GarrettCom®

A **BELDEN** BRAND

Magnum DX940e

Industrial Cellular Router

Installation Guide

Declarations

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Part Number Information

Part Number: 84-00197Z, revision A

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FCC Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 the user will be required to correct the interference at his/her own expense.

In order to maintain compliance with FCC regulations shielded cables must be used for electrical I/O with this equipment. Operation with non-approved equipment or unshielded cables may result in interference to radio and television reception. Changes or modifications could void the user's authority to operate the equipment. The user is cautioned not to change or modify this product.

FCC Part 68

This device complies with part 68 of the FCC rules and the requirements adopted by the ACTA. On the bottom of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

Note: REN (Ringer Equivalence Number) does not apply to this equipment.

IC CS03 (Industry Canada)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment entitled "Digital Apparatus", ICES-003 of the department of Communications (Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numériques", NMB-003 édictée par le ministre des Communications).

This product meets the applicable Industry Canada technical specifications/Le présent materiel est conforme aux specifications techniques applicables d'Industrie Canada.

EN55032

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

SAFETY

WARNING: Service to this unit can be made only by factory authorized personnel. Failure to observe this caution can result in malfunction to the unit as well as electrocution to personnel.

Avertissement: Cet appareil ne peut être examiné ou réparé que par un employé autorisé du fabricant. Si cette consigne n'est pas respectée, il y a risque de panne et d'électrocution.

Vorsicht: Dieses Gerät darf nur durch das bevollmächtigte Kundendienstpersonal der fabrik instandgehalten werden. Die Nichtbeachtung dieser Vorschrift kann zu Fehlfunktionen des Gerätes führen und das Personal durch Stromschläge gefährden.

Service Personnel Warning

The DX940e device may be AC or DC powered. Remove all power connections at the circuit panel before removing the unit.

The installation of this product must comply with all applicable codes and practices specified by the country, city, and operating company in which it is installed.

Grounding

All units require grounding. Use a grounding wire with a minimum size of 14 AWG at a maximum length of five feet.

The DX940e is equipped with an external grounding bolt (#10/32 UNF-2B). The ground lug bolt torque rating is 32 inch pounds (3.6 Nm).

Industry Canada Warnings	Avis d'Industrie Canada
Notice: Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.	Avis: Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations. Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.
Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. The precaution may be particularly important in rural areas.	Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Preface

ABOUT THIS MANUAL

This document provides instructions for installing the Magnum DX940e hardware. This document gives product descriptions, specifications, detailed information on ports and pin-outs, all site preparation required to install the product, complete installation procedures, power up instructions, and instructions for removing and maintaining the product. This document is arranged as follows:

Chapter 1, "Overview" - Contains a brief product description, a list of applicable specifications, and a description of all controls and indicators and pin-outs for connectors.

Chapter 2, "Installation" - Contains all site preparation that must be accomplished prior to installing the DX940e, installation in a rack, panel, or DIN-Rail system, powering the unit up, and making all external connections. This chapter also includes maintenance procedures.

CONVENTIONS

Graphically distinctive alerts (illustrated below) are interspersed throughout this manual. These alerts call your attention to useful information related to the text immediately following the alert. Notes provide supplemental information or provide a point of emphasis. Cautions warn you of the risk of poor system performance or of system failure.

NOTE: Notes provide you with helpful information about an upcoming step or action. If you do not use the information contained in a Note there is no risk of harm to the system, but using the information will improve performance and/or increase your understanding.

CAUTION: A caution warns you that you should take some action to avoid poor system performance or system failure.

LASER WARNING: This Warning is used to call attention to the fact that Laser output can cause serious damage to the eye.

ELECTRICAL WARNING: This format is used for Electrical Warnings. Callouts of this format are used to notify that a potential of electrocution exists and that a defined action could cause personal injury or death to occur.

HOT SURFACE WARNING: This warning indicates "Hot Surface" Do not touch, allow unit to cool one-half hour after power off before handling.

WEB ACCESS

All of the DX940e installation guide is also available in a PDF format on the GarrettCom website, http://media.beldensolutions.com/garrettcom/techsupport/hardware/userguides/dx940eug.pdf
See Product Bulletin and Administrator Guide sections in this guide for information on other related documents.

Contents

1.0 Overview

1.1   Overview

The Magnum DX940e can be configured at order time and provides connectivity to Ethernet via four 10/100/1000 Base-T Ethernet ports, 100Mbps or 1000Mbps Fiber ports via SFP's. Additionally, two 10/100/1000 Base-T ports can be added for Gigabit connectivity or 1000Mbps fiber ports (via SFP) can be added for 1000Mbps fiber connectivity. Other connectivity options includes optional four programmable serial ports, and one DDS or T1/E1 WAN port. Optionally a 4G/LTE cellular wireless interface can be added as well.

1.2   Configuration

The following sections describe the features and requirements of the DX940e.

1.2.1 Connectivity

The DX940e is equipped with:

- (Optional) 1 DDS or T1/E1 WAN port. Instead of the DDS or T1/E1 port, a 4G/LTE cellular wireless interface is available.

- 4 Ethernet ports 10/100/1000 Base-T, RJ45 OR 4 SFP 100Mbps or 1000Mbps ports. These are labeled E3 through E6. All ports are disabled by default, except E6.

- (Optional) 2 Ethernet 10/100/1000 Base-T ports OR 2 SFP 1000Mbps ports. These ports are labeled E1 and E2. These ports are disabled by default.

- (Optional) 4 Serial programmable RS232/422/485 ports.

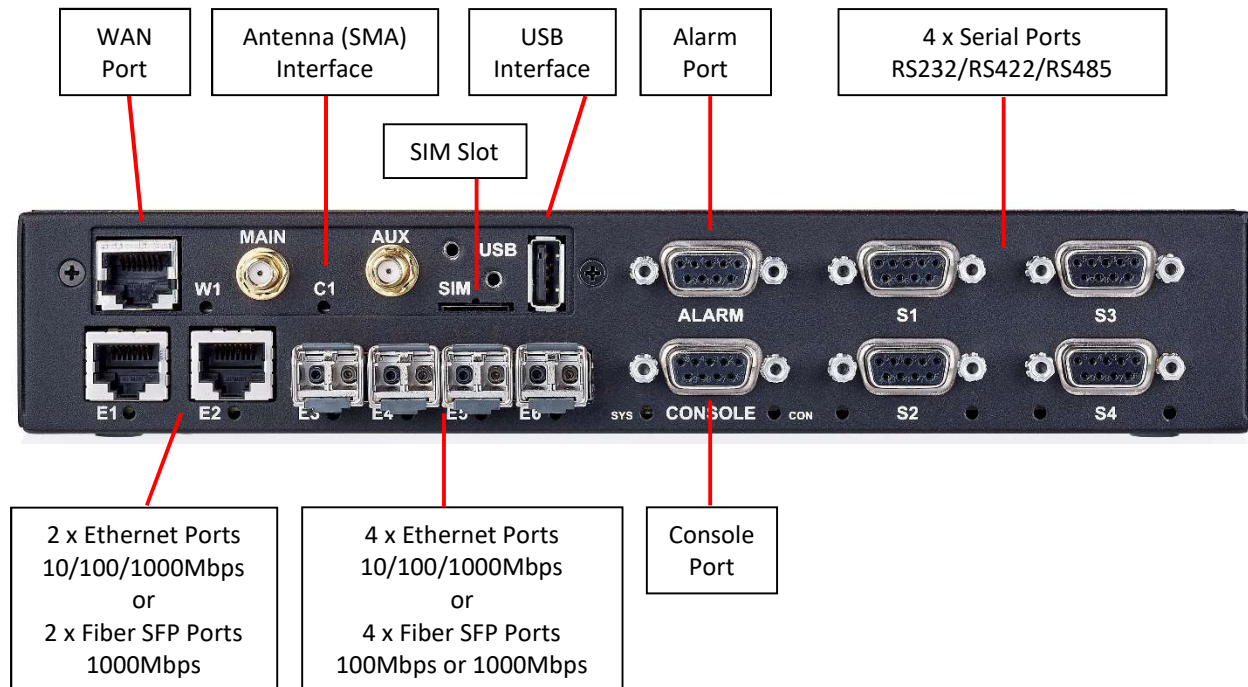These ports are all located on the front face of the device, as shown below in Figure 1-1.

Figure 1-1, Front view example

[1]

1.2.2 Power and Ground

The DX940e can be ordered with a high (90 -250 VAC or VDC) or Low (24-48 VDC) voltage power supply. The connection point for the power supply is located at the rear of the chassis. The rear face also contains the primary ground stud and labels including serial number, model number, and port and power specifications.
Shown below in Figure 1-2.

For detailed power specifications see Power Requirements.

Figure 1-2, Rear view example

NOTE: The hot surfaces warning label is affixed to this device because the device is rated to operate at *ambient* temperatures as high as 85°C (185°F). Also, due to temperature rise of internal components, it is recommended NOT to touch the device body throughout its input voltage range as well as full operating temperature range, as the metal surfaces of the device would become too hot to touch.

REMARQUE: l'étiquette d'avertissement relative aux surfaces chaudes est apposée sur cet appareil, car celui-ci est conçu pour fonctionner à des températures ambiantes atteignant 85°C (185°F). De plus, en raison de l'élévation de température des composants internes, il est recommandé de ne PAS toucher le corps de l'appareil dans toute la plage de tension d'entrée et de plage de température de fonctionnement, car les surfaces métalliques de l'appareil deviendraient trop chaudes au toucher.

1.2.3 Indicators

The operational status of the ports of the DX940e is indicated by LEDs located near the physical ports on the front of the DX940e, as illustrated in Figure 1-1, and a bank of LEDs on the top of the chassis, as illustrated in Figure 1-3.

Figure 1-3, Top view of DX940e

In Figure 1-3, the LEDs are shown for Console Port; Alarm Port; and E3 through E6. Ethernet Ports E3 through E6 are 10/100/1000 copper ports or 100Mbps or 1000Mbps Fiber ports (using SFPs).

Depending on the options ordered, additional LED's may be displayed in the boxes labeled "A" and "B" (shown by the red dotted line) in Figure 1-3 above. "A" and "B" (as shown in Figure 1-3 above) can have possible combinations of LEDs as shown in Figure 1-3(a) below.

Figure 1-3a, Possible LEDs in positions "A" and "B" shown in Figure 1-3 above.

The LEDs shown in Figure 1-3(a) are as follows:
- E1, E2 - Gigabit Ethernet ports
- C1 - Cellular Interface
- W1 - WAN Port
- S1 through S4 - Four Serial ports labeled S1, S2, S3 and S4

1.2.4 Mounting Options

There are three mounting options for the DX940e:
- 19" rack mount (see Mounting in a 19" Rack System)
- Panel mount (see Mounting on a Panel)
- DIN-Rail mount (see Mounting in a DIN-Rail System)

Each of these options requires specific accessory hardware. Each type of accessory hardware mates up with a specific set of screw holes on the sides of the chassis, illustrated in Figure 1-4.
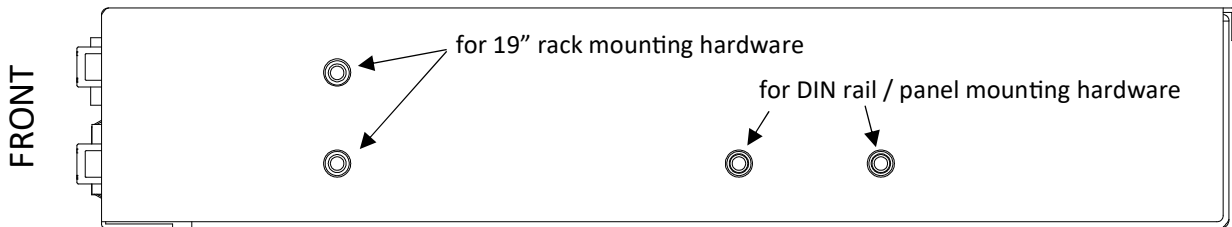

Figure 1-4, Side view

1.3   Specifications

The following sections provide detailed information about the physical, electronic, and industrial specifications of the DX940e.

1.3.1 Physical

The physical dimensions and weight of the DX940e are defined in Table 1-1.

Table 1-1, Physical Specifications

Height:	1.75 inches (4.45 cm)
Width:	9.5 inches (24.13 cm)
Depth:	9.0 inches (22.86 cm)
Weight:	5.0 lbs (2.3 kg)

1.3.2 Environmental

The environmental specifications of the DX940e are defined in Table 1-2.

Table 1-2, Environmental Specifications

Operating Temperature:	-40°C to 85°C (-40°F to 185°F) IAW 60950-1, installations in restricted access locations. No fans
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)
Operating Humidity:	5% to 95% (non-condensing)

1.3.3 Compliance

The industry compliance profile of the DX940e is defined in Table 1-3.

Table 1-3. Compliance with Standards

Industrial:	IEEE 1613, IEC 61850-3	
Emissions:	EN55032A, FCC Part 15A	
Immunity:	EN55024	EN61000-4-6 (CRF)
	EN61000-3-2 (Harmonics)	EN61000-4-8 (Magnetic)
	EN61000-3-3 (Flickers)	EN61000-4-10 (MagField)
	EN61000-6-2	EN61000-4-11 (VDI)
	EN61000-6-5	EN61000-4-12 (Oscillatory)
	EN61000-4-2 (ESD)	EN61000-4-16 (CCM)
	EN61000-4-3 (RF)	EN61000-4-17 (Ripple)
	EN61000-4-4 (EFT)	EN61000-4-29 (VDI)
	EN61000-4-5 (SURGE)	
Safety:	UL62368	

1.3.4 Power Requirements

The power requirements of the DX940e are defined in Table 1-4.

Table 1-4. Power Requirements

	High Voltage AC/DC	Low Voltage DC (Polarized)
Voltage Input Range:	90-250 VAC/VDC	24-48 VDC
Max. Power (Watts):	32	32
Typical Power (Watts):	18	18
Max. Amperage (Amps):	0.36A @ 90V 0.13A @ 250V	1.3A @ 24V 0.66A @ 48V

1.3.5 Ports and External Connectors

The ports and external connectors of the DX940e are defined in Table 1-5.

Table 1-5. Ports and External Connectors

Port Name:	Connector type:	Description:
WAN, W1/	RJ48	• DDS – 56/64 Kbps DDS CSU/DSU WAN connection. • T1/E1 – CSU/DSU WAN connection
Ethernet, E1 – E2	RJ45 or SFP	10/100/1000 Mbps Ethernet port for connection to copper Ethernet capable devices. With SFP, the speed is determined by the type of SFP plugged in, which can be 100 Mbps or 1000 Mbps.
Ethernet, E3 – E6	RJ45 or SFP	10/100/1000 Mbps Ethernet port for connection to copper Ethernet capable devices. With SFP, the speed is determined by the type of SFP plugged in, which can be 100 Mbps or 1000 Mbps.
Serial, S1 through S4	DB9, female	Connection to serial async devices. Configurable to 300, 600, 1200, 2400, 4800, 9600, and 19.2, 28.8, 33.6, 38.4, 57.6, 115.2, 230.4 Kbps.
USB	USB	USB serial interface for connection to a USB stick for data storage.
SIM	Micro SIM	Push-Push Micro SIM card slot for inserting Micro/3FF SIM for connection to 4G/LTE service provider.
Power Connection	Terminal block	• Non-Polarized for High Voltage input • Polarized for Low Voltage input
Facility Ground Point	Lug bolt	Facility ground connection point.
Console	DB9, female	Configured to operate at 38400 Baud, 8 bits, No parity, one stop bit and is configured as a DTE.
Alarm	DB9, female	Carries alarm signals to provide notification of events specified by software configuration.

NOTE: All copper I/O connections must be made with shielded cables and connectors.

1.3.6 Indicators

The status indicators of the DX940e are described in Table 1-6. There are two sets of LEDs so that you can conveniently monitor activity regardless of the orientation of the device. See Figure 1-3 for more details.

Table 1-6. Indicators

| LED Name:	Condition:	Indication:
W1 **(WAN DDS or** **T1/E1 Port)**	On - Green	Indicates an active circuit.
	Off	Indicates circuit is down or not configured properly.
	Flashing	Data is passing through the port.
S1 – S4 **(Serial Ports)**	On - Green	Port is connected to an active serial device.
	Off	Port is down.
	Flashing	Data is passing through the port.
E1 – E6 **(Ethernet Ports)**	On - Green	Port is connected to an active Ethernet device.
	Off	Port is down.
	Flashing	Data is passing through the port.
Console	On - Green	Connected to an active local terminal.
	Off	Not connected.
	Flashing	Data is passing through the port.
Alarm	Off	No power is applied to unit.
	Red	Reset state: System is not loaded
	Orange	System is being booted.
	Green	Normal operation.
C1 **(Cellular Wireless** **Interface)**	On - Green	Indicates an active circuit / Data is passing through the port.
	Off	Indicates circuit is down or not configured properly.

1.4   Pin-outs

The following subsections describe the pin-outs of the connectors used with the DX940e.

1.4.1 RJ48 DDS Connection

Table 1-7 defines the pin-out of the RJ48 connector used on port W1 with the DDS connection.
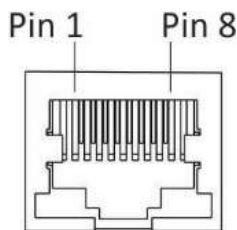
Table 1-7. RJ48 DDS Pin-Out
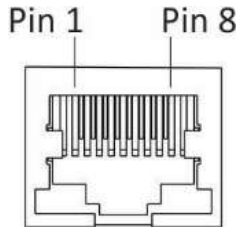
Pin	Signal
1	Tx Data - Ring
2	Tx Data - Tip
3	not used
4	not used
5	not used
6	not used
7	Rx Data - Tip
8	Rx Data - Ring

1.4.2 RJ48 T1/E1 Connection

Table 1-8 defines the pin-out of the RJ48 connector used on port W1 with the T1/E1 connection.

Table 1-8. RJ48 T1/E1 Pin-Out

Pin	Signal
1	Rx Data - Ring
2	Rx Data - Tip
3	not used
4	Tx Data - Ring
5	Tx Data - Tip
6	not used
7	not used
8	not used

1.4.3 RJ45 for 10/100/1000 Ethernet Ports

Table 1-9 defines the pin-out of the RJ45 connector used with the DX940e. RJ45 connectors are used on ports E1 thru E6 for 10/100/1000 Base-T connections to copper Ethernet-capable devices.

Table 1-9. RJ45 Pin-Out
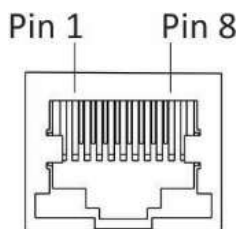
Pin	Signal
1	TD0+
2	TD0-
3	TD1+
4	TD2+
5	TD2-
6	TD1-
7	TD3+
8	TD3-

1.4.4 DB9 (Female) – RS232 Serial Ports and Console Port

Table 1-10 defines the pin-out of the DB9 female connector for the console port and for serial ports S1 -S4 when they are configured for the RS232 interface. DB9 connectors are used on RS232 serial ports S1 - S4 and the console port, for asynchronous connections.

Table 1-10. RS232 DB9 Pin-out
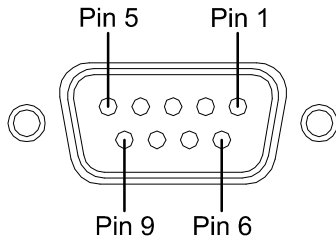
Pin	Name	Dir.	Description
1	DCD	In	Data Carrier Detect from DCE
2	RXD	In	Receive Data from DCE
3	TXD	Out	Transmit Data to DCE
4	DTR	Out	Data Terminal Ready to DCE
5	GND	Pwr	Signal Ground
6	DSR	In	Data Set Ready from DCE
7	RTS	Out	Request To Send
8	CTS	In	Clear to Send
9	RI	In	Ring Indicator from DCE

1.4.5 DB9 (Female) – Alarm Port

Table 1-11 defines the pin-out of the DB9 female connector for the alarm port on the DX940e.

Table 1-11. Alarm DB9 Pin-out
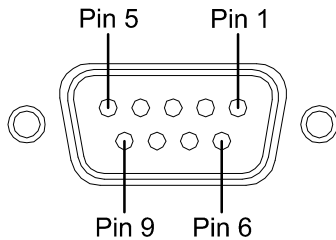
Pin	Signal
1	NC1 -Normally Closed 1
2	NO1 -Normally Opened 1
3	COM2 - Common 2
4	Reserved for future use
5	Reserved for future use
6	COM1 - Common 1
7	NO2 -Normally Opened 2
8	NC2 -Normally Closed 2
9	Reserved for future use

1.4.7 DB9 (Female) – RS485 Serial Ports

Table 1-12 defines the pin-out of the DB9 female connector used with serial ports on the DX940e when they are configured for the RS485 interface.

Table 1-12. RS485 DB9 Pin-out
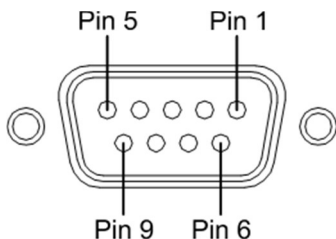
Pin	Signal	
1	RX-	In
2	RX+	In
3	TX-	Out
4	TX+	Out
5	GND	Power
6	Not Used	
7	Not Used	
8	Not Used	
9	Not Used	

2.0 Installation

This chapter provides specific procedures for installing the Magnum DX940e, preparing for installation, and uninstalling the device.

2.1 Preparing for Installation

The DX940e is designed to be installed in standard 19" racks, on a DIN-Rail system, or on a panel.

2.1.1 Tools

Regardless of the mounting system you are using you will need the following tools:

- Two screw drivers – one Phillips head and one slotted.
- A torque wrench (rated for ten and 32 inch pounds, or 1.1 Nm and 3.6 Nm)
- A wrench to connect a ground wire from the device chassis to a ground.

The instructions in this manual cover only the physical installation. System configuration is handled through a web-based interface and is described in the MNS-DX Administrator's Guide.

2.1.2 Site Suitability

Be sure that your installation site meets the following criteria:

- Conforms to the temperature and humidity ranges detailed in Table 1-2
- Can meet the power requirements detailed in Table 1-4
- Will remain stable after the addition of the 5 lb. DX940e
- Permits at least two inches of space between the DX940e and any other heat producing device.

2.1.3 Wiring and Grounding Guidelines

The DX940e requires several different types of connectors, cables, and wires. Requirements and recommendations are listed below:

Grounding: The primary ground stud located on the rear of the chassis must be used to connect to an approved ground with a wire meeting the following criteria:

- 14 AWG (minimum)
- a maximum of five feet in length
- terminated on the ground lug side with a #10 ring lug

Facility Power: The facility power cabling attached to the DX940e chassis must meet the following criteria:

- cabling constructed using 14 AWG stranded wire
- cable firmly attached to the terminal holes of the terminal block
- cable routed and strain relieved to the chassis according to good wiring practices

Copper: Copper I/O cables and connectors must be shielded.

2.1.4 External Connections

You can speed up the installation of the DX940e by having the following equipment and information on hand before beginning:

- A supply of cables and connectors of the required types.
- IP addresses for new devices and any existing devices you will be connecting to.
- Your notes on naming conventions and end point information.

2.2 Unpacking

Unpack and inspect the DX940e.

The DX940e is shipped with the following items in the box:

- DX940e unit
- Panel mounting brackets (19" Rack mount brackets or DIN–Rail mounting brackets, optional)
- Console Cable - DB9 terminations
- Ethernet cable - RJ45 terminations

Be sure that all the equipment you have ordered is included in the shipment.

Remove the unit from the Styrofoam end caps and inspect the DX940e chassis for dents or other shipping related damage. Report any damage immediately to GarrettCom customer support and DO NOT INSTALL the unit.

2.3 Installation of the DX940e Unit

To install the DX940e you must first:

- Mount it
- Make the ground and power connections.
- Connect the network cables

2.3.1 Mounting

Your DX940e shipment includes the mounting hardware you have ordered as appropriate to your site.
This hardware is one of:

- Included, a pair of brackets for mounting on a panel.
- Optional (ACC-DX-RM), a pair of L-shaped brackets for conventional mounting in a 19" rack system.
- Optional (ACC-DX-RRM), a pair of L-shaped brackets for reverse mounting in a 19" rack system.
- Optional (ACC-DX-DM), a pair of DIN-Rail mounting brackets.

2.3.1.1   Mounting on a Panel

Each bracket for mounting on a panel attaches with two screws to the screw holes located toward the rear of the DX940e (see Figure 1-4). You can adjust the distance of the DX940e from the panel to two positions by your selection of which pair of screw holes to use in attaching the bracket to the DX940e.
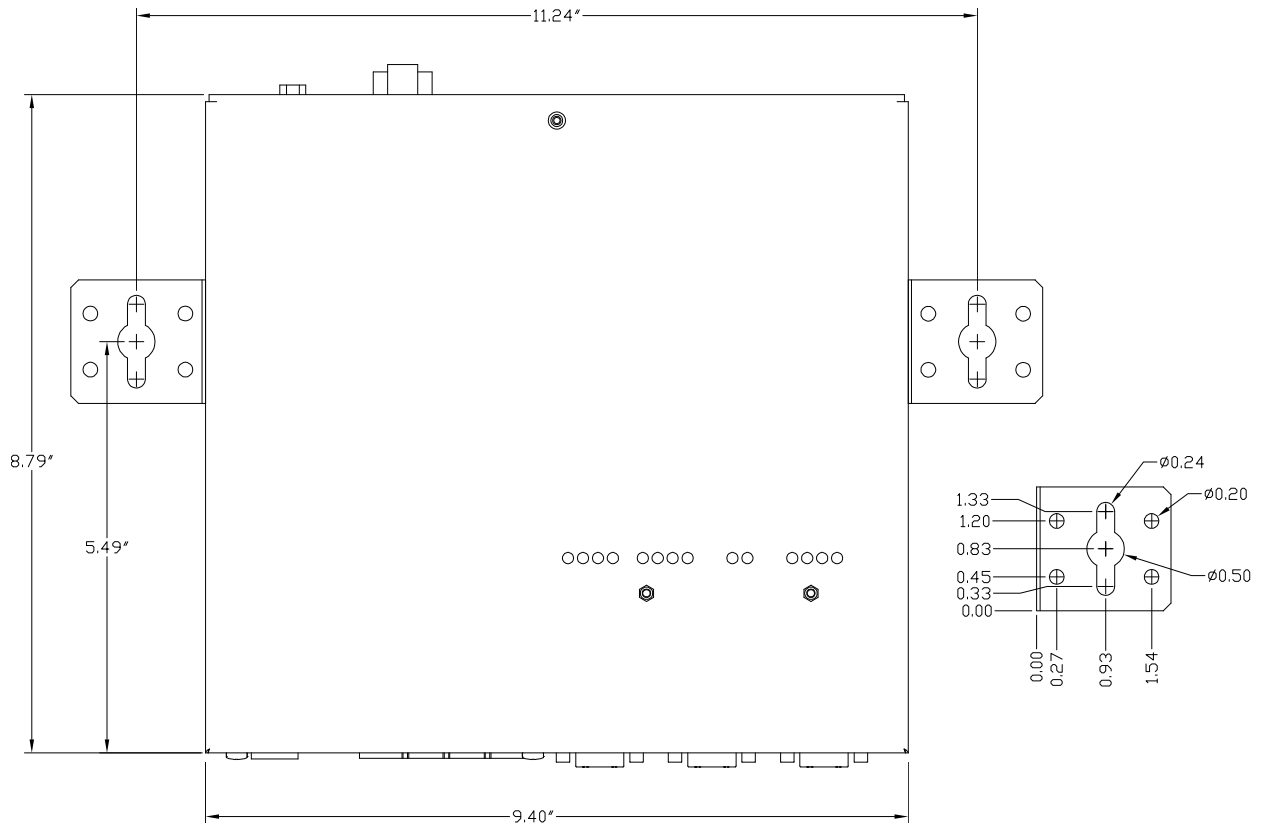
Figure 2-1, Panel Mounting brackets

Figure 2-2, Panel Mounting – Dimensions

2.3.1.2   Mounting in a 19" Rack System

The DX940e device can be mounted in a 19" rack system with the I/O connectors on the aisle side and the power and ground connectors on the wire side (conventional mounting) or in the reverse configuration.
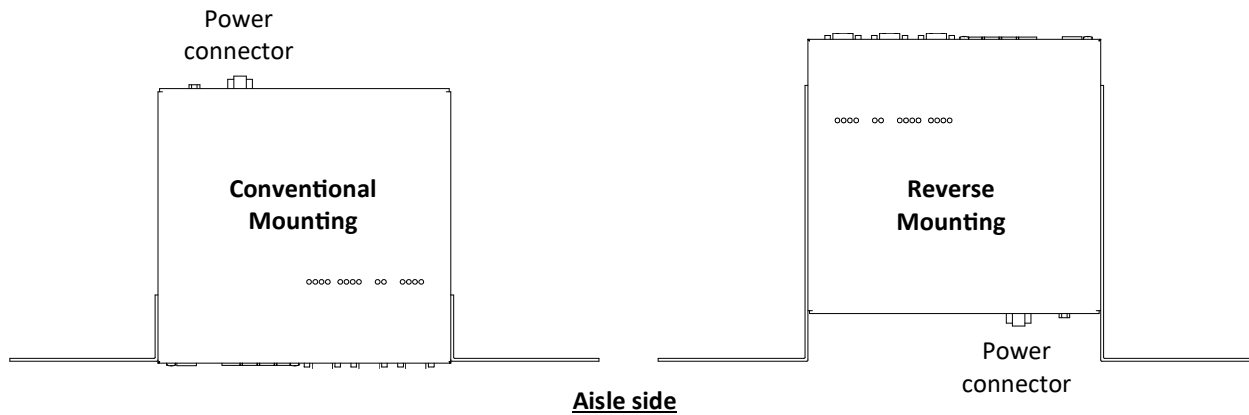
Power connector

Conventional Mounting

Reverse Mounting

Power connector

Aisle side

Figure 2-3, Top view – 19" Rack, Conventional and Reverse mounting

Conventional Mounting

The brackets for mounting in a 19-inch rack system, attach with two screws to the screw holes located toward the front of the DX (see Figure 1-4). You can adjust the depth of the device within the mounting system to four positions:

- By your selection of which pair of screw holes on the short side of the bracket
  (that is, the side that attaches to the DX940e) to use.
- By setting the long side of the bracket (that is, the side that attaches to the rack system) toward the front of the DX940e or toward the rear.

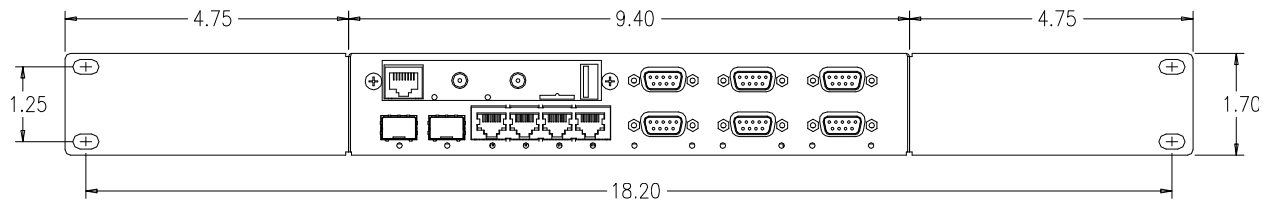Figure 2-4, Conventional Rack Mounting brackets

Figure 2-5, Conventional Rack Mounting - Dimensions

Reverse Mounting

The brackets provided for reverse mounting have an opening in their forward projecting parts to accommodate the power cable.
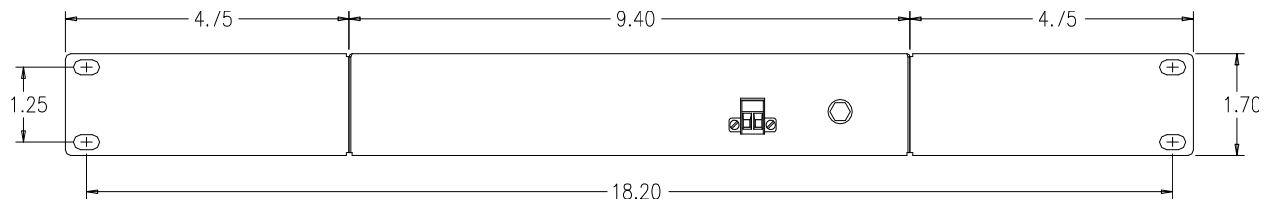

Figure 2-6, Reverse Rack Mounting brackets

Figure 2-7, Reverse Rack Mounting – Dimensions

2.3.1.3　Mounting in a DIN-Rail system

To mount the DX940e on a DIN-Rail, follow the below steps:

- Purchase the ACC-DX-00-DM accessory kit, which provides the DIN-Rail bracket for the DX940e.
- Kit includes:
  - o DIN-Rail mounting brackets, x2
  - o Screws 10-32 x 3/8, x4
  - o Installation instructions

Step 1:　Remove the Panel Mount Brackets pre-installed on the system, by removing the two 6-32x1/4" screws for each bracket as shown below.

[13]
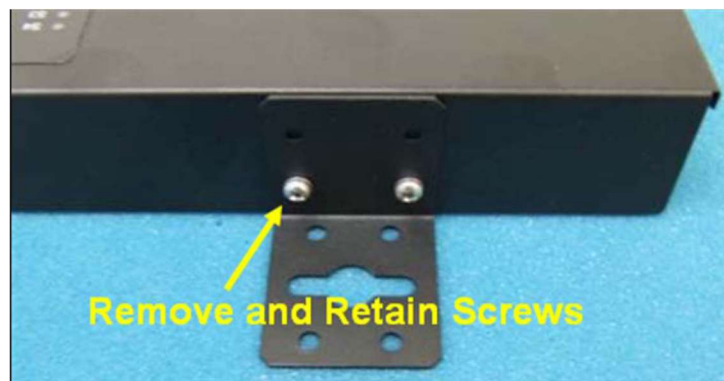
Step 2: Attach the DIN-Rail mounting brackets to the Panel Mount Brackets with the latch plungers oriented to the rear of the DX using two 10-32x3/8" screws as shown below.
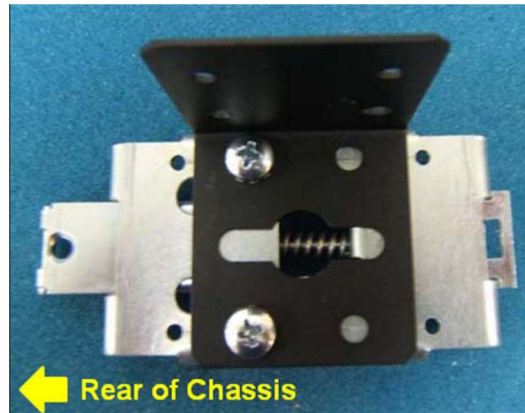
Step 3: Reattach the Panel Mount Brackets with DIN-Rail brackets to the DX940e using the 6-32x1/4" screws removed in step 1.

2.3.2 Connecting Facility Power

The DX940e comes in either high or low voltage models. The unit does not have a power on/off switch and is active when the power is connected.

ELECTRICAL WARNING: Always ensure that the ground connection is made prior to connecting facility power to the DX940e. The ground provides a protective circuit connection to ground in cases of transients and power surges. Connect the facility power to a DC or AC unit as described in the following sections.

2.3.2.1   Making the Ground and Power Connections

The DX940e provides a hardened DC or AC power supply for industrial applications and/or hostile environments. The ground lug and power supply connector are located on the rear of the unit as shown below.

Figure 2-8, Ground and Power connections | Power Connector | Ground bolt

ELECTRICAL WARNING: Verify that a proper ground connection is made from the ground lug to facility ground prior to connecting power to the DX940e. Failure to have a proper ground path could cause serious injury or death to personnel in cases of power surges.

Making the Ground Connection
The ground wire should be 14 AWG terminated with a #10 ring lug.

Make the facility ground connection as follows:
1) Loosen the ground bolt on the chassis, insert the #10 ring lug, and tighten the ground bolt.
2) Connect the other end of the ground wire to the facility ground.

Making the Power Connection

The power wires should be 14 AWG. Smaller wires may be used, down to 18 AWG, but verify that they meet your local electrical requirements.

Connect the power to the unit as follows.

⚠️ **ELECTRICAL WARNING: Ensure that power is disconnected from wiring prior to handling! Check the voltage rating next to the power connector - verify that it matches the power source.**

1) Remove the plug portion of the power connector by loosening the two captive mounting screws.
2) Strip back 1/4" off the insulation of the wires that will connect the unit to the power source.
3) Loosen saddle screws and insert each conductor firmly into a terminal hole of the plug
   (note: this connection is polarity sensitive for Low Voltage power input)
4) Visually inspect that no strands of wire are straying out of the hole, potentially shorting to ground or the other conductor. Tighten the saddle screws until the wires are secure.
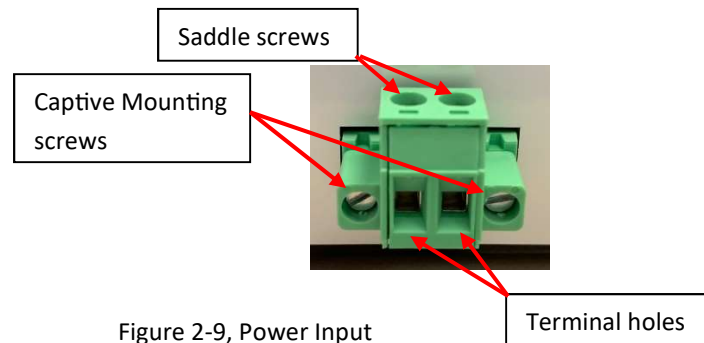5) Re-insert the plug into the power connector and secure the two captive mounting screws.

Figure 2-9, Power Input

2.3.3 Connecting to the Console Port and the Alarm Port

2.3.3.1 Console Port

The Console Port enables configuration of the device and is connected by a serial cable to a PC.
For hardware installation see "Connecting Network Cables", below. For startup and configuration information see MNS-DX Administrator's Guide.

2.3.3.2 Alarm Port

The alarm port carries alarm signals to provide notification of events specified by software configuration. The events that can be set to trigger alarms are described in the MNS-DX Administrator's Guide. Wire the pins of the alarm port appropriately depending on whether your downstream alarm system expects normally open or normally closed operation. See Table 1-11 for alarm port pin-out. Table 2-1 below defines the ratings of the alarm port contacts.

Nominal Switching Capacity (resistive load)	0.5A at 30VDC, 0.25A at 125VAC
Maximum Switching Power (resistive load)	15W, 31VA
Maximum Switching Voltage	110 VDC, 125 VAC
Maximum Switching Current	0.5A

Table 2-1, Alarm Port Contact ratings

2.3.4 Connecting Network Cables

There are two types of connections that can be made to the DX940e. They are serial and Ethernet copper. The following sections describe each type of connection separately.

2.3.4.1 Connecting Serial Cables

This procedure assumes that one end of the serial device cable is already attached to the end unit. Be aware of the serial port numbering scheme when installing the cables. The ports are configured in software later on and if a device is accidentally connected to the wrong port it will be difficult to detect.

Connect cables to the Serial ports as described below:

1) Align the DB9 connector with appropriate serial port and push gently until the connector is completely mated to the port.
2) Tighten the two extended capture screws hand tight.
3) Make sure that the connector is not supporting the whole weight of the cable. Providing strain relief on these cables will ensure a stable connection.
4) Return to step one above and connect the remainder of the serial cables.

2.3.4.2 Connecting Ethernet Cables

The Ethernet ports are standard RJ45 ports or SFP ports. Connect the shielded Ethernet cables to the Ethernet ports. For SFP ports make sure the proper SFP is purchased from GarrettCom as well.

Installing the RJ45 ports:
1) Install the RJ45 connector into the port with the clip facing down.
2) Push the RJ45 connector into the port until you hear a click.
3) Give the cable a gentle tug to ensure that the connector clip is firmly seated.
4) Verify that the connection has been made by checking the LED associated with this port on the top of the DX940e chassis. It should be illuminated. If the link LED is not illuminated verify that the equipment on the other end of the cable is powered up and properly connected.
5) Return to step one above and connect the remainder of the cables.

Installing the SFP ports:
1) Install the SFP in the SFP slot in DX940e.
2) Install the fiber connector in the SFP. Make sure the fiber connector matches the SFP fiber port type.
3) Gently push the fiber port in until a click is heard. This ensures the fiber connector and the SFP have mated properly.
4) Return to step 1 and install the other fiber ports.

2.3.4.3   Connecting the WAN Cable

The single WAN connection on the DX940e can be a DDS or a T1/E1 port. An RJ48 is used for both the DDS and the T1/E1 ports. This is a modular connector that connects the DX940e to the external telecommunications network. The following procedure assumes that the line and telecom equipment are ready to accept data traffic from the DX940e and the interfacing cable is already attached to this gear.

Connect the RJ48-terminated cable to the WAN port as follows:
1) Install the RJ48 connector into the WAN port with the clip facing down.
2) Push the RJ48 connector into the port until you hear a click.
3) Give the cable a gentle tug to ensure that the connector clip is firmly seated.
4) Verify that the connection has been made by checking the LED associated with this port on the top of the DX940e chassis. It should be illuminated. If the link LED is not illuminated verify that the equipment on the other end of the cable is powered up and properly connected.

2.3.4.4   Inserting / Removing SIM card

The DX940e unit uses Micro/3FF SIM cards and Push-Push type SIM connection.
1) Using tweezers, secure the SIM card as shown.
2) Insert the SIM card into the slot marked "SIM", with label side-up.
3) Push the SIM card into the slot until stop, "click" is heard, release.
4) To remove, Push the SIM card until stop, "click" is heard, release.
5) Use tweezers to grasp the SIM card and remove.

Figure 2-10, SIM installation

2.3.4.5   Connecting 4G/LTE Antennas

Using the two antenna interfaces (see figure 1-1) marked as "Main" and "Aux". Screw on the 4G/LTE antennas to the SMA type connectors, just until the point of stop.

- Garrettcom recommends to use Taoglas TG.10.0113 antennas.

2.4   Maintenance

The DX940e is designed to be replaced as a unit. There are no servicing requirements and there are no user-repairable/replaceable components in this device including the RTC lithium-ion battery. Maintenance is limited to replacing the unit.

The following sections detail disconnecting all connections to the chassis, removing the chassis, cleaning optical devices and packing the DX940e for return to the manufacturer. If it is still possible to connect a terminal to the malfunctioning DX940e and retrieve any configuration data from the device, do so prior to removing power.

2.4.1 Removing the DX940e

Removing the DX940e entails disconnecting the network cabling, disconnecting the power and ground lines, and removing the chassis from the rack or other installation location. The unit can then be packed for shipment to the manufacturer.

2.4.1.1   Disconnecting Network Cables

The sequence for removal of the serial and Ethernet cables is not important, but it is important to note that there are active devices connected to each end of the cable.

1) Remove all of the Async DB9 connectors from the serial ports by unscrewing the two captive screws on each cable and pulling the connector off the port. (Label the connector with the port number if the cable is to be reconnected at some later time.)
2) Remove the Ethernet RJ45 connectors from the Ethernet ports by pressing on the clip on the underside of the modular connector and pulling the connector straight out. (Label the connector with the port number if the cable is to be reconnected at some later time.) Repeat for the RJ48 WAN connector.

2.4.1.2   Disconnecting Power and Ground Lines

ELECTRICAL WARNING: Before disconnecting either AC or DC power connections at the DX940e ensure that the facility power has first been turned off. Failure to shut power off prior to removing the power connections could expose you to dangerous voltages causing injury or death.

Follow the procedure below to disconnect the power and ground lines.

1) Verify that power to the DX940e is turned off.
2) Use a screw driver to loosen the two screws that tighten the wire clamps in the power connector. Remove the wires from the connector.

ELECTRICAL WARNING: If the wires are not to be used immediately properly insulate them to ensure that an accidental turning on of the power will not cause a short or electrical hazard.

3) Remove the ground wire from the chassis by loosening the Ground Lug.

2.4.1.3 Packing the DX940e for Shipment

If you have saved the shipping box that your DX940e was received in, then add the end Styrofoam pieces around the chassis and place the unit in the box. Please contact customer support to receive a valid RMA number so that this item is either repaired and returned or credited to your account. Products without a proper RMA number will not be accepted for repair by GarrettCom.

If you have not saved the original shipping container then place the unit in a box so that normal shipping activities will not cause any damage to the unit. GarrettCom has no responsibility for the product during return shipping. For more warranty information, see Warranty and for details for the requirements for returning equipment, see Return Of Equipment.

2.5 Product Bulletin

The product bulletin for the DX940e is available on the GarrettCom website and is available at:
https://www.belden.com/hubfs/resources/technical/product-brochures-bulletins/magnum-dx940e-product-bulletin.pdf?hsLang=en

2.6 Administrator Guide

The Administrator Guide for the DX940e is available on the GarrettCom website and is available at:
https://www.belden.com/products/industrial/networking/software/magnum-mns-dx-software
   1) Scroll down page and choose Magnum MNS-DX Technical Support, then Garrettcom.
   2) Login with current account or Register for new account, to access the desired documentation.