24V DC Supply Bus is lower than 18V DC.
63	Hardware Link Fault Communication with the motor controller has failed.
64	Low Device Power +24V DC Supply Bus is lower than 18V DC.
71	Primary Contactor Fail To Close
72	Primary Contactor Fail To Open
103	Watchdog
105	Alarming Protocol Fault (S751)
108	Network control lost due to manual intervention
111	No response from a duplicate node message on a lone network
171	Secondary Contactor Fail To Close
172	Secondary Contactor Fail To Open

Table 45: Warning Codes, continued

Code Value	Meaning
247	Attached HOA Device Changed This error code is reported when the type of HOA device has changed. This is error report caused by the DSNAP when initially establishing communication with the attached device(s) immediately after a power-up or reset sequence. Either (or both) of the following conditions are not true:
248	Attached Overload Device Changed This error code is reported when the current range of the starter/overload has changed.
249	Attached S751 Device Changed This error code is reported when the current range of the S751 has changed.
250	Invalid Attached Device Type This error code is reported when, during the "association" procedure, the device type of the attached device does not match any recognized by the DSNAP's firmware.
251	Invalid Attached Device Version This error code is reported when, during the "association" procedure, a S751 is detected that reports a firmware version less than 1.04.
252	Attached Device Frame Size Changed The device type (as reported by the attached device) does not match the device type that was attached when the DSNAP was associated.
253	The attached HOA was not a recognized style or version.

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DeviceNet I/O Assemblies

The changing of the I/O assemblies from the default to other assemblies using CHStudio is performed in a graphical user environment. When using a generic DeviceNet Management tool that accepts EDS files, the EDS file will aid in simply choosing the I/O assemblies that are allowed and available.

Table 46: Allowable DeviceNet I/O Assemblies

Motor Controller	Allowable Input Assemblies (Dec.)	Allowable Output Assemblies (Dec.)
Non-reversing (E101, N010)	52, 53, 102, 105*, 108, 114	3*
Reversing (E501, N501)	54, 103, 106*, 109, 114	5*
S751 Soft Start	52, 53, 60, 102, 105*, 108, 114	3*

*Indicates the default

For users that have a generic DeviceNet Management tool that does not accept EDS files, follow the simple example below to aid in changing I/O assemblies using explicit messaging.

To read what the current Input assembly is, perform an explicit message of the following:

Table 47: Reading Current Input Assembly

Service	Class (HEX)	Instance (HEX)	Attribute (HEX)	Data (HEX)
Get Single	0x05 (Connection)	0x02 (Polled I/O)	0x64 (Production ID) (100 Dec.)	0x34 (34 = Basic Motor Starter)

To set the Input assembly, perform an explicit message of the following:

Table 48: Setting Input Assembly

Service	Class (HEX)	Instance (HEX)	Attribute (HEX)	Data (HEX)
Set Single	0x05 (Connection)	0x02 (Polled I/O)	0x64 (Production ID) (100 Dec.)	0xXX (XX = the input assembly in HEX. Example: 0x69 is D77B-DSNAP Abbreviated Motor Starter 1)

To read what the current Output assembly is, perform an explicit message of the following:

Table 49: Reading Current Output Assembly

Service	Class (HEX)	Instance (HEX)	Attribute (HEX)	Data (HEX)
Get Single	0x05 (Connection)	0x02 (Polled I/O)	0x65 (Consumption ID) (101 Dec.)	0x03 (3 = Basic Motor Starter)

To set the Output assembly, perform an explicit message of the following:

Table 50: Setting Output Assembly

Service	Class (HEX)	Instance (HEX)	Attribute (HEX)	Data (HEX)
Set Single	0x05 (Connection)	0x02 (Polled I/O)	0x65 (Consumption ID) (101 Dec.)	0xXX (XX = the output assembly in HEX. Example: 0x05 (5 Dec.) is Extended Motor Starter)

DeviceNet Input Assemblies**Table 51: Assembly 52 (0x34) — Basic Motor Starter**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux 2	Reserved	Reserved	Reserved	Aux 1	Running1	Reserved	Fault

Table 52: Assembly 53 (0x35) — Extended Motor Starter 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warning	Fault

Table 53: Assembly 54 (0x36) — Extended Motor Starter 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux 2	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warning	Fault

Table 54: Assembly 60 (0x3C) — Basic Soft Start Input

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
At Reference or Aux 2	Reserved	Reserved	Reserved	Aux 1	Running1	Reserved	Fault

Table 55: Assembly 102 (0x66) — D77B-DSNAP Motor Starter

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	% FLA							

Table 56: Assembly 103 (0x67) — D77B-DSNAP Extended Motor Starter

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	% FLA							

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Table 57: Assembly 105 (0x69) — D77B-DSNAP Abbreviated Motor Starter 1

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warn	Fault
1	% Thermal Capacity							
2	% FLA							
3	Fault Code (Low byte only)							

Table 58: Assembly 106 (0x6A) — D77B-DSNAP Abbreviated Motor Starter 2

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	% FLA							
3	Last Fault Code (Low byte only)							

Table 59: Assembly 108 (0x6C) — D77B-DSNAP Motor Starter with Fault Code

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Aux 1	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	Last Fault Code (Low byte)							
5	Last Fault Code (High byte)							

Table 60: Assembly 109 (0x6D) — D77B-DSNAP Expanded Motor Starter with Fault Code

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	Last Fault Code (Low byte)							
5	Last Fault Code (High byte)							

Table 61: Assembly 114 (0x72) — D77B-DSNAP Complete Status Assembly

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference or Aux 2	Reserved	Ctrl From Net	Ready	Running2	Running1	Warning	Fault

Table 62: Input Definitions

Data	Description
Fault/Trip	The motor controller is faulted or tripped Note: A "Faulted" motor controller may still respond to a Run1 or Run2 command
Warning	The motor controller has a warning condition
Running 1	Primary contactor is being commanded to run
Running 2	Secondary contactor is being commanded to run
Ready	The motor controller is configured and communicating with starter
CtrlFrom Net	Source of control
At Reference	This states that the motor controller is in the state that it is commanded to be in, or that the S751 is in bypass.
% Thermal Capacity	% thermal capacity of the motor from 0 to 100% (estimated motor temperature)
Average Current	Average RMS current of the motor
% FLA	The ratio of the running current divided by the FLA setting on the overload
Fault Codes and Warning Codes	Code for the fault of the motor controller. Refer to Table 44 and 45 on Page 51 .

DeviceNet Output Assemblies**Table 63: Assembly 3 (0x03) — Basic Motor Starter**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	Reserved	Fault Reset	Reserved	Run1

Table 64: Assembly 5 (0x05) — Extended Motor Starter

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	Reserved	Fault Reset	Run2	Run1

Table 65: Output Definitions

Data	Description
Run 1	Energize the primary contactor, or start the S751
Run 2	Energize the secondary contactor
Fault Reset	Reset the fault

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IT. Publications and Support

Table 66: IT. Publications

Publication	Description
Pub 50345	D77B-DSNAP Install Leaflet
Pub 50368	D77B-HOA8 Install Leaflet
MN05004001E	IT. DeviceNet Starter Network Adapter Product (D77B-DSNAP) Installation and Users Manual
Pub 49907	Intelligent Technologies S751 Soft Starter User Manual
MN03403002E	IEC Contactor and Starter User Manual
MN03305001E	NEMA Contactor and Starter User Manual

For copies of these and other publications contact the Literature Fulfillment Center at 1-800-957-7050.

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