ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Hitachi SJ100-007NFU* at our website: *Click HERE*

SJ100DN DeviceNet™ Series Inverters

Addendum to SJ100 Series Inverter Instruction Manual

In This Addendum.... page

— Getting Started 3
— Inverter Mounting and Installation 9
— Configuring Drive Parameters 27
— Operations and Monitoring 32
— Network Control and Monitoring 39
— Troubleshooting and Maintenance 70

In the Appendices:

— DeviceNet Object Lists 71
— Network Register Map 78
— Drive Parameter Settings Tables 91
— Restoring Factory Default Settings 99

READ THIS FIRST!

Addendum Number: NB643X
Addendum for Manual: NB585X

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Revisions

Revision History Table

No.	Revision Comments	Date of Issue	Addendum No.
	Initial Release of Addendum NB643X	Jan. 2003	NB643X

DeviceNet™ is a trademark of Open DeviceNet Vendor Association, Inc.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Getting Started

This section provides specification details for SJ100DN DeviceNet™ Series inverters corresponding to Chapter 1, “Getting Started,” in the SJ100 Inverter Instruction Manual.

Main Features

Congratulations on your purchase of a Hitachi SJ100DN DeviceNet Series inverter! Like the standard SJ100 Series inverters, this inverter drive features state-of-the-art circuitry and components, exceptionally small footprint, and high performance. The Hitachi SJ100DN product line includes all the horsepower and power input versions, but each inverter can also connect to a DeviceNet network for control and monitoring. The main features are:



Model SJ100DN–004NFU2

- 200V and 400V Class inverters
- UL or CE version available
- Sensorless vector control
- Regenerative braking circuit
- Convenient keypad for parameter settings
- Built-in DeviceNet network interface to allow control and monitoring via a DeviceNet network
- Sixteen programmable speed levels
- Three-wire control interface
- Up/Down electronic motorized speed pot function
- Motor constants are programmable, or may be set via auto-tuning

The design in Hitachi inverters overcomes many of the traditional trade-offs between speed, torque and efficiency. The performance characteristics are:

- High starting torque of 200% rating or greater
- Continuous operation at 100% torque within a 1:10 speed range (6/60 Hz / 5/50 Hz) without motor derating
- Fan has ON/OFF selection to provide longer life for cooling fan (on models with fan)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Comparison Summary, Standard vs. DeviceNet Series

The Hitachi SJ100DN DeviceNet Series inverters generally have the same motor control capability as the standard SJ100 inverters. However, a few important differences do exist. The addition of DeviceNet network connectivity to Hitachi inverters is accompanied by some changes to the available parameters, functions, front panel keypad, and intelligent terminals. Together, these changes provide a complete inverter solution with DeviceNet network capability, while removing some features that are generally unused in networked applications.

Feature	SJ100 (standard)	SJ100DN (DeviceNet)
Front panel speed control	Potentiometer, output freq.	—
Front panel LEDs for networking	—	MS – Module Status LED, NS – Network Status LED
Front panel door	Half door for programming keys and control terminals	—
Analog input terminals	[H], [O], [OI], [L]	—
PWM output terminal	[FM]	—
Intelligent input terminals	[1], [2], [3], [4], [5], [6]	[1], [2], [3] only
Intelligent input functions	Includes [AT]	Includes [STA], [STP], [F/R], [DNT], [OPE]
Intelligent output terminals	[11], [12], [AL0] to [AL2]	[11], [12] only
Intelligent output functions	Includes [OD]	—
Digital operator configuration	B_89	—
Network connector on front panel	RS422 or RJ11 modular	DeviceNet on Phoenix 5-terminal conn., male
Network connector for cable	—	DeviceNet on removable Phoenix 5-terminal conn., female
DeviceNet network settings	—	P_41to P_49
Frequency source selection	A_01 (selects potentiometer, control terminal, or F_01)	A_01 does not exist, so freq. source is always F_01 or the DeviceNet network host
Analog input settings	A_11 to A_16, B_81, C_81, C_82	—
Analog output settings	C_23	—
PID control settings	D_04, A_71 to A_76, C_44	—
Intelligent input terminal settings for [4] to [6]	C_04, C_05, C_06, C_14, C_15, C_16	—
Intelligent output terminal settings for [AL0] to [AL2]	C_24, C_33	—

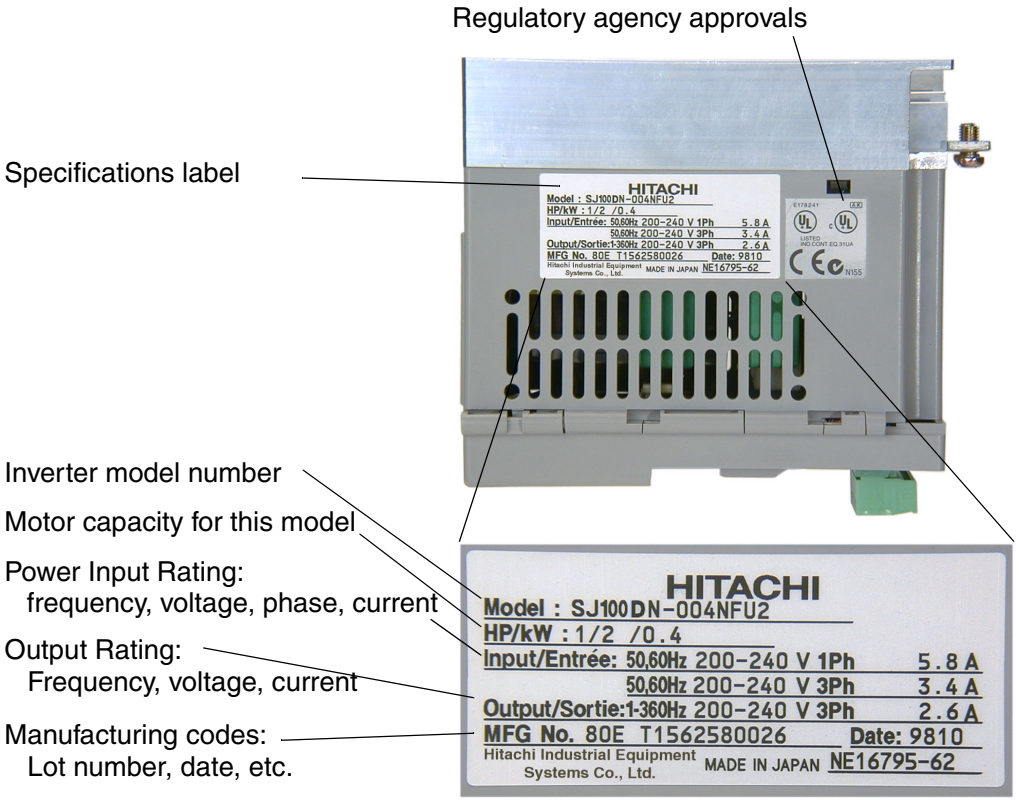


TIP: When using the standard SJ100 Series manual with your SJ100DN DeviceNet series inverter, refer to this page for a summary of the exceptions to that manual. Also note that your SJ100DN inverter comes with its own Quick Reference Guide (QRG).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

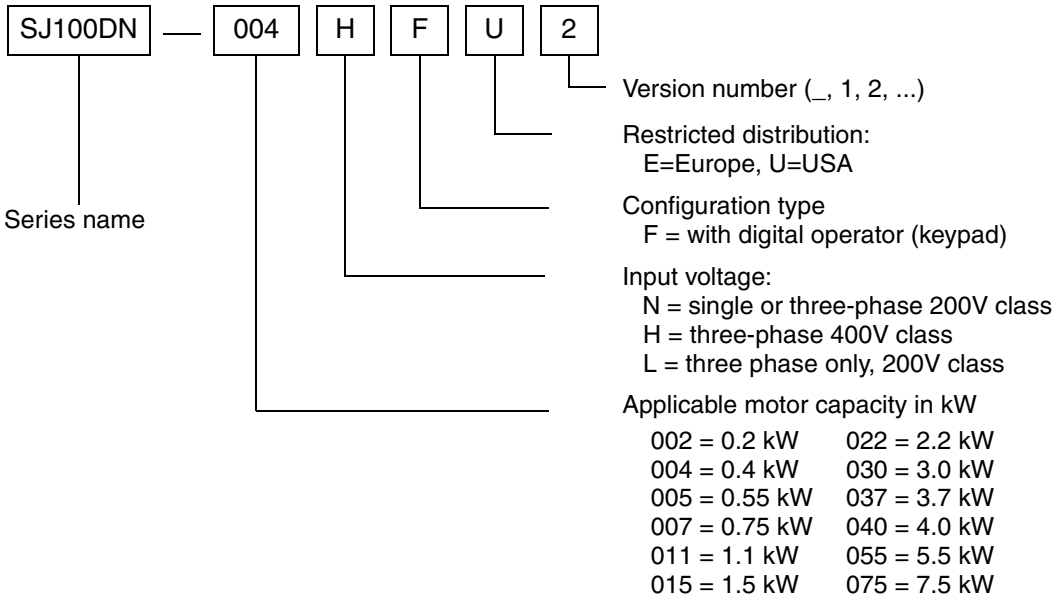
Inverter Specifications Label

The Hitachi SJ100DN Series inverters have product labels located on the right side of the housing, as pictured below. Be sure to verify that the specifications on the labels match your power source, motor, and application safety requirements.



Model Number Convention

The model number for a specific inverter contains useful information about its operating characteristics. Refer to the model number legend below:

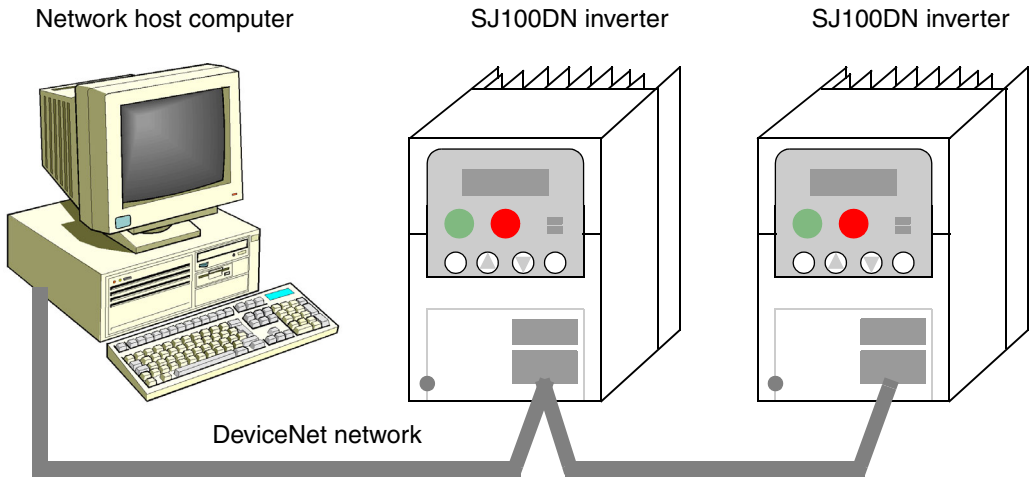


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DeviceNet Networking Overview

Hitachi SJ100DN DeviceNet Series inverters are optimized for use on a DeviceNet network. The inverter can respond to commands such as Run/Stop from a network host device, for example. SJ100DN inverters can also drive a motor in stand-alone mode, without a network connection. In that case, you use the inverter's keypad or input terminals for Run/Stop commands. However, this addendum will use stand-alone operation only for initial powerup tests of your SJ100DN inverter during installation. After the installation material, the addendum covers network operation in detail.

The diagram below shows SJ100DN inverters connected to a DeviceNet network. Each connection is called a node, and the SJ100DN connects to the network via the 5-pin, color-coded Phoenix connector on the front panel as shown.



A DeviceNet network supports up to 64 devices, each with their own node address. One device will be the network master; all other device(s) will be network slaves. The SJ100DN inverter will operate as a network slave, as the *network master* (also called *host computer*) will send commands to the slaves.

A factory network such as DeviceNet allows you to integrate devices of many different types, even from various manufacturers, all into an integrated control system. A common application that uses DeviceNet is a conveyor line. Typical devices on the network include a PLC (programmable logic controller) or host computer (such as a PC), inverter drives to run motors, proximity sensors, limit switches, diverter actuators, barcode scanners, label printers, and other packaging or shipping devices. Note that Hitachi also provides the L100DN DeviceNet Series inverters, which can also reside on the DeviceNet network.

For detailed DeviceNet network configuration instructions, see "Network Control and Monitoring" on page 39.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

General Specifications

SJ100DN DeviceNet Series inverters have the same electrical characteristics for driving the motor as the standard SJ100 inverters. So, refer to the SJ100 instruction manual for the electrical specifications tables and derating curves. The general specifications in this section will be similar to the those for the standard SJ100 inverters, but they reflect the differences given in “Comparison Summary, Standard vs. DeviceNet Series” on page 4. The following table applies to all SJ100DN DeviceNet Series inverters.

Item			General Specifications
Protective housing *1			IP20
Control method			Sine wave pulse-width modulation (PWM) control
Output frequency range *2			0.5 to 360 Hz
Frequency accuracy			Digital command: 0.01% of the maximum frequency
Frequency setting resolution			Digital: 0.1 Hz; DeviceNet: 0.01 Hz
Volt./Freq. characteristic *3			V/f optionally variable, V/f control (constant torque, reduced torque), sensorless vector control
Overload current rating			150%, 60 seconds
Acceleration/deceleration time			0.1 to 3000 sec., (linear accel/decel), second accel/decel setting available
Input signal	Freq. setting	Operator panel	Up and Down keys / Value settings
		Network	DeviceNet polled I/O – continuous update of output frequency
	FWD/ REV Run	Operator panel	Run/Stop (Forward/Reverse run change by command)
		External signal	Forward run/stop, Reverse run/stop (on intelligent terminals)
		Network	Forward run/stop, Reverse run/stop
	Intelligent input terminal		FW (forward run command), RV (reverse run command), CF1~CF4 (multi-stage speed setting), JG (jog command), 2CH (2-stage accel./ decel. command), FRS (free run stop command), EXT (external trip), USP (startup function), SFT (soft lock), RS (reset), PTC (thermal protection), DB (external DC braking command), SET (2nd setting selection), STA (start, 3-wire interface), STP (stop, 3-wire interface), F/R (FW/RV, 3-wire interface), DNT (DeviceNet select), UP (remote control accel.), DWN (remote control decel.), OPE (Force Operation from Digital Operator)
Output signal	Intelligent output terminal		RUN (run status signal), FA1,2 (frequency arrival signal), OL (overload advance notice signal), AL (alarm signal)
Other functions			AVR function, curved accel/decel profile, upper and lower limiters, 16-stage speed profile, fine adjustment of start frequency, carrier frequency change (0.5 to 16 kHz) frequency jump, gain and bias setting, process jogging, electronic thermal level adjustment, retry function, trip history monitor, 2nd setting selection, auto tuning, fan ON/OFF selection
Protective function			Over-current, over-voltage, under-voltage, overload, extreme high/ low temperature, CPU error, memory error, ground fault detection at startup, internal communication error, electronic thermal, CT error, DeviceNet comm. error

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Item		General Specifications
Operating Environment	Temperature	Operating (ambient): -10 to 50°C (*4) / Storage: -25 to 70°C (*5)
	Humidity	20 to 90% humidity (non-condensing)
	Vibration *6	5.9 m/s^2 (0.6G), 10 to 55 Hz
	Location	Altitude 1,000 m or less, indoors (no corrosive gasses or dust)
Coating color		Munsell 8.5YR6.2/0.2, cooling fins in base color of aluminum
Options		Braking unit, braking resistor, AC reactor, DC reactor, noise filter, DIN rail mounting

Note 1: The protection method conforms to JEM 1030.

Note 2: To operate the motor beyond 50/60 Hz, consult the motor manufacturer for the maximum allowable rotation speed.

Note 3: When SLV is selected, please set the carrier frequency higher than 2.1 kHz.

Note 4: If operating the inverter in an ambient temperature of 40–50◦ C, reduce the carrier frequency to 2.1 kHz, derate the output current by 80%, and remove the top housing cover. Note that removing the top cover will nullify the NEMA rating for the inverter housing.

Note 5: The storage temperature refers to the short-term temperature during transport.

Note 6: Conforms to the test method specified in JIS C0911 (1984). For the model types excluded in the standard specifications, contact your Hitachi sales representative.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Mounting and Installation

This section describes the SJ100 Series installation corresponding to Chapter 2, "Inverter Mounting and Installation," in the SJ100 Inverter Instruction Manual.

Orientation to Inverter Features

Please take a few moments to unpack your new SJ100DN inverter and do these steps:

1. Look for any damage that may have occurred during shipping.
2. Verify the contents of the box include:
   a. One SJ100DN inverter
   b. One Addendum for SJ100DN inverter (read this addendum first!)
   c. One SJ100 Instruction Manual
   d. One SJ100DN Quick Reference Guide
   e. One packet of desiccant—discard (not for human consumption)
3. Inspect the specifications label on the side of the inverter. Make sure it matches the product part number you ordered.

The SJ100DN DeviceNet Series inverters vary in size according to the current output rating and motor size for each model number. All feature the same basic keypad and connector interface for consistent ease of use. The inverter construction has a heat sink at the back of the housing. The larger models include a fan(s) to enhance heat sink performance. The mounting holes are pre-drilled in the heat sink for your convenience. Never touch the heat sink during or just after operation; it can be very hot.

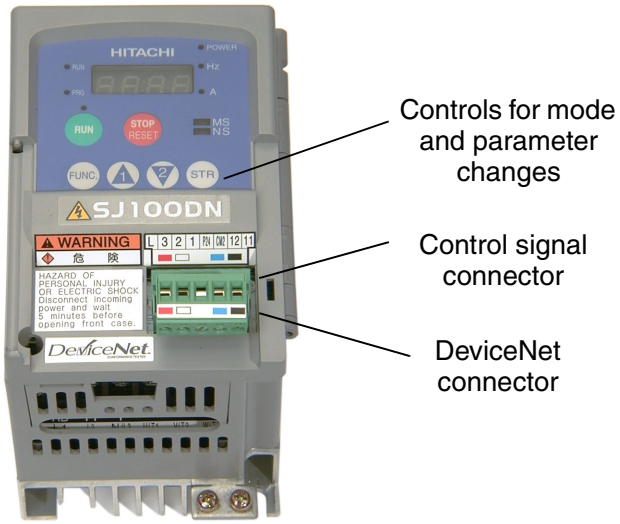
The electronics housing and front panel are built onto the front of the heat sink. The front panel has two levels of physical access designed for convenience and safety:

- **First-level access** – for basic use of inverter, editing parameters, and wiring control signals or network connection (power ON)
- **Second-level access** – for wiring the inverter power supply or motor (power OFF)

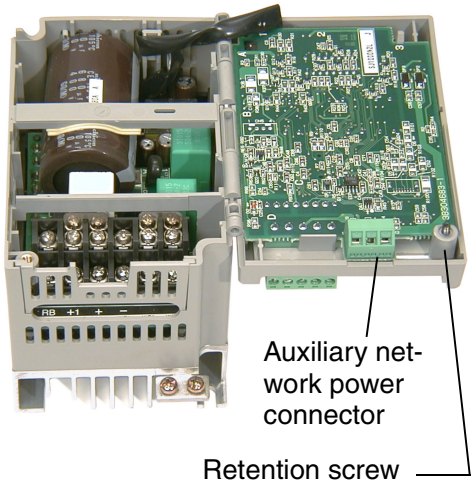
1. **First-level Access** – View the unit just as it came from the box as shown. The four-digit display can show a variety of performance parameters. LEDs indicate whether the display units are Hertz or Amperes. Other LEDs indicate AC Power (external), Run/Stop Mode, Program/Monitor Mode, Module Status, and Network status. Membrane keys Run and Stop/Reset control motor operation. And, you can access the two chassis GND screws on the metal tab at the bottom of the inverter.



The FUNC., ⇧, ⇩, and STR keys allow an operator to access and change the inverter's functions and parameter values. The top 8-position connector provides the interface for logic-level control signals. The bottom 5-position connector is the DeviceNet interface. It comes with a removable connector for connecting to a DeviceNet cable. These signals are generally low-voltage in nature and are appropriate for first-level access.



2. **Second-level access** – First, ensure no power source of any kind is connected to the inverter. If power has been connected, wait five minutes after powerdown and verify the Power LED is OFF to proceed. Then locate the recessed retention screw on the left side main front panel (it is along the left hinge area on some models, or behind the first access door on others). Use a small screwdriver (Regular or Phillips) to loosen the screw. Swing the door around to the right to reveal the internal components of the drive. The two-level tiered 12-position terminal block accepts wires for the power input and wires to the motor.

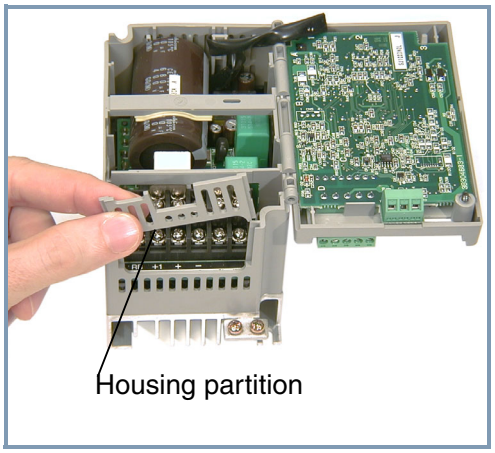


NOTE: The 3-terminal connector located on the circuit board behind the hinged front door can be used to connect DeviceNet network power. See "Step 2 – Connect Network Devices" on page 43 for more information.

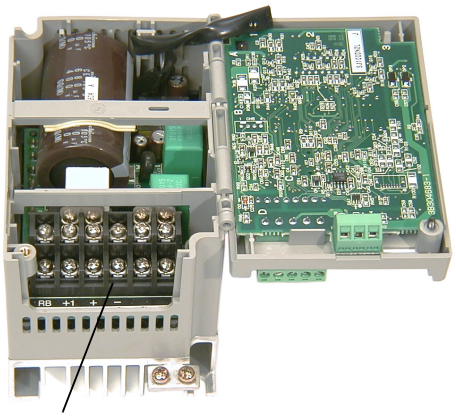
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notice the housing partition that lifts out to allow full access to the terminals for wiring as shown. Never operate the inverter drive with the partition removed or the full access door opened.

Never directly touch any terminal or circuit component. This protects you from touching a n unexpected live circuit, and it protects the inverter from electrostatic discharge (ESD).



The power and motor connector terminals are accessible with the removal of the housing partition. The input power and motor connections use the lower row of terminals. The upper row is for connecting dynamic braking components.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

System Description and Basic Installation

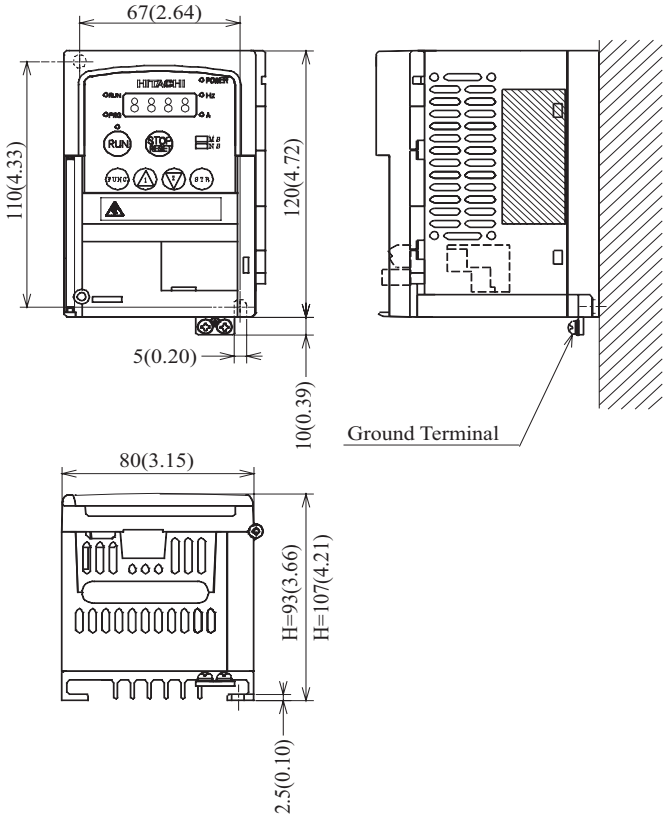
The Basic System Description and Step-by-Step Basic Installation sections in Chapter 2 of the standard SJ100 manual (included) will show you how to choose a mounting location and wire the inverter's power input and motor output terminals. Wire gauge, terminal torque specifications, fuse or breaker size, and many important Warning and Caution messages are included. So, all of the information you need to physically install your SJ100DN DeviceNet inverter is in the standard manual—with the exception of the dimension drawings, which follow below.

NOTE: After doing the basic installation (physical mounting and power wiring) per the instructions in Chapter 2 of the SJ100 manual, be sure to return to this addendum for the Powerup Test and Front Panel Keypad orientation.

Check Inverter Dimensions – Locate the applicable drawing on the following pages for your inverter.

Dimensions are given in millimeters (inches) format.

	MODEL	H mm (in.)
SJ100DN	-002NFE2	93 (3.66)
	-002NFU2	93 (3.66)
	-004NFE2	107 (4.21)
	-004NFU2	107 (4.21)
	-005NFE2	107 (4.21)

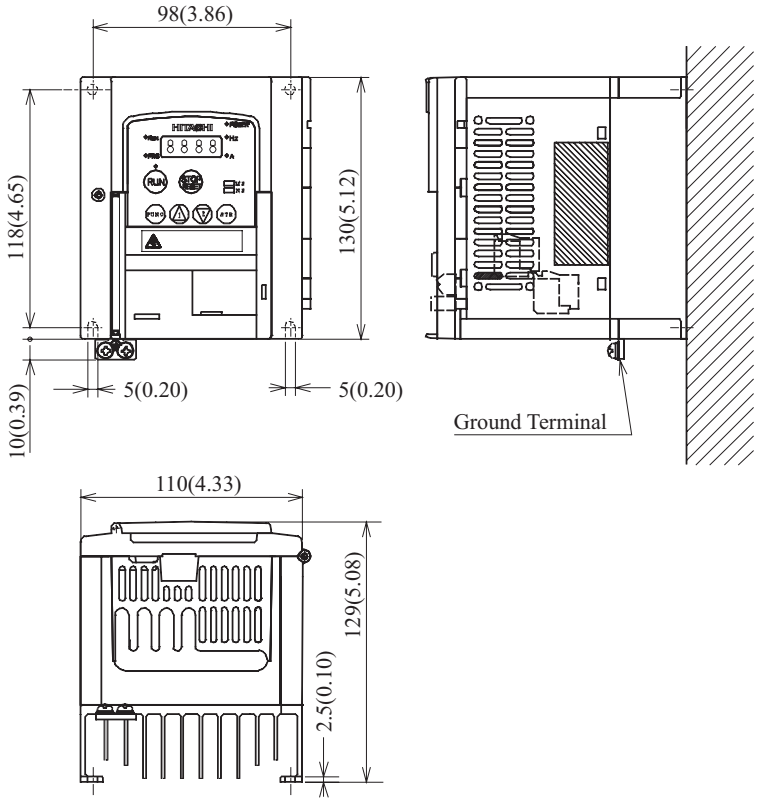


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

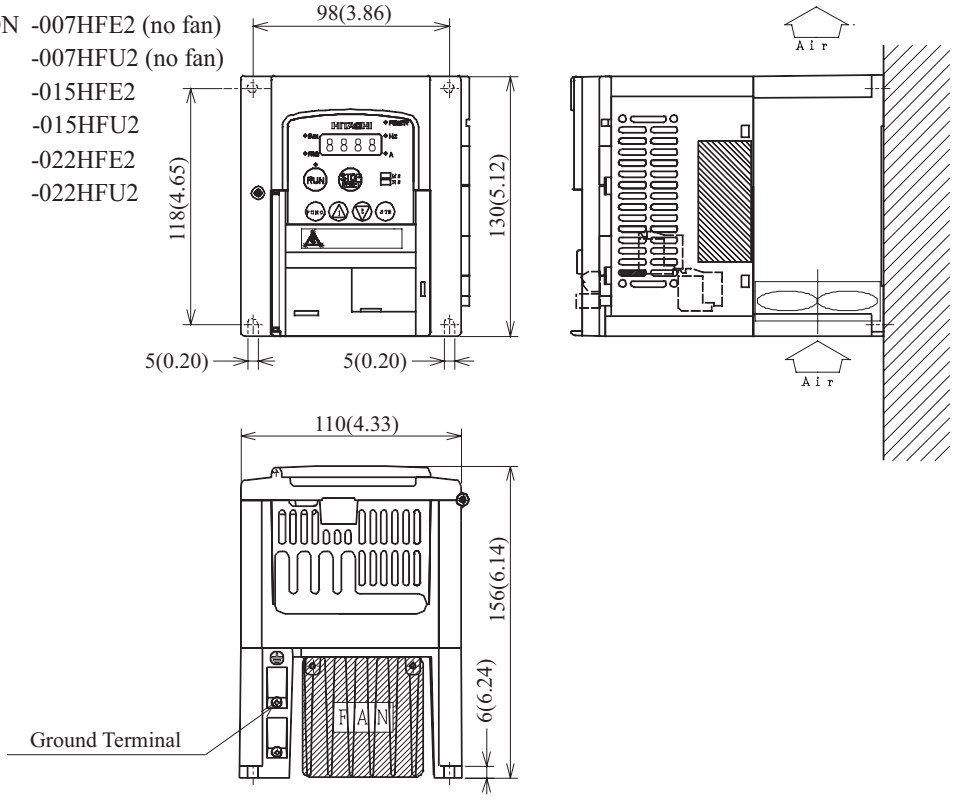
Dimensional drawings, continued...

MODEL

SJ100DN -004HFE2
-004HFU2
-007NFE2
-007NFU2
-011NFE2

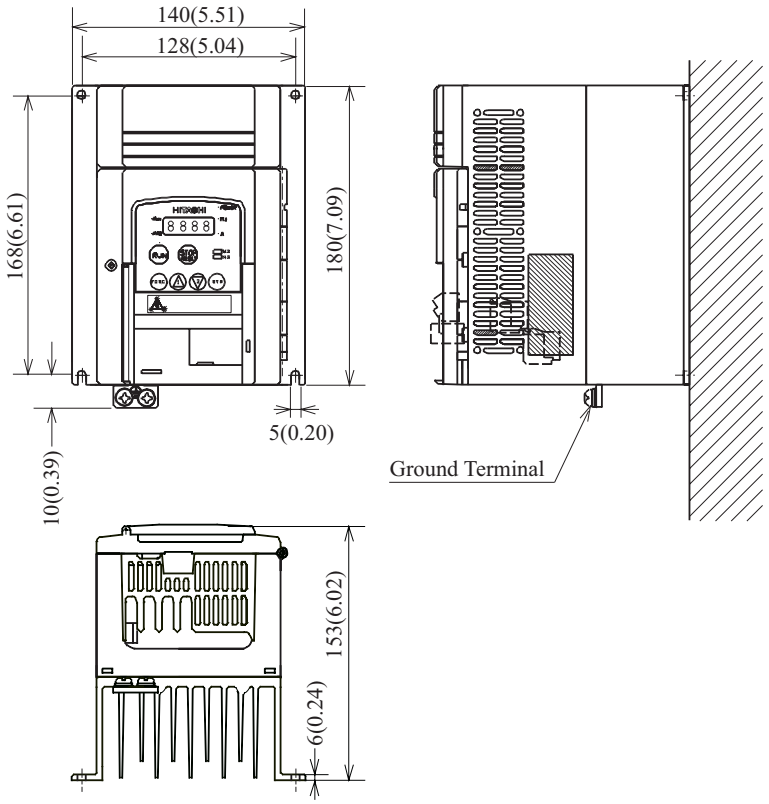


SJ100DN -007HFE2 (no fan)
-007HFU2 (no fan)
-015HFE2
-015HFU2
-022HFE2
-022HFU2

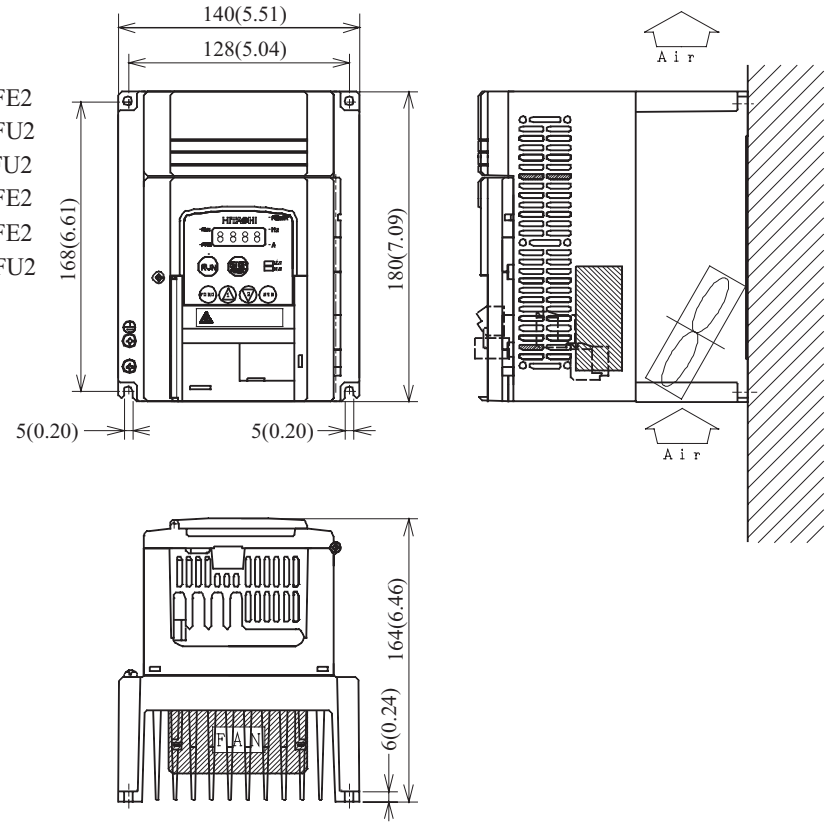


Dimensional drawings, continued...

SJ100DN -015NFE2
-015NFU2

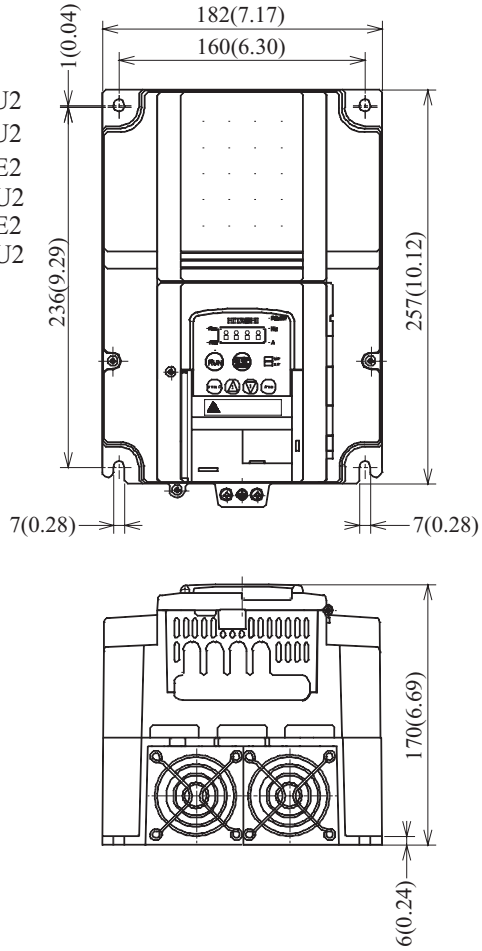


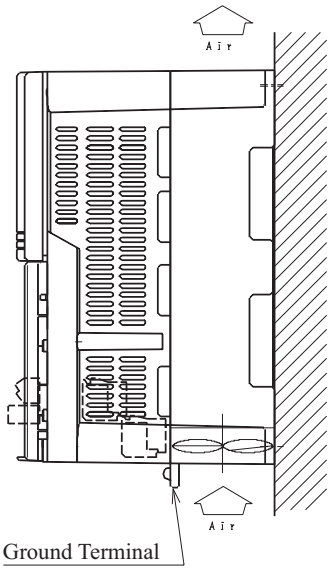
SJ100DN -022NFE2
-022NFU2
-037LFU2
-030HFE2
-040HFE2
-040HFU2



Dimensional drawings, continued...

SJ100DN -055LFU2
-075LFU2
-055HFE2
-055HFU2
-075HFE2
-075HFU2





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Powerup Test Overview

After wiring the inverter and motor, you're ready to do a powerup test. The procedure that follows is designed for the first-time use of the drive. Please verify the following conditions before conducting the powerup test:

- You have followed all the steps in this chapter up to this step.
- The inverter is new, and is securely mounted to a non-flammable vertical surface
- The inverter is connected to a power source and motor.
- No additional wiring of inverter connectors or terminals has been done.
- The power supply is reliable, and the motor is a known working unit, and the motor nameplate ratings match the inverter ratings.
- The motor is securely mounted, and is not connected to any load.

Goals for the Powerup test

If there are any exceptions to the above conditions at this step, please take a moment to take any measures necessary to reach this basic starting point. The specific goals of this powerup test are:

1. Verify that the wiring to the power supply and motor is correct.
2. Demonstrate that the inverter and motor are generally compatible.
3. Give a brief introduction to the use of the built-in operator keypad.

The powerup test gives you an important starting point to ensure a safe and successful application of the Hitachi inverter. We highly recommend performing this test before proceeding to the other chapters in this manual.

Pre-test and Operational Precautions

The following instructions apply to the powerup test, or to any time the inverter is powered and operating. Please study the following instructions and messages before proceeding with the powerup test.

1. The power supply must have fusing suitable for the load. Check the fuse size chart presented in the inverter manual in Chapter 2, if necessary.
2. Be sure you have access to a disconnect switch for the drive input power if necessary. However, do not turn OFF power during inverter operation unless it is an emergency.



CAUTION: The heat sink fins will have a high temperature. Be careful not to touch them. Otherwise, there is the danger of getting burned.



CAUTION: The operation of the inverter can be easily changed from low speed to high speed. Be sure to check the capability and limitations of the motor and machine before operating the inverter. Otherwise, there is the danger of injury.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CAUTION: If you operate a motor at a frequency higher than the inverter standard default setting (50Hz/60Hz), be sure to check the motor and machine specifications with the respective manufacturer. Only operate the motor at elevated frequencies after getting their approval. Otherwise, there is the danger of equipment damage and/or injury.

CAUTION: Check the following before and during the powerup test. Otherwise, there is the danger of equipment damage.

- Is the shorting bar between the [+1] and [+] terminals installed? DO NOT power or operate the inverter if the jumper is removed.
- Is the direction of the motor rotation correct?
- Did the inverter trip during acceleration or deceleration?
- Were the RPM and frequency meter readings as expected?
- Were there any abnormal motor vibrations or noise?

Powering the Inverter

If you have followed all the steps, cautions and warnings up to this point, you're ready to apply power. After doing so, the following events should occur:

- The *POWER* LED will illuminate.
- The numeric (7-segment) LEDs will display a test pattern, then stop at 0.0.
- The *Hz* LED will be ON. (This assumes the inverter is in Monitor Mode and is displaying D_01, the output frequency.)
- The MS (Module Status) and NS (Network Status) LEDs will exhibit a test pattern; each LED will briefly show green, then red. The ending state of powerup pattern is: MS = Green; NS = OFF.

If the motor starts running unexpectedly or any other problem occurs, press the *STOP* key. Only if necessary should you remove power to the inverter as a remedy.

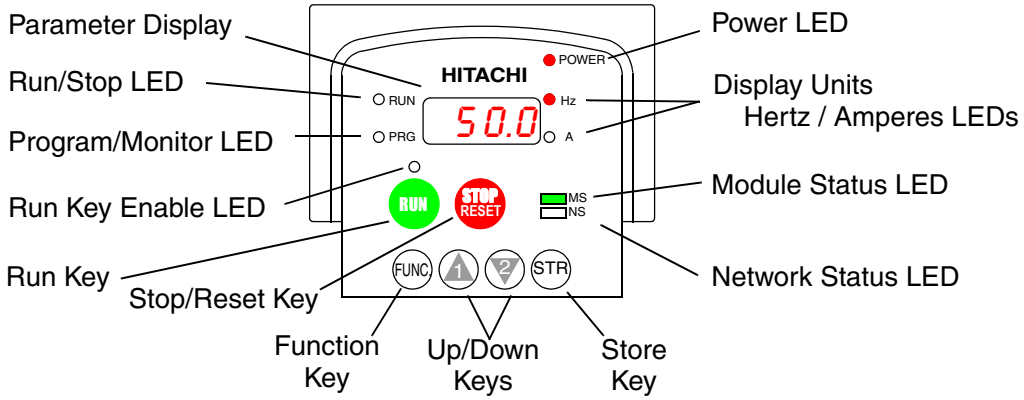
NOTE: If the inverter has been previously powered and programmed, the LEDs (other than the POWER LED) may illuminate differently than as indicated above. If necessary, you can initialize all parameters to the factory default settings. See "Restoring Factory Default Settings" on page 99 or refer to the SJ100DN Quick Reference Guide.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Using the Front Panel Keypad

Please take a moment to familiarize yourself with the keypad layout shown in the figure below. These are the visible controls and indicators when the front panel door is closed.

The display is used in programming the inverter's parameters, as well as monitoring specific parameter values during operation. Many functions are applicable only during the initial installation, while others are more useful for maintenance or monitoring.



- **Run/Stop LED** - ON when the inverter output is ON and the motor is developing torque (Run Mode), and OFF when the inverter output is OFF (Stop Mode).
- **Program/Monitor LED** - This LED is ON when the inverter is ready for parameter editing (Program Mode). It is OFF when the parameter display is monitoring data (Monitor Mode).
- **Run Key Enable LED** - is ON when the inverter is ready to respond to the Run key, OFF when the Run key is disabled.
- **Run Key** - Press this key to run the motor (the Run Enable LED must be ON first). Parameter F_04, Keypad Run Key Routing, determines whether the Run key generates a Run FWD or Run REV command.
- **Stop/Reset Key** - Press this key to stop the motor when it is running (uses the programmed deceleration rate). This key will also reset an alarm that has tripped.
- **Module Status LED** - ON (green) when the inverter has power. The Module Status LED may also be flashing and/or red in color. For a description of all LED states and their meanings, see the table in "Step 6 – Monitor Test – Verify Network Host Can Monitor Inverter" on page 51.
- **Network Status LED** - ON (green) when the inverter is connected to the network. The Network Status LED may also be flashing and/or red in color. For a description of all LED states and their meanings, see the table in "Step 6 – Monitor Test – Verify Network Host Can Monitor Inverter" on page 51.
- **Parameter Display** - A 4-digit, 7-segment display for parameters and function codes.
- **Display Units, Hertz/Amperes** - One of these LEDs will be ON to indicate the units associated with the parameter display.
- **Power LED** - This LED is ON when the power input to the inverter is ON.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- **Function Key** - This key is used to navigate through the lists of parameters and functions for setting and monitoring parameter values.
- **Up/Down (▲1, ▼2) Keys** - Use these keys alternately to move up or down the lists of parameter and functions shown in the display, and increment/decrement values.
- **Store (STR) Key** - When the unit is in Program Mode and you have edited a parameter value, press the Store key to write the new value to the EEPROM.

Keys, Modes, and Parameters

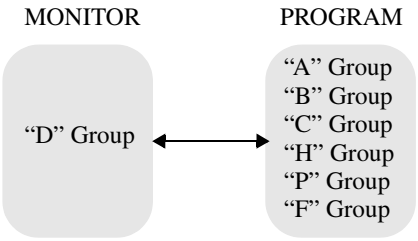
Purpose of the keypad is to provide a way to change modes and parameters. The term *function* applies to both monitoring modes and parameters. These are all accessible through *function codes* that are primarily 3-character codes. The various functions are separated into related groups identifiable by the left-most character, as the table shows.

Function Group	Type (Category) of Function	Mode to Access	PGM LED Indicator
"D"	Monitoring functions	Monitor	○
"F"	Main profile parameters	Program	●
"A"	Standard functions	Program	●
"B"	Fine tuning functions	Program	●
"C"	Intelligent terminal functions	Program	●
"H"	Motor constant functions	Program	●
"P"	DeviceNet network settings	Program	●
"E"	Error codes	—	—

For example, function "A_04" is the *base frequency setting* for the motor, typically 50 Hz or 60 Hz. To edit the parameter, the inverter must be in Program Mode (PGM LED will be ON). You use the front panel keys to first select the function code "A_04." After displaying the value for "A_04," use the Up/Down (▲1 or ▼2) keys to edit it.

NOTE: The inverter 7-segment display shows lower case "b" and "d," meaning the same as the upper case letters "B" and "D" used in this manual (for uniformity "A to F").

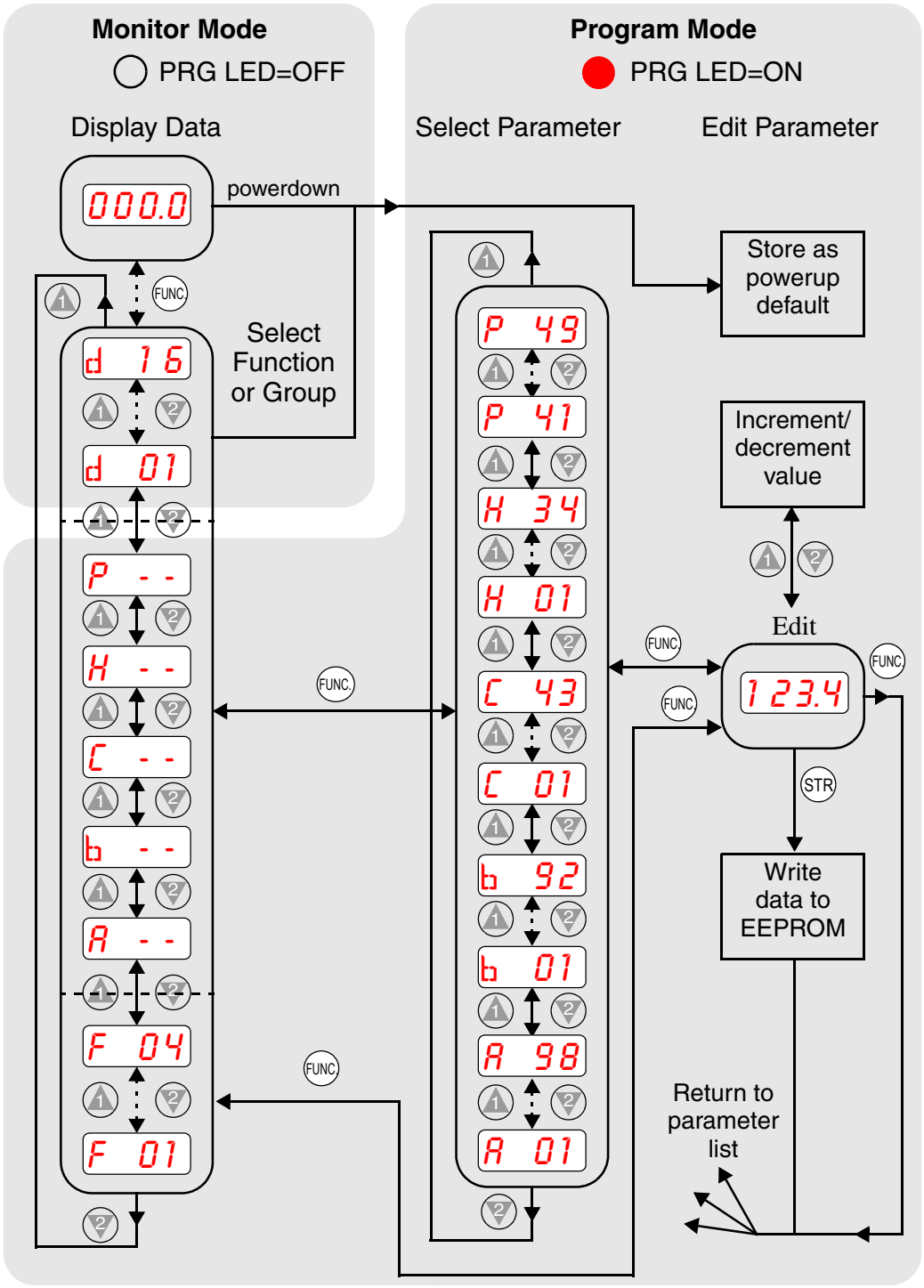
The inverter automatically switches into Monitor Mode when you access "D" Group functions. It switches into Program Mode when you access any other group, because they all have editable parameters. Error codes use the "E" Group, and appear automatically when a fault event occurs. Refer to Chapter 6 in the SJ100 inverter instruction manual for error code details.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Keypad Navigational Map

The SJ100DN Series inverter drives have many programmable functions and parameters. Chapter 3 in the manual will cover these in detail, but you need to access just a few items to perform the powerup test. The menu structure makes use of function codes and parameter codes to allow programming and monitoring with only a 4-digit display and a few keys and LEDs. So, it is important to become familiar with the basic navigational map of parameters and functions in the diagram below.



Selecting Functions and Editing Parameters

In order to run the motor for the powerup test, this section will show how to:

- select the inverter's maximum output frequency to the motor
- set the value of parameter F_01 to the output frequency for the powerup test
- select the keypad as the source of the RUN command
- set the number of poles for the motor

The following series of programming tables are designed for successive use. Each table uses the previous table's final state as the starting point. Therefore, start with the first and continue programming until the last one. If you get lost or concerned that some of the other parameters settings may be incorrect, refer to "Restoring Factory Default Settings" on page 99.



CAUTION: If you operate a motor at a frequency higher than the inverter standard default setting (50Hz/60Hz), be sure to check the motor and machine specifications with the respective manufacturer. Only operate the motor at elevated frequencies after getting their approval. Otherwise, there is the danger of equipment damage.

Setting the Motor Base Frequency – The motor is designed to operate at a specific AC frequency. Most commercial motors are designed for 50/60 Hz operation. First, check the motor specifications. Then follow the steps in the table below to verify the setting or correct for your motor. DO NOT set it for greater than 50/60 Hz unless the motor manufacturer specifically approves operation at the higher frequency.

Action	Display	Func./Parameter
Press the FUNC key.	d 01	Monitor functions
Press the 1 or 2 keys until ->	A --	"A" Group selected
Press the FUNC key.	A 02	First "A" parameter
Press the 1 key twice.	A 03	Base frequency setting
Press the FUNC key.	60 or 50	Default value for base frequency. US = 60 Hz, Europe = 50 Hz.
Press the 1 or 2 key as needed.	60	Set to your motor specs (your display may be different)
Press the STR key.	A 03	Stores parameter, returns to "A" Group list



TIP: If you need to scroll through a function or parameter list, press and hold the 1 or 2 key to auto-increment through the list.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Select the Keypad for the RUN Command – The RUN command causes the inverter to accelerate the motor to the selected speed. For local (non-network) inverter control, you can program the inverter to respond to either the control terminal signal (default) or the keypad RUN key. Follow the steps in the table below to select the front panel RUN key as the source for the RUN Command (the table resumes action from the end of the previous table).

Action	Display	Func./Parameter
Press the ▼ key.	A 02	Run command source
Press the FUNC key.	01	1 = control terminals (default) 2 = keypad
Press the ▲ key.	02	2 = keypad (selected)
Press the STR key.	A 02	Stores parameter, returns to "A" Group list



NOTE: When you press the STR key in the last step above (and the display = 02), the Run Key Enable LED above the RUN key on the keypad will turn ON. This is normal, and does not mean the motor is trying to run. It means that the RUN key is now enabled. DO NOT press the RUN key at this time—finish out the programming exercise first.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Set the Output Frequency – Note that the standard SJ100 Series inverter uses parameter A_01 Frequency Source Setting to select from sources that include a front panel potentiometer and input terminals. In contrast, the SJ100DN DeviceNet inverter is optimized for network control and does not have these two alternate frequency sources. Therefore, the SJ100DN does not need (or have) parameter A_01. The default frequency source for the SJ100DN is setting F_01 Output Frequency Setting. The frequency setting works in the following way:

- Operator (local) Control – When using the inverter's front panel Run and Stop keys to control the motor, the inverter uses parameter F_01 Output Frequency Setting.
- Network Control – When the inverter is under network control, Run and Stop commands typically arrive via the network. In this case, you have the additional option of using the inverter's parameters (includes F_01 Output Frequency Setting), or the network host device can send the output frequency setting via the network upon each network scan. More details are in "Network Control and Monitoring" on page 39.

This step in the powerup test will set F_01 Output Frequency Setting to 15Hz.

CAUTION: Be sure to set F_01 Output Frequency Setting to a safe value for your motor and application. The step below only uses 15Hz as an example.

Action	Display	Func./Parameter
Press the FUNC key.	A - -	"A" Group List
Press the 2 key six times until ->	F 01	Output frequency setting
Press the FUNC key.	0.0	Default output frequency
Press and hold the 1 key until ->. Use the 2 key also as necessary.	15.0	Set to 15.0 Hz, or a safe level (motor speed) for your application.
Press the FUNC key.	F 01	Stores parameter, returns to "F" Group list

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Configure the Inverter for the Number of Motor Poles – The number of magnetic poles of a motor is determined by the motor's internal winding arrangement. The specifications label on the motor usually indicates its number of poles. For proper operation, verify the parameter setting matches the motor poles. Many industrial motors have four poles, corresponding to the default setting in the inverter.

Follow the steps in the table below to verify the motor poles setting and change it if necessary (the table resumes action from the end of the previous table.

Action	Display	Func./Parameter
Press the FUNC key.	A - -	"A" Group selected
Press the ▲1 key three times.	H - -	"H" Group selected
Press the FUNC key.	H 01	First "H" parameter
Press the ▲1 key three times.	H 04	Motor poles parameter
Press the FUNC key.	4	2 = 2 poles 4 = 4 poles (default) 6 = 6 poles 8 = 8 poles
Press the ▲1 or ▼2 key as needed.	4	Set to match your motor (your display may be different)
Press the STR key.	H 04	Stores parameter, returns to "H" Group list

This step concludes the parameter setups for the inverter. You are almost ready to run the motor for the first time!

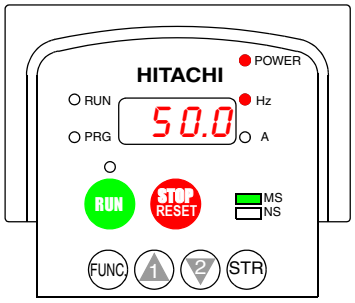


TIP: If you became lost during any of these steps, first observe the state of the PRG LED. Then study the "Keypad Navigational Map" on page 20 to determine the current state of the keypad controls and display. As long as you do not press the STR key, no parameters will be changed by keypad entry errors. Note that power cycling the inverter will not cause it to reset to a particular programming state.

The next section will show you how to monitor a particular parameter from the display. Then you will be ready to run the motor.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Monitoring Parameters with the Display



After using the keypad for parameter editing, it's a good idea to switch the inverter from Program Mode to Monitor Mode and close the panel door (puts the keys for parameter editing out of sight). This will also turn out the PRG LED, and the Hertz or Ampere LED indicates the display units.

For the powerup test, monitor the motor speed indirectly by viewing the inverter's output frequency. The *output frequency* must not be confused with *base frequency* (50/60 Hz) of the motor, or the *carrier frequency* (switching frequency of the inverter, in the kHz range). The monitoring functions are in the "D" list, located near the top left of the "Keypad Navigational Map" on page 20.

Output frequency (speed) monitor - Resuming the keypad programming from the previous table, follow the steps in the table below.

Action	Display	Func./Parameter
Press the FUNC. key.	H - -	"H" Group selected
Press the 1 key.	d 01	Output frequency selected
Press the FUNC. key.	0.0	Output frequency displayed

When the d 01 function code appeared, the PRG LED went OFF. This confirms the inverter is no longer in programming mode, even while you are selecting the particular monitoring parameter. After pressing the Function key, the display shows the current speed (is zero at this point).

Running the Motor

If you have programmed all the parameters up to this point, you're ready to run the motor! First, review this checklist:

1. DO NOT connect the inverter to the DeviceNet network or supply +24V network power yet.
2. Verify the Power LED and Module Status (MS) LEDs are ON (green, not flashing). If not, check the power connections.
3. Verify the Run Key Enable LED is ON. If not, review the programming steps to find the problem.
4. Verify the PRG LED is OFF. If it is ON, review the instructions above.
5. Make sure the motor is disconnected from any mechanical load.
6. Now, press the RUN key on the keypad. The RUN LED will turn ON.
7. The motor should accelerate to 15.0 Hz, and the display will indicate "15.0."
8. Press the STOP key to stop the motor rotation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Powerup Test Observations and Summary

Reading this section will help you make some useful observations when first running the motor.

Error Codes – If the inverter displays an error code (format is "*E X X*"), see Chapter 6 in the SJ100 instruction manual for instructions on how to interpret and clear the error.

Acceleration and Deceleration - The SJ100DN inverter has programmable acceleration and deceleration values. The test procedure left these at the default value, 10 seconds. You can observe this by setting the potentiometer at about half speed before running the motor. Then press RUN, and the motor will take 5 seconds to reach a steady speed. Press the STOP key to see a 5 second deceleration to a stop.

State of Inverter at Stop – If you adjust the motor's speed to zero, the motor will slow to a near stop, and the inverter turns the outputs OFF. The high-performance SJ100DN can rotate at a very slow speed with high torque output, but not zero (must use servo systems with position feedback for that feature). This characteristic means you must use a mechanical brake for some applications.

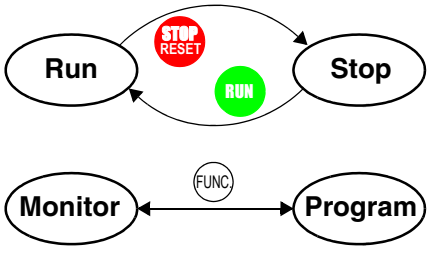
Interpreting the Display - First, refer to the output frequency display readout. The maximum frequency setting (parameter A_04) defaults to 50 Hz or 60 Hz (Europe and United States, respectively) for your application.

Example: Suppose a 4-pole motor is rated for 60 Hz operation, so the inverter is configured to output 60 Hz at full scale. Use the following formula to calculate the RPM.

$$\text{Speed in RPM} = \frac{Frequency \times 60}{\text{Pairs of poles}} = \frac{Frequency \times 120}{\text{\# of poles}} = \frac{60 \times 120}{4} = 1800\text{RPM}$$

The theoretical speed for the motor is 1800 RPM (speed of torque vector rotation). However, the motor cannot generate torque unless its shaft turns at a slightly different speed. This difference is called *slip.* So it's common to see a rated speed of approximately 1750 RPM on a 60 Hz, 4-pole motor. Using a tachometer to measure shaft speed, you can see the difference between the inverter output frequency and the actual motor speed. The slip increases slightly as the motor's load increases. This is why the inverter output value is called "frequency," since it is not exactly equal to motor speed. You can program the inverter to display output frequency in units more directly related to the load speed by entering a constant (discussed in Chapter 3 in the SJ100 instruction manual).

Run/Stop Versus Monitor/Program Modes – The Run LED on the inverter is ON in Run Mode, and OFF in Stop Mode. The Program LED is ON when the inverter is in Program Mode, and OFF for Monitor Mode. All four mode combinations are possible. The diagram to the right depicts the modes and the mode transitions via keypad.



NOTE: Some factory automation devices such as PLCs have alternate Run/Program modes; the device is in either one mode or the other. In the Hitachi inverter, however, Run Mode alternates with Stop Mode, and Program Mode alternates with Monitor Mode. This arrangement lets you program some values while the inverter is operating—providing flexibility for maintenance personnel.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Configuring Drive Parameters

This section provides details for SJ100DN DeviceNet Series configuration corresponding to Chapter 3, “Configuring Drive Parameters,” in the SJ100 Inverter Instruction Manual.

Hitachi SJ100DN DeviceNet Series inverters have additional parameters and functions beyond the SJ100 standard set. Also, several parameters that are not needed for a network-controlled inverter have been removed.

New parameters for SJ100DN DeviceNet Series

- P_41 to P_49 – DeviceNet network settings

Removed parameters (present only in standard SJ100)

- D_04 – Process variable (PV) monitor for PID control
- A_01 – Frequency source selection
- A_11 to A_16, B_81, C_81, C_82 – Analog input settings
- B_89 – Data select for digital operator OPE-J
- A_71 to A_76, C_44 – PID control settings
- C_04, C_05, C_06, C_14, C_15, C_16 – Intelligent output terminal settings for [4] to [6]
- C_23 – FM signal selection
- C_24, C_33 – Intelligent output terminal settings for [AL0] to [AL2]

New intelligent input terminal functions (not present in standard SJ100)

- [STA] – Start Motor (option code 20)
- [STP] – Stop Motor (option code 21)
- [F/R] – Forward/Reverse (option code 22)
- [DNT] – Select DeviceNet (option code 25)
- [OPE] – Force Operation from Digital Operator (option code 31)

Removed intelligent input terminal functions (present in standard SJ100)

- [AT] – Analog Input Voltage/current Select (option code 16)

Removed intelligent output terminal functions (present in standard SJ100)

- [OD] – Output Deviation for PID Control

The tables in this section list only the new parameters and intelligent inputs for the SJ100DN DeviceNet Series inverters. Refer to Chapter 3 in your SJ100 instruction manual for the main set of inverter parameters and intelligent terminal functions.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"C" Group: Intelligent Terminal Functions

Intelligent Input Terminals – The three intelligent input terminals for SJ100DN DeviceNet Series inverters have 22 possible option assignments.

"C" Function			Run Mode Edit	Defaults			
Func. Code	Name	Description		–FE (CE)	–FU (UL)	–F (Jpn)	Units
C_01	Terminal [1] function	Select function for terminal [1] 22 options (see inverter manual)	✘	00 [FW]	00 [FW]	00 [FW]	—
C_02	Terminal [2] function	Select function for terminal [2] 22 options (see inverter manual)	✘	21 [STP]	21 [STP]	21 [STP]	—
C_03	Terminal [3] function	Select function for terminal [3] 23 options (see inverter manual and Note below)	✘	12 [EXT]	12 [EXT]	12 [EXT]	—



NOTE: Terminal [3] can operate as the PTC (thermistor thermal protection) input. Thus, it has the additional [PTC] terminal input (option code 19) that may be assigned.

The input logic convention is programmable for each of the three inputs. The inputs default to normally open (active high), but you can select normally closed (active low) in order to invert the sense of the logic.

"C" Function			Run Mode Edit	Defaults			
Func. Code	Name	Description		–FE (CE)	–FU (UL)	–F (Jpn)	Units
C_11	Terminal [1] active state	Select logic convention, two option codes: 00... normally open [NO] 01... normally closed [NC]	✘	00	00	00	—
C_12	Terminal [2] active state	Select logic convention, two option codes: 00... normally open [NO] 01... normally closed [NC]	✘	00	00	00	—
C_13	Terminal [3] active state	Select logic convention, two option codes: 00... normally open [NO] 01... normally closed [NC]	✘	00	00	00	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To the 18 option codes for standard SJ100 inverters, SJ100DN Series inverters remove the code for the [AT] input, and add the following 5 options:

Input Function Summary Table				
Option Code	**Terminal Symbol**	**Function Name**	**Description**	
20	STA	Start Motor	ON	Start motor rotation on momentary contact (uses acceleration profile)
			OFF	No change to motor operation
21	STP	Stop Motor	ON	Stop motor rotation on momentary contact (uses deceleration profile)
			OFF	No change to motor operation
22	F/R	FWD/REV	ON	Select reverse direction of rotation
			OFF	Select forward direction of rotation
25	DNT	DeviceNet Select	ON	Inverter operates under DeviceNet network control
			OFF	Inverter operates under local control (keypad and input terminals)
31	OPE	Force Operation from Digital Operator	ON	Forces the operator interface Run command to over-ride commands from input terminals (such as [FW], [RV])
			OFF	Run command operates normally, as configured by A_02



NOTE: The assignment of [DNT] to an input terminal is optional. It is useful if you need to switch between DeviceNet network control and local control during running. Alternatively, you can use parameter P_43 DeviceNet Control Enable, which works similarly but does not require an input terminal. If assigned, the [DNT] setting has precedence over the P_43 setting. More information is in “Step 7 – Control Test – Verify Network Host Can Control Inverter” on page 54.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Intelligent Output Terminals – The SJ100DN DeviceNet Series inverters have 5 of the 6 possible output option assignments for standard SJ100 inverters ([OD] is removed). However, note that the alarm relay contact terminals [AL0], [AL1], and [AL2] are not present on the SJ100DN DeviceNet Series inverters (so C_24 and C_33 are not present on SJ100DN).

"C" Function			Run Mode Edit	Defaults			
Func. Code	Name	Description		–FE (CE)	–FU (UL)	–F (Jpn)	Units
C_21	Terminal [11] function	Select function for terminal [11], 5 options (see inverter manual	✘	00 [RUN]	00 [RUN]	00 [RUN]	—
C_22	Terminal [12] function	Select function for terminal [12], 5 options (see inverter manual)	✘	05 [AL]	05 [AL]	05 [AL]	—

The output logic convention is programmable for terminals [11] and [12]. The open-collector output terminals [11] and [12] default to normally open (active low), but you can select normally closed (active high) for these terminals in order to invert the sense of the logic.

"C" Function			Run Mode Edit	Defaults			
Func. Code	Name	Description		–FE (CE)	–FU (UL)	–F (Jpn)	Units
C_31	Terminal [11] active state	Select logic convention, two option codes: 00... normally open [NO] 01... normally closed [NC]	✘	00	00	00	—
C_32	Terminal [12] active state	Select logic convention, two option codes: 00... normally open [NO] 01... normally closed [NC]	✘	00	00	00	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"P" Group: DeviceNet Network Settings

The following table describes the DeviceNet network settings for SJ100DN inverters.

"P" Function			Run Mode Edit	Defaults			
Func. Code	Name	Description		–FE (CE)	–FU (UL)	–F (Jpn)	Units
P_41	DeviceNet baud rate	Three options; select codes: 00... 125 kbps 01... 250 kbps 02... 500 kbps	✘	00	00	00	—
P_42	DeviceNet MAC ID	Selects the DeviceNet node address, range is 0 to 63	✘	63	63	63	—
P_43	DeviceNet control enable	Two options; select codes: 00... Disable 01... Enable	✘	01	01	01	—
P_44	DeviceNet comm watchdog timer	Range is 0.00 to 99.99 seconds	✘	1.00	1.00	1.00	—
P_45	Inverter action on DeviceNet comm error	Five options: 00... Trip 01... Decelerate and trip 02... Hold last speed 03... Free-run stop 04... Decelerate and stop	✘	01	01	01	—
P_46	DeviceNet polled I/O: Output instance number	Three settings: 20, 21, 100 *1	✘	100	100	100	—
P_47	DeviceNet polled I/O: Input instance number	Three settings: 70, 71, 101 *1	✘	101	101	101	—
P_48	Inverter action on DeviceNet idle mode	Five options: 00... Trip 01... Decelerate and trip 02... Hold last speed 03... Free-run stop 04... Decelerate and stop	✘	01	01	01	—
P_49	DeviceNet motor poles setting for RPM	Range is 00 to 38 (even numbers only), two types: 00... For freq. setting (Hz) 02 to 38... For speed (RPM)	✘	00	00	00	—

Note 1: Functions P_46 and P_47 must be set as a corresponding pair. Valid settings for P_46 / P_47 are 20 / 70, 21 / 71, or 100 / 101 (default). Other setting combinations can cause a DeviceNet network error.

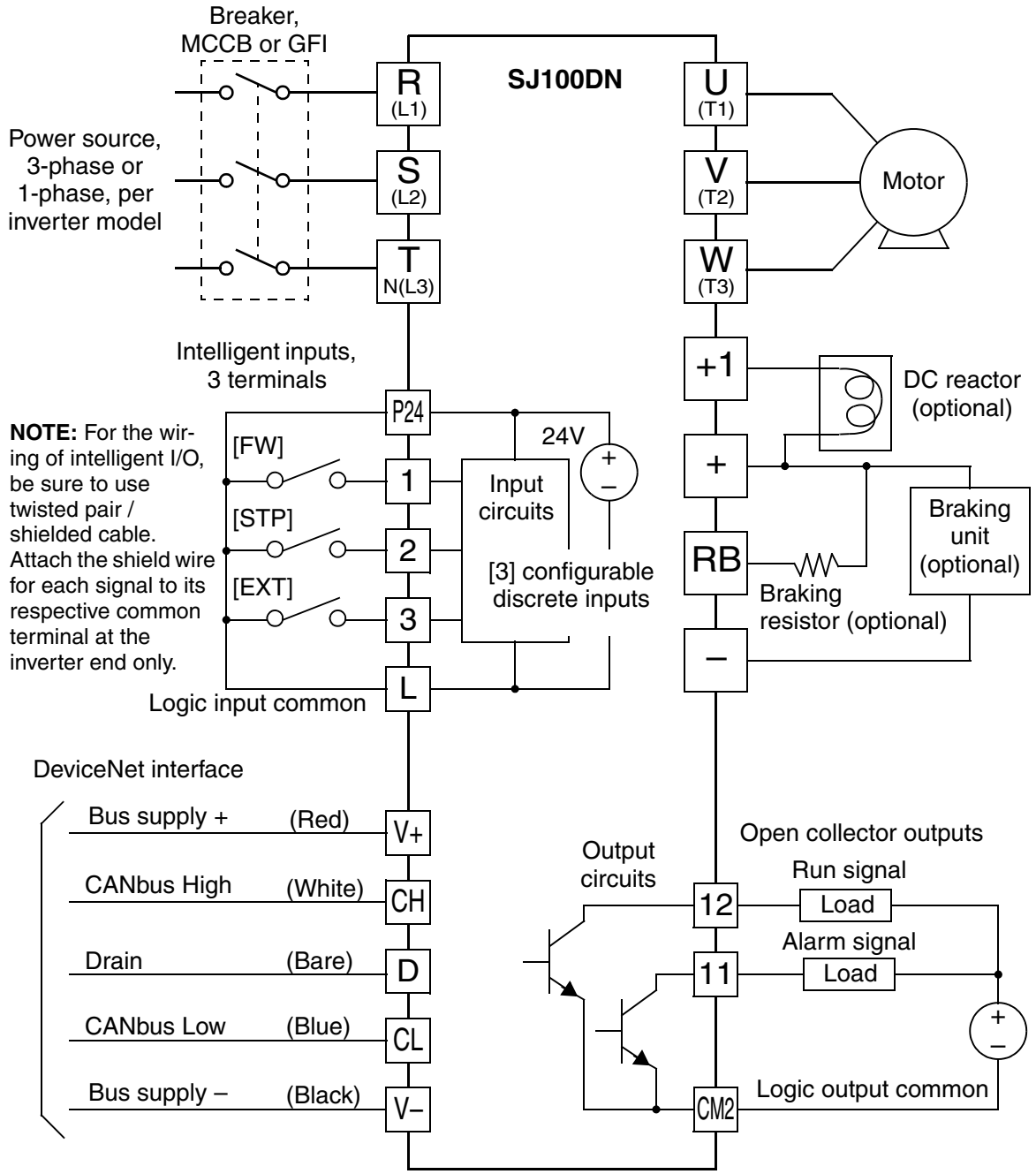
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Operations and Monitoring

This section covers new or modified intelligent terminal functions for SJ100DN DeviceNet Series inverters, corresponding to Chapter 4, “Operations and Monitoring,” in the SJ100 Inverter Instruction Manual.

Example Wiring Diagram

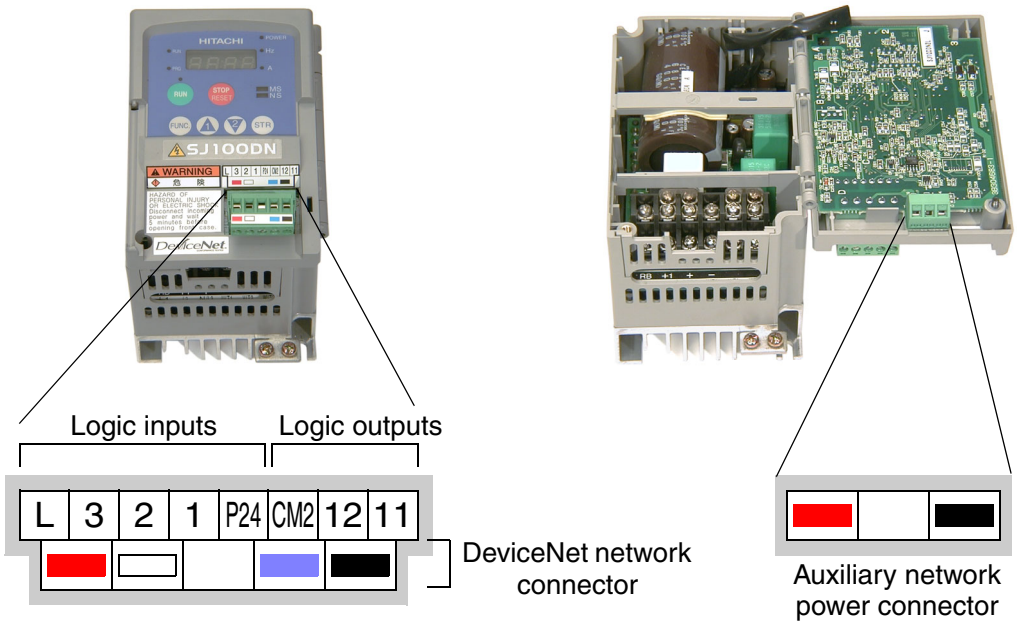
The SJ100DN DeviceNet Series inverters have fewer intelligent I/O terminals and are without analog I/O and relay outputs, in comparison to the standard SJ100 inverters. An example wiring diagram for SJ100DN is shown below. The DeviceNet interface wiring is discussed in detail in “Step 2 – Connect Network Devices” on page 43.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications of Control and Logic Connections

The control logic connector is located on the front panel, just below the keypad. The color-coded DeviceNet connector is located directly below the logic connector. Connector labeling is shown below.



Specifications for the logic connection terminals are in the following table:

Terminal Name	Description	Ratings
[P24]	+24VDC for logic inputs	24VDC, 30 mA max (Notes: Do not use for network power Do not short to terminal L)
[1], [2], [3]	Discrete logic inputs	27VDC max. (use P24 or an external supply referenced to terminal L)
[L]	GND for logic inputs	Sum of input 1, 2, and 3 currents (return) (Note: Do not ground)
[11], [12]	Discrete logic outputs	50mA maximum ON state current, 27 VDC maximum OFF state voltage
[CM2]	GND for logic outputs	100 mA: sum of 11 and 12 currents (return)

NOTE: The DeviceNet network must supply +24V to the inverter via the [V+] (Red) and [V–] (Black) terminals on the DeviceNet connector. DO NOT attempt to use the inverter's internal 24VDC supply (on [P24] and [L]) for DeviceNet network power.

The DeviceNet connector signals must meet the electrical requirements given by the DeviceNet industry standards. For more information, visit the Open DeviceNet Vendor Association website at http://www.odva.org.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Intelligent Input Summary

Intelligent input terminals for SJ100DN inverters include the standard SJ100 input terminals (see Chapter 3 in SJ100 Inverter Manual), with the following changes:

- Add [STA], [STP], and [F/R] terminals (three-wire interface inputs)
- Add [DNT] terminal (DeviceNet Select)
- Add [OPE] Force Operation from Digital Operator input terminal
- Remove [AT] intelligent input terminals

The added terminals are described in the sections that follow.

Three-wire Interface Operation

The 3-wire interface is an industry standard motor control interface. This function uses two inputs for momentary contact start/stop control, and a third for selecting forward or reverse direction. To implement the 3-wire interface, assign 20 [STA] (Start), 21 [STP] (Stop), and 22 [F/R] (Forward/Reverse) to the three intelligent input terminals. Use momentary contact for Start and Stop. Use a selector switch such as SPST for the Forward/Reverse input. Be sure to set the operation command selection A_02=01 for input terminal control of motor. If you have a motor control interface that needs logic-level control (rather than momentary pulse control), use the [FW] and [RV] inputs instead.

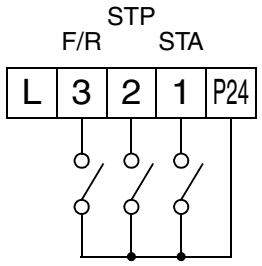
Option Code	Terminal Symbol	Function Name	Input State	Description
20	STA	Start Motor	ON	Start motor rotation on momentary contact (uses acceleration profile)
			OFF	No change to motor operation
21	STP	Stop Motor	ON	Stop motor rotation on momentary contact (uses deceleration profile)
			OFF	No change to motor operation
22	F/R	FWD/REV	ON	Select reverse direction of rotation
			OFF	Select forward direction of rotation

Valid for inputs:	C_01, C_02, C_03
Required settings:	A_02=01

Notes:

- The [STP] input stops the motor, whether it is under keypad control or under network control.
- [STP] is assigned to terminal [2} as a factory default setting. This feature is especially important for network-controlled applications.
- If you do not assign the [F/R] intelligent input terminal, the three-wire operation will be limited to the forward direction only.

Example (requires input configuration—see Chapter 3 in SJ100 Instruction Manual):

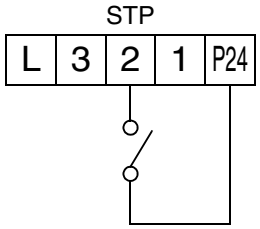


See I/O specs in the SJ100 Instruction Manual

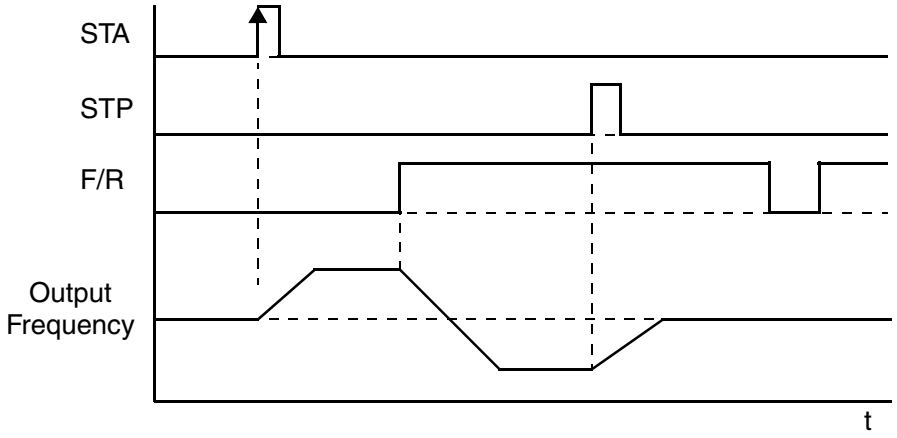
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Standard 3-wire control – By default, the SJ100DN inverter comes with [STP] (Stop Motor) assigned to terminal [2]. The Stop command causes the motor to decelerate to a stop when the inverter is in Run Mode. When the inverter is controlled via keypad, an operator will normally use the Stop/ Reset key on the front panel.

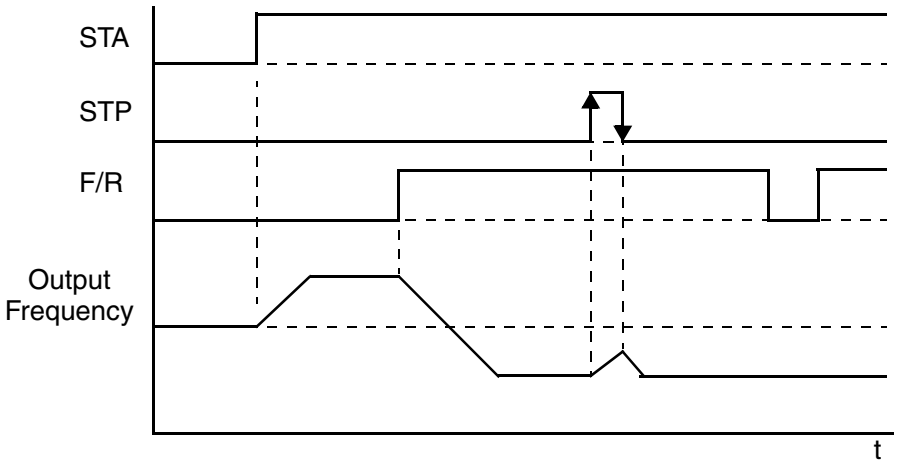
Example (default input configuration shown—see Chapter 3 in SJ100 Instruction Manual):



The diagram below shows the use of 3-wire control. STA (Start Motor) is an edge-sensitive input; an OFF-to-ON transition gives the Start command. The control of direction is level-sensitive, and the direction may be changed at any time. STP (Stop Motor) is also a level-sensitive input, and the Stop signal has priority over the Start signal.

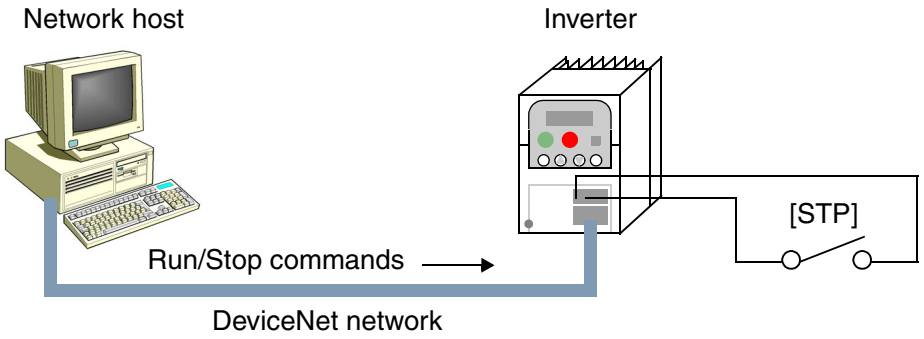


When both STA and STP signals are ON, the STP signal has priority (motor output will be OFF). However, the motor output resumes after STP signal is no longer active if the STA input is still ON.

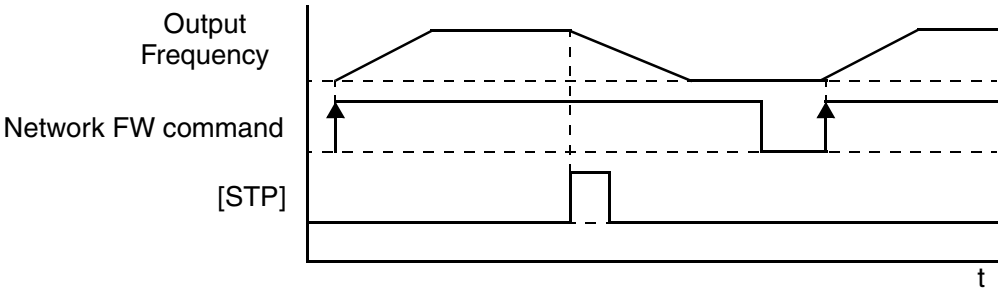


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use with DeviceNet operation – When the SJ100DN inverter is under network control, Run and Stop commands will typically arrive via the DeviceNet network. However, a network communications interruption is possible at any time. So for safety reasons, it is important to provide a dedicated Stop signal input as shown below.



In the graph below, the network FWD command places the inverter in Run mode. While the motor is running, the local [STP] input terminal activates, causing the inverter to decelerate the motor to a stop. It remains stopped even though the FW command is still active. The FW command must turn OFF and ON again to resume motor operation.

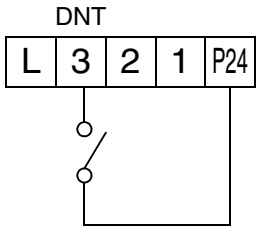


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DeviceNet Select

You can configure an intelligent input as [DNT] DeviceNet Select. It is not necessary to assign an input terminal as [DNT] in order to control or monitor the inverter via the DeviceNet network. Rather, the [DNT] input provides a way for an external control system to selectively force the inverter to ignore DeviceNet commands and use only its internal parameters and intelligent inputs for operation.

DeviceNet Control parameter P_43, DeviceNet Enable, serves a similar function—but it is typically updated via the DeviceNet network. These two methods control essentially the same thing, so it not meaningful to use both P_43 DeviceNet Enable and a [DNT] input at the same time. If [DNT] is assigned to an input terminal, parameter P_43 is ignored.

Option Code	Terminal Symbol	Function Name	State	Description
25	DNT	DeviceNet Select	ON	The inverter operates per commands and parameters (output freq., accel, decel) from DeviceNet
			OFF	The inverter operates per local commands (keypad or terminal Run/Stop) and its internal parameters (speed, accel, decel).
Valid for inputs:		C_01, C_02, C_03		Example (requires input configuration—see Chapter 3 in SJ100 Instruction Manual):  See I/O specs in the SJ100 Instruction Manual
Required settings:				

Notes:

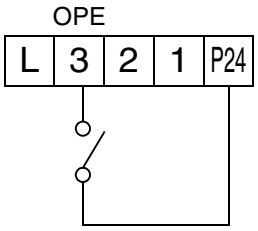
- When any input terminal is assigned as [DNT], parameter P_43 setting is ignored.
- When [DNT] is OFF, the inverter is not under control from DeviceNet commands. However, the DeviceNet host computer can still monitor inverter data via polled I/O, and it can still use Explicit Messaging to individually change inverter parameters.
- If you do not assign an input terminal as [DNT], then parameter P_43 DeviceNet Enable is the sole method of enabling/disabling control via the DeviceNet network.

For more information on DeviceNet network configuration, see “Step 2 – Connect Network Devices” on page 43.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Force Operation from Digital Operator

This function permits a digital operator interface to override the Run command source setting (A_02) when it is configured for a source other than the operator interface. When the [OPE] terminal is ON and the operator interface gives a Run command, the inverter uses the standard output frequency settings to operate the motor.

Option Code	Terminal Symbol	Function Name	State	Description
31	OPE	Force Operation from Digital Operator	ON	Forces the operator interface Run command to over-ride commands from input terminals (such as [FW], [RV])
			OFF	Run command operates normally, as configured by A_02
Valid for inputs:		C_01, C_02, C_03		Example (requires input configuration—see Chapter 3 in SJ100 Instruction Manual):  See I/O specs in the SJ100 Instruction Manual
Required settings:		A_02=01		

Notes:

- When the [OPE] signal is ON, the keypad Run and Stop keys are active, and [FW] or [RV] signal is ignored. However, [OPE] cannot cause the keypad to over-ride the DeviceNet host commands. To enable/disable DeviceNet control via an input terminal, use [DNT] (DeviceNet select).
- When changing the [OPE] state during Run Mode (inverter is driving the motor), the inverter will stop the motor before the new [OPE] state takes effect.
- If the [OPE] input turns ON and the digital operator gives a Run command while the inverter is already running, the inverter stops the motor. Then the digital operator can control the motor.

Intelligent Output Summary

Intelligent output terminals for SJ100DN inverters include the standard SJ100 output terminals (see Chapter 3 in SJ100 Inverter Manual), with the following changes:

- Remove [OD] (Output deviation for PID control) intelligent output terminal

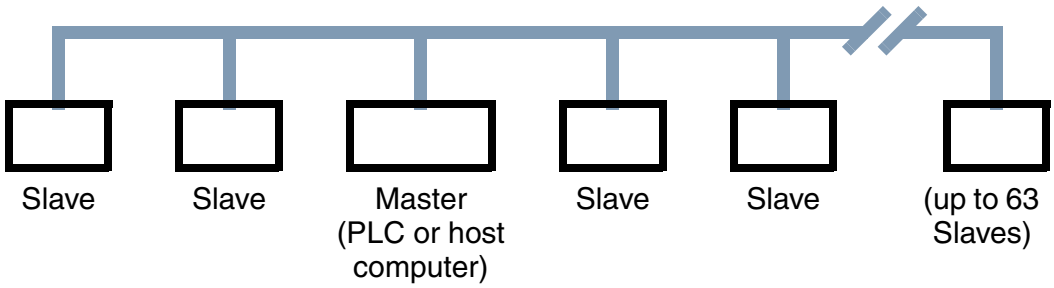
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Network Control and Monitoring

DeviceNet Overview

DeviceNet is a communications network typically used in factory automation applications. It is a specific implementation of a Controller Area Network (CAN), first developed for the automotive market. IC manufacturers produce CAN ICs by the millions, so they are low-cost and reliable. DeviceNet adapts this technology for industrial control. It allows a programmable logic controller (PLC) or other host computer to control up to 63 field devices such as relays, solenoids, and motor drives such as Hitachi's DN Series inverters. DeviceNet has several advantages which have helped make it a popular choice for various applications. The advantages include:

- Physical layout – main trunk line with individual drop lines
- Reduced wiring costs – uses a 5-wire cable; communications and device power are in the same cable (power devices such as motor drives still require a main power source)
- Devices may be connected or disconnected without powering down the network (if daisy-chained)
- Flexible device definitions – the device protocol provides for many types of input and output structures
- Open standard – allows multiple vendors to produce many types of products that can coexist on a network



DeviceNet is an *open* network standard, meaning that it has a non-proprietary protocol and no licensing requirements. Hundreds of vendors are members of the Open DeviceNet Vendor Association (ODVA), who ensures the integrity of the technical standards and oversees device conformance testing. Hitachi DN Series inverters are listed with the ODVA. This ensure compatibility with a wide range of devices from vendors making thousands of DeviceNet compatible industrial products. This also helps to connect those same devices over long distances in the factory.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Networking Overview

The SJ100DN DeviceNet Series inverters can operate under local control (via operator input via the keypad or via input terminal signals). This control method was covered in the previous section, “Operations and Monitoring,” and also in the SJ100 inverter manual’s Chapter 4, also named “Operations and Monitoring.”

The “Network Control and Monitoring” section will first show you how to connect the inverter to a DeviceNet network. Next, you will learn how to monitor and control the inverter from the network master (host computer). These instructions are presented in a series of steps, with each one preparing your application for the next one. Therefore, be sure not to skip any steps in this section.



NOTE: Be sure to install the inverter and perform the powerup test described in the “Inverter Mounting and Installation” on page 9 **before** attempting network operation.

The step to DeviceNet network control and monitoring are:

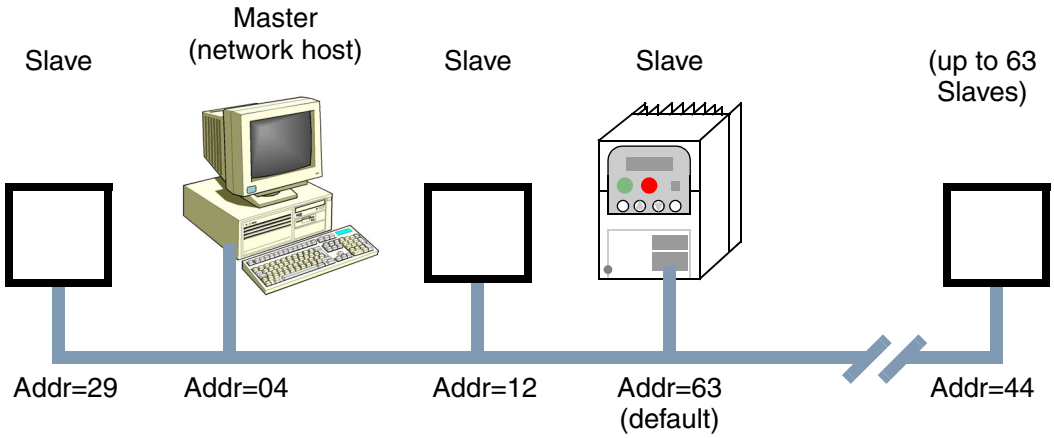
1. Design your network layout
2. Connect network devices
   a. Add network termination
   b. Add network power
3. Prepare network host computer
4. Prepare inverter for network
5. Understand the inverter’s I/O structure
   a. Polled I/O
   b. Explicit messaging
6. Monitor test – verify network host can *monitor* inverter
7. Control test – verify network host can *control* inverter
8. Use DeviceNet Explicit Messaging
9. Create a host computer control program

Note that the test to *monitor* the inverter from the network occurs before the test to *control* the inverter via the network. The setup for monitoring is more simple, and helps prepare the devices for the control step.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

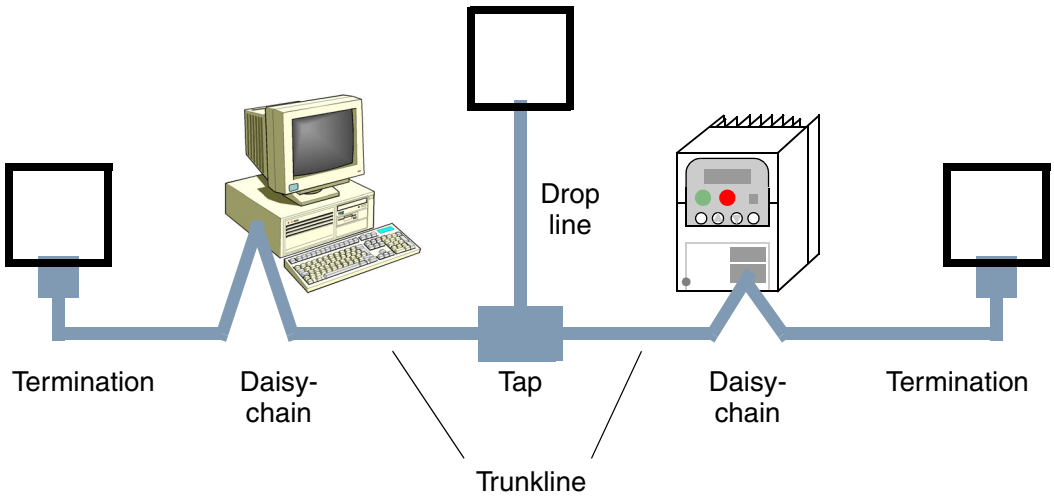
Step 1 – Design Your DeviceNet Network Layout

Your DeviceNet network layout will be determined by several factors, including the physical machine or plant layout. The network must have one network master, or host computer such as a PLC or control PC. The SJ100DN Series inverter is a DeviceNet slave. The network can have up to 63 slaves which can include inverter(s), sensors, actuators, or other intelligent devices.



The network diagram above shows a network master (host computer), and four slave devices. Each device constitutes a "node," and each node must have a unique address. The address is also called the MAC ID (Media Access Control Identification). As shown in the diagram, the node addresses do not have to occur in a particular sequence in the physical layout.

Showing node connections now in greater detail, the connection to each device in the middle of the network may be a *daisy-chain* connection or a *drop* connection. The difference is that a daisy-chain connection enters and exits right at the connector, while a drop connection inserts an extra segment just for the device. The device at each end of the physical network must include a termination resistor. The host computer and the inverter may be in the middle or at the ends of the network.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DeviceNet networks support three baud rates, listed in the following table.

Baud Rate	Trunk length (thick cable)	Drop Length	
		Maximum	Cumulative
125 kbps	500m (1640 ft.)	6m (20 ft.)	156m (512 ft.)
250 kbps	250m (820 ft.)	6m (20 ft.)	78m (256 ft.)
500 kbps	100m (328 ft.)	6m (20 ft.)	39m (128 ft.)



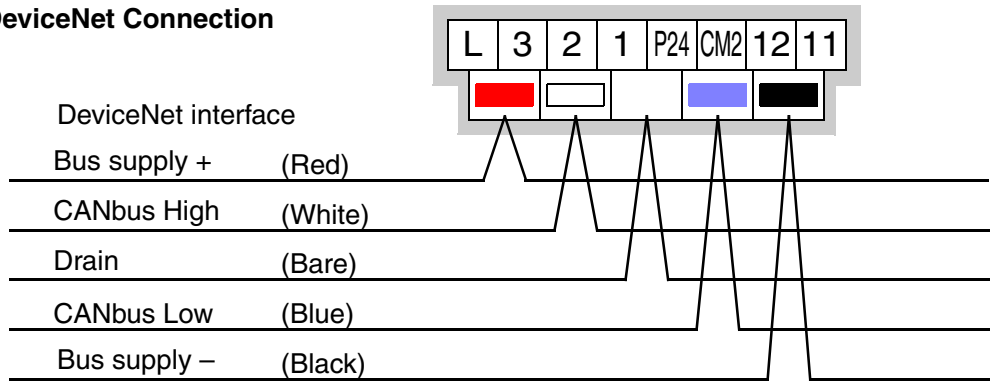
NOTE: If thin cable is used for the trunk line, the maximum distance is 100m (for all baud rates).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 2 – Connect Network Devices

A DeviceNet node connects to the network with five electrical connections. The diagram below shows the inverter connection as an example. The cable uses two twisted pairs with a shield. One twisted pair is for data, and the other is for +24V power. The color code shown is standard for DeviceNet.

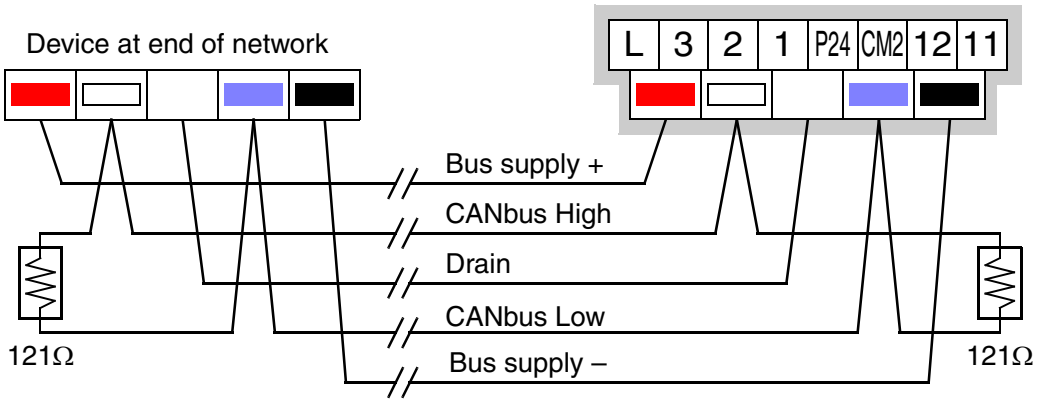
DeviceNet Connection



The diagram below shows SJ100DN inverters connected to a DeviceNet network. Each connection is called a node, and the SJ100DN connects to the network via the 5-pin, color-coded Phoenix connector on the front panel as shown.

Add network termination – A termination resistor (121Ω nominal) is required at each physical end of a DeviceNet network (segment) as shown in the diagram below. Each device does not typically have an internal termination resistor, as several such devices together would overload a network. The terminations provides signal integrity and noise immunity. Therefore, add two resistors as close to the endpoint connectors as possible.

DeviceNet Terminations





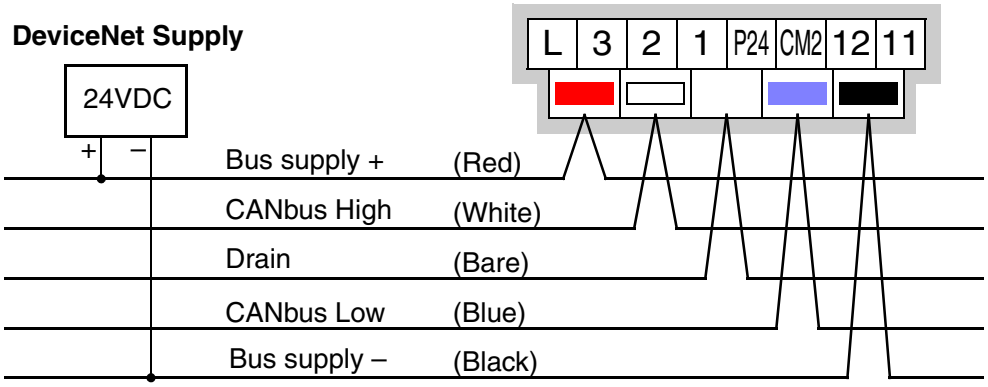
TIP: To simplify configuration and startup, we recommend starting with just the network host (PLC or computer) and the inverter. It is easier to resolve addressing or other conflicts with fewer devices. With network wiring for just two devices, you will need a termination resistor at both devices. After establishing network communications with the inverter, you can add other devices individually with a minimum of problems. Remember to maintain network termination at the endpoints at all times.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

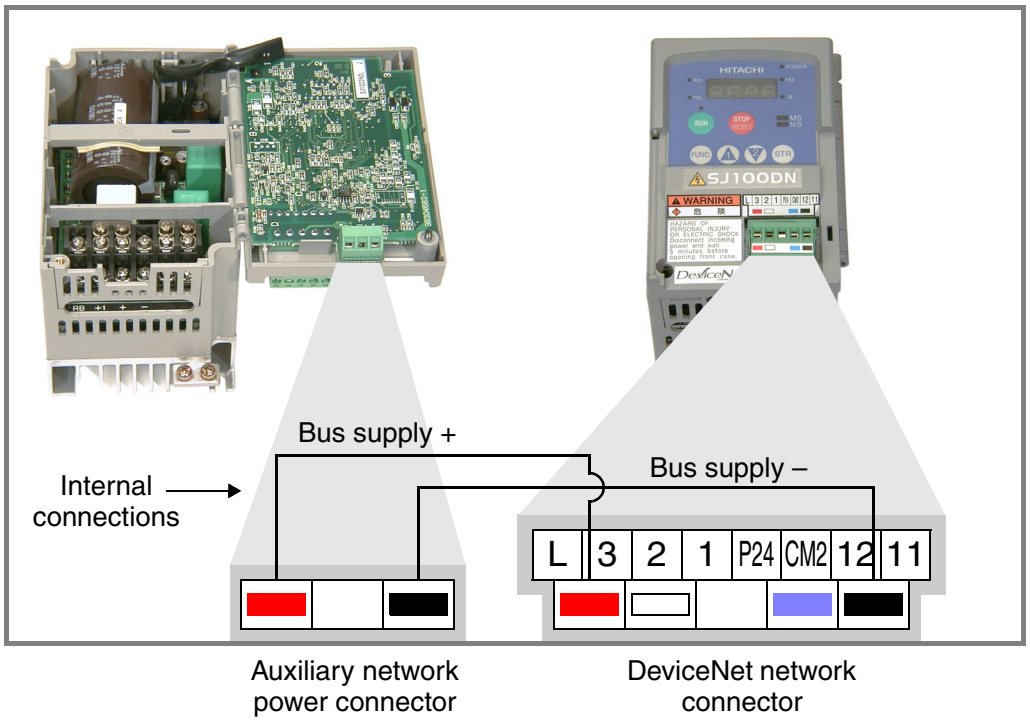
Add network power – Many devices such as sensors and relays can be powered directly from the network. However, inverters generally use much more power and a higher input voltage than a network could provide. As demonstrated by the installation powerup test, SJ100DN Series inverters need only the AC input power for stand-alone operation. For network monitoring or control, you must also supply external +24V network power to the DeviceNet connector. The inverter has internal optical isolation from the network, and draws negligible network power as a result. DeviceNet specifications support up to 8A per network segment.

NOTE: Class II NEC Code limits the current for any network segment to 4A. DeviceNet *thick* type cable is limited to 8A; *thin* type cable is limited to 3A.

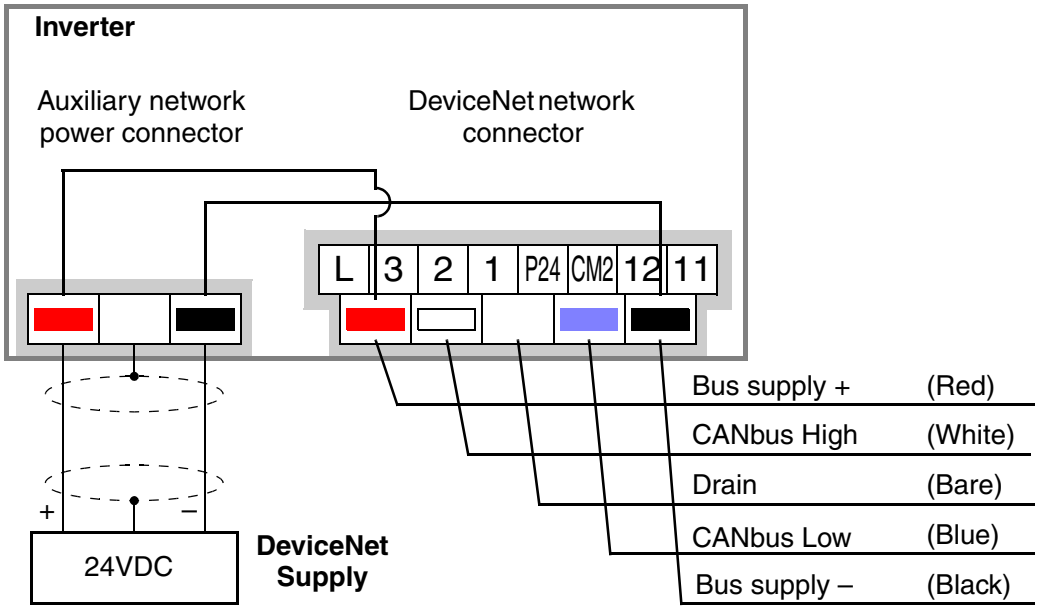
Add a +24VDC supply to the network as shown below. It is not necessary to power it for this step; later steps will provide powerup instructions.



Alternatively, you can use the auxiliary network power connector as shown below (left). The inverter internally connects the two connectors to pass through network power.



The example wiring diagram below shows the auxiliary network power connector being used for the network power supply connection.



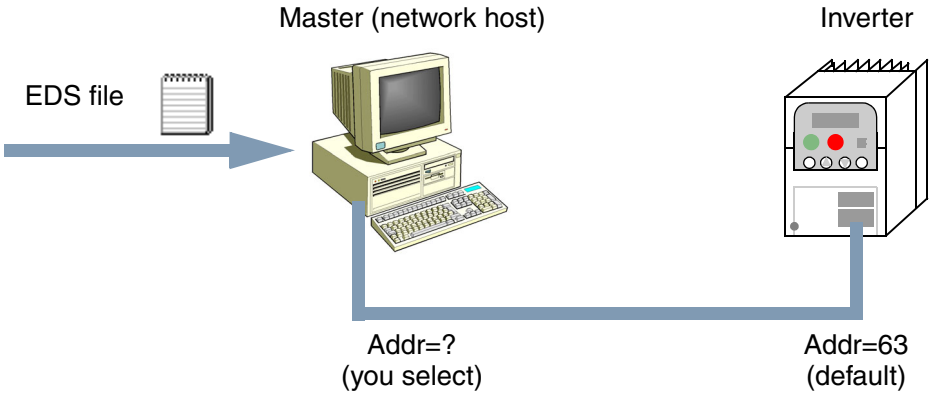
Using the auxiliary network power connector provides flexibility and convenience in wiring your application. Be sure to read the following points to avoid any problems:

- Make sure the polarity of the power supply connection is correct. If in doubt, check continuity between the two connectors to ensure the polarity is maintained.
- The power supply must provide proper output current limit and fusing for the network device load.
- Remember that you must open the front door panel of the inverter to connect or disconnect wiring to the auxiliary network power connector. If power has been connected, wait five minutes after powerdown and verify the Power LED is OFF before opening the inverter front door panel.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 3 – Prepare Network Host Computer for Network

This step presumes that you have already connected your network host device (PLC or computer) to the DeviceNet network. If using a PC, the addition of a DeviceNet scanner card is usually required.



Load EDS file – The I/O structure of smart field devices such as inverters are unique. Consequently, you must provide a network host computer with the I/O image of smart devices on the network. DeviceNet standards provide for a quick way to equip host computers with device-specific I/O images. The data is contained in an EDS file (Electronic Data Sheet). Manufacturers develop EDS files for their DeviceNet-compatible products, providing them to the DeviceNet standards organization. The ODVA (Open DeviceNet Vendors Association) maintains the files for download. Do the following steps:

- Visit the website at http://www.odva.org
- Navigate to the Downloads area, and then to EDS files.
- From the EDS files, select “Hitachi” as the manufacturer.
- Download the file that matches your inverter’s version (SJ100DN2, for example)
- Then load or place the EDS file in your network host device in the location (directory) it requires for use in network device scanning. Refer to the documentation of your host device for this information.

Set node address of host – If you have not already done so, set the node address (the MAC ID). It must be different from the inverter’s node address. Refer to the documentation of your host device for the address setting procedure. We recommend *not* using “00,” since that is the default of many other devices.

Set baud rate of host – The host computer’s baud rate and the inverter’s baud rate must match in order for them to communicate. We recommend using the lowest baud rate (125 kbaud) to get the network up and running. The default baud rate of the inverter is 125 kbaud.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 4 – Prepare Inverter for Network

Verify that the inverter's DeviceNet parameters are set as directed.

- P_41 baud rate setting must be the same as your network host computer.
- P_42 MAC ID setting must be different from your network host computer.
- P_43 DeviceNet enable must be set = 1 (required by subsequent steps in example).
- P_44 and P_45 are recommended to remain at the default settings.
- P_46 and P_47 must be set to the default values (required by subsequent steps).
- P 48 selects the inverter's action if the inverter detects network idle (leave at default).
- P 49 allows the host computer to command motor in output freq. (set = 0) or by motor speed in RPM (set = to number of poles). Leave at default (set = 0) for this example.

"P" Function			Defaults
Func. Code	**Name**	**Description**	
P_41	DeviceNet baud rate	Three options; select codes: 00...125 kbps 01...250 kbps 02...500 kbps	**00**
P_42	DeviceNet MAC ID	Selects the DeviceNet node address, range is 0 to 63	**63**
P_43	DeviceNet control enable	Two options; select codes: 00...Disable 01...Enable	**01**
P_44	DeviceNet comm watchdog timer	Range is 0.00 to 99.99 seconds	**1.00**
P_45	Inverter action on DeviceNet comm error	Five options: 00...Trip 01...Decelerate and trip 02...Hold last speed 03...Free-run stop 04...Decelerate and stop	**01**
P_46	DeviceNet polled I/O: Output instance number	Three settings: 20, 21, 100	**100**
P_47	DeviceNet polled I/O: Input instance number	Three settings: 70, 71, 101	**101**
P_48	Inverter action on DeviceNet idle mode	Five options: 00...Trip 01...Decelerate and trip 02...Hold last speed 03...Free-run stop 04...Decelerate and stop	01
P_49	DeviceNet motor poles setting for RPM	Range is 00 to 38 (even numbers only), two types: 00...For freq. setting (Hz) 02 to 38... For speed (RPM)	00

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 5 – Understand the Inverter's I/O Structure

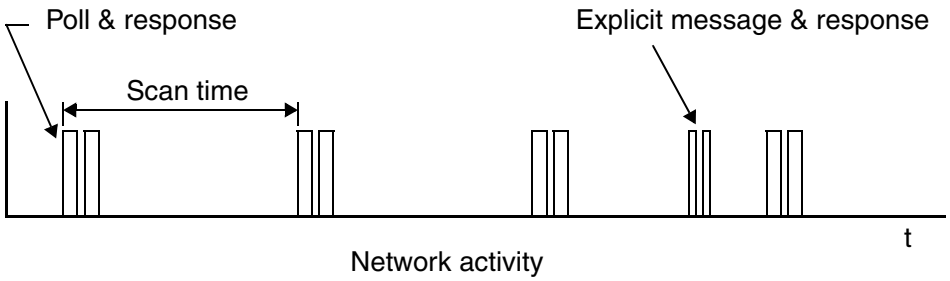
In DeviceNet terminology, I/O devices can either *produce* or *consume* data. An input point (or data byte or word) produces data, while an output point (or data byte or word) consumes data. The DeviceNet standard also provides for various ways the network master accesses I/O, either more or less frequently, according to certain criteria. The main benefit of having this variety is to let you conserve network bandwidth by using it where the application most needs it. DeviceNet categorizes I/O communication exchanges into several types listed below.

Polled I/O (supported in SJ100DN) – The Poll command initiated by the master contains output data. When the slave (inverter) is polled, it automatically returns input data to the master, which also serves as an acknowledgement. The main advantage of Polled I/O is that a fixed (predetermined) set of I/O data can be exchanged upon each network scan. There is no need to specify each bit or word of the request for output and input. The Run/Stop commands and output frequency command are included in the polled I/O set for the inverter.

Bit Strobe, Cyclic, and Change-of-State (not supported in SJ100DN) – These master commands are oriented to simpler I/O devices, time-based updates, or value-change updates. More suited to simple or analog applications such as data logging, these network master commands are not supported by SJ100DN inverters.

Explicit Messaging (supported in SJ100DN) – The Explicit Messaging mechanism goes beyond the four standard scan mechanisms listed above. A master can use an Explicit Message request to Get (read) or Set (write) specific data in a device such as the inverter. In that specific request, the master provides the complete network address to the device and the register within that device. The inverter has many parameters, but most of them need accessed rarely via the network. Thus, the inverter supports explicit messaging access to all of its parameter values.

The timing diagram below shows a simplified network activity timing diagram. The poll command and response occur at the regular interval of the master's scan time. This represents the polled I/O data (includes Run/Stop commands, inverter's output frequency and accel / decel times). One explicit message event occurs in the available "quiet" time within the network activity. This represents the master doing a single access of a specific inverter parameter (suited for rarely accessed parameters such as torque boost, etc.).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Polled I/O Data Map, Inverter Outputs – The polled I/O for the inverter maps to four words (16 bits each) input data, and four words output data. This represents a small portion of the inverter's parameters and commands—just those required to manage motor operation in real time. Some data words contain discrete (individual) bits (used as flags), while others words contain values (used as scalar numbers). When the network is active, polled I/O data is automatically updated on each network scan.

Inverter Produced Data, (Host) Input Instance (P_47) = 101								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Input term. [3]	Input term. [2]	Input term. [1]	Freq. Arrival	—	Trip	RV Run	FW Run
1	Inverter status (see status code table, next page)							
2	Output frequency monitor (low byte), D_01 value							
3	Output frequency monitor (high byte), D_01 value							
4	Output current monitor (low byte), D_02 value							
5	Output current monitor (high byte), D_02 value							
6	Trip error code, D_08 value							
7	—							

The I/O image above corresponds to the default (Host) Input Instance P_47 = 101. The Inverter Consumed Data, (Host) Output Instance I/O image is presented in Step 7.



NOTE: P_47 = 70 and P_47 = 71 settings provide other produced data configurations (not used in this example). See "Polled I/O Configurations" on page 66.

The following table defines individual bits of the status byte.

Inverter Produced Data, Status Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	FW Run	Inverter stopped or in RV	Inverter in FW Run
1	RV Run	Inverter stopped or in FW	Inverter in RV Run
2	Trip	No faults exist	Trip exists, not cleared
3	—	—	—
4	Frequency arrival	Inverter stopped, or in accel or decel	Inverter output arrived at target freq.
5	Input terminal [1]	Input [1] = OFF	Input [1] = ON
6	Input terminal [2]	Input [2] = OFF	Input [2] = ON
7	Input terminal [3]	Input [3] = OFF	Input [3] = ON

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The inverter state is represented by a code number in byte 1 of the produced (output) data. The following table lists the code values (decimal) and their meanings.

Inverter Produced Data, Inverter State Code Byte	
Code (dec.)	**Description**
0	The inverter is Stop Mode.
1	The inverter is in Run Mode.
2	The inverter is in Jog Mode.
3	The inverter is in Stop Mode and the motor output is free running (coasting).
4	The inverter is executing DC braking (includes CD braking wait time).
5	The inverter is attempting a restart with frequency matching (B_01 = 03).
6	The output is stopped for an instantaneous power failure.
7	The inverter is attempting a restart with frequency matching (B_01 = 02).
8	The inverter is waiting before it attempts a restart with frequency matching. The wait time is set by parameter B_03.
9	The inverter is in a trip condition, and is storing the trip history data to EEPROM. A Stop/Reset command to clear the trip is ignored in this state.
10	The inverter is in a trip condition.
11	An under-voltage condition exists at the inverter power input.
101 to 116	The inverter is in the auto-tuning process. The state codes within this range mean: 101 to 114 = executing auto-tuning algorithm 115 = successful completion 116 = failed auto-tuning



TIP: The next step (Step 6) verifies that the network host can monitor the inverter. The network host will monitor the inverter's produced (output) data while the motor is running. The step shows how to monitor and interpret produced data while the motor is running in a typical application.

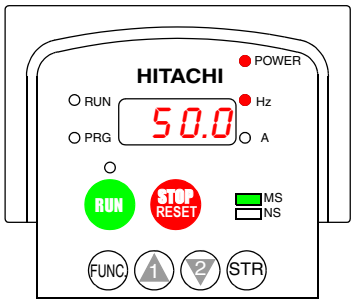
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 6 – Monitor Test – Verify Network Host Can *Monitor* Inverter

This step requires that you have completed the previous 5 steps, and that the powerup test during the installation was successful (see "Running the Motor" on page 25). At this point in the procedure, the inverter is using front panel keypad inputs for Run/Stop commands. The DeviceNet host computer can monitor inverter operation *without actually controlling* the inverter. So, you do not have to change any "P Group" parameters from their defaults to do this network monitoring test.

Inverter Status LEDs – The two status LEDs on the inverter's front panel are to the right of the Stop key.

- MS – Module Status
- NS – Network Status



The status LEDs may be green or red, and may or OFF, ON, or flashing between OFF and ON. The table below shows how to interpret the status LED indications. (At this point, the correct status is MS=green, NS=OFF.)

LED	Color	Status	Corrective Action
MS	Green	Normal power-ON status	—
	Flashing Green	Inverter in standby state	—
	Red	Fatal error (trip E11 or E12)	• Confirm electrical noise level is acceptable • Replace inverter
	Flashing Red	Trip condition (non-fatal)	Look up error code in manual Chapter 6, press Stop/Reset
	OFF	Inverter power is OFF	—
NS	Green	Connected to network/online	—
	Flashing Green	Connected to network/idle	—
	Red	Critical network error	Check network for: • Disconnected cable • Termination resistor not present / wrong value • Duplicate MAC IDs • Baud rate settings mis-match • Cable too long
	Flashing Red	Communications time-out	Check network for: • Disconnected cable • Termination resistor not present / wrong value • Baud rate settings mis-match • Cable too long
	OFF	Power OFF or DeviceNet offline	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Monitoring Sequence – Follow these steps to monitor inverter operation via the DeviceNet network. In this sequence, you will control the inverter from its keypad, but monitor operation from the network host computer.

a. Begin with power off to the network host, the inverter, and the network power.

b. Turn ON the +24VDC network power.

c. Turn ON power to the host computer and the inverter. The status LEDs will indicate: MS LED = Green, and the NS LED = OFF.

d. Confirm that the Run Key Enable LED is ON. It is directly above the Run key. If it is OFF, then be sure that A_02 = 02.

e. On the host computer, start the application that connects it to the network.

f. Set the host application to scan the DeviceNet network. (Do any configuration required to let the host "see" the inverter on the network.) You may notice that the inverter's NS LED = Flashing Green during network startup.



NOTE: If the inverter detects another device on the network has the same MAC ID, the inverter will display the MAC ID code on the front panel display and the inverter is in Stop Mode. When in Run Mode (or after any key is pressed), the display reverts to the normal indications.

g. Verify that the inverter's MS LED = Green, and now the NS LED = Green.



NOTE: If the NS LED = OFF, the network is disconnected. Check the cable, and also check the host application software settings. If the NS LED = Flashing Green, the network is connected, but idle. Start the host network scan to cause NS LED = Green. If Red or Flashing Red, use the Status LED table on the previous page to troubleshoot.

h. Confirm that the host computer can see the inverter's polled I/O. You will be monitoring the inverter's produced (output) I/O data, which are inputs to the host computer. At this point, all data words = 0000h as shown below.

Inverter Polled I/O Produced (Output)

	High byte		Low byte			
	MSB LSB		MSB LSB		Hex	Decimal
Word 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0000h	0
Word 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0000h	0
Word 2	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0000h	0
Word 3	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0000h	0



NOTE: If the host computer cannot find the inverter's polled I/O data, then check the host application software—its settings and configuration. Refer to the documentation that came with the host computer software. You may also verify that the host computer can communicate with another known working device (provided its MAC ID is unique).

i. Provided that the host computer finds the inverter's produced I/O, press the Run key on the inverter keypad. The motor should run in the same way it did for the powerup test during the inverter installation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

j. With the inverter output ON and the motor rotating, now you can use the host computer to monitor the inverter's polled I/O. The following diagram shows the expected (typical) data, using the default settings.

Inverter Polled I/O Produced (Output)

	High byte MSB	LSB	Low byte MSB	LSB	Hex	Decimal
Word 0	0 0 0 0	0 0 0 1	0 0 0 1	0 0 0 1	0111h	273
Word 1	0 0 0 0	0 1 0 1	1 1 0 1	1 1 0 0	05DCh	1500
Word 2	0 0 0 0	0 0 0 0	0 0 0 0	1 0 1 1	000Bh	11
Word 3	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0000h	0

Using the Polled I/O Data Map for produced (output) data given in Step 5, you can interpret the data sent to the host computer. For scalar values such as frequency and current, a scale factor of 1, 10, 100, or 1000 applies. The "Network Register Map" on page 78 lists the inverters parameters and the scale factor used to get/set the parameter value over the network. To get a parameter's actual value, divide the value sent by the inverter (in decimal form) by the scale factor.

- Word 0 – The status bits that are set have the meanings indicated below:

	High byte MSB	LSB	Low byte MSB	LSB	Hex	Decimal
Word 0	0 0 0 0	0 0 0 1	0 0 0 1	0 0 0 1	0111h	273

Inverter state = 1 (Run Mode) — Freq. arrival — FW Run

- Word 1 – The decimal value "1500" for output frequency corresponds to 15.00Hz (D_01 reading) when the scale factor of 100 is applied. Recall that the powerup test procedure for the installation set F_01 = 15.0Hz (restore this value if needed).
- Word 2 – The decimal value of "11" for output current corresponds to 1.1A (D_02 reading) when the scale factor of 10 is applied. This value represents a small inverter and motor size; your reading may differ.
- Word 3 – The decimal value of "0" for trip code (D_08 reading) corresponds to "no trip" status.

NOTE: When a trip event occurs, the polled I/O will indicate it by Trip Bit = 1 in Word 0 and the actual Trip Code in Word 3. When the trip condition is cleared (Stop/Reset key), then the Trip bit = 0, but the Trip Code in Word 3 remains. To clear it also, you must clear the inverter's trip history. For more information, see "Restoring Factory Default Settings" on page 99.

k. Press the Stop/Reset key on the inverter. This will cause the motor to stop, and the Polled I/O (produced data) shown above will return to 0 values.

l. To complete this monitoring sequence, stop the host computer's DeviceNet scan.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 7 – Control Test – Verify Network Host Can *Control* Inverter

If your network host computer successfully monitored the inverter's operation in Step 6, then achieving control capability from the network host in this step will be easy. First, it is important to know how to change inverter control between local (keypad) control and network control. Then you will be ready to control the inverter from the network.

Parameter Changes and Network Errors – Note that changing "P Group" DeviceNet parameter values in the inverter causes the inverter to reset and initialize its network operations. If the DeviceNet host computer is scanning at that moment, the inverter will cause a network time-out error when it initializes. So, you can avoid these network errors by stopping the network scan activity before changing "P Group" parameter values.

Configuring for Network Control – The configuration for network control depends on several factors. Understanding the principles below will help simplify how network control works:

- "Local control" refers to the inverter accepting Run/Stop commands from either its keypad or input terminals [FW] or [RV], if configured. "Network control" refers to a host computer remotely sending Run/Stop commands via a DeviceNet connection.
- A DeviceNet setting or signal at the inverter *enables* or *permits* network control. This means that an operator or control system at the inverter can, at any time, take back control of the inverter from a network host by disabling DeviceNet control.
- The inverter uses P_43 DeviceNet Control Enable for the primary method of control selection. By default, P_43 = 1 (set to enable network control).
- Alternatively, you can assign the intelligent input terminal [DNT] Select DeviceNet. Its ON/OFF states work the same way as P_43 settings. Note that when [DNT] is assigned to an input terminal, the inverter ignores the P_43 setting.

The table below summarizes these network control principles.

Configuring Network Control of Inverter

No.	P_43 DeviceNet Control Enable	[DNT] Select DeviceNet	Control Method Description
1	P_43 = 1, Enable (default setting)	(not assigned)	Inverter control may be done via network polled I/O. Inverter automatically resumes local control if network host sets Network Control bit = OFF, or the network scan or connection is lost.
2	P_43 = 0, Disable	(not assigned)	The inverter ignores network polled I/O control. However, the network host can still monitor the inverter via polled I/O, and it can use explicit messaging to get or set parameter values.
3	—	[DNT] = ON	Same description as No. 1. (When [DNT] is assigned, the inverter ignores P _43 setting.)
4	—	[DNT] = OFF	Same description as No. 2. (When [DNT] is assigned, the inverter ignores P _43 setting.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

When the inverter has enabled DeviceNet control via P_43 or a [DNT] terminal input signal, the DeviceNet host may control the inverter. However, the host computer must also set bit(s) in the polled I/O that is input data (consumed I/O) to the inverter. The bit names and definitions are:

- **Network Control** – When the Network Control bit = 1, the host computer indicates that it wants to control the inverter. If the inverter setting P_43 or [DNT] has enabled control, then the host computer can give FW Run and RV Run commands.
- **Network Reference** – Independent of network control, the host computer can supply the following parameter values for real-time motor control:
  - Output frequency – An alternate source for F_01 Output Frequency Setting
  - Acceleration time – An alternate source for F_02 Acceleration Time Setting
  - Deceleration time – An alternate source for F_03 Deceleration Time Setting

  When the Network Reference bit = 1, the host computer indicates that it wants to supply the output frequency and accel/decel setting to the inverter. If the inverter setting P_43 or [DNT] has enabled network control, the inverter will use the alternate values via DeviceNet. This applies independently of the Network Control bit setting.

The table below describes the Network Control and Network Reference setting logic. The logic requires that the inverter has enabled DeviceNet control as described above.

Network Control and Network Reference Bit Logic *1				
No.	**Network Control bit**	**Network Reference Bit**	**Source for Run/Stop**	**Source for Output Freq. / Accel / Decel**
1	0	0	Inverter	F_01, F_02, F_03
2	1	0	Network host	F_01, F_02, F_03
3	1	1	Network host	Polled I/O from host
4	0	1	Inverter	Polled I/O from host

Note 1: Logic above requires inverter's P_43 or [DNT] to enable DeviceNet control.

Typically a network host computer needs to have control of Run/Stop, speed, accel, and decel. This corresponds to No. 3 above, where both Network Control and Network Reference bits are set = 1. If the inverter needs temporary local control, you can either:

- Turn OFF the Network Control bit and/or Network Reference bit at the network host. Note that if you turn OFF only one of the two bits, the Run/Stop control comes from one device and the speed / accel / decel values comes from the other device. Or,
- Use the inverter's DeviceNet enable settings P_43 or the input terminal [DNT] (whichever is in effect) to temporarily disable DeviceNet control. This will cause the inverter to have local control of Run/Stop and the speed / accel / decel settings.

The DeviceNet network may remain online (scanning) without errors while changing the control between local or network, or changing the speed / accel / decel source.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Polled I/O Data Map, Inverter Inputs – The polled I/O for the inverter maps to four words (16 bits each) input data, and four words output data. In this section, we are concerned with the four words the host computer uses to control the inverter.

The following Polled I/O table shows how the host computer's control bits and reference data (output freq. / accel / decel) are organized. Word 0 (lower byte) contains discrete (individual) bits (used as flags). Data words 1, 2, and 3 contain values (used as scalar numbers). When the network is active, polled I/O data is automatically updated on each network scan.

Inverter Consumed Data, (Host) Output Instance (P_46) = 100								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	—	Network Reference	Network Control	—	Free run Stop	Fault Reset	RV Run	FW Run
1	—							
2	Output frequency (low byte), host override for F_01 value							
3	Output frequency (high byte), host override for F_01 value							
4	Acceleration time (low byte), host override for F_02 value							
5	Acceleration time (high byte), host override for F_02 value							
6	Deceleration time (low byte), host override for F_03 value							
7	Deceleration time (high byte), host override for F_03 value							



NOTE: P_46 = 20 and P_46 = 21 settings provide additional consumed data configurations (not used in this example). See "Polled I/O Configurations" on page 66.

The following table defines individual bits of the control byte.

Inverter Consumed Data, Control Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	FW Run	Stop	FW Run command
1	RV Run	Stop	RV Run command
2	Fault Reset	—	Reset the inverter, clear trip
3	Free Run Stop	—	Cause motor to free run (coast) and stop
4	—	—	—
5	Network Control	Run/Stop control is local to inverter	Run/Stop control is from network host polled I/O
6	Network Reference	Output freq. / accel / decel is from F_01, F_02, F_03	Output freq. / accel / decel is from network host polled I/O
7	—	—	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Control Sequence 1 – In this first sequence, the DeviceNet host computer will control the inverter (Run/Stop), but the inverter will use its internal parameters for output frequency / accel / decel (F_01, F_02, and F_03). This sequence assumes that you have successfully completed the Monitoring Sequence in Step 6.

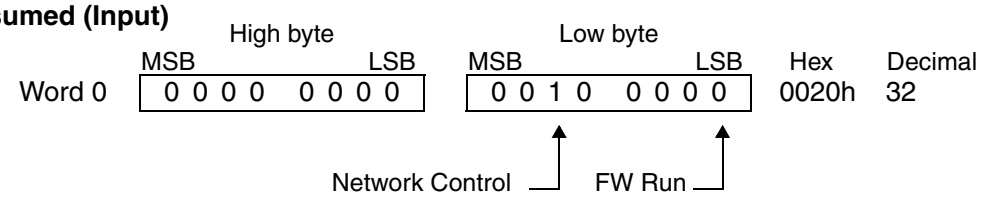
a. Confirm that the DeviceNet network is online, and the host computer is scanning the network.

b. Confirm that the Run Key Enable LED is still ON. It is directly above the Run key. If it is OFF, then be sure to set A_02 = 02. (This sequence will not make use of the Run key, but it will ask you to observe the Run Key Enable LED.)

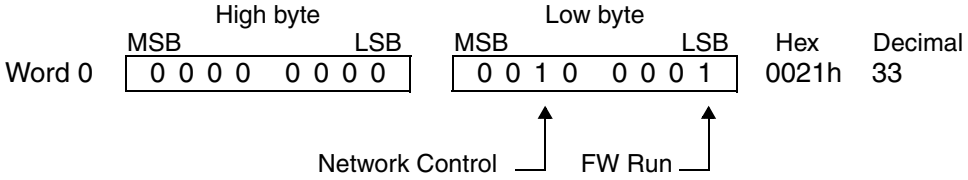
c. Confirm that the motor is stopped.

d. Refer to the control byte in Word 0 as shown below. With the host computer, set the Network Control bit (bit 5) = 1. As you do this, notice that the Run Key Enable LED on the inverter turns OFF. This indicates that the inverter has switched its control source from local to network control.

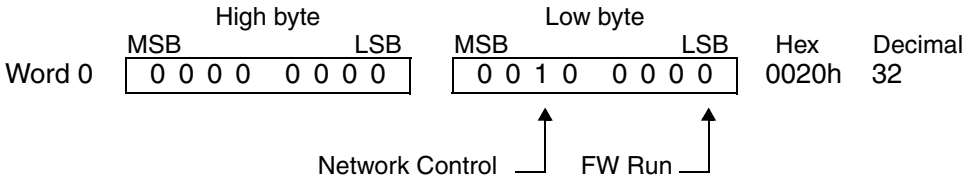
Inverter Polled I/O Consumed (Input)



e. Turn ON the FW Run bit (bit 0) in Word 0 as shown below. The motor will now begin to run. The output frequency will be 15.00Hz (set by F_01). To verify the motor speed, monitor D_01 on the inverter display, or use the host computer to observe the actual output frequency reported in the polled I/O.



f. Now turn OFF the FW Run bit (bit 0) in Word 0 as shown below. The motor will now stop.



The first control sequence is complete. The host computer controlled the inverter with Run/Stop, allowing the inverter to use its own profile parameters (F_01, F_02, F_03).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Control Sequence 2 – In this second sequence, the DeviceNet host computer will control the inverter (Run/Stop) and also provide values for output frequency / accel / decel (overrides F_01, F_02, and F_03). This sequence assumes that you have successfully completed Control Sequence 1 on the previous page.

a. Confirm that the motor is stopped.

b. Turn ON the Network Reference bit (bit 6) in Word 0 as shown below. This indicates to the inverter that the network will supply real-time profile values for output frequency / accel / decel. (The Network Control bit should still be ON.) DO NOT turn on the FW Run bit (bit 0) yet.

Inverter Polled I/O Consumed (Input)

	High byte MSB	LSB	Low byte MSB	LSB	Hex	Decimal
Word 0	0 0 0 0	0 0 0 0	0 1 1 0	0 0 0 0	0060h	96

Network Reference
Network Control
FW Run

c. Refer to the values for Word 1, Word 2, and Word 3 listed below. With the host computer, set the values as indicated.
Word 1 (Output Frequency) = 2000 decimal (20.00Hz)
Word 2 (Acceleration time) = 100 decimal (10.0 seconds)
Word 3 (Deceleration time) = 100 decimal (10.0 seconds)
The host computer's polled I/O output data should match the values below.

	High byte MSB	LSB	Low byte MSB	LSB	Hex	Decimal
Word 0	0 0 0 0	0 0 0 1	0 0 1 0	0 0 0 0	0060h	96
Word 1	0 0 0 0	0 1 0 1	1 1 0 1	1 1 0 0	07D0h	2000
Word 2	0 0 0 0	0 0 0 0	0 1 1 0	0 1 0 0	0064h	100
Word 3	0 0 0 0	0 0 0 0	0 1 1 0	0 1 0 0	0064h	100

NOTE: The scaling of the polled I/O data for output frequency /accel / decel values corresponds to the network scale factors for parameters F_01, F_02, and F_03, respectively. A listing of inverter parameters and scale factors is in the "Network Register Map" on page 78.

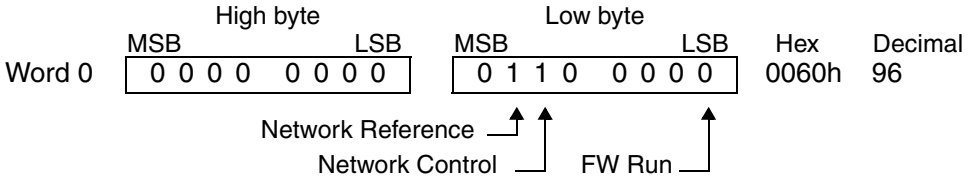
d. Turn ON the FW Run bit (bit 1) in Word 0 as shown below. The motor will now begin to run. The output frequency will be 20.00Hz. To verify the motor speed, monitor D_01 on the inverter display, or use the host computer to observe the actual output frequency reported in the polled I/O.

	High byte MSB	LSB	Low byte MSB	LSB	Hex	Decimal
Word 0	0 0 0 0	0 0 0 0	0 1 1 0	0 0 0 1	0061h	97

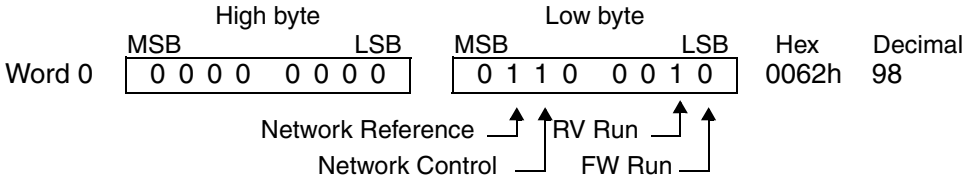
Network Reference
Network Control
FW Run

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

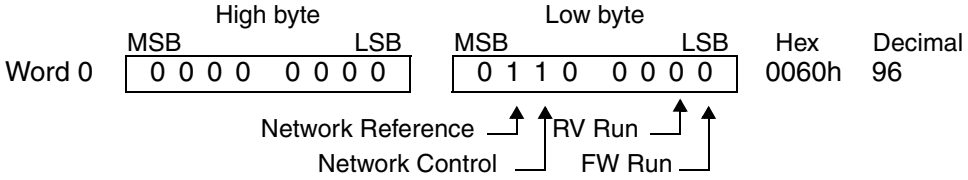
e. Now turn OFF the FW Run bit (bit 1) in Word 0 as shown below. The motor will now stop.



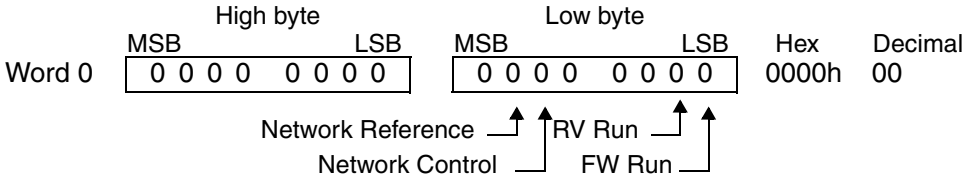
f. To demonstrate another control bit, turn on the RV Run bit (bit 1) as shown below. The motor will now run in the reverse direction.



g. Now turn OFF the RV Run bit (bit 1) in Word 0 as shown below. The motor will now stop.



h. Finally, turn OFF the Network Control bit (bit 5) and the Network Reference bit (bit 6) as shown below. Notice that the inverter's Run Key Enable LED now turns ON, indicating that the inverter's control source is local (keypad or terminal).



The second control sequence is complete. The host computer controlled the inverter with Run/Stop (both directions), and also supplied the profile parameter values for output frequency / accel / decel.

WARNING: Your application may require stopping the motor suddenly, in certain conditions, to avoid injury to personnel or equipment damage. If so, be sure to configure the [STP] input terminal on the inverter, described in "Three-wire Interface Operation" on page 34. This will provide a way for the control environment at the inverter to stop the motor, should the host computer fail to turn the motor OFF when required.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Host Output Data Notes – The following list provides further details on how the inverter responds to the polled I/O data from the host computer.

- Out-of-range data will be ignored.
- When the inverter is in Run Mode (FW Run or RV Run), any change to the Net Control bit or the Net Reference bit will be ignored.
- When an intelligent input terminal [CF1], [CF2], [CF3], [CF4], [JG], or [2CH] turns ON, the inverter performs the related function with priority.
- If the inverter reset is ON at powerup, a communication time-out error will occur at the master. In this case, the master will need to re-establish communications.
- When an inverter has a power cycle or reset, the DeviceNet master may request to start or resume motor rotation. If the master does not specify the accel or decel times (in the polled I/O, the inverter will use the F_02 and F_03 values.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 8 – Use DeviceNet Explicit Messaging

The control sequences in Step 7 showed how the network host computer can control the inverter via polled I/O. While polled I/O data is continuously supplied (on each network scan), it contains only a small set of control bits and values for the main running profile. In addition, the inverter provides a direct way host computer to access individual inverter parameters. In DeviceNet terminology, it is called *explicit messaging*.

The DeviceNet standards provide for a way to address individual devices on the network (*nodes*), and data (*attributes*) within each device. A complete address consists of four numbers: the Node Address (MAC ID), the Object Class Identifier, the Instance Number, and the Attribute Number. An explicit message connection between two devices uses these four numbers to identify and transfer data on a DeviceNet network. The four address components and their ranges are shown in the following table:

Address Component	Lowest	Highest
Node	0	63
Class	1	65535
Instance	0	65535
Attribute	1	255

A particular inverter on the network has a specific node address (default = 63). To access a particular parameter in that inverter, the host computer uses the class, instance, and attribute numbers together. The address ranges indicated in the table above could access any one of thousands of values within a device, if needed. In DeviceNet terminology, a *read* access is called *get*, and a *write* access is called a *set*.

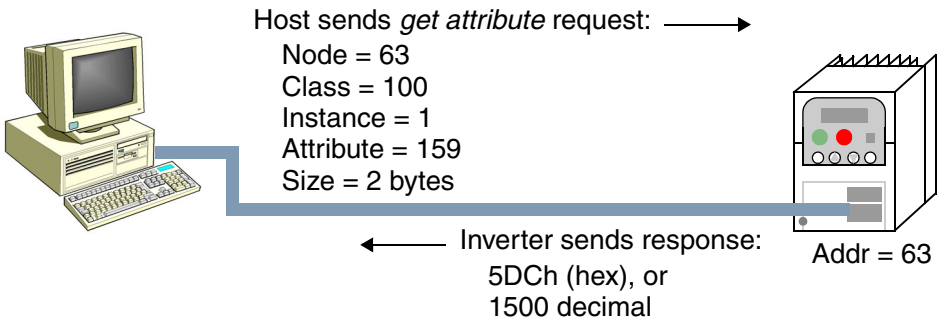
The assignment of DeviceNet explicit messaging addresses to inverters is somewhat arbitrary. In this step we consider an example parameter, but the complete set for the SJ100DN Series inverter is listed in the "Network Register Map" on page 78. The table excerpt below shows parameter F_01 and its network address for explicit messaging.

"F" Group Parameters, Example		DeviceNet Class ID = 100					
Func. Code	Name	Inst	Attr	Size	Range	Scaling	Get/ Set
F_01	Output frequency setting	1	159	2	0 – 360Hz	100	Get

When you construct a *get attribute* or *set attribute* request, refer to the Class ID in the table title bar (100), and the Inst, Attr, and Size columns (1, 159, 2).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A *get attribute* request from the host computer and the inverter's response is shown in the diagram below.



To perform the network request for parameter F_01 in the inverter, do the following:

a. Verify that your DeviceNet is running and the host computer is scanning.

b. In your host computer application, locate the mechanism for explicit messaging. Refer to your host computer documentation if necessary.

c. Enter the node, class, Instance, attribute and size numbers in the above diagram.

d. Set the preferred display data format (hex or decimal) of the response (if your host application provides this.

e. Have the host computer send the explicit message.

f. Verify the inverter's response is 5DCh, or 1500 decimal. If not, check the values in the *get attribute* request, and check the present value of parameter F_01 at the inverter.

g. Apply the scale factor in the Network Register Map table. For F_01, divide by 100, so "1500" becomes 15.00Hz.

A set attribute request works similarly, but you must choose a parameter that permits a set operation. refer to the right-most column of the table for Get/Set permissions.

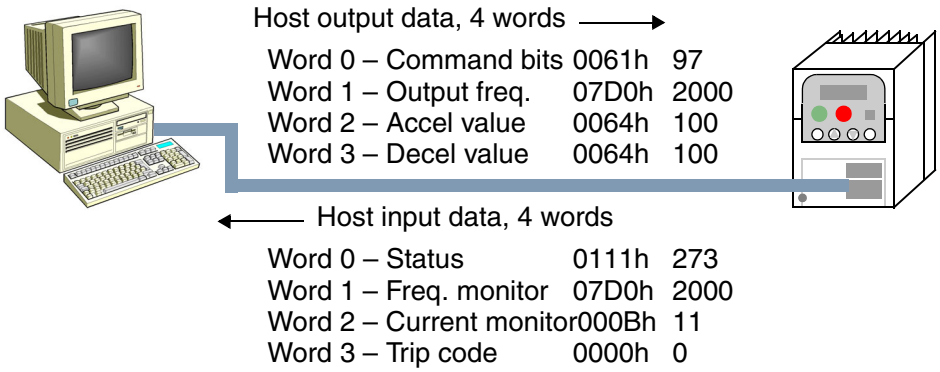
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 9 – Create a Host Computer Control Program

This section will provide an outline for constructing an example program for your host computer control application. The example will use a simple forward and reverse rotation for the velocity profile. Control programs for DeviceNet exist in a variety of languages (relay ladder logic, flow charts, high-level language, etc.). Therefore, the example program will be generic. It will use polled I/O for sending the basic commands and to get parameters, but your program could also use explicit messaging to access any inverter parameter.

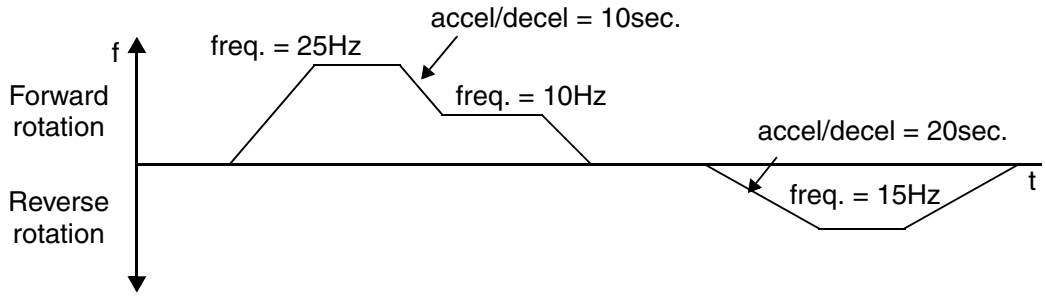
The following diagram shows the polled I/O data transmitted on a single network scan. At the moment of the scan, the inverter output is running the motor in the forward direction at 20.00Hz. The acceleration and deceleration times are set to 10.0 seconds.

Polled I/O Data



The figure below shows the velocity profile for the example program. It consists of a forward rotation followed by a reverse rotation. The program will send the commands and parameter values to set the speed and accel/decel values.

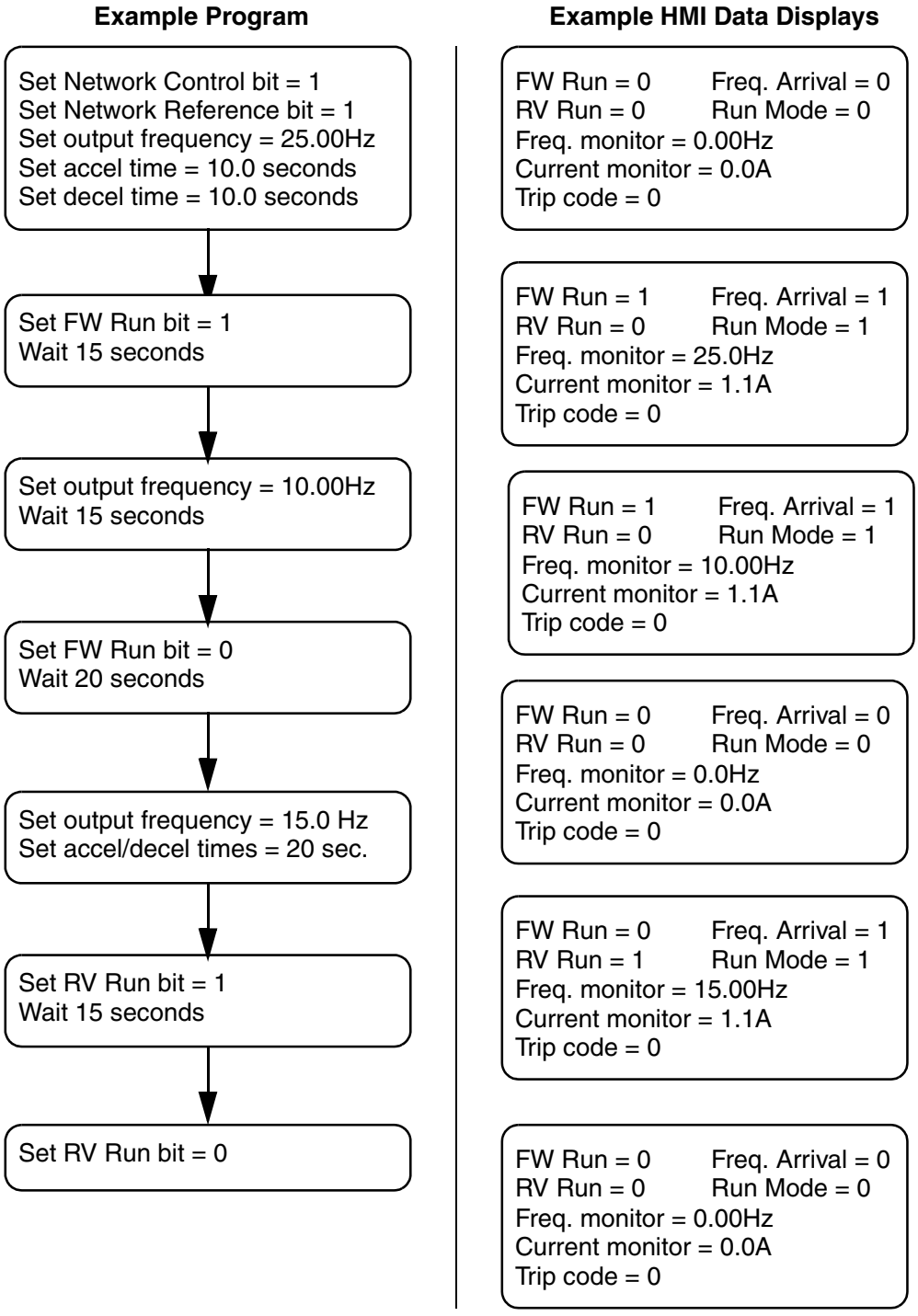
Program Example



Command Bit Sequencing – The order of 0-to-1 transitions of the host computer's Word 0 command bits is important. First, set the Network Control bit (bit 5) and/or the Network Reference bit (bit 6) as needed. Then you can set the FW Run or RV Run bit to rotate the motor. If either Run bit is set = 1 *before* the Network Control bit is set = 1, the inverter will ignore the request.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

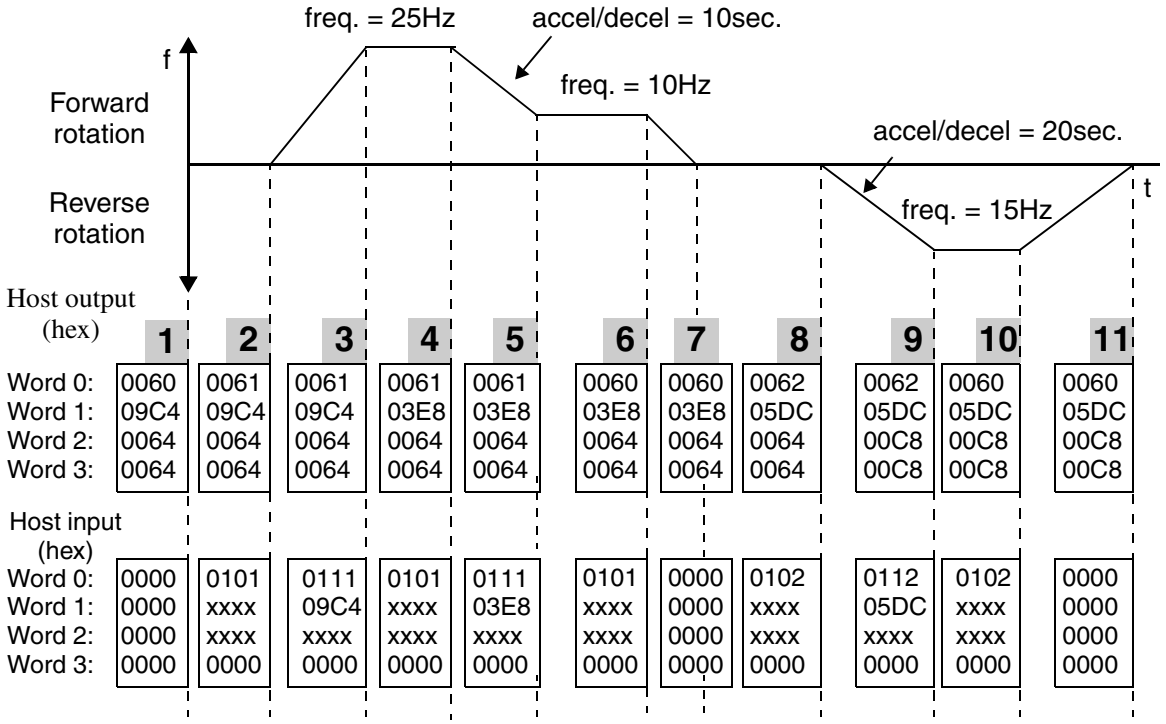
Example Program Sequence – The following host computer example program uses a flowchart to send commands and values to the inverter (host output, 4 words). The example HMI (Human-Machine Interface) data display shows the host monitoring the inverter data (host input, 4 words). All number values are in decimal format.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The diagram below shows the example inverter output velocity profile. The dashed lines correlate a profile change with the DeviceNet data related to that event. Data is in hex format. A value of "xxxx" means the value is changing at that point in the profile.

Program Example With Data



Timeline Step	Host Computer				SJ100DN Inverter		
	Action	Cmd	Freq.	Accel/ Decel	Response	Status	Freq. Mon.
1	Stop	0060h	25 Hz	10 sec.	Stop	0000h	0000h
2	FW Run	0061h	25.00 = 09C4h	10 = 0064h	Accel stage	0101h	xxxxh
3					Constant speed	0111h	09C4h
4	Change speed	same	10 Hz 10.00 = 03E8	same	Decel stage	0101h	xxxxh
5					Constant speed	0111h	03E8h
6	Stop	0060h	same	same	Decel stage	0101h	xxxxh
7					Stop	0000h	0000h
8	RV run	0062h	15 Hz 15.00 = 05DCh	20 sec. = 00C8h	Accel stage	0102h	xxxxh
9					Constant speed	0112h	05DCh
10	Stop	0060h	same	same	Decel stage	0102h	xxxxh
11					Stop	0000h	0000h

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Polled I/O Configurations

SJ100DN inverters offer three host output and host input polled I/O data configurations. These correspond to P_46 / P_47 = 20 / 70, 21 / 71, or 100 / 101. Each configuration differs in its use of up to 4 output or 4 input words (other combinations can cause network errors.) The DeviceNet networking example in the previous steps used the default polled I/O configuration (P_46 = 100 and P_47 = 101). This section describes each available polled I/O configuration.

Host Output Instance Configurations – The tables below list the three configurations for host output data (settable by P_46).

Inverter Consumed Data, (Host) Output Instance (P_46) = 20								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	—	—	—	—	—	Fault Reset	—	FW Run
1	—							
2	Output frequency (low byte), host override for F_01 value							
3	Output frequency (high byte), host override for F_01 value							

Inverter Consumed Data, (Host) Output Instance (P_46) = 21								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	—	Network Refer-ence	Network Control	—	—	Fault Reset	RV Run	FW Run
1	—							
2	Output frequency (low byte), host override for F_01 value							
3	Output frequency (high byte), host override for F_01 value							

Inverter Consumed Data, (Host) Output Instance (P_46) = 100								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	—	Network Refer-ence	Network Control	—	Free run Stop	Fault Reset	RV Run	FW Run
1	—							
2	Output frequency (low byte), host override for F_01 value							
3	Output frequency (high byte), host override for F_01 value							
4	Acceleration time (low byte), host override for F_02 value							
5	Acceleration time (high byte), host override for F_02 value							
6	Deceleration time (low byte), host override for F_03 value							
7	Deceleration time (high byte), host override for F_03 value							

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The control bits (Byte 0) of each host output instance use some or all of the bits defined in the following table.

Inverter Consumed Data, Control Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	FW Run	Stop	FW Run command
1	RV Run	Stop	RV Run command
2	Fault Reset	—	Reset the inverter, clear trip
3	Free Run Stop	—	Cause motor to free run (coast) and stop
4	—	—	—
5	Network Control	Run/Stop control is local to inverter	Run/Stop control is from network host polled I/O
6	Network Reference	Output freq. / accel / decel is from F_01, F_02, F_03	Output freq. / accel / decel is from network host polled I/O
7	—	—	—

Host Input Instance Configurations – The following tables list the three configurations for host input data (settable by P_47).

Inverter Produced Data, (Host) Input Instance (P_47) = 70								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	—	—	—	—	—	FW Run	—	Trip
1	Inverter status (see status code table, next page)							
2	Output frequency monitor (low byte), D_01 value							
3	Output frequency monitor (high byte), D_01 value							

The table below expands Byte 0 in the preceding table.

Inverter Produced Data, Status Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	Trip	No faults exist	Trip exists, not cleared
1	—	—	—
2	FW Run	Inverter stopped or in RV	Inverter in FW Run
3, 4, 5, 6, 7	—	—	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Inverter Produced Data, (Host) Input Instance (P_47) = 71								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Freq. Arrival	Network Refer-ence	Network Control	Ready	RV Run	FW Run	Warning	Trip
1	Inverter status (see status code table, next page)							
2	Output frequency monitor (low byte), D_01 value							
3	Output frequency monitor (high byte), D_01 value							

The table below expands Byte 0 in the preceding table.

Inverter Produced Data, Status Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	Trip	No faults exist	Trip exists, not cleared
1	Warning	No warning exists	Warning condition exists
2	FW Run	Inverter stopped or in RV	Inverter in FW Run
3	RV Run	Inverter stopped or in FW	Inverter in RV Run
4	Ready	Inverter is not ready	Inverter is ready (status byte code = 3, 4, or 5)
5	Network Control	Run/Stop control is local to inverter	Run/Stop control is from network host polled I/O
6	Network Reference	Output freq. / accel / decel is from F_01, F_02, F_03	Output freq. / accel / decel is from network host polled I/O
7	Frequency Arrival	Inverter stopped, or in accel or decel	Inverter output arrived at target freq.

Inverter Produced Data, (Host) Input Instance (P_47) = 101								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Input term. [3]	Input term. [2]	Input term. [1]	Freq. Arrival	—	Trip	RV Run	FW Run
1	Inverter status (see status code table, next page)							
2	Output frequency monitor (low byte), D_01 value							
3	Output frequency monitor (high byte), D_01 value							
4	Output current monitor (low byte), D_02 value							
5	Output current monitor (high byte), D_02 value							
6	Trip error code, D_08 value							
7	—							

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The table below expands Byte 0 in the preceding table.

Inverter Produced Data, Status Byte			
Bit	**Name**	**Bit = 0**	**Bit = 1**
0	FW Run	Inverter stopped or in RV	Inverter in FW Run
1	RV Run	Inverter stopped or in FW	Inverter in RV Run
2	Trip	No faults exist	Trip exists, not cleared
3	—	—	—
4	Frequency arrival	Inverter stopped, or in accel or decel	Inverter output arrived at target freq.
5	Input terminal [1]	Input [1] = OFF	Input [1] = ON
6	Input terminal [2]	Input [2] = OFF	Input [2] = ON
7	Input terminal [3]	Input [3] = OFF	Input [3] = ON

Inverter Status – The following table describes the Inverter Status (Byte 1) for all host output instances (P_47=70, P_47=71, and P_47=101).

Inverter Produced Data, Inverter State Code Byte	
Code (dec.)	**Description**
0	The inverter is Stop Mode.
1	The inverter is in Run Mode.
2	The inverter is in Jog Mode.
3	The inverter is in Stop Mode and the motor output is free running (coasting).
4	The inverter is executing DC braking (includes CD braking wait time).
5	The inverter is attempting a restart with frequency matching (B_01 = 03).
6	The output is stopped for an instantaneous power failure.
7	The inverter is attempting a restart with frequency matching (B_01 = 02).
8	The inverter is waiting before it attempts a restart with frequency matching. The wait time is set by parameter B_03.
9	The inverter is in a trip condition, and is storing the trip history data to EEPROM. A Stop/Reset command to clear the trip is ignored in this state.
10	The inverter is in a trip condition.
11	An under-voltage condition exists at the inverter power input.
101 to 116	The inverter is in the auto-tuning process. The state codes within this range mean: 101 to 114 = executing auto-tuning algorithm 115 = successful completion 116 = failed auto-tuning

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Troubleshooting and Maintenance

This section describes SJ100DN Series error codes corresponding to Chapter 6, "Troubleshooting and Maintenance," in the SJ100 Inverter Instruction Manual.

Error Codes and Notes

SJ100DN Series inverters have the additional error code listed below.

Error Code	Name	Cause(s)
E60	Communication error	• The DeviceNet cable may be disconnected or have an open wire, short, etc. • The communication error may be due to the external device. Check whether the interruption is for more than 3 seconds before resetting the error. If so, the watchdog timer in the inverter is timing out due to no response from the external device.

A DeviceNet communication error will result in an inverter trip with error code 60, as well as other actions that you can specify. The table below lists the DeviceNet fault types detected and the inverter actions.

DeviceNet Error Type	Inverter Action
Bus-OFF detection *1	P_45 setting (*2), five options: 00 .. Trip 01 .. Decelerate and trip 02 .. Hold last speed 03 .. Free-run stop 04 .. Decelerate and stop
DeviceNet watchdog timer time-out (time period in P_44 setting) *3	(same as above)
DeviceNet connection time-out *4	Decelerate and trip
Connection released *5	Decelerate and trip

Note 1: The inverter does not support DeviceNet requests during a communication fault. To clear a Bus-OFF error, power cycle the inverter or reset it via [RS].

Note 2: The P_45 setting only applies to the inverter's DeviceNet watchdog timer time-out, not a connection time-out or a host connection release event.

Note 3: The inverter's DeviceNet watchdog timer is active whenever the inverter is in Run Mode and its DeviceNet connection is enabled. (The DeviceNet connection may be enabled either by P_43 = 1 or when the signal is ON at the intelligent input terminal [DNT], if assigned. [DNT] input has priority over P_43.)

Note 4: The DeviceNet connection time-out refers to the time-out within the DeviceNet Connection Object, per the DeviceNet specifications. In if Run Mode when the time-out occurs, the inverter decelerates the motor to a stop.

Note 5: The host computer can release the connection to the inverter via the standard service release mechanism. In if Run Mode when the time-out occurs, the inverter decelerates the motor to a stop.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix A: DeviceNet Object Lists

This appendix contains DeviceNet Object Lists for the inverter to comply with DeviceNet specifications. Some host computer applications automatically handle the low-level details of object list attributes. So, you may or may not need this information when developing your host application program.

Device Profile		
Category	**Item**	**Description**
General Device Data	DeviceNet Specification, conforms to version #	Volume I – Release 2.0 Volume II – Release 2.0
	Vendor name	Hitachi, Ltd. (Vendor ID = 74)
	Device profile name	AC Drive (Profile number = 2)
	Product catalog number	—
	Product revision	3.2
Physical conformance data	Network power consumption	50mA at 11VDC
	Connector style	Open-pluggable
	Isolated physical layer	Yes
	LEDs supported	Module Status LED Network Status LED
	Default MAC ID	63
	Baud rate selection	Software selectable
	Baud rate settings	125, 250, and 500 k bits/sec.
Communication Data	DeviceNet network behavior	Group 2 server only
	UCMM supported	No
	DeviceNet connection supported	Polled I/O, Explicit Messaging
	Fragmented explicit messaging supported	Yes, acknowledge time-out = 1200ms

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The DeviceNet object lists in this section contain data types that are identified by DeviceNet standard acronyms, defined in the following table:

Acronym	Data Type Description	Range
BOOL	Boolean	Bit
BYTE	Bit string	1 Byte (8 bits)
WORD	Bit string	2 Bytes (16 bits)
STRING	String	Variable bits, variable range
USINT	Unsigned short integer	Int (1 Byte) – (0...255)
UINT	Unsigned integer	Int (2 Bytes) – (0...65535)
UDINT	Unsigned double integer	Int (4 Bytes) – (0...2^{32}–1)
SINT	Signed short integer	Int (1 Byte) – (–128...+127)
INT	Signed integer	Int (2 Bytes) – (–32768...+32767)
DINT	Signed double integer	Int (4 Bytes) – (–2^{31}...+2^{31}–1)

In the following Object tables, the Class ID numbers are in hex format.

Identity Object (Class ID = 1 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	(not supported)	—	—	—	—
Instance 1	Vendor ID	1	Get	UINT	74
	Device type	2	Get	UINT	2 (AC drive)
	Product code	3	Get	UINT	SJ100DN2 = 0702h
	Major revision	4	Get	USINT	3
	Minor revision		Get	USINT	2
	Status	5	Get	WORD	0
	Serial number	6	Get	UDINT	Factory initialized
	Product name	7	Get	STRING	“SJ100DN”

Supported Services, Identity Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Reset	05h	0.....Reset 1.....History clear and data initialize
NOP	17h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Error Responses to Set_Attribute_Single – In certain conditions the inverter cannot Set an attribute as the host has requested. For example, the host's data might be out-of-range for the specified parameter. The inverter will return an error code, listed for the specific condition in the table below.

Error Condition	Type	Type code	Specific error code
The inverter is in Run Mode	Device state conflict	10h	00
A trip, undervoltage, or trip-retry exists			01
Software lock mode enabled			02
Executing auto-tuning			04
Value less than start frequency setting	Invalid parameter (check F_01, A_03, A203, A_20–A_35, A220, A_38, A_52, A_61, A_62)	20h	00
Value less than lower frequency limit setting			01
Value more than upper frequency limit setting			02
Value more than maximum frequency setting			03
Out-of-range condition not listed above	Invalid parameter		04



NOTE: The Message Router Object (Class ID = 2 hex) is supported, but has no setting.

DeviceNet Object (Class ID = 3 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	Revision	1	Get	UINT	2
Instance 1	MAC ID	1	Get/Set	USINT	63
	Baud rate	2	Get/Set	USINT	125k bits/sec.
	BOI	3	Get	BOOL	0
	Bus OFF counter	4	Get/Set	USINT	0
	Allocation information choice byte	5	Get	BYTE	—
	Master's MAC ID	—	—	USINT	—

Supported Services, DeviceNet Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	
Allocate_M/S_Connection_Set	4Bh	
Release_M/S_Connection_Set	4Ch	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Assembly Object (Class ID = 4 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	(not supported)	—	—	—	—
Instance 20	DATA	3	Get/Set	4 Bytes	—
Instance 21	DATA	3	Get/Set	4 Bytes	—
Instance 70	DATA	3	Get	4 Bytes	—
Instance 71	DATA	3	Get	4 Bytes	—
Instance 100	DATA	3	Get/Set	8 Bytes	—
Instance 101	DATA	3	Get	8 Bytes	—

Supported Services, Assembly Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Connection Object (Class ID = 5 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	(not supported)	—	—	—	—
Instance 1	State	1	Get	USINT	—
	Instance type	2	Get	USINT	00
	Transport class trigger	3	Get	BYTE	83h
	Produced connection ID	4	Get	UINT	—
	Consumed connection ID	5	Get	UINT	—
	Initial comm. characteristics	6	Get	BYTE	21h
	Produced connection size	7	Get	UINT	C8h
	Consumed connection size	8	Get	UINT	C8h
	Expected packet rate	9	Get/Set	UINT	09C4h
	Watchdog time-out action	12	Get/Set	USINT	1
	Produced conn. path length	13	Get	UINT	0
	Produced connection path	14	Get	UINTarray	—
	Consumed conn. path length	15	Get	UINT	0
	Consumed connection path	16	Get	UINT array	—

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Connection Object (Class ID = 5 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Instance 2	State	1	Get	USINT	—
	Instance type	2	Get	USINT	01
	Transport class trigger	3	Get	BYTE	82h
	Produced connection ID	4	Get	UINT	—
	Consumed connection ID	5	Get	UINT	—
	Initial comm. characteristics	6	Get	BYTE	01h
	Produced connection size	7	Get	UINT	08h
	Consumed connection size	8	Get	UINT	08h
	Expected packet rate	9	Get/Set	UINT	03E8h
	Watchdog time-out action	12	Get/Set	USINT	0
	Produced conn. path length	13	Get	UINT	3
	Produced connection path	14	Get	UINT array	623625
	Consumed conn. path length	15	Get	UINT	3
	Consumed connection path	16	Get	UINT array	623624

Supported Services, Connection Object		
Service Name	**Code**	**Description**
Reset	05h	
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Motor Data Object (Class ID = 28 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	Revision	1	Get	WORD	0001
Instance 1	Motor Type	3	Get	BYTE	07
	Rated Current	6	Get/Set	WORD	B_12
	Rated Voltage	7	Get/Set	WORD	A_82
	Pole Count	12	Get/Set	WORD	P_49

Supported Services, Motor Data Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Control Supervisor Object (Class ID = 29 hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	Revision	1	Get	WORD	0001
Instance 1	Run1	3	Get/Set	BYTE	00
	Run2	4	Get/Set	BYTE	00
	Network Control	5	Get/Set	BYTE	00
	State	6	Get	BYTE	—
	Running1	7	Get	BYTE	00
	Running2	8	Get	BYTE	00
	Ready	9	Get	BYTE	00
	Faulted	10	Get	BYTE	00
	Warning	11	Get	BYTE	00
	Fault reset	12	Get/Set	BYTE	00
	Fault code	13	Get	WORD	0000
	Control from Network	15	Get	BYTE	00
	DN fault mode	16	Get	BYTE	02
	Force fault/trip	17	Get/Set	BYTE	00
	Force status	18	Get	BYTE	00

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Supported Services, Control Supervisor Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

AC/DC Drive Object (Class ID = 2A hex)					
Category	**Attribute**	**ID**	**Access Rule**	**Data Type**	**Initialization**
Class	Revision	1	Get	WORD	0001
Instance 1	At Reference	3	Get	BYTE	00
	Network Reference	4	Get/Set	BYTE	00
	Drive mode	6	Get	BYTE	01
	Speed, actual	7	Get	WORD	0000
	Speed reference	8	Get/Set	WORD	F_01 setting
	Current, actual	9	Get	WORD	0000
	Current limit	10	Get/Set	WORD	B_21 setting
	Input voltage	16	Get	WORD	—
	Output voltage	17	Get	WORD	0000
	Accel time	18	Get/Set	WORD	F_02 setting
	Decel time	19	Get/Set	WORD	F_03 setting
	Low speed limit	20	Get/Set	WORD	A_62 setting
	High speed limit	21	Get/Set	WORD	A_04 setting
	Speed scale	22	Get/Set	BYTE	00
	Current scale	23	Get/Set	BYTE	00
	Voltage scale	27	Get/Set	BYTE	00
	Time scale	28	Get/Set	BYTE	00
	Reference from network	29	Get	BYTE	00

Supported Services, AC/DC Drive Object		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix B:
Network Register Map

The following tables list the DeviceNet explicit addressing to access inverter parameters. Each parameters address consists of Class ID, Instance, and Attribute. The host will also need to use the Size (number of bytes) in the request. Most of the parameters provide both Get and Set access (denoted by "G/S") in the tables).

The inverter returns scalar values in decimal format. The scale factors are presented in the Scaling column. To get a parameter's actual value, the host computer will need to divide the data by the scale factor (unless it is "1"). The result will be a decimal number with an integer part and a decimal (fractional) part.

Main Profile Parameters and Basic Inverter Data

"D" Group Parameters and Basic Inverter Data		DeviceNet Class ID = 100					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
—	Rated capacity	1	100	1	1 0.2 kW 2 0.4 kW 3 0.55 kW 4 0.75kW 5 1.1 kW 6 1.5 kW 7 2.2 kW 8 8.3 kW 9 3.7 kW 10 4.0 kW 11 5.5 kW 12 7.5 kW	—	Get
—	Input AC voltage class	1	101	1	1 200V 2 400V	—	Get
—	Rated output current	1	102	2	0.00 – 655.35A	100	Get
—	Inverter status	1	103	1	0 – 255	1	Get
D_01	Output frequency monitor	1	104	2	0.01 – 360.00Hz	100	Get
D_02	Output current monitor	1	105	2	0.00 – 655.35A	10	Get
D_03	Rotation direction monitor	1	106	1	1 forward 2 reverse	—	Get
D_05	Intelligent input terminal status	1	108	1	0 open 1 close, Bit 0 = terminal 1 Bit 1 = terminal 2 Bit 2 = terminal 3	—	Get

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"D" Group Parameters and Basic Inverter Data		DeviceNet Class ID = 100					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
D_06	Intelligent output terminal status	1	109	1	0 open 1 close, Bit 0 = terminal 11 Bit 1 = terminal 12	—	Get
D_07	Scaled output frequency monitor	1	110	4	0.00–35964.00Hz (= 360 * 99.9)	100	Get
D_16	Cumulative operation RUN time monitor	1	115	4	0 – FFFFFFh (hex) hours	1	Get
—	P–N voltage monitor	1	118	2	0.0 – 6553.5V	10	Get
—	Rate of BRD loading	1	119	1	0 – 100%	1	Get
—	Rate of electronic thermal loading	1	120	1	0 – 100%	1	Get
—	Trip count	1	121	1	0 – 255	1	Get
D_08	Trip event monitor (nth trip)	1	122	1	00 to 60 (see Ch.6 in manual)	—	Get
	Output frequency at trip point	1	123	2	0.01 – 360Hz	100	Get
	Motor current at trip point	1	124	2	0.00 – 655.35A	100	Get
	DC bus voltage at trip point	1	125	2	0.0 – 6553.5V	10	Get
	Cumulative operation RUN time at trip point	1	126	4	0 – FFFFFFh (hex) hours	1	Get
D_09	Trip event monitor (nth-1 trip)	1	128	1	00 to 60 (see Ch.6 in manual)	—	Get
	Output frequency at trip point	1	129	2	0.01 – 360Hz	100	Get
	Motor current at trip point	1	130	2	0.00 – 655.35A	100	Get
	DC bus voltage at trip point	1	131	2	0.0 – 6553.5V	10	Get
	Cumulative operation RUN time at trip point	1	132	4	0 – FFFFFFh (hex) hours	1	Get
D_09	Trip event monitor (nth-2 trip)	1	134	1	00 to 60 (see Ch.6 in manual)	—	Get
	Output frequency at trip point	1	135	2	0.01 – 360Hz	100	Get
	Motor current at trip point	1	136	2	0.00 – 655.35A	100	Get
	DC bus voltage at trip point	1	137	2	0.0 – 6553.5V	10	Get
	Cumulative operation RUN time at trip point	1	138	4	0 – FFFFFFh (hex) hours	1	Get

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"F" Group Parameters and Basic Inverter Data		DeviceNet Class ID = 100					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
F_01	Output frequency setting	1	159	2	0 – 360Hz	100	Get
F_02	Acceleration (1) time setting	1	160	2	0.1 – 3000.0 sec.	10	Get
F202	Acceleration (1) time setting, 2nd motor	2	160	2	0.1 – 3000.0 sec.	10	Get
F_03	Deceleration (1) time setting	1	161	2	0.1 – 3000.0 sec.	10	Get
F203	Deceleration (1) time setting, 2nd motor	2	161	2	0.1 – 3000.0 sec.	10	Get
F_04	Keypad Run key routing	1	162	1	0 forward 1 reverse 2 [F/R] terminal	—	Get
—	Input terminal functions monitor1	1	163	2	See EDS file	—	Get
—	Input terminal functions monitor2	1	164	2	See EDS file	—	Get
—	Input terminal functions setting1	1	165	2	See EDS file	—	Get
—	Input terminal functions setting2	1	166	2	See EDS file	—	Get
—	Output terminal functions monitor	1	167	1	See EDS file	—	Get

Supported Services, DeviceNet Class ID = 100		
Service Name	**Code**	**Description**
Reset	05h	Initializes all parameters to factory default values, excluding P_41 DeviceNet baud rate and P_42 DeviceNet MAC ID
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Standard Functions

"A" Group Parameters		DeviceNet Class ID = 101					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
A_02	Run command source setting	1	102	1	1 Control terminal 2 Run key on keypad	—	G/S
A_03	Base frequency setting	1	103	2	50Hz to maximum frequency	1	G/S
A203	Base frequency setting, 2nd motor	2	103	2	50Hz to maximum frequency	1	G/S
A_04	Maximum frequency setting	1	104	2	Base freq. to 360Hz	1	G/S
A204	Maximum frequency setting, 2nd motor	2	104	2	Base freq. to 360Hz	1	G/S
A_20	Multi-speed 0 setting	1	120	2	0.00 – 360.00Hz	100	G/S
A220	Multi-speed 0 setting, 2nd motor	2	120	2	0.00 – 360.00Hz	100	G/S
A_21	Multi-speed 1 setting	1	121	2	0.00 – 360.00Hz	100	G/S
A_22	Multi-speed 2 setting	1	122	2	0.00 – 360.00Hz	100	G/S
A_23	Multi-speed 3 setting	1	123	2	0.00 – 360.00Hz	100	G/S
A_24	Multi-speed 4 setting	1	124	2	0.00 – 360.00Hz	100	G/S
A_25	Multi-speed 5 setting	1	125	2	0.00 – 360.00Hz	100	G/S
A_26	Multi-speed 6 setting	1	126	2	0.00 – 360.00Hz	100	G/S
A_27	Multi-speed 7 setting	1	127	2	0.00 – 360.00Hz	100	G/S
A_28	Multi-speed 8 setting	1	128	2	0.00 – 360.00Hz	100	G/S
A_29	Multi-speed 9 setting	1	129	2	0.00 – 360.00Hz	100	G/S
A_30	Multi-speed 10 setting	1	130	2	0.00 – 360.00Hz	100	G/S
A_31	Multi-speed 11 setting	1	131	2	0.00 – 360.00Hz	100	G/S
A_32	Multi-speed 12 setting	1	132	2	0.00 – 360.00Hz	100	G/S
A_33	Multi-speed 13 setting	1	133	2	0.00 – 360.00Hz	100	G/S
A_34	Multi-speed 14 setting	1	134	2	0.00 – 360.00Hz	100	G/S
A_35	Multi-speed 15 setting	1	135	2	0.00 – 360.00Hz	100	G/S
A_38	Jog frequency setting	1	138	2	0.5 – 9.99Hz	100	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"A" Group Parameters		DeviceNet Class ID = 101					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
A_39	Jog stop mode	1	139	1	0 Free-run stop 1 Controlled deceleration 2 DC braking to stop	—	G/S
A_41	Torque boost method selection	1	141	1	0 Manual torque boost 1 Automatic torque boost	—	G/S
A241	Torque boost method selection, 2nd motor	2	141	1	0 Manual torque boost 1 Automatic torque boost	—	G/S
A_42	Manual torque boost value	1	142	1	0 – 99%	1	G/S
A242	Manual torque boost value, 2nd motor	2	142	2	0 – 99%	1	G/S
A_43	Manual torque boost frequency adjustment	1	143	2	0.0 – 50.0%	10	G/S
A243	Manual torque boost frequency adjustment, 2nd motor	2	143	2	0.0 – 50.0%	10	G/S
A_44	V/f characteristic curve selection	1	144	1	0 Constant torque 1 Reduced torque 2 Sensorless vector control	—	G/S
A244	V/f characteristic curve selection, 2nd motor	2	144	1	0 Constant torque 1 Reduced torque 2 Sensorless vector control	—	G/S
A_45	V/f gain setting	1	145	1	50 – 100%	1	G/S
A_51	DC braking enable	1	151	1	0 Disable 1 Enable	—	G/S
A_52	DC braking frequency setting	1	152	2	0.5 – 10.0Hz	100	G/S
A_53	DC braking wait time	1	153	1	0.1 – 5.0 sec.	10	G/S
A_54	DC braking force during deceleration	1	154	1	0 – 100%	1	G/S
A_55	DC braking time for deceleration	1	155	2	0.1 – 60.0 sec.	10	G/S
A_61	Frequency upper limit setting	1	161	2	0.0 Disable 0.5 – 360.0Hz	100	G/S
A_62	Frequency lower limit setting	1	162	2	0.0 Disable 0.5 – 360.0Hz	100	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"A" Group Parameters		DeviceNet Class ID = 101					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
A_63, A_65, A_67	Jump (center) frequency setting	1 1 1	163 165 167	2 2 2	0.0 – 360.0Hz	100	G/S
A_64, A_66, A_68	Jump (hysteresis) frequency width setting	1 1 1	164 166 168	2 2 2	0.0 – 360.0Hz	100	G/S
A_81	AVR function select	1	181	1	0 AVR enabled 1 AVR disabled 2 AVR enabled except during deceleration	—	G/S
A_82	AVR voltage select	1	182	1	0 200V 1 220V 2 230V 3 240V 4 380V 5 400V 6 415V 7 440V 8 460V	—	G/S
A_92	Acceleration (2) time setting	1	192	2	0.1 – 3000.0 sec.	10	G/S
A292	Acceleration (2) time setting, (2nd motor)	2	192	2	0.1 – 3000.0 sec.	10	G/S
A_93	Deceleration (2) time setting	1	193	2	0.1 – 3000.0 sec.	10	G/S
A293	Deceleration (2) time setting, (2nd motor)	2	193	2	0.1 – 3000.0 sec.	10	G/S
A_94	Select method to switch to Acc2/ Dec2 profile	1	194	1	0 2CH input from terminal 1 transition frequency	—	G/S
A294	Select method to switch to Acc2/ Dec2 profile, 2nd motor	2	194	1	0 2CH input from terminal 1 transition frequency	—	G/S
A_95	Acc1 to Acc2 frequency transition point	1	195	2	0.0 – 360.0Hz	100	G/S
A295	Acc1 to Acc2 frequency transition point, 2nd motor	2	195	2	0.0 – 360.0Hz	100	G/S
A_96	Dec1 to Dec2 frequency transition point	1	196	2	0.0 – 360.0Hz	100	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"A" Group Parameters		DeviceNet Class ID = 101					
Func. Code	Name	Inst	Attr	Size	Range	Scaling	Get/ Set
A296	Dec1 to Dec2 frequency transition point, 2nd motor	2	196	2	0.0 – 360.0Hz	100	G/S
A_97	Acceleration curve selection	1	197	1	0 linear 1 S-curve	—	G/S
A_98	Deceleration curve selection	1	198	1	0 linear 1 S-curve	—	G/S

Supported Services, DeviceNet Class ID = 101		
Service Name	Code	Description
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Fine Tuning Functions

"B" Group Parameters		DeviceNet Class ID = 103					
Func. Code	Name	Inst	Attr	Size	Range	Scaling	Get/ Set
B_01	Selection of automatic restart mode	1	101	1	0 Alarm output after trip, no automatic restart 1 Restart at 0Hz 2 Resume operation after freq. matching 3 Resume previous freq. after freq. matching, then decelerate to stop and display trip info.	—	G/S
B_02	Allowable under-voltage power failure time	1	102	2	0.3 – 25.0 sec.	10	G/S
B_03	Retry wait time before motor restart	1	103	2	0.3 – 100.0 sec.	10	G/S
B_12	Level of electronic thermal setting	1	112	2	5% to 120% rated current, in A	10	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"B" Group Parameters		DeviceNet Class ID = 103					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
B212	Level of electronic thermal setting, 2nd motor	2	112	2	5% to 120% rated current, in A	10	G/S
B_13	Electronic thermal characteristic	1	113	1	0 Reduced torque 1 Constant torque 2 Reduced torque2	—	G/S
B213	Electronic thermal characteristic, 2nd motor	2	113	1	0 Reduced torque 1 Constant torque 2 Reduced torque2	—	G/S
B_21	Overload restriction operation mode	1	121	1	0 Disabled 1 Enabled for acceleration and constant speed 2 Enabled for constant speed only	—	G/S
B_22	Overload restriction setting	1	122	2	50% to 150% rated current, in A	100	G/S
B_23	Deceleration rate at overload restriction	1	123	2	0.3 – 30.0	10	G/S
B_31	Software lock mode selection	1	131	1	0 all parameters except B_31 are locked if [SFT] is ON 1 all parameters except B_31 and output freq. F_01 when [SFT] is ON 2 all parameters except B_31 are locked 3 all parameters except B_31 and F_01 are locked	—	G/S
B_82	Start frequency adjustment	1	182	2	0.5 – 9.9 Hz	100	G/S
B_83	Carrier frequency setting	1	183	1	0.5 – 16.0kHz	10	G/S
B_84	Initialization mode (parameters or trip history)	1	184	1	0 Trip history clear 1 Parameter initialization	—	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"B" Group Parameters		DeviceNet Class ID = 103					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
B_85	Country code for initialization	1	185	1	0 Japan version 1 Europe version 2 US version	—	G/S
B_86	Frequency scaling conversion factor	1	186	2	0.1 – 99.9	100	G/S
B_87	STOP key enable	1	187	1	0 Enabled 1 Disabled	—	G/S
B_88	Restart mode after FRS	1	188	1	0 Restart from 0Hz 1 Restart from real speed of motor (frequency matching)	—	G/S
B_90	Dynamic braking usage ratio	1	190	2	0.0 – 100.0%	10	G/S
B_91	Stop mode selection	1	191	1	0 Decel and stop 1 Free run stop	—	G/S
B_92	Cooling fan control	1	192	1	0 Fan always ON 1 Fan ON during Run, OFF during stop	—	G/S

Supported Services, DeviceNet Class ID = 103		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Intelligent Terminal Functions

"C" Group Parameters		DeviceNet Class ID = 105					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
C_01	Terminal [1] function	1	101	1	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 18, 19, 20, 21, 22, 25, 27, 28, 31 (see manual, Chapter 3)	—	G/S
C_02	Terminal [2] function	1	102	1	(same as above)	—	G/S
C_03	Terminal [3] function	1	103	1	(same as above)	—	G/S
C_11	Terminal [1] active state	1	111	1	0 normally open 1 normally closed	—	G/S
C_12	Terminal [2] active state	1	112	1	0 normally open 1 normally closed	—	G/S
C_13	Terminal [3] active state	1	113	1	0 normally open 1 normally closed	—	G/S
C_21	Terminal [11] function	1	121	1	0, 1, 2, 3, 5 (see manual, Ch. 3)	—	G/S
C_22	Terminal [12] function	1	122	1	(same as above)	—	G/S
C_31	Terminal [11] active state	1	131	1	0 normally open 1 normally closed	—	G/S
C_32	Terminal [12] active state	1	132	1	0 normally open 1 normally closed	—	G/S
C_41	Overload level setting	1	141	2	0% to 200% rated current, in A	100	G/S
C_42	Frequency arrival setting for accel	1	142	2	0.0 – 360.0Hz	100	G/S
C_43	Arrival frequency setting for decel	1	143	2	0.0 – 360.0Hz	100	G/S

Supported Services, DeviceNet Class ID = 105		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Motor Constants Functions

"H" Group Parameters		DeviceNet Class ID = 107					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
H_01	Auto-tuning Setting	1	101	1	0 Auto-tuning OFF 1 Auto-tune (rotate motor) 2 Auto-tune (without rotating)	—	G/S
H_02	Motor data selection	1	102	1	0 Use standard motor data 1 Use auto-tuning data	—	G/S
H202	Motor data selection, 2nd motor	2	102	1	0 Use standard motor data 1 Use auto-tuning data	—	G/S
H_03	Motor capacity	1	103	1	1 0.2 kW 2 0.4 kW 3 0.55 kW 4 0.75 kW 5 1.1 kW 6 1.5 kW 7 2.2 kW 8 3.0 kW 9 3.7 kW 10 4.0 kW 11 5.5 kW 12 7.5 kW 13 11 kW	—	G/S
H203	Motor capacity, 2nd setting	2	103	1	(same as above)	—	G/S
H_04	Motor poles setting	1	104	1	0 2 poles 1 4 poles 2 6 poles 3 8 poles	—	G/S
H204	Motor poles setting, 2nd motor	2	104	1	(same as above)	—	G/S
H_05	Motor constant Kp	1	105	1	0 – 99	1	G/S
H205	Motor constant Kp, 2nd motor	2	105	1	0 – 99	1	G/S
H_06	Motor stabilization constant	1	106	1	0 – 255	1	G/S
H206	Motor stabilization constant, 2nd motor	2	106	1	0 – 255	1	G/S
H_20	Motor constant R1	1	120	2	0.000 – 65.535Ω	1000	G/S
H220	Motor constant R1, 2nd motor	2	120	2	0.000 – 65.535Ω	1000	G/S

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"H" Group Parameters		DeviceNet Class ID = 107					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
H_21	Motor constant R2	1	121	2	0.000 – 65.535Ω	1000	G/S
H221	Motor constant R2, 2nd motor	2	121	2	0.000 – 65.535Ω	1000	G/S
H_22	Motor constant L	1	122	2	0.00 – 655.35mH	100	G/S
H222	Motor constant L, 2nd motor	2	122	2	0.00 – 655.35mH	100	G/S
H_23	Motor constant Io	1	123	2	0.00 – 655.35A	100	G/S
H223	Motor constant Io, 2nd motor	2	123	2	0.00 – 655.35A	100	G/S
H_24	Motor Constant J	1	124	2	1.0 – 1000.0	10	G/S
H224	Motor constant J, 2nd motor	2	124	2	1.0 – 1000.0	10	G/S
H_30	Auto-tuned motor constant R1	1	130	2	0.000 – 65.535Ω	1000	G/S
H230	Auto-tuned motor constant R1, 2nd motor	2	130	2	0.000 – 65.535Ω	1000	G/S
H_31	Auto-tuned motor constant R2	1	131	2	0.000 – 65.535Ω	1000	G/S
H231	Auto-tuned motor constant R2, 2nd motor	1	131	2	0.000 – 65.535Ω	1000	G/S
H_32	Auto-tuned motor constant L	1	132	2	0.00 – 655.35mH	100	G/S
H232	Auto-tuned motor constant L, 2nd motor	2	132	2	0.00 – 655.35mH	100	G/S
H_33	Auto-tuned motor constant Io	1	133	2	0.00 – 655.35A	100	G/S
H233	Auto-tuned motor constant Io, 2nd motor	2	133	2	0.00 – 655.35A	100	G/S
H_34	Auto-tuned motor constant J	1	134	2	1.0 – 1000.0	10	G/S
H234	Auto-tuned motor constant J, 2nd motor	2	134	2	1.0 – 1000.0	10	G/S

Supported Services, DeviceNet Class ID = 107		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DeviceNet Network Settings

"P" Group Parameters		DeviceNet Class ID = 109					
Func. Code	**Name**	**Inst**	**Attr**	**Size**	**Range**	**Scaling**	**Get/ Set**
P_41	DeviceNet baud rate	1	141	1	0 125 kbaud 1 250 kbaud 2 500 kbaud	—	G/S
P_42	DeviceNet MAC ID	1	142	1	0 – 63	1	G/S
P_43	DeviceNet control enable	1	143	1	0 Disable 1 Enable	—	G/S
P_44	DeviceNet comm watchdog timer	2	144	2	0.00 – 99.99 sec.	100	G/S
P_45	Inverter action on DeviceNet comm error	1	145	1	0 Trip 1 Decel and trip 2 Hold last speed 3 Free run stop 4 Decel and stop	—	G/S
P_46	DeviceNet polled I/O: Output instance number	1	146	1	20, 21, 100	1	G/S
P_47	DeviceNet polled I/O: Input instance number	1	147	1	70, 71, 101	1	G/S
P_48	Inverter action on DeviceNet idle mode	1	148	1	0 Trip 1 Decel and trip 2 Hold last speed 3 Free run stop 4 Decel and stop	—	G/S
P_49	DeviceNet motor poles setting for RPM	1	149	1	0 – 38 (even numbers only)	1	G/S

Supported Services, DeviceNet Class ID = 109		
Service Name	**Code**	**Description**
Get_Attribute_Single	0Eh	
Set_Attribute_Single	10h	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix C:
Drive Parameter Settings Tables

Introduction

This section lists the user-programmable parameters for the SJ100DN series inverters and the default values, corresponding to Appendix B, "Drive Parameter Settings Tables," in the SJ100 Inverter Instruction Manual. The right-most column of the tables is blank, so you can record values you have changed from the default. This involves just a few parameters for most applications. This section presents the parameters in a format oriented toward the keypad on the inverter.

Parameter Settings for Keypad Entry

SJ100 series inverters provide many functions and parameters that can be configured by the user. We recommend that you record all parameters that have been edited, in order to help in troubleshooting or recovery from a loss of parameter data.

Inverter model SJ100 _____

MFG. No. _____

} This information is printed on the specification label located on the right side of the inverter.

Main Profile Parameters

"F" Group Parameters		Default Setting			User Setting
Func. Code	**Name**	**–FE (Europe)**	**–FU (USA)**	**–F (Japan)**	
F_01	Output frequency setting	0.0	0.0	0.0	
F_02	Acceleration (1) time setting	10.0	10.0	10.0	
F202	Acceleration (1) time setting, 2nd motor	10.0	10.0	10.0	
F_03	Deceleration (1) time setting	10.0	10.0	10.0	
F203	Deceleration (1) time setting, 2nd motor	10.0	10.0	10.0	
F_04	Keypad Run key routing	00	00	00	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Standard Functions

"A" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
A_02	Run command source setting	01	01	02	
A_03	Base frequency setting	50.0	60.0	60.0	
A203	Base frequency setting, 2nd motor	50.0	60.0	60.0	
A_04	Maximum frequency setting	50.0	60.0	60.0	
A204	Maximum frequency setting, 2nd motor	50.0	60.0	60.0	
A_20	Multi-speed 0 setting	0	0	0	
A220	Multi-speed 0 setting, 2nd motor	0	0	0	
A_21	Multi-speed 1 setting	0	0	5	
A_22	Multi-speed 2 setting	0	0	10	
A_23	Multi-speed 3 setting	0	0	15	
A_24	Multi-speed 4 setting	0	0	20	
A_25	Multi-speed 5 setting	0	0	30	
A_26	Multi-speed 6 setting	0	0	40	
A_27	Multi-speed 7 setting	0	0	50	
A_28	Multi-speed 8 setting	0	0	60	
A_29	Multi-speed 9 setting	0	0	0	
A_30	Multi-speed 10 setting	0	0	0	
A_31	Multi-speed 11 setting	0	0	0	
A_32	Multi-speed 12 setting	0	0	0	
A_33	Multi-speed 13 setting	0	0	0	
A_34	Multi-speed 14 setting	0	0	0	
A_35	Multi-speed 15 setting	0	0	0	
A_38	Jog frequency setting	1.0	1.0	1.0	
A_39	Jog stop mode	00	00	00	
A_41	Torque boost method selection	00	00	00	
A241	Torque boost method selection, 2nd motor	00	00	00	
A_42	Manual torque boost value	11	11	11	
A242	Manual torque boost value, 2nd motor	11	11	11	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"A" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
A_43	Manual torque boost frequency adjustment	10.0	10.0	10.0	
A243	Manual torque boost frequency adjustment, 2nd motor	10.0	10.0	10.0	
A_44	V/f characteristic curve selection	02	02	02	
A244	V/f characteristic curve selection, 2nd motor	02	02	02	
A_45	V/f gain setting	100	100	100	
A_51	DC braking enable	00	00	00	
A_52	DC braking frequency setting	0.5	0.5	0.5	
A_53	DC braking wait time	0.0	0.0	0.0	
A_54	DC braking force during deceleration	0	0	0	
A_55	DC braking time for deceleration	0.0	0.0	0.0	
A_61	Frequency upper limit setting	0.0	0.0	0.0	
A_62	Frequency lower limit setting	0.0	0.0	0.0	
A_63, A_65, A_67	Jump (center) frequency setting	0.0	0.0	0.0	
A_64, A_66, A_68	Jump (hysteresis) frequency width setting	0.5	0.5	0.5	
A_81	AVR function select	02	00	02	
A_82	AVR voltage select	230/400	230/460	200/400	
A_92	Acceleration (2) time setting	15.0	15.0	15.0	
A292	Acceleration (2) time setting, (2nd motor)	15.0	15.0	15.0	
A_93	Deceleration (2) time setting	15.0	15.0	15.0	
A293	Deceleration (2) time setting, (2nd motor)	15.0	15.0	15.0	
A_94	Select method to switch to Acc2/ Dec2 profile	00	00	00	
A294	Select method to switch to Acc2/ Dec2 profile, 2nd motor	00	00	00	
A_95	Acc1 to Acc2 frequency transition point	0.0	0.0	0.0	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"A" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
A295	Acc1 to Acc2 frequency transition point, 2nd motor	0.0	0.0	0.0	
A_96	Dec1 to Dec2 frequency transition point	0.0	0.0	0.0	
A296	Dec1 to Dec2 frequency transition point, 2nd motor	0.0	0.0	0.0	
A_97	Acceleration curve selection	00	00	00	
A_98	Deceleration curve selection	00	00	00	

Fine Tuning Functions

"B" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
B_01	Selection of automatic restart mode	00	00	00	
B_02	Allowable under-voltage power failure time	1.0	1.0	1.0	
B_03	Retry wait time before motor restart	1.0	1.0	1.0	
B_12	Level of electronic thermal setting	Rated current for each inverter	Rated current for each inverter	Rated current for each inverter	
B212	Level of electronic thermal setting, 2nd motor	Rated current for each inverter	Rated current for each inverter	Rated current for each inverter	
B_13	Electronic thermal characteristic	01	01	00	
B213	Electronic thermal characteristic, 2nd motor	01	01	00	
B_21	Overload restriction operation mode	01	01	01	
B_22	Overload restriction setting	Rated current x 1.25	Rated current x 1.25	Rated current x 1.25	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"B" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
B_23	Deceleration rate at overload restriction	1.0	1.0	1.0	
B_31	Software lock mode selection	01	01	01	
B_82	Start frequency adjustment	0.5	0.5	0.5	
B_83	Carrier frequency setting	5.0	5.0	12.0	
B_84	Initialization mode (parameters or trip history)	00	00	00	
B_85	Country code for initialization	01	02	00	
B_86	Frequency scaling conversion factor	1.0	1.0	1.0	
B_87	STOP key enable	00	00	00	
B_88	Restart mode after FRS	00	00	00	
B_90	Dynamic braking usage ratio	0.0	0.0	0.0	
B_91	Stop mode selection	00	00	00	
B_92	Cooling fan control	00	00	00	

Intelligent Terminal Functions

"C" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
C_01	Terminal [1] function	00	00	00	
C_02	Terminal [2] function	21	21	21	
C_03	Terminal [3] function	12	12	12	
C_11	Terminal [1] active state	00	00	00	
C_12	Terminal [2] active state	00	00	00	
C_13	Terminal [3] active state	00	00	00	
C_21	Terminal [11] function	00	00	00	
C_22	Terminal [12] function	05	05	05	
C_31	Terminal [11] active state	00	00	00	
C_32	Terminal [12] active state	00	00	00	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"C" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
C_41	Overload level setting	Inverter rated current	Inverter rated current	Inverter rated current	
C_42	Frequency arrival setting for accel	0.0	0.0	0.0	
C_43	Arrival frequency setting for decel	0.0	0.0	0.0	

Motor Constants Functions

"H" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
H_01	Auto-tuning Setting	00	00	00	
H_02	Motor data selection	00	00	00	
H202	Motor data selection, 2nd motor	00	00	00	
H_03	Motor capacity	Specified by the inverter capacity	Specified by the inverter capacity	Specified by the inverter capacity	
H203	Motor capacity, 2nd setting	Specified by the inverter capacity	Specified by the inverter capacity	Specified by the inverter capacity	
H_04	Motor poles setting	4	4	4	
H204	Motor poles setting, 2nd motor	4	4	4	
H_05	Motor constant Kp	20	20	20	
H205	Motor constant Kp, 2nd motor	20	20	20	
H_06	Motor stabilization constant	100	100	100	
H206	Motor stabilization constant, 2nd motor	100	100	100	
H_20	Motor constant R1	Factory set	Factory set	Factory set	
H220	Motor constant R1, 2nd motor	Factory set	Factory set	Factory set	
H_21	Motor constant R2	Factory set	Factory set	Factory set	
H221	Motor constant R2, 2nd motor	Factory set	Factory set	Factory set	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

"H" Group Parameters		Default Setting			User Setting
Func. Code	Name	-FE (Europe)	-FU (USA)	–F (Japan)	
H_22	Motor constant L	Factory set	Factory set	Factory set	
H222	Motor constant L, 2nd motor	Factory set	Factory set	Factory set	
H_23	Motor constant Io	Factory set	Factory set	Factory set	
H223	Motor constant Io, 2nd motor	Factory set	Factory set	Factory set	
H_24	Motor Constant J	Factory set	Factory set	Factory set	
H224	Motor constant J, 2nd motor	Factory set	Factory set	Factory set	
H_30	Auto-tuned motor constant R1	Factory set	Factory set	Factory set	
H230	Auto-tuned motor constant R1, 2nd motor	Factory set	Factory set	Factory set	
H_31	Auto-tuned motor constant R2	Factory set	Factory set	Factory set	
H231	Auto-tuned motor constant R2, 2nd motor	Factory set	Factory set	Factory set	
H_32	Auto-tuned motor constant L	Factory set	Factory set	Factory set	
H232	Auto-tuned motor constant L, 2nd motor	Factory set	Factory set	Factory set	
H_33	Auto-tuned motor constant Io	Factory set	Factory set	Factory set	
H233	Auto-tuned motor constant Io, 2nd motor	Factory set	Factory set	Factory set	
H_34	Auto-tuned motor constant J	Factory set	Factory set	Factory set	
H234	Auto-tuned motor constant J, 2nd motor	Factory set	Factory set	Factory set	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DeviceNet Network Settings

"P" Group Parameters		Default Setting			User Setting
Func. Code	Name	–FE (Europe)	–FU (USA)	–F (Japan)	
P_41	DeviceNet baud rate	00	00	00	
P_42	DeviceNet MAC ID	63	63	63	
P_43	DeviceNet control enable	01	01	01	
P_44	DeviceNet comm watchdog timer	1.00	1.00	1.00	
P_45	Inverter action on DeviceNet comm error	01	01	01	
P_46	DeviceNet polled I/O: Output instance number	100	100	100	
P_47	DeviceNet polled I/O: Input instance number	101	101	101	
P_48	Inverter action on DeviceNet idle mode	01	01	01	
P_49	DeviceNet motor poles setting for RPM	00	00	00	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix D:
Restoring Factory Default Settings

Keypad Method – You can restore (initialize) all inverter parameters to factory default settings from the keypad. (The network method via DeviceNet is on the next page.) After initializing the inverter, use the powerup test in to get the motor running again.

No.	Action	Display	Func./Parameter
1	Use the FUNC, ▲1, and ▼2 keys to navigate to the "B" Group.	b - -	"B" Group selected
2	Press the FUNC key.	b 01	First "B" parameter selected
3	Press and hold the ▲1 key until ->	b 85	Country code for initialization selected
4	Press the FUNC key.	02	00 = Japan, 01 = Europe, 02 = U.S.
5	Confirm the country code is correct. Do not change it unless you are absolutely sure the power input voltage range and frequency match the country code setting. To change the country code, press ▲1 or ▼2 to set, STR to store.		
6	Press the FUNC key.	b 85	Country code for initialization selected
7	Press the ▼2 key.	b 84	Initialization function selected
8	Press the FUNC key.	00	00 = initialization disabled, clear trip history only
9	Press the ▲1 key.	01	00 = clear trip history 01 = initialize all settings
10	Press the STR key.	b 84	Initialization now enabled to restore all defaults
11	Press and hold the FUNC, ▲1, and ▼2 keys. Do not release yet.	b 84	First part of special key sequence
12	Holding the keys above, press and hold the STOP RESET (STOP) key for 3 sec.	b 84	Final part of special key sequence
13	Release only the STOP RESET (STOP) key; wait for d 00 blinking display.	d 00	Initialization begins when display starts blinking
14	Now release the FUNC, ▲1, and ▼2 keys only after the d 00 display function begins blinking.	EU USA JP	Default parameter country code shown during initialization process (left-most char displays alternating pattern)
15	Initialization is complete.	d 01	Function code for output frequency monitor shown

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

NOTE: SJ100DN inverters cannot connect to a remote operator panel. For initialization, use the inverter's front panel keypad or use the network host (see below).

DeviceNet Method – The network host computer can restore (initialize) all inverter parameters to factory default settings. The host will use a series of explicit message requests. The explicit messages will set parameters B_84 and B_85 in the same way as the keypad method prepares for initialization. Then, a specific "Reset" explicit message service completes the sequence. Just follow these steps:

1. Set B_84 according to whether you want to initialize all parameters or clear the trip history. Use the explicit message address for B_84 given in the table below.
2. Set B_85 for the country of initialization (usually this setting is already correct). Use the explicit message address for B_85 given in the table below.
3. Use the Reset service listed below for Class ID 100 to perform the unitization. The parameters in Class IDs of 100, 101, 103, 105, 107, and 109 are initialized.

NOTE: Executing the host Reset service causes the inverter to stop network communications (similar to power-on reset). Therefore, the network master will detect a time-out error. It cannot re-connect to the inverter until the initialization is complete (3–4 sec.)

Parameter or Function		DeviceNet Class ID = 103					
Func. Code	**Name**	**Class**	**Inst**	**Attr**	**Size**	**Range**	**Action**
B_84	Initialization mode (parameters or trip history)	103	1	184	1	0 Trip history clear 1 Parameter initialization	Set
B_85	Country code for initialization	103	1	185	1	0 Japan version 1 Europe version 2 US version	Set

Supported Services, DeviceNet Class ID = 100		
Service Name	**Code**	**Description**
Reset	05h	Initializes all parameters to factory default values, excluding P_41 DeviceNet baud rate and P_42 DeviceNet MAC ID

NOTE: A DeviceNet initialization will not affect the setting for P_41 DeviceNet baud rate and P_42 DeviceNet MAC ID. Otherwise, an initialization could cause a loss of communications.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP