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TD9300 Data Terminal

Installation and Configuration Manual

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Preface

Scope of Manual

This manual describes the TD9300 data terminal. The manual is intended for use by experienced technicians familiar with installing and operating radio network equipment. It includes information on installing, configuring and operating the TD9300 in a TN9300 DMR trunked network.

Document Conventions

Rewrite this when UI is finalised.

The TD9300 data terminal has a web interface with an accordion menu on the left side of the screen. “Configuration > Users” means click Configuration in the top-level menu, then click Users in the expanded Configuration menu tree to display its page.

Within this manual, four types of alerts may be given to the reader. The following paragraphs illustrate each type of alert and its associated symbol.

Warning **This alert is used when there is a hazardous situation which, if not avoided, could result in death or serious injury.**

Caution This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice This alert is used to highlight information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.

This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

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Associated Documentation

SCADA Gateway Installation and Configuration Manual (MNE-00020-**xx**).

The characters **xx** represent the issue number of the documentation.

Always get the latest issue of a manual from the Tait support website. Also available on the website are software release notes, and technical notes (TNs) which provide technical details not yet in the manuals, or solve any problems that may have arisen. Printed copies of the manuals are available on request.

Publication Record

Issue	Publication Date	Description
1	May 2015	First release

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1 Safety and Regulatory Information

1.1 Personal Safety

1.1.1 Explosive Environments

Warning **Do not operate the equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.**

1.1.2 Proximity to RF Transmissions / A proximité des émissions RF

To comply with the RF Field Limits for Devices Used by the General Public for (Uncontrolled Environment)[a], a safe separation distance of at least 3.3 feet (1 metre) from the antenna system should be maintained.

This figure is calculated for a typical installation, employing one 25 W transmitter. Other configurations, including installations at multi-transmitter sites, must be installed so that they comply with the relevant RF exposure standards.

a. Reference Standards
Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz*
USA Federal Communications Commission OET bulletin 65 (47CFR 1.1310)
IEEE C95.1 2005: *Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*

Pour respecter les limites imposées au champ RF au niveau des équipements utilisés par le grand public (environnement non contrôlé)[a], une distance de séparation de sécurité d'au moins 1 mètre du bloc d'antenne devrait être observée.

Ce nombre est calculé pour une installation typique, ayant un émetteur de 25 W. D'autres configurations, incluant les installations ayant des sites de plusieurs émetteurs, doivent être installées de façon à se conformer aux normes pertinentes des expositions RF.

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a. Normes de référence
Code de sécurité 6 de Santé Canada: *Limites d'exposition humaine à l'énergie électromagnétique radioélectrique dans la gamme de fréquences de 3 kHz à 300 GHz*
Commission fédérale des communications (FCC) des Etats Unis d'Amérique bulletin OET numéro 65 (47CFR 1.1310)
IEEE C95.1 2005: *Norme pour les niveaux de sécurité compatibles avec l'exposition des personnes aux champs électromagnétiques de radiofréquence 3 kHz à 300 GHz*

1.1.3 High Surface Temperatures

Caution The surfaces of the terminal can become hot during prolonged operation. Do not touch these parts of the terminal.

EN 60950 Requirements (25W Terminal)

This terminal complies with the European Union standard EN 60950 when operated up to the rated 50% duty cycle of 20 seconds transmit and 20 seconds receive, and with ambient temperatures of 77°F (25°C) or lower.

Caution Operation outside these limits may cause the external temperature of the terminal to rise higher than this standard permits.

1.1.4 LED Safety (EN 60825-1)

This equipment contains Class 1 LED Products.

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1.2 Equipment Safety

1.2.1 Installation and Servicing Personnel

The equipment should be installed and serviced only by qualified personnel.

1.2.2 Antenna Load

Transmitting into a low VSWR will maximize the power delivered to the antenna.

Notice Do not remove the load from the TD9300 while it is transmitting.

Load transients (switching or removing the load) can damage the transmitter.

1.2.3 Anti-tampering Devices

All network elements should be physically secured, where possible. This includes the use of locked cabinets and the use of seals on connectors.

All network and audio connectors should be sealed with the stick-on type of seal. The purpose of the seals is to detect unauthorized tampering. The seal should reveal if any of the connectors have been unplugged or if any unauthorized equipment has been plugged in.

The seals must be difficult to remove without breaking, and must bridge between the cable and equipment side (plug and socket) of the connection.

Seals must cover any unused network or audio sockets. This includes the Ethernet connector, any spare switch ports, and the console port on the router and switch.

The seals must be difficult to reproduce. A sticker initialed or signed by the technician should satisfy this.

Seals must be replaced if they need to be disturbed during maintenance.

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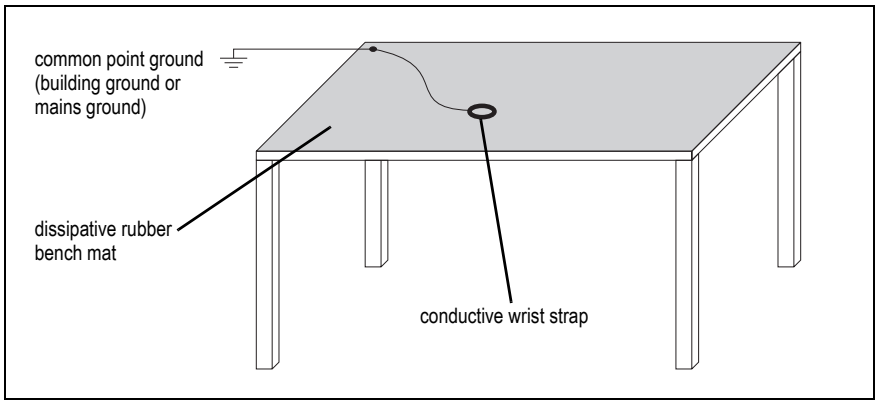
1.2.4 ESD Precautions

Notice This equipment contains devices which are susceptible to damage from static charges. You must handle these devices carefully and according to the procedures described in the manufacturers' data books.

We recommend you purchase an antistatic bench kit from a reputable manufacturer and install and test it according to the manufacturer's instructions. Figure 1.1 shows a typical antistatic bench set-up.

You can obtain further information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ANSI/ESD S20.20-1999 or BS EN 100015-4 1994.

Figure 1.1 Typical antistatic bench set-up



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1.3 Environmental Conditions

1.3.1 Operating Temperature Range

The operating temperature range of the equipment is –22°F to +140°F (–30°C to +60°C) ambient temperature.

1.3.2 Humidity

The humidity should not exceed 95% relative humidity through the specified operating temperature range.

1.3.3 Dust and Dirt

The TD9300 has the following ingress protection ratings:

- IP40
- IP51 (dust category 2) with the front panel connectors facing down.

1.3.4 Grounding and Lightning Protection

Electrical Ground

A threaded grounding connector is provided on the front panel for connection to the site ground point (refer to "Overview of Inputs and Outputs" on page 20 for more details).

Lightning Ground

It is extremely important for the security of the site and its equipment that you take adequate precautions against lightning strike. While it is outside the scope of this manual to provide comprehensive information on this subject, we recommend that you conform to your country's standards organization or regulatory body.

1.3.5 Equipment Ventilation

Always ensure there is adequate ventilation around the equipment.

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1.4 Regulatory Information

1.4.1 Distress Frequencies

The 406 to 406.1 MHz frequency range is reserved worldwide for use by Distress Beacons. Do **not** program transmitters to operate in this frequency range.

1.4.2 Compliance Standards

This equipment has been tested and approved to various national and international standards. Refer to "Compliance Standards" on page 37 for a complete list of these standards.

1.4.3 Radio Frequency Emissions Limits in the USA

CFR Title 47 Part 15.19 (a) (1) - Receivers

Part 15 of the FCC Rules imposes RF emission limits on receivers. This radio complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

CFR Title 47 Part 15.19 (a) (3) - All Others

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.

1.4.4 Radio Frequency Emissions Limits in Canada

This device complies with Industry Canada licence exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

1.4.5 Unauthorized Modifications

Any modifications you make to this equipment which are not authorized by Tait may invalidate your compliance authority's approval to operate the equipment.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

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2 Introduction

The TD9300 Data Terminal is an element of the Tait solution for grid automation on electricity distribution networks. It uses its RF capability to connect over the Tait DMR Tier III trunked network to exchange DMR control channel and packet data messages with the Tait SCADA Gateway.

The TD9300 transfers industry-standard SCADA protocols over its RS-232/RS-485 and Ethernet interfaces to allow interconnection to industrial control equipment such as RTUs and IEDs.

The TD9300 can be installed in pole-mounted or other box enclosures (refer to “Installation” on page 15). The operating temperature range is –22°F to +140°F (–30°C to +60°C).

Refer to the System Manual for more information.

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3 Installation

3.1 DIN Rail Mounting

Need kit number & contents.

The TD9300 can be mounted on a standard 35 mm DIN rail using the optional DIN rail adaptor. Ten holes are provided on the bottom of the chassis for mounting this adaptor, using M3 Taptite screws (refer to Figure 3.1 on page 16 and Figure 3.3 on page 18). These holes allow the TD9300 to be mounted flat against the DIN rail. Up to two units may be mounted in this way across a 19 inch rack or cabinet.

Notice Make sure that the mounting rail is strong enough to bear the weight of the TD9300 units without bending, and also rigid enough to prevent excessive vibration of the TD9300 units.

If access to the rear of the TD9300 is restricted when it is installed, it may be difficult to release the latch to remove the unit at a later date. Before mounting the unit, feed a cable tie through the hole in the end of the latch and fasten it into a loop. This may help you to pull the latch open when required.

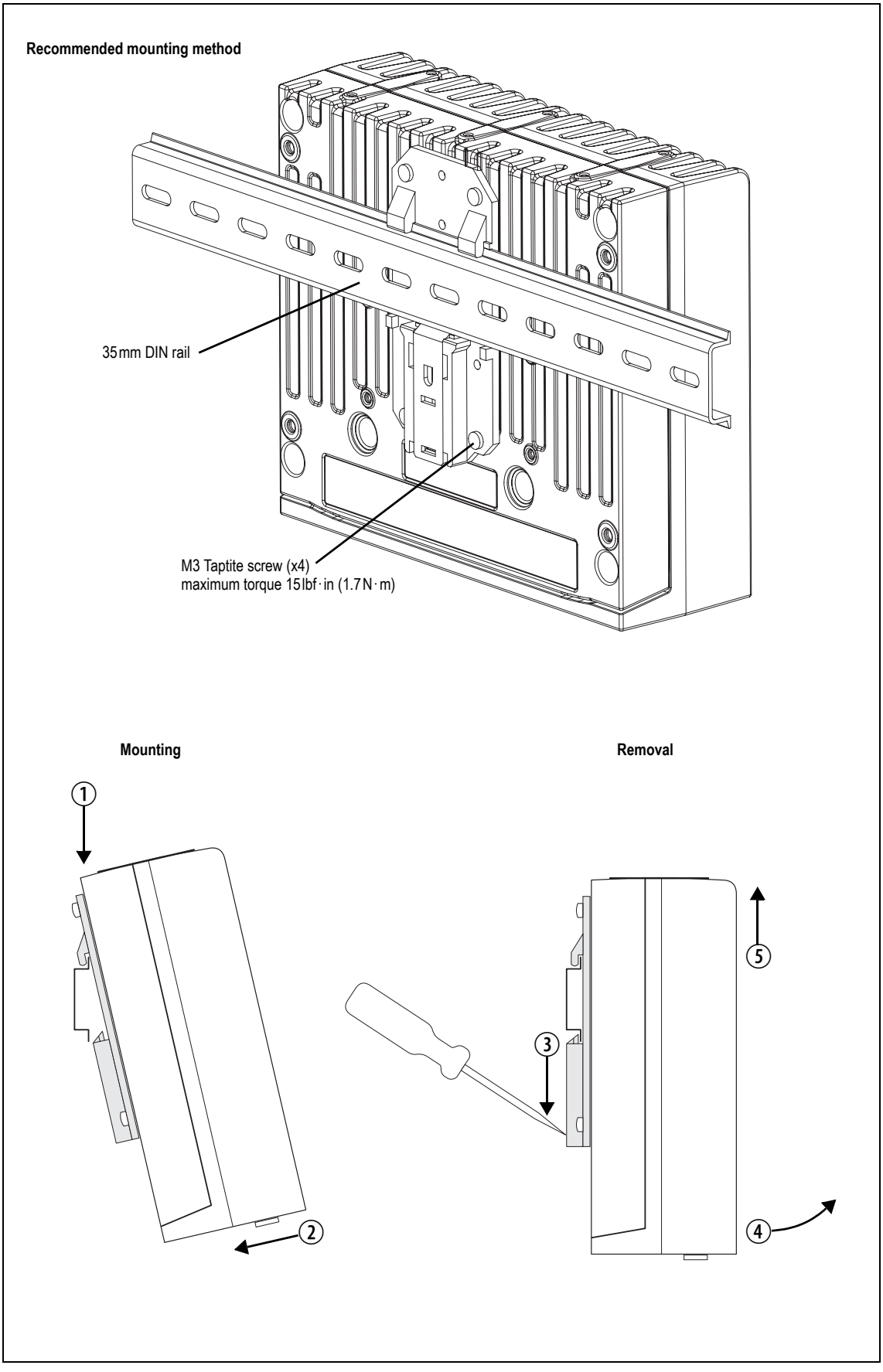
Mounting

1. Mount the DIN rail adaptor to the bottom of the TD9300 as shown, using four M3 Taptite screws. Use a Torx T10 driver. Tighten to a maximum torque of 15 lbf·in (1.7 N·m).
2. Fit the top of the adaptor onto the top of the DIN rail ①.
3. Push the bottom of the adaptor in and down onto the rail until the latch clicks into position ②. Pulling the latch down may make this easier.

Removal

1. Insert a flat-bladed screwdriver into the latch ③. Push the screwdriver down to hold the latch open.
2. Pull the bottom of the adaptor away from the rail first ④, then lift the TD9300 off the rail ⑤.

Figure 3.1 DIN rail mounting



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3.2 Flat Mounting

Need kit number & contents.

The TD9300 can also be mounted directly on a flat surface using the optional mounting brackets (refer to Figure 3.2). Four holes are provided on the bottom of the chassis for securing these brackets with the M4x12 Taptite screws supplied with the TD9300. Tighten to a maximum torque of 22 lbf·in (2.5 N·m).

If a different mounting method is required, the measurements for these mounting holes are provided in Figure 3.3 on page 18.

Figure 3.2 Flat mounting

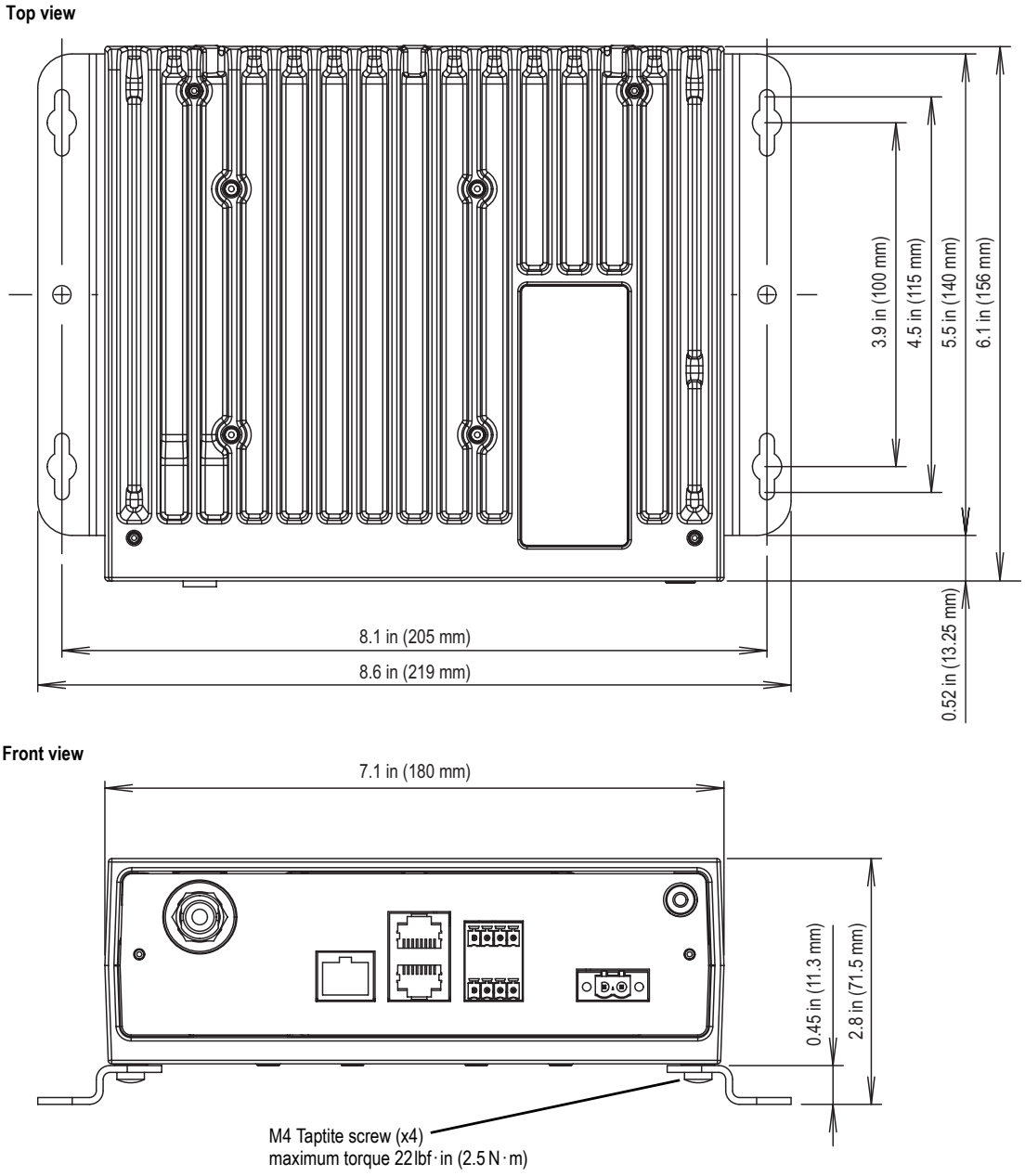

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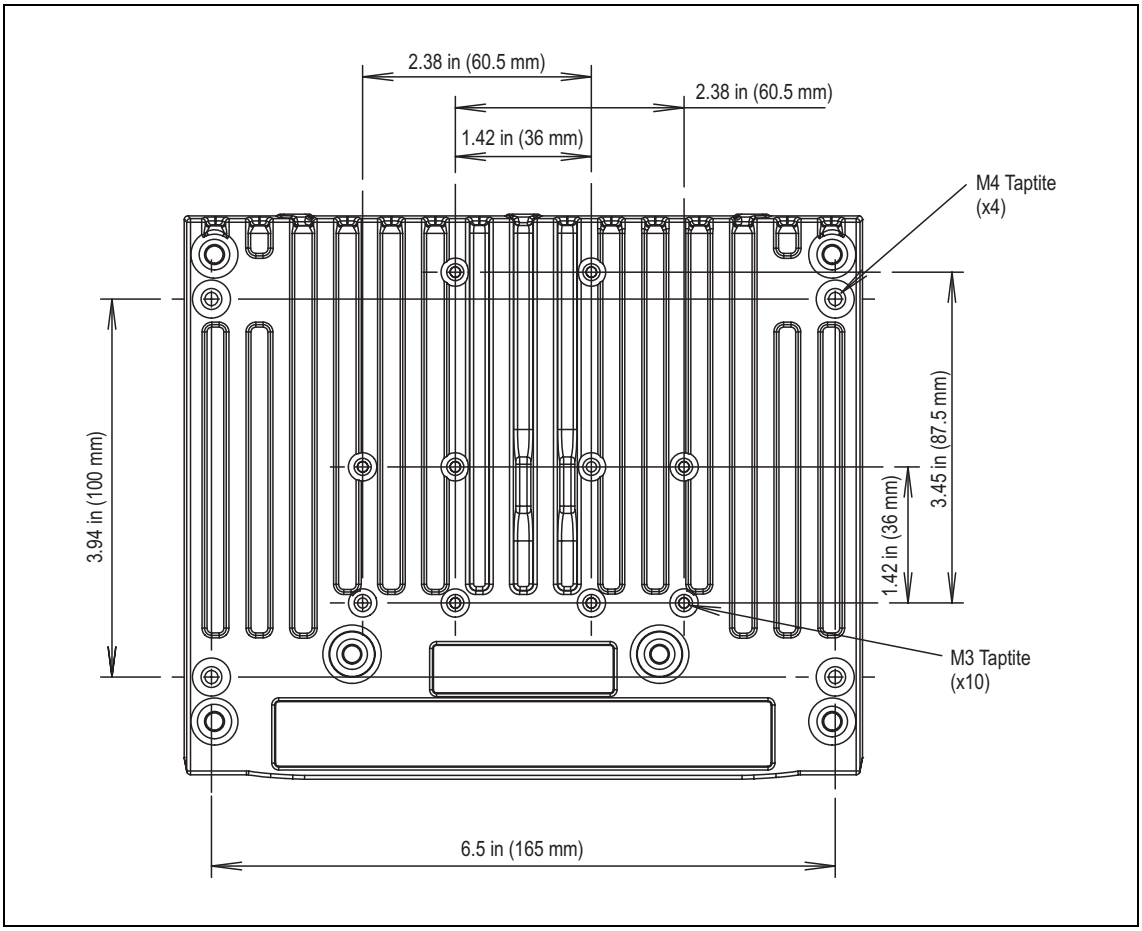
Figure 3.3 Location of mounting holes in the chassis



3.3 Taptite Screws

The mounting holes provided in the chassis of the TD9300 (as shown in Figure 3.3) are designed for use with trilobular thread-rolling screws, such as Taptite. Tait recommends using the Taptite screws provided with the equipment to mount the TD9300. Using any other type of screw may damage the chassis, or may cause the TD9300 to be mounted insecurely.

3.4 IP Rating

The TD9300 has an IP40 rating when mounted in any orientation. It also has an IP51 rating (dust category 2) when mounted with the front panel connectors facing down.

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4 Connection

This chapter provides detailed information on connecting the various inputs and outputs on the front panel.

Notice With the exception of the RF cable, all cables connected to the TD9300 must be less than 10 ft (3 m) in length.

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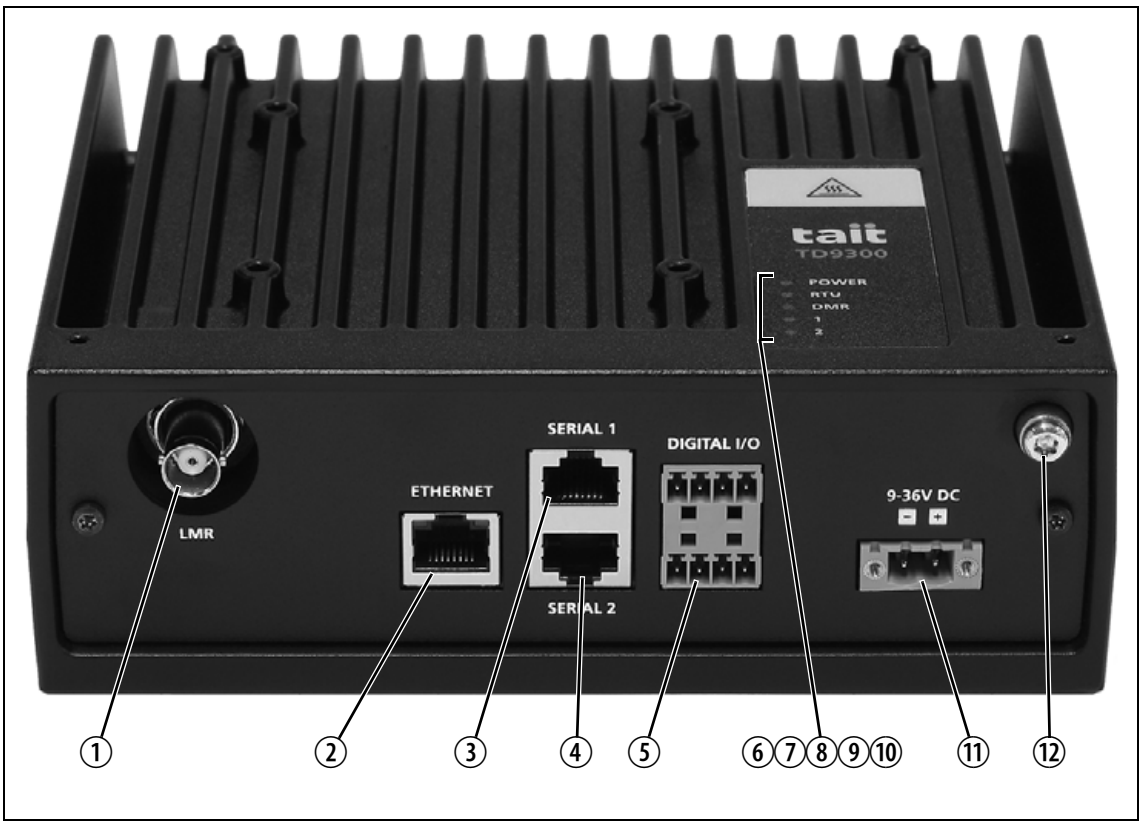
4.1 Overview of Inputs and Outputs

Refer to "Interface Pin Allocations" on page 22 for the pin allocations of the front panel connectors.

Figure 4.1 Front panel connections and indicator LEDs



①	RF connector	LMR RF input and output.
②	Ethernet	The Ethernet interface is used to connect the TD9300 to the RTU/IED or to the network. It is also used to configure the TD9300 via a web browser. It is a 10BASE-T or 100BASE-T connection. The green link speed LED indicates the negotiated link speed. The LED is lit when the link speed is 100BASE-T. The amber link status and activity LED is lit when the link is active, and flashes when activity is present.
③	Serial RS-232/RS-485	Serial RS-232/RS-485 connection 1 is used to connect to an RTU/IED.
④	Serial RS-232/RS-485	Serial RS-232/RS-485 connection 2 is used to connect to a remote console.
⑤	Digital inputs/outputs	This connector provides two digital inputs and two digital outputs.

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⑥ Power LED	The green power LED is lit when power is connected to the TD9300.
⑦ RTU Status LED	The green RTU status LED is lit when the RTU is linked to the TD9300.
⑧ DMR LED	The green DMR LED is lit when the TD9300 is registered on the DMR network.
⑨ 1 LED	Reserved for future use.
⑩ 2 LED	Reserved for future use.
⑪ DC input	Connect a 9–36 VDC power supply to this input using the supplied connector. The maximum current drawn by the TD9300 is 4.5 A at 24 VDC when transmitting at 25 W. Refer to "Connecting DC Power" on page 23 for more information.
⑫ Ground	M4 chassis ground connector. An M4x10 mm screw and washers are supplied with the unit.

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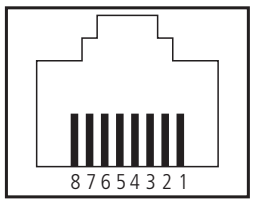
4.2 Interface Pin Allocations

Refer to "Specifications" on page 35 for more information on these connectors.

Ethernet Connector

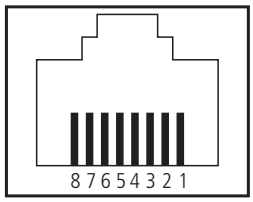


external view

Pin	Description
1	transmit data +
2	transmit data –
3	receive data +
4	not connected
5	not connected
6	receive data –
7	not connected
8	not connected

Serial Connectors

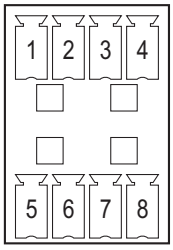
serial 1 shown



external view

Pin	Description
1	not connected
2	not connected
3	not connected
4	ground
5	receive data output
6	transmit data input
7	clear to send output
8	request to send input

Digital Input/Output Connector



external view

Pin	Description
1	input 1 A
2	input 1 B
3	input 2 A
4	input 2 B
5	output 1 A
6	output 1 B
7	output 2 A
8	output 2 B

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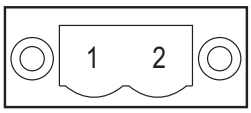
4.3 Connecting DC Power

The TD9300 is designed to accept an input of 9–36 VDC (12 or 24 VDC nominal) with negative ground. You must connect the DC supply to the TD9300 via a fuse or circuit breaker with a minimum rating of 15 A.

The minimum recommended gauge of the DC supply leads to the front panel DC input is 18AWG.

The pin allocations for the DC input on the TD9300 are given in the following table.

	Pin	Description
 external view	1	–V input
	2	+V input

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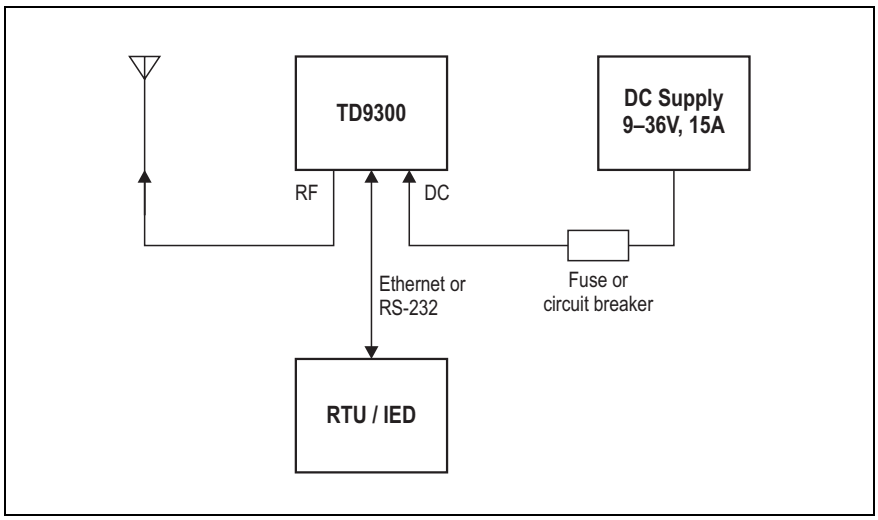
4.4 System Connections

Figure 4.2 below shows an example of the basic system connections when a TD9300 is used with an RTU or IED.

Figure 4.2 Example system connection



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5 Getting Started

5.1 Confirming Operation

The LEDs on the front and top panels will indicate that the TD9300 is operating correctly.

1. Connect power to the TD9300.
2. Check that the LEDs indicate normal operation, as described below.

LED	Color	State	
Power	green	off steady	power is not connected to the TD9300 power is connected to the TD9300
RTU status	green	off steady	the RTU is not linked to the TD9300 the RTU is linked to the TD9300
DMR	green	off steady	the TD9300 is not registered on the DMR network the TD9300 is registered on the DMR network
1	reserved for future use		
2	reserved for future use		
Ethernet link speed	green	off steady	10BASE-T 100BASE-T
Ethernet link status/ activity	amber	steady flashing	link connected activity present

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6 Configuration

6.1 Accessing the Console

You can access the TD9300 console either by connecting through the Ethernet port using SSH-over-IP, or by connecting through the “SERIAL 2” port using SSH-over-serial.

When using the serial connection, configure the serial port as follows:

- 115200 baud rate
- 8 data bit
- 1 bit stop
- no parity

Use the following default username and password for SSH access to the TD9300:

- Username: *root*
- Password: *k1w1*

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6.2 Configuring the Ethernet Port

Does the TD9300 have a default IP address? Will the customer be able to do this through the UI?

You can configure IP settings for the TD9300 by connecting through “SERIAL 2”, or the Ethernet port if the IP address is known.

To configure IP settings for the TD9300, complete the following steps:

1. Connect to the TD9300 console either through “SERIAL 2”, or through the Ethernet port (if the configured IP address is known)
2. Modify the IP address and CIDR Subnet Mask of the Ethernet port by entering the following command:

   td-config ip = <TD9300-ip-address/CIDR-Subnet-Mask>

   Example: *td-config ip = 192.168.1.1*
3. Restart the Ethernet port by entering the following command:

   /etc/init.d/networking restart
4. Verify the Ethernet port configuration by connecting a host to the ethernet port and either pinging the TD9300, or using PuTTY to SSH in.

   ping <TD9300-ip-address>

   Example: *ping 192.168.1.1*

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6.3 Address and Protocol Configuration Settings

Addressing and protocol settings need to be configured in the TD9300 *vi dataterminal.cfg* file. This section outlines the process for configuring addressing and protocol settings, and also describes the parameters that can be configured.

To configure the addressing and protocol settings complete the following steps:

1. Log on to the TD9300 via the Ethernet port, “SERIAL 2”, or SCADA Gateway using SSH.

   Username: *root*
   Password: *k1w1*

If configuring over-the-air, only minor changes are recommended

2. Edit the *vi dataterminal.cfg* file and set the desired parameters. The example provided below shows parameters that should be set (if DNP3 protocol is used):

   CommsServer.Addr: 001/0100
   Scada.Protocol: DNP3
   Dnp.Local: 101
   Dnp.Remote: 100
   LogLevel: 0x001f
   LogDirName: logs
   Scada.RtuUrl: tcp://192.168.1.1:20000
   Device.Parity: 0
   IP.Mode: routed
   IP.Remote:ip://172.29.0.200,172.29.0.210

3. If any routing rules have been changed, they will need to be flushed by executing the following command:

   ip tun del glp0

4. Restart the TD9300 by executing the following command:

   /etc/init.d/dataterminal restart

Every time the TD9300 configuration is changed, the TD9300 must be restarted before the changes will take effect.

Please carefully check the parameter list below.

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Table 6.1 Data Terminal Parameters

Parameter	Description	Default
LogLevel	A bit field with each bit representing the following: 0. Error (Serious errors that may compromise performance) 1. Warning (Errors that we can recover from) 2. Notice (Important events such as startup/ shutdown) 3. Debug (Show the flow of the program, state changes, messages received and transmitted) 4. Fine (Finer grained debug information) 5. COMPORT 6. HTTP (not used at pressent) 7. MAP27 link layer debug info	0x07 (Error, Warning and Notice)
GLPResponseDelay	The time (ms) between receiving an incoming GLP message from the GL comms server and transmitting a response. This delay is used to allow the incoming message to be delivered to the SCADA device and for it to send a response.	
CommsServer.Addr	MPT1327 address of the SCADA master	
CommsServer.Password		
IP.Remote	Specifies all subnets and/or IPs that will have constituent IPs routed over the network. On the Comms Server this will be the subnets that the RTUs are in, on the TD9300 this will be the subnets over the SCADA Control Servers. Subnets must be canonical CIDR subnets, that is, the host portion must be all zero. For example: *ip://172.16.32.0/19,10.1.8.0/24*	
IP.Local	Specifies an IP and subnet to be used locally. If you want to reach this TD9300 over the network you can specify an IP here to have it applied to *eth0* at run time. This will also be used as the source address for reply packets from this box back to the other end of the link. If the local devices (RTUs or control servers) are not already in the local link of the configured IP, you should add an ip/net here that allows us to reach them on the local link. *ip://<cidr-subnet>* For example: *ip://192.168.3.88/24*	

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Table 6.1 Data Terminal Parameters

Parameter	Description	Default
GLP.Compression	If set to 1, GPL messages are compressed before transmission.	1
Map27.Url	The connection address for the MAP27 link has one of the following forms: *tcp://[ip address]:[port address]*: (the port address can be omitted and will default to 20000) *serial://[device name]:[speed]*: (the speed can be omitted and will default to 19200)	
Map27.WdogThreshold	This is a watchdog which monitors the per-minute state updates. If it sees we have no service for this number of times in a row, it resets the radio.	3
Map27.Mode	ascii or binary	ascii
Scada.Keepalive	This causes link messages to be sent to detect a failed connection to the RTU. Currently implemented in DNP, IEC101, IEC104/101, but not IEC104 modes. This setting is the number of seconds between keepalive messages. After 4 messages without response, the connection is marked as broken.	10
Scada.RtuUrl	The connection address for the SCADA device. Has one of the following forms: *tcp://[ip address]:[port address]*: (the port address can be omitted and will default to 20000) *udp://[ip address]:[port address]*: (the port address can be omitted and will default to 20000) *listen://[port number]* *serial://[device name]:[speed]*: (the speed can be omitted and will default to 20000)	
Scada.Protocol	The SCADA protocol to be used. Either: DNP3 IEC101 IEC104 IEC101to104	
Scada.Protocol.Analyse	Used by the IEC protocols to indicate whether protocol messages should be analysed (stdout only)	false

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Table 6.1 Data Terminal Parameters

Parameter	Description	Default
Scada.Protocol.IEC101.Balanced	This must be set to the mode of the RTU. Used in analyser, and to know what sort of keepalive messages to send.	false
Scada.Protocol.IEC101.LinkOctets	This must be set to the link address size of the RTU. Used in analyser, but also to know what keepalive messages to send.	0
Scada.Protocol.IEC101.LinkAddress	This must be set to the link address of the RTU. Used in analyser, but also to know what keepalive messages to send.	0
Scada.Protocol.IEC101to104.LocalPollRate	For Unbalanced 101/104 conversion mode only. How often in milliseconds a periodic Class 2 poll is sent to the RTU.	500
Dnp.Remote	The DNP address of the SCADA master.	
Dnp.Local	The DNP address of the SCADA device.	
DiscardMessageTimeout	The time (ms) that an outbound SCADA mesage is kept before deletion.	20000
CallBackstopTimeout	The time (ms) that an inactive call is kept going before it is closed down.	60000
StatusCallRetryTime	If a status call fails (gets a negative ack), wait this time (in ms) before retrying.	20000
InactivityTimeout	The number of ms we will wait before resetting the radio. This timer is automatically reset every time we receive DMR packet data.	300000 (5mins)
Rate	Used to select the rate of DMR packet data: 50 (1/2 rate) 75 (3/4 rate) 100 (Full rate)	100
Confirmed	Used to select whether transmission of DMR packet data is confirmed or not. u c	c
TestMode		

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6.4 Upgrading the LMR Radio Board

To upgrade either the database or firmware for the TD9300 LMR radio board, complete the following steps:

1. Open a secure shell session with the TD9300 through “SERIAL 2” (using a TD9300 programming cable), or connect via the Ethernet port using PuTTY or a similar application.
2. Execute using the following command:

   .portmonitor.py
3. Connect the TD9300 programming cable to “SERIAL 1”.
4. Open and use the standard 9300 programming application as normal.
5. Perform firmware upgrades and database upgrades as normal.
6. Reconnect through “SERIAL 2” and terminate the port router script on the shell session by pressing ctrl+c.

6.5 Programming the LMR Radio Board

The radio board must be configured with network and addressing parameters that are compatible with the DMR network and fleet plan.

Configure the following fields as shown:

RAP Port

Select Global Features > Serial Protocol form > RAP

- RAP Enabled - Enabled
- RAP Port - Mic
- Baud Rate - 115200
- Link Layer Type - ASCII

Hunting Parameters

Select Trunked Features > Network Settings > Hunting Params form > Common

- Background Hunt - Disabled
- Comprehensive Hunt - Enabled
- Auto Register at Power On - Enabled
- Vote Now Operation - Disabled

For more information on these fields see the 9300 programming application Help.

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6.6 Upgrading the Main Board

To upgrade the firmware for the main board you will need physical access to the terminal. The following steps outline the firmware upgrade process:

1. Download the latest firmware from the Tait Technical Support website and save a copy to the PC you plan to use for the upgrade

2. Using an ethernet cable, connect your PC to the TD9300 terminal and securely copy the firmware onto the TD9300. To do this, use an SCP application (e.g PSCP or WinSCP) and execute the following command:

   *"C:\Program Files (x86)\PuTTY\pscp.exe" -scp <firmware-file-name>root@<dataterminal-ip-address>/firmware**

3. Use SSH to log on to the TD9300 as the root user
   - Username: *root*
   - Password: *k1w1*

   Once logged in, execute the following command:

   cd/firmware
   tar xvf <firmware-filename>
   ./install.sh

*Replace the fullpath to PuTTY ("<*C:\path*>") to match your PuTTY executable location.

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7 Specifications

This chapter provides general and physical specifications for the TD9300. Since the TD9300's RF capability is provided by a TM9300 RF board, refer to the TM9300 Specifications Manual (MMB-00005-xx) for RF performance specifications.

The performance figures given in these specifications are minimum figures, unless otherwise indicated (e.g. "typical"), for equipment operating at standard room temperature (+71.6°F to +82.4°F [+22°C to +28°C]) and standard test voltage (24VDC).

You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait.

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General

Supply Voltage	
Operating Voltage	9VDC to 36VDC
Standard Test Voltage	24VDC
Polarity	negative earth
Polarity Protection	active isolation (rated to –36VDC)
Supply Current (at 24VDC)	4.5A at 25W output power
Operating Temperature Range	–22°F to +140°F (–30°C to +60°C) ambient temperature
Dimensions	
Height	2.4in (61mm)
Width	7.1in (180mm)
Length	6.1in (156mm)
Weight	4.2lb (1.9kg)

Serial Ports

Port Type	DCE (Tx, Rx, CTS, RTS)
Signal Levels	RS-232 and RS-485 compatible
Format	8 bit ASCII, 1 stop bit, no parity
Baud Rate	1200 to 115,200 bps

Ethernet Interface

Transceiver	10/100Base-T
Indicator LEDs	
Green	speed
Orange	link/activity

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Digital Inputs and Outputs

Digital Inputs

Input Voltage Range	5–50 VDC
Input Current	10 mA
Input Low Threshold	$V_{IL} \geq 1.0$ V
Input High Threshold	$V_{IH} \leq 3.5$ V
Input Source Current	$I_{IL} > -1$ mA ($V_{IL} = 0$ V)
Continuous Input Voltage	$\lvert V_{IN} \rvert \leq 30$ V
Transient Input Voltage	$\lvert V_{IN} \rvert \leq 50$ V ($t \leq 1$s)

Digital Outputs

Output Voltage Range	5–50 VDC
Output Current	100 mA
Relay Interface	NO/NC
Output Low Voltage	$V_{OL} \leq 0.6$ V ($I_{OL} = 250$ mA)
Output High Voltage	$V_{OH} \geq 3.5$ V [TTL and 5V CMOS compatible] ($I_{OH} = -100$ µA)
Maximum Off-state Voltage	$-0.3\text{V} \leq V_{OH} \leq 30$ V (transients outside this range may be clamped)
Off-state Leakage Current	$I_{OH} \leq 6$ mA ($V_{OH} = 30$V, pulled up through an external load)

Compliance Standards

Where applicable, this equipment has been tested and approved to the following standards.

EMC	EN 301 489-1 EN 301 489-5 EN 300 113 CFR Title 47 Part 15 RSS-119 ICES-003 AS/NZS 4768
Safety	EN 60950-1 ANSI/UL 60950-1 CAN/CSA-C22 60950-1-07
Ingress Protection	IP40 - all orientations IP51 (dust category 2) - front panel connectors facing down

Environmental

Low Pressure (Altitude)	MIL-STD-810G 500.5 Proc 2
Humidity	MIL-STD-810G 507.5 Proc 2
Vibration	MIL-STD-810G 514.6 Proc 1
Shock	MIL-STD-810G 516.6 Proc 1

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