

WC45i-GW-485 Modbus Gateway

User & Reference Manual



Part Number: LUM0086AA Revision: Mar-2018

Safety Information

The products described in this manual can fail in a variety of modes due to misuse, age, or malfunction and is not designed or intended for used in systems requiring fail-safe performance, including life safety systems. Systems with the products must be designed to prevent personal injury and property damage during product operation and in the event of product failure.

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Preface

Contact FreeWave Technical Support

For up-to-date troubleshooting information, check the **Support** page at <u>www.freewave.com</u>. FreeWave provides technical support Monday through Friday, 8:00 AM to 5:00 PM Mountain Time (GMT -7).

- Call toll-free at 1-866-923-6168.
- In Colorado, call 303-381-9200.
- Contact us through e-mail at moreinfo@freewave.com.

Other WAVECONTACT Information

Use the FreeWave <u>http://support.freewave.com/</u> website to download the latest version of these documents.

Registration is required to use this website.

Document	Description	FreeWave Part Number
User Manual	The User Manual provides setup, configuration, and safety information for the WC45i-GW-485.	LUM0086AA
Quick Start Guide	The Quick Start Guide provides the out-of-the-box setup of the WC45i-GW-485.	QSG0035AA
Application Note	Remote Shutdown System	LAN5510AA

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Document Styles

This document uses these styles:

- Parameter setting text appears as: [Page=radioSettings]
- File names appear as: configuration.cfg.
- File paths appear as: C:\Program Files (x86)\FreeWave Technologies.
- User-entered text appears as: xxxxxxxx.

Caution: Indicates a situation that **MAY** cause damage to personnel, the radio, data, or network.

Example: Provides example information of the related text.

FREEWAVE Recommends: Identifies FreeWave recommendation information.

Important!: Provides crucial information relevant to the text or procedure.

Note: Emphasis of specific information relevant to the text or procedure.



Provides time saving or informative suggestions about using the product.



Warning! Indicates a situation that **WILL** cause damage to personnel, the radio, data, or network.

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1. Overview

Thank you for purchasing the WC45i-GW-485 Modbus Gateway.

The WAVECONTACT WC45i-GW-485 has these features:

- AES 128-bit Encryption
- Class 1 Division 2 Area certification
- RS485 connection to a Modbus master device.
- Wide range DC power input: +6 to +36VDC.
- Collects and caches Modbus data from all WAVECONTACT remote devices.
- Provides configuration and status registers for remote configuration and status monitoring.
- Stores a maximum of 4700 register values from any combination of remote Endpoints.
- Supports transparent Modbus mode.
- Internal Remote Shut Down (RSD) logic control option.
- Slave register re-mapping.
- Remote configuration of WAVECONTACT devices through an Ethernet Gateway connection.
- Remote sensor configuration (PACTware[™] and RadarMaster).
- Integrated 500mW FHSS 900MHz ISM band radio and high gain antenna.

Note: The terms node and Endpoint are used interchangeably in this document.

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1.1. Operation

The WC45i-GW-485 supports all remote WAVECONTACT Endpoints. This allows all remote sensor data to be available in Modbus format.

- The register data from remote sensor Endpoints is available by requesting the remote Endpoint's Modbus Slave ID and register address from that Endpoint's register map.
- The WC45i-GW-485:
 - responds with the most recent copy of the data from the remote Endpoint.
 - automatically times out data from a remote Endpoint it stops receiving data for.

1.1.1. Remote WC45i-GW-485s and Non-sleeping Radio Only Endpoints

- Pre-configured remote Endpoints forward their set of registers to the Modbus Gateway on a pre-defined schedule (1 minute to 5 minutes is typical).
 - The register data is then buffered in the Gateway and can be read by the RTU at any time.
- If a Modbus request is received by the WC45i-GW-485 for a Modbus ID and address where buffered data does NOT exist but the Modbus ID is known, the Modbus request is forwarded to the remote Modbus Endpoint over the WAVECONTACT network.
 - The response is returned to the RTU.
- If a request for multiple registers is issued by the RTU **AND** if the WC45i-GW-485 does NOT have all registered data buffered, an exception is returned.
 - The system will NOT combine buffered and transparent data within a single Modbus response.

1.1.2. Remote WC45i-GW-485 Endpoint Re-Scan

It is possible to cause a remote WC45i-GW-485 to re-scan for attached Modbus devices by writing to one of the Gateway's configuration registers.

- This is useful to discover a Modbus device that is added to an existing Modbus Endpoint.
- The scan may be initiated by one of these methods:
 - If the radio address of the Gateway is known, writing this address to Gateway register 3000 will result in a scan.
 - If the Modbus ID of one of the already registered devices attached to a WC45i-GW-485 is known, a scan is started by writing the ID to Gateway register 3002.

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2. Equipment

2.1. Included Equipment

The WC45i-GW-485 package contains these items:

Included Equip	ment - WC45i-GW-485
Qty	Description
1	WC45i-GW - Gateway with Modbus Interface and 25ft cable
1	WC45i-BB - Smart Breakout Board
1	WC45i-GW-485 Quick Start Guide

2.1.1. User-supplied Equipment

- Small, flathead screwdriver
- Mounting equipment for the WC45i-GW-485.
- USB to Serial DB9 programming cable (FreeWave Part #: WC-USB-DB9)
- DC Adapter Power Supply (+6 to +36VDC)
- Barrel connector with Ground and Power flying leads
- Computer for WAVECONTACT device configuration.

Note: See Available Accessories (on page 108) for additional equipment.

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3. WC45i-GW-485 Connections

- Connections (on page 11)
- Power and Gateway Connections (on page 13)

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3.1. Connections

Important!: The WC45i-GW-485 Modbus Gateway is configured using the **WC Toolkit**. Download the **WC Toolkit** software from <u>http://support.freewave.com/</u>. Registration is required to use this website.

Note: The **RS232 Config / Debug** connector on the WC45i-GW **MUST** be used for WC Toolkit access.

The Config / Debug port is accessed by a direct connection to the WC45i-GW-485 **RS232 Config / Debug** connector port.

The WC45i-GW-485 uses a 6-conductor cable and the WC45i-BB Smart Breakout Board for power and serial communications.

3.1.1. Connections - WC45i-BB

The WC45i-BB Smart Breakout Board (FreeWave Part #: WC45i-BB, Figure 1), is used to:

- Connect to the RS232 lines (#2)
- Configure the WC45i-GW-485 system (#4).
- Power the WC45i-GW-485 (#5).

Important!: The Signal Strength LEDs (#3) do NOT light at the Gateway as multiple Endpoints with varying signal strength may be connected at one time.

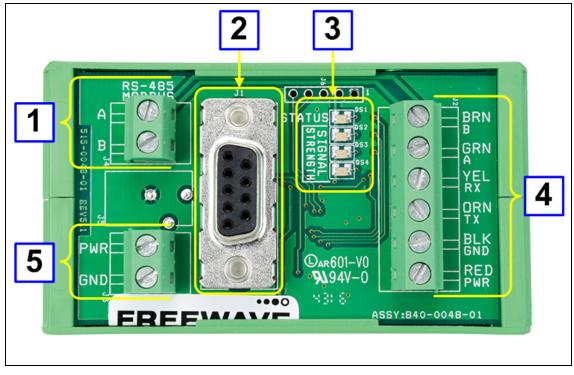


Figure 1: WC45i-BB Smart Breakout Board used with the WC45i-GW-485

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WC45i-BB S	WC45i-BB Smart Breakout Board Connections		
Location #	Title	Description	
1	RS485 Modbus Block	Connect the Modbus master to the RS485 Modbus Block.	
2	RS232 RS232 Config / Debug connector	The RS232 Config / Debug connector is for the USB to Serial DB9 programming cable (FreeWave Part # WC-USB-DB9).	
3	Signal Strength LEDs	See LEDs (on page 107) for detailed information.	
4	 BRN-B GRN-A YEL-RX ORG-TX BLK-GND RED-PWR 	 RS485 B - 9600 Baud RS485 A - 9600 Baud RS232 Config / Debug connector RX - 9600 Baud RS232 Config / Debug connector TX - 9600 Baud Ground Positive Power (+6 to +36VDC) 	
5	PWR GND	Power Source from an external power supply of +6 to +36VDC. External power ground.	

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3.2. Power and Gateway Connections

Important!: Verify the items listed in Equipment (on page 9) are available before starting this procedure.

It is assumed that the reader and installer have completed the FreeWave WC45i-GW-485 installation and setup training to follow the procedures in this document.

- 1. All wiring should be neat and orderly.
- 2. On the WC45i-BB Smart Breakout Board:
 - a. Connect the configuration wires of the Gateway to their respective color-designated screw terminal connections.
 - b. Connect the Serial end of the WC-USB-DB9 cable to the **RS232 Config / Debug** connector port and the USB connection to the computer.
 - c. Use the PWR screw terminal connection to connect the Power Source from an external power supply of +6 to +36VDC.
 - d. Use the GND screw terminal connection to connect the External power ground.
 - e. Connect the Modbus master to the RS485 Modbus Block.

The WC45i-BB connections are similar to Figure 2:



Figure 2: WC45i-BB Connections

3. If this is the first time the WC45i-GW-485 is installed, wait for the drivers to install.

Important!: Depending on the computer and connection, the driver installation can take 3-6 minutes.

- 4. Continue with:
 - WC Toolkit Installation (on page 14)
 - Configuration (on page 24)

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4. WC Toolkit Installation

Note: The images in this procedure are for Windows® 7 and/or Firefox®. The dialog boxes and windows may appear differently on each computer.

1. Click <u>http://support.freewave.com/</u>. The **FreeWave Support** site opens.

Important!: Registration is required to use this website.

		SUPPORT REGISTER FREEWAVE.COM
	How can we help?	
Q Search the kr	owledge base	
Help Topics		Log In
		Username
		Password
		Remember Me Lost your password?
		Can't Find it? Contact us! Phone: 1.866.923.6168
		Email: <u>support@freewave.com</u>



2. Enter the User Name and Password.

```
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```

3. Click

A successful Login message briefly appears. The **Help Topics** window opens.

4. Click the **Software** link.

Help Topics		
1 III		With
Software	Path Study Request Form	log out
TumlQ App Server Software	MM2-M13 Series	
Training and Education	TumLink Series	Can't Find it? Contact us! Phone: 1.866.923.6168 Email: <u>support@freewave.com</u>
		•

Figure 4: Help Topics window

The Software window opens.

5. Click the **WAVECONTACT Toolkit** link.

FREEWAVE	SUPPORT	REGISTER	FREEWAVE.COM	
	Q Search	n the knowledge	base	Е
Software		Can't Find it	? Contact us!	
Tool Suite		Phone: 1.866 Email: <u>suppor</u>	.923.6168 tt@freewave.com	
WAVECONTACT Toolkit				Ŧ

Figure 5: Software window

The available software appears in the window.

6. Select and click the attachment.

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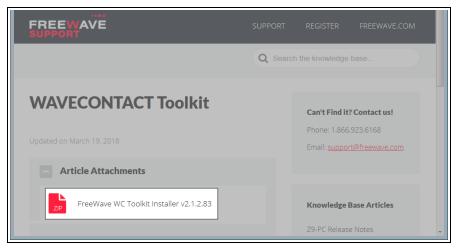


Figure 6: WAVECONTACT Toolkit window

The **Opening** dialog box opens.

Opening FreeWave-V	VC-Toolkit-Installer-v2.1.2.83.zip	×
You have chosen to	open:	
👢 FreeWave-W	/C-Toolkit-Installer-v2.1.2.83.zip	
which is: Com	pressed (zipped) Folder (8.8 MB)	
from: http://s	upport.freewave.com	
What should Firefo	ox do with this file?	
© <u>O</u> pen with	Windows Explorer (default)	
◙ <u>S</u> ave File)
🗖 Do this <u>a</u> uto	matically for files like this from now on.	
	OK Cance	

Figure 7: WC Toolkit Opening dialog box

Note: This procedure shows Firefox® dialog boxes. Other browsers will have different dialog boxes and procedures.

7. Click **OK**.

The Enter name of file to save to dialog box opens.

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Enter name of file to s	save to mputer → OS (C:) →	_WC Toolkit for FW →	✓ 4 ₂	Search _WC Toolkit for FW 🔎
Organize 🔻 New	folder			II - 0
Desktop Desktop Desktop Computer OS (C:) DVD RW Drive	e (D:)	Name	* III	Date modified
	FreeWave-WC-Toolkit- Compressed (zipped) Fo			•
lide Folders				Save Cancel

Figure 8: Enter name of file to save to dialog box

- 8. Search for and select a location to save the .zip file to and click **Save**. The **Enter name of file to save to** dialog box closes.
- 9. Open a Windows® Explorer window and find the location where the .zip file was saved.
- 10. Double-click the .zip file.
- 11. Extract the .exe file from the .zip file into a parent location.
- 12. Double-click the **.exe** file to run the WC Toolkit installer. The **Open File - Security Warning** dialog box opens.

Open File - Security Warning
Do you want to run this file?
Name:FW\FreeWave WC Toolkit Installer v2.1.2.83.exe Publisher: <u>SignalFire Telemetry, Inc.</u> Type: Application From: C:_WC Toolkit for FW\FreeWave WC Toolkit I
Always ask before opening this file
potentially harm your computer. Only run software from publishers you trust. What's the risk?

Figure 9: Open File - Security Warning dialog box

13. Click Run.

The User Account Control dialog box opens.

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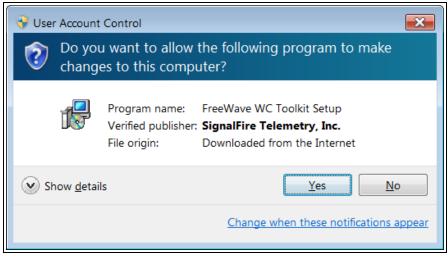
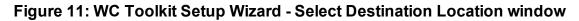


Figure 10: User Account Control dialog box

14. Click Yes.

The WC Toolkit Setup Wizard starts.

😼 Setup - FreeWave WC Toolkit	- • 🗙
Select Destination Location Where should FreeWave WC Toolkit be installed?	
Setup will install FreeWave WC Toolkit into the following folder.	
To continue, click Next. If you would like to select a different folder, click E	Browse.
C:\Program Files (x86)\FreeWave\FreeWave WC Toolkit	Browse
At least 19.2 MB of free disk space is required.	
Next >	Cancel



15. Click **Next** to continue. The **Ready to Install** window opens.

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🔂 Setup - FreeWave WC Toolkit	• 💌
Ready to Install Setup is now ready to begin installing FreeWave WC Toolkit on your computer.	
Click Install to continue with the installation, or click Back if you want to review or change any settings.	
Destination location: C:\Program Files (x86)\FreeWave\FreeWave WC Toolkit	*
*	Ŧ
< Back Install C	ancel

Figure 12: WC Toolkit Setup Wizard - Ready to Install window

16. Click Install.

The install process is very quick. The **Installation Complete** window opens.

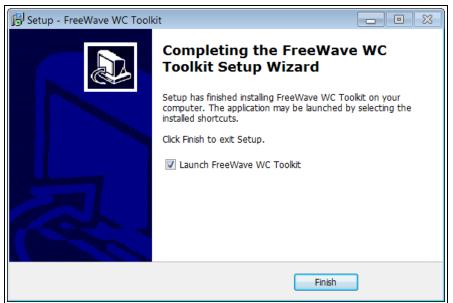


Figure 13: WC Toolkit Setup Wizard - Installation Complete window

17. Click **Finish** to open WC Toolkit.

An Update message appears in the WC Toolkit window is an update is available.

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C	FreeWave WC	Foolkit v2.1.	2.83		- • •
	File Options	Updates	Tools	Help	Update Available
	Auto-Detect Device COM Port: COM1 Select COM Port Auto-Detect De	ort to Auto-Dete			EEWAVE
	Select Device WC45i-Gateway				Open Device Window

Figure 14: WC Toolkit - Update Available message

18. Continue with the WC Toolkit Update (on page 21) procedure.

5. WC Toolkit Update

If the WAVECONTACT device is connected to the internet, WC Toolkit automatically searches for an update for either the WC Toolkit itself or the connected device's firmware.

An **Update Available** message appears if an update is available.

Note: An **Update Available** message also appears in the Device Configuration window (on page 57) for any connected WAVECONTACT device when an update is available for that device. The update procedure is the same for the device and WC Toolkit.

 Open the WC Toolkit software. The Update Available message appears in the window. (Figure 15)

O FreeWave WC Toolkit v2.1.2.83	
File Options Updates To	ols Help Update Available
Auto-Detect Device COM Port: COM1 Refres Select COM Port to Auto-Detect Auto-Detect Device on COM Port Select Device WC45i-Gateway	Customer Login: None

Figure 15: WC Toolkit - Update Available message

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2. Click the Update Available message link.

O FreeWave WC Toolkit v2.1.2.83	
File Options Updates Tools Help Update Available Auto-Detect Device COM Port: COM1 Refresh Select COM Port to Auto-Detect Auto-Detect Device on COM Port Auto-Detect Device on COM Port Customer Login: None	Click this link.
Select Device WC45i-Gateway	

Figure 16: Click the Update Available message link

The Open File - Security Warning dialog box opens.



Figure 17: Open File - Security Warning dialog box

3. Click Run.

The User Account Control dialog box opens.

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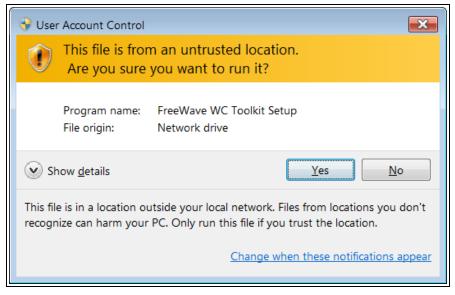


Figure 18: User Account Control dialog box

4. Click Yes.

The WC Toolkit update process is very quick.

When the update is completed, WC Toolkit re-opens the **Select Device** window showing the updated software version in the WC Toolkit window. (Figure 19)

O FreeWave WC Toolkit	_ • ×
File Options Updates Tools	Help
Auto-Detect Device COM Port: COM Refresh Auto-Detect COM : Success Auto-Detect Device on COM Port	Customer Login: None
Select Device WC45i-Gateway	Open Device Window

Figure 19: Select Device window

5. Continue with Configuration of the WC45i-GW-485.

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6. Configuration

Note: The terms node and Endpoint are used interchangeably in this document.

FREEWAVE Recommends: Install and configure the **WC45i** Gateway before any Endpoints to ensure the Endpoints have connectivity after installation.

Important!: The WC45i-GW-485 Modbus Gateway is configured using the WC Toolkit. Download the WC Toolkit software from <u>http://support.freewave.com/</u>. Registration is required to use this website.

Important!: The **RS232 Config / Debug** connector on the WC45i-GW **MUST** be used for WC Toolkit access.

The Config / Debug port is accessed by a direct connection to the WC45i-GW-485 **RS232 Config** / **Debug** connector port.

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Procedure

Note: The screenshots are examples only. The dialog boxes and windows appear differently on each computer.

1. Verify the WC Toolkit software is installed on the computer connected to the WC45i-GW-485.

Note: See WC Toolkit Installation (on page 14) and WC Toolkit Update (on page 21).

 Open the WC Toolkit software. The Select Device window opens. (Figure 20)

O FreeWave WC Toolkit v	
File Options Updates Tools	Help
Auto-Detect Device	
COM Port: COM Refresh	••••
Auto-Detect COM	FREEWAVE
Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	Open Device Window

Figure 20: Select Device window

- 3. Click the **Refresh** button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the **COM Port** list box.
- 4. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.
- 5. Click the **Auto-Detect Device on COM Port** button to have WC Toolkit connect the device to the COM Port selected in the **COM Port** list box.

Note: Optional: Click the **Select Device** list box arrow and select the connected WC45i-Gateway device.

Click the **Open Device Window** button to open the Device Configuration window (on page 57).

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O FreeWave WC Toolkit v	
File Options Updates Tools Auto-Detect Device COM Port: COM22 Refresh Auto-Detect COM22: Success	Help FREEWAVE
Auto-Detect COM22: Success Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	Open Device Window
WC45i-Gateway WaveView	
W220i-Analog (4-20mA) WC20i-Analog (1-5V) WC20i-HART ^{***} WC20i-Digital WC20i-Modbus 485 WC20i-Modbus 485/2DI WC20i-Turbine WC20i-KTh WC20i-RTD	
WC30i-TZ WC30i-AXIS - Thief Hatch WC30i-AXIS - Pumpjack Monitor WC30i-Wireless Pressure Sensor WC30i-Wireless Level Sensor	
WC40i-Modbus System WC40i-RSD System WC40i-MultiIO System WC40i-MultiIO Module WC40i-Counter System WC40i-RSD Remote Switch	
WC25i-Wireless IO Module	
WC15i C1D1 Endpoint	

Figure 21: Select Device list box

The Device Configuration window opens for the selected device.

Note: See Device Configuration window (on page 57) for detailed information.

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	WC45i-Gateway File Options Settings Update	s Tools Help				1 Passed
		Modbus Slaves Reporting				
2	COM Port: COM22 - Refresh	Double-click a Row to View Registers				Auto Refresh List
~	COM22 Open	Slave Node No ID Type Nat		Register Checkin Quantity Interval	TTL (min): Mainboa Current/Max Firmware	
	Open Close Offline	1 WC20i-HART	-46	18 1 min	5/7 0.56	2.50 (sleeping)
	TCP Connection	5 WC30i-Pressur Pres		20 5 sec	1/2 0.24	2.50 (sleeping)
		5 WCJUPPIessui Pies	ssurer -55	20 3 580		2.50 (sieeping)
	Connect/Update				3	
	Product GATEWAY(STICK)					
	Supply Voltage 9.017 Bootloader Version 2.01					
4	Gateway Version 8.02					
	Gateway Version Date 17-Mar-2017					
	Radio Version 2.50					
	Radio Address 27076					
	Corporate ID <encrypted></encrypted>					
	Radio Network 1					
	Radio Network Group 10					
	Radio Power (dBm) 5					
	Gateway Slave ID 250					
	RS485 Baud Rate 9600					
	RS485 UART Mode 8N1 Registers in Use 38 of 4700					
	Slave Entries in Use 2 of 240					
	Radio Packets/Minute 10					
	Remote Sensor Config Unlocked					
	Settings Radio Network	Set Encryption Key	Help Gateway RS485	5 Settings	ateway Slave ID Word/Byte Orde	er Remote Configuration
	Set		Gateway Slave		High Word/High Byte (ABCD)	Ready
	Radio Network Group 10 -				High Word/Low Byte (BADC)	Set
		Key; freewave			Low Word/High Byte (CDAB)	
		Key: freewave	UART Mode:	8N1 -	Low Word/Low Byte (DCBA)	Start Configuration
	Success	↑		1	↑	T
	E	C		7	0	
	101	6		1	Ŏ	9
			L			

Figure 22: Device Configuration window: WC45i-Gateway

6. In the Settings area (#5), change these settings:

Note: The **Network** settings are used to create separate networks using multiple Gateways (that are in close proximity to one another).

Important!: The Radio Network and Radio Network Group settings are selected by the user but MUST MATCH the existing Gateway network for successful communication between the Gateway and Endpoint. See WAVECONTACT Network Frequencies (on page 95) for additional information.

- a. Click the **Radio Network** list box arrow and select 0 (zero) to 7 for the assigned number.
- b. Click the **Radio Network Group** list box arrow and select 0 (zero) to 29 for the network group assigned number.
- c. Click the Set button to save the information.
- 7. In the Set Encryption Key area (#6), change these settings:
 - a. In the **Key** text box, enter the encryption key for the device using 6 to 16 characters.
 - b. Click the **Set** button to save the information.

Important!: A Key CANNOT contain spaces or angle brackets. The Gateway and Endpoints only communicate if they are configured with the same **Key**. When setting up a new network, use this same encryption Key on all the devices.

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Note: When the WC45i-GW-485 drops its network, it attempts to join networks using the same encryption **Key**.



Caution: It is possible to hide the encryption **Key** so it cannot be read. This is the most secure option, but if the **Key** is forgotten, there is **no way to recover it**. The **Key** must be reset on every device on the network.

8. Optional: Click the **Settings** menu and select **Set Encryption Key Unrecoverable** to permanently hide the key.

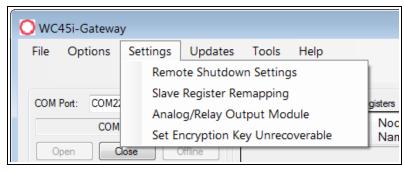


Figure 23: Settings menu > Set Encryption Key Unrecoverable

9. Click **Refresh List** button to update the **Modbus Slaves Reporting** table with all connected remote Endpoints.

Double-clic	k a Row to View Reg	gisters						Auto Refresh	Refresh List
Slave ID	Node Type	Node Name	RSSI (dBm)	Register Quantity	Checkin Interval	TTL (min): Current/Max	Mainboard Firmware	Radio Firmware	Configure
1	WC20i-HART		-46	18	1 min	5/7	0.56	2.50 (sleeping)	
5	WC30i-Pressur	Pressure1	-33	20	5 sec	1/2	0.74	2.50 (sleeping)	

Figure 24: Modbus Slaves Reporting table

10. Configure the Endpoints attached to the WC45i-GW-485.

Note: Use the Configuration procedure in the User Manual for these WAVECONTACT Endpoints: WC15i Multi-Input C1D1 Endpoint, WC20i Endpoint, WC30i Wireless Pressure Sensor, WC40i Modbus Endpoint, WC40i-COUNT Counter Endpoint, or WC40i-MB-RSD Modbus Endpoint.

- 11. Optional: On the WC20i or WC45i-GW-485Endpoint, press the **Check-in** button to apply power to the configured sensor, read the sensor values, and send the collected sensor data to the Gateway.
- 12. Verify the Gateway is communicating with the Endpoints.

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Note: A successful connection on the WAVECONTACT Endpoint is indicated with Green blinking \ominus TX and ACT lights and a Red blinking \ominus light for RX.

If the connection is NOT successful, a Green blinking \bigcirc TX light appears for 10 seconds.

- 13. If applicable, continue with these other WC45i configuration procedures:
 - Remote Endpoint Configuration (on page 40)
 - Remote Shutdown (RSD) and Local Digital Output Control (on page 44)
 - Slave Register Remapping (on page 48)
- 14. Close the WC Toolkit software.
- 15. Remove the WC-USB-DB9 USB to Serial DB9 programming cable from the computer and the WC45i-BB.
- 16. As applicable, replace the Endpoint cover.
- 17. Mount the Gateway device.

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7. Gateway Event Log

The Gateway keeps an internal log of events that are viewed in the Gateway Log window (on page 73) of WC Toolkit.

The **Gateway Log** window is used to log events such as reboots, remote Endpoints joining and/or timing out, local RSD control events, remote configuration sessions, firmware updates, etc.

Procedure

Note: The terms node and Endpoint are used interchangeably in this document.

- 1. Open the Device Configuration window (on page 57).
- 2. On the Tools menu, click View Gateway Log.

O WC45i-Gateway		
File Options Settings Updates	Tools Help	_
	Detect Ethernet Gateways Ctrl+E	
COM Port: COM22	Show Ethernet Gateway IP Address	
	Debug Terminal Ctrl+D	F
COM22 Open	RS485 Details	
Open Close Offline	View Gateway Log Ctrl+L	
TCP Connection	Network Map Ctrl+M	
Connect/Lindate		

Figure 25: Tools menu > View Gateway Log

The **Gateway Log** window opens. The **Gateway Log** tab is active.

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Sateway Log Log Statistics			
Timestamp	Sequence	Event Type	Message
3/22/2017 4:31:40 PM	186	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 4:18:35 PM	185	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 4:17:31 PM	184	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 4:07:10 PM	183	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 3:54:25 PM	182	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 3:41:25 PM	181	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 2:27:33 PM	180	NODEINFO	Slave 1 Added, Radio Address 27013, WC20-HART, Checkin Interval=1 min, RSSI=-34, BattV=3675
3/22/2017 2:18:39 PM	179	BOOTUP	Gateway Software Reboot, SupplyVoltage=8958mV
3/22/2017 2:18:39 PM	178	REBOOT	Reboot Reason: no modbus slaves
3/22/2017 2:16:39 PM	177	NODEINFO	Slave 1 Timed Out, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-29, BattV=3398
3/22/2017 2:16:01 PM	176	REMOTECONFIG	Session started with Slave 1, Radio Address 27014
3/22/2017 2:09:46 PM	175	NODEINFO	Slave 1 Added, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-29, BattV=3398
3/22/2017 2:08:15 PM	174	FIRMWARE	Radio Firmware Update: spiNode_300mw_v2.50.fwi
3/22/2017 2:05:23 PM	173	FIRMWARE	Radio Firmware Update: spiNode_300mw_v2.50.fwi
3/22/2017 2:03:39 PM	172	NODEINFO	Slave 1 Timed Out, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-39, BattV=3626
3/22/2017 1:28:15 PM	171	NODEINFO	Slave 1 Added, Radio Address 27014, Sent TC, Checkin Interval=1 min, RSSI=-45, BattV=3613
3/22/2017 1:19:39 PM	170	BOOTUP	Gateway Software Reboot, SupplyVoltage=8841mV
3/22/2017 1:19:39 PM	169	REBOOT	Reboot Reason: no modbus slaves
		Gateway Powered	Dn: 0 days, 8 hr, 33 min, 23 sec Last Power Up: 03/22/2017 08:06:39

Figure 26: Gateway Log window - Gateway Log tab

- 3. Complete any of these options:
 - Click the Refresh or Refresh List button to update the information in the table.
 - Click the Log Entries list box arrow and select how many log entries to view on the Gateway Log tab.
 - Click the **Load Log from File** button to open the Microsoft® **Open** dialog box with the default location where the **.csv** file of the log information is saved.
 - Click the **Save Log to File** button to open the Microsoft® **Save As** dialog box with the default location to save the .csv file of the log information in.
- 4. Optional: Click the Log Statistics tab to view statistics about the log events.

Slave ID 4	 Node Type Sent Float 	3/22/2017 1:28:11 PM	Timeouts 1	3/22/2017 2:03:35 PM	(dBm) -29	Configurations	Voltage (mV)
						0	3398

Figure 27: Gateway Log window - Log Statistics tab

- 5. Optional: Click the **Refresh** or **Refresh List** button to update the information in the table.
- 6. Optional: Click the **Save Report to File** button to open the Microsoft® **Save As** dialog box with the default location to save the CSV version of the log file in.
- 7. Close the Gateway Log window.

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8. Firmware Updates

Firmware updates for both the Gateway and the built-in radio are completed over:

- the RS232 Config / Debug connector port using WC Toolkit.
- a remote TCP connection if a WC45i-GW-P Ethernet Gateway is used.

Note: These procedures are for both the WC45i-GW-485 and WC45i-GW-DIN devices.

- Gateway Firmware Update (on page 33)
- Radio Firmware Update (on page 35)
- Rescue Gateway (ARM) Bootload (on page 37)

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8.1. Gateway Firmware Update

 Verify the WC Toolkit software is installed on the computer connected to the WC45i-GW-485.

Note: See WC	Toolkit Installation (on page	14) and WC	Toolkit Ur	odate (c	on pag	ae 21)).
	100mm motunation	on page		roomat or		n pas	,,	۰.

2. Open the **WC Toolkit** software.

The Select Device window opens. (Figure 28)

O FreeWave WC Toolkit v	- • 🔀
File Options Updates Tools	Help
Auto-Detect Device COM Port: COM Refresh Auto-Detect COM : Success	FREEWAVE
Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	Open Device Window

Figure 28: Select Device window

- 3. Click the **Refresh** button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the **COM Port** list box.
- 4. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.
- Click the Auto-Detect Device on COM Port button to have WC Toolkit connect the device to the COM Port selected in the COM Port list box. The Device Configuration window opens for the selected device.
- 6. On the Update menu, click Update Gateway Firmware.

OWC45i-Gateway				
File Options Settings	Updates	Tools	Help	
	Updat	te Gatew	ay Firmware	
COM Port: COM22 -	Upda	te Radio	Firmware	s
COM22 Open		Slave	Node	Node

Figure 29: Updates menu > Update Gateway Firmware

The Firmware Updates window opens.

Note: See Firmware Updates window (on page 71) for detailed information.

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O Firmware	Updates	
Current File	\\freewave.local\fileshares\FWToolkit\Firmware\modbusGW_X0_8_0	Browse Start Transfer
Ready to Tra	nsfer File	

Figure 30: Firmware Updates window

Note: By default, the latest firmware file is selected from the update server. When the **Update Gateway Firmware** menu is selected, the WC45i-Gateway searches for the most recent **modbusGW** file to update.

- 7. Click the Start Transfer button to load the file to the device.
- 8. Wait while the **Firmware Updates** window progress bar shows the file transfer.

O Firmware	Updates 📃 🔳 💌
Current File	\\freewave.local\fileshares\\FWToolkit\Firmware\Browse
99%	Cancel
Updating Ra	dio

Figure 31: Progress bar of firmware update

A message appears when the firmware update is successful.



Figure 32: Successful firmware update message

9. Click **OK** to close the message.

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8.2. Radio Firmware Update

 Verify the WC Toolkit software is installed on the computer connected to the WC45i-GW-485.

```
Note: See WC Toolkit Installation (on page 14) and WC Toolkit Update (on page 21).
```

2. Open the **WC Toolkit** software.

The Select Device window opens. (Figure 28)

O FreeWave WC Toolkit v	
File Options Updates Tools	Help
Auto-Detect Device COM Port: COM Refresh Auto-Detect COM : Success	FREEWAVE
Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	Open Device Window

Figure 33: Select Device window

- 3. Click the **Refresh** button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the **COM Port** list box.
- 4. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.
- Click the Auto-Detect Device on COM Port button to have WC Toolkit connect the device to the COM Port selected in the COM Port list box. The Device Configuration window opens for the selected device.
- 6. On the Update menu, click Update Gateway Firmware.

0) wc	45i-Gatewa	ау				
	File	Options	Settings	Updates	Tools	Help	
				Upda	te Gatew	vay Firmware	
COM Port: COM22 -		Upda	te Radio	Firmware			
		CON	122 Open		Slave	Node	Node

Figure 34: Updates menu > Update Radio Firmware

The Firmware Updates window opens.

Note: See Firmware Updates window (on page 71) for detailed information.

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O Firmware	Updates	- • ×
Current File	\\freewave.local\fileshares\\FWToolkit\Firmware\spiNode_300mw_v2.	Browse Start Transfer
Ready to Tra	nsfer File	.:

Figure 35: Firmware Updates window

Note: By default, the latest firmware file is selected from the update server. When the **Update Radio Firmware** menu is selected, the WC45i-Gateway searches for the most recent **appNode** file to update.

- 7. Click the Start Transfer button to load the file to the device.
- 8. Wait while the **Firmware Updates** window progress bar shows the file transfer.

O Firmware	Updates	- • ×
Current File	\\freewave.local\fileshares\\FWToolkit\Firmware\	Browse
99%		Cancel
Updating Ra	dio	.::

Figure 36: Progress bar of firmware update

A message appears when the firmware update is successful.



Figure 37: Successful firmware update message

9. Click **OK** to close the message.

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8.3. Rescue Gateway (ARM) Bootload

Possible causes to run a **Rescue Bootload**:

- Power failure.
- Communications failure during firmware update process.
- The base LED is solid on and/or the WC Toolkit is unable to communicate with the Gateway.

Procedure

- 1. Remove the DC power from the Gateway.
- 2. Verify the WC Toolkit software is installed on the computer connected to the WC45i-GW-485.

Note: Download the WC Toolkit software from http://support.freewave.com/.

3. Open the **WC Toolkit** software. The **Select Device** window opens. (Figure 28)

O FreeWave WC Toolkit v	
File Options Updates Tools	Help
Auto-Detect Device COM Port: COM Refresh Auto-Detect COM : Success	FREEWAVE
Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	✓ Open Device Window

Figure 38: Select Device window

- 4. Click the **Refresh** button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the **COM Port** list box.
- 5. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.
- Click the Auto-Detect Device on COM Port button to have WC Toolkit connect the device to the COM Port selected in the COM Port list box. The Device Configuration window opens for the selected device.
- 7. On the Update menu, click Update Gateway Firmware.

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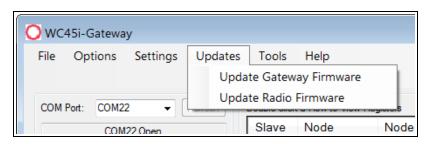


Figure 39: Updates menu > Update Gateway Firmware

The Firmware Updates window opens.

Note: See Firm	ware Updates window (on page 71) for detailed information.	
O Firmwar	e Updates	
Current File	<pre>\/freewave.local/fileshares//FWToolkit/Firmware/modbusGW_X0_8_0 Browse Start Transfer</pre>	
Ready to Tr	ansfer File .:	

Figure 40: Firmware Updates window

Note: By default, the latest firmware file is selected from the update server. When the **Update Gateway Firmware** menu is selected, the WC45i-Gateway searches for the most recent **modbusGW** file to update.

8. Click the **Start Transfer** button to load the file to the device.

Wait while the Firmware Updates window progress bar shows the file transfer.

O Firmware	Updates	
Current File 99%		Browse Cancel
Updating Ra	adio	.::

Figure 41: Progress bar of firmware update

A message appears when the firmware update is successful.

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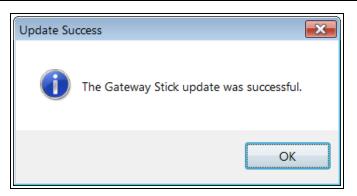


Figure 42: Successful firmware update message

9. Re-connect the DC power to the Gateway. The firmware update process starts.

Note: If the firmware update does NOT start, remove power for at least 10 seconds and re-try.

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9. Remote Endpoint Configuration

The WC45i-GW-485 Modbus Gateway allows configuration changes to be made to any of the connected WAVECONTACT remote Endpoints wirelessly.

- The WC45i-GW-485 requires an initial configuration using the Config / Debug connector.
 - The Config / Debug port is accessed by a direct connection to the WC45i-GW-485 RS232 Config / Debug connector port.

Note: This procedure assumes WC Toolkit has been installed. Download the **WC Toolkit** software from <u>http://support.freewave.com/</u>. Registration is required to use this website.

Procedure

Note: The terms node and Endpoint are used interchangeably in this document.

- 1. Open the Device Configuration window (on page 57).
- 2. In the **Configure** column, select the check-box next to the Endpoint to configure.

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ile Options S	Settings Updates	Tools	Help								Passe
COM Port: COM22	✓ Refresh		ves Reporting a Row to View Re	aisters						Auto Refresh	Refresh List
COM22		Slave ID	Node Type	Node Name	RSSI (dBm)	Register Quantity	Checkin Interval	TTL (min): Current/Max	Mainboard Firmware	Radio Firmware	Configure
Open Clos	e Offline	1	WC20i-HART		-45	18	1 min	6/7	0.56	2.50 (sleeping)	
Connect/	Update										
Product Supply Votagion Sateway Version Sateway Version Date Radio Ardress Corporate ID Radio Atdress Corporate ID Radio Network Radio Network Group Radio Network Group Radio Network Group Radio Revers (Janter Radio Network Group Radio Radio Radio Radio Radio Radio Radio Radio Radio Packets Minute Reado Packets Minute Remote Sensor Config	2.50 27076 <chcrypted> 1 10 5 250 9600 8N1 22 of 4700 1 of 240 1</chcrypted>										
Settings Radio Network Radio Network Group	1 • Set	Set Encrypt Key	ion Key r: freewave	Set	Gateway RS48 Gateway Slave Baud Rate: UART Mode:	-	Set	iateway Slave ID W High Word/High I High Word/Low E Low Word/High E Low Word/Low B	Byte (ABCD) lyte (BADC) lyte (CDAB)	t	iration ady ifiguration

Figure 43: Detail of Endpoint in Modbus Slaves Reporting Table

- 3. Click the Start Configuration button to activate a Remote Configuration session.
 - If the Endpoint has a **Non-Sleeping** radio, the **Remote Configuration** session is ready immediately.
 - If it is a **Sleeping** device, wait for the Endpoint to either check-in or send a beacon so it can be commanded into **Configuration** mode.
 - A WC20i Endpoint sends a beacon every 21/2 minutes.
 - All other **Sleeping** Endpoints send a beacon every 5¹/₂ minutes.
 - When the device has entered a **Remote Configuration** session, a message indicating the **Slave is Ready** appears.

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COM22 Open ID	ve Node Type WC20i-HART	Node RS Name (dB		Checkin	TTL (min):	Mainboard	Radio		
Open Cose Offine 1 TCP Connection			m) Quantity					Configure	
TCP Connection	WC20i-HART			Interval	Current/Max	Firmware	Firmware	-	
		-45	18	1 min	6/7	0.56	2.50 (sleeping)	V	
Connect/Update									
oduct GATEWAY(STICK)									
upply Voltage 9.075									
potloader Version 2.01									
ateway Version 8.02									
ateway Version Date 17-Mar-2017									
adio Version 2.50									
adio Address 27076									
prorate ID <encrypted></encrypted>									
adio Network 1									
adio Network Group 10									
adio Power (dBm) 5									
ateway Slave ID 250									
S485 Baud Rate 9600									
S485 UART Mode 8N1									
egisters in Use 22 of 4700									
lave Entries in Use 1 of 240									
adio Packets/Minute 1									
emote Sensor Config Unlocked									
ettings						10.01	Remote Configu	~	
	cryption Key		RS485 Settings		Sateway Slave ID W		- Hemote Corrigu	ration	Г • .
adio Network Group 10 - Set		Gateway	Slave ID: 250 -		High Word/High E		Slave is	Ready	
		Set Baud Rat	e: 9600 -		High Word/Low B				
	Key: freewave	LIART M	ode: 8N1 -	\leq) Low Word/High B) Low Word/Low B	NG (CDAB)	Gpnfigure	End	
			. (unit -) Low Word/Low b	yte (DCBA)			
ress							1		
							Rer	note Config	auration
							1	CI	· • •
							1	Slave	e is Ready

Figure 44: Remote Configuration area - Slave is Ready

4. Click the **Configure** button to open the Edit Configuration window (on page 64).

Important!: The **Remote Configuration** session automatically times out after 10 minutes of inactivity and the Endpoint will resume normal operation.

Note: The **Edit Configuration** window is unique for the selected Endpoint device. Figure 45 shows the **Edit Configuration** window for a WC20i-HART Endpoint.

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Additional Settings Node Type:	Installers	HART Sensor Configuration	HART Configuration
WC20i-HART"	5	Virtual Serial Port Driver is Not Installed	Scan for HART Device
Force Device to Che	ckin to Gateway	Start PACTware 4.1 Start Rosemount Radar Master	Set Polling Address V to V
Current Configuration:	Refresh	General	Sensor Loop must be powered ON
Mainboard Version	0.56	Checkin Interval 1 minute Set	
Radio Version	2.50 (sleeping)		- Analog Sensor Zero - Channel B (C1D1)
Radio Address	27013		④ 4 - 20mA Sensor ① 1 - 5V Sensor
Corporate ID	<encrypted></encrypted>	Node Name Set	Zero Value: mA Set
Radio Network	1	Radio Mode Sleeping - Set	
Radio Network Group	10		Read Zero Offset Erase Zero Offset
Checkin Interval	1 minute	Sensor Power	Zero Offset: Unknown
Slave ID	1	Sensor A On Time (sec) 2	Analog 4-20mA/1-5V Scaling
Node Name		Sensor Always On Set	Scale B Type None
Radio Mode	Sleeping	Sensor B On Time (sec)	
Sensor A On Time (sec)			Scaling B Low Value Set
Sensor Power Mode	LOW	Sensor Power Mode LOW - Set	Scaling B High Value
Loop Power	OFF	Manual Loop Power Control Tum On	- Digital I/O
		Channel A O Channel B	State Change Checkin 🔍 Set

Figure 45: Edit Configuration window - WC20i-HART

- 5. Make any necessary changes in the active areas of the window and click the corresponding **Set** button to save the changes.
- 6. When finished changing the configuration, close the **Edit Configuration** window and return to the **Device Configuration** window.
- 7. Click the End button to stop the Remote Configuration session.

Note: The Remote Configuration session automatically times-out after 10 minutes of inactivity.

- 8. Optional: On the WC20i or WC45i-GW-485Endpoint, press the **Check-in** button to apply power to the configured sensor, read the sensor values, and send the collected sensor data to the Gateway.
- 9. Verify the Gateway is communicating with the Endpoints.

Note: A successful connection on the WAVECONTACT Endpoint is indicated with Green blinking ⊖ TX and ACT lights and a Red blinking ⊖ light for RX.

If the connection is NOT successful, a Green blinking \bigcirc TX light appears for 10 seconds.

- 10. Close the WC Toolkit software.
- 11. Remove the WC-USB-DB9 USB to Serial DB9 programming cable from the computer and the WC45i-BB.
- 12. As applicable, replace the Endpoint cover.
- 13. Mount the Gateway device.

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10. Remote Shutdown (RSD) and Local Digital Output Control

The WC45i-GW-485 Modbus Gateway supports Internal Logic Control capability which enables the Gateway to control output relays on the WC40i-MB-RSD Modbus Endpoint or WC40i-COUNT.

Note: The WC40i-MB-RSD Modbus Endpoint bundle includes the WC40i-MB and the WC40i-RSD products.

- The WC45i-GW-485 receives data from multiple remote Endpoints.
- The data is used from those remote Endpoints to set the relay output on one or more remote WC40i-MB-RSD or WC40i-COUNT.
 - An example of the topology is shown in Figure 46.

Note: See Connections (on page 11) for port locations.

Use the Remote Shutdown Configuration (on page 46) procedure to control the output relays.

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10.1. Example: WC45i-GW-485 Modbus Gateway Topology

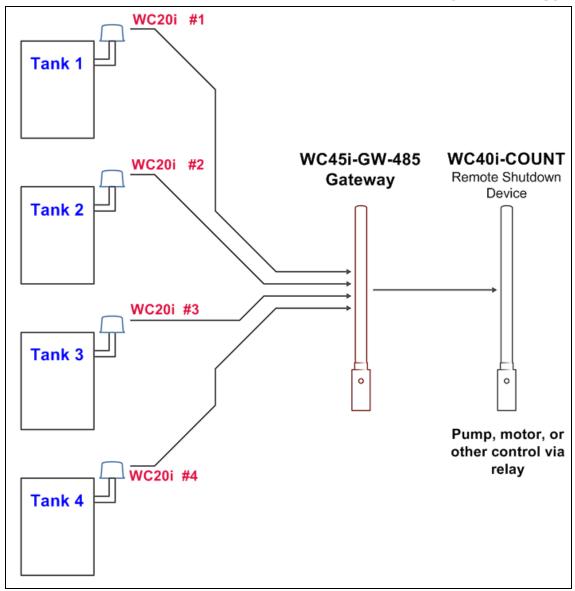


Figure 46: Example: WC45i-GW-485 Modbus Gateway Topology

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10.2. Remote Shutdown Configuration

Note: The terms node and Endpoint are used interchangeably in this document.

- 1. Open the Device Configuration window (on page 57).
- 2. On the Settings menu, click Remote Shutdown Settings.

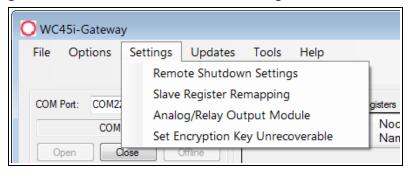


Figure 47: Settings menu > Remote Shutdown Settings

The Remote Shutdown Settings window (on page 84) opens.

Source Node					tion Relay will AL	Relay Control Logic						-	Destination Counter/RSD Stick						
	Slave ID	Node Type	Registe Addres		Register Typ	be	Current Register Value	Run System (Energize Relay when)	Value	Shutdown System (De-energize Relay) when	m	Value	Number of Readings		Slave ID	Relay Channel		Current Relay State (readonly)
1	2	WC20i-Anal	- 3003-Scale	i -	32bit FLOAT	-	Unknown	Less than	•	4000	Greater than	•	4100	3	- 2	25	1	-	Unknown
2	0	None	• 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•		1	- ()	1	-	Unknown
3	0	None	▼ 0		16bit UINT	-	Unknown	Greater than	•	0	Less than	۳		1	- 0)	1	•	Unknown
4	0	None	▼ 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	-	0	1	- 0)	1	-	Unknown
5	0	None	• 0	-	16bit UINT	-	Unknown	Greater than	٠	-	Less than	•	-	1	- ()	1	-	Unknown
6	0	None	▼ 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	-	0	1	- 0)	1	-	Unknown
7	0	None	▼ 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	۳	0	1	- 0)	1	•	Unknown
8	0	None	▼ 0		16bit UINT	-	Unknown	Greater than	•	0	Less than	-	0	1	- 0)	1	-	Unknown
9	0	None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- ()	1	•	Unknown
10	0	None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- ()	1	-	Unknown
11	0	None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- ()	1	•	Unknown
12	0	None	- 0		16bit UINT	Ŧ	Unknown	Greater than	•	0	Less than	۳	0	1	- ()	1	-	Unknown
13	0	None	- 0	-	16bit UINT	-	Unknown	Greater than	۳	0	Less than	•	0	1	- ()	1	-	Unknown
14	0	None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- ()	1	-	Unknown
		ttings from Gateway	_		-		ster results in Relay beir energize Relay via Mo		_		-	_		Save to Fil		Load from File	Clear B	Remo	te Shutdown Tabl

Figure 48: Remote Shutdown Settings window

- 3. As appropriate, complete these sections of the window:
 - a. Source Node (Endpoint) area (on page 86).
 - b. Relay Control Logic Section (on page 88).
 - c. Destination Counter / RSD Stick Section (on page 90).
- 4. Click the **Write Remote Shutdown Settings to Gateway** button to store the settings in the WC45i-Gateway.
- 5. Optional: Click the **Failsafe Enabled** check box to require ALL rules to have valid data for the relay to be energized.

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Important!: If one or more of the Endpoints time-out or does not exist, the relay is deenergized.

If this option is NOT selected, then an Endpoint that is not installed or fails to check in is ignored and the relay is energized using logic only from the units that are active.

6. Optional: Click the **Latch De-Energized** check box so the rules may only de-energize the relay.

Note: For the relay to be energized again, a Modbus write from a PLC to the Gateway for the destination WC40i-MB-RSD or WC40i-COUNT relay must occur. This is useful if manual intervention is required before the relay is energized after an event. In 10, a Modbus coil write to Slave ID 5 relay channel 1 (which is register 1) is required to energize the relay.

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11. Slave Register Remapping

The Gateway allows any of the remote register data to be remapped to a single block of registers available at the Gateway's Slave ID.

Note: The default is 247.

- This is useful for collecting a subset of register data from multiple Endpoints and making it readable in a single block of registers.
- A maximum of 750 registers can be remapped to the Gateway's Slave ID starting at register 5000.

Procedure

Note: The terms node and Endpoint are used interchangeably in this document.

- 1. Open the Device Configuration window (on page 57).
- 2. On the Settings menu, click Slave Register Remapping.

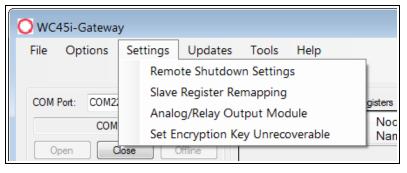


Figure 49: Settings menu > Slave Register Remapping

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	Remapped Address	Slave ID	Register Address	Node Name	Data Type		Register Value	Description	A E
•	5000				16bit UINT	-			
	5001				16bit UINT	-			
	5002				16bit UINT	-			
	5003				16bit UINT	-			
	5004				16bit UINT	-			
	5005				16bit UINT	-			
	5006				16bit UINT	-			
	5007				16bit UINT	-			
	5008				16bit UINT	-			
	5009				16bit UINT	-			
	5010				16bit UINT	-			
	5011				16bit UINT	-			-
	Mapping from Gatev Mapping to Gatewa		ve to File d from File	Show Reg	ult Register Map ister Addresses in HEX a Values in HEX	۲	-	 Fail with Last Value (else High) Fail with Last Value (else Low) 	

The Slave Register Remapping window (on page 91) opens.

Figure 50: Slave Register Remapping window

3. In the Slave ID column / text box, enter the remote source Endpoint Modbus Slave ID.

Important!: Verify there are no duplicate Slave IDs in a given network. The Gateway only caches one set of data for each Slave ID. A duplicate is overwritten.

4. In the **Register Address** column text box, enter the register address to map to each Gateway register.

Note: The **Node Name**, **Data Type**, **Register Value**, and **Description** columns are automatically filled in by the Gateway once the mapping is written to the Gateway.

5. Click the Write Mapping to Gateway button to remap the registers.

Figure 51 shows an example of a the **Slave Register Remapping** window.

- Slave ID 1 is a WC20i-AN Analog Endpoint mapped to have sensor current, RSSI and battery voltage available at Gateway registers 5000 through 5002.
- Slave ID 5 is NOT reporting data to the Gateway so its registers are failing high.

	Remapped Address	Slave ID	Register Address	Node Name	Data Type		Register Value	Description	^
Þ	5000			Analog4-20	16bit UINT	-	14479	Sensor A Current (uA)	
	5001	1	65531	Analog4-20	16bit INT	-	-47	RSSI (dB)	
	5002	1	65532	Analog4-20	16bit UINT	-	3195	Battery Voltage (mV)	
				1	·		1		
	0000	3	00032	Digital			3/30	battery voltage (mv)	_
	5007	5	3001		16bit UINT	-	65535		
	5008	5	65531		16bit INT	-	-1	RSSI (dB)	
	5009	5	65532		16bit UINT	-	65535	Battery Voltage (mV)	
	5010			1	AGEN LINET		1		

Figure 51: Example of the Slave Register Remapping window

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Important!: If the Gateway does NOT have data for a remapped value, it will respond with 0xFFFF, or 0x0000 for the register request. Use the Fail Mode settings to configure this globally.

Note: 0xFFFF = 65535, 0x0000 = 0.

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12. Modbus Gateway Register Map

Important!: By default, the WAVECONTACT Modbus Gateway is assigned Modbus **Slave ID** number 247.

- Only the Gateway status / configuration registers are read at this address.
- All remote Endpoint registers are read from the Slave ID and Register Address of the remote Endpoint, unless the Slave Register Remapping (on page 48) procedure is used.
- Registers include:
 - Boolean Registers (on page 52)
 - Read / Write Registers (on page 52)
 - Read-only Registers (on page 53)

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12.1. Boolean Registers

- These are 1-bit coil registers.
- They can only be written to Modbus opcode 0x05 (Write Single Coil).
- Writing 0x0000 to a coil has **NO** effect.
- To perform these resets, write a 0xFF00 to the respective coil:

Boolean Registers		
Register Number	Register Address (Offset)	Description
00001	0000	Resets the Gateway and radio.
00002	0001	Resets the radio leaving the Gateway on.
00003	0002	Resets all counters to zero. Note: See Modbus Gateway Register Map (on page 51) 2026-2031.

12.2. Read / Write Registers

- These are 16-bit read/write registers.
- They can be written to by Modbus opcode 0x06 or 0x10 (Write Single and Multiple Registers, respectively).
- They can be read with Modbus opcode 0x03 or 0x04 (Read Discrete Input and Holding Registers, respectively).
- The first three registers are identical to the previous three write coils and behave similarly.
- They will be read as 0x0000 and can be triggered by writing 0xFF00 to them.
- The remaining must be written with 16-bit values in the range specified in the Read / Write Registers (on page 52) table:

Read / Write Registe	ers	
Register Number	Register Address (Offset)	Description
41001	1000	Resets the Gateway and radio
41002	1001	Resets the radio leaving the Gateway on
41003	1002	Resets all GW status counters to zero. Note: See Modbus Gateway Register Map (on page 51) 2026-2031.

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12.3. Read-only Registers

- These are 16-bit Read-only registers.
- They can be read with Modbus opcode 0x03 or 0x04 (Read Discrete Input and Holding Registers, respectively).

Note: If the Gateway has a large total number of registers approaching 4700, register 2008 should be monitored to ensure that free registers are available before adding a new Endpoint.

Read-only Register	s	
Register Number	Register Address (Offset)	Description
42001	2000	Upper 16 bits of SFTS GW Endpoint address (the radio ID).
42002	2001	Lower 16 bits of SFTS GW Endpoint address (the radio ID).
42003	2002	Upper 16 bits of Radio Firmware version number.
42004	2003	Lower 16 bits of Radio Firmware version number.
42005	2004	Upper 16 bits of Gateway firmware version number.
42006	2005	Lower 16 bits of Gateway firmware version number.
42007	2006	Number of slave Endpoints that data is cached for this Gateway.
42008	2007	Total number of registers allocated to slave devices.
42009	2008	Total number of free registers available for slave devices.
42010	2009	Bitmask for active slave IDs 15-0 (LSB is 0).
42011	2010	Bitmask for active slave IDs 31-16 (LSB is 16).
42012	2011	Bitmask for active slave IDs 47-32 (LSB is 32).
42013	2012	Bitmask for active slave IDs 63-48 (LSB is 48).
42014	2013	Bitmask for active slave IDs 79-64 (LSB is 64).
42015	2014	Bitmask for active slave IDs 95-80 (LSB is 80).
42016	2015	Bitmask for active slave IDs 111-96 (LSB is 96).
42017	2016	Bitmask for active slave IDs 127-112 (LSB is 112).
42018	2017	Bitmask for active slave IDs 143-128 (LSB is 128).
42019	2018	Bitmask for active slave IDs 159-144 (LSB is 144).
42020	2019	Bitmask for active slave IDs 175-160 (LSB is 160).
42021	2020	Bitmask for active slave IDs 191-176 (LSB is 176).
42022	2021	Bitmask for active slave IDs 207-192 (LSB is 192).
42023	2022	Bitmask for active slave IDs 223-208 (LSB is 208).

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Read-only Register	1						
Register Number	Register Address (Offset)	Description					
42024	2023	Bitmask for active slave IDs 239-224 (LSB is 224).					
42025	2024	Bitmask for active slave IDs 255-240 (LSB is 240).					
42026	2025	Gateway power supply voltage in mV.					
42027	2026	Radio packets received count.					
42028	2027	Radio packets sent count.					
42029	2028	RS-485 messages received count.					
42030	2029	RS-485 messages sent count .					
42031	2030	Total Modbus errors from master and slaves.					
42032	2031	Modbus exceptions from slave Endpoints.					
42033	2032	Radio packets received / transmitted per minute.					
		FREEWAVE Recommends: Less than 60					
42034	2033	Radio packets per minute alert.					
		 0 (zero) if packets/min <= 60. 					
		• 1 if packets/min > 60.					
42101	2100	Address test register.					
		Note: This register always returns 2100.					
42102	2101	Address test register.					
		Note: This register always returns 2101.					
42103	2102	Address test register.					
		Note: This register always returns 2102.					
43001	3000	Writes the radio address of an Endpoint to this register to cause that WC45i-GW-485 to perform a scan for attached Modbus sensors.					
43004	3003	Writes Modbus ID for a Modbus Client Endpoint to this register to cause that remote Endpoint to perform a sca for attached Modbus sensors.					
44002	4001	Status of Slave ID 1.					
		Note : This register returns 1 if Slave is present and 0 (zero) if Slave is not present.					

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Read-only Registers								
Register Number	Register Address (Offset)	Description						
44003	4002 Status of Slave ID 2.							
		Note : This register returns 1 if Slave is present and 0 (zero) if Slave is not present.						
44241	4240	Status of Slave ID 240.						
		Note : This register returns 1 if Slave is present and 0 (zero) if Slave is not present.						

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13. WC Toolkit Software Environment

The WC Toolkit software environment uses these windows to configure all WAVECONTACT devices:

- Device Configuration window (on page 57)
- Edit Configuration window (on page 64)
- Firmware Updates window (on page 71)
- Gateway Log window (on page 73)
- Remote Shutdown Settings window (on page 84)
- Slave Register Remapping window (on page 91)

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13.1. Device Configuration window

The **Device Configuration** window is used to configure the settings on the WC45i-GW-485 Modbus Gateway.

- If one or more remote Endpoints are configured with the correct network settings they send their data to the Gateway.
- The Gateway shows the Endpoint type, Endpoint name, RSSI signal strength, programmed Endpoint check-in interval, the Time To Live (TTL), and the Endpoints radio and main firmware versions.

Access and Window Description

1. Verify the WC Toolkit software is installed on the computer connected to the WC45i-GW-485.

```
Note: See WC Toolkit Installation (on page 14) and WC Toolkit Update (on page 21).
```

- 2. Open the **WC Toolkit** software.
 - The **Select Device** window opens. (Figure 52)

O FreeWave WC Toolkit v	
File Options Updates Tools	Help
COM Port: COM Refresh Auto-Detect COM : Success	FREEWAVE
Auto-Detect Device on COM Port	Customer Login: None
Select Device	
WC45i-Gateway	✓ Open Device Window

Figure 52: Select Device window

- 3. Click the **Refresh** button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the **COM Port** list box.
- 4. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.
- 5. Click the **Auto-Detect Device on COM Port** button to have WC Toolkit connect the device to the COM Port selected in the **COM Port** list box.

Note: Optional: Click the **Select Device** list box arrow and select the connected WC45i-Gateway device.

The **Device Configuration** window opens for the selected device.

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	OWC45i-Gateway File Options Settings Updates	s Tools Help			1	Passed				
_		Modbus Slaves Reporting								
2	COM Port: COM22 - Refresh	Double-click a Row to View Reg	uble-click a Row to View Registers Auto Refresh Refresh							
2	COM22 Open	Slave Node ID Type	Node RSSI Name (dBm)	Register Checkin Quantity Interval	TTL (min): Mainboard Current/Max Firmware	Radio Firmware Configure				
	Open Close Offline	1 WC20i-HART	-46	18 1 min	5/7 0.56	2.50 (sleeping)				
	TCP Connection	5 WC30i-Pressur	Pressure1 -33	20 5 sec	1/2 0.74	2.50 (sleeping)				
	Connect/Update				3					
4	Product GATEWAY(STICK) Supply Voltage 9.017 Bootloader Version 2.01 Gateway Version 8.02 Gateway Version 8.02 Gateway Version 8.02 Gateway Version 2.01 Radio Address 2.007.6 Corporate ID C/Forcepted> Radio Network Group 10 Radio Network Group 2.50 Radio Network Group 10 Radio Network Group 2.50 Radio Network Group 10 Radio Network Group 2.50 Radio Network Group 2.50 Radio Network Group 10 Radio Network Bit1 10 Redio Packets //Mnude 10 Radio Packets //Mnude 10 Radio Packets //Mnude 10 Redio Packets //Mnude				5					
	Radio Network	Set Encryption Key	Help Gateway RS48		Gateway Slave ID Word/Byte Order	Remote Configuration				
	Radio Network Group 10 - Set	K		9600 - Set	High Word/High Byte (ABCD) High Word/Low Byte (BADC) Low Word/High Byte (CDAB)					
		Key: freewave	UART Mode:	8N1 -	Low Word/Low Byte (DCBA)	Start Configuration				
	Success	▲		•	•					
	5	6		7	8	9				

Figure 53: Device Configuration window: WC45i-Gateway

Device Configuration	Device Configuration window: WC45i-GW-485					
Control Area	Control Title	Control Description				
	Set button	Click the Set button to save the information.				
1 - Status of Last Operation text boxtext box	Operation text whether the last command from the WC Toolk boxtext box connected device is Active or has Passed.					
		Note: A Firmware Update Available message appears in this text box when the WC Toolkit has detected that a newer version of firmware is available for download than what is installed on the device.				
		Note: This information is read-only.				
2 - Serial Port Settings area		The Serial Port Settings area shows the connected COM port and is used to re-connect to the COM port if the connection is lost.				
2 - Serial Port Settings area	COM Port list box	Click the COM Port list box arrow and select the COM port on the computer associated with the connected WC45i-GW-485.				

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Device Configuration	on window: WC45i-G	W-485						
Control Area	Control Title	Control Description						
2 - Serial Port Settings area	Refresh button	Click the Refresh button to have WC Toolkit search for and list the available COM ports reported by Windows and connected devices in the COM Port list box.						
2 - Serial Port Settings area	COM text box	The COM text box shows the COM port the WAVECONTACT device is connected to.						
		Note: This information is read-only.						
2 - Serial Port Settings area	Open button	Click the Open button to re-connect the WAVECONTACT device to the COM port.						
2 - Serial Port Settings area	Close button	Click the Close button to disconnect the WAVECONTACT device from the COM port.						
2 - Serial Port Settings area	Offline button	Click the Offline button to disconnect the WAVECONTACT device from the COM port but continue to configure the device offline.						
2 - Serial Port Settings area	TCP Connection check box	Note : The TCP Connection check box is only available for the WC45i-GW-P Ethernet Gateway.						
2 - Serial Port Settings area	Connect / Update button	Click the Connect / Update button to re-connect to the COM port of the WAVECONTACT device.						
3 - Modbus Slaves Reporting table		The Modbus Slaves Reporting table shows all connected remote Endpoints.						
		Note : This information is read-only. See the Modbus Slaves Reporting table (on page 62) for detailed information about the table.						
4 - Information area		The Information area of the Device Configuration window shows connection information about the connected WAVECONTACT device.						
		Note: This information is read-only.						
5 - Settings area		The Settings area is used to define the radio mode and radio network.						

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	on window: WC45i-G						
Control Area	Control Title	Control Description					
5 - Settings area	Radio Network list box	Click the Radio Network list box arrow and select 0 (zero) to 7 for the assigned number.					
		Note: The default value is 1. Important!: The Radio Network and Radio Network Group settings are selected by the user but MUST MATCH the existing Gateway network for successful communication between the Gateway and Endpoint. See WAVECONTACT Network Frequencies (on page 95) for additional information.					
5 - Settings area	Radio Network Group list box	Click the Radio Network Group list box arrow and select 0 (zero) to 29 for the network group assigned number.					
		Note: The default value is 10.					
		Important!: The Radio Network and Radio Network Group settings are selected by the user but MUST MATCH the existing Gateway network for successful communication between the Gateway and Endpoint. See WAVECONTACT Network Frequencies (on page 95) for additional information.					
6 - Set Encryption Key area		The Set Encryption Key area is used to activate and define the encryption key for the WAVECONTACT device.					
6 - Set Encryption Key area	Help button	Click to open the Encryption Help message.					
6 - Set Encryption Key area	Key text box	In the Key text box, enter the encryption key for the device using 6 to 16 characters.					
		Important!: A Key CANNOT contain spaces or angle brackets. The Gateway and Endpoints only communicate if they are configured with the same Key .					

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Device Configuration	on window: WC45i-GV	N-485
Control Area	Control Title	Control Description
7 - Gateway RS485 Settings area		The Gateway RS485 Settings area is used to define the RS485 settings and communication timing. Note : The Gateway has registers that are read for diagnostics. They are not often used except when remapping Modbus data. When remapping, read all data from this Slave ID.
7 - Gateway RS485 Settings area	Gateway Slave ID list box	Click the Gateway Slave ID list box arrow and select the Modbus Slave ID for the Gateway.
7 - Gateway RS485 Settings area	Baud Rate list box	Click the Baud Rate list box arrow and select the baud rate for the RS485 Modbus port.
7 - Gateway RS485 Settings area	UART Mode list box	Click the UART Mode list box arrow and select the number of data bits, parity, and stop bits used with the RS485 Modbus port.
8 - Gateway Slave ID Word / Byte Order area		The Gateway Slave ID Word / Byte Order area is used to set communication timing by selecting one of the byte order options for transmission of Modbus data.
8 - Gateway Slave ID Word / Byte Order area	High Word / High Byte (ABCD) option button	Select the High Word / High Byte (ABCD) option button to transmit the Modbus data in a High Word / High Byte order.
8 - Gateway Slave ID Word / Byte Order area	High Word / Low Byte (BACD) option button	Select the High Word / Low Byte (BACD) option button to transmit the Modbus data in a High Word / Low Byte order.
8 - Gateway Slave ID Word / Byte Order area	Low Word / High Byte (CDAB) option button	Select the Low Word / High Byte (CDAB) option button to transmit the Modbus data in a Low Word / High Byte order.
8 - Gateway Slave ID Word / Byte Order area	Low Word / Low Byte (DCBA) option button	Select the Low Word / Low Byte (DCBA) option button to transmit the Modbus data in a Low Word / Low Byte order.
9 - Remote Configuration area		The Remote Configuration area is used to start and end a Remote Configuration session.

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Device Configuration	on window: WC45i-G	W-485					
Control Area	Control Title	Control Description					
9 - Remote Configuration area	Start Configuration	Click the Start Configuration button to activate a Remote Configuration session.					
	button	 If the Endpoint has a Non-Sleeping radio, the Remote Configuration session is ready immediately. 					
		 If it is a Sleeping device, wait for the Endpoint to either check-in or send a beacon so it can be commanded into Configuration mode. 					
		 A WC20i Endpoint sends a beacon every 2¹/₂ minutes. 					
		 All other Sleeping Endpoints send a beacon every 5¹/₂ minutes. 					
		 When the device has entered a Remote Configuration session, a message indicating the Slave is Ready appears. 					
9 - Remote Configuration area	Configure button	Click the Configure button to open the Edit Configuration window (on page 64).					
9 - Remote Configuration area	End button	Click the End button to stop the Remote Configuration session.					
		Note : The Remote Configuration session automatically times-out after 10 minutes of inactivity.					

13.1.1. Modbus Slaves Reporting table

Device Configura	Device Configuration window: Modbus Slaves Reporting table					
Control Title	Control Description					
Auto Refresh check box	Select the Auto Refresh check box to automatically update the information in the table every 10 seconds.					
Refresh List button	Click the Refresh or Refresh List button to update the information in the table.					
Slave ID column	The Slave ID column / text box shows the remote source Endpoint Modbus Slave ID selected in the Settings area of the Device Configuration window.					
Node Type column	The Node Type column shows the type of Endpoint attached to the WC45i-Gateway.					
Node Name column	The Node Name column / text box shows the name assigned to the Endpoint in the Settings area of the Device Configuration window.					

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Device Configura	ation window: Modbus Slaves Reporting table						
Control Title	Control Description						
RSSI (dbm) column	The RSSI (dbm) column / text box shows the signal strength received from the Endpoint to its neighbor (e.g., a neighbor could be the Gateway if it is not hopping).						
	Example : The RSSI is adjusted so if a 500mW device is communicating to a 40mW device the RSSI is shown as being equal in both directions at the lower signal strength.						
	Notes						
	 All communications are bi-directional so messages are needed in both directions for communications. 						
	 The RSSI and TTL values are color coded (green, yellow, orange, red) to indicate the relative link quality of an Endpoint. Red=Bad link, Yellow=OK link, Green=Good link. 						
Register Quantity column	The Register Quantity column shows the number of Modbus register data points available the Endpoint has reported to the Gateway.						
Checkin Interval column	The Checkin Interval column shows the check-in time selected in the Checkin Interval list box of the Settings area of the Device Configuration window.						
TTL (min): Current / Max	The TTL Current is set to the TTL Max each time an update is received from that Endpoint.						
column	 The TTL Current indicates the number of minutes remaining until the Endpoint is timed out of the Gateway if no updates are received. 						
	 The TTL Max indicates the maximum TTL for that Endpoint. 						
	Note : The RSSI and TTL values are color coded (green, yellow, orange, red) to indicate the relative link quality of an Endpoint. Red=Bad link, Yellow=OK link, Green=Good link.						
Mainboard Firmware column	The Mainboard Firmware column shows the version of firmware currently installed on the mainboard of the Gateway.						
Radio Firmware column	The Radio Firmware column shows the version of radio firmware currently installed on the Endpoint.						
Configure column	In the Configure column, select the check-box next to the Endpoint to configure.						

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13.2. Edit Configuration window

The Edit Configuration window is used to configure individual Endpoints in the network.

Access and Window Description

- 1. Open the Device Configuration window (on page 57).
- 2. In the **Configure** column, select the check-box next to the Endpoint to configure.
- 3. Click the **Start Configuration** button to activate a **Remote Configuration** session.
 - When the device has entered a **Remote Configuration** session, a message indicating the **Slave is Ready** appears.

	- Refresh		a Row to View Re							Auto Refresh	1901	esh List			
COM22 (Open	Slave ID	Node Type	Node Name	RSSI (dBm)	Register Quantity	Checkin Interval	TTL (min): Current/Max	Mainboard Firmware	Radio Firmware		Configure			
Open Close	e Offine	1	WC20i-HART		-45	18	1 min	6/7	0.56	2.50 (slee	ping)	7			
Connect/L	Jpdate														
roduct	GATEWAY(STICK)														
Supply Voltage	9.075														
Bootloader Version	2.01														
	8.02														
ateway Version Date															
	2.50														
	27076														
	<encrypted></encrypted>														
	1														
Radio Network Group															
	5 250														
	250 9600														
	9600 8N1														
	22 of 4700														
Vave Entries in Use															
Radio Packets/Minute															
Remote Sensor Config															
Settings										1.					
Radio Network	1 •	Set Encrypti	on Key	Help	Gateway RS48			ateway Slave ID Wo		Remot	e Configurat	on	1 -		
Radio Network Group	10 - Set				Gateway Slave	ID: 250 👻		High Word/High E		1	Slave is R	eady			
				Set	Baud Rate:	9600 -	Set) High Word/Low B) Low Word/High B	lyte (BADC) Set						
		Key	freewave		UART Mode:	8N1 -) Low Word/High B		Gon	figure	End			
) LOW MOID/LOW Dy							
cess										1					
										1	Rem	ote Conf	iguratior	1	
										1		Class		4.	
												SIdV	e is Rea	ay	
										1					

Figure 54: Remote Configuration area - Slave is Ready

4. Click the **Configure** button to open the **Edit Configuration** window.

The **Edit Configuration** window opens with device-specific control options depending on the connected sensor:

• Edit Configuration window - General Sensor (on page 65)

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Additional Se Node Type:	ttings Tools Ze	ro Both Counters Zero Counter 1 Zero Counter 2 Passed
WC20i-Digital		Checkin Interval 1 minute Set
		Slave ID 1 Set
Force Device	e to Checkin to Gateway	Node Name Set Z
	,	Radio Mode Sleeping - Set
Current Configura		
Mainboard Versi		Sensor Power
Radio Version Radio Address	2.50 (sleeping) 28503	Sensor A On Time (sec)
Corporate ID	<encrypted></encrypted>	Sensor Always On
Radio Network	<encrypted></encrypted>	Sensor B On Time (sec) Set
Radio Network (Sensor Power Mode Set 4
Checkin Interval		
Slave ID	1	Manual Loop Power Control Turn On
Node Name		Channel A O Channel B
Radio Mode	Sleeping	
State Change Ch	heckin Off	Analog 4-20mA/1-5V Scaling
		Scale A Type None 👻
		Scaling A Low Value Set
		Scaling A High Value
		Scale B Type None
		Scaling B Low Value
		Set Set
		Scaling B High Value
		Analog Sensor Zero
Digital I/O		
State Change C	heckin Off 🔻 Set	
Channel 1 Mode		Zero Value:mA Set
Channel 2 Mode		Bead Zero Offset Frase Zero Offset
		Zero Offset: Unknown
Relay Settings		
Comm Failsafe (r	min) 🚽 Se	
Message Failsaf	e (min) 👻 Se	Scan for HART Device
Relay 1 Control	Energize De-Energize	Set Polling Address 🔽 to 🔽 🚽 9
Relay 2 Control	Energize De-Energize	Sensor Loop must be powered ON

Figure 55: Edit Configuration window

Edit Configuration window - General Sensor		
Control Area	Control Title	Control Description
	Set button	Click the Set button to save the information.
Status of Last Operation text box		The Status of Last Operation text box indicates whether the last command from the WC Toolkit to the connected device is Active or has Passed. Note: A Firmware Update Available message appears in this text box when the WC Toolkit has detected that a newer version of firmware is available for download than what is installed on the device. Note: This information is read-only.

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Edit Configuration window - General Sensor		
Control Area	Control Title	Control Description
2 - General area	Checkin Interval list box	Click the Checkin Interval list box arrow and select how often the Endpoint wakes up, reads the , and transmits the data to the Gateway.
2 - General area	Slave ID text box	In the Slave ID column / text box, enter the remote source Endpoint Modbus Slave ID. Important!: Verify there are no duplicate Slave IDs in a given network. The Gateway only caches one set of data for each Slave ID. A duplicate is overwritten.
2 - General area	Node Name text box	In the Node Name text box, enter a name for the Endpoint using a maximum of 10 characters.
2 - General area	Radio Mode list box	Click the Radio Mode list box arrow and select either Sleeping or Non-Sleeping .
3 - WC45i-GW- 485 Information area		The Information area of the Device Configuration window shows connection information about the connected WAVECONTACT device.
		Note: This information is read-only.
3 - WC45i-GW- 485 Information area	Force Device to Checkin to Gateway button	Click the Force Device to Checkin to Gateway button to force the Endpoint to send data to the WC45i-GW-485, WC45i-GW-AN, or WC45i-GW-DIN.
3 - WC45i-GW- 485 Information area	Refresh button	Click the Refresh button to update the information in this area.
4 - Sensor Power area	Sensor A On Time (sec) text box	In the Sensor A On time (sec) text box, enter the number of seconds . FREEWAVE Recommends: Accept the default Sensor A On time (sec) value of 2 seconds for most devices. However, radar sensors often require a longer warm-up time.

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Edit Configurati	Edit Configuration window - General Sensor		
Control Area	Control Title	Control Description	
4 - Sensor Power area	Sensor Always On check box	Select the Sensor Always On check box to make the sensor always have power no matter what type of power source is connected to the device.	
		Note: Having the Sensor Always On selected is useful for rapid data collection on a sensor that has a long warm-up time. However, it will shorten the battery life dramatically unless a Solar Powered WC20i is used.	
4 - Sensor Power area	Sensor B On Time (sec) text box	In the Sensor B On Time (sec) text box, enter the number of seconds a second sensor powers on before its value is read.	
4 - Sensor Power area	Sensor Power Mode list box	Click the Sensor Power Mode list box arrow and select either HIGH or LOW volts for the WC20i.	
		Note: HIGH outputs 18.5 volts to the sensor and LOW outputs 12.5 volts.LOW results in longer battery life but some sensors require a higher voltage.In 4-20mA mode HIGH is automatically selected and is the only option.It will supply a minimum of 13.5V to the sensor at full load.	
4 - Sensor Power area	Manual Loop Power Control button	Click the Manual Loop Power Control button to send power to the sensor so the sensor can be configured.	
	button	Note : The loop times out after a short time if it is not shut off.	
4 - Sensor Power area	Channel A option button	Select the Channel A option button to assign the changed settings to Channel A in a 2-channel device.	
4 - Sensor Power area	Channel B option button	Select the Channel B option button to assign the changed settings to Channel B in a 2-channel device.	
5 - Analog 4- 20mA / 1-5V Scaling area	Scale A Type list box	Click the Scale A Type or Scaling B Type list box arrow and select either a 4-20mA or 1-5V sensor to scale to an engineering unit equivalent (e.g., 4-20mA = 0-1000 PSI).	
		Note : If None is selected, there is no scaling of the analog readings to engineering units.	

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Edit Configurati	on window - Gene	ral Sensor
Control Area	Control Title	Control Description
5 - Analog 4- 20mA / 1-5V Scaling area	Scaling A Low Value text box	In the Scaling A or B Low Value text box, manually enter the sensor's lower range value. Note: By default, the Scaling A or B Low Value corresponds with the lowest reading from the sensor, either 4mA or 1V, depending on the selection in the Scale A Type list box or Scale B Type list box.
5 - Analog 4- 20mA / 1-5V Scaling area	Scaling A High Value text box	In the Scaling A or B High Value text box, manually enter the sensor's upper range value.
		Note: By default, the Scaling A or B High Value corresponds with the highest reading from the sensor, either 20mA or 5V, depending on the selection in the Scale A Type list box or Scale B Type list box.
5 - Analog 4- 20mA / 1-5V Scaling area	Scaling B Type list box	Click the Scale A Type or Scaling B Type list box arrow and select either a 4-20mA or 1-5V sensor to scale to an engineering unit equivalent (e.g., 4-20mA = 0-1000 PSI).
		Note : If None is selected, there is no scaling of the analog readings to engineering units.
5 - Analog 4- 20mA / 1-5V Scaling area	Scaling B Low Value text box	In the Scaling A or B Low Value text box, manually enter the sensor's lower range value.
		Note: By default, the Scaling A or B Low Value corresponds with the lowest reading from the sensor, either 4mA or 1V, depending on the selection in the Scale A Type list box or Scale B Type list box.
5 - Analog 4- 20mA / 1-5V Scaling area	Scaling B High Value text box	In the Scaling A or B High Value text box, manually enter the sensor's upper range value.
		Note : By default, the Scaling A or B High Value corresponds with the highest reading from the sensor, either 20mA or 5V, depending on the selection in the Scale A Type list box or Scale B Type list box.
6 - Digital I/O area	State Change Checkin list box	Click the State Change Checkin list box arrow and select Yes to check on a change of state at the input rather than waiting for the check in time to expire.
6 - Digital I/O area	Channel 1 Mode list box	Click the Channel 1 Mode list box arrow and select either INPUT (analog or digital) or OUTPUT (relay control) for Channel 1.

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Edit Configurati	Edit Configuration window - General Sensor		
Control Area	Control Title	Control Description	
6 - Digital I/O area	Channel 2 Mode list box	Click the Channel 2 Mode list box arrow and select either INPUT (analog or digital) or OUTPUT (relay control) for Channel 2.	
7 - Analog Sensor Zero area	4-20mA option button	Select the 4-20mA option button to apply the designated sensor reading entered in the Zero Value text box when using a 4-20mA input.	
7 - Analog Sensor Zero area	1-5V option button	Select the 1-5V option button to apply the designated sensor reading entered in the Zero Value text box when using a 1-5V input.	
7 - Analog Sensor Zero area	Scaled Units option button	Select the Scaled Units option button to scale to an engineering unit equivalent (e.g., 4-20mA = 0-1000 PSI).	
7 - Analog Sensor Zero area	Channel A option button	Select the Channel A option button to assign the changed settings to Channel A in a 2-channel device.	
7 - Analog Sensor Zero area	Channel B option button	Select the Channel B option button to assign the changed settings to Channel B in a 2-channel device.	
7 - Analog Sensor Zero area	Zero Value text box	In the Zero Value text box, enter what the sensor should be reading.	
7 - Analog Sensor Zero area	Read Zero Offset button	Click the Read Zero Offset button to force the sensor to use the setting in the Zero Value text box.	
7 - Analog Sensor Zero area	Erase Zero Offset button	Click the Erase Zero Offset button to erase the value entered in the Zero Value text box.	
8 - Relay Settings area	Comm Failsafe (min) list box	Click the Comm Failsafe (min) list box arrow and select the time to set the outputs to a de-energized state if the link is lost with the Gateway after the set time.	
		Note : This setting is used for Remote Shutdown Device .	

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Edit Configuration window - General Sensor		
Control Area	Control Title	Control Description
8 - Relay Settings area	Message Failsafe (min) list box	Click the Message Failsafe (min) list box arrow and select the time to set the outputs to a de-energized state if messages are lost from the Gateway after the selected time. Caution: If a time is selected in the Message Failsafe (min) list box, the time entered must be set higher than the Modbus Coil Write and Analog Output Write frequency of the Modbus master device.
8 - Relay Settings area	Relay 1 Control or Relay 2 Control Energize button	Click the Relay 1 Control or Relay 2 Control Energize button to manually test (energize) the relays.
8 - Relay Settings area	Relay 1 Control or Relay 2 Control De- Energize button	Click the Relay 1 Control or Relay 2 Control De-Energize button to manually test (de-energize) the relays.
9 - HART Configuration area	Scan button	Click the Scan button to scan for the HART ID and show it in the first Polling Address list box so it can be changed later using this same window.
		Important!: The HART ID must be set to 1 for the WC20i to communicate with the HART sensor.
9 - HART Configuration area	Polling Address list boxes	Click the second Polling Address list box arrow and select the new HART ID to change the HART sensor to.

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13.3. Firmware Updates window

The **Firmware Updates** window is used to access and transfer the update file for the WC45i-GW-485.

Access and Window Description

- 1. Open the Device Configuration window (on page 57).
- 2. On the **Updates** menu, click either **Update Gateway Firmware** or **Update Radio Firmware**.

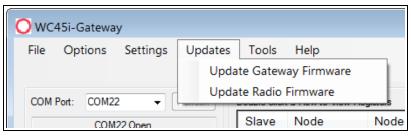


Figure 56: Updates menu

The Firmware Updates window opens.

13.3.1. Update Gateway Firmware menu - Firmware Updates window

Note: By default, the latest firmware file is selected from the update server. When the **Update Gateway Firmware** menu is selected, the WC45i-Gateway searches for the most recent **modbusGW** file to update.

O Firmware	Updates
Current File	\\freewave.local\fileshares\\FWToolkit\Firmware\modbusGW_X0_8_0 Browse Start Transfer
Ready to Tra	nsfer File

Figure 57: Update Gateway Firmware menu - Firmware Updates window

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13.3.2. Update Radio Firmware menu - Firmware Updates window

Note: By default, the latest firmware file is selected from the update server. When the **Update Radio Firmware** menu is selected, the WC45i-Gateway searches for the most recent **appNode** file to update.

O Firmware	Updates 🗖 🗖 🗖	G
Current File	\\freewave.local\fileshares\\FWToolkit\Firmware\spiNode_300mw_v2. Browse Start Transfer	
Ready to Transfer File		

Figure 58: Update Radio Firmware menu - Firmware Updates window

Firmware Updates window		
Control Title	Control Description	
Current File	The Current File text box shows the selected file location of the update file.	
text box	Note: By default, the latest firmware file is selected from the update server.	
Browse button	Click to open the Open dialog box.	
	Use the dialog box to search for and select the update file.	
Start Transfer button	Click the Start Transfer button to load the file to the device.	

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13.4. Gateway Log window

The **Gateway Log** window is used to log events such as reboots, remote Endpoints joining and/or timing out, local RSD control events, remote configuration sessions, firmware updates, etc.

There are two tabs in the window:

- Gateway Log tab (on page 74)
- Log Statistics tab (on page 76)

Access and Window Description

- 1. Open the Device Configuration window (on page 57).
- 2. On the Tools menu, click View Gateway Log.

O WC45i-Gateway		
File Options Settings Updates	Tools Help	
	Detect Ethernet Gate	ways Ctrl+E
COM Port: COM22	Show Ethernet Gatew	ay IP Address
	Debug Terminal	Ctrl+D
COM22 Open	RS485 Details	Ċ
Open Close Offline	View Gateway Log	Ctrl+L
TCP Connection	Network Map	Ctrl+M
Connect/Undate		

Figure 59: WC45i-GW-485 Modbus Gateway > Tools menu > View Gateway Log

The **Gateway Log** window opens. The **Gateway Log** tab is active.

There are two tabs in the window:

- Gateway Log tab (on page 74)
- Log Statistics tab (on page 76)

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13.4.1. Gateway Log tab

Note: The information in this tab is read-only.

Timestamp	Sequence	Event Type	Message
3/22/2017 4:31:40 PM	186	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 4:18:35 PM	185	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 4:17:31 PM	184	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 4:07:10 PM	183	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 3:54:25 PM	182	REMOTECONFIG	Session ended with Slave 1, Radio Address 27013
3/22/2017 3:41:25 PM	181	REMOTECONFIG	Session started with Slave 1, Radio Address 27013
3/22/2017 2:27:33 PM	180	NODEINFO	Slave 1 Added, Radio Address 27013, WC2Di-HART, Checkin Interval=1 min, RSSI=-34, BattV=3675
3/22/2017 2:18:39 PM	179	BOOTUP	Gateway Software Reboot, SupplyVoltage=8958mV
3/22/2017 2:18:39 PM	178	REBOOT	Reboot Reason: no modbus slaves
3/22/2017 2:16:39 PM	177	NODEINFO	Slave 1 Timed Out, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-29, BattV=3398
3/22/2017 2:16:01 PM	176	REMOTECONFIG	Session started with Slave 1, Radio Address 27014
3/22/2017 2:09:46 PM	175	NODEINFO	Slave 1 Added, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-29, BattV=3398
3/22/2017 2:08:15 PM	174	FIRMWARE	Radio Firmware Update: spiNode_300mw_v2.50.fwi
3/22/2017 2:05:23 PM	173	FIRMWARE	Radio Firmware Update: spiNode_300mw_v2.50.fwi
3/22/2017 2:03:39 PM	172	NODEINFO	Slave 1 Timed Out, Radio Address 27014, Sent Float, Checkin Interval=1 min, RSSI=-39, BattV=3626
3/22/2017 1:28:15 PM	171	NODEINFO	Slave 1 Added, Radio Address 27014, Sent TC, Checkin Interval=1 min, RSSI=-45, BattV=3613
3/22/2017 1:19:39 PM	170	BOOTUP	Gateway Software Reboot, SupplyVoltage=8841mV
3/22/2017 1:19:39 PM	169	REBOOT	Reboot Reason: no modbus slaves

Figure 60: Gateway Log window - Gateway Log tab

Gateway Log wi	Gateway Log window - Gateway Log tab			
Control Area	Control Title	Control Description		
Gateway Log table	Timestamp column	The Timestamp column shows the date and time of the event.		
Gateway Log table	Sequence column	The Sequence column shows the count number assigned to the event in the order it happened.		
Gateway Log	Event Type	The Event Type column shows the name of the event.		
table	column	Important!: FreeWave internal use only.		
Gateway Log table	Message column	The Message column shows a description of the Event Type activity.		
		Important!: FreeWave internal use only.		
	Refresh button	Click the Refresh or Refresh List button to update the information in the table.		
	Log Entries list box	Click the Log Entries list box arrow and select how many log entries to view on the Gateway Log tab.		
		Note: The default value is 100.		

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Gateway Log wi	Gateway Log window - Gateway Log tab		
Control Area	Control Title	Control Description	
	Gateway Powered On text box	The Gateway Powered On text box shows how long the Gateway has had continuous power.	
	Gateway Uptime text box	The Gateway Uptime text box shows the time the Gateway has been active since the last reboot.	
	Last Power Up text box	The Last Power Up text box shows the date and time when the Gateway power supply was started.	
	Last Reboot text box	The Last Reboot text box shows the date and time when the Gateway was rebooted.	
	Load Log from File button	Click the Load Log from File button to open the Microsoft® Open dialog box with the default location where the .csv file of the log information is saved.	
	Save Log to File button	Click the Save Log to File button to open the Microsoft® Save As dialog box with the default location to save the .csv file of the log information in.	

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13.4.2. Log Statistics tab

The Log Statistics tab shows statistics about the log events.

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The information in the **Log Statistics** table can be saved as a CSV file to view in a spreadsheet program.

Note: The information in this tab is read-only. The terms node and Endpoint are used interchangeably in this document.

Sent Roat 3/22/2017 1.28:11 PM 1 3/22/2017 2:03:35 PM -29 0 3398	Sent Fl	t Float 3/22/2017 1:28:11 P	PM 1	3/22/2017 2:03:35 PM	-29	0	3398
Average 1 timeout/week Gateway Reboots: 27							

Figure 61: Gateway Log window - Log Statistics tab

Gateway Log wi	Gateway Log window - Log Statistics tab			
Control Area	Control Title	Control Description		
Log Statistics table	Slave ID column	The Slave ID column / text box shows the remote source Endpoint Modbus Slave ID selected in the Settings area of the Device Configuration window.		
Log Statistics table	Node Type column	The Node Type column shows the type of Endpoint attached to the WC45i-Gateway.		
Log Statistics table	Time Joined column	The Time Joined column shows when the Endpoint was connected to the Gateway.		
Log Statistics table	Number of Timeouts column	The Number of Timeouts column shows the number of times the Endpoint has timed out since connected to the Gateway.		
Log Statistics table	Last Time Out column	The Last Time Out column shows date and time of the last timeout for the attached Endpoint.		

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Gateway Log w	indow - Log Statist	ics tab
Control Area	Control Title	Control Description
Log Statistics table	RSSI (dbm) column	The RSSI (dbm) column / text box shows the signal strength received from the Endpoint to its neighbor (e.g., a neighbor could be the Gateway if it is not hopping).
		Example : The RSSI is adjusted so if a 500mW device is communicating to a 40mW device the RSSI is shown as being equal in both directions at the lower signal strength.
		Notes
		 All communications are bi-directional so messages are needed in both directions for communications.
		 The RSSI and TTL values are color coded (green, yellow, orange, red) to indicate the relative link quality of an Endpoint.
		Red=Bad link, Yellow=OK link, Green=Good link.
Log Statistics table	Remote Configurations column	The Remote Configurations column shows the total number of times the device has been configured remotely.
Log Statistics table	Supply Voltage (mV) column	The Supply Voltage (mV) column shows the last reported supply voltage to the Endpoint from the battery or solar panel.
	Refresh button	Click the Refresh or Refresh List button to update the information in the table.

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Gateway Log w	og window - Log Statistics tab			
Control Area	Control Title	Control Description		
	Average timeout / week text box	 The Average timeout / week text box shows the average number of timeouts in a week for an Endpoint since a reboot. Notes A timeout is when an Endpoint's TTL, shown in the Device Configuration window (on page 57), goes to 0 (zero) and the data is deleted from the Gateway. This number does not reset. This time (in minutes) = the Checkin Interval list box selection * 5 + 2 minutes. With the bar to the left of the text provides a visual depiction of the average timeout (Red=Bad, Yellow=OK, Green=Good). Example: If 1 minute is selected in the Checkin Interval list box AND the Gateway does NOT get an 		
	Average timeout / day text box	update within 7 minutes (1*5+2=7), it will timeout the data and increment the timeout count by 1. The Average timeout / day text box shows the average number of timeouts in a day for an Endpoint since a reboot.		
		 A timeout is when an Endpoint's TTL, shown in the Device Configuration window (on page 57), goes to 0 (zero) and the data is deleted from the Gateway. This number does not reset. 		
		• This time (in minutes) = the Checkin Interval list box selection * 5 + 2 minutes.		
		The bar to the left of the text provides a visual depiction of the average timeout (Red=Bad, Yellow=OK, Green=Good).		
		Example : If 1 minute is selected in the Checkin Interval list box AND the Gateway does NOT get an update within 7 minutes (1*5+2=7), it will timeout the data and increment the timeout count by 1.		
	Gateway Reboots text box	The Gateway Reboots text box shows the number of times the Gateway has rebooted since it was activated.		
	Gateway Uptime text box	The Gateway Uptime text box shows the time the Gateway has been active since the last reboot.		

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Gateway Log window - Log Statistics tab		ics tab
Control Area	Control Title	Control Description
	Save Report to File button	Click the Save Report to File button to open the Microsoft® Save As dialog box with the default location to save the CSV version of the log file in.

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13.5. (RegisterView) Slave 1 window

The **(RegisterView) Slave 1** window is used to view additional details about the selected Endpoint, including the register data from the remote Endpoint.

Access and Window Description

- 1. Verify the Configuration (on page 24) procedure is completed.
- 2. Double-click one of the Endpoint rows in the **Modbus Slaves Reporting** table. The **(RegisterView) Slave 1** window opens.

Node Type: WC30i-Wireless Pr	ressure	Sensor		Update Register Values
Slave ID:	1	Node Nar	me:	Load Tags Save Tag
Node Address:	2850	9 Node_	1	
Battery Voltage (V):	ry Voltage (V): 3.583 V Route:			
RSSI (dBm): -34 dBm 1 -			34 dBm) > GW	
Data Type		Register Address	Register Value	Description
16bit UINT	-	3000	500	Sensor Voltage (mV)
16bit UINT	-	3001	0	Sensor PSI (int)
16bit UINT	-	3002	9	Sensor PSI x100 (int)
16bit UINT	-	3003	0	High Notification
16bit UINT	-	3004	0	Low Notification
16bit UINT	-	3005	0	Low Battery
16bit UINT	-	3006	5000	Sensor Span (PSI)
16bit UINT	-	3007	0	Error Status
32bit FLOAT	-	3008	0.09924173	Sensor PSI (float)
32bit FLOAT	-	3009		
32bit FLOAT	-	3010	0	Custom Scaled (float)
32bit FLOAT	-	3011		
32bit FLOAT	-	3012	0	Alarm High Threshold
32bit FLOAT	-	3013		
32bit FLOAT	-	3014	0	Alarm Low Threshold
32bit FLOAT	•	3015		
16bit UINT	-	65524	0	Mainboard FW Version Major
16bit UINT	•	65525	75	Mainboard FW Version Minor
16bit UINT	-	65526	130	Radio FW Version Major
16bit UINT	•	65527	50	Radio FW Version Minor
16bit INT	-	65531	-34	RSSI (dBm)
16bit UINT	-	65532	3583	Battery Voltage (mV)
16bit UINT	-	65535	56	Device Type

Figure 62: (RegisterView) Slave 1 window

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(RegisterView) SI	ave 1 window
Control Title	Control Description
Update Register Values button	Click the Update Register Values button to update the information in the table.
Load Tags button	Click the Load Tags button to open the Microsoft® Open dialog box with the default location where the .regtag version of the log files are saved.
Save Tags button	Click the Save Tags button to open the Microsoft® Save As dialog box with the default location to save the .regtag version of the log file in.
Slave ID text box	The Slave ID column / text box shows the remote source Endpoint Modbus Slave ID selected in the Settings area of the Device Configuration window.
	Note: This information is read-only.
Node Name text box	The Node Name column / text box shows the name assigned to the Endpoint in the Settings area of the Device Configuration window.
	Note: This information is read-only.
Node Address text box	The Node Address text box shows the unique radio address assigned to the radio.
	Note: This information is read-only.
Battery Voltage	The Battery Voltage (V) text box shows the battery voltage of the Endpoint.
(V) text box	Note: This information is read-only.
Route text box	The Route text box shows the route the packet used to get to the Gateway.
	Example : Figure 62 shows one hop and the RSSI of the hop.
	Note: This information is read-only.

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(RegisterView) SI	ave 1 window
Control Title	Control Description
RSSI (dbm) text box	The RSSI (dbm) column / text box shows the signal strength received from the Endpoint to its neighbor (e.g., a neighbor could be the Gateway if it is not hopping).
	Note: This information is read-only.
	Example : The RSSI is adjusted so if a 500mW device is communicating to a 40mW device the RSSI is shown as being equal in both directions at the lower signal strength.
	Note : All communications are bi-directional so messages are needed in both directions for communications.
Data Type list box column	The Data Type list box column shows the data type for the identified Endpoint and its data register.
	Notes
	 When the Endpoint is automatically identified by the Gateway, the Data Type list box column is read-only and cannot be changed.
	 If the Data Type is NOT known, click the Data Type list box arrow and select the data format for the Modbus register.
	 If the Apply Default Register Map check box is cleared, the Data Type options are available.
	The options are:
	16bit UINT
	32bit UINT
	32bit INT
	32bit FLOAT
	32bit UINT (Enron)
	32bit INT (Enron)
	32bit FLOAT (Enron)
	Important!: The Data Type text box cannot be changed when it is identified by the Gateway.
Register Address column	The Register Address column shows the register address set by the Endpoint that is sending the data to the Gateway.
Register Value column	The Register Value column shows data that the Endpoint is sending in.
Description column	The Description column shows information describing the data at this Register Address .

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(RegisterView) SI	ave 1 window
Control Title	Control Description
Apply Default Register Map check box	Click the Apply Default Register Map check box to have the Gateway auto- detect the Endpoint register information. Clear the check box to manually select the Endpoint register information. Note : By default, when the Gateway recognizes the connected Endpoint type, the Apply Default Register Map check box is selected.
Display Address in HEX check box	Click the Display Address in HEX check box to view the Register Address column information as hexadecimal values.
Display Value in HEX check box	Click the Display Value in HEX check box to view the Register Value column information as hexadecimal values.

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13.6. Remote Shutdown Settings window

The **Remote Shutdown Settings** window is used to control output relays on the WC40i-MB-RSD Modbus Endpoint or WC40i-COUNT.

Access and Window Description

- 1. Open the Device Configuration window (on page 57).
- 2. On the Settings menu, click Remote Shutdown Settings.

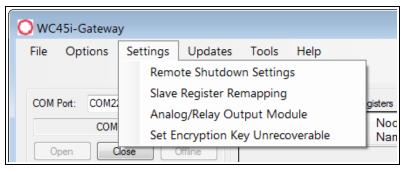


Figure 63: WC45i-GW-485 Modbus Gateway Settings menu > Remote Shutdown Settings

The Remote Shutdown Settings window has these sections:

- Source Node (Endpoint) area (on page 86)
- Relay Control Logic Section (on page 88)
- Destination Counter / RSD Stick Section (on page 90)

				Node						F	Relay Control Logic					Destinat	ion Counter,	/RS	D Stick
	Slave ID	Node Type	Registe Addres		Register Typ	pe	Current Register Value	Run System (Energize Rela when		Value	Shutdown Syste (De-energize Relay) when.	•	Value	Number o Readings		Slave ID	Relay Channel		Current Relay State (readonly)
1 2		WC20i-Anal	- 3003-Scale	d 🔻	32bit FLOAT	-	Unknown	Less than	-	4000	Greater than	-	4100	3	-	25	1	•	Unknown
2 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- () (1	•	Unknown
3 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	• () [1	•	Unknown
4 0		None	• 0	-	16bit UINT	-	Unknown	Greater than		0	Less than		0	1	• () [1	-	Unknown
5 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- () (1	-	Unknown
6 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	-	0	1	- () (1	-	Unknown
7 0		None	• 0	-	16bit UINT	Ŧ	Unknown	Greater than	•	0	Less than		0	1	• () (1	Ŧ	Unknown
8 0		None	▼ 0	-	16bit UINT	-	Unknown	Greater than		0	Less than	-	0	1	• () (1	-	Unknown
9 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- () (1	-	Unknown
10 0		None	• 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	-	0	1	- () (1	•	Unknown
11 0		None	▼ 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	•	0	1	- () (1	•	Unknown
12 0		None	▼ 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	-	0	1	• () (1	-	Unknown
13 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	•	0	Less than	•	0	1	- () (1	-	Unknown
14 0		None	- 0	-	16bit UINT	-	Unknown	Greater than	-	0	Less than	-	0	1	- () (1	-	Unknown

Figure 64: Remote Shutdown Settings window

Remote Shutdown Settings window					
Control Title Control Description					
Update button	Click the Update button to refresh the information in the Current Register Value column and the Current Relay State column.				

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Remote Shutdown	Remote Shutdown Settings window							
Control Title	Control Description							
Remote Shutdown Settings table	 See these sections for detailed descriptions: Source Node (Endpoint) area (on page 86) Relay Control Logic Section (on page 88) Destination Counter / RSD Stick Section (on page 90) 							
Read Remote Shutdown Settings from Gateway button	Click the Read Remote Shutdown Settings from Gateway button to retrieve the stored settings from the WC45i-Gateway.							
Write Remote Shutdown Settings to Gateway button	Click the Write Remote Shutdown Settings to Gateway button to store the settings in the WC45i-Gateway.							
Failsafe Enabled check box	 Click the Failsafe Enabled check box to require ALL rules to have valid data for the relay to be energized. If one or more of the Endpoints time-out or does not exist, the relay is de- 							
	 energized. If this option is NOT selected, then an Endpoint that is not installed or fails to check in is ignored and the relay is energized using logic only from the units that are active. 							
Latch De- Energized check box	 Click the Latch De-Energized check box so the rules may only de-energize the relay. For the relay to be energized again, a Modbus write from a PLC to the Gateway for the destination WC40i-MB-RSD or WC40i-COUNT relay must occur. This is useful if manual intervention is required before the relay is energized after an event. In 10, a Modbus coil write to Slave ID 5 relay channel 1 (which is register 1) is required to energize the relay. Note: See the WC40i-COUNT Counter Endpoint or WC40i-MB-RSD Modbus Endpoint User Manual for a detailed register map.							
Save to File button	Click the Save to File button to open the Microsoft® Save As dialog box with the default location to save the .rsd file in.							
Load from File button	Click the Load from File button to open the Microsoft® Open dialog box with the default location to load the .rsd file from.							
Clear Remote Shutdown Table button	Click the Clear Remote Shutdown Table button to clear the table of custom configuration settings and return to the default configuration information.							

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13.6.1. Source Node (Endpoint) area

The Source Node (Endpoint) area is used to select the source register for the logic rule.

Source Node								
Slave ID	Node Type		Register Address		Register Typ	e	Current Register Value	
2	WC20i-Anal	•	3003-Scaled	•	32bit FLOAT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	
0	None	•	0	•	16bit UINT	•	Unknown	

Figure 65: Source Node (Endpoint) area

Source Node (Endpoint)	Source Node (Endpoint) area - WC45i-GW-485					
Column	Description					
Slave ID column	The Slave ID column / text box shows the remote source Endpoint Modbus Slave ID selected in the Settings area of the Device Configuration window.					
	Note: This information is read-only.					
Node Type column / list box	Click the Node Type list box arrow and select the type of remote Endpoint.					
	 The list box contains a list of the standard WAVECONTACT remote Endpoints. 					
	Note: Select Custom for manual data entry.					
Register Address column / list box	Click the Register Address list box arrow and select the register address for the data to use for the logic.					
	Important!: If Custom was select in the Node Type column / list box, click the Register Type list box arrow and select the correct data type.					

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Source Node (Endpoint)	Source Node (Endpoint) area - WC45i-GW-485				
Column	Description				
Register Type column / list box	If Custom was select in the Node Type column / list box, click the Register Type list box arrow and select the correct data type.				
	Note : The correct Register Type is automatically selected unless a Custom Node Type is used.				
Current Register Value column	The Current Register Value column shows the value of the selected source data register.				
	Note : Click the Update button to refresh the information in the Current Register Value column and the Current Relay State column.				

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13.6.2. Relay Control Logic Section

The **Relay Control Logic Section** is used to set the trigger thresholds for the selected source data register.

Relay Details

The relays used on the Output Module are SPDT (NO/NC) relays and have these ratings:

Output Module Relay - WC45i-GW-485				
Relay	Rating			
30 VDC	2A			
125 VAC	0.5 A			
10 ⁸	Operations (life)			

Notes

- The relays have Normally Open (NO) and Normally Closed (NC) contacts.
- The Normal state of the relay is the de-energized state.
 - This state should be used to set the controlled system (pump, motor, etc.) in the safe or off state.

	R	elay Control Logic				Relay Control Logic							
Run System (Energize Relay) when	Value	Shutdown Syster (De-energize Relay) when	m	Value	Number of Readings								
Less than	4000	Greater than	•	4100	3	-							
Greater than	- 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	•							
Greater than	• 0	Less than	•	0	1	-							
Greater than	• 0	Less than	•	0	1	-							

Figure 66: Relay Control Logic Section

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Relay Control Logic Sect	ion - WC45i-GW-485
Columns	Description
Run System (Energize Relay) column / list box	Click the Run System (Energize Relay) list box arrow and select the logic operand to use for the energize logic evaluation.
Value column / text box	In the Value column / text boxtext box, enter the value that the relay is energized at.
	Note : The Energized state is the normal operating state of the relay.
Shutdown System (De- Energize Relay) column / list box	Click the Shutdown System (De-Energize Relay) list box arrow and select the logic operand to use for the de-energize logic evaluation.
list box	Important!: By default, this selection is automatically the opposite of the selection for the Run System (Energize Relay) column.
	Note : The de-energized state is the SAFE state of the relay.
Value column / text box	In the Value column / text boxtext box, enter the value that the relay is de-energized at.
	Note : The de-energized state is the SAFE state of the relay.
Number of Readings column / list box	Click the Number of Readings list box arrow and select the number of check-in packets that must be received in a row that are above (or below) the logic threshold for the de-energize condition.
	This is useful so that a single reading does not cause a shut-down of the Endpoint.
	 The default is 1 where each check-in will cause the rule to be evaluated and acted on.
	 A single reading that satisfies the run system (energize) condition will cause the relay to energize.

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13.6.3. Destination Counter / RSD Stick Section

Destina	Destination Counter/RSD Stick					
Slave ID	Relay Channel		Current Relay State (readonly)			
25	1	•	Unknown			
0	[1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	Ŧ	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			
0	1	•	Unknown			

Figure 67: Destination Counter / RSD Stick Section

Destination Counter / RS	Destination Counter / RSD Stick Section - WC45i-GW-485				
Column	Description				
Slave ID column	This is the Slave ID of the destination WC40i-COUNT.				
	Note: This information is read-only.				
Relay Channel column / list box	Click the Relay Channel list box arrow and select the relay channel to switch.				
Current Relay State column	The Current Relay State column shows the last value of the relay as reported to the Gateway.				
	Note: Click the Update button to refresh the information in the Current Register Value column and the Current Relay State column.				

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13.7. Slave Register Remapping window

The Gateway allows any of the remote register data to be remapped to a single block of registers available at the Gateway's Slave ID.

Note: The default is 247.

- This is useful for collecting a subset of register data from multiple Endpoints and making it readable in a single block of registers.
- A maximum of 750 registers can be remapped to the Gateway's Slave ID starting at register 5000.

The **Slave Register Remapping** window is used to remap the remote register data to a single block of registers available at the Gateway's Slave ID.

Access and Window Description

- 1. Open the Device Configuration window (on page 57).
- 2. On the Settings menu, click Slave Register Remapping.

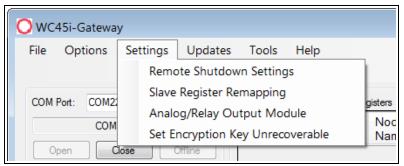


Figure 68: Settings menu > Slave Register Remapping

The Slave Register Remapping window opens.

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	Remapped Address	Slave ID	Register Address	Node Name	Data Type		Register Value	Description	(
Þ	5000				16bit UINT	•			
	5001				16bit UINT	-			
	5002				16bit UINT	-			
	5003				16bit UINT	-			
	5004				16bit UINT	-			
	5005				16bit UINT	-			
	5006				16bit UINT	-			
	5007				16bit UINT	-			
	5008				16bit UINT	•			
	5009				16bit UINT	•			
	5010				16bit UINT	•			
	5011				16bit UINT	•			
Read Mapping from Gateway Save to File Write Mapping to Gateway Load from File			Show Reg	Apply Default Register Map Show Register Addresses in HEX			 Fail with Last Value (else High) Fail with Last Value (else Low) 		
	Table Clear Gat Gateway Registers us		ort to CSV	Use Exten	ded Slave ID (2-bytes)				

Figure 69: Slave Register Remapping window

Slave Register F	Remapping windo	w			
Control Area	Control Title	Control Description			
	Refresh button	Click the Refresh or Refresh List button to update the information in the table.			
Slave Register Remapping table	Remapped Address column	The Remapped Address column shows the Modbus address for the remapped register.			
Slave Register Remapping table	Slave ID column	The Slave ID column / text box shows the remote source Endpoint Modbus Slave ID selected in the Settings area of the Device Configuration window.			
Slave Register Remapping table	Register Address column	In the Register Address column text box, enter the register address to map to each Gateway register.			
	counn	Note: The Node Name, Data Type, Register Value, and Description columns are automatically filled in by the Gateway once the mapping is written to the Gateway.			
Slave Register Remapping table	Node Name column	The Node Name column / text box shows the name assigned to the Endpoint in the Settings area of the Device Configuration window.			

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Slave Register F	Remapping windo	Slave Register Remapping window						
Control Area	Control Title	Control Description						
Slave Register Remapping table	Data Type list box column	The Data Type list box column shows the data type for the identified Endpoint and its data register.						
lable		Notes						
		 When the Data Type is automatically identified by the Gateway, the Data Type list box column is read-only and cannot be changed. 						
		 If the Data Type is NOT known, click the Data Type list box arrow and select the data format for the Modbus register. 						
		Important!: The Data Type text box cannot be changed when it is identified by the Gateway.						
Slave Register Remapping table	Register Value column	The Register Value column shows data that the Endpoint is sending in.						
Slave Register Remapping table	Description column	The Description column shows information describing the data at this Register Address .						
	Read Mapping from Gateway button	Click the Read Mapping to Gateway button to read the current registers.						
	Write Mapping from Gateway button	Click the Write Mapping to Gateway button to remap the registers.						
	Clear Table button	Click the Clear Table button to reset any changes made in the window to its defaults.						
	Clear Gateway button	Click the Clear Gateway button to clear any settings written to the Gateway.						
	Save to File button	Click the Save to File button to open the Microsoft® Save As dialog box with the default location to save the .remap file.						
	Load from File button	Click the Load from File button to open the Microsoft® Open dialog box with the default location to load the .remap file from.						
	Export to CSV button	Click the Export to CSV button to open the Microsoft® Save As dialog box with the default location to save the .csv file in.						
Display area	Apply Default Register Map check box	Note : By default, when the Gateway recognizes the connected Endpoint type, the Apply Default Register Map check box is selected.						

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Slave Register F	Remapping windo	w					
Control Area	Control Title	Control Description					
Display area	Show Register Addresses in HEX check box	Click the Show Register Addresses in HEX check box to view the Register Address column information as hexadecimal values.					
Display area	Show Data Values in HEX check box	Click the Show Data Values in HEX check box to view the Register Value column information as hexadecimal values.					
Display area	Use Extended Slave ID (2- bytes) check	Click the Use Extended Slave ID (2-bytes) check box to activate the Use Extended Slave ID (2-bytes) text box.					
	box	 When this check box is NOT selected, the Modbus address of the Gateway is 8 bits in length. 					
		 When with the check box selected, the Modbus address of the Gateway is 16 bits in length and equal to the value entered in the Use Extended Slave ID (2-bytes) text box. 					
Display area	Use Extended Slave ID (2- bytes) text box	In the Use Extended Slave ID (2-bytes) text box, enter any number from 0 to 4095 to designate the 16 bit Modbus address of the Gateway.					
Display area	Set button	Click the Set button to save the information.					
Fail Mode area	Fail Mode with High Value option button	Select the Fail Mode with High Value option button to return a Modbus value of 65535 when polling of the end device fails.					
Fail Mode area	Fail with Last Value (else High) option button	Select the Fail with Last Value (else High) option button to return the last value polled from the end device if there was never any data for that register or if the Gateway reboots or is re-powered.					
		Note : If no successful poll has yet occurred, returns 65535.					
Fail Mode area	Fail Mode with Low Value option button	Select the Fail Mode with Low Value option button to return a Modbus value of 0 (zero) when polling of the end device fails.					
Fail Mode area	Fail with Last Value (else Low) option button	Select the Fail with Last Value (else Low) option button to return the last value polled form the end device if there was never any data for that register or if the Gateway reboots or is re-powered.					
		Note: If no successful poll has yet occurred, returns 0 (zero).					

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14. WAVECONTACT Network Frequencies

The frequencies used by the WAVECONTACT network vary depending on the **Radio Network** and **Radio Network Group** selected in the Device Configuration window (on page 57).

Example: Using the Radio Network Group Selection: 0, 1, 2, or 3 (on page 96) table, the Radio Network and Radio Network Group settings of 0 (zero) and 0 (zero) (respectively) uses the frequencies between 908.20 and 918.20. The Radio Network and Radio Network Group settings of 0 (zero) and 2 (respectively) uses 905.00 to 915.00.

- Radio Network Group Selection: 0, 1, 2, or 3 (on page 96)
- Radio Network Group Selection: 4, 5, 6, or 7 (on page 97)
- Radio Network Group Selection: 8, 9, 10, 11 (on page 98)
- Radio Network Group Selection: 12, 13, 14, 15 (on page 99)
- Radio Network Group Selection: 16, 17, 18, or 19 (on page 100)
- Radio Network Group Selection: 20, 21, 22, 23 (on page 101)
- Radio Network Group Selection: 28 or 29 (on page 103)

14.1. Radio Network Group Selection: 0, 1, 2, or 3

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 0, 1, 2, or 3.

Radio Network selection	Radio Network Group selection: 0 or 1	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 2 or 3	Low Frequency	High Frequency
0	0	908.20	918.20	0	2	905.00	915.00
1	0	908.40	918.40	1	2	905.20	915.20
2	0	908.60	918.60	2	2	905.40	915.40
3	0	908.80	918.80	3	2	905.60	915.60
4	0	909.00	919.00	4	2	905.80	915.80
5	0	909.20	919.20	5	2	906.00	916.00
6	0	909.40	919.40	6	2	906.20	916.20
7	0	909.60	919.60	7	2	906.40	916.40
0	1	909.80	919.80	0	3	906.60	916.60
1	1	910.00	920.00	1	3	906.80	916.80
2	1	910.20	920.20	2	3	907.00	917.00
3	1	910.40	920.40	3	3	907.20	917.20
4	1	910.60	920.60	4	3	907.40	917.40
5	1	910.80	920.80	5	3	907.60	917.60
6	1	911.00	921.00	6	3	907.80	917.80
7	1	911.20	921.20	7	3	908.00	918.00

14.2. Radio Network Group Selection: 4, 5, 6, or 7

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 4, 5, 6, or 7.

Radio Network selection	Radio Network Group selection: 4 or 5	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 6 or 7	Low Frequency	High Frequency
0	4	908.20	918.20	0	6	905.00	915.00
1	4	908.40	918.40	1	6	905.20	915.20
2	4	908.60	918.60	2	6	905.40	915.40
3	4	908.80	918.80	3	6	905.60	915.60
4	4	909.00	919.00	4	6	905.80	915.80
5	4	909.20	919.20	5	6	906.00	916.00
6	4	909.40	919.40	6	6	906.20	916.20
7	4	909.60	919.60	7	6	906.40	916.40
0	5	909.80	919.80	0	7	906.60	916.60
1	5	910.00	920.00	1	7	906.80	916.80
2	5	910.20	920.20	2	7	907.00	917.00
3	5	910.40	920.40	3	7	907.20	917.20
4	5	910.60	920.60	4	7	907.40	917.40
5	5	910.80	920.80	5	7	907.60	917.60
6	5	911.00	921.00	6	7	907.80	917.80
7	5	911.20	921.20	7	7	908.00	918.00

14.3. Radio Network Group Selection: 8, 9, 10, 11

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 8, 9, 10, or 11.

Radio Network selection	Radio Network Group selection: 8 or 9	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 10 or 11	Low Frequency	High Frequency
0	8	908.20	918.20	0	10	905.00	915.00
1	8	908.40	918.40	1	10	905.20	915.20
2	8	908.60	918.60	2	10	905.40	915.40
3	8	908.80	918.80	3	10	905.60	915.60
4	8	909.00	919.00	4	10	905.80	915.80
5	8	909.20	919.20	5	10	906.00	916.00
6	8	909.40	919.40	6	10	906.20	916.20
7	8	909.60	919.60	7	10	906.40	916.40
0	9	909.80	919.80	0	11	906.60	916.60
1	9	910.00	920.00	1	11	906.80	916.80
2	9	910.20	920.20	2	11	907.00	917.00
3	9	910.40	920.40	3	11	907.20	917.20
4	9	910.60	920.60	4	11	907.40	917.40
5	9	910.80	920.80	5	11	907.60	917.60
6	9	911.00	921.00	6	11	907.80	917.80
7	9	911.20	921.20	7	11	908.00	918.00

14.4. Radio Network Group Selection: 12, 13, 14, 15

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 12, 13, 14, or 15.

Radio Network selection	Radio Network Group selection: 12 or 13	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 14 or 15	Low Frequency	High Frequency
0	12	908.20	918.20	0	14	905.00	915.00
1	12	908.40	918.40	1	14	905.20	915.20
2	12	908.60	918.60	2	14	905.40	915.40
3	12	908.80	918.80	3	14	905.60	915.60
4	12	909.00	919.00	4	14	905.80	915.80
5	12	909.20	919.20	5	14	906.00	916.00
6	12	909.40	919.40	6	14	906.20	916.20
7	12	909.60	919.60	7	14	906.40	916.40
0	13	909.80	919.80	0	15	906.60	916.60
1	13	910.00	920.00	1	15	906.80	916.80
2	13	910.20	920.20	2	15	907.00	917.00
3	13	910.40	920.40	3	15	907.20	917.20
4	13	910.60	920.60	4	15	907.40	917.40
5	13	910.80	920.80	5	15	907.60	917.60
6	13	911.00	921.00	6	15	907.80	917.80
7	13	911.20	921.20	7	15	908.00	918.00

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14.5. Radio Network Group Selection: 16, 17, 18, or 19

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 16, 17, 18, or 19.

Radio Network selection	Radio Network Group selection: 16 or 17	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 18 or 19	Low Frequency	High Frequency
0	16	908.20	918.20	0	18	905.00	915.00
1	16	908.40	918.40	1	18	905.20	915.20
2	16	908.60	918.60	2	18	905.40	915.40
3	16	908.80	918.80	3	18	905.60	915.60
4	16	909.00	919.00	4	18	905.80	915.80
5	16	909.20	919.20	5	18	906.00	916.00
6	16	909.40	919.40	6	18	906.20	916.20
7	16	909.60	919.60	7	18	906.40	916.40
0	17	909.80	919.80	0	19	906.60	916.60
1	17	910.00	920.00	1	19	906.80	916.80
2	17	910.20	920.20	2	19	907.00	917.00
3	17	910.40	920.40	3	19	907.20	917.20
4	17	910.60	920.60	4	19	907.40	917.40
5	17	910.80	920.80	5	19	907.60	917.60
6	17	911.00	921.00	6	19	907.80	917.80
7	17	911.20	921.20	7	19	908.00	918.00

14.6. Radio Network Group Selection: 20, 21, 22, 23

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 20, 21, 22, or 23.

Radio Network selection	Radio Network Group selection: 20 or 21	Low Frequency	High Frequency	Radio Network selection	Radio Network Group selection: 22 or 23	Low Frequency	High Frequency
0	20	908.20	918.20	0	22	905.00	915.00
1	20	908.40	918.40	1	22	905.20	915.20
2	20	908.60	918.60	2	22	905.40	915.40
3	20	908.80	918.80	3	22	905.60	915.60
4	20	909.00	919.00	4	22	905.80	915.80
5	20	909.20	919.20	5	22	906.00	916.00
6	20	909.40	919.40	6	22	906.20	916.20
7	20	909.60	919.60	7	22	906.40	916.40
0	21	909.80	919.80	0	23	906.60	916.60
1	21	910.00	920.00	1	23	906.80	916.80
2	21	910.20	920.20	2	23	907.00	917.00
3	21	910.40	920.40	3	23	907.20	917.20
4	21	910.60	920.60	4	23	907.40	917.40
5	21	910.80	920.80	5	23	907.60	917.60
6	21	911.00	921.00	6	23	907.80	917.80
7	21	911.20	921.20	7	23	908.00	918.00

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14.7. Radio Network Group Selection: 24, 25, 26, 27

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 24, 25, 26, or 27.

Radio Network selection	Radio Network Group selection: 24 or 25	Low Frequency	High Frequency		Radio Network selection	Radio Network Group selection: 26 or 27	Low Frequency	High Frequency
0	24	908.20	918.20		0	26	905.00	915.00
1	24	908.40	918.40		1	26	905.20	915.20
2	24	908.60	918.60		2	26	905.40	915.40
3	24	908.80	918.80		3	26	905.60	915.60
4	24	909.00	919.00		4	26	905.80	915.80
5	24	909.20	919.20		5	26	906.00	916.00
6	24	909.40	919.40		6	26	906.20	916.20
7	24	909.60	919.60		7	26	906.40	916.40
0	25	909.80	919.80	Ī	0	27	906.60	916.60
1	25	910.00	920.00		1	27	906.80	916.80
2	25	910.20	920.20		2	27	907.00	917.00
3	25	910.40	920.40		3	27	907.20	917.20
4	25	910.60	920.60		4	27	907.40	917.40
5	25	910.80	920.80		5	27	907.60	917.60
6	25	911.00	921.00		6	27	907.80	917.80
7	25	911.20	921.20		7	27	908.00	918.00

14.8. Radio Network Group Selection: 28 or 29

In the Device Configuration window (on page 57), these are the **High** and **Low Frequencies** when the **Radio Network Group** list box selection is 28 or 29.

Radio Network selection	Radio Network Group selection: 28 or 29	Low Frequency	High Frequency
0	28	908.20	918.20
1	28	908.40	918.40
2	28	908.60	918.60
3	28	908.80	918.80
4	28	909.00	919.00
5	28	909.20	919.20
6	28	909.40	919.40
7	28	909.60	919.60
0	29	909.80	919.80
1	29	910.00	920.00
2	29	910.20	920.20
3	29	910.40	920.40
4	29	910.60	920.60
5	29	910.80	920.80
6	29	911.00	921.00
7	29	911.20	921.20

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Appendix A: Technical Specifications

Technical Specification: WC45i-GW-485 Modbus Gateway		
Specification	Description	
Transmitter		
Frequency	902-928 MHz license-free ISM band compliant with FCC Part 15	
Range	3 miles or more, depending on placement	
Networks	Up to 64 separate networks receiver	
Sensitivity	-105dB	
Interfaces		
Data Interface	RS-485 Modbus RTU, or Modbus-TCP, RS 232 for configuration.	
	Note : All readings are converted to Modbus registers and stored in the Gateway.	
Internal Diagnostics	Line voltage	
	Signal Strength	
	Error conditions	
	Internal event logging	
Power Requirements		
Power	+6 to +36VDC	
Radio Power	500 mW	
General Information		
Operating Temperature	-40°C to 85°C	

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Technical Specification: WC45i-GW-485 Modbus Gateway		
Specification	Description	
Humidity	0% - 100% condensing	
Antenna Type	Omnidirectional	
Antenna Gain	5dB	
Weight	2.4 lbs	
Enclosure	Weather-tight, integrated electronics and antenna, NEMA 3R	
Safety Rating	Non-incendive, Class 1 Division 2 Groups C and D, T5	

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Appendix B: Connection Troubleshooting

Verify the connection between the Gateway and Endpoint:

- Check the LEDs on the Endpoint.
 - If LEDs don't indicate linked, double check radio settings.
 - See LEDs (on page 107).
- If the Endpoint is linking, use the 4-pin to USB programming cable to connect to Gateway and examine the Endpoints reporting to that Gateway.
- If the Endpoints are reporting in, double check that the Modbus IDs and registers are correct in the Modbus master.

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Appendix C: LEDs

The WC45i-GW-485 has one LED available for field diagnostics.

Status LEDs	Description
Slow Flash (3 second pause)	System is running and in communication with radio network.
Fast Flash (0.5 second pause)	System is running but no network found.
Solid On	System Fault needs service or rescue bootload.

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Appendix D: Available Accessories

Available Accessories	
FreeWave Part #	Description
WC-USB-DB9	USB to Serial DB9 programming cable
WC45-Whip	Whip Antenna
	Suitable for use in fiberglass or plastic enclosure with direct mount to DIN mounted card.
WC45-PM	Panel Mount Antenna
	Mount outside of an enclosure.

These accessories are available from FreeWave for the WAVECONTACT products.

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Appendix E: FreeWave Legal Information

Export Notification

FreeWave Technologies, Inc. products may be subject to control by the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR). Export, re-export, or transfer of these products without required authorization from the U.S. Department of Commerce, Bureau of Industry and Security, or the U.S. Department of State, Directorate of Defense Trade Controls, as applicable, is prohibited. Any party exporting, re-exporting, or transferring FreeWave products is responsible for obtaining all necessary U.S. government authorizations required to ensure compliance with these and other applicable U.S. laws. Consult with your legal counsel for further guidance.

FCC Notifications

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

The content of this guide covers FreeWave Technologies, Inc. models sold under FCC ID: W8V-M655.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of these measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Notification of Power Warning

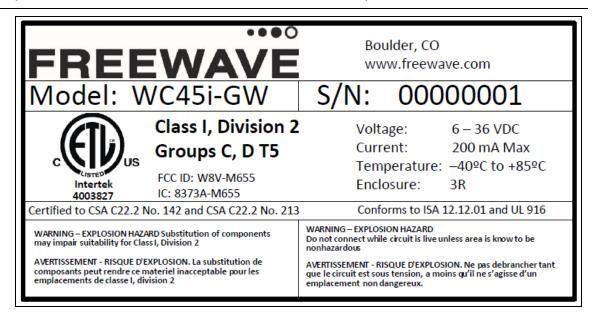
The WC45i-GW-485 Modbus Gateway covered in this document has a maximum transmitted output power of +14dBm.

The antennas used MUST provide a separation distance of at least 20 cm from all persons and MUST NOT be co-located or operate in conjunction with any other antenna or transmitter.

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Important!: This label MUST BE visible when the WAVECONTACT product is installed.

WC45i-GW-ETL-FCC-FC C1D2 Label

IC Notifications

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a maximum (or lesser) gain approved for this transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.r.i.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industri e Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les ri sques de brouillage radioélectrique à l'intention des autres utilisat eurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établisseme nt d'une communication satisfaisante.

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

Ce dispositif est conforme aux normes permis-exemptes du Canada RSS d'industrie. L'opération est sujette aux deux conditions suivantes : (1) ce dispositif peut ne pas causer l'interférence, et (2) ce dispositif doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer le fonctionnement peu désiré du dispositif.

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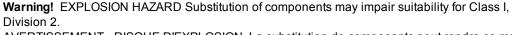
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Hazardous Location Certification



Warning! EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE COMPONENTS UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS. AVERTISSEMENT : RISQUE D'EXPLOSION. NE PAS RETIRER OU REMPLACER LES COMPOSANTS QUE L'ALIMENTATION EST DÉBRANCHÉ OU ZONE EST LIBRE DE CONCENTRATIONS IGNITIBLE.



AVERTISSEMENT - RISQUE D'EXPLOSION. La substitution de composants peut rendre ce materiel inacceptable pour les emplacements de classe I, division 2.

Warning! EXPLOSION HAZARD Do not disconnect while circuit is live unless area is known to be nonhazardous.

AVERTISSEMENT - RISQUE D'EXPLOSION. Ne débranchez pas lorsque le circuit est en direct, sauf si la zone est connue pour être nonhazardous.



Warning! The Wireless IO Module must be installed in a suitable enclosure for intended environment.

AVERTISSEMENT - Le module IO sans fil doit être installé dans une enceinte appropriée pour l'environnement prévu.

Warning! All wring methods must be in accordance with the NEC. AVERTISSEMENT - Toutes les méthodes de Essorez doivent être en conformité avec la NEC.

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