DB_NEXUS
Operator Manual

DUROBYTE NEXUS TCP: 91010.0

DuroByte Inc.

Rev 5

Important Notice

This document is provided for instructional purposes only and is neither approved nor intended to serve as a standard form. Users of this document should confer with qualified advisors with respect to its commissioning and other documentation. Please contact DuroByte if questions or concerns arise during setup or normal operation. Proper contacts can be found on the company website at www.**durobyte**.com.

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1. Overview

1.1 Introduction

Purpose of this manual

This manual is a reference guide for the installation, configuration and operation of the DB_NEXUS tag reader system.

Requirements

This manual assumes general controls/automation and networking knowledge.

Scope

The Operator Manual provides a guideline to the hardware installation, wiring, configuration interface and diagnostics of the DB_NEXUS.

1.2 About the DB_NEXUS

Description

The DB_NEXUS is a communication module designed as an interface between a PLC and Siemens RF300 series RFID reader head. It can operate over Modbus TCP/IP and TCP/IP protocols.

Features

The DB_NEXUS can communicate with up to 2 Siemens RF3xxR series reader heads. The reader heads read and write data to RF3xxT series Tags.

1.3 Ordering Data

DB_NEXUS:	91010.0
Siemens Antenna Cables:	Reader cable 5 m (6GT2891-0FH50) Reader cable 10 m (6GT2891-0FN10) Reader cable 20 m (6GT2891-0FN20) Reader cable 50 m (6GT2891-0FN50)
RF3xxR Reader Head:	6GT2801-2AB10 (Other Compatible reader heads are acceptable)

1.4 Specification and Features

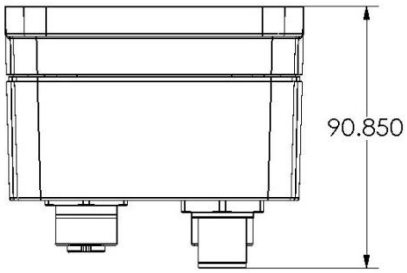
Specifications

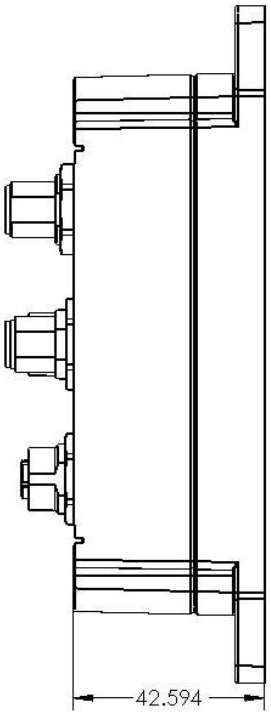
Model #:	91010.0
Dimensions:	65.786mm X 150.786mm X 90.850mm
Weight:	500g (1.1 lbs.)
Operating Temperature:	0^{o} C to 50^{o}C Max Ambient
Storage Temp:	-40^{o} C to 50^{o}C Max Ambient
Vibration:	68-2-6 FC 1.5mm. 10-55Hz; 2 hrs. ea. Axis.
Shock:	68-2-27 EA 30g; 11ms; 3 shocks each axis.
Protection:	IP67
Enclosure Material:	ABS801L
Voltage Input:	24VDC
Current:	0.25A @ 24VDC Powered by a certified SELV LPS power supply output rated 24Vdc, 100VA max

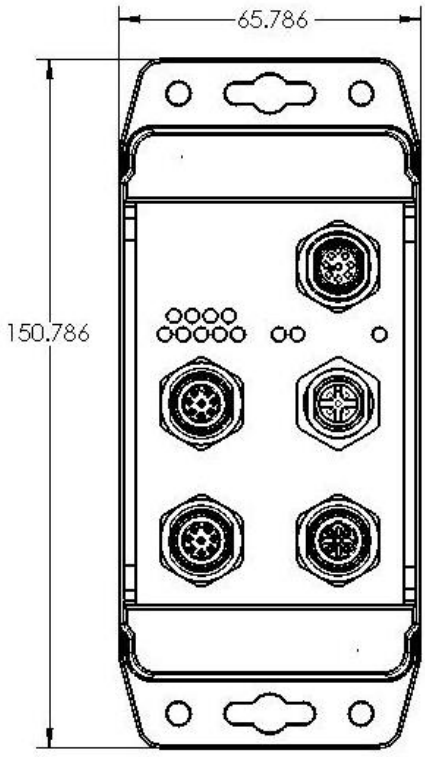
Features

DB_NEXUS is only compatible with Siemens RF3xxR readers and RF3xxT tags

1.5 DB_NEXUS Dimensions







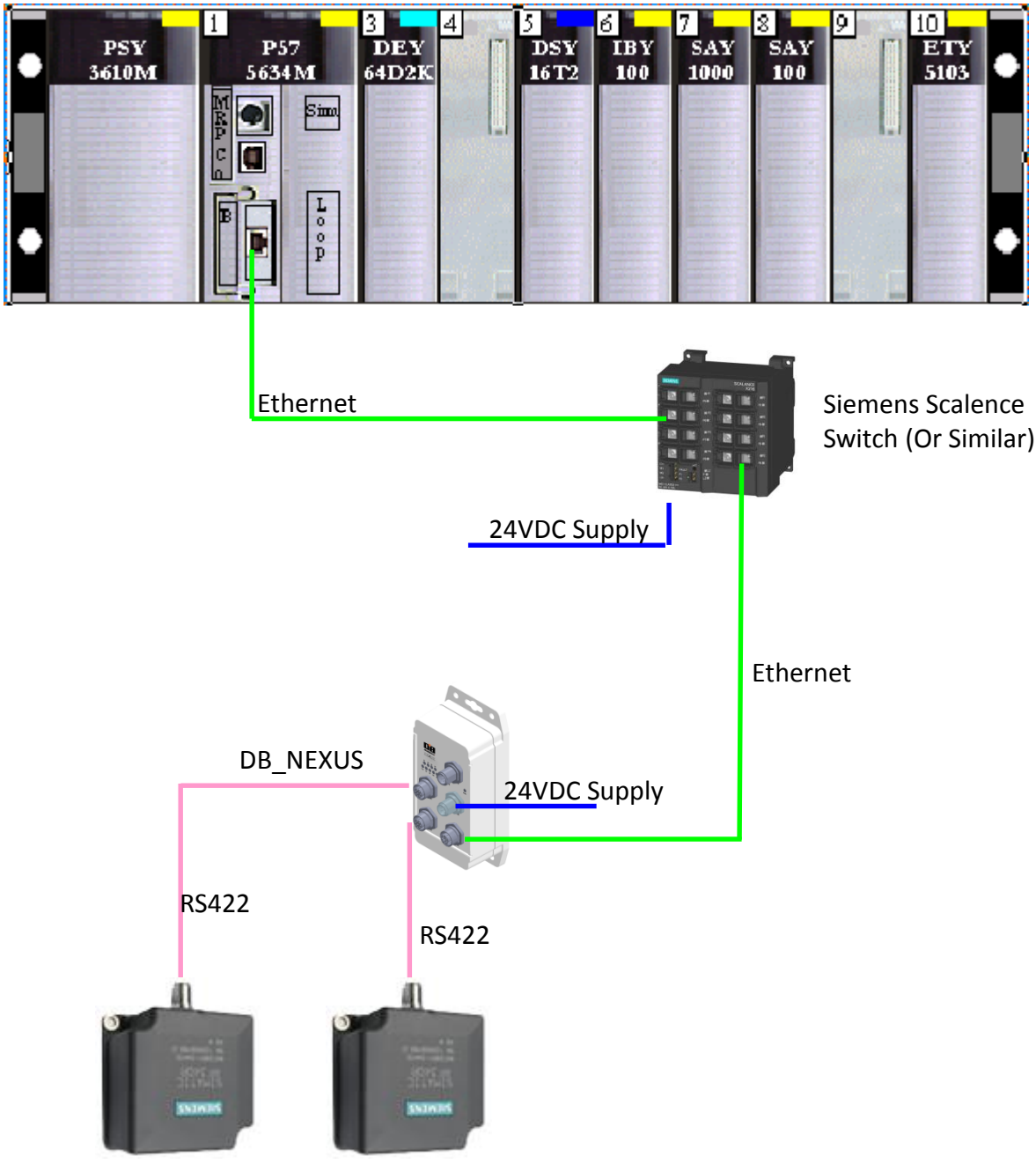
Note: The measurements above are measured in millimetres.

2. Hardware

2.1 General Layout

The layout below demonstrates a typical setup for connect the DB_NEXUS reader to a Unity PLC.

General Auto Station Layout



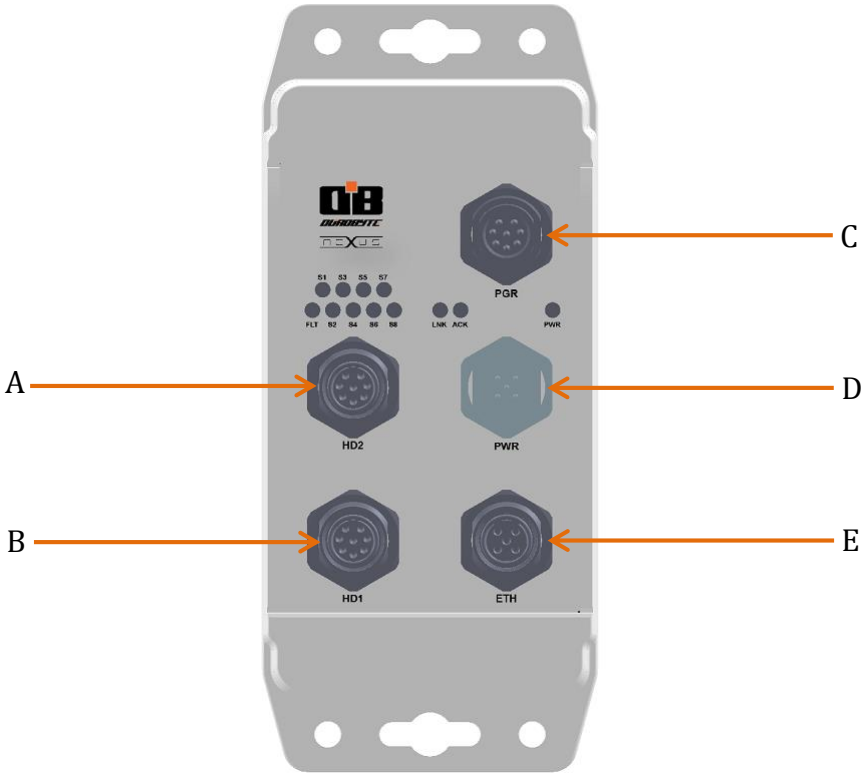
2.2 DB_NEXUS Connector Description

Connector Layout

The relatively small footprint of the DB_NEXUS means smaller brackets can be used and it can be mounted in environments where space is an issue.

All Connectors and LED's are located on a single side of the enclosure for easy access and visibility.

Below is the general connector layout and description of connectors.

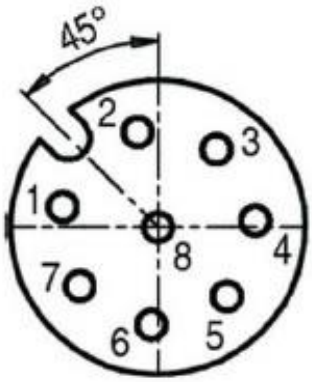


A. HD2: 8 Pin Female Antenna Connector (M12)
B. HD1: 8 Pin Female Antenna Connector (M12)
C. PRG: 8 Pin Male Serial Programming Port
D. PWR: 5 Pin Male Power connector (M12 A-Coded)
E. ETH: 4 Pin Female Ethernet Connector (M12 D-Coded)

2.3 Connector Pinout

Below is a description of the connectors and their respective pinouts. All connectors are circular M12.

Antenna Connectors (A, B):

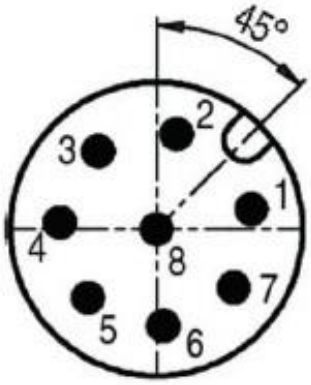


8 Pole M12 A-Coding Female Connector

PIN #	Description
1	+24 V
2	-RxD
3	0V
4	RxD
5	TxD
6	-TxD
7	Unused
8	Functional Ground (PE)/shield

Note: See antenna technical manual for more details

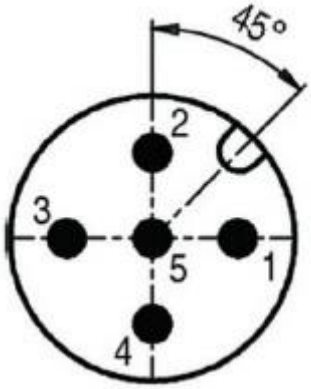
Programming Connector (C):



8 Pole M12 A-Coding Male Connector

PIN #	Description
1	MCLR
2	+3.3 V
3	GND
4	PGD2
5	PGC2
6	SP1
7	SP2
8	SP3

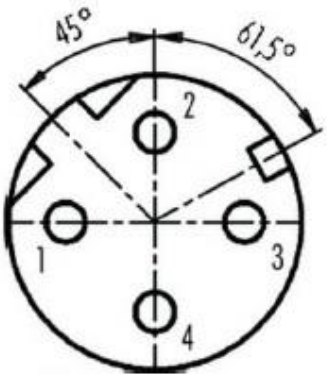
Power Connector (D):



5 Pole M12 A-Coding Male Connector

PIN #	Description
1	Electronics supply (power to DB_NEXUS and Reader heads, +24 VDC)
2	Unused
3	Ground for electronics (0 VDC)
4	Unused
5	Functional Ground (PE)

Ethernet Connector (E):



4 Pole M12 D-Coding Female Connector

PIN #	Description
1	Transmit Data + (TX+)
2	Receive Data + (RX+)
3	Transmit Data – (TX-)
4	Receive Data – (RX-)

2.4 Led Description

LED's	Description	Colour
PWR	Power	Green
FLT	Fault	Red
S1	Status	Yellow
S2	Status	Yellow
S3	Status	Yellow
S4	Status	Yellow
S5	Status	Yellow
S6	Status	Yellow
S7	Status	Yellow
S8	Status	Yellow
LINK	Ethernet Connection Status	Green
ACK	Ethernet Activity	Yellow

2.5 LED Operation

During power up sequence LED's S1 through S8 and FLT will turn on. During this period the DB_NEXUS will attempt to connect to the reader heads. When connected to either 1 or 2 reader heads, LED S1 will flash at 1 Hz, indicating normal operation.

Power up:

LED's	Status
PWR	ON
FLT	ON
S1	ON
S2	ON
S3	ON
S4	ON
S5	ON
S6	ON
S7	ON
S8	ON
LINK	N/A
ACK	N/A

Normal operation:

LED's	Status
PWR	ON
FLT	OFF
S1	ON when tag 0 detected
S2	OFF
S3	ON when tag 1 detected
S4	OFF
S5	OFF
S6	OFF
S7	OFF
S8	Flashing at 1Hz
LINK	ON
ACK	Flashing

Fault Condition:

LED's	Status
PWR	ON
FLT	ON
S1	Fault Code bit 1
S2	Fault Code bit 2
S3	Fault Code bit 3
S4	Fault Code bit 4
S5	Fault Code bit 5
S6	Fault Code bit 6
S7	Fault Code bit 7
S8	Fault Code bit 8

During a fault, the fault LED will turn on and S1 to S8 will display a binary fault code.

Example:

LED's	Status
PWR	ON
FLT	ON
S1	OFF
S2	ON
S3	ON
S4	OFF
S5	OFF
S6	ON
S7	OFF
S8	OFF

01100100 (binary value) = 0x64 (hexadecimal value)

Code: 0x64. Command invalid parameter (A parameter specified in the command was invalid)

Note: For more fault information refer to Section 6 Diagnostics.

3. Installation

3.1 Installation Precautions

Mounting Guidelines

Avoid mounting the DB_NEXUS near sources of EMI (electro-magnetic interference) or near devices that generate high ESD (electro-static discharge) levels. Avoid routing cables near motors and solenoids.

Do not route cables near unshielded cables or near wiring carrying high voltage or high current, only Cross cables at perpendicular intersections, if at all.

Important Configuration Note

Every DB_NEXUS is configured to the default IP address of **192.168.1.100**. Attach and configure only one DB_NEXUS unit at a time.

Warning: Connecting multiple DB_NEXUS units prior to assigning each a unique IP address could result in network errors and IP conflicts.

Power Requirements

The DB_NEXUS requires a power supply capable of providing 0.25A @ 24VDC (6W). Powered by a certified SELV LPS power supply output rated 24Vdc, 100VA max.

Network Planning

Plan to perform a test phase and construct a small scale independent network that includes only the essential devices required to test your RFID application. To avoid possible interference with other devices, do not initially connect your RFID testing environment to an existing network.

Recommended Cabling

When connecting to Siemens RF300 series reader heads it is recommended that standard Siemens connecting cables RF3xxR are used.

3.2 Installing the DB_NEXUS

1. Unpack and inspect the DB_NEXUS hardware and accessories. If an item appears to be damaged, notify your reseller immediately.
2. Securely mount the DB_NEXUS to your chosen location using four [M5X0.8X12] screws and matching locking washers and nuts (not included). The DB_NEXUS should be aligned in such a manner that the LED indicators can be seen during normal operation.
3. Connect the antenna cables.

4. Connect the 24V power supply to the M12 5 pin male connectors
5. Connect Ethernet cable to M12 4 pin connector
6. Connect laptop and configure IP address (see section 4 for configuration details)

4. Configuration

4.1 The HTML Server

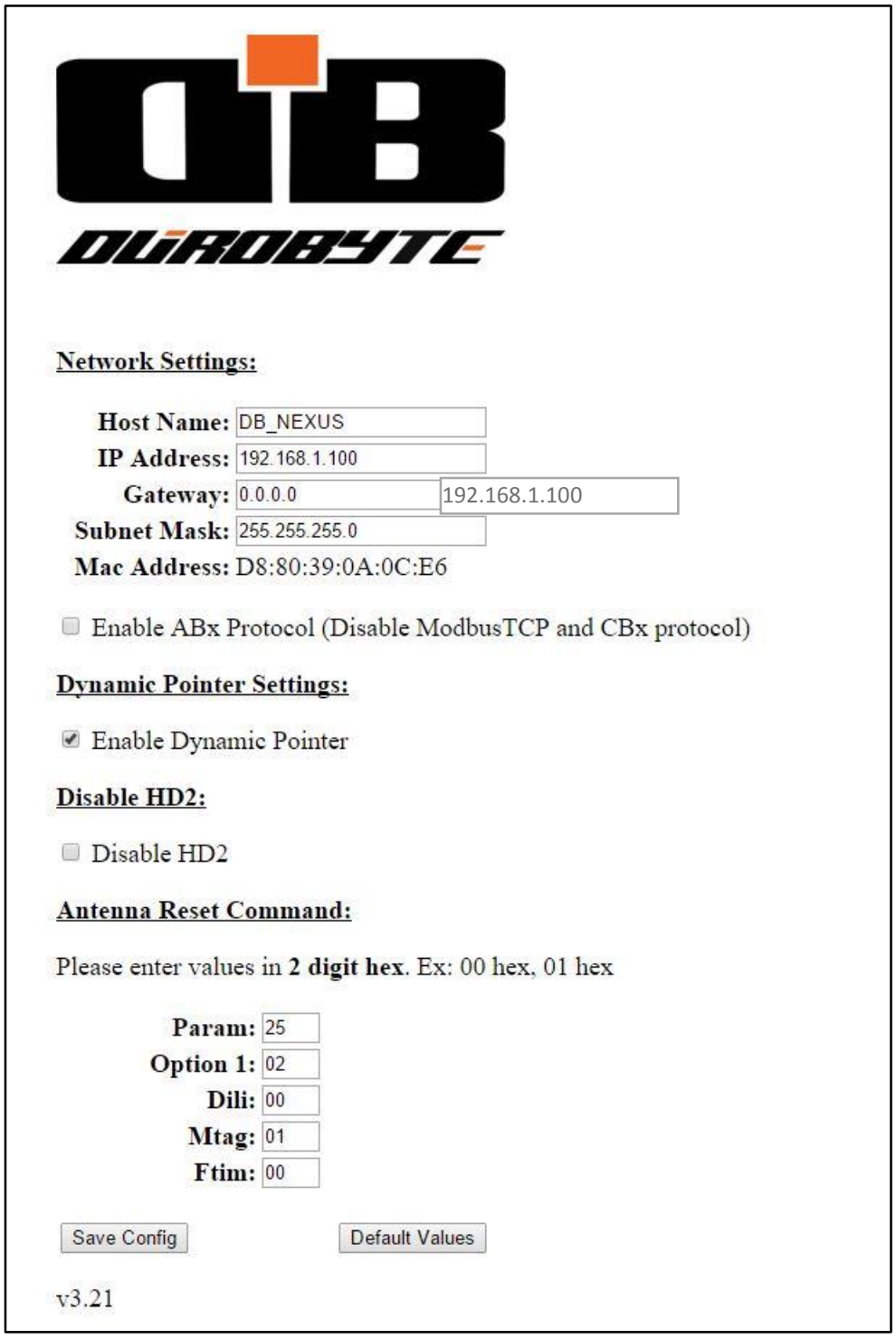
One of the first steps in configuring the DB_NEXUS is to set the device's IP address. Built into the DB_NEXUS is an embedded ***HTML Server*** that provides users with a Website-like interface with tools used to configure the unit.

4.2 IP Address Configuration

Default IP Address: 192.168.1.100

Changing IP Settings

1. Open a Web browser on the Host PC that is connected to the DB_NEXUS either directly or connect through a network switch.
2. In the URL address field, enter the DB_NEXUS's default IP address (192.168.1.100).
3. Press ENTER.
4. The Network Page will be displayed. (Figure 1)
5. In the fields provided, enter a host name, an IP Address, a Subnet Mask and a Gateway IP Address for the DB_NEXUS. Please check with your Network Administrator for the correct values to use.
6. Click the "Save Config" button to store the configuration changes to the DB_NEXUS's non-volatile flash memory. A confirmation screen will appear. (Figure 2)
7. Manually cycle power to the DB_ NEXUS. It takes several seconds for the DB_ NEXUS to reboot, after which your IP configuration changes will have been implemented.
8. After the DB_ NEXUS has completely restarted, verify the new IP configuration by opening a Web browser and entering the newly assigned IP address in the URL field. If successful, you should arrive back at the Network Settings – Main Page.


Network Settings:
Host Name: DB_NEXUS
IP Address: 192.168.1.100
Gateway: 0.0.0.0 192.168.1.100
Subnet Mask: 255.255.255.0
Mac Address: D8:80:39:0A:0C:E6
Enable ABx Protocol (Disable ModbusTCP and CBx protocol)
Dynamic Pointer Settings:
Enable Dynamic Pointer
Disable HD2:
Disable HD2
Antenna Reset Command:
Please enter values in 2 digit hex. Ex: 00 hex, 01 hex
Param: 25
Option 1: 02
Dili: 00
Mtag: 01
Ftim: 00
Save Config
Default Values
v3.21

(Figure 1)


DUROBYTE
Please cycle power to device for changes to take effect.

(Figure 2)

4.3 Pinging the DB_NEXUS

You may also test whether the DB_NEXUS is reachable across your network by using the PING network tool. After the DB_NEXUS has restarted, go to the host PC and run **PING.EXE** (on Microsoft Windows systems) or use another network diagnostic tool that can run a similar TCP/IP ping command. Using a Ping utility helps verify that the DB_NEXUS is accessible across the network.

To Ping the DB_ NEXUS from a Windows PC, open a command prompt and at the C:\> prompt type: **Ping "*IP Address*"** (Where *"IP Address*" is the new IP address assigned to the DB_ NEXUS). If the DB_ NEXUS is online and functioning, a successful response will be similar to:

```
Reply from "IP Address": bytes=32 time=3ms TTL=60
Reply from "IP Address": bytes=32 time=1ms TTL=60
Reply from "IP Address": bytes=32 time=1ms TTL=60
Reply from "IP Address": bytes=32 time=1ms TTL=60
```

If the host does not receive a successful response from the DB_ NEXUS, it may indicate an improperly configured IP address setting. Please verify that you followed the instructions above for setting the IP address of the DB_ NEXUS. Also, be sure to disable any firewall services running on the host computer. Firewalls can potentially block communications between the host, the PLC and/or the DB_ NEXUS.

4.4 Switch Configuration

Switch must be configured for autonegotiation. The DB_NEXUS will automatically select the best configuration. (Typically 100 megabits per second and full duplex)

5. Nexus Discovery Tool

5.1 About the Nexus Discovery Tool

Description

The Nexus Discovery Tool is a Java based application that can be used to find all DB_NEXUS devices connected to a network. Also, if there is a device with an unknown IP address the Nexus Discovery Tool can be used to find that IP address.

System Requirements

The Nexus Discovery Tool minimum requirements:

1. Pentium 2 266MHz or faster
2. 128 MB of physical RAM
3. 1 MB of free space
4. Java Runtime Environment 6 update 18 or newer (To download latest version of JRE visit www.java.com)
5. Ethernet Network Adapter

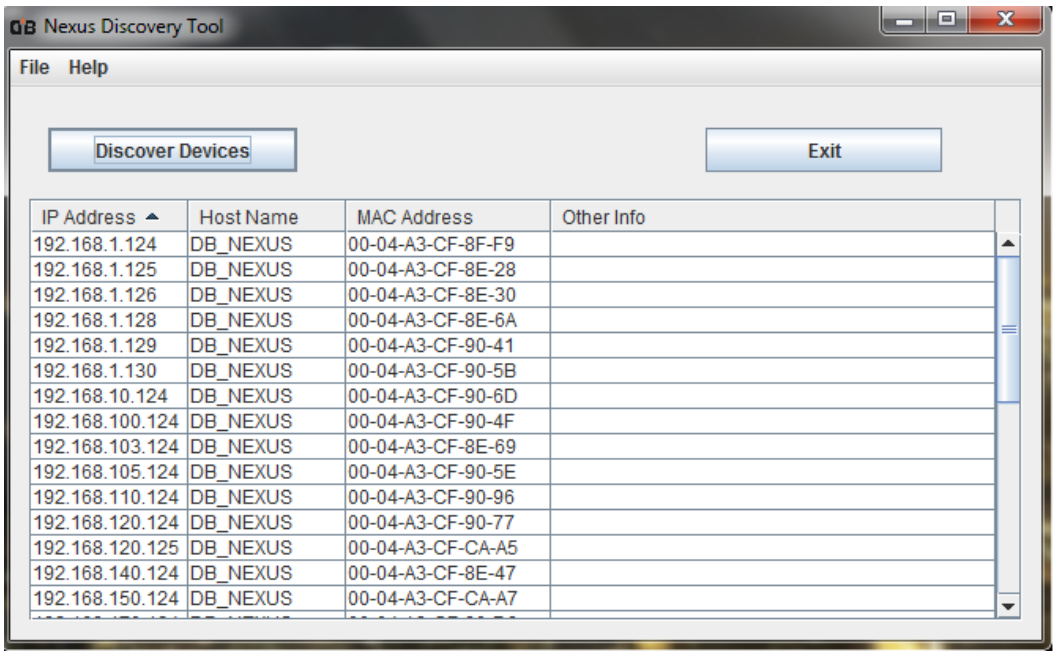
5.2 Using the Nexus Discovery Tool

Connecting

Host PC running the Nexus Discovery Tool must be connected to the DB_NEXUS device(s) either directly or over a network. The host PC must also have a unique IP address and connected on the same subnet as DB_NEXUS devices.

Operation

Once Host PC is connected to the network, run the Nexus Discovery Tool. Press Discover Devices. A list of connected DB_NEXUS devices will be displayed along with IP address, Host name, MAC address and Other Info. Clicking on a device will load the default web browser and connect to the DB_NEXUS configuration page.



5.3 Downloading the Nexus Discovery Tool

The Nexus Discovery Tool can be downloaded at
http://durobyte.com/product/nexus/nexus_rfid_tcpip.html

6. Diagnostics

6.1 Fault Messages

Code (Hex)	Code (Dec)	(Binary) S1.....S8	Description
0x01	1	0000 0001	Siemens - Presence error. Tag went out of field when command active.
0x04	4	0000 0100	Fill tag command failed
0x05	5	0000 0101	Siemens - Parameterization error, possible causes: Unknown command, Incorrect parameter, Function not allowed
0x06	6	0000 0110	Siemens - Air interface faulty
0x0A	10	0000 1010	Tag not present during read or write operation
0x0C	12	0000 1100	Siemens - Tag memory defective
0x0D	13	0000 1101	Siemens - Error in the specified memory address (access attempted to non-existent or non-accessible memory areas).
0x13	19	0001 0011	Siemens - Buffer overflow. Insufficient buffer available
0x14	20	0001 0100	Siemens - Major system fault (hardware fault)
0x15	21	0001 0101	Siemens - Parameter assignment error
0x18	24	0001 1000	Siemens – Only RESET command permitted
0x19	25	0001 1001	Siemens - Previous command is still active
0x1E	30	0001 1110	Siemens - Incorrect number of characters in frame
0x1F	31	0001 1111	Siemens - Running command cancelled by reset command
0x20	32	0100 0000	Time out waiting for Tag Read Command contains a syntax error
0x21	33	0010 0001	Time out waiting for Tag Write Command contains a syntax error
0x23	35	0010 0011	Invalid or unsupported tag type
0x30	48	0011 0000	Internal controller error
0x31	49	0011 0001	Invalid controller type
0x32	50	0011 0010	Invalid tag address
0x35	53	0011 0101	Invalid hardware reset
0x51	81	0101 0001	Tag end address out of range
0x61	97	0110 0001	Command malformed generic syntax error
0x63	99	0110 0011	Invalid command ID
0x64	100	0110 0100	Invalid command parameter
0x65	101	0110 0101	Invalid node ID
0x66	102	0110 0110	Command inactive controller ID
0x6D	109	0110 1101	Internal error buffer overflow
0x6E	110	0110 1110	Flash failure. Internal memory error
0x70	112	0111 0000	General exception
0x74	114	0111 0100	CRC error
0x75	115	0111 0101	Protocol error internal communications error
0x7F	127	0111 1111	Invalid field count
0x80	128	0100 0000	Attempted read or write without being defined

7. Service and support

For service and support Contact support@durobyte.com