WOODWARD

Product Manual 26612
(Revision C, 7/2016)
Original Instructions

RTN Gateway

Control Part Numbers 8200-1250, 8200-1252, & 8200-1253

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Manual 26612

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Important Definitions

This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** - Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.
- **WARNING -** Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.
- **CAUTION** - Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.
- **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT -** Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Regulatory Compliance

European Compliance for CE Marking:
These listings are limited only to those units bearing the CE Marking.

EMC Directive: Declared to Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)

ATEX – Potentially Explosive Atmospheres Directive: Directive 2014/34/EU on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres
Zone 2, Category 3, Group II G, Ex nA IIC T4 X Gc IP20

North American Compliance:
These listings are limited only to those units bearing the CSA identification.

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, & D, T4 at 70 °C surrounding air temperature. For use in Canada and the United States. CSA Certificate 70006135

This Product is certified as a component for use in other equipment. The final combination is subject to acceptance by the authority have jurisdiction or local inspection.

Marine Compliance:

DNV-GL: Temperature Class B, Humidity Class B, Vibration Class A, EMC Class A. Required protection according to the Rules to be provided upon installation on board.

Special Conditions for Safe Use:
This equipment is intended to be installed in a metal cabinet or enclosure to provide protection against the entry of dust or water and to protect against mechanical impact.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D per CSA for Canada and US or non-hazardous locations only The product has been certified as open type equipment to be installed in the enclosure of the final application and the final installation is subjected to the local authority having jurisdiction as listed on the CSA certificate.

This equipment is suitable for use in European Zone 2, Group IIC environments when installed in an IP-54 minimum rated enclosure per self-declaration to EN 60079-15. The interior of the enclosure shall not be accessible without the use of a tool.

ATEX Explosive Atmosphere locations require the enclosure be coded
Ex nA or *Ex e* and provide a minimum ingress protection IP54 per IEC 60529.

For ATEX compliance, this equipment must be protected externally against transient disturbances. Provisions shall be made to prevent the power input from being exceeded by transient disturbances of 119 V_{PEAK}.

Wiring must be in accordance with North American Class I, Division 2, (CEC and NEC) or European Zone 2, Category 3 wiring methods as applicable, and in accordance with the authority having jurisdiction.

A fixed wiring installation is required in accordance with the Local Inspection Authority. A switch or circuit breaker shall be included in the building installation that is in close proximity to the equipment and within easy reach of the operator and that is clearly marked as the disconnecting device for the equipment. The switch or circuit breaker shall not interrupt the protective earth conductor.

Do not connect more than one RTN Gateway to any one fuse or circuit breaker.

Protective Earth Grounding is required by the input PE terminal (see Chapter 5, Installation).

For Communications wires, use wires with a temperature rating of at least 5 °C above surrounding ambient. All others use wires with a temperature rating of at least 10 °C above surrounding ambient.

The RTN Gateway contains a single-cell primary battery suitable for the life of the product. This battery is not to be charged and is not customer replaceable. If real-time clock functionality is interrupted, contact your Woodward representative.

The RTN Gateway shall not be installed in areas exceeding Pollution Degree 2 as defined in 60664-1.

The risk of electrostatic discharge is reduced by permanent installation of the RTN Gateway and proper connection of the equipotential ground lugs, and care when cleaning. Verify that the area is non-hazardous prior to the device being cleaned or wiped off.

Unmarked inputs are classified as permanently connected IEC measurement Category I. To avoid the danger of electric shock, do not use inputs to make measurements within measurement categories II, III, or IV. See individual inputs for additional information on transient overvoltage input ratings.

⚠WARNING

Explosion Hazard

EXPLOSION HAZARD Due to the Hazardous Location Listings associated with this product, proper wire type and wiring practices are critical to the operation.

⚠WARNING

Explosion Hazard

ENCLOSURE REQUIREMENT –
ATEX/IECEx Zone 2, Category 3G applications require the final installation location provide a minimum IP54 ingress protection enclosure against dust and water per IEC 60529. The enclosure must be coded Ex nA or Ex e.

⚠WARNING

Explosion Hazard

MOUNTING –
The control must be mounted in a vertical position inside the enclosure. The installer shall ensure the maximum surrounding air temperature of the control must not exceed +70 °C at the final location.

⚠WARNING

Explosion Hazard

Do not remove covers or connect/disconnect electrical connectors unless power has been switched off and the area is known to be non-hazardous.

⚠WARNING

Explosion Hazard

Substitution of components may impair suitability for Class 1, Division 2 or Zone 2.

⚠WARNING

Explosion Hazard

The external ground lugs shown on the installations drawing must be properly connected to ensure equipotential bonding. This will reduce the risk of electrostatic discharge in an explosive atmosphere. Cleaning by hand or water spray must be performed while the area is known to be non-hazardous to prevent an electrostatic discharge in an explosive atmosphere.

⚠WARNING

Explosion Hazard

Do not use test points on the power supply or control board unless the area is known to be non-hazardous.

⚠WARNING

Explosion Hazard

Do not make adjustments to the IP address DIP switch on the CAN board unless the area is known to be non-hazardous.

⚠AVERTISSEMENT

Risque d'explosion

Ne pas enlever les couvercles, ni raccorder / débrancher les prises électriques, sans vous en assurez auparavant que le système a bien été mis hors tension; ou que vous situez bien dans une zone non explosive.

⚠AVERTISSEMENT

Risque d'explosion

La substitution de composants peut render ce matériel inacceptable pour les emplacements de Classe I, Division 2 et/ou Zone 2.

⚠AVERTISSEMENT

Risque d'explosion

Ne pas utiliser les bornes d'essai du block d'alimentation ou des cartes des commande à moins de se trouver dans un emplacement non dangereux.

⚠CAUTION

Emergency Disconnecting Service

An emergency switch or circuit breaker shall be included in the building installation that is in close proximity to the equipment and within easy reach of the operator. The switch or circuit breaker shall be clearly marked as the disconnecting device for the equipment. The switch or circuit breaker shall not interrupt the Protective Earth (PE) conductor.

⚠CAUTION

Risk of Calibration and Checkout

The calibration and checkout procedure should only be performed by authorized personnel knowledgeable of the risks posed by live electrical equipment.

⚠CAUTION

Fuse Power Supply Mains

The power supply MAINS should be properly fused according to the NEC/CEC or authority having final jurisdiction per the Input Power Specifications.

IMPORTANT

The Intelligent Gateway is designed for installation in a standard metal cabinet or enclosure. If the cabinet door is open or the Intelligent Gateway is not installed in a metal cabinet, some degraded performance in the presence of radio wave energy may occur. Radio wave energy may be from transmitters such as cell phones or push to talk radios in very close proximity. The unit is designed not to be affected when the transmitter is more than 1.0 to 1.5 m away when keyed.

It is recommended that operation of such radio wave devices be kept more than 1.5 m (5 ft.) from the Intelligent Gateway control. Installation of the Intelligent Gateway in a metal enclosure, as intended, will also prevent performance degradation.


Both direct and alternating current


Alternating current


Direct current


Caution, risk of electrical shock


Caution, refer to accompanying documents


Protective conductor terminal


Frame or chassis terminal

Chapter 1.
General Information

Introduction

This manual describes the Woodward RTN (Real-Time Network) Gateway. It provides a variety of useful information for the user ranging from simple basic descriptions to detailed information on wiring, specifications, and functionality. Included are:

- General information on the RTN Gateway
- A physical description of the control hardware
- Information on RTN Gateway communications and distributed I/O interfaces
- Installation and maintenance
- Troubleshooting information
- For information on programming, networking, and communication protocols, refer to the software manual provided with the control.

RTN Gateway Description

The RTN Gateway is a real-time 10-network CAN communication system designed to expand the number of CAN networks and CAN modules that a single MicroNet Plus system can control. The RTN Gateway allows control of up to 100 CAN modules depending on the rate group (the update time) and the types of modules. The Gateway communicates to the MicroNet Plus CPU via its redundant RTN (Real-Time Network) connections. These communication connections can also be extended with Ethernet switches, allowing the gateway to be connected to redundant MicroNet CPU modules. A fiber optic Ethernet switch may be used so that the RTN Gateway may be placed closer to the CAN control modules and further from the MicroNet reducing the cost and complication of long CAN cable runs. Fiber optics will allow the distance between MicroNet CPUs and Gateway/Modules units to be up to 2 km (1.2 miles).

An addressing DIP switch on the side of the Gateway allows up to 7 RTN Gateways installed with a single MicroNet system. The RTN Gateway can be configured in a redundant system, such that communication interfaces are duplicated by two RTN Gateways. CAN networks can be redundant from a single Gateway for redundant CAN module configurations.

The RTN Gateway is only compatible with CyberSecure MicroNet Plus systems.

System Requirements:

- MicroNet Plus CyberSecure CPU Module
- GAP software version 3.04 or higher
- Coder software version 6.00 or higher

Table 1-1. CAN Network Compatibility

RTCnet Modules*	LINKnet-HT Modules	Woodward Valves	CANopen Devices
Only Real-Time Network Connections	Woodward valves are recommended to be on their own network. LINKnet HT and other CANopen devices can share networks.		
* Modules/Devices configured as Real-Time cannot share a CAN network with devices configured as non-real-time.			

Table 1-2. Gateway Compatibility

Module Description	Available for RTCnet series (Real-Time Control)	Available for LINKnet-HT series
RTD (8 channel)	X	X
AIO (8AI 4–20 mA, 2AO)	X	X
AIO (8AI 4–20 mA, 2AO 4–20 mA)	X	
DIN (16 channel)	X	X
DOUT (16 channel)	X	X
T/C (8 channel)	X	X
T/C HI ACCURACY (8 channel)	X	

Woodward's GAP Graphical Application Program is how Application programming is accomplished. GAP is a pictures-to-code system that provides a high-level programming environment for users who have control expertise but do not have specific programming skills.

The control runs on low-voltage DC power (18–32 Vdc). RTN Gateway field wiring is accomplished via terminal blocks that plug into the module ports.

Chapter 2.
Control Overview

RTN Gateway Sample Configurations

MicroNet Plus Distributed I/O
- Single CPU, Single GW, Simplex Nodes

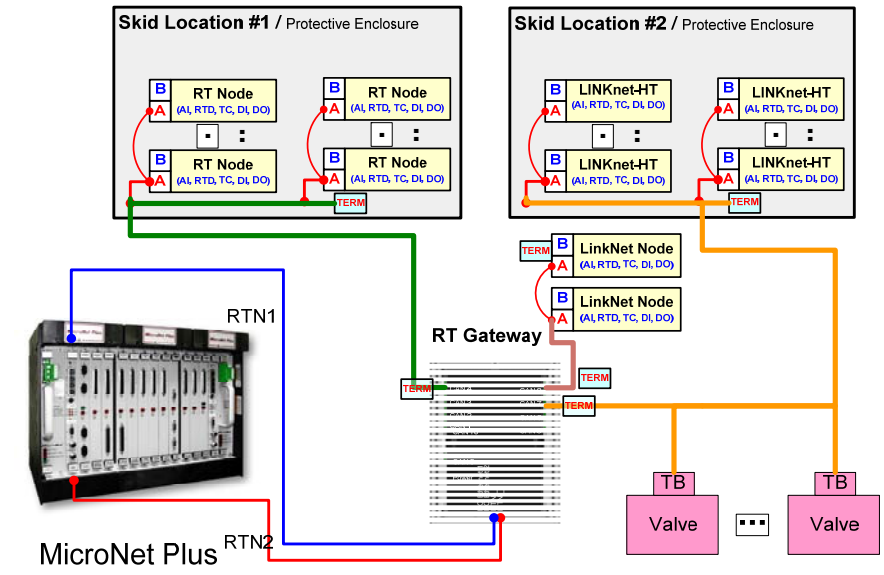


Figure 2-1. RTN Distributed I/O Single CPU, Single GW Simplex Nodes

MicroNet Plus Distributed I/O
- Dual CPU's, Single GW, Simplex Nodes

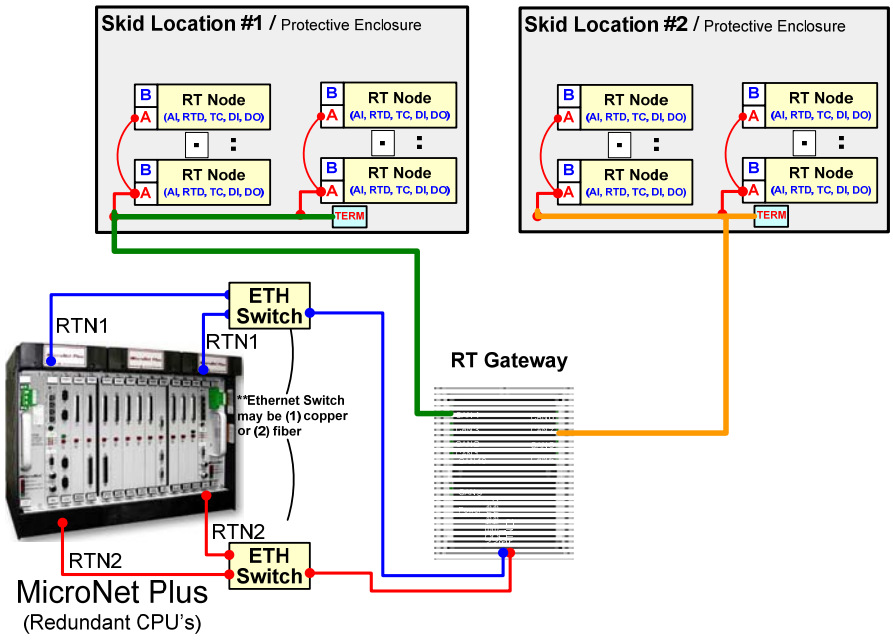


Figure 2-2. RTN Distributed I/O Dual CPUs, Single GW Simplex Nodes

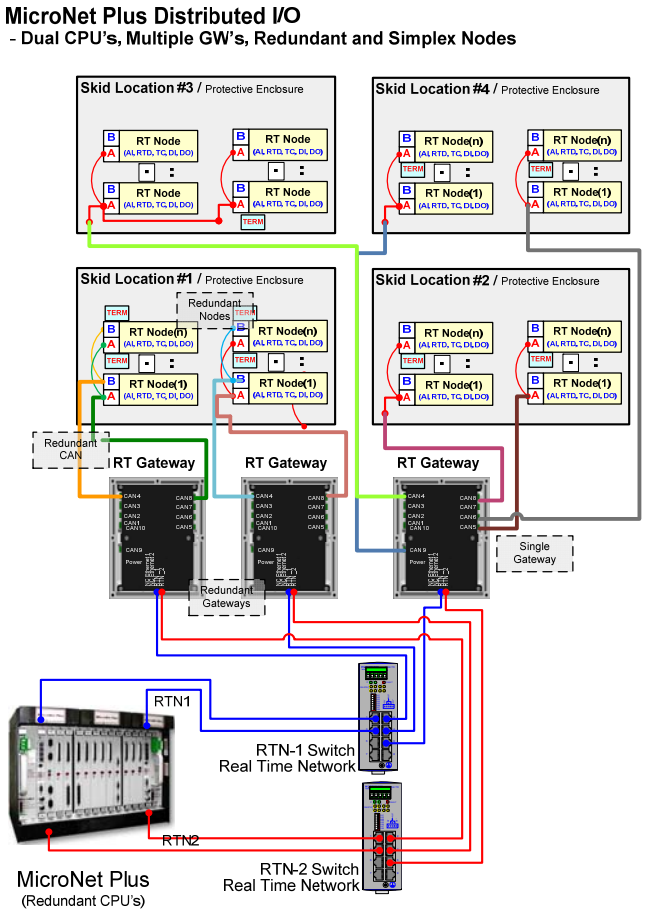


Figure 2-3. RTN Distributed I/O Dual CPU's, Multiple GW's Simplex Nodes

This configuration shows redundant MicroNet Plus CPUs connected to redundant RTN Gateways and to redundant critical control nodes. Additionally, the redundant MicroNet Plus CPUs communicate to a single Gateway, which communicates with several nodes over several CAN networks.

The gateway has 10 independent CAN networks. Networks 1-4, 5-8, and 9-10 use three separate processing units (see Figure 2-1). Therefore, in a redundant node configuration, it is recommended to utilize CAN networks from different processing units to increase reliability.

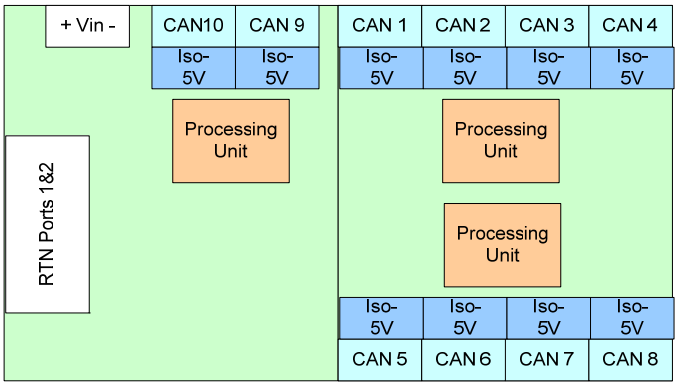


Figure 2-4. GW CAN Port Internal Configuration

The RTN Gateway utilizes the two redundant Real-Time Networks from the MicroNet Plus CyberSecure CPU (the Gateway will operate with a single Real-Time Network connection but this is not a recommended configuration). The Gateway distributes data between this real-time control network and 10 CAN communication networks. Up to seven RTN Gateways can be addressed in one MicroNet system.

The number of CAN modules and their data update rate on the CAN networks depends on the rate group configured in the GAP software.

The Gateway CAN networks can be configured to update node data in any combination of 10 ms, 20 ms, 40 ms, 80 ms, 160 ms (depending on node type and baud rate).

The Gateway is compatible with Woodward RTCnet and LINKnet-HT node modules listed in Table 1-1. The Gateway is compatible with Woodward valves and CANopen devices.

The Woodward network configuration tool provides a means of network configuration within allowed constraints. Woodward's GAP software provides the means to add distributed real-time CAN networks to a MicroNet Plus control system via the Gateway.

Chapter 3. Specifications

Environmental Specifications

Operating Temperature
The RTN Gateway Control Platform operates in a specified ambient temperature of –40 to +70 °C (–4 to +158 °F).

NOTICE **Continuous operation with insufficient airflow or higher operating temperatures will lead to reduced reliability and possible damage to the control.**

Storage Temperature
The RTN Gateway Control Platform is designed to be stored without applied power at the temperature range of –40 to +85 °C (–40 to +185 °F).

High-temperature and high-humidity environments adversely affect component life. Recommend room temperature storage for long life. If the unit is to be stored for an extended period, apply operating power at least for one hour every 18 to 24 months.

Shock
The RTN Gateway was designed to meet the shock requirements specified by US MIL-STD-810F procedure 516.5, procedure 1 (40 G, 11 ms duration sawtooth pulse).

Vibration (with Isolator Kit P/N 8923-0382)
10–2000 Hz @ 0.04 G^2/Hz, 8.2 Grms for a period of 1.5 h/axis

Vibration (Hard Mounted)
10–500 Hz @ 0.015 G^2/Hz, 1.04 Grms for a period of 2 h/axis

Audible Noise Emission
The RTN Gateway does not emit an audible noise.

Enclosure Protection
In order to meet Zone 2 European Group IIC, the RTN Gateway must be mounted in an enclosure that meets or exceeds IP54 meeting the construction requirements of IEC 60079-15.

In order to ensure performance well within the EMC requirements for all configurations of RTN Gateway, the single or multiple RTN Gateway configuration must be mounted in a metal enclosure, with the enclosure grounded and cabling & installation recommendations followed.

Altitude
The RTN Gateway is designed to operate up to 3000 m / 9800 feet.

Weight
The RTN Gateway weighs 4.3 kg (9.5 lb).

Electromagnetic Compatibility (EMC)

The unit complies with the requirements of EN 61000-6-4 & EN 61000-6-2 per:

EN 61000-6-4 RF Emissions:

- Radiated Electromagnetic Emissions 30 MHz to 3000 MHz tested per CISPR 16
- Distributed Telecom Port Conducted RF Emissions Limits on RTN & CAN port cable shields 0.150 MHz to 30 MHz per CISPR 16

EN 61000-6-2 Immunity:

- Electrostatic Discharge (ESD) immunity to ±6 kV Contact and ±8 kV Air (arc) per IEC 61000-4-2, Except I/O pins
- Package & Handling and Operational Electrostatic Discharge (ESD) immunity to ±2 kV Contact to I/O pins
- Radiated RF Immunity to 10 V/m, 80 to 3000 MHz, per IEC 61000-4-3
- Electrical Fast Transients (EFT) Immunity to ±2.0 kV, 5 & 100 kHz rep rate, on I/O & Power input cabling per IEC 61000-4-4
- Surge Immunity to ±0.5 kV DM & ±1.0 CM on power input per IEC 61000-4-5
- Surge Immunity to ±1.0 line-earth on I/O lines per IEC 61000-4-5
- Conducted RF (CRF) Immunity to 10 VRMS, 0.150 to 80 MHz, per IEC 61000-4-6

The unit does not have a Marine Type approval; however, it complies with the EMC test requirements for Marine Type Approval of IACS UR E10 when installed into a metal enclosure per:

IACS UR E10 General Distribution Zone Emissions:

- Radiated Electromagnetic Emissions 150 kHz to 3000 MHz tested per CISPR 16
- Power Line Conducted Electromagnetic Emissions 10 kHz to 30 MHz tested per CISPR 16

IACS UR E10 Immunity:

- Electrostatic Discharge (ESD) immunity to ±6 kV Contact & ±8 kV Air (arc) per IEC 61000-4-2, Except I/O pins
- Radiated RF Immunity to 10 V/m, 80 to 3000 MHz, per IEC 61000-4-3
- Electrical Fast Transients (EFT) Immunity to ±2.0 kV, 5 & 100 kHz rep rate, on I/O & Power input cabling per IEC 61000-4-4
- Surge Immunity to ±0.5 kV DM & ±1.0 CM on power input per IEC 61000-4-5
- Surge Immunity to ±1.0 line-earth on I/O lines per IEC 61000-4-5
- Conducted RF (CRF) Immunity to 10 VRMS, 0.150 to 80 MHz, per IEC 61000-4-6
- Conducted Low Frequency Injection Immunity (CLFI) to noise ripple on top of power inputs limited to ≤3.6 V rms at ≤2 W ripple power from 50 Hz to 12 kHz, per IACS UR E10 methods
- Conducted Low Frequency Injection Immunity (CLFI) to noise ripple on top of power inputs limited to ≤3.6-0.36 VRMS at ≤2.0–0.2 W ripple power in the 12–150 kHz range, per Woodward requirements extended from IACS UR E10

Power Supply Input

Table 3-1. Power Supply Input Specifications

Range	18–32 Vdc
Input Current	0.83 A @ 24 Vdc 1.11 A @ 18 Vdc
Input Power	20 W
Interrupt Time Holdup	8 ms @ P 24 V
Efficiency	70% minimum over operating input voltage range
Reverse Polarity Protection	56 Vdc

Input Wiring Constraints
Wire the RTN Gateway control platform such that no other device receives power from the wiring between the RTN Gateway Control Platform and the power supply source.

Power Supply Monitoring Circuit (Power Supply Board)
The Gateway will shut down or not boot if the power supply voltage to it is outside of a 15 Vdc to 35 Vdc range. Ensure that the power supply is within the operating range specified above over the operating temperature range.

Electric Shock

The RTN Gateway control platform shall not present an electrical shock hazard to the operator or maintenance personnel when used in a normal manner per the National Electrical Code Handbook, ANSI/NFPA 70 HANDBOOK-1990. Safety is ensured by certification through the safety agencies specified in the “Regulatory Compliance” section of this document.

Connect Protective Earth (PE) to the termination point on the backside of the unit next to the label with the symbol ⏚ to reduce the risk of electric shock. Make this connection using a thread-forming screw (M4 x 6 mm). The conductor providing the connection shall have a properly sized ring lug and wire larger than or equal to 3.3 mm² (12 AWG).

⚠WARNING

The RTN Gateway must have input power removed before installing or removing.

This equipment is suitable for use in Class 1, Division 2, Groups A, B, C, and D, Zone 2, Group IIC, or non-hazardous locations only.

Wiring must be in accordance with Class I, Division 2 or Zone 2 wiring methods and in accordance with the authority having jurisdiction.

Chapter 4. Installation

Introduction

This chapter provides the general information for mounting location selection, installation, and wiring of the RTN Gateway. Hardware dimensions, ratings, and requirements are given for mounting and wiring the control in a specific application.

General Installation

When selecting a location for mounting the RTN Gateway, consider the following:

- Protect the unit from direct exposure to water or to a condensation-prone environment.
- The control is designed for installation in a protective metal enclosure such as a standard cabinet with ingress protection rating of IP54 or greater.
- Provide an ESD strap as ESD mitigation inside the cabinet for handling the equipment and plugging/unplugging the connectors.
- The operating range of the RTN Gateway is –40 to +70 °C (–40 to +158 °F). See the Environmental Specifications for more details.
- Provide adequate ventilation for cooling. Shield the unit from radiant heat sources.
- Do not install the unit or its connecting wires near inductive, high-voltage, or high-current devices. If this is not possible, shield both the system connecting wires and the interfering devices and/or wires.
- Allow adequate space around the unit for air flow, servicing, and wiring.
- Do not install where objects can be dropped on the terminals.
- Ground the chassis for proper safety and shielding effectiveness.
- When installing on a generator set package, provide vibration isolation.

Shipping Carton

Before unpacking the control, refer to the inside front cover and page vi of this manual for WARNINGS and CAUTIONS. Be careful when unpacking the control. Check for signs of damage such as bent or dented panels, scratches, and loose or broken parts. If any damage is found, immediately notify the shipper.

The RTN Gateway was shipped from the factory in an anti-static foam lined carton. Always use this carton for transport of the RTN Gateway or for storage when the RTN Gateway is not installed in the system.

Mounting

Figure 4-1 shows the RTN Gateway mounting pattern. The RTN Gateway is to be mounted in an appropriate enclosure for the installed environment. This equipment is designed for installation within a control room panel inside an enclosure/cabinet or stand alone enclosure or cabinet.

⚠WARNING

This equipment is intended to be installed in a metal cabinet or enclosure to provide protection against the entry of dust or water and to protect against mechanical impact. For ATEX compliance, a minimum ingress protection rating of IP54 is required for the enclosure. The interior of the enclosure shall not be accessible in normal operation without the use of a tool.

The standard RTN Gateway package must be mounted to allow sufficient room for wiring access. Eight front panel mounting holes permit secure mounting. A minimum of 75 mm (3 inch) of clear space around the outer surfaces of the RTN Gateway is required for wiring and ventilation.

Electrical Connections

The CAN ports utilize pluggable dual row CageClamp screwless style terminal blocks, with both screwless and with screw fastener retention mechanism. It is required that CAN ports 1-8 utilize screw down fastener style CageClamp terminals due to the weight and routing of CAN cable to these ports. CAN ports 9-10 are screwless type.

The spring clamp can be actuated by using a standard 2.5 mm (3/32 inch) flat bladed screwdriver (see Figure 4-2). These terminal blocks accept wires from 0.08–1.1 mm² (28–18 AWG). Two 0.5 mm² (20 AWG) wires or three 0.3 mm² (22 AWG) wires can be easily installed in each terminal.

It is necessary for proper operation of CAN to install 120 Ω terminating resistor between the CANH and CANL connections on each end of the network, at the furthest apart ends of the network. Each CAN port used must have a 120 Ω resistor either at the port or within 1 m of cabling for the two furthest devices. The second row of connections is intended to be used for the termination resistor at the RTN Gateway end port. Final resistance from CANL to CANH should be ~60 Ω after both termination resistors are installed.

CAN Cabling must be shielded for proper operation during EMC events and to protect the environment from RF noise. CAN Common, CANH, & CANL wires may not be exposed by any more than 7.6 cm (3 inches) at junction terminal blocks and no more than 3.8 cm (1.5 inches) at the port plugs. Shielding is intended to be directly grounded to EARTH at the entrance to the enclosure. Directly ground each shield to EARTH within 30 cm (12 inches) of the enclosure entrance penetration. The PE connection will be the single point direct shield ground for the entire CAN network, each Woodward device port has an AC (capacitor) termination to PE inside it, which must also be connected to the shield.

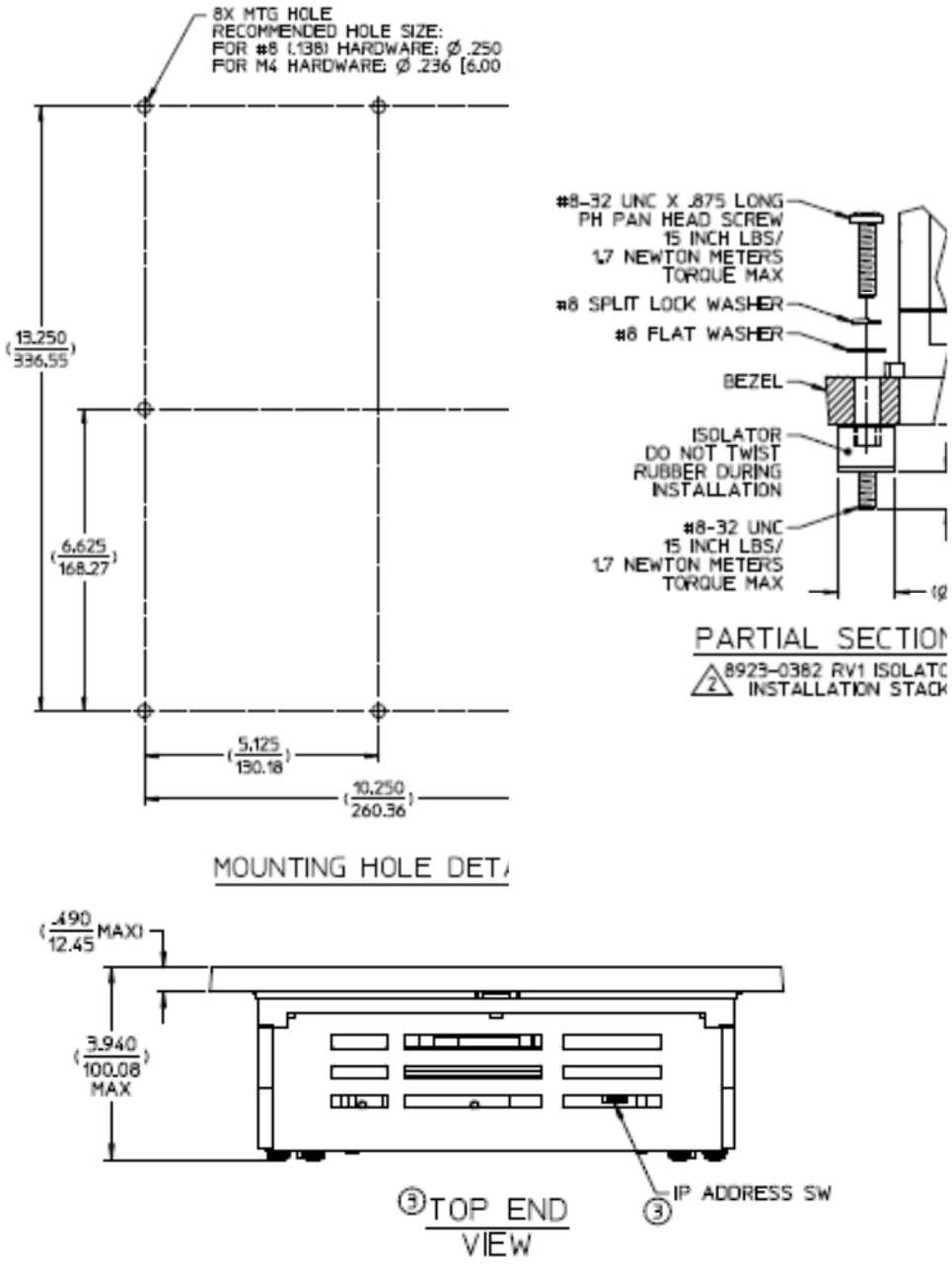


Figure 4-1. Optional RV1 Isolation Kit Installation

Grounding

Connect Protective Earth (PE) to the termination point on the base plate of the unit next to the label with the symbol ⏚ to reduce the risk of electric shock. Make this connection using a thread-forming screw (M4 x 6 mm). The conductor providing the connection shall have a properly sized ring lug and wire larger than or equal to 3.3 mm² (12 AWG).

The unit also needs low impedance grounding to earth, e.g. the cabinet or enclosure used. One or more of the following can accomplish the low impedance ground:

- A short 15 cm (6 inch) or shorter protective earth wire
- A 1.3 cm (0.5 inch) wide flat hollow braid less than 1 m (39 inch) long
- A 1.3 cm (0.5 inch) wide flat tin or lead/tin plated copper strap less than 1 m long
- The use of the eight mounting bolts and paint breaking washers.

⚠WARNING

Do not connect chassis ground or PE ground to signal common. Interference due to increased noise or circuit damage may occur if signal commons are connected to chassis ground or PE.

Safety Ground Wire Installation

Route safety wires against the grounded cabinet structure. Locate safety ground wire at least 150 mm (6 inches) from unshielded cabling and 75 mm (3 inches) from shielded cabling inside the cabinet, and 150 mm (6 inches) from any I/O cabling exiting the cabinet.

Recommended Grounding Practices

Providing the proper ground for the RTN Gateway control is important. Follow recommended shield termination practices. If the two opposite ends of the shields are directly grounded to Earth, differences in potential between these two points could result in equalizing current flow which then produces unacceptably high common mode noise voltages.

Input Power

The RTN Gateway control requires a nominal voltage source of 18 to 32 Vdc. Input power requirements vary depending on the control version. Table 4-1 contains information for the maximum configuration.

⚠WARNING

Power must be applied to the RTN Gateway control at least 90 seconds prior to expected use. The control must have time to do its power up diagnostics to become operational. Failure of the diagnostics will disable control function.

⚠WARNING

The RTN Gateway must have the input power removed before installing or removing.

This Equipment is Suitable For Use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

This equipment is suitable for use in European Zone 2, Group IIC environments.

Wiring must be in accordance with North American Class I, Division 2, or European Zone 2, Category 3 wiring methods as applicable, and in accordance with the authority having jurisdiction.

Do not connect more than one RTN Gateway to any one fuse or circuit breaker.

Communication wires must use wires with a temperature rating of at least 5 °C above surrounding ambient. All others use wires with a temperature rating of at least 10 °C above surrounding ambient.

WARNING

ATEX compliance is dependent on this equipment being protected externally against transient disturbances. Make provisions to prevent the power input from being exceeded by transient disturbances of more than 119 V PEAK.

The power supply output supplying the RTN Gateway must be of a low impedance type for proper operation of the control. DO NOT power a control from a high voltage source containing dropping resistors and zener diodes. If batteries are used for operating power, an alternator or other battery-charging device is necessary to maintain a stable supply voltage. The RTN Gateway also does not have protection from the load dump present on the power bus by disconnecting batteries from the charging alternator, if the alternator doesn't self-suppressed the load dump (clamp it).

NOTICE

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

IMPORTANT

If an alternator is used to charge batteries supplying the RTN Gateway power, the alternator must be a suppressed/clamped type or have external load dump transient suppression. The RTN Gateway does not have sufficient energy handling capability to suppress a full alternator load dump.

When applying current to the RTN Gateway control, significant inrush currents are possible. The magnitude of the inrush current depends on the power source voltage level & impedance, so Woodward cannot specify the maximum inrush current. Time-delay fuses or circuit breakers must be used to avoid nuisance trips.

Input Power Wiring

Connect Protective Earth ground (PE) to the chassis at the termination point on the unit labeled with  . Connect the power supply grounding terminals to earth to ensure grounding of the power supply printed circuit boards. The grounding conductor must be the same size as the main supply conductors.

⚠WARNING

The controls' power supplies are not equipped with input power switches, for this reason, a fixed wiring installation is required. A switch or circuit breaker shall be included in the building installation that is in close proximity to the equipment, within easy reach of the operator, and that is clearly marked as the disconnecting device for the equipment. The switch or circuit breaker shall not interrupt the protective earth conductor and shall be rated for inrush current.

It is expected that the installation of this equipment will include over current protection between the power source and the RTN Gateway control. This over current protection may be accomplished by series connection of properly rated fuses or circuit breakers (including inrush rating). Branch circuit protection of no more than 250% of the maximum RTN Gateway power supply input current rating must be provided. See Table 4-1 for maximum recommended fuse ratings. This value meets the 250% UL listing requirements. The use of properly sized UL class CC, J, T, G, RK1, or RK5 fuses meet the requirements for branch circuit protection. Do not connect more than one RTN Gateway control to any one fuse. Use only the wire size specified in Table 4-1 or equivalent metric size which meets local code requirements. Time delay fuses should be used to prevent nuisance trips.

Table 4-1 provides the power supply holdup time specification; which is the time the supply will continue to operate within specification after its input power is interrupted. This information may be useful in specifying uninterruptible power supply (UPS) systems.

Table 4-1. Power Supply Requirements

Input Voltage Range	Fuse (Current Rating)	Fuse (I^2t Rating)	Wire Size* **	Holdup Time
18–32 Vdc**	≤9 A	>100	2/4 mm² 12/14 AWG	8 ms

IMPORTANT

*** 4 mm² (12 AWG) is the largest wire gauge size that may be connected to the control power input terminal blocks.**

**** The minimum input voltage allowed is 18 V at the power input of the control. The length, size of wire, and load current will determine the minimum supply output voltage. The minimum supply voltage measured at the RTN Gateway should always be greater than 18 V. Example: Two (source and return) 20 foot (6 m) lengths of 14 AWG (2 mm²) wire carrying 1.2 A (maximum rated current) will result in a voltage drop from source output to control power input of approx. 0.16 volts. The resulting supply voltage from this example must be greater than 18.16 volts.**

***** A fuse or circuit breaker shall not interrupt the protective earth conductor.**

Input Power Wiring Diagram

The power supply and ground connections are located on the power supply board (see also Recommended Grounding Practices). The –24 V tie to the Common System Ground must be at the supply.

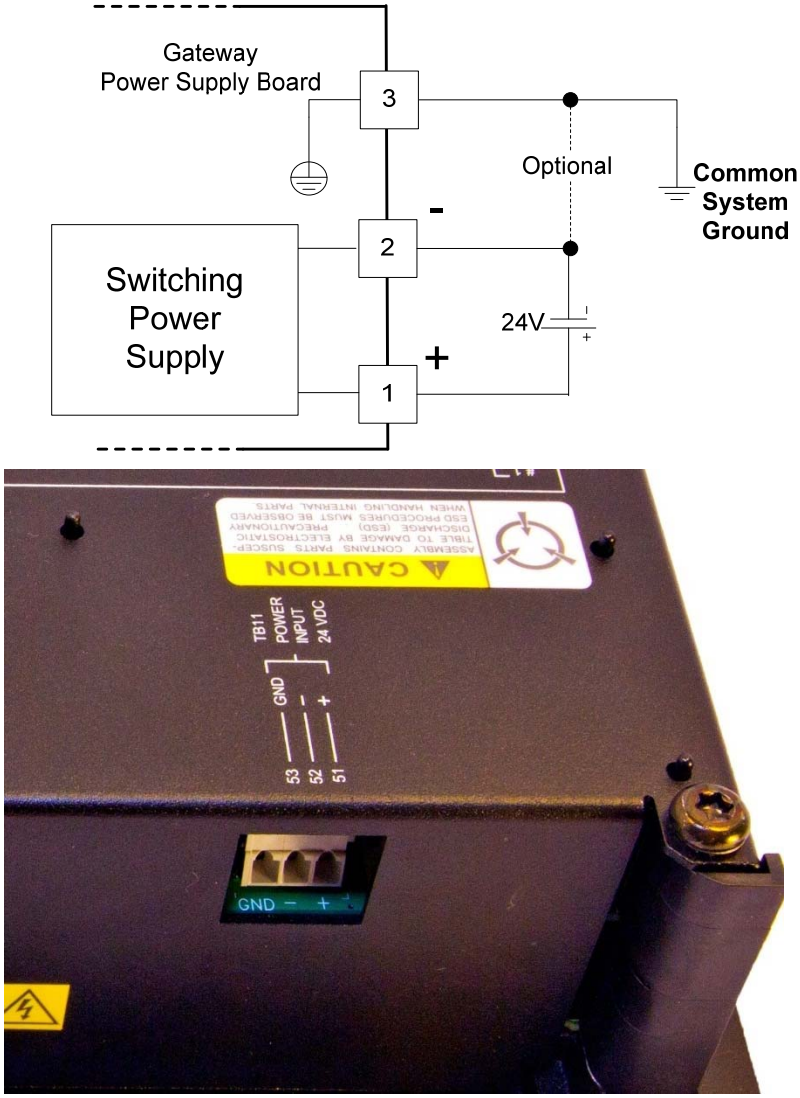
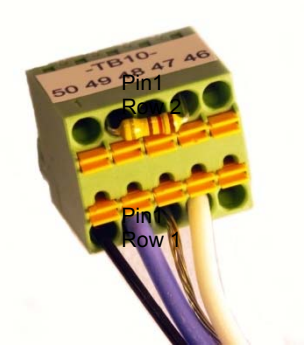


Figure 4-2. Input Power Wiring Diagram and Example

CAN Cable Wiring

After RTN Gateway input power is disconnected, the terminal blocks can be removed one at a time by pulling them straight out. Be careful not to pull the plug out at an angle, as this will fracture the end terminal. Wires for the all the pluggable I/O terminal blocks should be stripped at 8 mm (0.3 inch).



Termination Resistor (120Ω)
Pin2->Pin4

CAN Cable
Pin 1 – not used
Pin 2 – CAN High
Pin 3 – CAN Shield
Pin 4 – CAN Low
Pin 5 – CAN Signal Ground

Figure 4-3. Spring Clamp Terminal Block

Row 1 and Row 2 Pins are electrically the same. This allows for easier connection of multiple CAN modules on a single CAN network.

IMPORTANT

<u>Do not</u> tin (solder) the wires that terminate at the RTN Gateway terminal blocks. The spring-loaded CageClamp terminal blocks are designed to flatten stranded wire, and if those strands are tinned together, the connection loses surface area and is degraded. The solder tinned wire end will also cold flow over time potentially further degrading the connection.

⚠WARNING

EXPLOSION HAZARD—Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.

Shields and Grounding

Shield all signal lines except power supply wiring to prevent picking up stray signals from adjacent equipment.

IMPORTANT

Shielding of power supply wires inside the metal enclosure is recommended for Marine Type Approval installation applications. Power supply wiring does not normally require shielding for other installations, but may be shielded if desired.

All shielded cable must be twisted conductor pairs, triples or multiple pairs. The RTN Gateway control is designed with AC & direct shield terminations to earth ground at the control. An individual shield termination to earth is provided at the RTN Ethernet Port for each of the RTN Signals, these signals require shielding. Each of the CAN Cable shields have an AC (Capacitor) shield termination to earth, do not tin (solder) or attempt to tin the shield wire for connection into the terminal block. Wire exposed beyond the shield should be as short as possible, not exceeding 50 mm (1.5 inches). CAN shield wire termination should be made with the braided shield & drain wires combined to make the largest wire possible that will fit into the terminal block connector.

If intervening terminal blocks are used in routing a CAN signal, the shield should be continued through the terminal block. If shield grounding is desired at the terminal block, it should be AC (capacitor) coupled to earth, unless this is at the RTN Gateway enclose penetration where direct connections are required. It is suggested to limit the number of TB break points along the trunk length of cabling between the field device end and gateway end to a minimum, at least 1 m (39 inches) of cable with an intact shield should present between breaks in the trunk (not applicable at the gateway or field device ends). Using a 0.01 uF, 1500 V, capacitor at the shield break point for the TB is usually sufficient to compensate for the wiring exposed outside the shield, but care must be taken when using these (see below). CAN Common, CANH, & CANL wires may not be exposed outside the shield by any more than 7.6 cm (3 inches) at junction terminal blocks and no more than 3.8 cm (1.5 inches) at the port plugs. If the terminal block is at the enclosure entrance penetration the shield must be directly connected to earth. All shield terminations not at the entry into RTN Gateway's metal enclosure should be AC coupled to earth through a capacitor. (A 0.01 uF, 1500 V capacitor is typically sufficient. The intent is to provide a low impedance path to earth for the shield at frequencies of 150 kHz and higher.)

Avoid multiple, spread out, direct or high capacitance connections of a shield to earth. Multiple connections risks high levels of low frequency ground current, like 50/60 Hz, flowing within the shield. When making multiple connections, add the impedance of them up and make sure it is much greater than safety grounds impedance required by local laws.

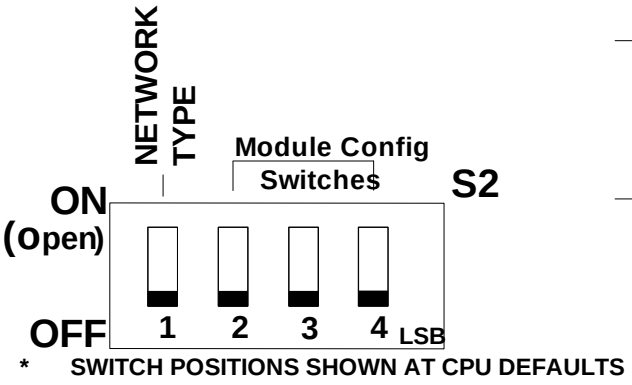
Shield termination can be a deterministic process. AC shield connections (capacitors) may be dictated at the control, instead of the direct earth connection provided. Typically, shields at signal inputs are connected directly to earth, and shields at signal outputs are AC-coupled to earth or floating. All shields from the RTN Gateway must be directly terminated to earth at the exit penetration of the RTN Gateway enclosure. They must also be connected to dedicated termination points on the RTN Gateway. See Woodward application notes 50532, *Interference Control in Electronic Governing Systems*, and 51204, *Grounding and Shield Termination,* for more information.

Gateway Addressing

Figure 4-4. Module Configuration Switch

Hardware Configuration: The Module Configuration Switch (S2) must be configured properly for RTN Gateway mode (RTN, CHASSIS-X1, address 0x001) operation. This module will be factory configured appropriately. If multiple RTN Gateways are used, each Gateway must have its own unique Module Config switch setting.

Note: you cannot have any two RTN Gateways or RTN CPUs at the same address.



Network Type

Switch	Function
OFF	RTN Network 172.20.x.x
ON	RTN Network 10.250.x.x

Module Config

Addr	Switch	Function
0	000	CPU, MAIN CHASSIS (not used for RTN Gateway)
1	001	RTN, CHASSISX1
2	010	RTN, CHASSISX2
3	011	RTN, CHASSISX3
4	100	RTN, CHASSISX4
5	101	RTN, CHASSISX5
6	110	RTN, CHASSISX6
7	111	RTN, CHASSISX7

Figure 4-5. Module Configuration Switch Setting

IMPORTANT **It is recommended to verify proper switch settings before installing the module in the system and when troubleshooting Gateway related issues.**

IMPORTANT **If the Gateway module is incorrectly configured for RTN mode, the RTN Ethernet ports will not operate.**

Network Type: The Network Type setting is factory set OFF and will automatically configure the RTN communication port IP addresses to the 172.20.x.x series.

IMPORTANT **The customer network attached to the main CPU's Ethernet #1 may already use the RTN port addresses of 172.20.x.x. For this case, the Network Type switch should be configured ON to use the 10.250.x.x RTN port addresses.**

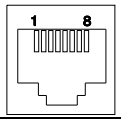
Network Configuration Utility (AppManager)
Woodward's *AppManager* software can be used to load Control software (GAP), monitor diagnostic faults. The *AppManager* utility can be downloaded from **www.woodward.com/ic/software**. A PC connection must be made to the main CPU's Ethernet #1 (ENET1) using an RJ45 Ethernet cable.

10/100 BaseT Ethernet Ports

Figure 4-6. 10/100 BaseT Ethernet Ports (RJ45)

There are four 10/100 BaseT Ethernet Ports (RJ45) on the Gateway. However, only ports 3 & 4 are available to the application software, as RTN Ports. These ports are full duplex, auto switching, and do not require the use of an Ethernet shield box.

Table 4-2. Ethernet Port Pinout

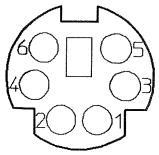
Connector	Signal Mnemonic
RJ45F 	Shielded RJ45 female receptacle
1	RX+
2	RX-
3	TX+
4	--
5	--
6	TX-
7	--
8	--
Shield	Chassis EARTH

RS-232 Service Port

An isolated RS-232 service port is located near one corner of the A5200 CPU module. This port is for VxWorks operating system use only and cannot be configured for application software use. The communication settings are fixed at 38.4 kBaud, 8 data bits, no parity, 1 stop-bit, and no flow control.

For debug use, a null-modem cable and 5450-1065 Serial Adapter cable (PS2M to DB9F) is required to attach this port to a PC. This port is to be used by trained Field Service personnel only!

Shielded cable is required when connecting to the Service Port. Using shielded cable will help ensure the robustness of the serial communications.



Pin 1 – RS-232 Receive
Pin 2 – RS-232 Transmit
Pin 3 – Signal Ground
Pin 4 – Not Used
Pin 5 – Signal Ground
Pin 6 – Not Used
Connector Shell – Chassis EARTH

Figure 4-7. CPU Service Port (mini-DIN6F)

CAN Communication Ports

10 CAN ports are available for communication with Woodward Valves and other CAN devices. Ports 1-8 are 5 pin pluggable connectors, screw down type. Ports 9-10 are the same 5 pin pluggable connectors but are not required to be screw-down type to meet vibration specifications. Although it is recommended to secure all wiring.

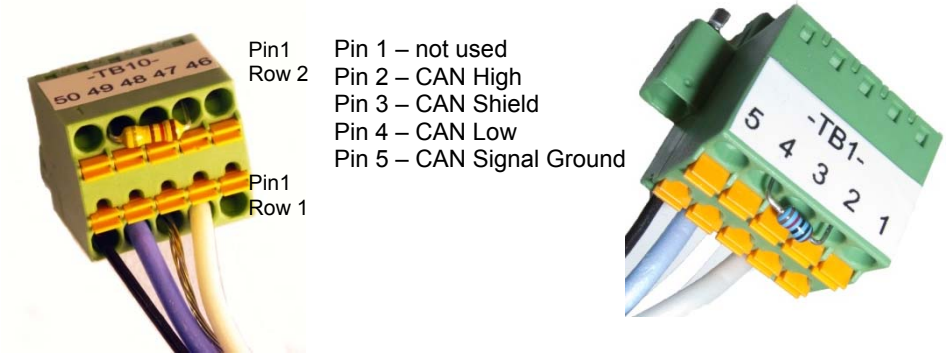


Figure 4-8. CAN Communication Ports

Table 4-3. Suggested CAN wiring colors

Pin#	Belden 3106A	High Temp Cable
1 - Not Used		
2 - CAN High	White	White with Orange stripe
3 - CAN Shield	Shield	Shield
4 - CAN Low	Blue	Orange with White stripe
5 - CAN Signal Ground	black	Blue with White stripe

CAN networks must include 120 Ω (1/4 W 10% recommended) terminations at each end of the trunk line. Drop cables connecting a device to the trunk line should be as short as possible and less than 6 meters.

Table 4-4. CAN Network Trunk Line Specifications

Network Speed	Max Trunk Length (Thick cable)	Max Trunk Length (Thin cable)	Max Drop Length	Max Cumulative Drop Length
1 Mbps	30 m	30 m	1 m	10 m
500 Kbps	100 m	100 m	6 m	20 m
250 Kbps	250 m	100 m	6 m	40 m
125 Kbps	500 m	100 m	6 m	80 m

IMPORTANT

Max trunk Length will be reduced by the sum of the cumulative drop cable length.

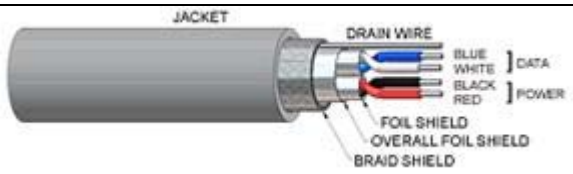
$L_{TrunkMax}$=(Max Trunk Length) – (Cumulative Drop Length)

CAN Cable Specification

Three types of cable are recommended by Woodward.

Thick cable is preferred and recommended for all uses. Most CAN / DeviceNet cable is not rated for temperatures above 80 °C so be careful during installation to avoid hot routing areas. Always use shielded cables for improved communications in industrial environments. For MicroNet related CAN cables and connectors, see Woodward Reference drawing 9097-20987.

Table 4-5. CAN Cable Specification

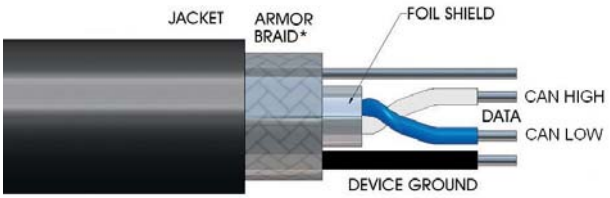
	
Impedance:	120 Ω ±10% at 1 MHz
DC resistance:	< 7Ω per 1000 ft
Cable capacitance:	12 pF/ft at 1 kHz
Propagation delay	1.36 ns/ft (maximum)
Data Pair:	19 strands, 1.0 mm² corresponds to 18 AWG, individually tinned, 3 twists/foot
Power Pair:	19 strands, 1.5 mm² corresponds to 15 AWG, individually tinned, 3 twists/foot
Drain / Shield Wire:	19 strands Tinned Copper shielding braid or shielding braid and foil
Cable type:	Twisted pair cable. 2x2 lines
Bend Radius:	20x diameter during installation or 7x diameter fixed position
Signal attenuation:	0.13 dB/100 ft @ 125 kHz (maximum) 0.25 dB/100 ft @ 500 kHz (maximum) 0.40 dB/100 ft @ 1000 kHz (maximum)

In addition, some three wire cables acceptable for CAN communications is also available. These are available in a size between the standard thin and mid-sized cables specifically for DeviceNet. These come in a normal temperature and high temperature versions available for purchase directly from the supplier.

Recommended Bulk Cable

Cable manufacturer Turck and Belden are widely available in North America. Turck, Lumberg, and Lapp Cable products are available in Europe. All cables below are suitable for DeviceNet trunk and drop cabling. Be aware that cable vendors may not use the same wire colors on individual conductors.

Table 4-6. Recommended Cable for RTCnet and LINKnet-HT

Belden YR58684, bulk cable	
	
Impedance:	120 Ω ±10% at 1 MHz
DC resistance:	17.5 Ω per 1000 ft
Cable capacitance:	11 pF/ft at 1 kHz
Data Pair:	22 AWG, 7 strands, individually tinned, FEP insulation (BLUE, WHITE twisted pair)
Ground:	22 AWG, 7 strands, individually tinned, FEP insulation (BLACK)
Drain / Shield Wire:	22 AWG, 7 strands, individually tinned
Shielding:	Foil 100% with outer Braid 65%
Jacket:	FEP Insulation, BLACK
Cable type:	1.5 pair, twisted shielded
Outer Diameter:	0.244 inches
Bend Radius:	2.5 inches
Temperature:	–70 to +125 C
Similar Cable:	Belden 3106A (different colors, low temperature)

*__Note:__ Turck and Lumberg can also provide custom length cord sets with connectors.

Table 4-7. Cable Manufactures

Manufacturer	**part number**	**Website**
Belden	3082A DeviceNet Thick Cable–Grey	www.belden.com
Belden	3083A DeviceNet Thick Cable–Yellow	www.belden.com
Lapp Cable	2710-250 Unitronic DeviceNet Thick	www.lappcable.com
Lumberg	STL 613	www.lumbergusa.com
Turck	Type 575, DeviceNet Thick Cable – Grey	www.turck.com

Network Power Distribution

Input Power

Source limitations etc.
Voltage ranges, etc.

Input Power Wiring

Max Wiring Length for Primary Power Distribution Bus: 300 m (recommend 12 AWG or larger)
Node Power wiring shall be 20 AWG to allow daisy chaining the power from node to node.
Daisy chaining of power wires shall be limited to TBD
The entire Power Distribution Bus shall meet the Input Source Impedance.
Wire shielding: none required, however it is allowed with shield termination to shield/chassis pin on the power input connector.

Recommended Grounding Practices

Ground each type of the I/O nodes to earth by the DIN rail. Bond the DIN Rail and mounting plate to ground. The DIN Rail connector is designed to be the main functional ground for the units.

The optional power input ground wire may be, and is recommended to be, grounded too if corrosion or significant vibration may be present. A DIN Rail mounted grounding terminal block connected to the power port ground pin by as short and large gage wire as possible is recommended.

Wire/bond input power ground terminal, not power return, to earth ground in applicable cases like environments that lead to corrosion or hazardous atmosphere environments.

Shielded Wire, Shield Termination Lead Preparation

Where shielded cable is required, cut the cable to the desired length and prepare the cable as instructed below.

1. Strip outer insulation from both ends, exposing the braided or spiral wrapped shield. Do not cut the shield or nick the wire inside the shield.
2. Using a sharply pointed tool, carefully spread the strands of the braided shield to form a hole.
3. Take hold of the inner conductor(s) wires insulation and pull the wires out of the shield one at a time.
    a. If the shield is the braided type, twist it to prevent fraying; twist it with the drain wire if one is present.
    b. Foil shields require the drain to be brought out and excess foil may be removed.
4. Remove 6 mm (1/4 inch) of insulation from the inner insulated signal conductors.
5. Connect wiring and shield as shown in plant wiring diagram.
6. If a shield connection is not required or desired, fold back and secure or remove the excess shield as needed. (If there is a connection point for the shield, it should be used to get optimal performance.)

General Wiring Guidance

For noise suppression reasons, it is recommend that all low current and low voltage wires be separated from all high-current and/or high-voltage wiring.

Recommend strain relief for CAN network cables connected to Ports 9 and 10 because they do not use screw down connectors. In general, strain relief of cables is a wise practice.

Input power ground terminal, not power return, should also be wired/bonded to earth ground.

Installations with severe electromagnetic interference (EMI) may require additional shielding precautions, such as wire run in conduit or double shielding. Contact Woodward for more information.

Shields from the control to its loads or input sources can be directly grounded to earth at both ends, but only if the cable length is sufficiently short to prevent ground loop current in the shield (e.g. within a single cabinet or where the shortest straight line distance between earth connection points is no further than 10 m apart).

Enclosure Installations: When installing the control in a metal enclosure, as intended, shielded I/O must be AC or DC terminated directly to the cabinet (earth ground) at the entry to the cabinet, as well as at the control shield pins.

Specifics are provided in each individual installation section.

Non-Marine Enclosure Application Information

Enclosure/Cabinet Structural Grounding – EMC Robustness Improvements

- The cabinet must be a six-sided metal enclosure.
  - ✓ Do not use cabinet doors with windows unless they are shielded — doors should be solid metal.
- The enclosure floor and/or top panels must provide holes for cable entry.
- Top and bottom cable entry areas must be restricted in size. Cable entry aperture sizes should be minimized to the extent possible, the largest dimension of any aperture (hole) is no greater than 152 mm (6 inches). This is particularly important when RF transmitters, like push to talk radios or cell phones, can be located near the cable access areas.
- An enclosed metal cable area or cableway joining to the cabinet is part of the enclosure; if it has no holes larger than 152 mm (6 inches) and no RF transmitters can be present within it. This allows larger holes in the enclosure cable access plate. The enclosed cableway effectively becomes part of the enclosure.
- The cabinet enclosure frame and device mounting areas must be bonded (grounded) together.
- The frame shall be electrically connected at each structural interface (<2.5 mΩ).
- Mounting plates shall be electrically connected to structural frame (<2.5 mΩ).
  - ✓ Four corners minimum, four corners, + two mid-points preferred so <3' (90 cm) is the maximum distance between ground points.
- Doors must be electrically connected to the main structural frame (<2.5 mΩ).
  - ✓ One place minimum, three places preferred, use of 25 mm (1 inch) wide bond straps is preferred.
  - ✓ Optimally install bond straps at the locations that cables cross the door hinge. If no cables cross the hinge point, locate straps to break up the size of gaps or openings in the metal structure to door interface.
- Cover panels shall be electrically connected to structural frame (<10 mΩ).
  - ✓ One place minimum, two places preferred (placed at opposite corners).
- Floor and top panels must be electrically connected to structural frame (<2.5 mΩ).
  - ✓ One place minimum, four places at the corners is preferred.
- DIN rails must be electrically connected to structural frame (<2.5 mΩ).
  - ✓ Once every 20 cm (8 inches): use a minimum of two screws to bond a DIN rail to cabinet frame or mounting panel.
- The cabinet must provide a shield termination point for cables as they enter/exit the enclosure. Shielded I/O must be AC or DC terminated directly to the cabinet (earth ground) at the entry to the cabinet, as well as connected at the RTN Gateway shield pins.

IMPORTANT **The grounding section covers how to create shield terminations and when to ground shields: directly to earth or indirectly to earth through a capacitor. There must be one earth ground for each shield.**

Marine Enclosure Application Information (Optional)

Enclosure/Cabinet Structural Grounding – EMC Robustness Improvements

- The cabinet must be a six-sided metal enclosure, and maybe EMI shield rated. The interior surfaces must be conductive and coated with corrosion protection treatments.
  - ✓ Do not use cabinet doors with windows unless they are shielded — doors should be solid metal.
- The enclosure floor and/or top panels must provide holes for cable entry.
- Top and bottom cable entry areas must be restricted in size. Cable entry aperture sizes should be minimized to the extent possible, the largest dimension of any aperture (hole) is no greater than 152 mm (6 inches). This is particularly important when RF transmitters, like push to talk radios or cell phones, can be located near the cable access areas.
- The cabinet/enclosure frame and device mounting areas must be bonded (grounded) together.
- The frame shall be electrically connected at each structural interface (<2.5 mΩ).
- Mounting plates shall be electrically connected to structural frame (<2.5 mΩ).
  - ✓ 4 corners minimum, 4 corners + 2 mid-points preferred so <3' (90 cm) is the maximum distance between ground points.
- Doors must be electrically connected to the main structural frame (<2.5 mΩ) and if an EMI rated enclosure they must be mounted to contact an EMI gasket grounding surface all the way around the perimeter (360 degrees) when the door is closed.
  - ✓ Bond strap 1 place minimum, 3 places or 360 degree coverage EMI Gasket preferred. Use of three 25 mm (1 inch) wide bond straps is acceptable.
  - ✓ Optimally, install bond straps at the locations that cables cross the door hinge. If no cables cross the hinge point, locate straps to break up the size of gaps or openings in the metal structure.
- Enclosure cover panels shall be electrically connected to structural frame (<10 mΩ) and if an EMI rated enclosure must be mounted to contact an EMI gasket grounding surface all the way around the perimeter (360 degrees) when the panel is mounted.
  - ✓ Bond strap 1 place minimum, 2 places (placed at opposite corners) or 360 degree coverage EMI Gasket preferred.
- Floor and top panels must be electrically connected to structural frame (<2.5 mΩ) and must be mounted to contact an EMI gasket grounding surface all the way around the perimeter (360 degrees) when the panel is mounted.
  - ✓ Bond strap 1 place minimum, 4 places or 360 degree coverage EMI Gasket preferred.
- DIN rails must be electrically connected to structural frame (<2.5 mΩ).
  - ✓ Once every 20 cm (8 inches): use a minimum of 2 screws to bond a DIN rail to cabinet frame or mounting panel.
- The cabinet must provide a shield termination point for cables as they enter/exit the enclosure. Shielded I/O must be AC or DC terminated directly to the cabinet (earth ground) at the entry to the cabinet, as well as connected at the RTN Gateway shield pins.
- All cables that have sections going outside the cabinet must be shielded from the cabinet entry/exit point to the cable end point inside the cabinet. Cables normally unshielded may limit the shield to just the section inside the cabinet, with shield terminations to the cabinet at each end.

IMPORTANT **The grounding section covers how to create shield terminations and when to ground shields: directly to earth or indirectly to earth through a capacitor. There must be one earth ground.**

General Enclosure Application Information

Cable Entry Locations

- Install cable shield termination hardware at cable entry points.
- Cable shield terminations must be electrically connected to structural frame and shall allow direct grounding (<2.5 mΩ) or AC (capacitor) grounding of cable shields as specified.
- Route each of the shielded cable types separately, by type. Maintain a minimum of 5 cm (2 inches) between types.
- Maintain unshielded cables within 0-10 mm (0.0-0.4 inches) of the enclosure metal mounting panels, frame rails, etc., until they get close to the RTN Gateway. Approximately 152-203 mm (6-8 inches) near the RTN Gateway may be moved away from the enclosure ground by as much as needed to get to the connector.
- The cable shielding of shielded cables performs better, if the shielded cables follow the same routing instructions given for unshielded cables, however this is not required.
- RTN Gateway cable shields termination pins, except for CAN shield (Ethernet), are designed connected directly to chassis. If this direct connection is used, directly connect cables at the cabinet's cable entry point to the cabinet.
- Shield all signal lines going outside the cabinet while inside the cabinet to prevent picking up stray signals.

IMPORTANT

Shielding of power supply wires inside the metal enclosure is preferred, but not required for Marine Type Approval installation applications. Power supply wiring does not normally require shielding for other installations, but may be shielded if desired.

IMPORTANT

The grounding section covers how to create shield terminations and when to ground shields: directly to earth or indirectly to earth through a capacitor. There must be one earth ground on each shield.

Equipment Zoning (Segregation)

If equipment besides the RTN Gateway is present in the same enclosure, separate the equipment types inside the enclosure/cabinet, as possible:

- Analog equipment area
- Discrete I/O equipment areas
- Shielded I/O area
- Un-shielded I/O area
- Power
- AC mains PT & CT monitoring area
- Light Industrial EMC compliant equipment area
- Monitor/keyboard/pointing device (HMI if applicable)
- Other equipment area
- Maintain a minimum or 15 cm (6 inches) of separation between equipment type areas

IMPORTANT

Light Industrial equipment is defined as equipment that is designed and tested to comply with European Union (EU) directives (e.g. EN61000-6-1 and EN61000-6-3, or similar ITE Standards) for Light Industrial environments. Industrial compliant equipment is designed and tested for the EU directives to Heavy Industrial environments (e.g., EN61000-6-2 and EN61000-6-4).

Third Party Hardware Located Inside the Enclosure/Cabinet

Use only CE Compliant or Marine Type Approved devices

CE Compliant to Light Industrial Levels

- ✓ Locate cables (to and from Light Industrial) away from all I/O cables that enter or exit the cabinet by 305 mm (12 inches)
- ✓ Locate cables (to and from Light Industrial) away from all other cables not going outside the cabinet, separated by greater than 150 mm (6 inches).

CE Complaint to Industrial Levels

- ✓ Locate based on zoning restrictions

Installation of Other Equipment, Fans, Meters, etc.

- ✓ Follow general guidance above and segregate as needed. Keep these away from cabling leaving the enclosure or noise sources as specified above.

Shield Termination Schemes

- ✓ Follow general guidance above and see Application Note 51204 for this information.

Input Power Routing and Filtering

- Unshielded input power coming inside the enclosure/cabinet from outside it or going outside the cabinet from inside it must be routed separately from all other circuits as it enters the cabinet and while inside the cabinet.
- If input power feeding the RTN Gateway is ever outside the cabinet, it must be routed separately from all other circuits as it enters the cabinet and while inside the cabinet. Marine Type Approval applications also suggest input power that leaves the cabinet/enclosure to be shielded while inside the enclosure/cabinet. Shield termination at the cabinet entry point and just before the device input, shield may be used to segregate power.
- Route RTN Gateway power coming from outside the cabinet if it is routed directly against the mounting panel. All other I/O and internal cabling must be kept more than 152 mm (6 inches) away.
- Input power must route directly to controls that are “Industrial” compliant.
- Input power that must route to controls that are “Light Industrial” compliant must be filtered with a minimum of 20 dB filtering.
- Input power that must be routed near other cabling will be filtered prior to the point the cables follow a common path. Filter with a 20 dB filter.

Figure 4-9. Descriptions of Main Cabinet Cabling Options

Shielded Cable Routing & Shield Termination

WARNING

Do not connect chassis ground or PE ground to signal common. Interference due to increased noise or circuit damage may occur if signal commons are connected to chassis ground or PE.

Field Device not in Cabinet, No Interim Device (Left, Figure 4-5)

- Use shielded cable from RTN Gateway to field device (Node/uNet).
- Route the cable from RTN Gateway to the enclosure/cabinet exit point with the cable against cabinet metal structure.
- DC or AC (AC is non-preferred) ground the cable shield at entry point to enclosure/cabinet and connect at the RTN Gateway shield termination pin.
- If the I/O cable is AC grounded or floated at the field device end of the cable, it must be directly ground at the enclosure/cabinet entrance and at the RTN Gateway shield termination point.
- If the I/O cable is directly grounded (DC coupled) at the field device end of the cable, it should be ground with a capacitor (AC ground) at the cabinet. AC ground it both at the RTN Gateway shield pin and at the cable entry point into the cabinet.
- Two separate I/O cable shields:
  - ✓ If over braided (two isolated shields), directly ground over braid shield to cabinet and shield pin—directly connect inner braids at field device termination point. The inner braid must have at least one point directly grounded to earth.

Field Device not in Cabinet, with Interim Device in the Cabinet (Center, Figure 4-5)

- Locate interim device away from unshielded discrete areas > 152 mm (6 inches).
- Use shielded cable from RTN Gateway to field device (Isolator, FTM, Analog Driver, indicator meter, etc.)
- Route the cable from RTN Gateway to the interim device with the cable against cabinet metal structures.
- The interim device must have one AC shield and one DC shield connection. The following are the shield termination combinations, starting from outside the cabinet and working to the RTN Gateway.

Table 4-8. Shield Termination Combinations

Field Device	Cabinet Entry	Interim Device (Field)	Interim Device (Interior)	RTN Gateway	Status
DC	AC	AC	DC	DC	Allowed / Preferred
AC	AC	AC	DC	DC	Allowed
AC	AC	AC	DC	AC	Allowed / Not Preferred
AC	DC	DC	AC	DC	Allowed / Not Preferred
AC	DC	DC	AC	AC	Allowed / Not Preferred
DC	AC or DC	DC	AC	AC or DC	Not allowed
DC	DC	DC	AC	AC or DC	Not allowed

Two separate I/O cable shields:

- ✓ If over braided (two isolated shields), directly ground over braid shield to cabinet and shield pin—directly connect inner braids at field device termination point. The inner braid must have at least one point directly grounded to earth.

Field Device in Cabinet, No Interim Device (Right, Figure 4-5)

- Locate field device away from unshielded discrete areas > 152 mm (6 inches).
- Use shielded cable from RTN Gateway to field device (Isolator, FTM, Analog Driver, indicator meter, etc.)
- Locate field device as close to the enclosure/cabinet I/O cable entry point as possible.
- Route the I/O cable against cabinet metal structures from entry point to field device.
- Ground the I/O cable shield directly at both ends.
  - ✓ If over braided (two isolated shields), directly ground over braid shield to cabinet—directly connect inner braids at field device termination point. The inner braid must have at least one point directly grounded to earth.
  - ✓ If single shield, ground the shield to the cabinet, and/or shield pin at both ends.

Unshielded Cable Routing & Termination

Field Device not in Cabinet, No Interim Device (Left, Figure 4-5)

- Route the I/O cable against the metal enclosure/cabinet structures, from cabinet entry point to the RTN Gateway.
- Limit the length of unshielded I/O cable inside the cabinet. Lengths over 915 mm (36 inches) are too long.
- Use special considerations if lengths greater than 915 mm (36 inches) are required, to separate this unshielded wiring from other circuits and minimize electromagnetic coupling into or from the cable.
- Do not let other cables within 305 mm (12 inches) of unshielded cables if they are parallel for greater than 610 mm (24 inches).
- Do not let other cables within 150 mm (6 inches) of unshielded cables if they are parallel for less than 610 mm (24 inches).

Field Device not in Cabinet, with Interim Device in the Cabinet (Center, Figure 4-5)

- Locate unshielded field devices > 152 mm (6 inches) away from other field devices.
- Locate field device as close to I/O cable entry point as possible.
- Route the I/O cable against the metal enclosure/cabinet structures, from cabinet entry point to the interim device.
- Route the I/O cable against the metal cabinet wall, from the interim device to the RTN Gateway.
- Limit the length of unshielded I/O cable inside the cabinet. Lengths over 915 mm (36 inches) are too long.
- Use special considerations if lengths greater than 915 mm (36 inches) are required, to separate this unshielded wiring from other circuits and minimize electromagnetic minimize electromagnetic coupling into or from the cable.
- Do not let other cables within 305 mm (12 inches) of unshielded cables if they are parallel for greater than 610 mm (24 inches).
- Do not let other cables within 150 mm (6 inches) of unshielded cables if they are parallel for less than 610 mm (24 inches).

Field Device in Cabinet, No Interim Device (Right, Figure 4-5)

- Locate field device as close to I/O cable entry point as possible.
- Route the I/O cable against the metal cabinet wall, from cabinet entry point to the RTN Gateway.
- Limit the length of unshielded I/O cable inside the cabinet. Length over 915 mm (36 inches) is too long and may couple.
- Use special considerations if lengths greater than 915 mm (36 inches) are required, to separate this unshielded wiring from other circuits and minimize electromagnetic minimize electromagnetic coupling into or from the cable.
- Do not let other cables within 305 mm (12 inches) of unshielded cables if they are parallel for greater than 610 mm (24 inches).
- Do not let other cables within 150 mm (6 inches) of unshielded cables if they are parallel for less than 610 mm (24 inches).

Chapter 5.
General Start-up and Operating Instructions

General

Connect CAN modules to networks, and note shield configurations. Single-point shields should be terminated to Earth or the enclosure/cabinet at the cable exit/entrance point.

Connect the RTN Ethernet cables to the Gateway from the MicroNet. Note: Very long Ethernet cables require galvanic isolation (Woodward has an FTM with an AC coupling shield on one side and a DC coupling on the opposite side to accomplish this). Use AC shield termination to the MicroNet side, and DC shield termination to the RTN Gateway. Reverse shield FTM if installed at the MicroNet.

Apply power to the RTN Gateway and the RTCnet or LINKnet-HT CAN modules.

Application Guidelines

The following items are general guidelines intended to educate the system integrator on potential installation and application issues that might arise when the RTN Gateway controller is applied.

CAN Network

The connectors used for CAN ports 1–8 network cable connections are all identical and utilize screw-down type connectors. The connectors used for CAN ports 9–10 network cable connections are all identical and do not utilize screw-down type connectors. It is recommended to add some strain relief to cables on CAN ports 9 and 10. It is possible for the end user to connect the wrong cable connector to the wrong input port, so the terminals are numbered to minimize the chance of this happening. The system integrator should take precautions to ensure that it is easy to view the terminal labels or design other methods to allow the user to easily identify the correct cable for each connector.

The CAN Network's cables are shielded, and the shields should be directly terminated to earth at only one point. The shield must be directly connected at the RTN Gateway end enclosure/cabinet entry/exit point. AC (capacitor) coupling is used everywhere else. The RTN Gateway's CAN shield pins are AC coupled to earth (chassis) internally and must be connected to the shield.

Ethernet Connectors

The RTN Gateway has four Ethernet connectors that are arranged in one connector assembly. Only ports 3 and 4 are active for RTN connection to a MicroNet Plus. Ports 1 and 2 are not used. These are designed to accept shielded Ethernet cabling, and the shield is directly connected to earth (chassis) inside the connector.

The physical spacing between connectors is limited. This can create a situation where it is easy to connect the wrong cable to the connector.

To reduce this risk, the system integrator should implement an Ethernet cable labeling process to allow the user to easily identify which Ethernet cable connects to each Ethernet port. The RTN Gateway also has application level checks that the system integrator should be aware of when designing a system.

At the GAP application level, there are functions available to monitor the RTN Ethernet ports. The following functions can be implemented depending on the application requirements.

RTN Gateway Status GAP Block (GW_STAT)
Monitors the status of the RTN connections and other health parameters.

Shield Ethernet port cables. Cable shields are terminated directly to earth at the RTN Gateway end and must also be terminated at the enclosure/cabinet entry/exit point. You may use an Ethernet Field Termination Module (FTM), available from Woodward, to break the shield path between the RTN Gateway field device and the master control, preferably at the RTN Gateway enclosure entry point, but somewhere near one of the ends (MicroNet or RTN Gateway). Do this if the shortest distance between cabling grounds is more than 10 m.

Installation Functional Check Guidelines

In general, functionally test all IO points prior to starting the prime mover. Check the IO points for ground loops and other possible sources of noise. I/O cabling should have isolation from other power sources that are not related to the specific IO circuit. These installation guidelines are general guidelines only. The system integrator / end user are responsible for understanding the application and defining a field checkout procedure that addresses the requirements of the system being installed.

IMPORTANT

When performing IO checkout, take appropriate safety precautions to ensure that during testing, properly lock out the devices, or that no safety issue is created.

Ethernet Connections
Remove Ethernet connections one at a time, and verify expected faults in the GAP software (GW_STAT and CHAS_STAT) blocks.

CAN Connections

- The CAN network connections should be verified to ensure that the correct networks are connected to the correct connector.
- Note: Due to the identical design of the 10 CAN ports and the potential for similar cables, labeling is important to ensure that the user can easily identify which network cable is connected to the CAN Port connectors.

Chapter 6. Maintenance

There are no user-serviceable parts within the RTN Gateway. There is no routine maintenance.

Chapter 7.
Diagnostics and Troubleshooting

Status Indicators (LEDs)

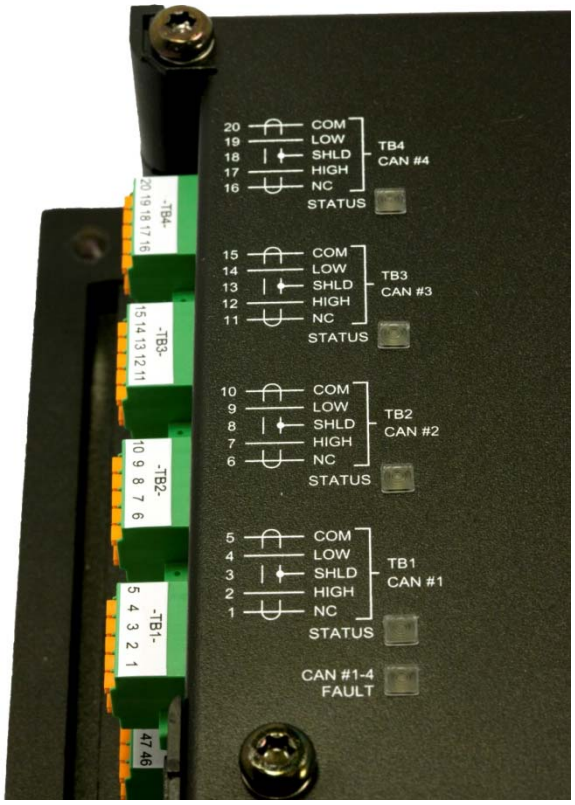


Figure 7-1. CAN Ports 1–8 Status and Fault Indicators

Table 7-1. Indicator Name and Description

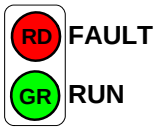
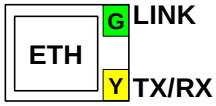
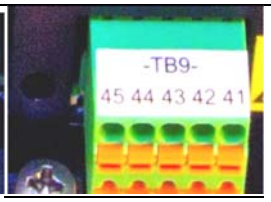
LED	Name	Description
	FAULT	CPU FAULT (RED)—Active upon reset and flashes CPU fault codes as necessary. See Table 4-4.
	RUN	RUN (GREEN)—Active GREEN after the CPU Operating system is loaded and running. See Table 4-4. 
	LINK	LINK ACTIVE (GREEN)—A valid Ethernet connection to another device exists
	TX/RX	TX/RX (YELLOW)—Active YELLOW when data is transmitted or received.
	CAN Port Status	CAN Port Status LED for Ports #1-8 Green: Active Red: Inactive
	CAN #1-4 FAULT	Fault with CAN ports 1-4. See Table 4-3 for flash codes. 
	CAN #5-8 FAULT	Fault with CAN ports 5-8. See Table 4-3 for flash codes. 
CAN LED's 	CAN #9, #10	  CAN #9, #10 (GREEN/RED)—Active GREEN or RED when data is transmitted or received through CAN port #9 or #10.

Table 7-2. CAN PORT STATUS Indicators

LED Status	Flash Code	State Description
Green	ON	Port Operational
RED	ON	CAN controller is bus off
OFF	OFF	No Error
GREEN	1	Stopped
GREEN	Blinking	Port Pre-Operational
RED	1	Too many frame errors
RED	2	Guard or Heartbeat error

Table 7-3. CAN FAULT Indicators

Failure	Flash Code
CPU FAIL	1
Unexpected Exception	2
RAM Error	3
Watchdog Timeout	4
EE Error	5
FLASH Error	6
OS Error	7
Overflow	8

Table 7-4. Gateway Unit Fault Codes

Failure	Flash Code
RAM Test Failure	1, 4
Real Time Clock Test Failure	2, 2
Floating Point Unit Test Failure	2, 3
Flash Test Failure	2, 4
HD1 Flash Test Failure	2, 5
I2C Bus Test Failure	2, 6
Module Installed in wrong slot	2, 7
Main Chassis CPU switch must be set to 0	3,5
Remote RTN Rate Group 5 Slip	3, 7
Remote RTN Rate Group 10 Slip	3, 8
Remote RTN Rate Group 20 Slip	3, 9
Remote RTN Rate Group 40 Slip	3, 10
Remote RTN Rate Group 80 Slip	3, 11
Remote RTN Rate Group 160 Slip	3, 12

Fault Detection (I/O)

In addition to detecting board hardware faults, the application program may detect I/O faults.

Microcontroller Faults—IOLOCK. When a CPU or I/O module fails, watchdog logic drives it into an IOLOCK condition where all output circuits and signals are driven to a known de-energized state as described below. The System MUST be designed such that IOLOCK and power OFF states will result in a SAFE condition of the controlled device.

- CPU and I/O module failures will drive the module into an IOLOCK state.
- CPU failure will assert an IOLOCK signal to all modules and drive them into an IOLOCK state.

The IOLOCK state is asserted under various conditions including:

- CPU and I/O module watchdog failures
- PowerUp and PowerDown conditions
- System reset and hardware/software initialization
- Entering configuration mode

IMPORTANT **Additional watchdog details and any exceptions to these failure states are specified in the related CPU or I/O module section of the manual.**

Troubleshooting Guide

Power Supply Checks

This troubleshooting guide checks areas which may present difficulties. If these checks are made prior to contacting Woodward for technical assistance, system problems can be more quickly and accurately assessed.

- Is the input voltage within the control's specified input voltage range (measured at control power supply input)?
- Is the input power free of switching noise or transient spikes?
- Is the power circuit dedicated to the RTN Gateway control only?

Reference Grounds

- Non-isolated nodes may not have a CAN signal ground available. If signal ground is not available, use the alternate wiring scheme of connecting all circuit grounds of isolated nodes to the shield, and connecting the shield to earth ground at a non-isolated node.
- If devices other than RTCnet or LINKnet-HT nodes are used on the same CAN network as the nodes, they may have non-isolated CAN ports. Non-Isolated CAN ports may not have a pin to terminate the signal common to. In this case a wire will need to be taken to the common of the supply input. This ensures that all ports are at the same reference with no degradation of capability present due to signal reference offset biasing.

Troubleshooting and Tuning

The Gateway module runs off-line and on-line diagnostics that display troubleshooting messages through the debug Service Port and AppManager. Off-line diagnostics run automatically on power-up and upon reset. On-line diagnostics run during normal MicroNet operation when the GAP application is active. More information on diagnostics tests, subsequent LED flash codes, and serial port messages is contained in the VxWorks manual.

Fault Detection (Unit Level)

Each Gateway has a red fault LED that illuminates when resetting the system. During initialization of the Gateway, which occurs after every CPU reset, the CPU turns the Fault LED on. The CPU then tests the Gateway using diagnostic routines built into the software. If the diagnostic test fails, the LED remains on or blinks. If the test is successful, the LED goes off.

Chapter 8.
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/directory**.

Product Service Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:
- Return authorization number;
- Name and location where the control is installed;
- Name and phone number of contact person;
- Complete Woodward part number(s) and serial number(s);
- Description of the problem;
- Instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- Protective caps on any connectors;
- Antistatic protective bags on all electronic modules;
- Packing materials that will not damage the surface of the unit;
- At least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- A packing carton with double walls;
- A strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- The part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- The unit serial number, which is also on the nameplate.

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: **www.woodward.com**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at **www.woodward.com/directory**, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used in Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Products Used in Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Turbine Model Number _____

Type of Fuel (gas, steam, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.)

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Appendix A.
Acronyms and Glossary of Terms

Acronyms

AC	Alternating Current
ADC	Analog-to-Digital Converter
AWG	American Wire Gauge (metric equivalent is mm²)
CAN	Controller Area Network
CE	The CE marking is a European proof of conformity and is also described as "passport" that allows manufacturers and exporters to circulate products freely within the EU. The letters "CE" (French for "Conformité Européenne") indicate that the manufacturer has satisfied all assessment procedures specified by law for its product.
CPU	Central Processing Unit. Executes the GAP application program.
CT	Current Transformer. Used to measure the generator or bus current.
DC	Direct Current
EEPROM	Electrically Erasable and Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
GAP	Graphical Application Program
GW	RTN Gateway
I/O	Input/Output
LED	Light Emitting Diode
LON	Local Operating Network
MFT	Minor Frame Timer. Used by the CPU for scheduling execution of the software.
MTBF	Mean Time Between Failures
PC	Personal Computer
PCB	Printed Circuit Board
PT	Potential Transformer. Used to measure the generator or bus voltage.
RAM	Random Access Memory
RG	Rate Group. Defines how often software is executed.
RTD	Resistance Temperature Device
RTN	Real-Time Network
RXD	Receive Data Line
SRAM	Static Random Access Memory
SSTP	Shielded-Shielded Twisted Pair (or Double Shielded Ethernet Cables)
THD	Total Harmonic Distortion
TXD	Transmit Data Line

Terms

RTN Gateway Chassis—A combination of pieces required to hold the boards together

Serial Port—A connection for RS-232

Revision History

Changes in Revision C—

- Remove Restricted markings from front cover
- Updated Declaration of Conformity

Changes in Revision B—

- Remove C-Tick information form Regulatory Compliance section
- Updated Declaration of Conformity

Changes in Revision A—

- Added new part number 8200-1252 to cover

Declarations

EU DECLARATION OF CONFORMITY

EU DoC No.:	00442-04-EU-02-01
Manufacturer's Name:	WOODWARD, INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Name(s)/Number(s):	RTN Gateway Communication System
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 94/9/EC (until April 19th, 2016) and Directive 2014/34/EU (from April 20th, 2016) on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)
Markings in addition to CE marking:	Ex Category 3 Group II G, Ex nA Gas Group IIC , T4 X Gc
Applicable Standards:	EN61000-6-4, 2011: EMC Part 6-4: Generic Standards – Emissions for Industrial Environments EN61000-6-2, 2005: EMC Part 6-2: Generic Standards – Immunity for Industrial Environments EN60079-0, 2007: Electrical apparatus for explosive gas atmospheres – Part 0: Equipment General Requirements EN60079-15, 2010: Electrical apparatus for explosive gas atmospheres – Part 15: Construction, Test and Marking for Type of protection 'n' electrical apparatus

This declaration of conformity is issued under the sole responsibility of the manufacturer
We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER

Signature

Christopher Perkins
Full Name

Engineering Manager
Position

Woodward, Fort Collins, CO, USA
Place

14-Apr-2016
Date

5-09-1183 Rev 26

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26612.

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