GE
Intelligent Platforms

Programmable Control Products

PACSystems* RSTi

DeviceNet Network Adapter

User's Manual, GFK-2801A

September 2012

Warnings, Cautions and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note: Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Intelligent Platforms assumes no obligation of notice to holders of this document with respect to changes subsequently made.

GE Intelligent Platforms makes no representation or warranty, expressed, implied, or statutory with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

If you purchased this product through an Authorized Channel Partner, please contact the seller directly.

General Contact Information

Online technical support and GlobalCare	http://www.ge-ip.com/support
Additional information	http://www.ge-ip.com/
Solution Provider	solutionprovider.ip@ge.com

Technical Support

If you have technical problems that cannot be resolved with the information in this guide, please contact us by telephone or email, or on the web at www.ge-ip.com/support

Americas

Online Technical Support	www.ge-ip.com/support
Phone	1-800-433-2682
International Americas Direct Dial	1-780-420-2010 (if toll free 800 option is unavailable)
Technical Support Email	support.ip@ge.com
Customer Care Email	customercare.ip@ge.com
Primary language of support	English

Europe, the Middle East, and Africa

Online Technical Support	www.ge-ip.com/support
Phone	+800-1-433-2682
EMEA Direct Dial	+1-780-401-7717 (if toll free 800 option is unavailable or if dialing from a mobile telephone)
Technical Support Email	support.emea.ip@ge.com
Customer Care Email	customercare.emea.ip@ge.com
Primary languages of support	English, French, German, Italian, Czech, Spanish

Asia Pacific

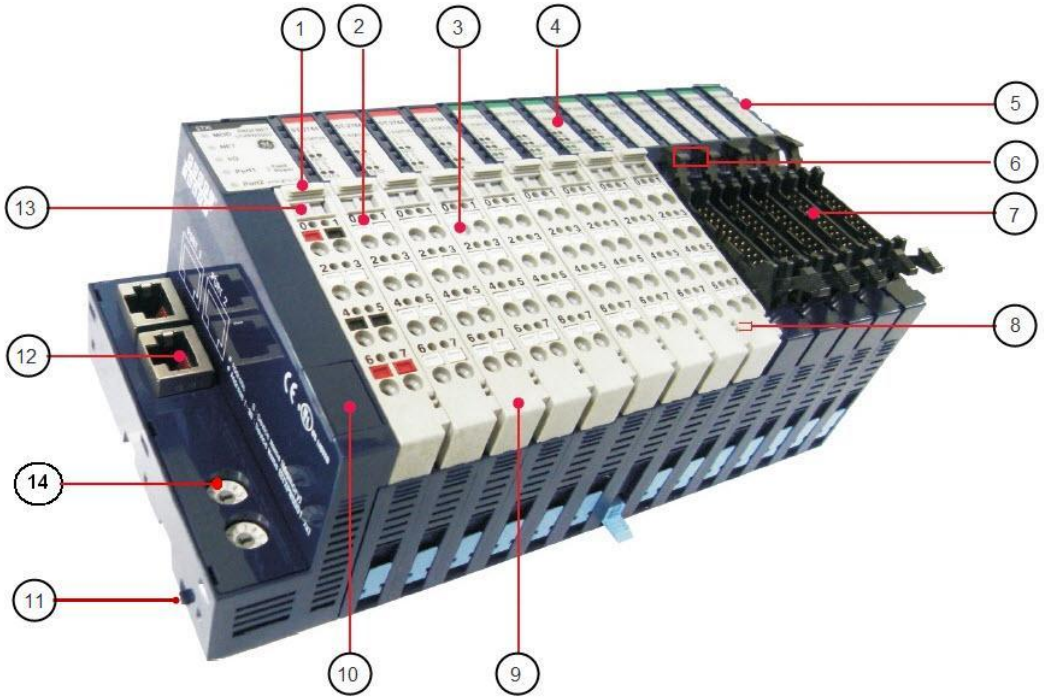
Online Technical Support	www.ge-ip.com/support
Phone	+86-400-820-8208
	+86-21-3217-4826 (India, Indonesia, and Pakistan)
Technical Support Email	support.cn.ip@ge.com (China)
	support.jp.ip@ge.com (Japan)
	support.in.ip@ge.com (remaining Asia customers)
Customer Care Email	customercare.apo.ip@ge.com
	customercare.cn.ip@ge.com (China)

Contents

Contents

1. Introduction

The PACSystems RSTi Network Interface and I/O family provides a cost effective, modular distributed I/O system. The RSTi network is ideally suited for distributed applications such as water/wastewater, process control, packaging and assembly. You can easily add RSTi modules to the system to build functional remote I/O stations to meet your application requirements.



Sr. Number	Label
1	Removable Switch of Terminal Block
2	Tester Pin Hole
3	Screw less Connection System
4	I/O Status Display LED
5	System-Data Pin (6 Pins)
6	Module Number Marking (Header Type)
7	Header Type Module (16 points)
8	Field Power Pin (2 pins)

Sr. Number	Label
9	RTB (Removable Terminal Block)
10	Reserved communication Port (Useful to only manufacturer)
11	PUSH Lock for DIN rail
12	Fieldbus Connector (actual connector depends upon the type network adapter)
13	Module Number Marking (on the Removable terminal Block
14	Node ID or station address setting (either rotary or dip switches depends upon the type of network adapter)

A set of interconnected RSTi modules can be chosen to suit the application and connected as a slave on a MODBUS network. An RSTi Network Adapter provides the interface between the network and the RSTi modules. The Network Adapter and I/O modules selected for an application constitute an I/O station.

1.1 I/O Station Capacity

- Up to 32 IO modules can be connected to a Network Adapter (STXDNS001), whereas DeviceNet network adapters with integrated IO support only up to 10 IO modules. The power consumption of all the modules in the node should be calculated and ensured that it does not exceed the capacity of Network Adapter and power modules.
- The sum of all input and output data can be up to:
  - 252 bytes per station for a DeviceNet network adapter STXDNS001
  - 70 bytes per station for a DeviceNet network adapter STXDNS*

1.2 Installation

The Network Adapter must be connected to the left of the other RSTi modules in the I/O station.

Within the RSTi station the bus connection, power supply, and power distribution are completed by connecting modules together on the DIN rail. Sensors and actuators are wired to the RSTi modules using spring clamp terminals on the module's removable terminal strips. These terminal strips can be keyed so that they cannot be accidentally swapped. If a module must be replaced, the wiring does not need to be removed; just remove the terminal strip from the module.

1.3 Features

- Modules can be easily installed and connected without tools.
- Flexible and modular structure allows I/O stations to be easily expanded.
- A comprehensive selection of I/O modules supports a wide range of applications.
- Small removable terminal blocks conserve panel space and save time making system connections.
- Module-based diagnostic functions
- The amount of costly parallel wiring is reduced. Within a station, voltage and data routing can be carried out without additional wiring, reducing the cabinet space needed.
- Different parts of the system can be operated independent of one another. This means that pretests can be carried out when the system is set up and that the whole system can be adapted and expanded.

1.4 List of RSTi Network adapters

RSTi DeviceNet Network Adapters

- STXDNS001 DeviceNet network adapter
- STXDNS032 32 point Positive Logic Input
- STXDNS132 32 point Negative Logic Input
- STXDNS232 32 point Negative Logic Output
- STXDNS332 32 point Positive Logic Output
- STXDNS016 16 relay output
- STXDNS116 16 relay output isolated
- STXDNS432 16 Positive Logic in/16 Positive Logic out
- STXDNS532 16 Negative Logic in/16 Negative Logic out
- STXDNS824 16 Positive Logic in/8 relay out
- STXDNS924 16 Negative Logic in/8 relay out
- STXDNS825 16 Positive Logic in/8 relay out isolated
- STXDNS925 16 Negative Logic in/8 relay out isolated

1.5 PACSystems Documentation

- *PACSystems RSTi I/O Manual* – GFK 2745

2. Installation

Warning

Installing or removing modules or wiring with power applied to the system or field wiring can cause an electrical arc. This can result in unexpected and potentially dangerous action by field devices. Arcing is an explosion risk in hazardous locations. Be sure that the area is non-hazardous or remove power appropriately before installing or removing modules or wiring.

Potentially dangerous voltages are present on a module's terminals, even when system power is turned off. Field power must be turned off when installing or removing a terminal block assembly.

Personnel, who install, operate and maintain automation systems that contain these products must be trained and qualified to perform those functions.

Overloading power modules or Network adapter can result into electric arc and damage to modules.

Caution

Check the rated voltage and terminal array before wiring.

Ensure that specified environmental conditions are not exceeded. Avoid placing the module in direct sunlight.

Review module specifications carefully, and ensure that input and output connections are made in accordance with the specifications.

Use specified cables for wiring.

Field power isolators must be used according to the requirements of the 5VDC/24VDC/48VDC or AC voltage modules used in the system.

If system power consumption exceeds the power limits, use system power expansion modules.

Power supplies for system power and field power must be supplied from separate sources.

2.1 Module Mounting

2.1.1 How to Mount a Module on a DIN Rail

1. Press down the module lightly on the DIN Rail until it clicks and locks.

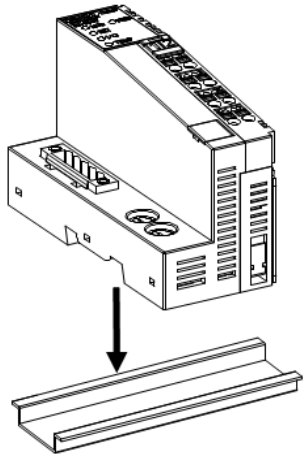


Figure 1: Pressing down the module lightly

2. . You can use the PUSH lock for DIN rail up as a second locking mechanism.

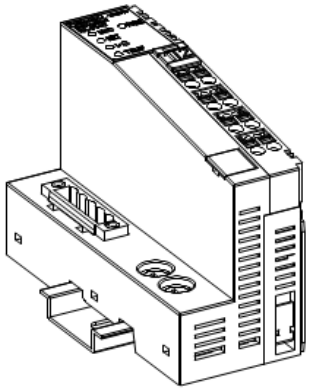


Figure 2: PUSH lock as a second locking mechanism

2.1.2 How to Remove a Module from the DIN Rail

1. Pull down the locking mechanism by using small flat screw driver as in the following figures.

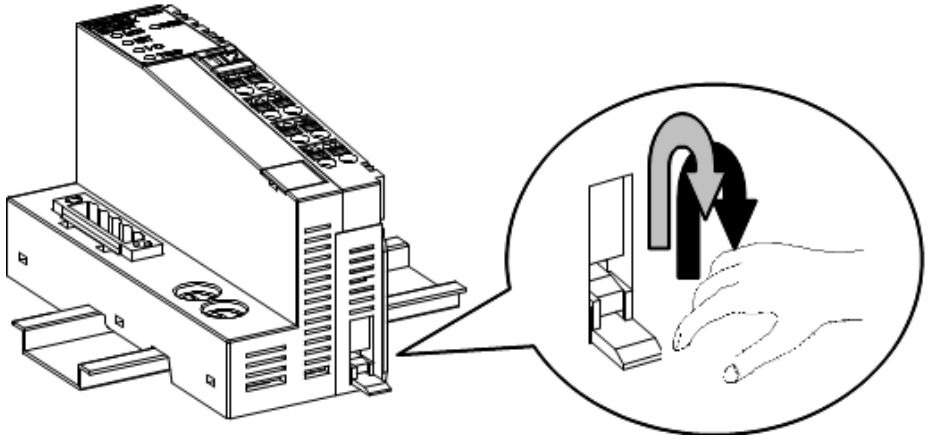


Figure 3: Pulling down the lock

2. Pull up the module to remove from the DIN rail.

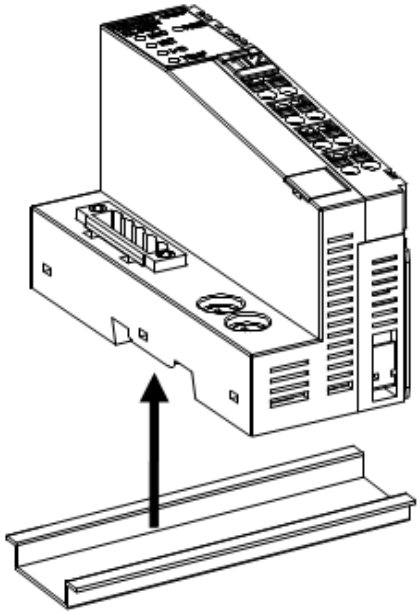


Figure 4: Pulling up the module

2.2 Installing and Removing Components

To plug in the module use a small-bladed screwdriver and push down the locking lever located at bottom of the module. Install the module on DIN rail firmly; push up the locking lever to lock.
To pull out the RSTi module, push down the locking lever rail.

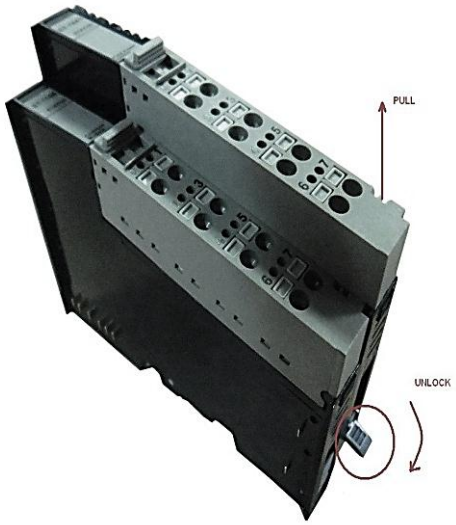


Figure 5: Removing RSTi module from DIN rail

2.3 Internal Bus/Field Power Contacts

Communication between the Network adapters and the IO module as well as system / field power supply of the bus modules is carried out via the internal bus. It is comprised of 6 data pins and 2 field power pins.

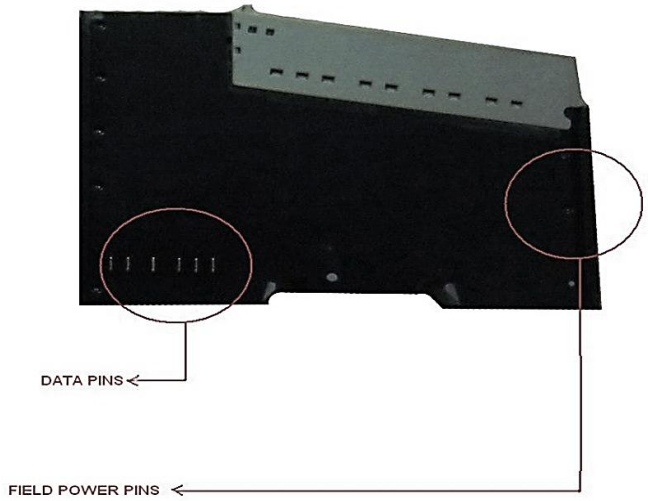


Figure 6: Internal bus with 6 data pins and 2 field power pins

Warning

Do not touch data and field power pins, in order to avoid damage by ESD noise.

2.3.1 RSTi Bus Data Pin & Field Power Pin Description

Table 1: RSTi Bus Pin Name and Description

No.	Name	Description
1	Vcc	System supply voltage (5V dc)
2	GND	System Ground
3	Token Output	Token output port of Processor module
4	Serial Output	Transmitter output port of Processor module
5	Serial Input	Receiver input port of Processor module
6	Reserved	Reserved for bypass Token
7	Field GND	Field Ground
8	Field Vcc	Field supply voltage (24Vdc)

2.3.2 RSTi Data Bus System

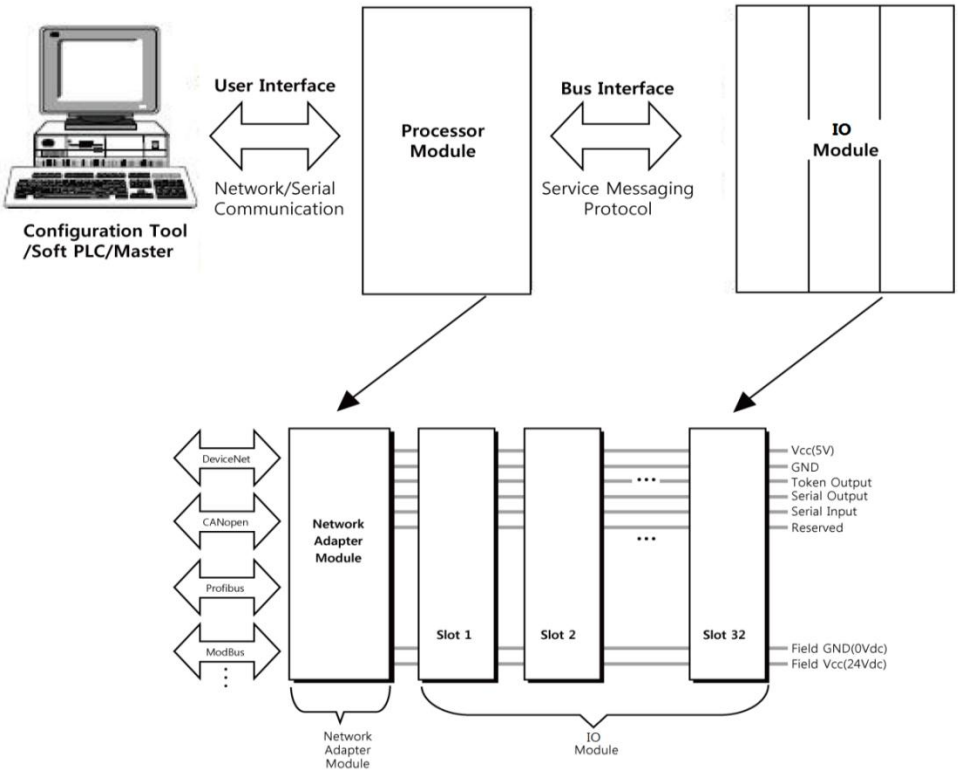


Figure 7: Interface between different modules

- **Network Adapter Module**: The Network Adapter Module forms the link between the field bus and the field devices through IO Modules. The connection to different field bus systems can be established by each of the corresponding Network Adapter Modules: PROFIBUS, CANopen, DeviceNet, Ethernet/IP, CC-Link, MODBUS/Serial, MODBUS/TCP, PROFINET etc.
- **IO Module**: The IO Modules are supported by a variety of input and output field devices. There are digital and analog input/output modules and special function modules.
- **Two types** of **Bus Message**

  Service Messaging
  I/O Messaging

3. DeviceNet Network Adapters

DeviceNet Network Adapters include STXDNS001 and STXDNS* modules

- STXDNS001

The following are the features of STXDNS001:

  - STXDNS001 is connected with the 5 pin open male Connector.
  - It works as a slave in the Master/Slave environment.
  - The node size is able to extend up to 64 nodes, including master.
  - Each STXDNS001 can control maximum 1024 digital input/1024 digital output, or 64 analog input/64 analog output channels.
  - It Supports Poll, Bit-Strobe, Cyclic, COS network protocols.
  - LED indicators for diagnostic functions (the status of Module, network IO units, and field power)
  - It supports the communication speed from 125Kbps, 250Kbps, 500Kbps and the auto baud rate detection.
  - The station number is assigned by rotary switch.

- STXDNS*

The following are the features of STXDNS*:

  - STXDNS* supports DeviceNet communication protocol and is connected with 5pin open Male Connector.
  - These modules work as a slave under Master/Slave circumstances.
  - They allow I/O Data communications with Master by means of polling, Strobe, COS, Cyclic process.
  - They support the transmission rate from 125Kbps, 250Kbps, 500Kbps and Auto Baud rate Detection.
  - They also define the Node Address and communication speed by using Dip Switch.

STXDNS*: STXDNS032/132/232/332/432/532/016/116/824/924/825/925

3.1 STXDNS001 DeviceNet Network Adapter Module

3.1.1 Interface

The following figure shows the interface diagram for STXDNS001

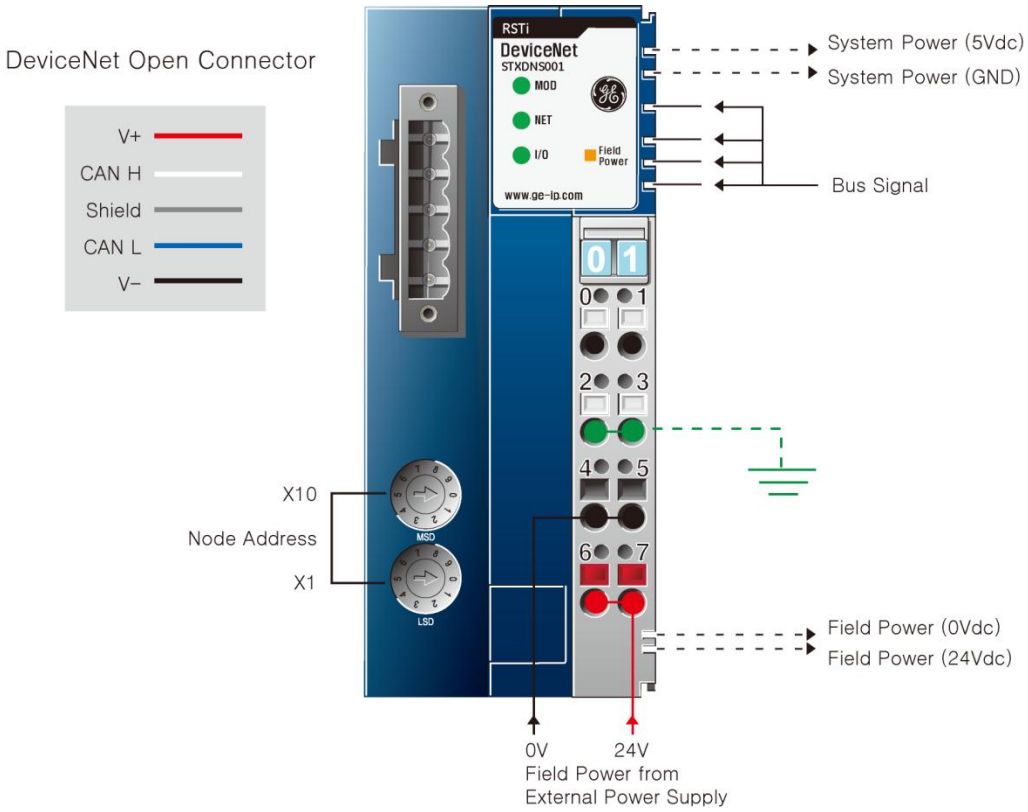


Figure 8: DeviceNet network adapter module: STXDNS001

The following table lists the pin numbers and their description for STXDNS001

Table 2: STXDNS001: Pin Description

Pin Number	Description	Pin Number	Description
0	System power 24v	1	System power 0 v
2	Ground	3	Ground
4	Field power 0v	5	Field power 0v
6	Field power 24v	7	Field power 24v

3.1.2 Specifications

The following table describes the Specifications of STXDNS001.

Table 3: Interface Specifications

Item	*Specification*
Adapter Type	Group 2 Only Slave
Max. IO Module	32 slots
Max. Input Size	2016 bits
Max. Output Size	2016 bits
Max. Length Bus Line	Max.100m@500Kbps, Max. 250m@250Kbps, Max. 500m@125Kbps
Max. Nodes	64 nodes including master
Communication Speed	125Kbps, 250Kbps, 500Kbps, auto baud supported
Network Protocol	Poll, Bit-Strobe, Cyclic, COS
Interface Connector	5pin Open male connector
Node MAC ID Setup	2 Rotary Switches
Module Location	First module of RSTi system.
Field Power Detection	About 11Vdc

Table 4: General Specification

Item	*Specification*
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 11~28.8Vdc Protection : Output current limit(1.2A) Reverse polarity protection
Power Dissipation	40mA typical @24Vdc
Current for I/O Module	1.2A @5Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply voltage : 24Vdc nominal Supply voltage range : 11~28.8Vdc
Max. Current Field Power Contact	DC 10A Max.
Weight	155g
Module Size	42mm x 99mm x 70mm
Shock Operating	10g
Shock Non-Operating	30g
Vibration/shock resistance	Displacement : 0.012Inch p-p from 10~57Hz Acceleration : 2G's from 57~500Hz Sweep Rate : 1 octave Per Minute Axes to test : x, y, z Frequency Sweeps Per Axis : 10
EMC resistance burst/ESD	EMC Directive
Installation Pos. / Protect. Class	Variable/IP20
Product Certifications	$_{C}$UL$_{US,}$ CE, FCC

3.2 STXDNS032/132/232/332/432/532/016/116/824/924/825/925

3.2.1 Interface

3.2.1.1 STXDNS032 - DeviceNet Network Adapter with32 point Positive Logic Input

The following illustration shows the interface diagram for STXDNS032.

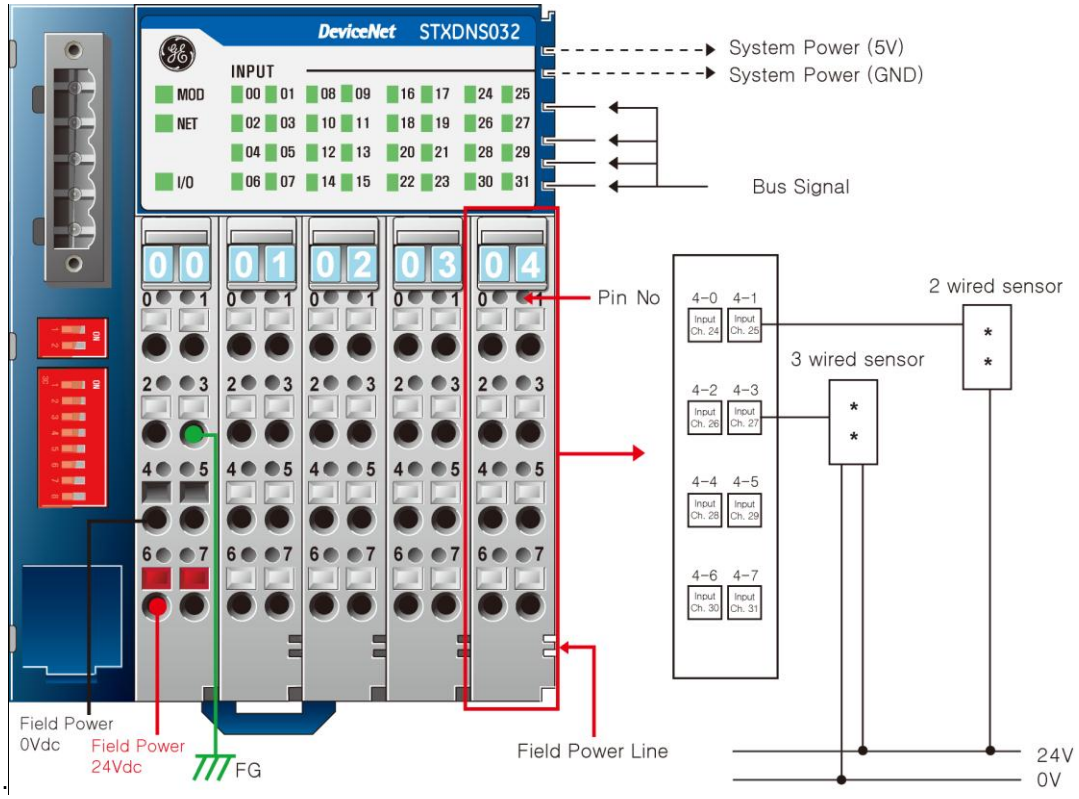


Figure 9: DeviceNet Network Adaptor Module: STXDNS032

Table 5: STXDNS032: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Input Channel 16
01-1	Input Channel 1	03-1	Input Channel 17
01-2	Input Channel 2	03-2	Input Channel 18
01-3	Input Channel 3	03-3	Input Channel 19
01-4	Input Channel 4	03-4	Input Channel 20
01-5	Input Channel 5	03-5	Input Channel 21
01-6	Input Channel 6	03-6	Input Channel 22
01-7	Input Channel 7	03-7	Input Channel 23
02-0	Input Channel 8	04-0	Input Channel 24
02-1	Input Channel 9	04-1	Input Channel 25
02-2	Input Channel 10	04-2	Input Channel 26
02-3	Input Channel 11	04-3	Input Channel 27
02-4	Input Channel 12	04-4	Input Channel 28
02-5	Input Channel 13	04-5	Input Channel 29
02-6	Input Channel 14	04-6	Input Channel 30
02-7	Input Channel 15	04-7	Input Channel 31

3.2.1.2 STXDNS132 - DeviceNet Network Adapter with 32 point Negative Logic Input

The following illustration shows the interface diagram for STXDNS132.

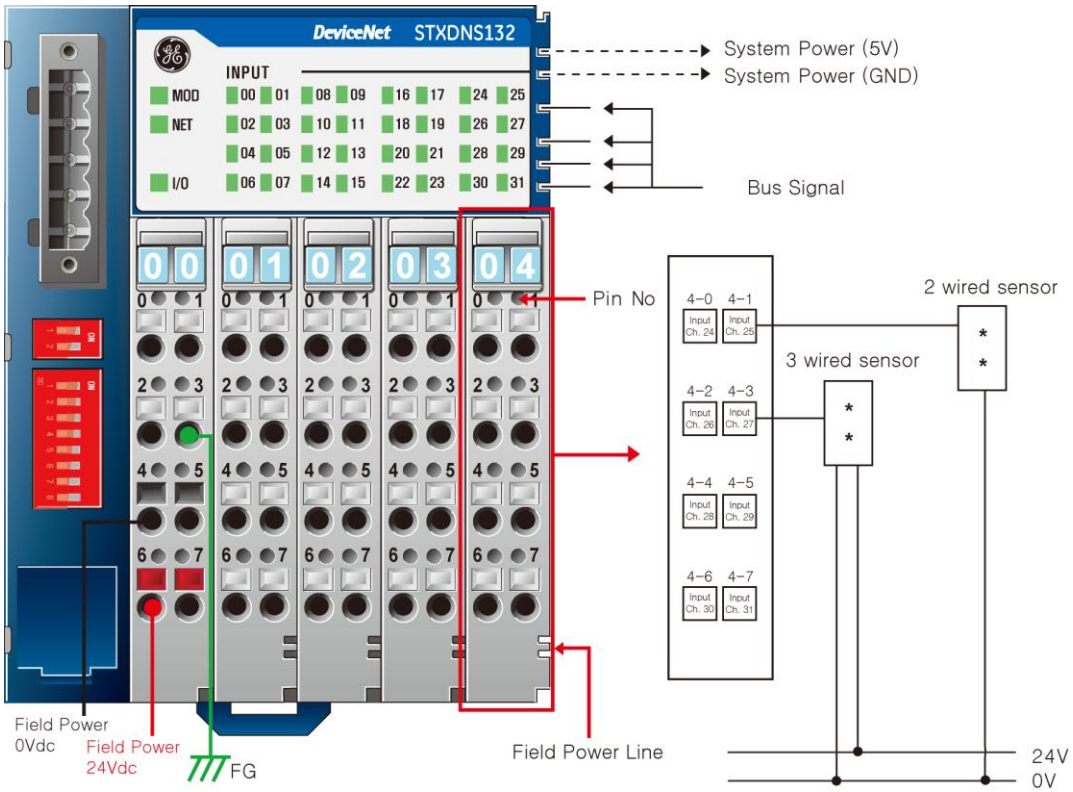


Figure 10: DeviceNet Network Adaptor Module: STXDNS132

Table 6: STXDNS132: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Input Channel 16
01-1	Input Channel 1	03-1	Input Channel 17
01-2	Input Channel 2	03-2	Input Channel 18
01-3	Input Channel 3	03-3	Input Channel 19
01-4	Input Channel 4	03-4	Input Channel 20
01-5	Input Channel 5	03-5	Input Channel 21
01-6	Input Channel 6	03-6	Input Channel 22
01-7	Input Channel 7	03-7	Input Channel 23
02-0	Input Channel 8	04-0	Input Channel 24
02-1	Input Channel 9	04-1	Input Channel 25
02-2	Input Channel 10	04-2	Input Channel 26
02-3	Input Channel 11	04-3	Input Channel 27
02-4	Input Channel 12	04-4	Input Channel 28
02-5	Input Channel 13	04-5	Input Channel 29
02-6	Input Channel 14	04-6	Input Channel 30
02-7	Input Channel 15	04-7	Input Channel 31

3.2.1.3 STXDNS232 - DeviceNet Network Adapter with 32 point Negative Logic Output

The following illustration shows the interface diagram for STXDNS232.

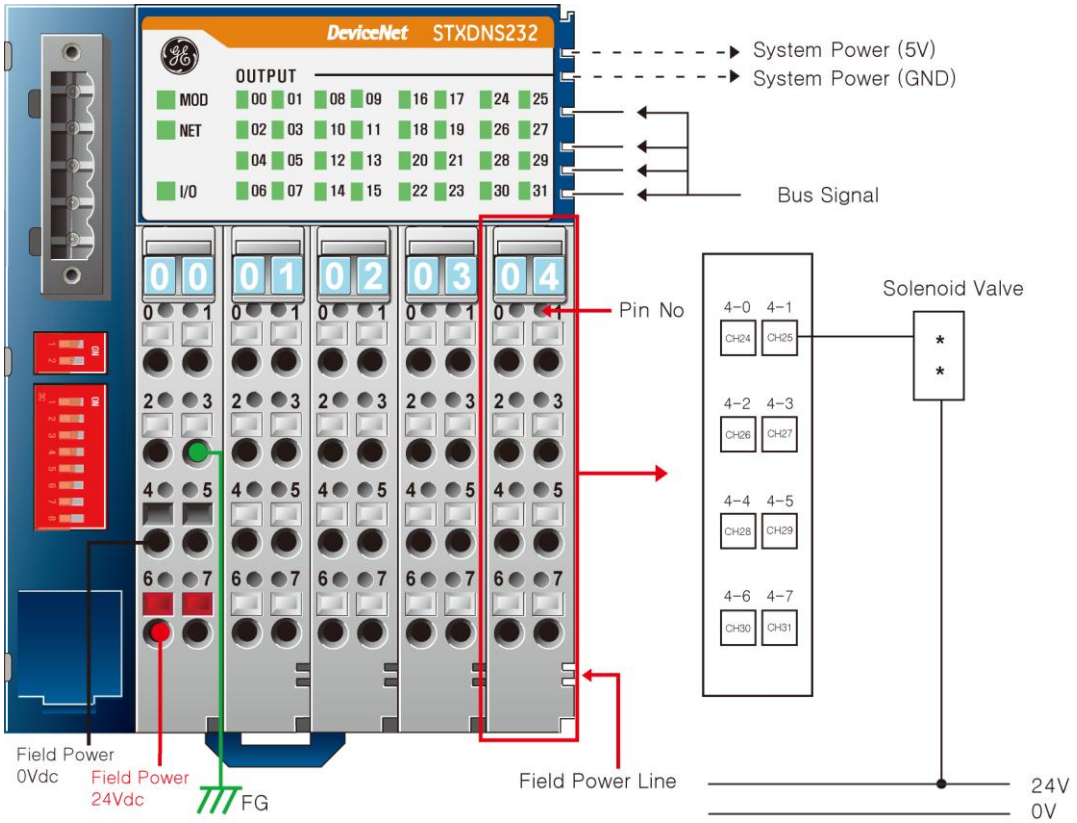


Figure 11: DeviceNet Network Adaptor Module: STXDNBS232

Table 7: STXDNS232: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Output Channel 0	03- 0	Output Channel 16
01-1	Output Channel 1	03-1	Output Channel 17
01-2	Output Channel 2	03-2	Output Channel 18
01-3	Output Channel 3	03-3	Output Channel 19
01-4	Output Channel 4	03-4	Output Channel 20
01-5	Output Channel 5	03-5	Output Channel 21
01-6	Output Channel 6	03-6	Output Channel 22
01-7	Output Channel 7	03-7	Output Channel 23
02-0	Output Channel 8	04-0	Output Channel 24
02-1	Output Channel 9	04-1	Output Channel 25
02-2	Output Channel 10	04-2	Output Channel 26
02-3	Output Channel 11	04-3	Output Channel 27
02-4	Output Channel 12	04-4	Output Channel 28
02-5	Output Channel 13	04-5	Output Channel 29
02-6	Output Channel 14	04-6	Output Channel 30
02-7	Output Channel 15	04-7	Output Channel 31

3.2.1.4 STXDNS332- DeviceNet Network Adapter with32 point Positive Logic Output

The following illustration shows the interface diagram for STXDNS332.

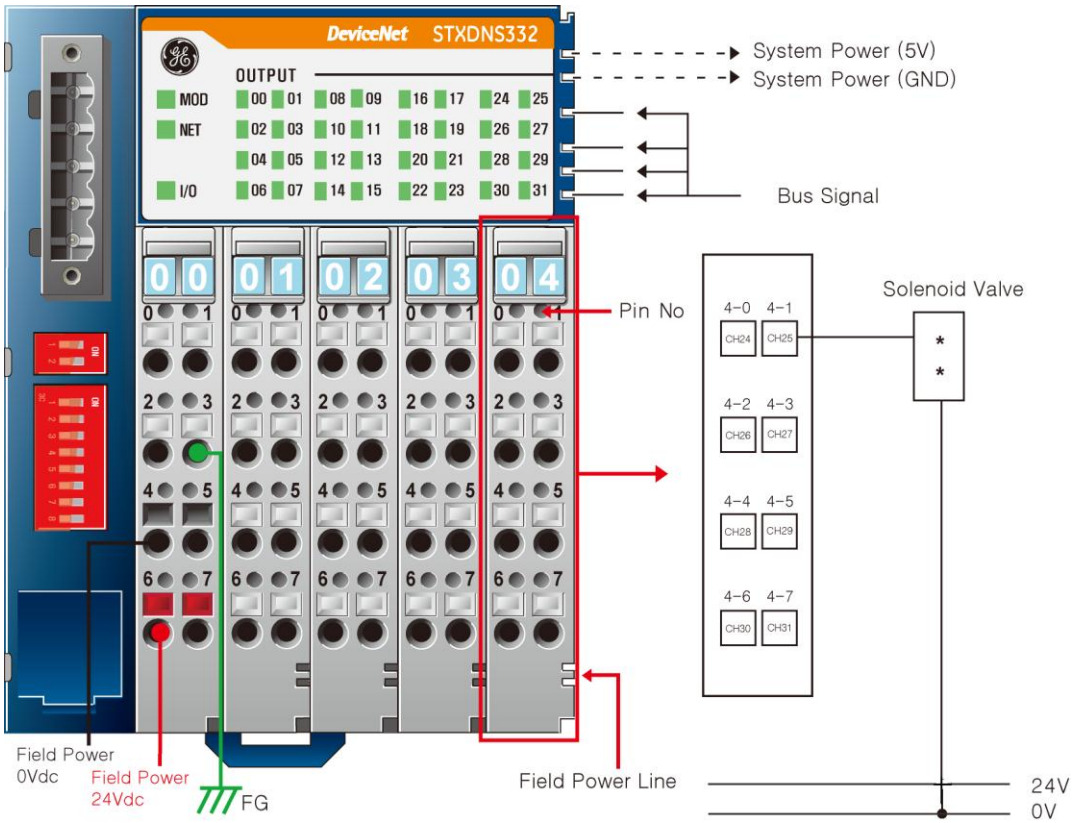


Figure 12: DeviceNet Network Adaptor Module: STXDNS332

Table 8: STXDNS332: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Output Channel 0	03- 0	Output Channel 16
01-1	Output Channel 1	03-1	Output Channel 17
01-2	Output Channel 2	03-2	Output Channel 18
01-3	Output Channel 3	03-3	Output Channel 19
01-4	Output Channel 4	03-4	Output Channel 20
01-5	Output Channel 5	03-5	Output Channel 21
01-6	Output Channel 6	03-6	Output Channel 22
01-7	Output Channel 7	03-7	Output Channel 23
02-0	Output Channel 8	04-0	Output Channel 24
02-1	Output Channel 9	04-1	Output Channel 25
02-2	Output Channel 10	04-2	Output Channel 26
02-3	Output Channel 11	04-3	Output Channel 27
02-4	Output Channel 12	04-4	Output Channel 28
02-5	Output Channel 13	04-5	Output Channel 29
02-6	Output Channel 14	04-6	Output Channel 30
02-7	Output Channel 15	04-7	Output Channel 31

3.2.1.5 STXDNS016 - DeviceNet Network Adapter with16 relay output

The following illustration shows the interface diagram for STXDNS016

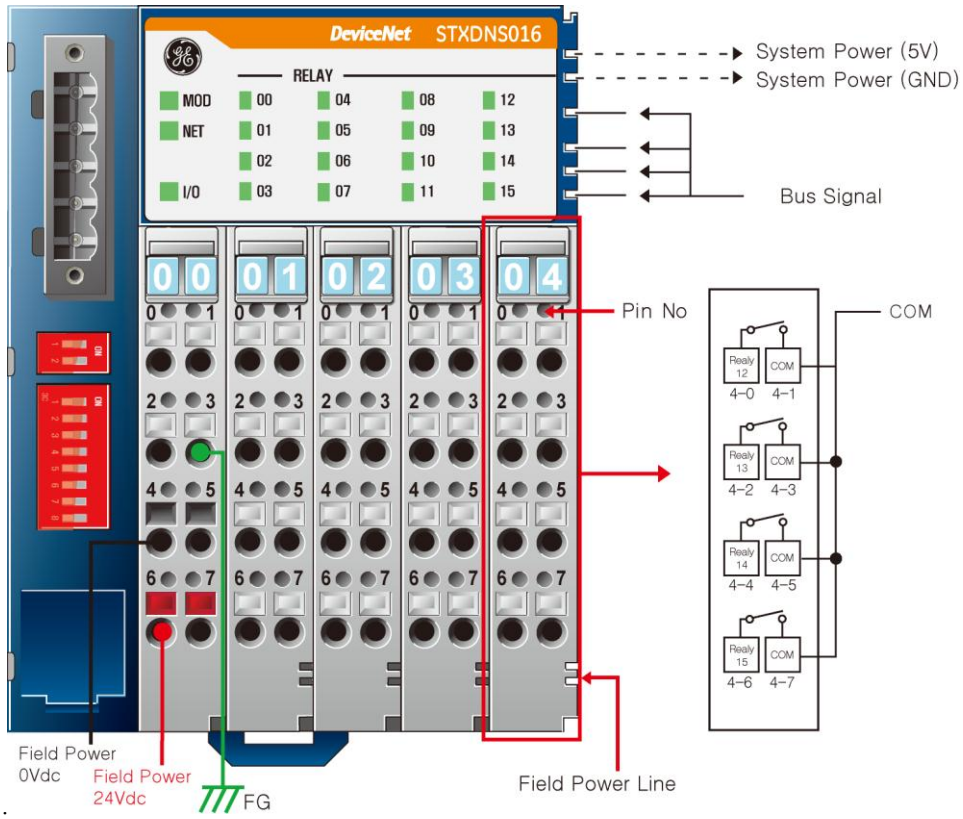


Figure 13: DeviceNet Network Adaptor Module: STXDNS016

Table 9: STXDNS016: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Relay Output 0	03- 0	Relay Output 8
01-1	COM 0	03-1	COM 2
01-2	Relay Output 1	03-2	Relay Output 9
01-3	COM 0	03-3	COM 2
01-4	Relay Output 2	03-4	Relay Output 10
01-5	COM 0	03-5	COM 2
01-6	Relay Output 3	03-6	Relay Output 11
01-7	COM 0	03-7	COM 2
02-0	Relay Output 4	04-0	Relay Output 12
02-1	COM 1	04-1	COM 3
02-2	Relay Output 5	04-2	Relay Output 13
02-3	COM 1	04-3	COM 3
02-4	Relay Output 6	04-4	Relay Output 14
02-5	COM 1	04-5	COM 3
02-6	Relay Output 7	04-6	Relay Output 15
02-7	COM 1	04-7	COM 3

3.2.1.6 STXDNS116 - DeviceNet Network Adapter with 16 relay output isolated

The following illustration shows the interface diagram for STXDNS116

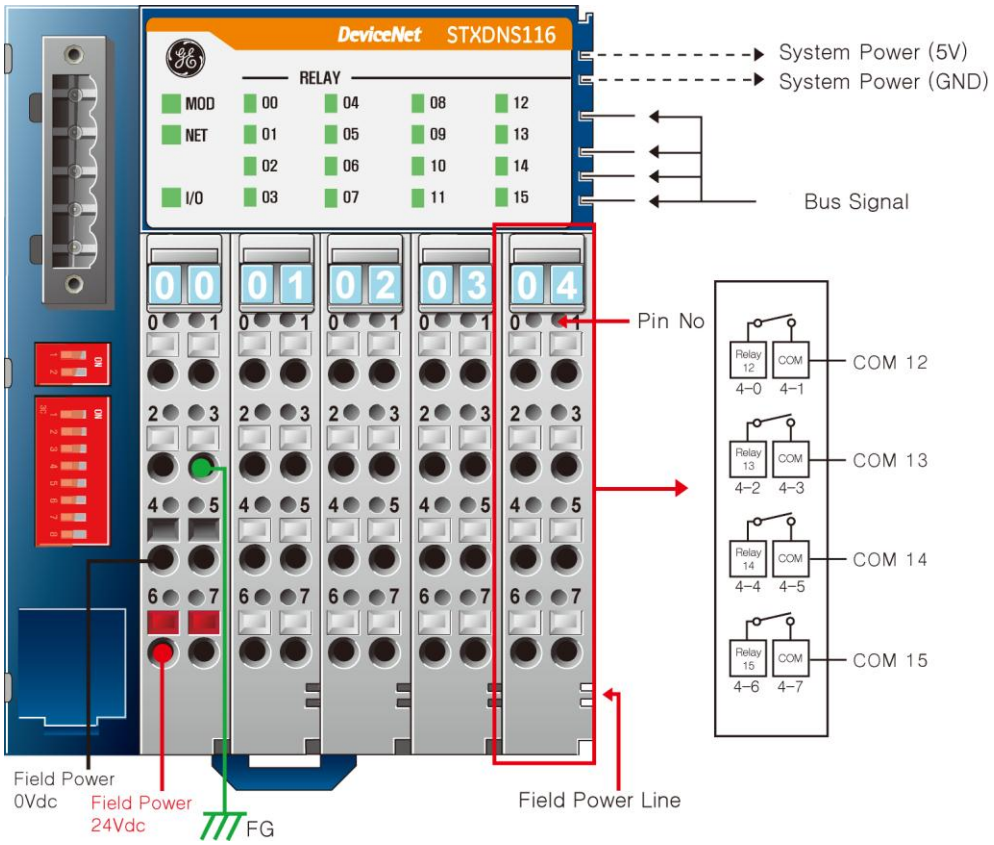


Figure 14: DeviceNet Network Adaptor Module: STXDNS116

Table 10: STXDNS116: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Relay Output 0	03- 0	Relay Output 8
01-1	COM 0	03-1	COM 8
01-2	Relay Output 1	03-2	Relay Output 9
01-3	COM 1	03-3	COM 9
01-4	Relay Output 2	03-4	Relay Output 10
01-5	COM 2	03-5	COM 10
01-6	Relay Output 3	03-6	Relay Output 11
01-7	COM 3	03-7	COM 11
02-0	Relay Output 4	04-0	Relay Output 12
02-1	COM 4	04-1	COM 12
02-2	Relay Output 5	04-2	Relay Output 13
02-3	COM 5	04-3	COM 13
02-4	Relay Output 6	04-4	Relay Output 14
02-5	COM 6	04-5	COM 14
02-6	Relay Output 7	04-6	Relay Output 15
02-7	COM 7	04-7	COM 15

3.2.1.7 STXDNS432 - DeviceNet Network Adapter with 16 Pos. Logic in/16 Pos. Logic out

The following illustration shows the interface diagram for STXDNS432.

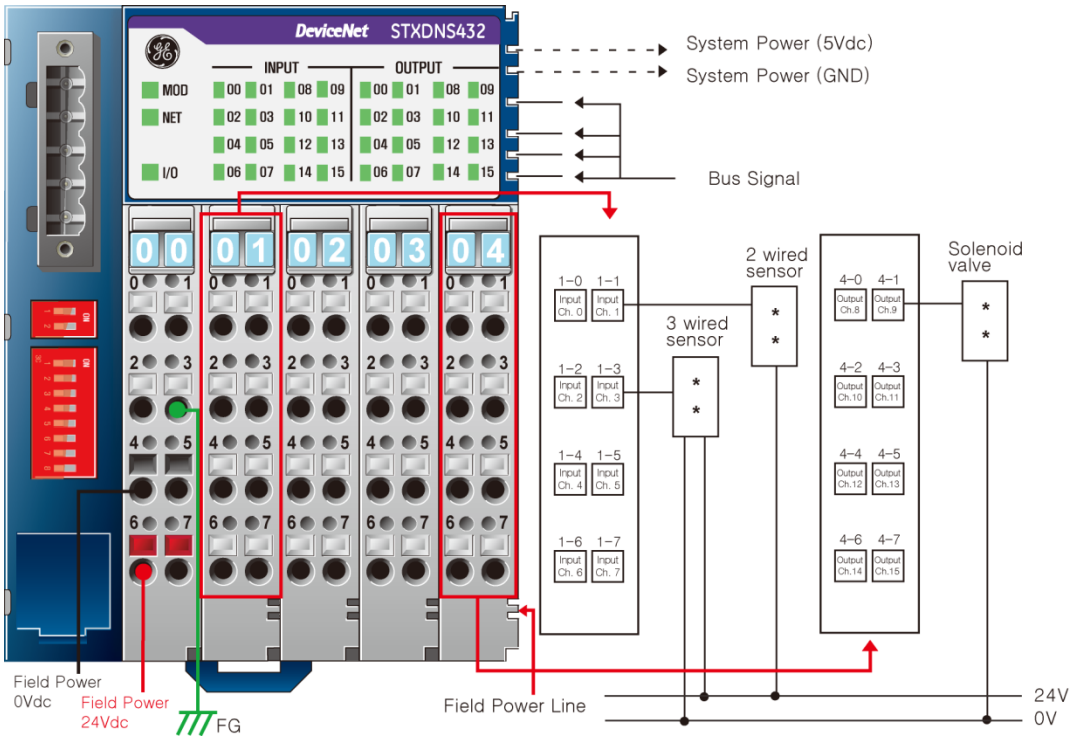


Figure 15: DeviceNet Network Adaptor Module: STXDNSS432

Table 11: STXDNS432: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Output Channel 0
01-1	Input Channel 1	03-1	Output Channel 1
01-2	Input Channel 2	03-2	Output Channel 2
01-3	Input Channel 3	03-3	Output Channel 3
01-4	Input Channel 4	03-4	Output Channel 4
01-5	Input Channel 5	03-5	Output Channel 5
01-6	Input Channel 6	03-6	Output Channel 6
01-7	Input Channel 7	03-7	Output Channel 7
02-0	Input Channel 8	04-0	Output Channel 8
02-1	Input Channel 9	04-1	Output Channel 9
02-2	Input Channel 10	04-2	Output Channel 10
02-3	Input Channel 11	04-3	Output Channel 11
02-4	Input Channel 12	04-4	Output Channel 12
02-5	Input Channel 13	04-5	Output Channel 13
02-6	Input Channel 14	04-6	Output Channel 14
02-7	Input Channel 15	04-7	Output Channel 15

3.2.1.8 STXDNS532 - DeviceNet Network Adapter with 16 Neg. Logic in/16 Neg. Logic out

The following illustration shows the interface diagram for STXDNS532.

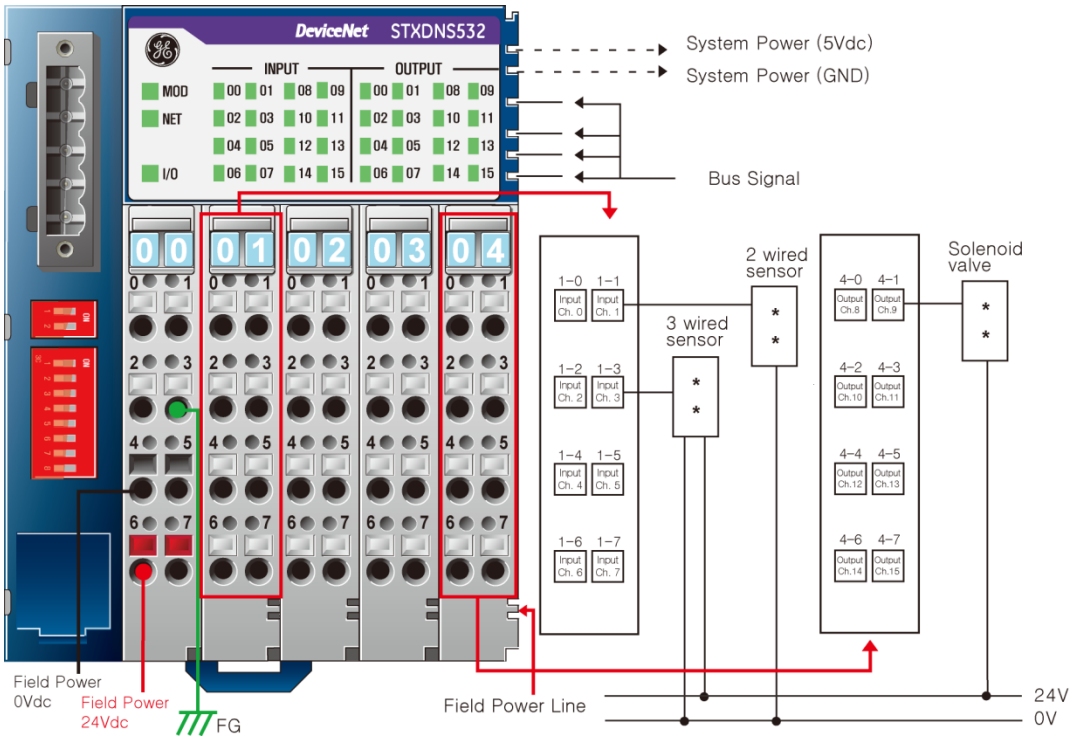


Figure 16: DeviceNet Network Adaptor Module: STXDNS532

Table 12: STXDNS532: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Output Channel 0
01-1	Input Channel 1	03-1	Output Channel 1
01-2	Input Channel 2	03-2	Output Channel 2
01-3	Input Channel 3	03-3	Output Channel 3
01-4	Input Channel 4	03-4	Output Channel 4
01-5	Input Channel 5	03-5	Output Channel 5
01-6	Input Channel 6	03-6	Output Channel 6
01-7	Input Channel 7	03-7	Output Channel 7
02-0	Input Channel 8	04-0	Output Channel 8
02-1	Input Channel 9	04-1	Output Channel 9
02-2	Input Channel 10	04-2	Output Channel 10
02-3	Input Channel 11	04-3	Output Channel 11
02-4	Input Channel 12	04-4	Output Channel 12
02-5	Input Channel 13	04-5	Output Channel 13
02-6	Input Channel 14	04-6	Output Channel 14
02-7	Input Channel 15	04-7	Output Channel 15

3.2.1.9 STXDNS824 - DeviceNet Network Adapter with 16 Positive Logic in/8 relay out

The following illustration shows the interface diagram for STXDNS824.

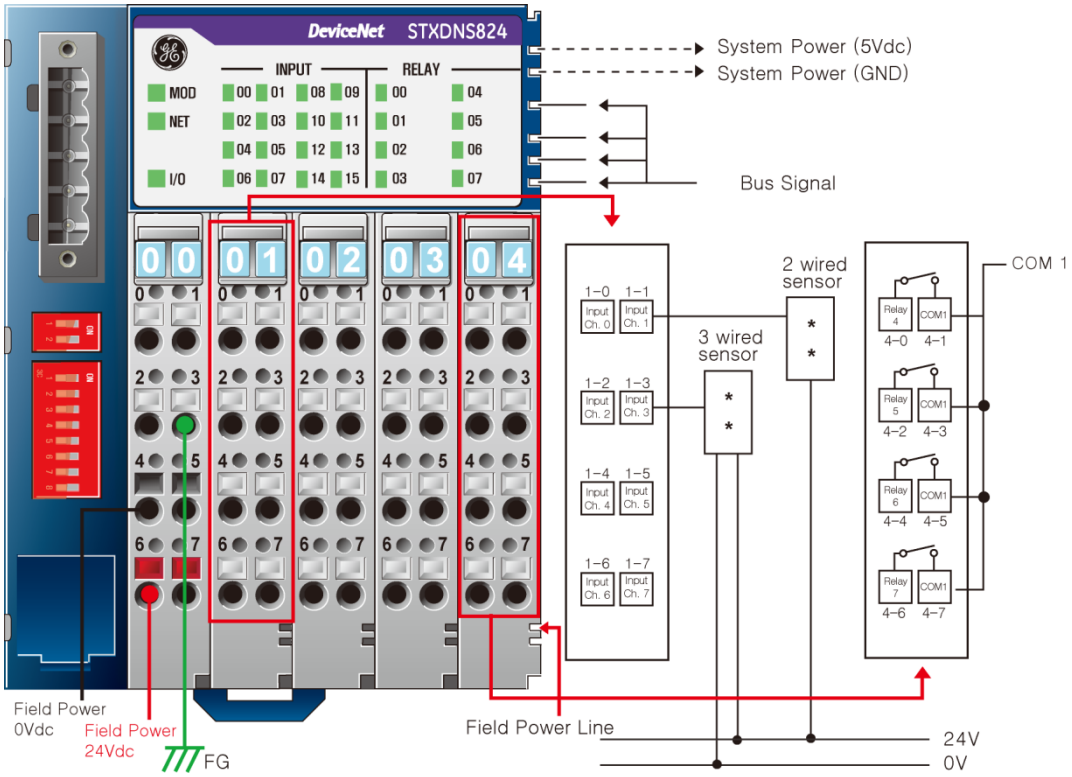


Figure 17: DeviceNet Network Adaptor Module: STXDNS824

Table 13: STXDNS824: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Relay Output 0
01-1	Input Channel 1	03-1	COM 0
01-2	Input Channel 2	03-2	Relay Output 1
01-3	Input Channel 3	03-3	COM 1
01-4	Input Channel 4	03-4	Relay Output 2
01-5	Input Channel 5	03-5	COM 2
01-6	Input Channel 6	03-6	Relay Output 3
01-7	Input Channel 7	03-7	COM 3
02-0	Input Channel 8	04-0	Relay Output 4
02-1	Input Channel 9	04-1	COM 4
02-2	Input Channel 10	04-2	Relay Output 5
02-3	Input Channel 11	04-3	COM 5
02-4	Input Channel 12	04-4	Relay Output 6
02-5	Input Channel 13	04-5	COM 6
02-6	Input Channel 14	04-6	Relay Output 7
02-7	Input Channel 15	04-7	COM 7

3.2.1.10 STXDNS924- DeviceNet Network Adapter with 16 Negative Logic in/8 relay out

The following illustration shows the interface diagram for STXDNS924.

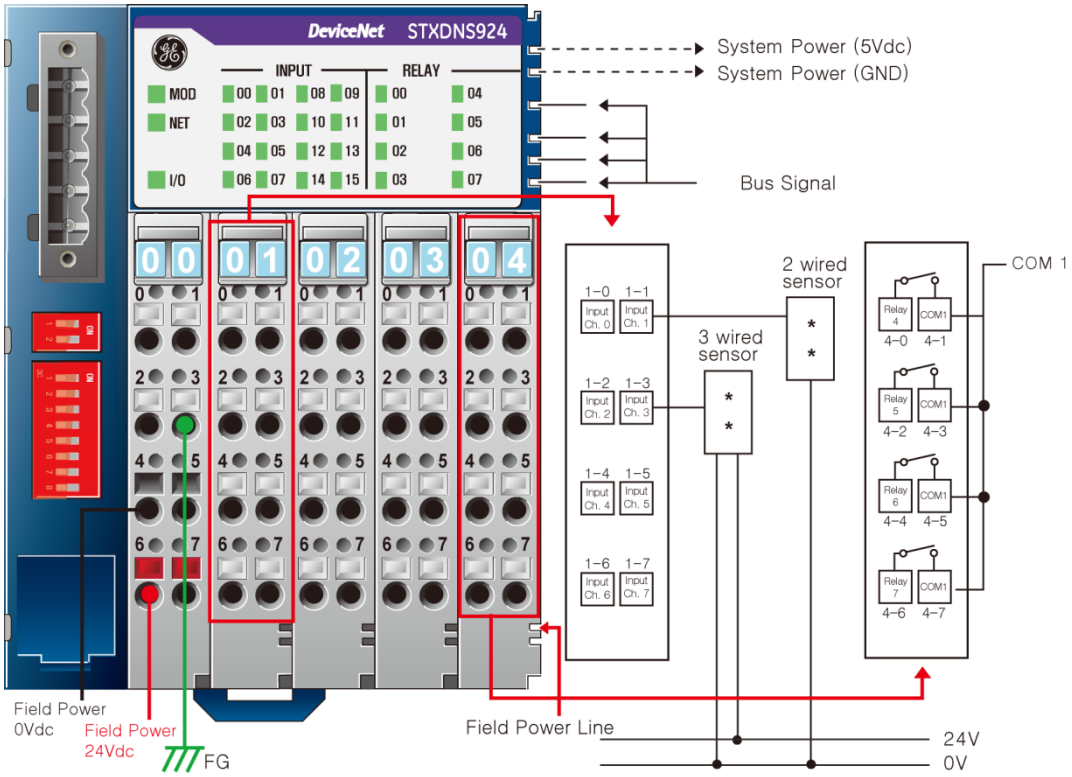


Figure 18: DeviceNet Network Adaptor Module: STXDNS924

Table 14: STXDNS924: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Relay Output 0
01-1	Input Channel 1	03-1	COM 0
01-2	Input Channel 2	03-2	Relay Output 1
01-3	Input Channel 3	03-3	COM 0
01-4	Input Channel 4	03-4	Relay Output 2
01-5	Input Channel 5	03-5	COM 0
01-6	Input Channel 6	03-6	Relay Output 3
01-7	Input Channel 7	03-7	COM 0
02-0	Input Channel 8	04-0	Relay Output 4
02-1	Input Channel 9	04-1	COM 1
02-2	Input Channel 10	04-2	Relay Output 5
02-3	Input Channel 11	04-3	COM 1
02-4	Input Channel 12	04-4	Relay Output 6
02-5	Input Channel 13	04-5	COM 1
02-6	Input Channel 14	04-6	Relay Output 7
02-7	Input Channel 15	04-7	COM 1

3.2.1.11 STXDNS825 - DeviceNet Network Adapter with 16 Pos. Logic in/8 relay out isolated

The following illustration shows the interface diagram for STXDNS825.

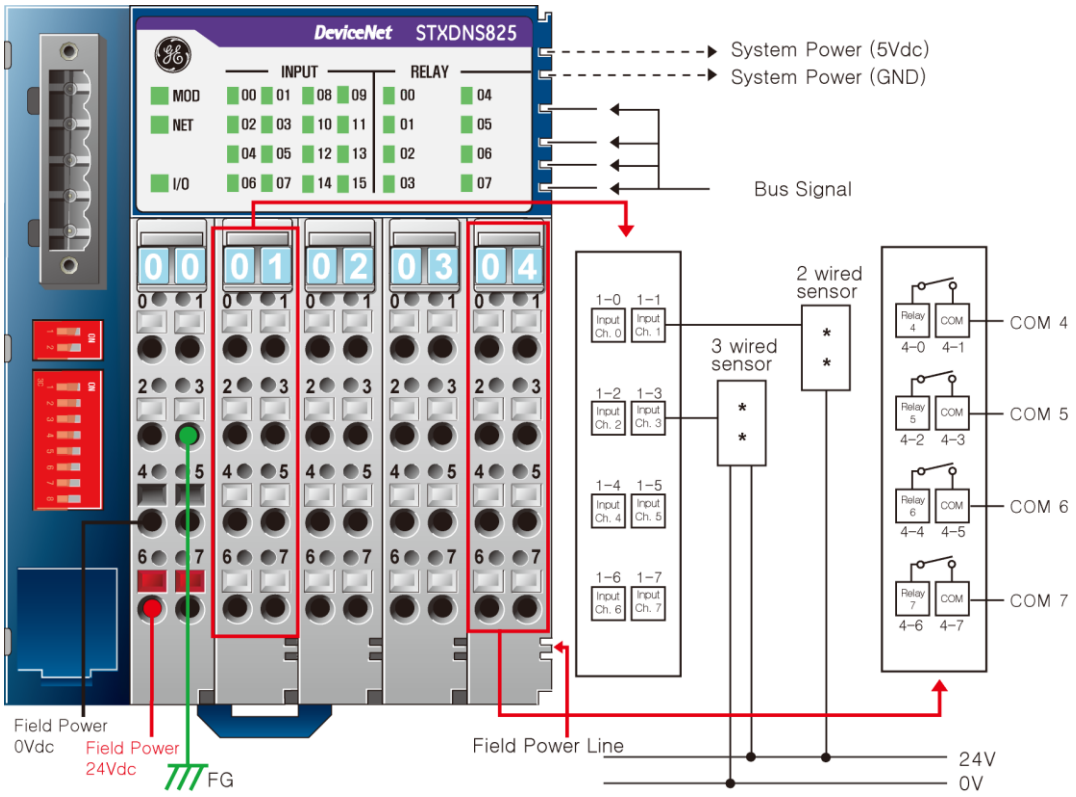


Figure 19: DeviceNet Network Adaptor Module: STXDNS825

Table 15: STXDNS825: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Relay Output 0
01-1	Input Channel 1	03-1	COM 0
01-2	Input Channel 2	03-2	Relay Output 1
01-3	Input Channel 3	03-3	COM 1
01-4	Input Channel 4	03-4	Relay Output 2
01-5	Input Channel 5	03-5	COM 2
01-6	Input Channel 6	03-6	Relay Output 3
01-7	Input Channel 7	03-7	COM 3
02-0	Input Channel 8	04-0	Relay Output 4
02-1	Input Channel 9	04-1	COM 4
02-2	Input Channel 10	04-2	Relay Output 5
02-3	Input Channel 11	04-3	COM 5
02-4	Input Channel 12	04-4	Relay Output 6
02-5	Input Channel 13	04-5	COM 6
02-6	Input Channel 14	04-6	Relay Output 7
02-7	Input Channel 15	04-7	COM 7

3.2.1.12 STXDNS925 - DeviceNet Network Adapter with 16 Neg. Logic in/8 relay out isolated

The following illustration shows the interface diagram for STXDNS925.

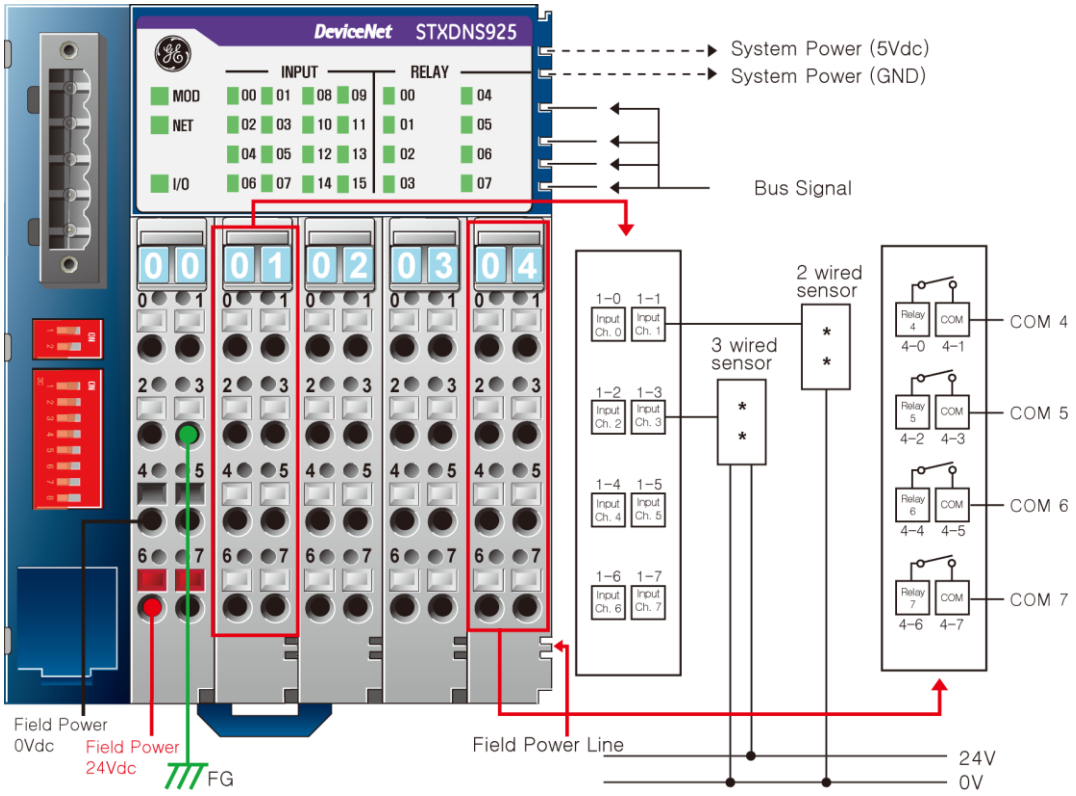


Figure 20: DeviceNet Network Adaptor Module: STXDNS925

Table 16: STXDNS925: Pin Description

Pin Number	Description	Pin Number	Description
01-0	Input Channel 0	03- 0	Relay Output 0
01-1	Input Channel 1	03-1	COM 0
01-2	Input Channel 2	03-2	Relay Output 1
01-3	Input Channel 3	03-3	COM 1
01-4	Input Channel 4	03-4	Relay Output 2
01-5	Input Channel 5	03-5	COM 2
01-6	Input Channel 6	03-6	Relay Output 3
01-7	Input Channel 7	03-7	COM 3
02-0	Input Channel 8	04-0	Relay Output 4
02-1	Input Channel 9	04-1	COM 4
02-2	Input Channel 10	04-2	Relay Output 5
02-3	Input Channel 11	04-3	COM 5
02-4	Input Channel 12	04-4	Relay Output 6
02-5	Input Channel 13	04-5	COM 6
02-6	Input Channel 14	04-6	Relay Output 7
02-7	Input Channel 15	04-7	COM 7

3.2.2 Specifications

Table 17: STXDNS032/132/232/332/432/532/016/116/824/924/825/925 Specifications

Model	DNS 032	DNS 132	DNS 232	DNS 332	DNS 432	DNBS 532	DNBS 016	DNS 116	DNS 824	DNS 924	DNS 825	DNS 925
Input/Interface Specifications												
Number of Inputs	32 Points				16 Points				16 Points			
Logic Type	Pos.	Neg.			Pos.	Neg.			Pos.	Neg.	Pos.	Neg.
Indicates	1 LED/ 1 point											
Input Voltage	24 Vdc	0Vdc			24Vdc	0Vdc			24Vdc	0Vdc	24Vdc	0Vdc
Maximum Off-State Voltage	5Vdc				5Vdc				5Vdc			
Minimum On-State Voltage	9Vdc				9Vdc				9Vdc			
Input Signal Delay	< 0.5msec				< 0.5msec				< 0.5msec			
Input Impedance	About 5.4KΩ				About 5.4KΩ				About 5.4KΩ			
Output Specifications												
Number of Outputs			32 Points		16 Points							
Logic Type			Neg.	Pos.		Neg.						
Output Load Current			Maximum 0.5A/1pt, 8A/All									
Output Voltage			0Vdc	24Vdc		0Vdc						
Drop Voltage (ON-state)			Maximum 0.3Vdc									
Leakage Current (OFF-state)			Maximum 50uA									
Output Signal Delay			< 0.3msec									
Protection			Short protection, Over Temperature protection, Over Current Limit									
Relay Output Specifications												
Number of Output							16 points		8 points			
Relay Type							Normally Open, Single Pole, Single Throw					
Output Rating							2A@5~28.8Vdc,240Vac, 0.8A@48Vdc, 0.5A@110Vdc					
Minimum Load							100uA, 100mVdc/Point					
Minimum On-Stage Voltage Drop							0.5V@2.0A, Resistive Load, 24Vdc					
Output Delay Time							Maximum 10ms					
Initial Contact Resistance							30mΩ					

Model	***DNS 032***	***DNS 132***	***DNS 232***	***DNS 332***	***DNS 432***	***DNBS 532***	***DNBS 016***	***DNS 116***	***DNS 824***	***DNS 924***	***DNS 825***	***DNS 925***
Expected Contact Life							300K Cycle Resistive, 100K Cycle Inductive					
Common Type							4 Point /1 COM	1 Point /1 COM	4 Point/1 COM		1 Point/1 COM	
Isolation							Relay Coil/Contact Isolation					
IO Common Specifications												
Power Dissipation	Maximum 110mA@24Vdc											
Isolation	System Power to internal logic: Non-isolation, Internal logic to I/O driver: Isolation											
Field Power	Supply Voltage: 24Vdc nominal, Supply Voltage range: 11~28.8Vdc											
Current for IO Module	0.4A@5Vdc											
Field Power Current	Maximum 6A@24Vdc											
Weight	Maximum 340g											
Module Size	83mm x 99mm x 70mm											
Environmental Conditions	See “Environmental Specifications" in Appendix D.											

3.3 LED Indicators

3.3.1 Module Status LED (MOD)

Table 18: Module Status LED

Color	Status	Function
Off	Power off	No power is supplied to the unit.
Solid Green	Device Operational	The unit is operating in normal condition.
Flashing Green	Device in Standby	The device needs commissioning due to configuration missing, incomplete or incorrect.
Flashing Red	Minor Fault	Recoverable Fault - EEPROM checksum error.
Solid Red	Unrecoverable Fault	The device has an unrecoverable fault. - Firmware Fault.

3.3.2 Network Status LED (NET)

Table 19: Network Status LED

Color	Status	Function
Off	Not Powered, Not On-line	Device is not on-line or may not be powered
Flashing Green	On-line, Not connected	Device is on-line but has no connections in the established state - Passed the Duplicate MAC_ID test - Not allocated to a master
Solid Green	On-line, Connected	Device is on-line and allocated to a master.
Flashing Red	Connection Time-out	One or more I/O connections are in the time-out state.
Solid Red	Critical Communication Failure	Failed communication. - Duplicate MAC ID - Bus-off

3.3.3 IO Module Status LED (I/O)

Table 20: IO Module status LED

Color	Status	Function
Off	Not powered No IO Module	Device has no IO module or may not be powered
Flashing Green	-Bus On-line, Do not Exchange I/O data	Bus is on-line but does not exchanging I/O data (Passed the IO module configuration).
Solid Green	Bus Connection, Run Exchanging IO data	Exchanging I/O data
Solid Red	Bus connection fault during exchanging IO data	One or more IO module in fault Status. - Changed IO module configuration. - Bus communication failure.
Flashing Red	IO Configuration Failed	Failed to initialize IO module - Detected invalid IO module ID. - Overflowed Input / Output Size - Too many IO module - Initial protocol failure - Vendor code Mismatch.

3.3.3.1 Field Power Status LED

Table 21: Field Power Status LED

Color	Status	Function
Off	Not Supplied Field Power	Not supplied 24V dc field power
Solid Green	Supplied Field Power	Supplied 24V dc field power

3.4 DeviceNet Module Installation

3.4.1 Dimensions

3.4.1.1 STXDNS001 Dimension

The following illustration displays the dimension for STXDNS001

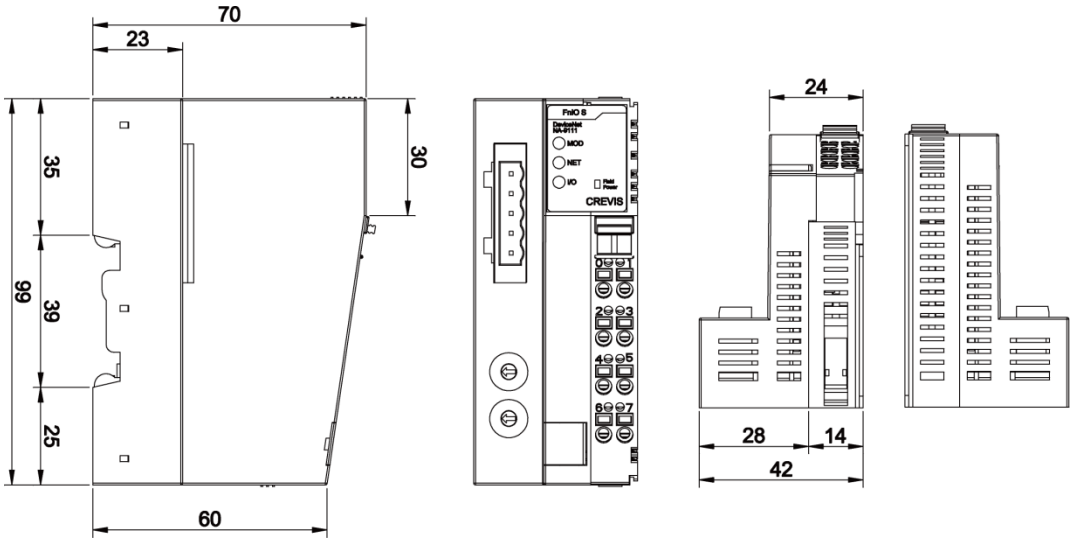


Figure 21: Dimension for STXDNS001

3.4.1.2 STXDNS* Dimension

The following illustration displays the dimension for STXDNS*.

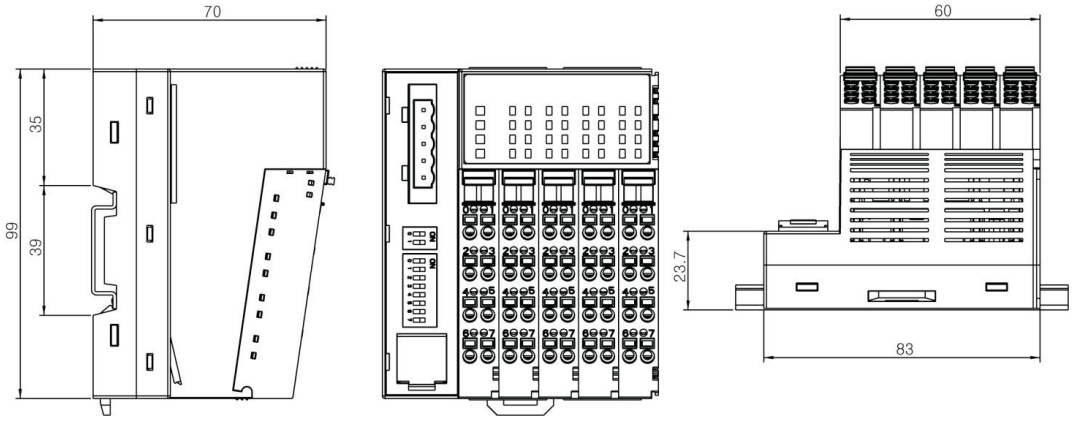


*Figure 22: Dimension for STXDNS**

3.4.1.3 Total IO

The maximum number of IO module assemblies that can be connected to STXDNS001 is 32. The maximum length is 426mm.

3.4.1.4 DeviceNet Network Composition

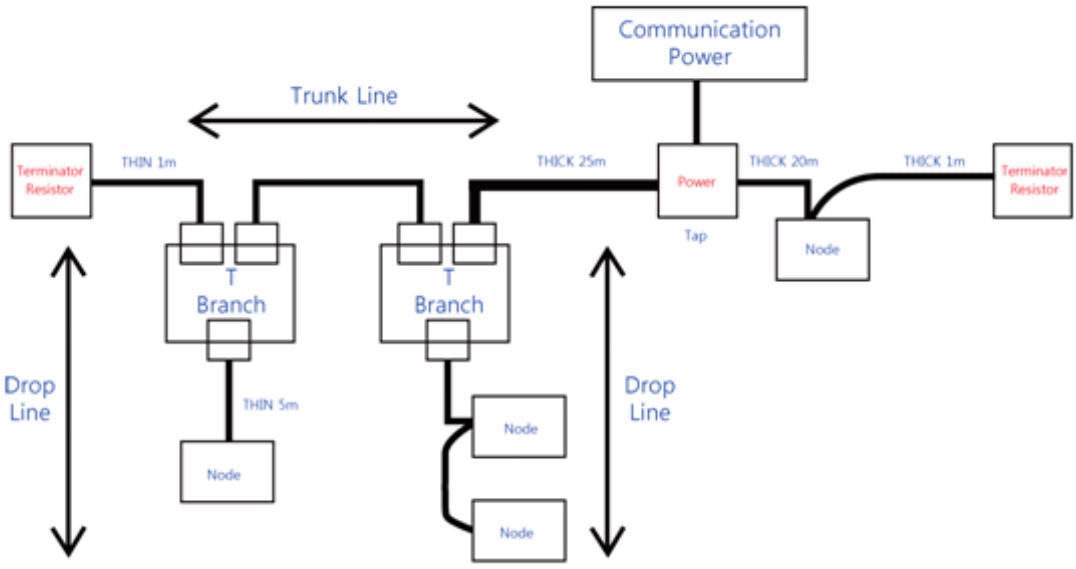


Table 22: Network Components

Name	Description
Node	Node is the Slave DeviceNet that is assigned the address number. DeviceNet system is comprised of a Master and Slave. The Master manages the DeviceNet network and composes external I/O in Slave. Slave polls external I/O.
Trunk / Drop Line	Trunk line is the cable that is installed with a terminator resistor on each end. Drop line is cable that T branch from trunk line. In the DeviceNet, both trunk and drop line are used.
Connection Mode	DeviceNet has two types of connection modes. T-branch: T-branch is a method that branches off drop-line by a T-branch tap Multi-drop: The Multi drop method connects the nodes directly without the use of a T-branch.
Terminator Resistor	Terminator resistor is installed for reduction a reflected wave in both ends of the trunk line.
Communication Power	DeviceNet requires the user to supply communication power to each node connector through the DeviceNet cable.

3.4.2 DeviceNet Cable Specifications

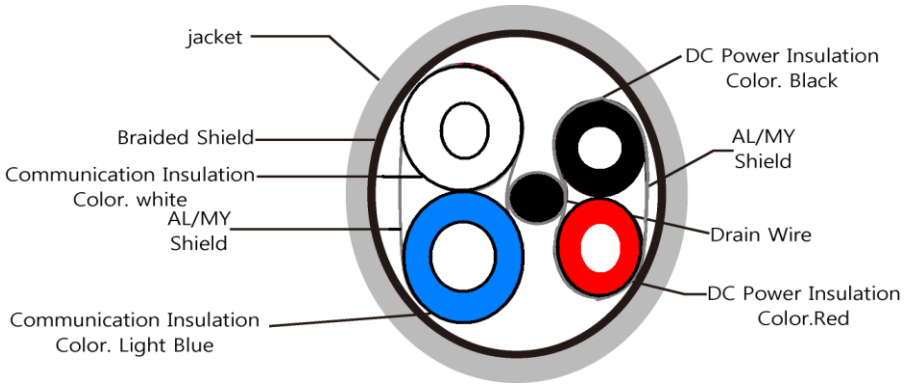


Table 23: DeviceNet Cable Specifications

Physical Characteristics	Thick Cable Spec	Thin Cable Spec
Communication cable		
Conductor pair size	#18 Copper(minimum) : 19 strand min(individually tinned)	#24 Copper(minimum) : 19 strand min(individually tinned)
Insulation diameter	0.150 inches	0.077 inches
Colors	Light blue White	Light blue White
Pair twist/ft	3(approx.)	5(approx.)
Impedance	120Ω ± 10% (at 1MHz)	
Power pair		
Conductor pair size	#15 Copper(minimum) : 19 strand min(individually tinned)	#22 Copper(minimum) : 19 strand min(individually tinned)
Insulation diameter	0.098 inches	0.055 inches
Color	Red Black	Red Black
Tape shield over pair	1.0mil/1mil,Al/Mylar Al side out w/shorting fold (pull-on applied)	1.0mil/1mil,Al/Mylar Al side out w/shorting fold (pull-on applied)
Drain wire	#18 Copper(minimum): 19 strand min	#22 Copper(minimum): 19 strand min
Roundness	Radius delta to be within 15% of 0.5 0.D	
Agency certification	NEC(UL) type CL2(min.)	
Jacket marker	Vender name & part#, and additional	

The maximum length of network for each cable type is as follows.

Table 24: Maximum Length for Thick Cable

Communication rate	Truck Length	Truck Exchange (Thick Cable)	Cumulative drop	Maximum drop
125Kb	500m(1640ft)	1.0	156m(512ft)	6m(20ft)
250Kb	250m(820ft)	1.0	76m(256ft)	6m(20ft)
500Kb	100m(328ft)	1.0	38m(128ft)	6m(20ft)

Table 25: Maximum Length for Thin Cable

Communication rate	Truck Length	Truck Exchange (Thick Cable)	Cumulative drop	Maximum drop
125Kb	100m(328ft)	5.0	156m(512ft)	6m(20ft)
250Kb	100m(328ft)	2.5	76m(256ft)	6m(20ft)
500Kb	100m(328ft)	1.0	38m(128ft)	6m(20ft)

3.4.3 DeviceNet Connector Specifications

3.4.3.1 Mini Connector

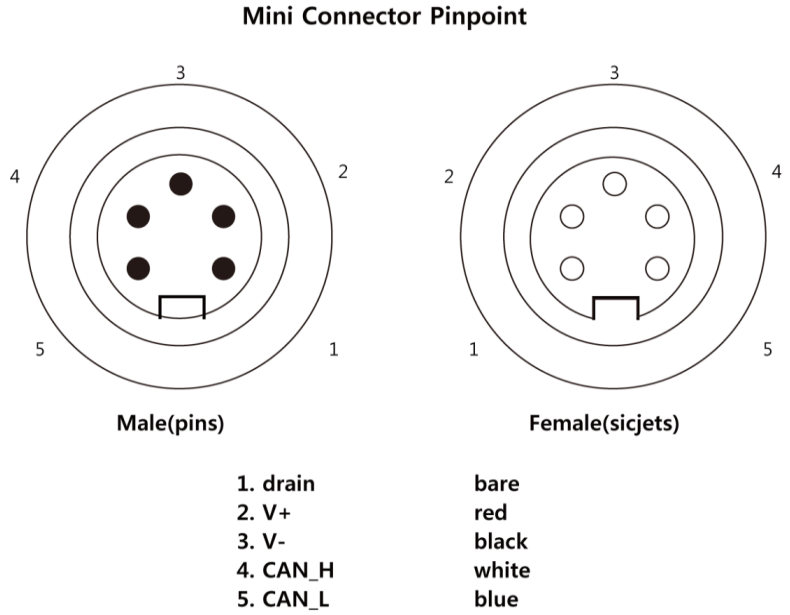


Table 26: Mini Connector Specifications

Male General Characteristics	***Specification***
Number of Pins	5
Coupling Nut	Male
Coupling Nut Thread	7/8–166 UN-2A THD
Rotation	Optional
Pin out	Drain : Pin1, V+ : Pin2, V- : Pin3, CAN_H : Pin4, CAN_L : Pin5
Female General Characteristics	***Specification***
Number of Pins	5
Coupling Nut	Female
Coupling Nut Thread	7/8–166 UN-2B THD
Rotation	Required
Pin out	Drain : Pin1, V+ : Pin2, V- : Pin3, CAN_H : Pin4, CAN_L : Pin5
Physical Characteristics	***Specification***
Wiping Contact Plating Requirements	30 micro inch gold minimum over 50 micro inch nickel minimum or 5 micro inch gold minimum over 20 micro inch Palladium-nickel minimum over 50 micro inch nickels. All gold must be 24 karat

3.4.3.2 Network Connector

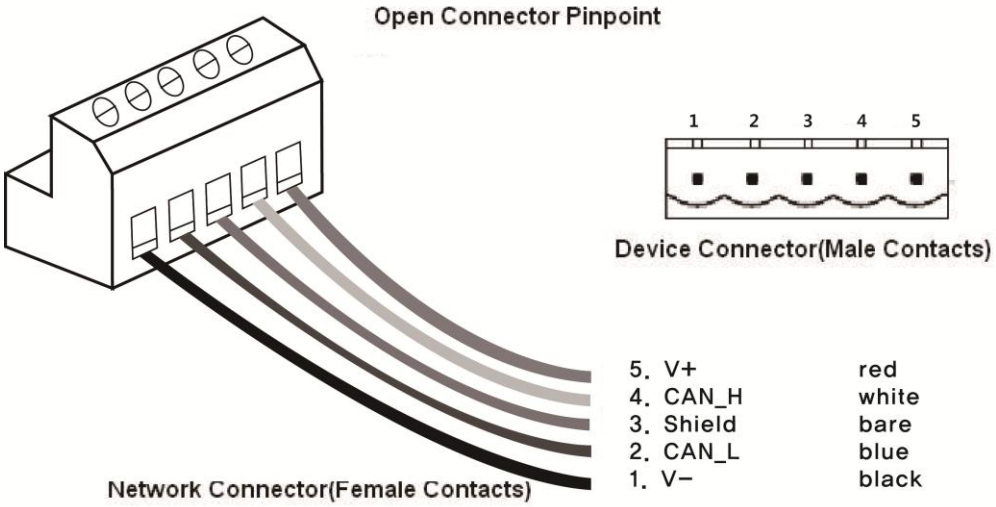


Figure 23: Communication Interface for STXDNS001 and STXDNS*

STXDNS* : STXDNS032/132/232/332/432/532/016/116/824/924/825/925

Table 27: Network Connector Specifications

Male General Characteristics	***Specification***
Number of Pins	5
Coupling Nut	None
Coupling Nut Thread	None
Rotation	None
Pin out	V- : Pin1, CAN_L : Pin2, Shield : Pin3, CAN_H : Pin4, V+ : Pin5
Female General Characteristics	***Specification***
Number of Pins	5
Coupling Nut	None
Coupling Nut Thread	None
Rotation	None
Pin out	V- : Pin1, CAN_L : Pin2, Shield : Pin3, CAN_H : Pin4, V+ : Pin5
Physical Characteristics	***Specification***
Wiping Contact Plating Requirements	30 micro inch gold minimum over 50 micro inch nickel minimum or 5 micro inch gold minimum over 20 micro inch Palladium-nickel minimum over 50 micro inch nickels. All gold must be 24 karat
Wiping Contract Life	1000 insertion - extractions
Electrical Characteristics	***Specification***
Operating Voltage	25 Volt minimum
Contact Rating	8 Amps minimum

Device network power is 24V. Network and I/O field power must be separated

3.4.3.3 Terminator Resistor Specification for STXDNS001

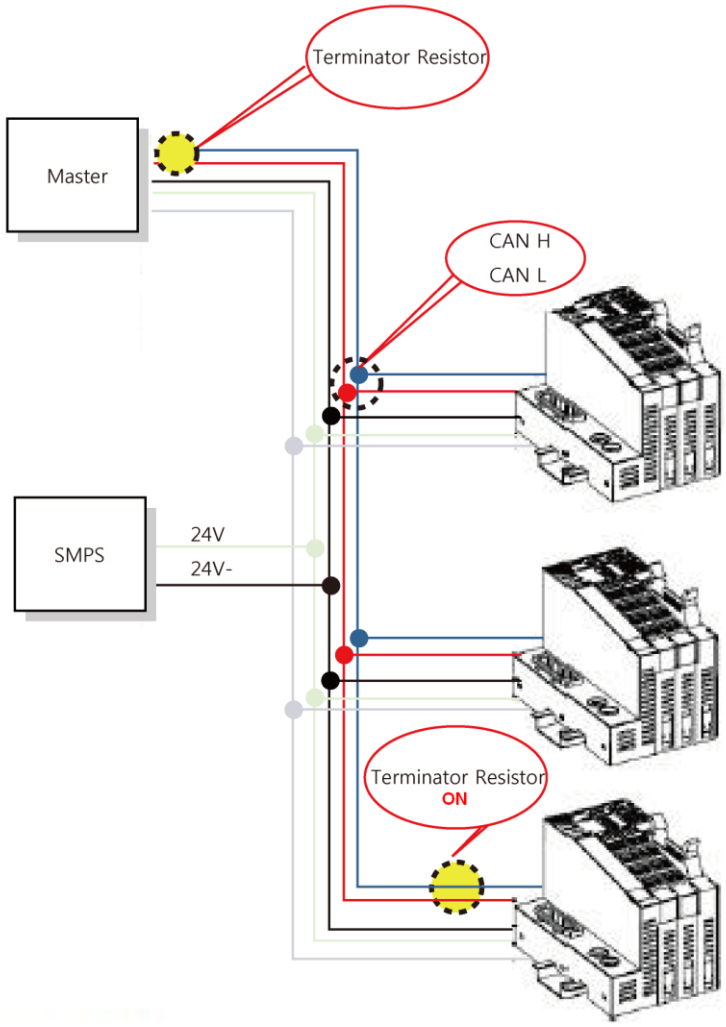
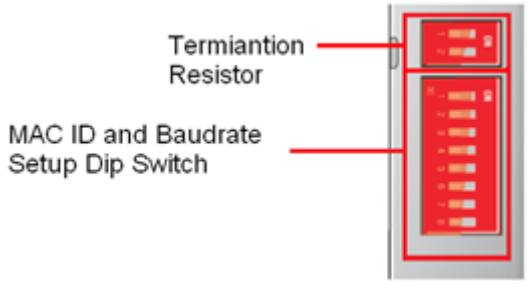


Figure 24: Terminator resistor specification

For STXDNS001

Specification of terminator Resistors are Carbon film Resistor. Resistance specification is 120Ω, 1%, 1/4W

For STXDNS*



Termination Resistor setting	Dip SW #1	Dip SW #2
ON	on	on
OFF	off	off

*Figure 25: DeviceNet DIP switch set up for STXDNS**

STXDNS*: STXDNS032/132/232/332/432/532/016/116/824/924/825/925

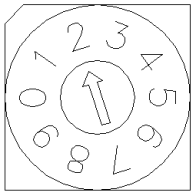
4. DeviceNet Module Configuration

4.1 DeviceNet MAC ID Setup

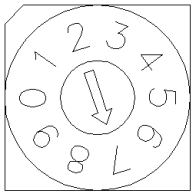
4.1.1 MAC ID Setup for STXDNS001:

Each DeviceNet Adapter must have a unique MAC ID (from 0 to 63) so that it can be addressed independently from other nodes.

For STXDNS001, if value range of 2 rotary switches is 64~99, the MAC ID can be set by from network (software). The below figure shows MAC ID 27(=2*10 + 7*1) of a slave



X 10 (MSD)



X 1 (LSD)

Figure 26: DeviceNet MAC ID set up for STXDNS001

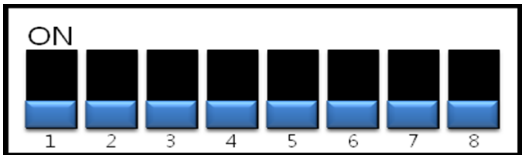
4.1.2 MAC ID and Baud rate Setup for STXDNS032/132/232/332/432/532/016/116/824/924/825/925

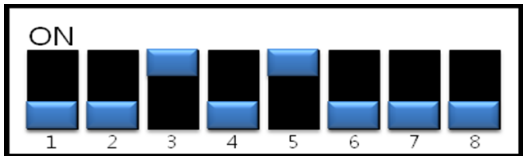
4.1.2.1 MAC ID Setup for STXDNS032/132/232/332/432/532/016/116/824/924/825/925

Each DeviceNet Adapter must have a unique MAC ID (from 0 to 63) so that it can be addressed independently from other nodes.

Dip Switch #1–6 setting.

No.						
1	2	4	8	16	32	Baudrate





4.1.2.2 MAC ID Setting Example

When setting MAC ID to No.20 (Bin.10100) No.3 & 5 Dip S/W On.

Baud rate Setup for STXDNS032/132/232/332/432/532/016/116/824/924/825/925

DIP #7	DIP #8	Baud rate
OFF	OFF	125Kbps
ON	OFF	250Kbps
OFF	ON	500Kbps
ON	ON	Auto Baud rate

4.2 Configuring DeviceNet Adapter

4.2.1 EDS Setting

The Electronic Data Sheet (EDS) provides information necessary to access and alter the configuration parameter of a device. EDS is an external file that contains information about configurable attributes for the debate, including object addresses of each parameter. The application objects in a device represent the destination addresses for configuration data. These addresses are encoded in the EDS.

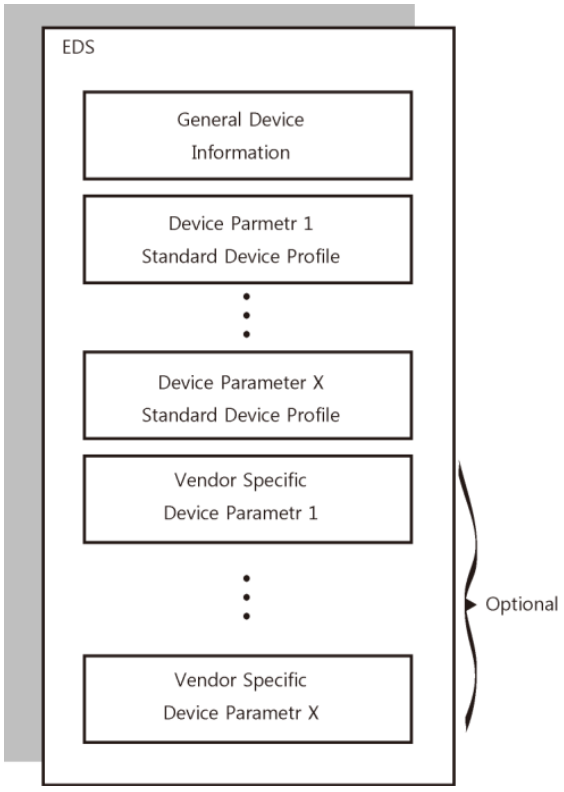
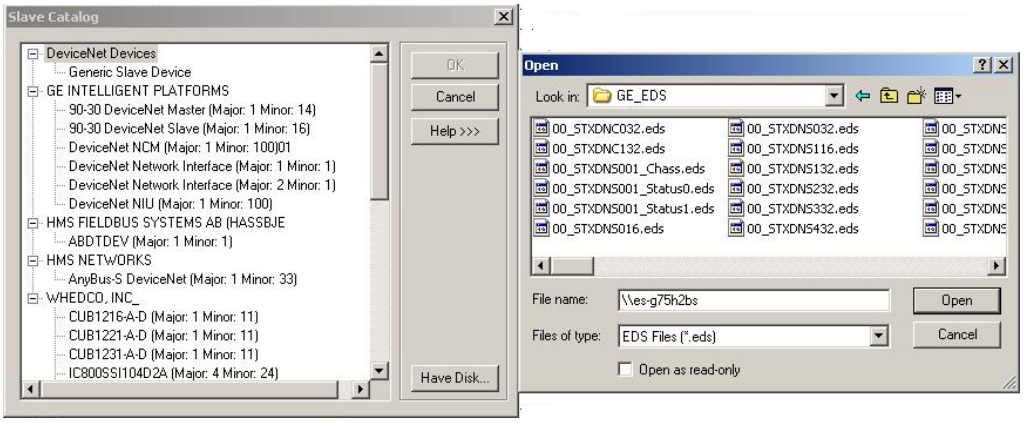


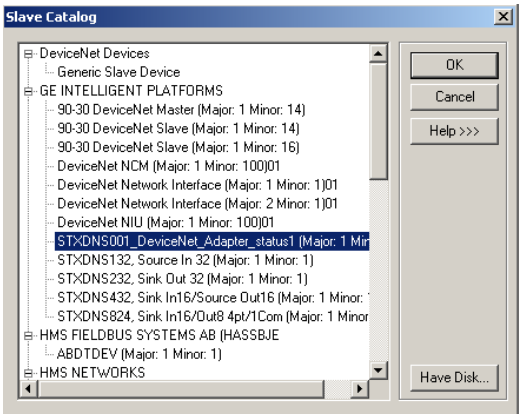
Figure 27: Block Diagram of an EDS File

To configure I/O station, add a GE-IP DeviceNet master module at the desired slot in the Rx3i Proficy Machine Edition project. Right click on the master module and choose “Add Slave”.

1. A pop-up window “slave catalog” will appear which can help you in configuring the I/O station along with the I/O modules
2. On the slave catalog window click on “Have Disk” button and browse to the location where *.eds files are placed and select the required eds file.



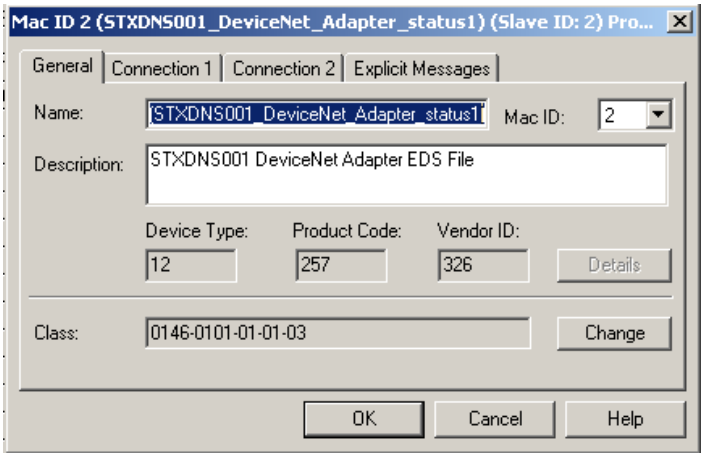
3. Select the desired DeviceNet network adapter module after it gets added in the “slave Catalog” popup window.



4.2.2 Configuring the Network Settings of a DeviceNet Adapter Module

To configure the Network Settings for a DeviceNet Slave Module, right-click the DeviceNet Slave in the PLC configuration, and choose Network Settings.

The Network Settings dialog box appears



The General tab allows setting a name and description for the module. On this tab, you can also select the MACID. The rest of the tabs set up the messaging connections that will be used by the module.

4.2.2.1 Configuring the MAC ID

All software-configured devices originally have the same default MAC ID: 63. Therefore, assigning the MAC ID 63 to be used by a device on the network should be avoided if possible, to prevent duplicate MAC ID conflicts when adding a new slave.

4.2.2.2 Configuring I/O Messaging Connections

I/O Messaging is the term used for the routine and automatic exchange of data between the master and slaves in a DeviceNet system. Each configured I/O Message defines a dedicated communication path between a producing device and one or more consuming devices. Once these connections have been established, I/O Messaging communications occur automatically during system operation.

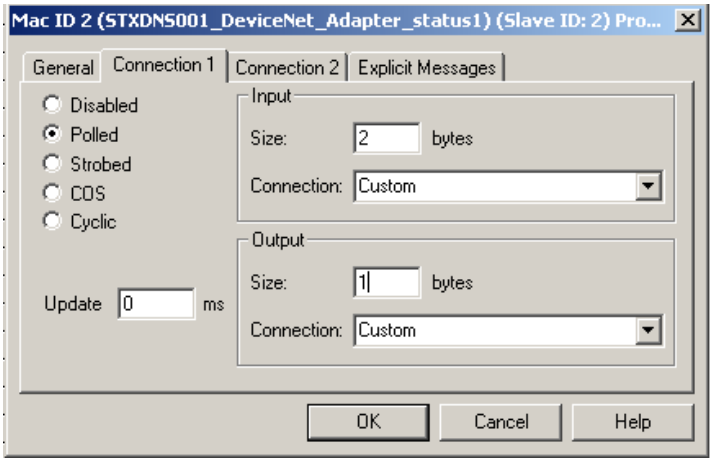
The DeviceNet Slave Module can be set up for up to two different I/O Messaging connections. Each connection can be disabled (the default), or set up for Polled, Strobed, Change-of-State, or Cyclic operation. Connections should be configured to meet the needs of the application.

The selection made for one I/O Messaging connection determines which connection types remain available for the other I/O Messaging connection, as shown by the table below. For example, you can only select one polling connection for the module.

Selected for One Connection	*Available for the Other Connection*
Disabled	Disabled, polled, strobe, cos. cyclic
Polled	Disabled, strobed, cos, cyclic
Strobed	Disabled, polled, cos, cyclic
Cos	Disabled, polled, strobed
Cyclic	Disabled, polled, strobed

Configuration of each of these connection types is described on the following pages

4.2.2.2.1 Configuring a Polled I/O Messaging Connection



For input resources, specify the number of data bytes the DeviceNet Slave Module will send to the master.

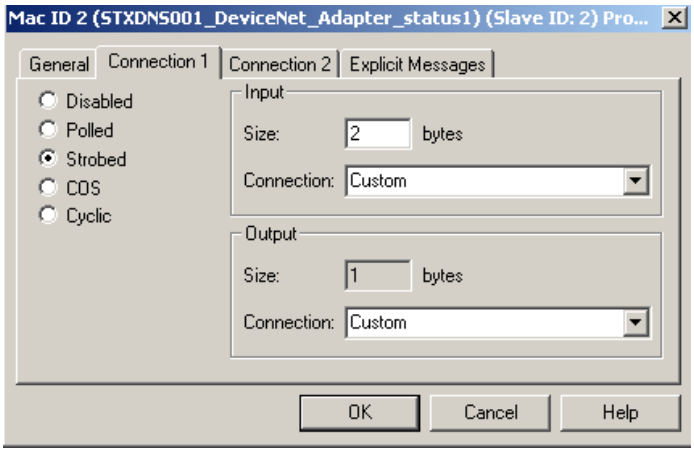
For output resources, enter the number of bytes the DeviceNet Slave Module will consume from the master

4.2.2.2.2 Configuring a Strobed I/O Messaging Connection

In Strobed I/O mode, the master produces a single Strobe request message that is consumed by all devices with a connection configured for strobing, requesting their current status.

Each strobed device then responds with its input data. Devices respond in the order of their MAC IDs, beginning with the lowest MAC ID first. MAC IDs can be specifically assigned to prioritize I/O reporting by the slaves.

To configure Strobed I/O Messaging for a connection, select Strobed on the Slave Properties menu.

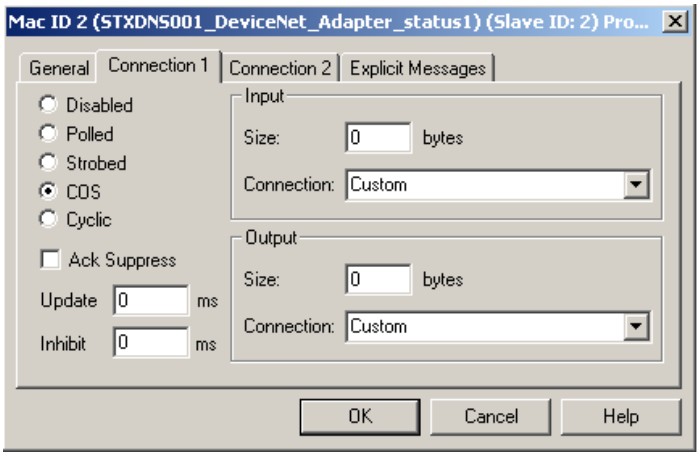


For input resources, specify the number of data bytes the module will send to the master. The length for output resources is automatically set to 1 byte. The message from the Master to the Slaves telling them to send back their inputs is a 1 byte message. It reflects the state of the I/O bit in the strobe request message for the device: set (1) or clear (0).

4.2.2.2.3 Configuring a Change-of-State (COS) I/O Messaging Connection

A connection configured for Change-of-State (COS) I/O Messaging is activated only when the module sends a message to the master, reporting a change of status. The master then sends an output message to the module and the module responds with its input data.

To configure COS Messaging for a connection, select COS on the Connection tab.



For input resources, specify the number of data bytes the module will send to the master. For output resources, enter the number of bytes the module will consume from the master.

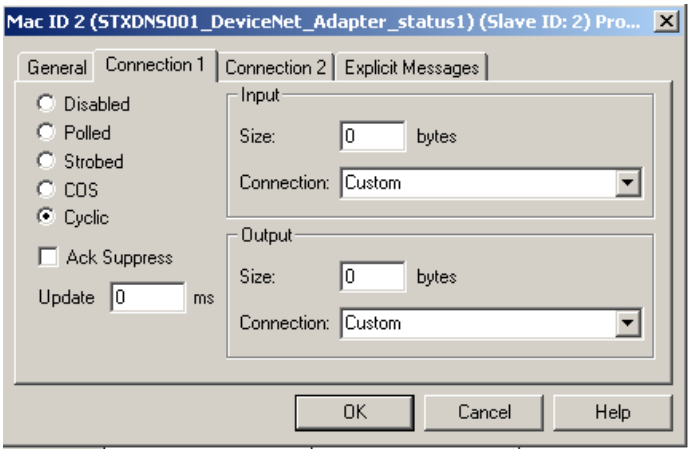
If Acknowledge Suppress is selected, the master will not wait for an acknowledge message from the module.

4.2.2.2.4 Configuring a Cyclic I/O Messaging Connection

In Cyclic I/O Messaging as in Polled I/O Messaging, the DeviceNet master automatically sends a message containing outputs to a device connection configured for Cyclic update. The module sends back a response containing input data. Like Polling, Cyclic I/O Messaging requires 2 messages to update the I/O data for a device. Unlike Polled messaging, Cyclic messaging can use a different interval as configured for each slave.

A Cyclic I/O connection can be used as a 'heartbeat' to provide assurance of a device's continued operation, with a Change-of-State I/O connection to the same device used to update its I/O state.

To configure Cyclic I/O Messaging for a connection, select Cyclic on the Slave Properties menu.



For input resources, specify the number of data bytes the module will send to the master.

For output resources, enter the number of bytes the module will consume from the master.

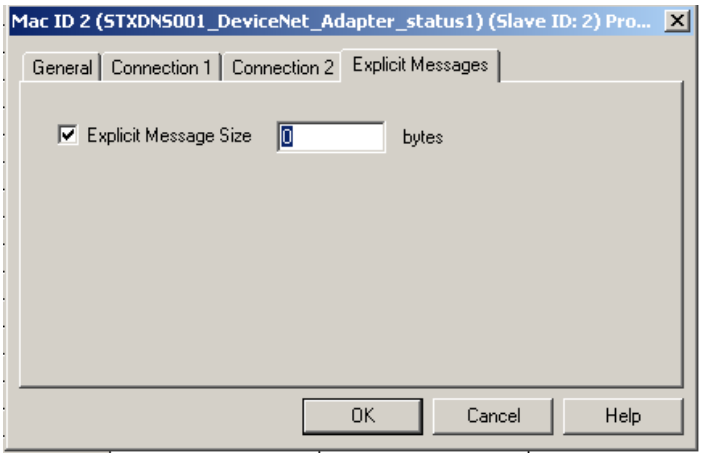
If Acknowledge Suppress flag is selected, the DeviceNet master does not wait for an acknowledge message from the module.

4.2.2.2.5 Configuring DeviceNet Explicit Messaging

Explicit Messaging is the highest priority messaging. Explicit messaging provides access to objects other than the default I/O connection set, and optionally creates a buffer for explicit connection.

If Explicit Messaging should be enabled for the DeviceNet Slave Module, click on Enable Explicit Connection on the Explicit Messages tab.

Also specify the message size. Make sure the size specified is large enough. The DeviceNet module implements Explicit Messaging through the use of COMMREQ instructions in the application program.



4.3 I/O Process Image Map

An IO module may have three types of data as I/O data, configuration parameter and memory register.

The data exchange between network adapter and IO modules is done via an I/O process image data by Bus protocol. The following figure shows the data flow of process image between network adapter and IO modules.

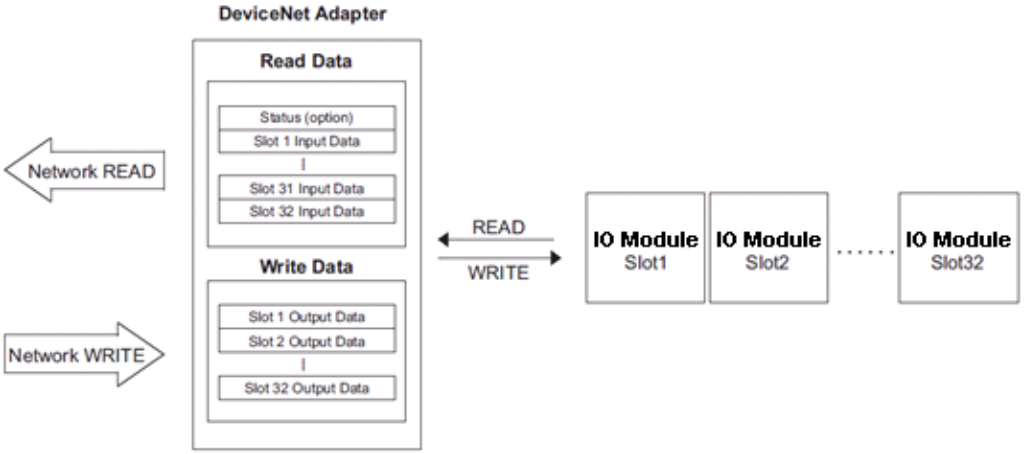


Figure 28: Data exchange between network adapter and IO modules

Status byte is set by default as not. How to set the Status byte is refer to object Model Section

Table 28. Description of Status byte

Bit Description	*Decimal Bit*	*Explanation*
Bus Status	00-03	0: Exchange IO data(normal operation) 1: Stop Exchanging IO(ready to exchange IO) 2: Bus Communication Fault 3: Slot Configuration Fault 4: No IO Module slot
Reserved	04-06	Reserved
Field Power Status	07	0: 24Vdc Field Power On 1: 24Vdc Field Power Off (Applicable for STXDNS001)

4.3.1 Input Process Image Map

Input image data depends on slot position and IO module slot data type. Input process image data is only ordered by IO module slot position when input image mode is uncompressed (mode 0, 2). But, when input image mode is compressed (mode 1, 3), input process image data is ordered by IO module slot position and slot data type.

Input process image mode can be set by Bus Manager Object attribute#5.

Figure 29: Slot configuration

* After the system is reset, the new “Process Image Mode” action is applied.

Table 29: Slot number and Module Description:

Slot Address	Module Description
#0	DeviceNet Adapter
#1	4-discrete input
#2	8-discrete input
#3	2-analog input
#4	16-discrete input
#5	4-discrete input
#6	8-discrete input
#7	4-discrete input
#8	2-analog input
#9	16-discrete input
#10	4-discrete input

Table 30: Input Process Image Mode#0 (Status (1byte) + Uncompressed Input Processing Data)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Field Power	Bus Status						
1	Empty, Always 0				Discrete Input 4 pts (Slot#1)			
2	Discrete Input 8 pts (Slot#2)							
3	Analog Input Ch0 low byte (Slot#3)							
4	Analog Input Ch0 high byte (Slot#3)							
5	Analog Input Ch1 low byte (Slot#3)							
6	Analog Input Ch1 high byte (Slot#3)							
7	Discrete Input low 8 pts (Slot#4)							
8	Discrete Input high 8 pts (Slot#4)							
9	Empty, Always 0				Discrete Input 4 pts (Slot#5)			
10	Discrete Input 8 pts (Slot#6)							
11	Empty, Always 0				Discrete Input 4 pts (Slot#7)			
12	Analog Input Ch0 low byte (Slot#8)							
13	Analog Input Ch0 high byte (Slot#8)							
14	Analog Input Ch1 low byte (Slot#8)							
15	Analog Input Ch1 high byte (Slot#8)							
16	Discrete Input low 8 pts (Slot#9)							
17	Discrete Input high 8 pts (Slot#9)							
18	Empty, Always 0				Discrete Input 4 pts (Slot#10)			

Field Power:

0: 24Vdc Field Power On.

1: 24Vdc Field Power Off

Bus Status:

0: Normal Operation

1: Bus Standby

2: Bus Communication Fault

3: Slot Configuration Failed

4: No IO Module Slot

Status
(1 byte)

Table 31: Input Process Image Mode#1 (Status (1 byte) + Compressed Input Processing Data)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Field Power	Bus Status						
1	Analog Input Ch0 low byte (Slot#3)							
2	Analog Input Ch0 high byte (Slot#3)							
3	Analog Input Ch1 low byte (Slot#3)							
4	Analog Input Ch1 high byte (Slot#3)							
5	Analog Input Ch0 low byte (Slot#8)							
6	Analog Input Ch0 high byte (Slot#8)							
7	Analog Input Ch1 low byte (Slot#8)							
8	Analog Input Ch1 high byte (Slot#8)							
9	Discrete Input 8 pts (Slot#2)							
10	Discrete Input low 8 pts (Slot#4)							
11	Discrete Input high 8 pts (Slot#4)							
12	Discrete Input 8 pts (Slot#6)							
13	Discrete Input low 8 pts (Slot#9)							
14	Discrete Input high 8 pts (Slot#9)							
15	Discrete Input 4 pts (Slot#5)				Discrete Input 4 pts (Slot#1)			
16	Discrete Input 4 pts (Slot#10)				Discrete Input 4 pts (Slot#7)			

Input Assembly Priority:

1. Analog Input Data (Word type)
2. Eight or 16 points Discrete Input Data (Byte type)
3. Four points Input Data (Bit type)
4. Two points Input Data (Bit type)

Table 32: Input Process Image Mode#2 (Uncompressed Input Processing Data without Status)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Empty, Always 0				Discrete Input 4 pts (Slot#1)			
1	Discrete Input 8 pts (Slot#2)							
2	Analog Input Ch0 low byte (Slot#3)							
3	Analog Input Ch0 high byte (Slot#3)							
4	Analog Input Ch1 low byte (Slot#3)							
5	Analog Input Ch1 high byte (Slot#3)							
6	Discrete Input low 8 pts (Slot#4)							
7	Discrete Input high 8 pts (Slot#4)							
8	Empty, Always 0				Discrete Input 4 pts (Slot#5)			
9	Discrete Input 8 pts (Slot#6)							
10	Empty, Always 0				Discrete Input 4 pts (Slot#7)			
11	Analog Input Ch0 low byte (Slot#8)							
12	Analog Input Ch0 high byte (Slot#8)							
13	Analog Input Ch1 low byte (Slot#8)							
14	Analog Input Ch1 high byte (Slot#8)							
15	Discrete Input low 8 pts (Slot#9)							
16	Discrete Input high 8 pts (Slot#9)							
17	Empty, Always 0				Discrete Input 4 pts (Slot#10)			

Table 33: Input Process Image Mode#3 (Compressed Input Processing Data without Status)

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Analog Input Ch0 low byte (Slot#3)							
1	Analog Input Ch0 high byte (Slot#3)							
2	Analog Input Ch1 low byte (Slot#3)							
3	Analog Input Ch1 high byte (Slot#3)							
4	Analog Input Ch0 low byte (Slot#8)							
5	Analog Input Ch0 high byte (Slot#8)							
6	Analog Input Ch1 low byte (Slot#8)							
7	Analog Input Ch1 high byte (Slot#8)							
8	Discrete Input 8 pts (Slot#2)							
9	Discrete Input low 8 pts (Slot#4)							
10	Discrete Input high 8 pts (Slot#4)							
11	Discrete Input 8 pts (Slot#6)							
12	Discrete Input low 8 pts (Slot#9)							
13	Discrete Input high 8 pts (Slot#9)							
14	Discrete Input 4 pts (Slot#5)				Discrete Input 4 pts (Slot#1)			
15	Discrete Input 4 pts (Slot#10)				Discrete Input 4 pts (Slot#7)			

Input Assembly Priority:

1. Analog Input Data (Word type)
2. Eight or 16 points Discrete Input Data (Byte type)
3. Four points Input Data (Bit type)
4. Two points Input Data (Bit type)

4.3.2 Output Process Image Map

Output image data depends on slot position and IO module slot data type. Output process image data is only ordered by IO module slot position when output image mode is uncompressed (mode 0). But, when output image mode is compressed (mode 1), output process image data is ordered by Io module slot position and slot data type.

Output process image mode can be set by Bus Manager Object attribute#6.

Figure 30: Slot configuration Example

Table 34: Slot number and module description

Slot Address	Module Description
#0	DeviceNet Adapter
#1	4-discrete output
#2	8-discrete output
#3	2-analog output
#4	16-discrete output
#5	4-discrete output
#6	8-discrete output
#7	2-relay output
#8	2-relay output
#9	2-analog output
#10	16-discrete output
#11	4-discrete output

Table 35: Input Process Image Mode#0 (Status (1byte) + Uncompressed Input Processing Data)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Empty, not used				Discrete Output 4 pts (Slot#1)			
1	Discrete Output 8 pts (Slot#2)							
2	Analog Output Ch0 low byte (Slot#3)							
3	Analog Output Ch0 high byte (Slot#3)							
4	Analog Output Ch1 low byte (Slot#3)							
5	Analog Output Ch1 high byte (Slot#3)							
6	Discrete Output low 8 pts (Slot#4)							
7	Discrete Output high 8 pts (Slot#4)							
8	Empty, not used				Discrete Output 4 pts (Slot#5)			
9	Discrete Input 8 pts (Slot#6)							
10	Empty, not used							Discrete Output 2 pts (Slot#7)
11	Empty, not used							Discrete Output 2 pts (Slot#8)
12	Analog Output Ch0 low byte (Slot#9)							
13	Analog Output Ch0 high byte (Slot#9)							
14	Analog Output Ch1 low byte (Slot#9)							
15	Analog Output Ch1 high byte (Slot#9)							
16	Discrete Output low 8 pts (Slot#10)							
17	Discrete Output high 8 pts (Slot#10)							
18	Empty, not used				Discrete Output 4 pts (Slot#11)			

Table 36: Output Process Image Mode#1 (Compressed Output Processing Data)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Analog Output Ch0 low byte (Slot#3)							
1	Analog Output Ch0 high byte (Slot#3)							
2	Analog Output Ch1 low byte (Slot#3)							
3	Analog Output Ch1 high byte (Slot#3)							
4	Analog Output Ch0 low byte (Slot#9)							
5	Analog Output Ch0 high byte (Slot#9)							
6	Analog Output Ch1 low byte (Slot#9)							
7	Analog Output Ch1 high byte (Slot#9)							
8	Discrete Output 8 pts (Slot#2)							
9	Discrete Output low 8 pts (Slot#4)							
10	Discrete Output high 8 pts (Slot#4)							
11	Discrete Input 8 pts (Slot#6)							
12	Discrete Output low 8 pts (Slot#10)							
13	Discrete Output high 8 pts (Slot#10)							
14	Discrete Output 4 pts (Slot#5)				Discrete Output 4 pts (Slot#1)			
15	Discrete Output 2 pts (Slot#8)		Discrete Output 2 pts (Slot#7)		Discrete Output 4 pts (Slot#11)			

Output Assembly Priority:

1. Analog Output Data (Word type)
2. Eight or 16 points Discrete Output Data (Byte type)
3. Four points Output Data (Bit type)
4. Two points Output Data (Bit type)

5. DeviceNet Interface

A DeviceNet node is modeled as a collection of Objects. An Object provides an abstract representation of a particular component within a product. The realization of this abstract object model within a product is implementation dependent. In other words, a product internally maps this object model in a fashion specific to its implementation.

The objects and their components are addressed by a uniform addressing scheme consisting of:

- Media Access Control Identifier (MAC ID), an integer identification value assigned to each node on a DeviceNet network.
- Class Identifier (Class ID), an integer identification value assigned to each Object Class accessible from the network.
- Instance Identifier (Instance ID), an integer identification value assigned to an Object Instance that identifies it among all Instances of the same Class.
- Attribute Identifier (Attribute ID), an integer identification value assigned to a Class and/or Instance Attribute.
- Service Code, an integer identification value which denotes a particular Object Instance and/or Object Class function.

5.1 Supported Objects

- Device Type Number: $0C_{HEX}$ (Communications Adapter)

Table 37: Object Types

Name of Object	*Type*	*Number of Instances*	*Class Code*
Identity	Required	1	01_{HEX}
Message Router	Required	1	02_{HEX}
DeviceNet	Required	1	03_{HEX}
Assembly	Required	2	04_{HEX}
Connection	Required	4	05_{HEX}
Acknowledge Handler	Required	1	$2B_{HEX}$
Bus Manager	Vendor-specific	1	70_{HEX}
IO Module Slot	Vendor-specific	1~32	71_{HEX}

Table 38: Objects Behavior, Interface

Object	*Behavior*	*Interface*
Identity	Device identification, reset service	Message Router
DeviceNet	Configures port attributes	Message Router
Assembly	Defines I/O data format and concatenates configuration data	I/O Connection or Message Router
Connection	Contains the number of logical ports into or out-of the device	Message Router
Acknowledge Handler	Manage the reception of message acknowledgments	Message Router
Bus Manager	Management functions for the Bus	Message Router

5.2 Object Settings

5.2.1 Identity Object

Class Code: 01HEX

Table 39: Common Services

Service Code	Implemented for		Service Name	Value
	Class	Instance		
0x05	No	Yes	Reset	0: Reset Only 1: Reset and Factory Default
0x0E	No	Yes	Get_Attribute_Single	

Class Attributes

None

Table 40: Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	Vendor ID	UINT	326
	2	Get	Device Type	UINT	$0C_{HEX}$ (Communications Adapter)
	3	Get	Product Code	UINT	For STXDNS001 – 257, for STXDNS* - refer Appendix C
	4	Get	Revision - Major - Minor	Structure of: USINT USINT	20.000
	5	Get	Status	WORD	As per DeviceNet specifications.
	6	Get	Serial Number	UDINT	Unique Number
	7	Get	Product Name - String Length - ASCII String	Structure of: USINT STRING	Example: STXDNS001GEIP DNet Adapter
	9	Get	CRC	UINT	EEPROM Checksum Code
	100(64h)	Get	Device Fault Code	USINT	00_{HEX} : Normal Operation Bit 0: No IO Module Bit 1: Too many IO Modules Bit 2: Overflow I/O size Bit 3: I/O Configuration failure Bit 4: EEPROM Checksum fault Bit 6: Invalid Module ID Bit 7: Firmware fault
	Vendor-specific				
	102(66h)	Get	Firmware Code	USINT	112 : STXDNS001, 113 : STXDNS*series
	104(68h)	Get	Firmware Release Date	UDINT	0xYYYYMMDD ex) 0x20111205

5.2.2 Message Router Object

Class Code: 02HEX

Common Services

None

Class Attributes

None

Instance Attributes

None

5.2.3 DeviceNet Object

Class Code: 03HEX

Table 41: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Table 42: Class Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
0	1	Get	Revision	UINT	20, 000

Table 43: Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get/Set*	MAC ID	USINT	0 ~ 63 (SET is Applicable only for STXDNS001)
	2	Get/Set**	Baud Rate	USINT	0=125K, 1=250K, 2=500K (SET is Applicable only for STXDNS001)
	3	Get/Set	Bus off Interrupt	BOOL	faulted node recovery
	4	Get	Bus-Off Counter	USINT	0 ~ 255
	8	Get	MACID Switch Value	USINT	0 ~ 99 Actual value of Rotary Switch (Applicable only for STXDNS001)
	100(64h)	Get/Set	Auto-Baud Action	BOOL	0: Enabled (default) (Not allowed to set the Baud Rate from Network) 1: Disabled (Allowed to set the Baud Rate from Network) (Applicable only for STXDNS001)
	101(65h)	Get/Set	Quick Start,	BOOL	0:Noarmal Start-up 1:Quick Start-up
	111(6Fh)	Get/Set	Dip Switch Value	USINT	Actual value of Dip Switch (Not Applicable for STXDNS001)

* The MAC ID Rotary Switch value = 0~63: Not allowed to set the MAC ID from Network.

The MAC ID Rotary Switch value = 64~99: Allowed to set the MAC ID from Network.

** The Auto-Baud Action (attribute #100) value = 0: Not allowed to set the Baud Rate from Network

The Auto-Baud Action (attribute #100) value = 1: Allowed to set the Baud Rate from Network

New values will be applicable after device is restarted.

5.2.4 Assembly Object

Class Code: 04HEX

Table 44: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Class Attributes

None

Input Instance Attributes

Table 45: Input/output Instance ID

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
100(64h)	3	Get	Input (Produced) Process Image Data	Array n BYTE	Input process current image data
150(96h)	3	Set/Get	Output (Consumed) Process Image Data	Array n BYTE	Output process current image data (SET is Applicable in Explicit Only Mode)

5.2.5 Connection Object

Class Code: 05HEX

Table 46: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	No	Set_Attribute_Single*

*Default values are set after power cycle

Class Attributes

None

Table 47: Instance Attributes for Explicit Messaging Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	state	USINT	As per DeviceNet specifications.
	2	Get	instance_type	USINT	0: Explicit Message
	3	Get	transportClass_trigger	BYTE	83_{HEX}
	4	Get	produced_connection_id	UINT	*0x040B : MAC ID=01, Message group 2, Message ID 3
	5	Get	consumed_connection_id	UINT	*0x040C : MAC ID=01, Message ID 4
	6	Get	initial_comm_characteristics	BYTE	21_{HEX}
	7	Get	produced_connection_size	UINT	STXDNS001 =259 ; STXDNS* = 44
	8	Get	consumed_connection_size	UINT	STXDNS001 =259 ; STXDNS* = 44
	9	Get/Set	expected_packet_rate	UINT	2504 (default) Timer Resolution of 8msec(applicable in explicit only mode)
	12	Get/Set	watchdog_timeout_action	USINT	3 : Deferred Delete (default)
	13	Get	produced_connection_path_length	UINT	00, 00
	14	Get	produced_connection_path	Array of USINT	Empty
	15	Get	consumed_connection_path_length	UINT	00, 00
	16	Get	consumed_connection_path	Array of USINT	Empty

*attribute 3 transport Class trigger = 0x83 → Direction=Server, Production Trigger=IGNORED, Transport Class = 3.

This is the value assigned to this attribute within the server end-point of an Explicit Messaging Connection

Table 48: Instance Attributes for Poll I/O Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
2	1	Get	State	USINT	Defined in Spec
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	82_{HEX}
	4	Get	produced_connection_id	UINT	* 0x03C1 : MAC ID=01, Message ID=6, Unconnected Explicit Request Message
	5	Get	consumed_connection_id	UINT	* 0x040D : MAC ID=01, Message ID=5, Group 2 message Identifier
	6	Get	initial_comm_characteristics	BYTE	01_{HEX}
	7	Get	produced_connection_size	UINT	
	8	Get	consumed_connection_size	UINT	
	9	Get/Set	expected_packet_rate	UINT	Timer Resolution of 8msec
	12	Get	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_ length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_ length	UINT	0 or 6
	16	Get	consumed_connection_path	Array of USINT	

Table 49: Instance Attributes for Bit-Strobe I/O Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
3	1	Get	state	USINT	Defined in Spec
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	82_{HEX}
	4	Get	produced_connection_id	UINT	*0x0381 : MAC ID=01, Message ID=14, Message group 1
	5	Get	consumed_connection_id	UINT	*0X0400 : MAC ID = 00, Message ID = 0, Message group 2
	6	Get	initial_comm_characteristics	BYTE	02_{HEX}
	7	Get	produced_connection_size	UINT	0 to 8
	8	Get	consumed_connection_size	UINT	8
	9	Get/Set	expected_packet_rate	UINT	Timer Resolution of 8msec
	12	Get	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_ length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_ length	UINT	0 or 6
	16	Get	consumed_connection_path	Array of USINT	

Table 50: Instance Attributes for COS I/O Connection (Acknowledged)

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
4	1	Get	State	USINT	As per DeviceNet specifications
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	12_{HEX}
	4	Get	produced_connection_id	UINT	
	5	Get	consumed_connection_id	UNT	
	6	Get	initial_comm_characteristics	BYTE	1
	7	Get	produced_connection_size	UINT	
	8	Get	consumed_connection_size	UINT	
	9	Get/Set	expected_packet_rate	UINT	Timer Resolution of 8msec
	12	Get/Set	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_ length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_ length	UINT	4
	16	Get	consumed_connection_path	Array of USINT	20 2B 24 01
	17	Get/Set	production_inhibit_time	UINT	00, 00

Table 51: Instance Attributes for COS I/O Connection (Unacknowledged)

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
4	1	Get	State	USINT	As per DeviceNet specifications
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	10_{HEX}
	4	Get	produced_connection_id	UINT	* 0x0341 MAC ID : 01, Message ID=13, Message Group 1
	5	Get	consumed_connection_id	UINT	$0FFFF_{HEX}$
	6	Get	initial_comm_characteristics	BYTE	$0F_{HEX}$
	7	Get	produced_connection_size	UINT	
	8	Get	consumed_connection_size	UINT	
	9	Get/Set	expected_packet_rate	UINT	Timer Resolution of 8msec
	12	Get/Set	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_length	UINT	0
	16	Get	consumed_connection_path	Array of USINT	Empty
	17	Get/Set	production_inhibit_time	UINT	00, 00

5.2.6 Acknowledge Handler Object

Class Code: 2BHEX

Table 52: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
Ox10	Yes	Yes	Set_Attribute_Single*

*Default values are set after power cycle

Class Attributes

None

Table 53: Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Set	Acknowledge Timer	UNIT	Default: 16
	2	Get	Retry Limit	USINT	1
	3	Get	COS Producing Connection Instance	UINT	4

5.2.7 Bus Manager Object

Class Code: 70HEX

Table 54: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Class Attributes

None

Table 55: Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	Number of Slot	USINT	
	2	Get	Num of Activated Slots	USINT	
	3	Get	Num of Deactivated Slots	USINT	
	4	Get	External IDs	Array of 33 BYTE	See Table 61and Appendix B.
	5	Get/Set*	Selection of Produced Connection Type	USINT	See Table 56. Valid value range is 0,1,2,3 (default 2)
	6	Get/Set*	Selection of Consumed Connection Type	USINT	See Table 57. Valid value range is 0,1 (default 0)
	7	Get/Set*	Slot Active Flag	DWORD	See Table 58 (applicable only for STXDNS001)
	8	Get	Slot Live List	DWORD	See Table 59.
	9	Get	Slot Alarm List	DWORD	See Table 60.
	10	Get	Bus Status	USINT	0: Normal Operation 1: Bus Standby 2: Bus Connection Fault 3: IO Module Configuration Fault 4: No IO Module
	11	Get	Input (Produced) Byte Size	UINT	IO input byte size
	12	Get	Output (Consumed) Byte Size	UINT	IO output byte size(

*After the system is reset, the new “Set Value” action is applied.

If configuration is changed, automatically default value is set.

Table 56: Selection of Input (Produced) Process Image Mode

Selection Input Image Mode	Description	
0	Status(1byte) + Uncompressed Input Processing Data	
1	Status(1byte) + Compressed Input Processing Data	
2	Uncompressed Input Processing Data	Default
3	Compressed Input Processing Data	

Table 57: Selection of Output (Consumed) Process Image Mode

Selection Output Image Mode	Description	
0	Uncompressed Output Processing Data	default
1	Compressed Output Processing Data	

Table 58: Slot Active Flag

DWORD(32bits)	Decimal Bit	Description
Get/Set	Bit 00	Activate/Deactivate flag for slot position #1 (0:Active, 1:Decative)
	Bit 01	Activate/Deactivate flag for slot position #2 (0:Active, 1:Decative)
	Bit 02	Activate/Deactivate flag for slot position #3 (0:Active, 1:Decative)
	. . .	. . .
	Bit 30	Activate/Deactivate flag for slot position #31 (0:Active, 1:Decative)
	Bit 31	Activate/Deactivate flag for slot position #32 (0:Active, 1:Decative)

Table 59: Slot Live List

DWORD(32bits)	Decimal Bit	Description
Get	Bit 00	This bit is set (1) when slot position #1 is available to exchange IO
	Bit 01	This bit is set (1) when slot position #2 is available to exchange IO
	Bit 02	This bit is set (1) when slot position #3 is available to exchange IO
	. . .	. . .
	Bit 30	This bit is set (1) when slot position #31 is available to exchange IO
	Bit 31	This bit is set (1) when slot position #32 is available to exchange IO

Table 60: Slot Alarm List

DWORD(32bits)	Decimal Bit	Description
Get	Bit 00	This bit is set (1) when an error is detected in slot position #1
	Bit 01	This bit is set (1) when an error is detected in slot position #2
	Bit 02	This bit is set (1) when an error is detected in slot position #3
	. . .	. . .
	Bit 30	This bit is set (1) when an error is detected in slot position #31
	Bit 31	This bit is set (1) when an error is detected in slot position #32

Table 61: External IDs (=IO Module ID)

Byte	Description
0	Network Adapter Module External ID = 0x00
1	External ID for slot position #1
2	External ID for slot position #2
3	External ID for slot position #3
4	External ID for slot position #4
5	External ID for slot position #5
6	External ID for slot position #6
7	External ID for slot position #7
8	External ID for slot position #8
9	External ID for slot position #9
10	External ID for slot position #10
11	External ID for slot position #11
12	External ID for slot position #12
13	External ID for slot position #13
14	External ID for slot position #14
15	External ID for slot position #15
16	External ID for slot position #16
17	External ID for slot position #17
18	External ID for slot position #18
19	External ID for slot position #19
20	External ID for slot position #20
21	External ID for slot position #21
22	External ID for slot position #22
23	External ID for slot position #23
24	External ID for slot position #24
25	External ID for slot position #25
26	External ID for slot position #26
27	External ID for slot position #27
28	External ID for slot position #28
29	External ID for slot position #29
30	External ID for slot position #30
31	External ID for slot position #31
32	External ID for slot position #32

5.2.8 IO Module Slot Object

Class Code: 71HEX

Table 62: Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Class Attributes

None

Table 63: Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1–32 (Slot Address)	1	Get	Module External ID	USINT	See Appendix B.
	2	Get	I/O Data Code - Input Data Code - Output Data Code	Structure of: USINT USINT	See Table 64.
	3	Get	Input Offset Table - Byte Offset - Bit Offset	Structure of: USINT USINT	Byte offset in the Input Assembly Corresponding bit offset in the byte (If Input data length is zero, then return Empty.)
	4	Get	Output Offset Table - Byte Offset - Bit Offset	Structure of: USINT USINT	Byte offset in the Output Assembly Corresponding bit offset in the byte (If Output data length is zero, then return Empty.)
	5	Get	Input Data	Array of BYTE	Read Input data size defined by attributes 2. If Input data length is zero, then return Empty.
	6	Get/Set	Output Data	Array of BYTE	Read/Write Output data size defined by attributes 2. If Output data length is zero, then return Empty.(Set is applicable in explicit only mode)
	7	Get/Set*	Active Flag	BOOL	0: This slot is activated 1: This slot is deactivated
	8	Get	Configuration Parameter Data length	USINT	Refer to Configuration Parameter document
	9	Get/Set	R/W Configuration Data	n Byte	Data array size defined by attributes 8.

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
	10	Get	Register Data Length	USINT	Refer to Configuration Parameter document
	100	Get	Product Code	4 Byte	See Table 65.
	101	Get	Catalog Number	4 Byte	See Appendix B.
	102	Get	Firmware Revision	Structure of: USINT USINT	IO Module Firmware Revision

*The New values will be applicable after system is reset.

If configuration is changed, automatically default value is set.

Table 64: I/O Data Code Format

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Input Data Type		Input Data Length					
+1	Output Data Type		Output Data Length					

Input/output Type:

0 0: No I/O Data

0 1: Byte Data

1 0: Word Data

1 1: Bit Data

Input/output Data Length:

0 0 0 0 0 0 0: 0 Bit/Byte/Word

0 0 0 0 0 0 1: 1 Bit/Byte/Word

0 0 0 0 0 1 0: 2 Bit/Byte/Word

0 0 0 0 0 1 1: 3 Bit/Byte/Word

…

1 1 1 1 1 1 1: 63 Bit/Byte/Word

Table 65: Product Code Format

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	***Connection Type***							
+1	***Assembly Type***							
+2	***Output Information***							
+3	***Input Information***							

Connection Type

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Reserved						**Mem**	**IO**

IO (Input/output Connection):

IO = 0: does not support Input/output Connection

IO = 1: support Input/output Connection

MEM (Memory Register Service):

MEM = 0: does not support Memory Register Service Connection

MEM = 1: support Memory Register Service Connection

Assembly Type

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+1	**Unit_Type**		**Priority**		**S**	Reserved		

Unit_Type:

0 0: Not Used

0 1: Input Module

1 0: Output Module

1 1: I/O Both Modules

Priority (Input/output Data Priority for assembly):

0 0: Priority 0 (low) usually it is used by Byte/Bit Type Discrete module.

0 1: Priority 1

1 0: Priority 2 - usually it is used by Analog I/O module.

1 1: Priority 3 (high)

S (Status for DeviceNet Slot Diagnostic):

0: No Status

1: Support Word Input Diagnostic (0x8000 = -32678)

Input/ Output Information

Byte#	*Bit 7*	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*	
+2	**Data_Type**		**Data_Length**						Output Information
+3	**Data_Type**		**Data_Length**						Input Information

Data_Type:

0 0 : Byte Data

0 1 : Word Data

1 0 : Bit Data

1 1 : have no Input or Output Data

Data_Length:

0 0 0 0 0 0 0 : 1 Bit/Byte/Word

0 0 0 0 0 0 1 : 2 Bit/Byte/Word

0 0 0 0 0 1 0 : 3 Bit/Byte/Word

0 0 0 0 0 1 1 : 4 Bit/Byte/Word

0 0 0 0 1 0 0 : 5 Bit/Byte/Word

0 0 0 0 1 0 1 : 6 Bit/Byte/Word

0 0 0 0 1 1 0 : 7 Bit/Byte/Word

0 0 0 0 1 1 1 : 8 Byte/Word

0 0 0 1 0 0 0 : 9 Byte/Word

…

1 1 1 1 1 1 0 : 63 Byte/Word

1 1 1 1 1 1 1 : 64 Byte/Word

A. Diagnostics

A.1 How to Diagnose when Device Cannot Communicate with the Network

- Verify that cable connections are correct.
- Verify that proper terminator resistors are installed. Check location of terminator resistor.
  - Ensure there are no duplicate node addresses.
  - Check configuration of master for port settings, time out, data size etc.
  - Power cycle the network adapter to ensure applicability of correct baud rate, parity, byte formats, IO configuration parameters, Input and Output process image modes.
  - Check system power & field power connections. Ensure separate power sources are used for system power and Field power. Ensure Network adapter or system power modules are not over loaded.
  - Ensure ground cable connections.
  - Ensure environment factors are within the limits.

B. Product List

Table 66: Product List

ST-Number	Description	ID(hex)	Production Status
Digital Input Modules			
ST-1114	4 Points, Sink(Positive), 5Vdc	41 00 01	Active
ST-1124	4 Points, Source(Negative), 5Vdc	41 00 02	Active
ST-1214	4 Points, Sink(Positive), 12V/24Vdc	41 00 03	Active
ST-1218	8 Points, Sink(Positive), 12V/24Vdc	41 00 07	Active
ST-121F	16 Points, Sink(Positive), 12V/24Vdc	41 01 13	Active
ST-1224	4 Points, Source(Negative), 12V/24Vdc	41 00 04	Active
ST-1228	8 Points, Source(Negative), 12V/24Vdc	41 00 08	Active
ST-122F	16 Points, Source(Negative), 12V/24Vdc	41 01 14	Active
ST-1314	4 Points, Sink(Positive), 48Vdc	41 00 05	Active
ST-131F	16 Points, Sink(Positive), 48Vdc	41 01 17	Active
ST-1324	4 Points, Source(Negative), 48Vdc	41 00 06	Active
ST-1804	4 Points, 110Vac,	41 00 09	Active
ST-1904	4 Points, 220Vac,	41 00 0A	Active
Digital Output Modules			
ST-2114	4 Points TTL Inverting, 5Vdc/20mA,	81 00 0D	Active
ST-2124	4 Points TTL Non-Inverting, 5Vdc/20mA,	81 00 0F	Active
ST-221F	16 Points Sink(Negative Logic), 24Vdc/0.5A,	81 01 15	Active
ST-222F	16 Points Source(Positive Logic), 24Vdc/0.5A,	81 01 16	Active
ST-2314	4 Points Sink(Negative Logic), 24Vdc/0.5A,	81 00 0E	Active
ST-2318	8 Points Sink(Negative Logic), 24Vdc/0.5A,	81 00 11	Active
ST-2324	4 Points Source(Positive Logic), 24Vdc/0.5A,	81 00 10	Active
ST-2328	8 Points Source(Positive Logic), 24Vdc/0.5A,	81 00 12	Active
ST-2414	4 Points Sink(Negative Logic), 24Vdc/0.5A, Diagnostics	81 00 08	Active
ST-2424	4 Points Source(Positive Logic),24Vdc/0.5A, Diagnostics	C1 00 00 38	Active
ST-2514	4 Points Sink(Negative Logic), 24Vdc/2A, Diagnostics	C1 00 00 35	Active
ST-2524	4 Points Source(Positive Logic), 24Vdc/2A, Diagnostics	C1 00 00 36	Active
ST-2742	2 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 0B	Active
ST-2744	4 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 51	Active
ST-2748	8 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 50	Active
ST-2852	2 Points, 12~125Vac/0.5A, Triac	81 00 0C	Active

ST-Number	Description	ID(hex)	Production Status
	Analog Input Modules		
ST-3114	4 Channels, Current, 0~20mA, 12bit	41 43 1C	Active
ST-3118	8 Channels, Current, 0~20mA, 12bit	41 47 82	Active
ST-3134	4 Channels, Current, 0~20mA, 14bit	41 43 1E	Active
ST-3214	4 Channels, Current, 4~20mA, 12bit	41 43 1D	Active
ST-3218	8 Channels, Current, 4~20mA, 12bit	41 47 83	Active
ST-3234	4 Channels, Current, 4~20mA, 14bit	41 43 1F	Active
ST-3424	4 Channels, Voltage, 0~10Vdc, 12bit	41 43 20	Active
ST-3428	8 Channels, Voltage, 0~10Vdc, 12bit	41 47 22	Active
ST-3444	4 Channels, Voltage, 0~10Vdc, 14bit	41 43 22	Active
ST-3524	4 Channels, Voltage, -10Vdc~10Vdc, 12bit	41 43 21	Active
ST-3544	4 Channels, Voltage, -10Vdc~10Vdc, 14bit	41 43 23	Active
ST-3624	4 Channels, Voltage, 0~5Vdc, 12bit	41 43 24	Active
ST-3644	4 Channels, Voltage, 0~5Vdc, 14bit	41 43 25	Active
ST-3702	2 Channels, RTD, Status	41 41 28	Active
ST-3704	4 Channels, RTD, Status	41 43 64	Active
ST-3708	8 Channels, RTD, Status	41 47 65	Active
ST-3802	2 Channels, TC	41 41 2A	Active
ST-3804	4 Channels, TC	41 43 66	Active
ST-3808	8 Channels, TC	41 47 67	Active
	Analog Output Modules		
ST-4112	2 Channels, Current, 0~20mA, 12bit	81 41 2C	Active
ST-4114	4 Channels, Current, 0~20mA, 12bit	81 43 6D	Active
ST-4212	2 Channels, Current, 4~20mA, 12bit	81 41 2D	Active
ST-4214	4 Channels, Current, 4~20mA, 12bit	81 43 6E	Active
ST-4422	2 Channels, Voltage, 0~10Vdc, 12bit	81 41 2E	Active
ST-4424	4 Channels, Voltage, 0~10Vdc, 12bit	81 43 6A	Active
ST-4491	1 Channel, Voltage, 0~10Vdc, 12bit, Manual Type	C1 40 41 BF	Active
ST-4522	2 Channels, Voltage, -10~10Vdc, 12bit	81 41 2F	Active
ST-4622	2 Channels, Voltage, 0~5Vdc, 12bit	81 41 30	Active
ST-4911	1 Channel, Current, 0~1A, 12bit	81 40 31	Active

ST-Number	Description	ID(hex)	Production Status
	Special Modules		
ST-5101	1 Channel, High Speed Counter, 5V Input	C1 01 05 34	Active
ST-5111	1 Channel, High Speed Counter, 24V Input	C1 01 05 39	Active
ST-5112	2 Channel, High Speed Counter, 24V Sink Input	C1 01 07 4D	Active
ST-5114	4 Channel, High Speed Counter, 24V Sink Input	C1 03 0F 4C	Active
ST-5211	RS232 Communication, 1Channel, RTS/CTS Flow Control	C1 05 05 42	Active
ST-5212	RS232 Communication, 2Channel	C1 0B 0B 43	Active
ST-5221	RS422 Communication, 1Channel	C1 05 05 44	Active
ST-5231	RS485 Communication, 1Channel	C1 05 05 45	Active
ST-5232	RS485 Communication, 2Channel	C1 0B 0B 46	Active
ST-5351	SSI Interface 1CH	C1 01 09 9E	Active
ST-5422	2 CH PWM output, 1.5A/24Vdc, source	C1 05 01 57	Active
ST-5442	2 CH PWM output, 0.5A/24Vdc, source	C1 05 01 56	Active
ST-5444	4 CH PWM output, 0.5A/24Vdc, source	C1 0B 03 54	Active
ST-5641	1 CH Pulse output, 0.5A/24Vdc, source	C1 05 03 92	Active
ST-5642	2 CH Pulse output, 0.5A/24Vdc, source	C1 09 07 90	Active
ST-5651	1 CH Pulse output, RS422	C1 05 03 98	Active
	Power Modules		
ST-7408	8 Channels, Shield, ID Type	02 00 E4	Active
ST-7508	8 Channels, Common, 0Vdc, ID Type	02 00 E5	Active
ST-7511	1 Channel, Expansion Power, Input 24Vdc, Output 1.0A/5Vdc, ID Type	02 00 E0	Active
ST-7518	8 Channels, Common, 24Vdc, ID Type	02 00 E6	Active
ST-7588	8 Channels, Common, 0Vdc and 24Vdc, ID Type	02 00 E7	Active
ST-7641	1 Channel, Field Distributor, 5Vdc~48Vdc, 110Vac~220Vac, ID Type	02 00 E2	Active

C. Product Codes

Table 67: Product codes

Catalog No.	Description	Product Code	Common Type	Input/output Size (Byte)
STXDNS032	32 point Positive Logic Input	0x2111		In : 4
STXDNS132	32 point Negative Logic Input	0x2112		In : 4
STXDNS232	32 point Negative Logic Output	0x2121		Out : 4
STXDNS332	32 point Positive Logic Output	0x2122		Out : 4
STXDNS016	16 relay output	0x2133	4Pt/1Com	Out : 2
STXDNS116	16 relay output isolated	0x2155	1Pt/1Com	Out : 2
STXDNS432	16 Positive Logic input/16 Positive Logic output	0x2134		In : 2 Out : 2
STXDNS532	16 Negative Logic input /16 Negative Logic output	0x2125		In : 2 Out : 2
STXDNS824	16 Positive Logic input /8 relay out	0x2136	4Pt/1Com	In : 2 Out : 1
STXDNS924	16 Negative Logic input /8 relay out	0x2137	4Pt/1Com	In : 2 Out : 1
STXDNS825	16 Positive Logic input /8 relay out isolated	0x2156	1Pt/1Com	In : 2 Out : 1
STXDNS925	16 Negative Logic input /8 relay out isolated	0x2157	1Pt/1Com	In : 2 Out : 1

D. Product Certifications and Installation Guidelines for Conformance

This appendix describes the compliance markings and standards to which the RSTi products have been certified.

D.1 Important Notes

Solid state equipment has operational characteristics differing from those of electromechanical equipment.

Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls describes some important differences between solid state equipment and hard-wired electromechanical devices.

Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must ensure that each intended application of this equipment is acceptable.

In no event will GE be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, GE cannot assume responsibility or liability for actual use based on the examples and diagrams.

D.2 Safety Notes

Warning

The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, for example, RSTi Bus Pin.

D.3 Certifications

$_{c}$UL$_{US}$ Listed Industrial Control Equipment, certified for U.S. and Canada

See UL File E105285

CE Mark

EN 61000-6-2:2005; Industrial Immunity

EN 61000-6-4:2007; Industrial Emissions

D.4 Government Regulations

U.S., Canadian, Australian, and European regulations are intended to prevent equipment from interfering with approved transmissions or with the operation of other equipment through the AC power source.

The PACSystems RSTi family of products has been tested and found to meet or exceed the requirements of U.S. (47 CFR 15), Canadian (ICES-003), Australian (AS/NZS 3548), and European (EN 61000-6-4:2007) regulations for Class A digital devices when installed in accordance with the guidelines noted in this manual. These various regulations share commonality in content and test levels with that of CISPR 22 and based on this commonality testing to the each individual standard was deemed inappropriate.

The FCC requires the following note to be published according to FCC guidelines:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case user will be required to correct the interference at his own expense.

Industry Canada requires the following note to be published:

Note: This Class A digital apparatus complies with Canadian ICES-003.

D.5 Environmental Specifications

D.5.1 DeviceNet STXDNS001

Table 68: Environmental specifications for STXDNS001

Items	Specification
Operating Temperature	-20℃ to 55℃ for UL applications : -20℃ to 60℃ for non-UL applications
Storage Temperature	Storage -40℃ to 85℃
Relative Humidity	90% Non-condensing
Protection Class	IP20
Mounting	DIN Rail

D.5.2 DeviceNet STXDNS*

Table 69: Environmental specifications for STXDNS*

Items	Specification
Operating Temperature	0℃ to 55℃ for UL applications ; 0℃ to 60℃ for non-UL applications
Non-Operating Temperature	Storage -40℃ to 85℃
Relative Humidity	90% Non-condensing
Protection Class	IP20
Mounting	DIN Rail

STXDNS* : STXDNS032/132/232/332/432/532/016/116/824/924/825/925

D.6 Abbreviations

Table 70: Abbreviations

Items	Description
ASCII	American Standard Code for Information Interchange
CRC	Cyclic Redundancy Check
EEPROM	Electronically Erasable Programmable Read Only Memory
ESD	Electrostatic discharge
FG	Frame Ground
GND	Ground
I/O	Input/ Output
LRC	Longitudinal Redundancy Check
MAC	Media Access Control
PDU	Power Drive Unit
TC	Thermocouple
RTD	Resistance Temperature Detector
RTU	Remote terminal unit
RXD	Received data
TXD	Transmit data
TCP/IP	Transfer control protocol / Internet protocol
ARP	Address resolution protocol

GE Intelligent Platforms Information Centers

Headquarters:
1-800-433-2682 or 1-434-978-5100

Global regional phone numbers are available on our web site www.ge-ip.com

Additional Resources

For more information, please visit the GE Intelligent Platforms web site:

www.ge-ip.com

GFK-2801