EATON | Cutler-Hammer

Intelligent Technologies

DeviceNet Starter Network Adapter Product (D77B-DSNAP)

Installation and User Manual

EATON | Cutler-Hammer

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Cover Photo: ***IT.*** D77B-DSNAP

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Product Overview

Description

Cutler-Hammer Intelligent Technologies (*IT.*) D77B-DSNAP (**D**eviceNet **S**tarter **N**etwork **A**dapter **P**roduct) by Eaton Corporation 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	45 mm
	0	
C	1	54 mm
D	2	76 mm
E	3	105 mm
	4	
F	5	140 mm

Table 2: D77B-DSNAP S751 Connectivity Table

S751 Soft Start
All

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.cutler-hammer.eaton.com/it

Notice

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

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

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Safety

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

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.

Environmental Ratings

The following environmental ratings apply to the D77B-DSNAP.

Table 3: Environmental Ratings

Category	Description	Specification
Transportation/ Storage	Temperature	-50°C to 80°C [-58°F to 176°F]
	Humidity	5 – 95% non-condensing
Operating	Temperature	0°C to 60°C [32°F to 140°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
Agency Certifications	UL 508 CE (Low Voltage Directive) CSA C22.2 No. 14 ODVA Group 2 slave no UCMM
Radiated and Conducted Emissions	EN 5011 Class A
Electrical/EMC	
ESD Immunity (IEC 61000-4-2)	±8 kV air, ±4 kV contact
Radiated Immunity (IEC 61000-4-3)	10 V/m 80 – 1000 MHz, 80% amplitude modulation @ 1 kHz
Fast Transient (IEC 61000-4-4)	±2 kV supply and control ±1 kV communications
Surge (IEC 61000-4-5)	±1 kV line-to-line ±2 kV line-to-ground
RF Conducted (IEC 61000-4-6)	10V, 0.15 – 80 MHz
Magnetic Field (IEC 61000-4-8)	30 A/m, 50 Hz
Voltage Dips (IEC 61000-4-11)	30% dip @ 10 ms 60% dip @ 100 ms >95% interrupt @ 5 ms
Protection Degree (IEC 60947-1)	IP20

Catalog Numbering System

The D77B-DSNAP can be ordered as an assembly or as individual components. The assembly includes all components for normal operation.

Table 5: Catalog Numbers

Description	Catalog Number
SNAP Jumper to terminal adapter	D77B-RJJ1
D77B-DSNAP Assembly of terminal adapter, jumper and D77B-DSNAP	D77B-DSNAP-X1
D77B-DSNAP Assembly of terminal adapter, jumper, D77B-DSNAP and second contactor sensor	D77B-DSNAP-X2
DeviceNet Start Network Adapter Product	D77B-DSNAP
SNAP Terminal Adapter for FVR and FVNR starters and S751 Soft Start	D77B-TC8
Second contactor sensor for FVR starters and contactors	D77B-A2
Ground Fault Detector for 45 mm and 54 mm frame starters	D77B-GF1
Ground Fault Detector for 76 mm and 105 mm starters	D77B-GF2
Ground Fault Detector for 140 mm starters	D77B-GF3

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Physical Features

Physical Description

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

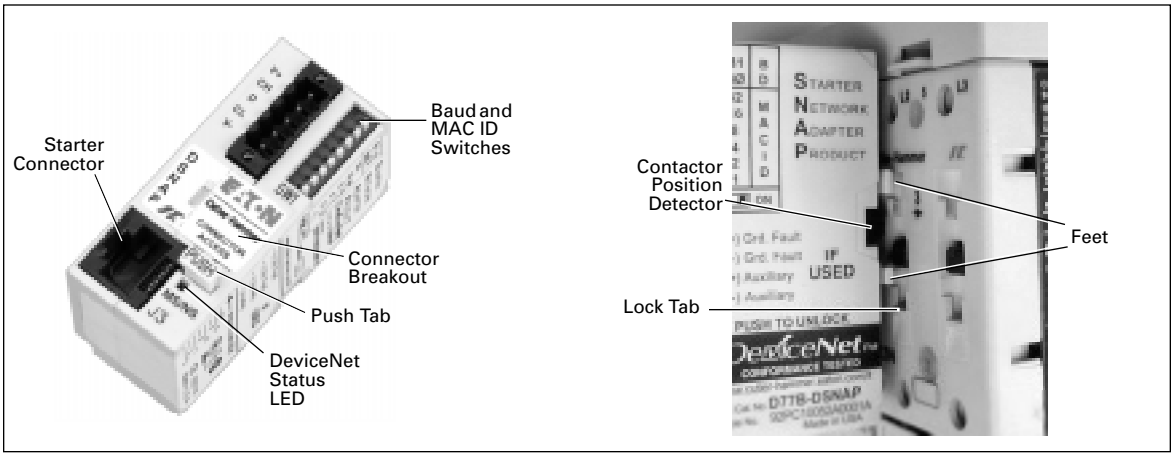

Figure 1: D77B-DSNAP Features

Dimensions

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

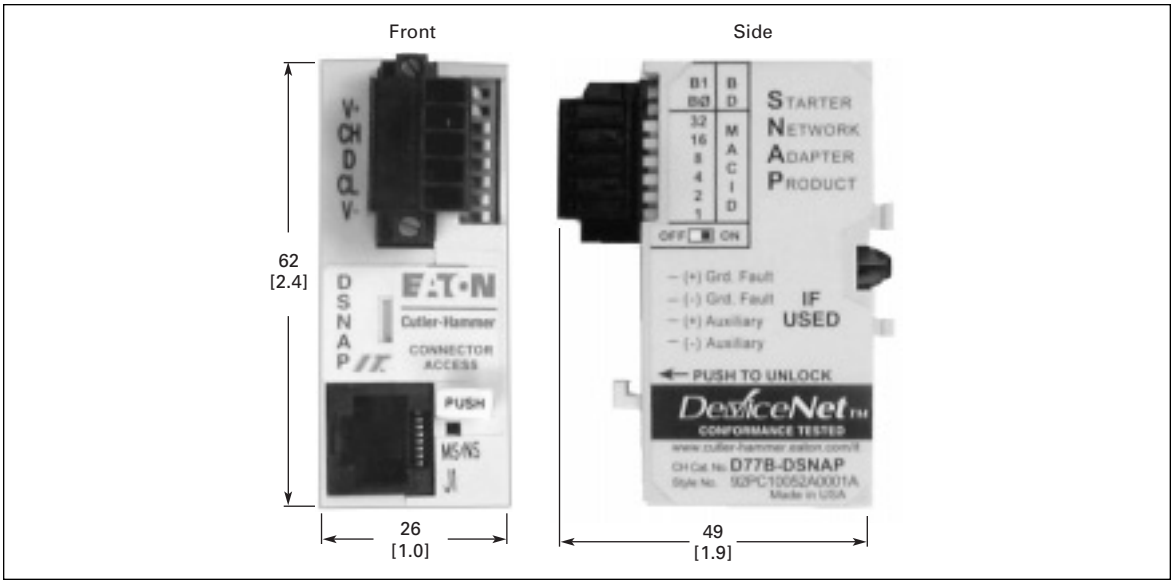

Figure 2: D77B-DSNAP Dimensions, mm [in]

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 Eaton's Cutler-Hammer ***IT.*** Starter. 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 Eaton's Cutler-Hammer ***IT.*** Starter must be connected to the ***IT.*** Starter terminal, as illustrated in **Figure 3**.

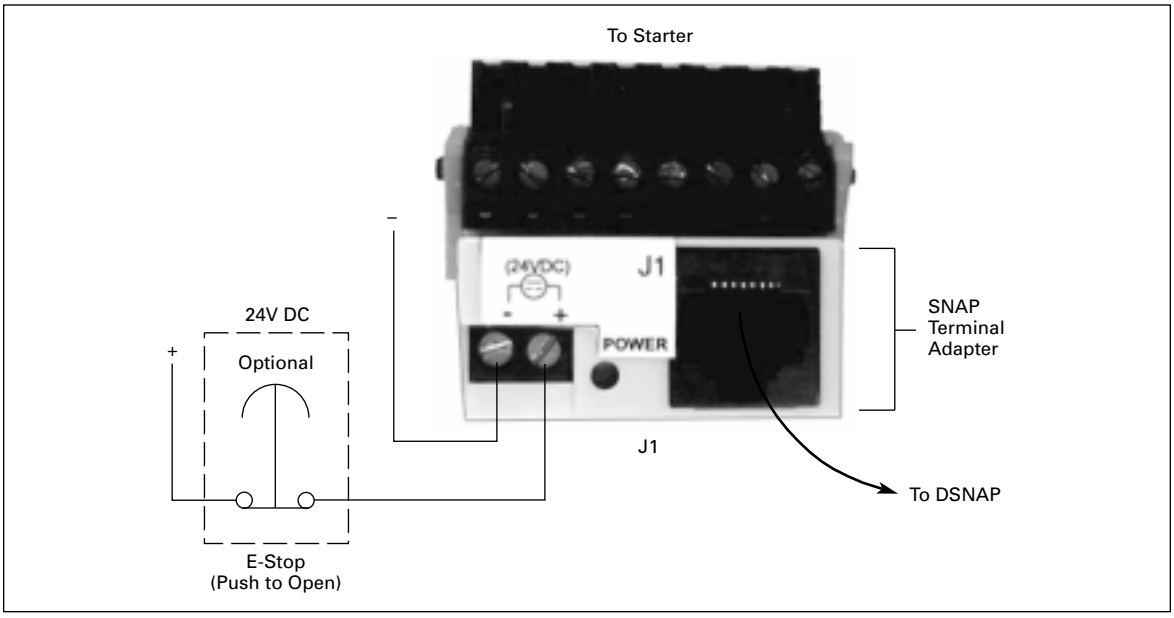

Figure 3: Starter Terminal Adapter Connection

⚠ 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.

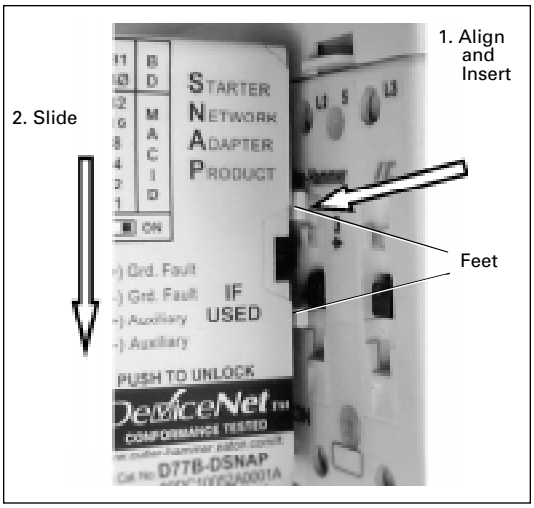


Figure 4: D77B-DSNAP Alignment and Mounting

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, **Figure 1** on **Page 5**.
2. Slide the D77B-DSNAP up.
3. Pull the D77B-DSNAP away from the starter contact block.

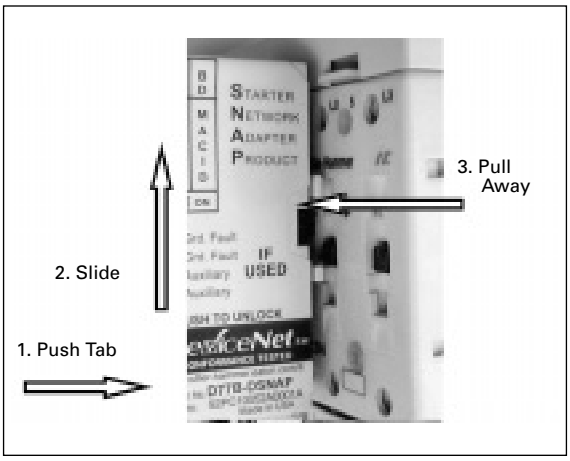


Figure 5: D77B-DSNAP Removal

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.

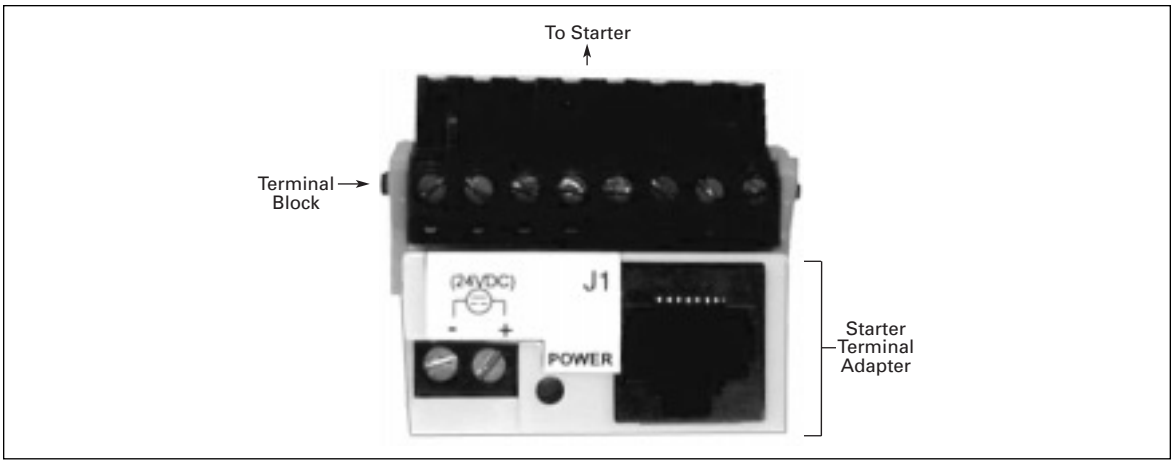


Figure 6: Connecting Starter Terminal Adapter

Insert one end of the Starter Adapter Jumper (Catalog Number D77B-RJJ1) into J1 on the Starter Terminal Adapter and the other end into or on the D77B-DSNAP.

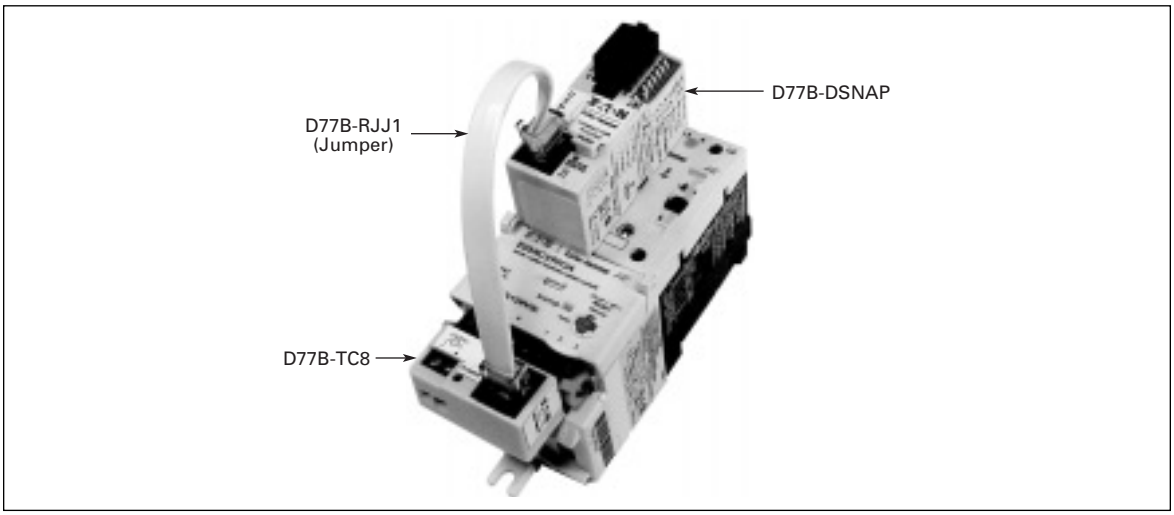


Figure 7: Jumper Installation

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.
- 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

Set the DeviceNet MAC ID and Baud Rate

The MAC ID and baud can only be set using the DIP switches on the front of the D77B-DSNAP. A software tool (such as CH Studio) can view the settings for the D77B-DSNAP MAC ID and baud rate, but cannot be used to modify them.

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.

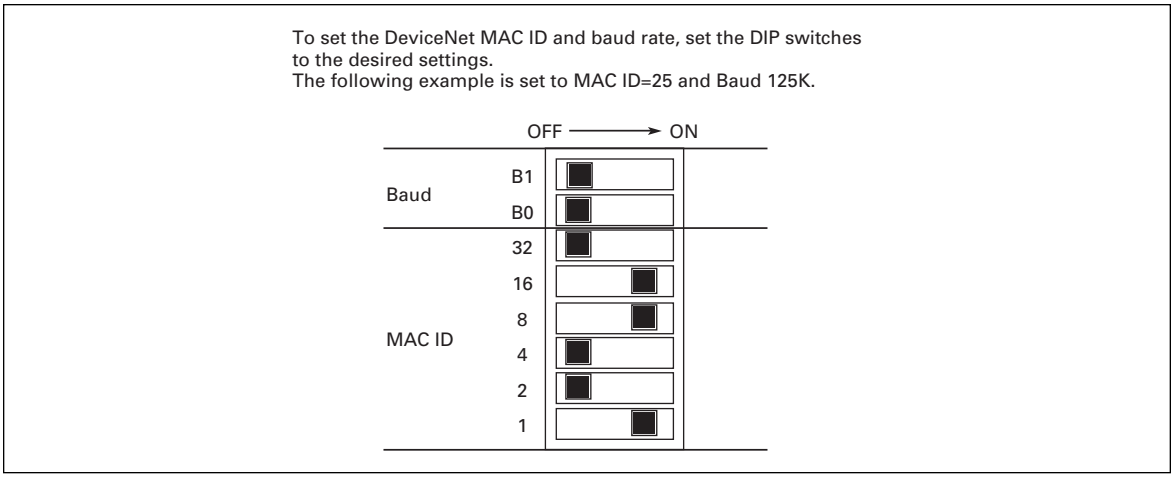


Figure 8: DIP Switch Setting Example

Table 9: Baud Rate Configuration Switches

B1	B0	Baud
OFF	OFF	125K
OFF	ON	250K
ON	OFF	500K
ON	ON	Not Allowed

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, 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.

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-DNSAP 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**.

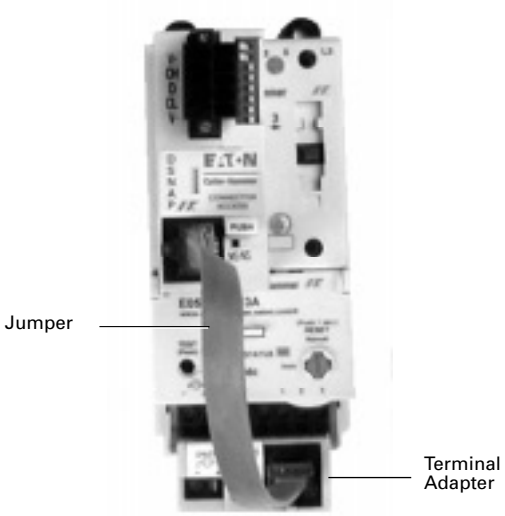


Figure 9: D77B-DSNAP-X1 on FVNR *IT.* Starter

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 "married" to that specific size, type and overload range of ***IT.*** Starter. Any attempt to install an already "married" D77B-DSNAP onto another ***IT.*** Starter without first performing a reset (Appendix A, **Page 30**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED); the D77B-DSNAP will not 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 10: 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	Reserved	CtrlFrom Net	Ready	Reserved	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 11: Output Assembly for Non-reversing Starter (E101, N101) and S751 Soft Start

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

FVR Motor Controller

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

Note: The 45 mm and 54 mm frame ***IT.*** Starters will require the user to depress the cross over cover locking tab while installing the D77B-DNSAP. 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 (D77B-A2) 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.

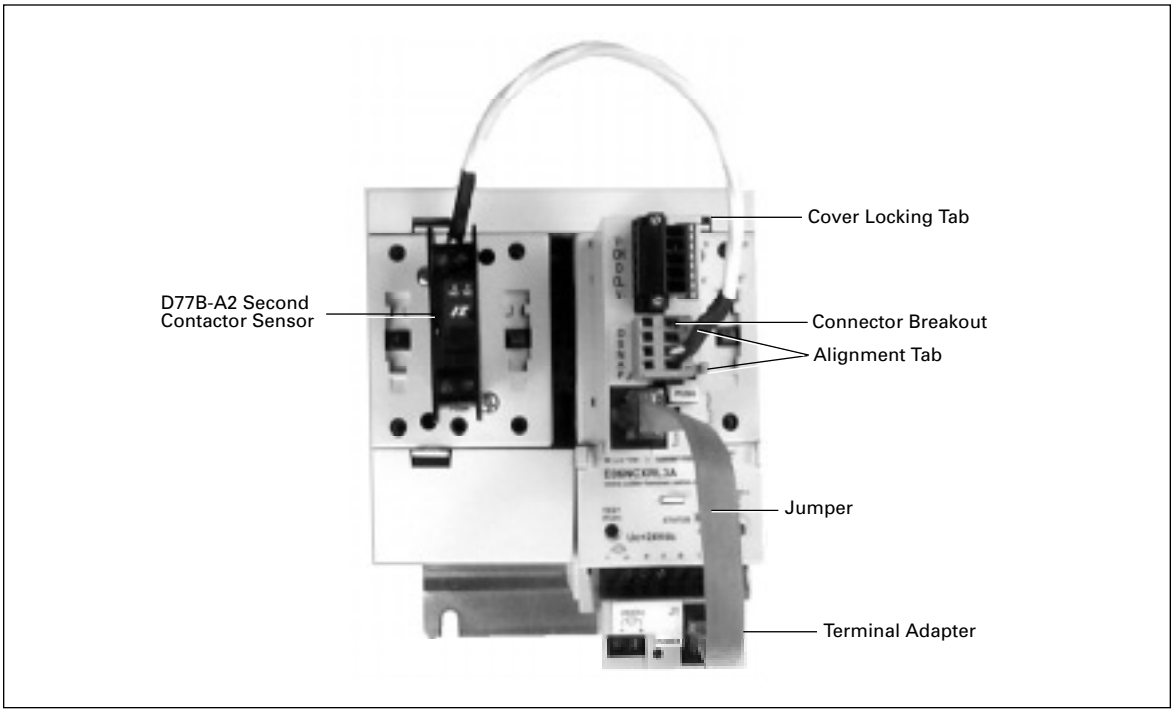


Figure 10: D77B-DSNAP-X2 on FVR *IT.* Starter

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 on the second contactor and that the green connector is installed into the breakout. If this is not performed, the auto configuration will set the D77B-DSNAP up for an FRNR ***IT.*** Starter. After the auto configuration is complete, the D77B-DSNAP is "married" to that specific size, type and overload range of ***IT.*** Starter. Any attempt to install an already "married" D77B-DSNAP onto another ***IT.*** Starter without first performing a reset (Appendix A, **Page 30**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED); the D77B-DSNAP will not 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 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	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 13: 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

S751 Motor Controller

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

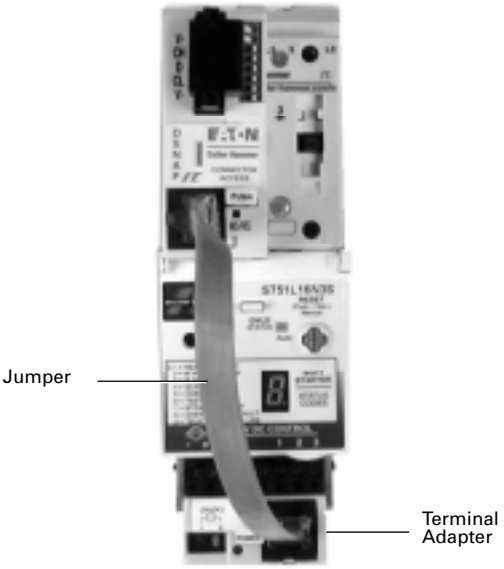


Figure 11: D77B-DSNAP-X1 on S751 *IT.* Soft Starter

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 DeviceNe**t on **Page 10**.

The D77B-DSNAP will auto configure to the S751 Starter when the D77B-DSNAP and the ***IT.*** Starter are first powered (together). After the auto configuration is complete, the D77B-DSNAP is "married" to that specific size, and overload range of S751. Any attempt to install an already "married" D77B-DSNAP onto another S751 without first performing a reset (Appendix, **Page 30**) will result in the D77B-DSNAP entering a recoverable fault state (flashing red MS/NS LED); the D77B-DSNAP will not 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 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	Reserved	CtrlFrom Net	Ready	Reserved	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 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

Safe State Behavior

The safe state behavior of the D77B-DSNAP is factory set to Fault and Stop. Refer to **Page 35**, **Table 33** Control Supervisor Object (0x29) Instance 0x01 (16 Dec.) 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 16: 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)	52, 53, 54, 102, 103, 105, 106*, 108, 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 Eaton’s Cutler-Hammer Web site (www.cutler-hammer.eaton.com/it).

Refer to Appendix A on **Page 39** for all input and output assembly information.

Input Assembly Data Definition

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

Table 17: Input Assembly Data Definitions

Data	Description
Fault/Trip	The motor controller is faulted or tripped **Note:** A "Faulted" M.C. 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 D77B-AC2 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 and Warning Codes	Code for the fault of the motor controller. Valid fault and warning codes are:
	0 = No Fault 10 = Test 20 = Current Trip 21 = Thermal Overload 22 = Phase Loss 26 = Phase Imbalance 27 = Ground Fault 41 = Control Undervoltage 62 = Memory Fault 63 = Hardware Link Fault (Not Communicating with Starter) 64 = No Device Power 71 = Fail to Close Primary Contactor 72 = Fail to Open Primary Contactor 101 = Invalid Attached Device Version 102 = SCR Over Temperature 103 = Watchdog 104 = SNAP Protocol Failure to Connect 105 = SNAP Protocol Fault 106 = Temperature Sensor Fault 171 = Fail to Close Second Contactor 172 = Fail to Open Second Contactor 173 = Invalid Action Attempted

Output Assembly Data Definition

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

Table 18: 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

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.

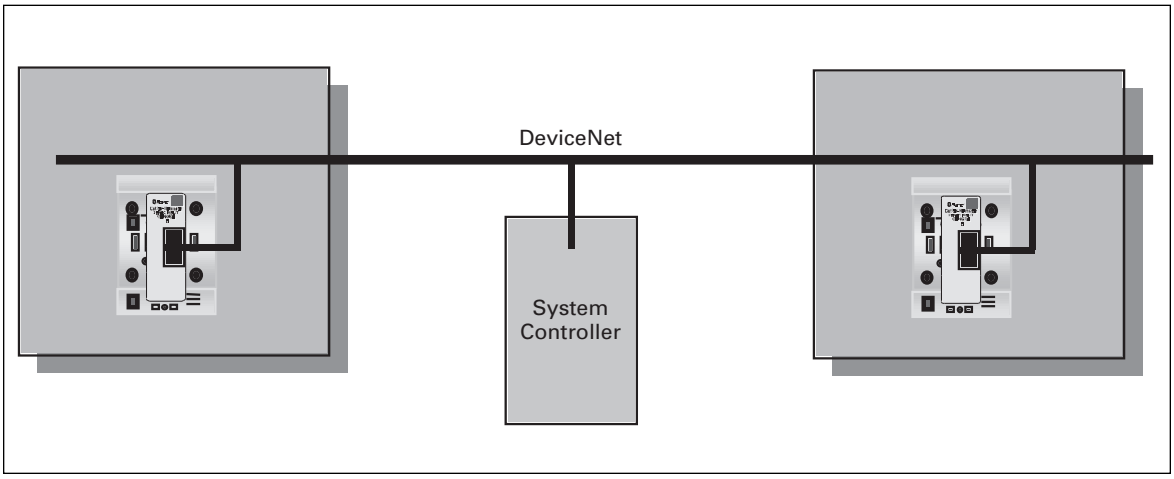


Figure 12: Typical D77B-DSNAP Application

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 19: 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 *Contactor and Starter User Manual* (Publication No. 49400).

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

Table 20: 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.
Underload 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.
Current Threshold - 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 21: 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

Functional Description

Table 22: 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 17**
RUNNING 1 = Run/FWD/SLOW
RUNNING 2 = REV/FAST
FAULT = any fault in **Table 17**

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

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.

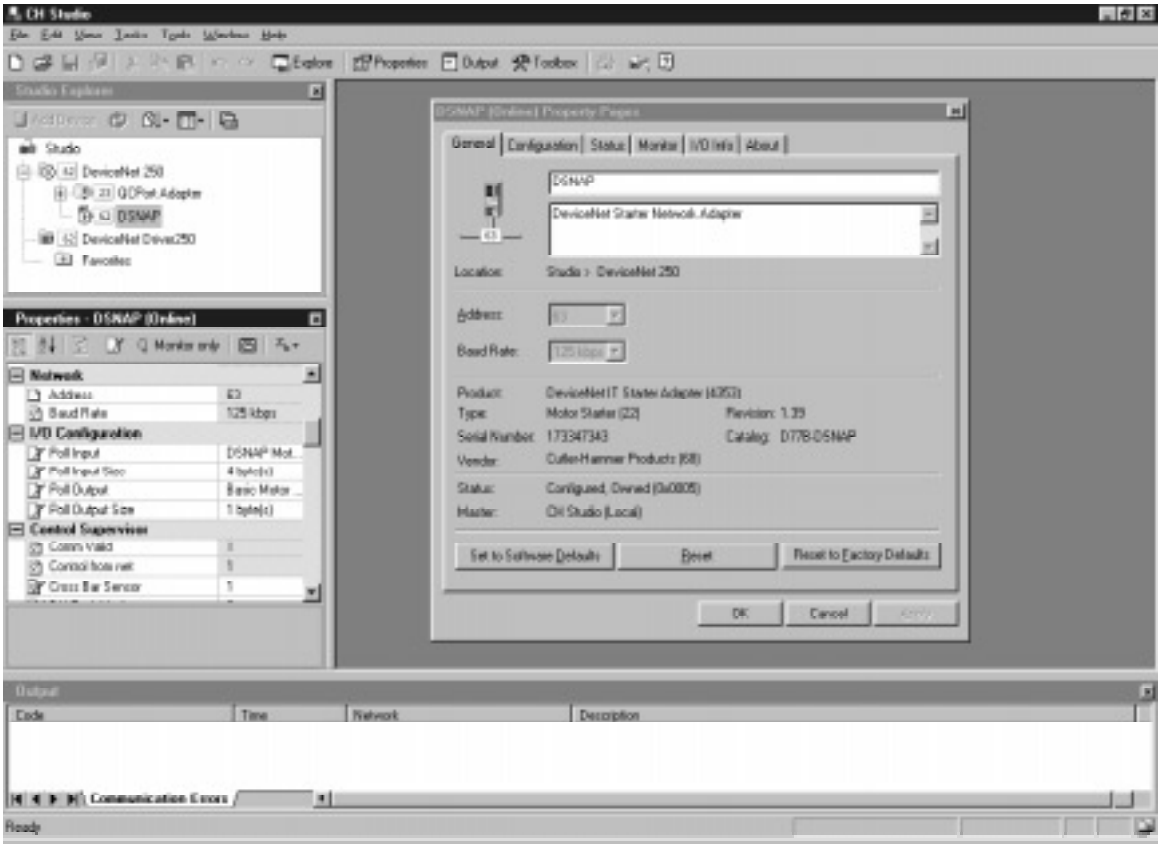
CH Studio takes advantage of the Windows graphical interface to present a suite of tools that is easy to learn and efficient to use, while meeting the requirements for developing complex network configurations.

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

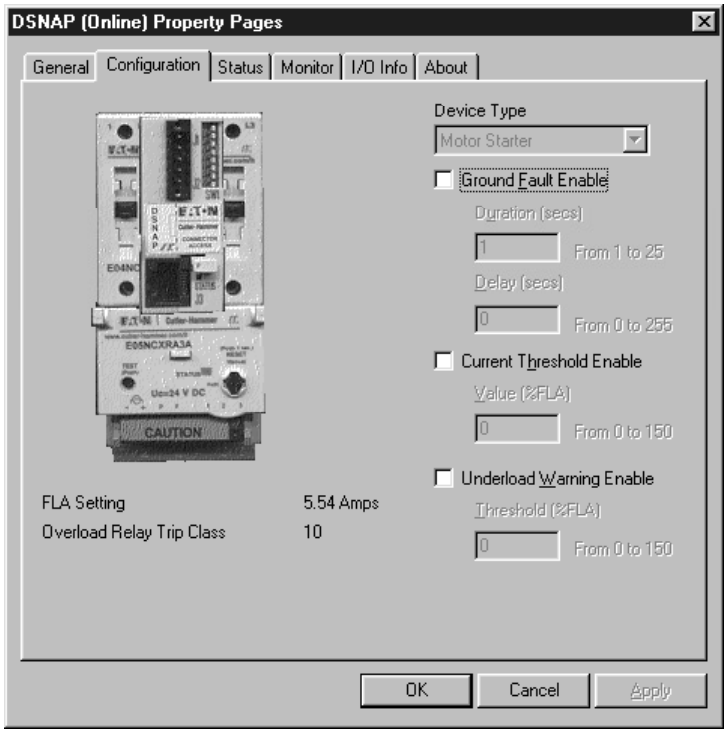
General Properties

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.



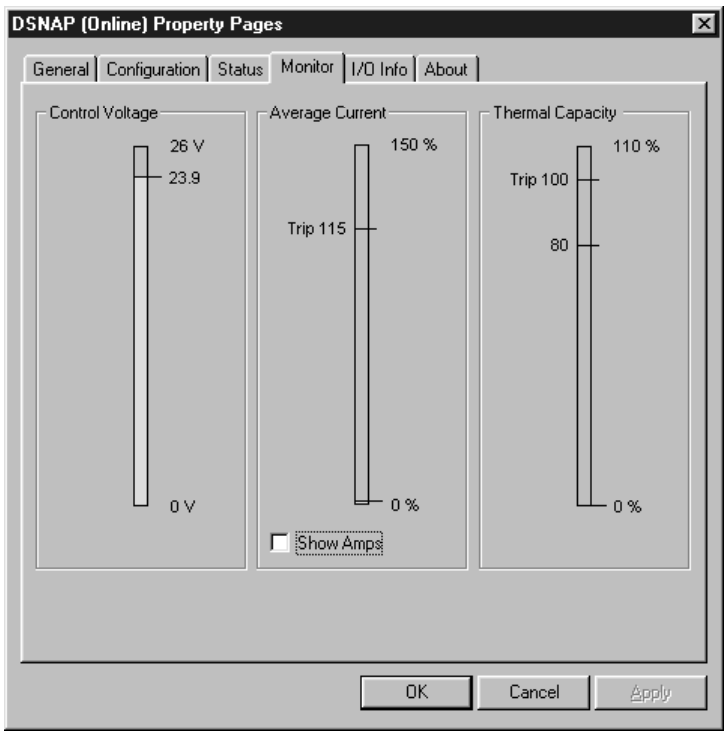
Configuring Enhanced Features

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 Property Window.



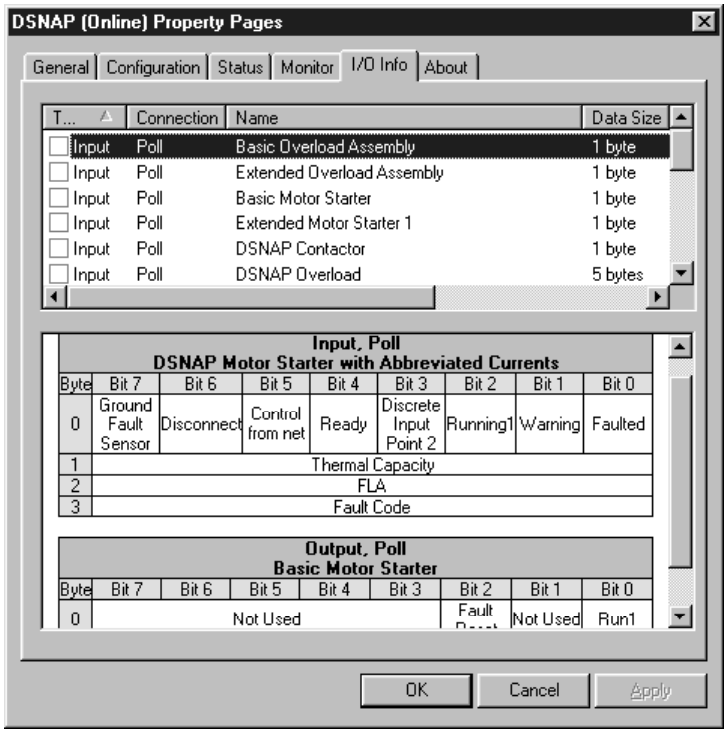
Monitor the D77B-DSNAP

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.



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.



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.cutler-hammer.eaton.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 Cutler-Hammer Web site:
   www.cutler-hammer.eaton.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. Using a DeviceNet configuration tool, perform a reset to the Identity Object, instance 1 data = 1.

Troubleshooting and Maintenance

Renewal Parts

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

Table 23: D77B-DSNAP Renewal Parts

Description	Catalog Number
SNAP Jumper to terminal adapter	D77B-RJJ1
D77B-DSNAP Assembly of terminal adapter, jumper and D77B-DSNAP	D77B-DSNAP-X1
D77B-DSNAP Assembly of terminal adapter, jumper, D77B-DSNAP and second contactor sensor	D77B-DSNAP-X2
DeviceNet Start Network Adapter Product	D77B-DSNAP
SNAP Terminal Adapter for FVR and FVNR starters and S751 Soft Start	D77B-TC8
Second contactor sensor for FVR starters and contactors	D77B-A2
Ground Fault Detector for 45 mm and 54 mm frame starters	D77B-GF1
Ground Fault Detector for 76 mm and 105 mm starters	D77B-GF2
Ground Fault Detector for 140 mm starters	D77B-GF3

Troubleshooting

Table 24: Troubleshooting

Observation	Possible Cause	Corrective Action
MS/NS LED flashing red after power-up	D77B-DSNAP is not communicating to the *IT.* 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 *IT.* Starter.
	The D77B-DSNAP was configured or "married" to another *IT.* Starter	Perform a reset (Appendix A **Page 30**) to re-marry the D77B-DSNAP to the *IT.* Starter.
	The D77B-DSNAP is powered but the *IT.* Starter is not	Power the *IT.* 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 *IT.* 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 *IT.* Starter.
IT. Starter will not energize	*IT.* Starter is not powered	Verify that the *IT.* Starter has 24V DC on the + and - of the terminal block, the Power LED should be green on the D77B-TC8 terminal adapter.
	IT. 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 27** 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 *IT.* Starter is powered and perform a Reset to Out of Box (Appendix A, **Page 30**).
	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 D77B-A2 and the D77B-DSNAP is faulty.	Verify all connections on the D77B-A2 and the D77B-DSNAP. Verify that the D77B-A2 is properly connected to the second contactor.

Appendix A: Supported DeviceNet Objects

DeviceNet Objects

Table 25: Supported Objects

Object	Object ID	Page
Identity	0x01	**Page 31**
DeviceNet	0x03	**Page 31**
DeviceNet Connection	0x05	**Page 32**
Discrete Input Point	0x08	**Page 33**
Motor Data	0x28	**Page 34**
Motor Control Supervisor	0x29	**Page 35**
Overload	0x2C	**Page 37**
Soft Start	0x2D	**Page 38**
Supported DeviceNet I/O Assemblies		**Page 39**

Table 26: 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

Table 27: Identity Object 0x01

Attribute	Access	Data Type	Name	Value
Instance 1				
01	Get	UINT	Vendor Id	68 [0x44] = Cutler-Hammer
02	Get	UINT	Device Type	12 [0x0C] = Communication Adapter 22 [0x16] = Motor Starter 23 [0x17] = Soft Starter
03	Get	UINT	Product Code	4353 [0x1101] DSNAP, FVNR or S751 4354 [0x1102] DSNAP, FVR or two speed
04	Get	ARRAY	Revision	Byte 0 = Major Revision Byte 1 = Minor Revision
06	Get	UDINT	Serial Number	Serial Number of D77B-DSNAP
09	Get	UINT	Configuration Consistency Value	CRC on configuration values
176	Set	SHORT STRING	User Label or Tag Name	A user established ASCII string of 16 characters or less
177	Get	USINT	Fault Value	Same as Atrribute 13 of the Control Supervisor (0x29) Object — Instance 1
Instance 2 (Overload)/Instance 3 (S751)				
03	Get	UINT	Product Code	XY 11
				X (Motor Controller) / Y (Frame Size)
				3 = *IT.* Starter 6 = S751 / 1 = 27 mm 2 = 45 mm 3 = 54 mm 4 = 76 mm 5 = 105 mm 6 = 140 mm
04	Get	ARRAY	Revision	Byte 0 = Major Revision Byte 1 = Minor Revision
06	Get	UDINT	Serial Number	Serial Number of connected device

Table 28: DeviceNet Object 0x03 — Instance 1

Attribute	Access	Data Type	Name	Value
1	Get	USINT	MAC ID	0 – 63
2	Get	USINT	Baud Rate	0 = 125K 1 = 250K 2 = 500K
3	Get	BOOL	BOI	
4	Get	USINT	Bus Off Counter	0 – 255
8	Get	USINT	MAC ID Switch	
9	Get	USINT	Baud Rate Switch	

Table 29: Connection Object 0x05 — Instance 1 (Explicit Connection)

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

Table 30: Connection Object 0x05 — Instance 2 (I/O Message)

Attribute	Access	Data Type	Name	Value
1	Get	USINT	State	0 = nonexistent 1 = configured 3 = established 4 = timed out
2	Get	USINT	Instance Type	1 = I/O Message
3	Get	BYTE	Transport Class Trigger	131 [0x83]
4	Get	UINT	Produced Connection Id	01111[MAC ID]
5	Get	UINT	Consumed Connection Id	10[MAC ID]101
6	Get	BYTE	Initial Comm Characteristics	1 [0x01]
7	Get	UINT	Produced Connection Size	1 – 7
8	Get	UINT	Consumed Connection Size	1
9	Get	UINT	Expected Packet Rate	Timer Resolution of 10 mSec.
12	Get	USINT	Watchdog Timeout Action	1 = Auto Delete
14	Get/Set	EPATH	Produced Connection Path	20 04 24 XX 30 03 XX = Instance
16	Get/Set	EPATH	Consumed Connection Path	20 04 24 XX 30 03 XX = Instance
100	Get/Set	USINT	Production ID (Input Assembly)	See DeviceNet I/O Assemblies, **Page 39**
101	Get/Set	USINT	Consumption ID (Output Assembly)	See DeviceNet I/O Assemblies, **Page 39**

Table 31: Discrete Input Object 0x08

Attribute	Access	Data Type	Name	Value
Instance 1 (Primary Contact Block Detect)				
3	Get	BOOL	Data	0 = Off 1 = On
Instance 2 (Secondary Contact Block Detect)				
3	Get	BOOL	Data	0 = Off 1 = On
Instance 3 (Ground Fault Detect)				
3	Get	BOOL	Data	0 = Off 1 = On

Table 32: Motor Data Object 0x28 — Instance 1

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

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

Table 33: Control Supervisor Object 0x29 — Instance 1

Attribute	Access	Data Type	Name	Value
3	Set	BOOL	Run 1	0 = False
4	Set	BOOL	Run 2	0 = False
5	Set	BOOL	Net Control	0 = Local Control 1 = Network Control
7	Get	BOOL	Running 1	0 = Other State 1 = Enabled and Run 1
8	Get	BOOL	Running 2	0 = Other State 1 = Enabled and Run 2
9	Get	BOOL	Ready	0 = Other State 1 = Ready or Enabled or Stopping
10	Get	BOOL	Faulted	0 = No Faults 1 = Fault Occurred
11	Get	BOOL	Warning	0 = No Warning 1 = Warning
12	Set	BOOL	Fault Reset	0 > 1 = Fault Reset 0 = No Action
13	Get	UINT	Fault Code	0 = No Fault 10 = Test 20 = Current Trip 21 = Thermal Overload 22 = Phase Loss 26 = Phase Imbalance 27 = Ground Fault 41 = Control Undervoltage 62 = Memory Fault 63 = Hardware Link Fault 64 = No Device Power 71 = Fail to Close Primary Contactor 72 = Fail to Open Primary Contactor 101 = Invalid Attached Device Version 102 = SCR Overt Temperature 103 = Watchdog 104 = SNAP Protocol Failure to Connect 105 = SNAP Protocol fault 106 = Temperature Sensor Fault 171 = Fail to Close Second Contactor 172 = Fail to Open Second Contactor 173 = Invalid Action Attempted
14	Get	UINT	Warning Code	0 = No Warning 29 = Underload 41 = Control Undervoltage 71 = Fail to Close Primary Contactor 72 = Fail to Open Primary Contactor 104 = SNAP Protocol Failure to Connect 171 = Fail to Close Second Contactor 172 = Fail to Open Second Contactor

Table 32: Control Supervisor Object 0x29 — Instance 1 (Continued)

Attribute	Access	Data Type	Name	Value
16	Set	USINT	DeviceNet Fault Mode (See Warning)	0 = Fault + Stop 1 = Hold Last State 3 = Run 1 4 = Run 2
22	Get/Set	UDINT	Cycle Count	Number of times the motor has been started
101	Get	DWORD	Local Signals	Byte0 (Consuming Assemble Data) Bit 0 = Run1 Bit 1 = Run2 Bit 3 = Fault Reset Bit 5 = Control From Net Byte1 (N/A) Byte2 (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 Byte3 (N/A)
110	Get/Set	USINT	Number of Contactors	1 = 1 Contactor (FVNR) 2 = 2 Contactor (FVR)
111	Get/Set	BOOL	Communication Valid	0 = Starter Communication Fault 1 = Valid Starter Communication
114	Get/Set	BOOL	Net Select	0 = Control is Local 1 = Control is From Network
115	Get/Set	BOOL	CB Sensor	0 = Disable Crossbar Sensor detect 1 = Enable Crossbar Sensor detect

⚠ 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 34: Overload Object 0x2C — Instance 1

Attribute	Access	Data Type	Name	Value
3	Get	INT	Trip Class Setting	Setting of the overloads FLA attribute = (INT)*(0.1 Amps)/2^CS
4	Get	USINT	Trip Class	0 – 200
5	Get	INT	Average of 3 Phase Current	Average Current of 3 Phase (RMS) = (INT)*(0.1 Amps)/2^CS
7	Get	USINT	%Thermal Capacity	0 – 100%
12	Get	SINT	Current Scale (CS)	Current Scaling Factor Scaled Current = (INT)*(0.1 Amps)/2^CS
103	Get/Set	BOOL	Ground Fault Enable	0 = Disabled (default) 1 = Enabled
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
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
107	Get	BOOL	Ground Fault	0 = No ground fault 1 = Ground fault
108	Get	BOOL	Current Threshold Enable	0 = Disabled (default) 1 = Enabled
109	Get/Set	USINT	Current Threshold Percent	% of FLA setting to set current threshold 0 – 255%
110	Get	BOOL	Current Threshold Warning	0 = No Warning (default) 1 = Warning
111	Get/Set	BOOL	Underload Enable	0 = Disabled (default) 1 = Enabled
112	Get/Set	USINT	Underload Percent	% of FLA setting to set underload 0 – 255%
113	Get	BOOL	Underload Warning	0 = No Warning (default) 1 = Warning
114	Get	UINT	Starter 24V DC Value	Value of 24V DC connected to the starter 235 = 23.5V DC
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
116	Get	BOOL	Impending Trip Warning	0 = current < 115% FLA 1 = current > 115% FLA
117	Get	USINT	%FLA	% Running Current divided by the FLA setting on the overload (0 – 255%)
121	Get	UDINT	Max FLA	Amps 256

Table 35: Soft Start Object 0x2D — Instance 1

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

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 36: 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)	52, 53, 54, 102, 103, 105, 106*, 108, 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 37: 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 38: 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 39: 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 40: 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 41: Assembly 52 (0x34) — Basic Motor Starter

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

Table 42: Assembly 53 (0x35) — Extended Motor Starter 1

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

Table 43: Assembly 54 (0x36) — Extended Motor Starter 2

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

Table 44: 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	Reserved	Reserved	Reserved	Reserved	Running1	Reserved	Fault

Table 45: 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	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	% FLA							

Table 46: 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	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	Average Current (Low byte)							
3	Average Current (High byte)							
4	% FLA							

Table 47: 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	Reserved	CtrlFrom Net	Ready	Reserved	Running1	Warn	Fault
1	% Thermal Capacity							
2	% FLA							
3	Fault Code (Low byte only)							

Table 48: 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	Reserved	CtrlFrom Net	Ready	Running2	Running1	Warn	Fault
1	% Thermal Capacity							
2	% FLA							
3	Last Fault Code (Low byte only)							

Table 49: 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	Reserved	CtrlFrom Net	Ready	Reserved	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 50: 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	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 51: 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	Reserved	Ctrl From Net	Ready	Running2	Running1	Warning	Fault

Table 52: Input Definitions

Data	Description
Fault/Trip	The motor controller is faulted or tripped **Note:** A "Faulted" M.C. 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 D77B-AC2 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 and Warning Codes	Code for the fault of the motor controller. Valid fault and warning codes are: 0 = No Fault 10 = Test 20 = Current Trip 21 = Thermal Overload 22 = Phase Loss 26 = Phase Imbalance 27 = Ground Fault 41 = Control Undervoltage 62 = Memory Fault 63 = Hardware Link Fault (Not Communicating with Starter) 64 = No Device Power 71 = Fail to Close Primary Contactor 72 = Fail to Open Primary Contactor 101 = Invalid Attached Device Version 102 = SCR Over Temperature 103 = Watchdog 104 = SNAP Protocol Failure to Connect 105 = SNAP Protocol Fault 106 = Temperature Sensor Fault 171 = Fail to Close Second Contactor 172 = Fail to Open Second Contactor 173 = Invalid Action Attempted

DeviceNet Output Assemblies

Table 53: 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 54: 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 55: Output Definitions

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

IT. Publications and Support

Table 56: *IT.* Publications

Publication	Description
MN05002001E	***IT.*** D77A I/O Module Products Installation and Users Manual
MN05001002E	***IT.*** QCPort System Install and Planning Guide
MN05001001E	***IT.*** QCPort Starter Network Adapter Product (QSNAP) Installation and Users Manual
MN05004001E	***IT.*** DeviceNet Starter Network Adapter Product (D77B-DSNAP) Installation and Users Manual
MN05004002E	***IT.*** DeviceNet Adapter Installation and User 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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