FREEWAVE

WC30i-TZ Wireless Flow Totalizer

User & Reference Manual

Part Number: LUM0099AA
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.

Warning! Remove power before connecting or disconnecting the interface or RF cables.

FreeWave Technologies, Inc. warrants the FreeWave® WC30i-TZ Wireless Flow Totalizer (Product) that you have purchased against defects in materials and manufacturing for a period of three years from the date of shipment, depending on model number. In the event of a Product failure due to materials or workmanship, FreeWave will, at its discretion, repair or replace the Product. For evaluation of Warranty coverage, return the Product to FreeWave upon receiving a Return Material Authorization (RMA). The replacement product will remain under warranty for 90 days or the remainder of the original product warranty period, whichever is longer.

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2. If Product is used outside of FreeWave specifications as stated in the Product's data sheet.
3. If Product has been modified, repaired, or altered by Customer unless FreeWave specifically authorized such alterations in each instance in writing.

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Preface

Contact FreeWave Technical Support

For up-to-date troubleshooting information, check the **Support** page at www.freewave.com.

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 http://support.freewave.com/ 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 WC30i-TZ.	LUM0099AA
Quick Start Guide	The Quick Start Guide provides the out-of-the-box setup of the WC30i-TZ.	QSG0048AA
Application Note	Intrinsically Safe Installation	LAN5509AA
Application Note	Battery Life Estimates	LAN5511AA

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: **xxxxxxxxx**.

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.

1. Overview

Thank you for purchasing the WC30i-TZ Wireless Flow Totalizer.

The WC30i-TZ is an intrinsically safe device with these features:

- Frequency Range and Input Sensitivity
  - 1Hz to 4kHz (low gain) and 20mV peak-to-peak (p-p)
  - 1Hz to 2kHz (high gain) and 5mV peak-to-peak (p-p)
  - Jumper selectable
- Provides grand total, yesterday's total, and today's total to individual Modbus registers
- Real time clock for daily contract hour setting
- Configurable push button zeroing with optional batch mode
- Configurable K factor
- Flow rate reporting
- Display showing flow rates and flow totals
- Low power operation from an Intrinsically Safe, high capacity lithium primary battery pack
- Sends data to a WC45i-Gateway
- On-board logging of 30 days of flow totals
- Batch processing mode

Note: See Available Accessories (on page 83) for additional equipment.

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

2. Equipment

2.1. Included Equipment

Included Equipment		
FreeWave Part #	**Qty**	**Description**
WC30i-TZ	1	WC30i-TZ Wireless Flow Totalizer
QSG0048AA	1	Quick Start Guide

2.2. User-supplied Equipment

- 4-pin to USB programming cable (FreeWave Part #: WC-USB-4PIN).
- Teflon tape
- Computer for WAVECONTACT device configuration.
- Turbine Flowmeter

Note: See Available Accessories (on page 83) for additional equipment.

3. WC30i-TZ Connections

- Local Display (LCD) (on page 10)
- Internal Connections (on page 12)
- Power Connection (on page 14)

3.1. Local Display (LCD)

The WC30i-TZ uses a local LCD display (with back-light) to view flow totals, flow rates, and status information.

Note: By default, the LCD and back-light automatically turn off after 30 seconds unless configured to always be on.

- The LCD (#1 in Figure 1) is powered on only when the **LCD Power-on** button under the LCD is pressed.
- Press the **LCD Power-on** button (#2 in Figure 1) to cycle through these information screens:

WC30i-TZ LCD Information		
Screen Title	**Reporting Format**	**Reporting Measurement**[Note 1]
Inst. Flow Rate[Note 2]	0.000	Gal / Sec***
Avg Flow Rate[Note 3]	0.000	Gal / Sec***
Today's Volume	0.00	Gal***
Yesterday's Volume	0.00	Gal***
Total Volume	0.00	Gal***
K-Factor	1.0	cnt / Gal***
Radio: Not Conn	RSSI:	dBm

Notes

1. The Reporting Measurements are determined by the selection made in the Units area (on page 61) of the Device Configuration window.

   Example: Gallons is the default selection in the **Units** area.
   If Cubic Meters (**cu. meters**) is selected in the **Volume Units** and **K-Factor** list boxes, the Reporting Measurement is **cm / Sec** or **cm** for their respective screens.
   The K-Factor is reported as **cnt / cm**.

2. The **Instantaneous Flow Rate (Inst. Flow Rate)** is calculated every 2 seconds.
   At check-in, the most recent instantaneous calculated flow rate is reported.
3. The **Average Flow Rate (Avg Flow Rate)** is the flow rate over the configured **Checkin Interval** list box period.

   Example: If the **Checkin Interval** list box is configured as 2-minutes, each check-in contains the average flow rate over the 2 minutes.

Additional Information

- Activate LCD Always On (on page 37)
- Deactivate LCD Always On (on page 38)

Figure 1: WC30i-TZ LCD and LCD Power-on button

3.2. Internal Connections

The WC30i-TZ connections are shown in Figure 2:

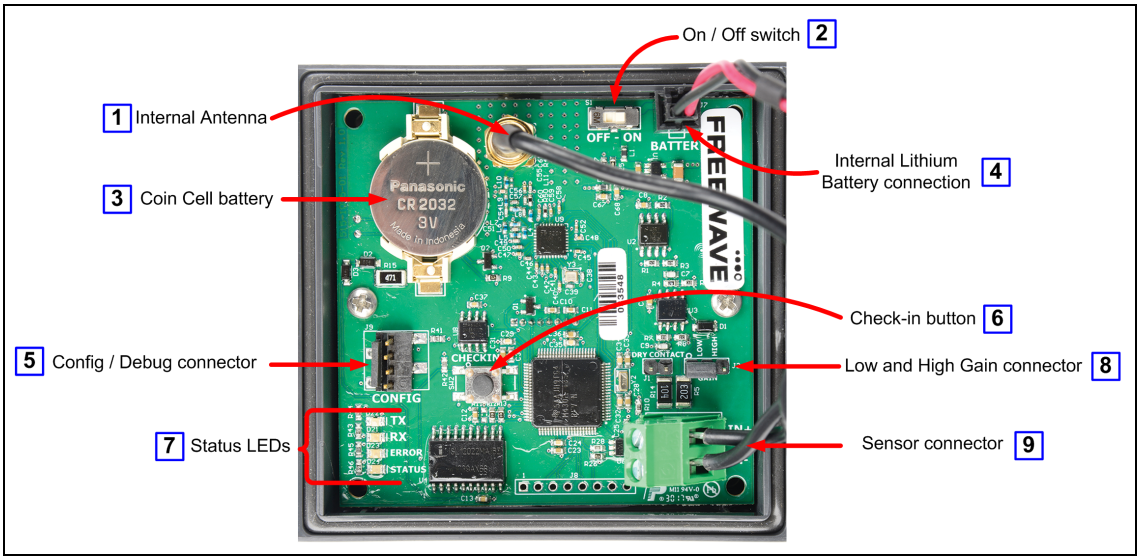


Figure 2: WC30i-TZ Wireless Flow Totalizer Connections

WC30i Wireless Pressure Sensor - Connections		
Item #	**Title**	**Description**
1	Internal Antenna	The Internal Antenna communicates with the WC45i-Gateway.
2	**On / Off** switch	The **On / Off** switch is used to provide power to the WC30i-TZ using the **Internal Lithium Battery** connection.
3	**Coin Cell** battery	The **Coin Cell** battery is used to backup the real-time clock in the event that the main battery pack is unplugged. **Important!**: The battery is a user-supplied **Panasonic CR2032 Coin Cell** battery. **Warning!** Use of any battery other than a **Panasonic CR2032 Coin Cell** battery will impair the protection provided by the equipment. **AVERTISSEMENT**: La sécurité intrinsèque et la protection du produit seront compromis par l'utilisation de batteries autres que celle fournie par FreeWave ayant comme numéro de pièce **Panasonic CR2032**. **Note**: See Mounting, Battery Replacement, Cleaning (on page 45) for additional information.

WC30i Wireless Pressure Sensor - Connections		
Item #	**Title**	**Description**
4	**Internal Lithium Battery** connection	This is the location of the Internal Lithium Battery Pack connection.
5	**RS232 Config / Debug** connector	This is the connection for the 4-pin to USB programming cable (FreeWave Part #WC-USB-4PIN).
6	**Check-in** button	Press the **Check-in** button to have the WC30i-TZ perform a check-in and send the current readings to the Gateway.
7	Status LEDs	See LEDs (on page 82) for detailed information.
8	**Low and High Gain** connector	Move the **Low and High Gain** connector jumper between the **Low** or **High** jumper position to control the Input Sensitivity between the WC30i-TZ and the connected turbine flow meter. **FREEWAVE Recommends**: For most turbine flow meters, the **Low and High Gain** connector jumper should remain in its default LOW GAIN position. This provides a sensitivity of 20mV peak-to-peak (p-p). **Note**: If a high sensitivity is needed, move the **Low and High Gain** connector jumper to the HIGH GAIN position to increase the sensitivity to 5mV peak-to-peak (p-p).
9	Sensor connector	This is the connection for the turbine sensor.

3.3. Power Connection

Important!: Verify the items listed in Equipment (on page 8) are available before starting this procedure.

Note: It is assumed that the reader and installer have completed the FreeWave WC30i-TZ installation and setup training to follow the procedures in this document.

Procedure

1. All wiring should be neat and orderly.
2. Unsnap and open the latch cover on the WC30i-TZ.
3. Connect the battery cable to the **Internal Lithium Battery** connection (**see #4** of Figure 3).
4. Slide the **On / Off Switch** to the On position.
5. Connect the 4-pin to USB programming cable to the **RS232 Config / Debug** connector (**see #5** of Figure 3).

   Note: #4 and #5 match the descriptions in the Internal Connections (on page 12).

6. Connect the USB end of the 4-pin to USB programming cable to the computer.

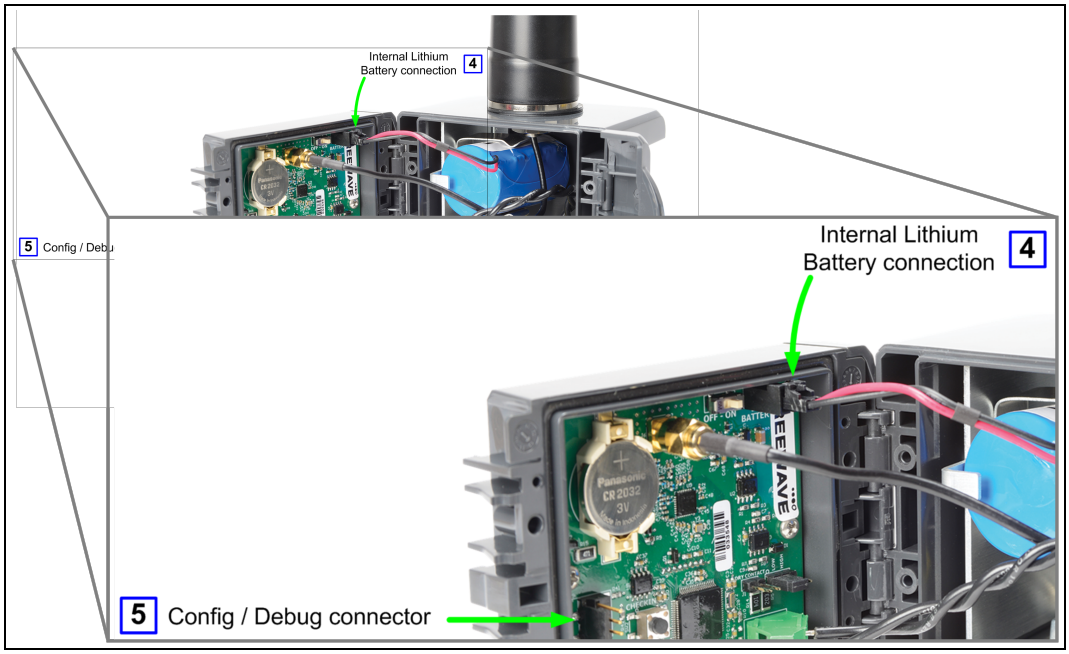


Figure 3: WC30i-TZ Internal Lithium Battery connection and Config / Debug connector

7. If this is the first time the WC30i-TZ is installed, wait for the drivers to install.

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

8. Continue with:
   - WC Toolkit Installation (on page 16)
   - Configuration (on page 26)

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 http://support.freewave.com/.
   The **FreeWave Support** site opens.

   Important!: Registration is required to use this website.

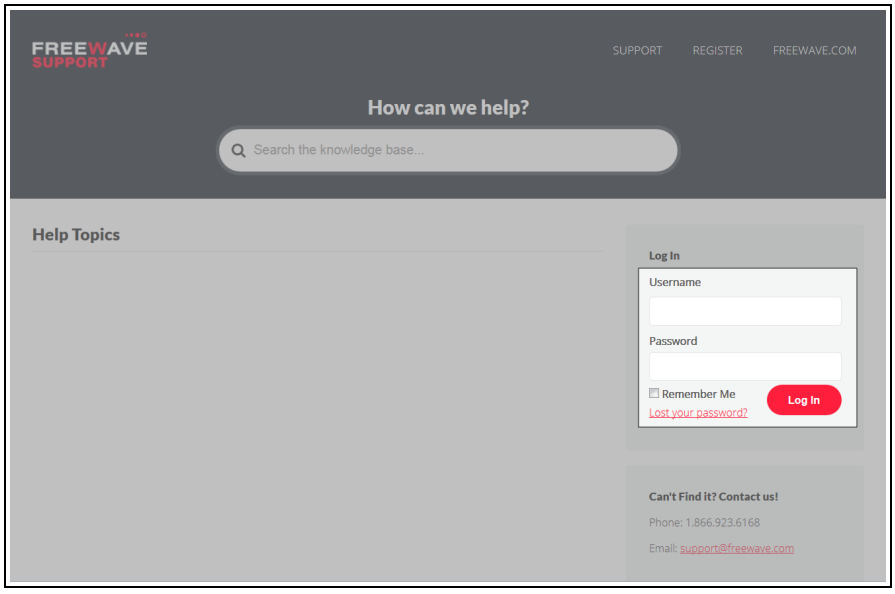


Figure 4: FreeWave Login window

2. Enter the **User Name** and **Password**.

3. Click 

.
A successful Login message briefly appears.
The **Help Topics** window opens.
4. Click the **Software** link.

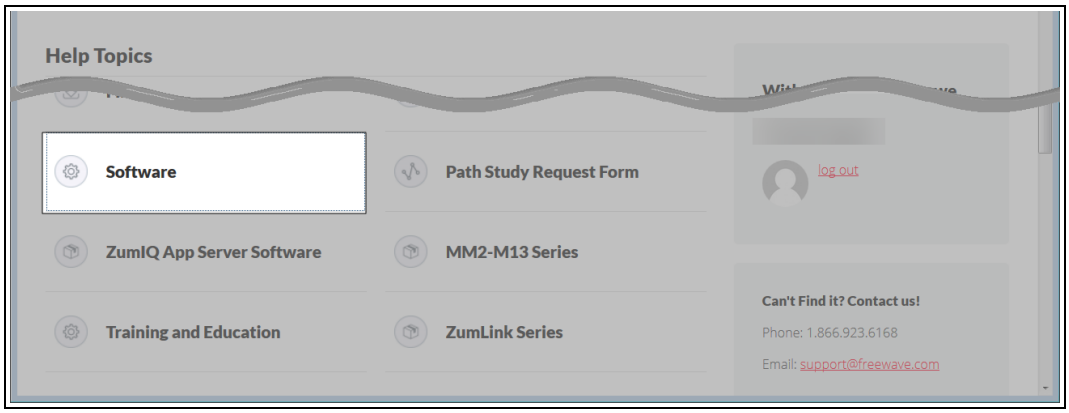


Figure 5: Help Topics window

The **Software** window opens.
5. Click the **WAVECONTACT Toolkit** link.

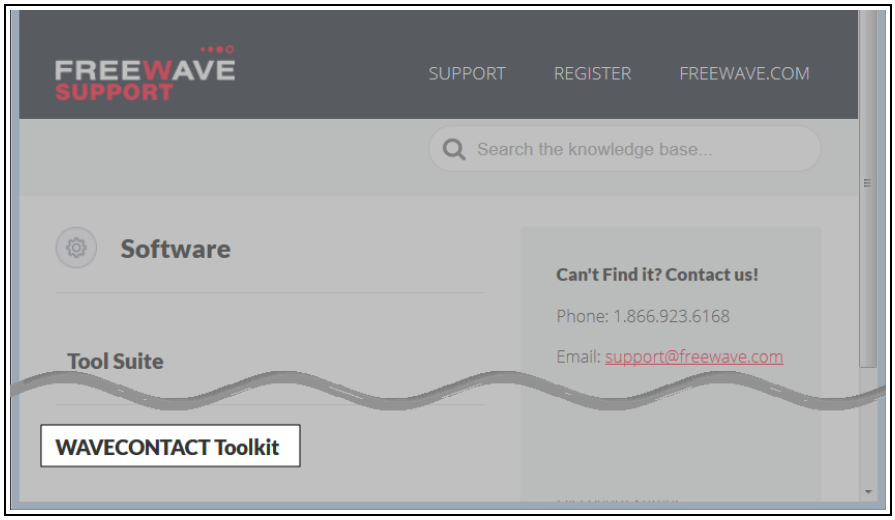


Figure 6: Software window

The available software appears in the window.
6. Select and click the attachment.

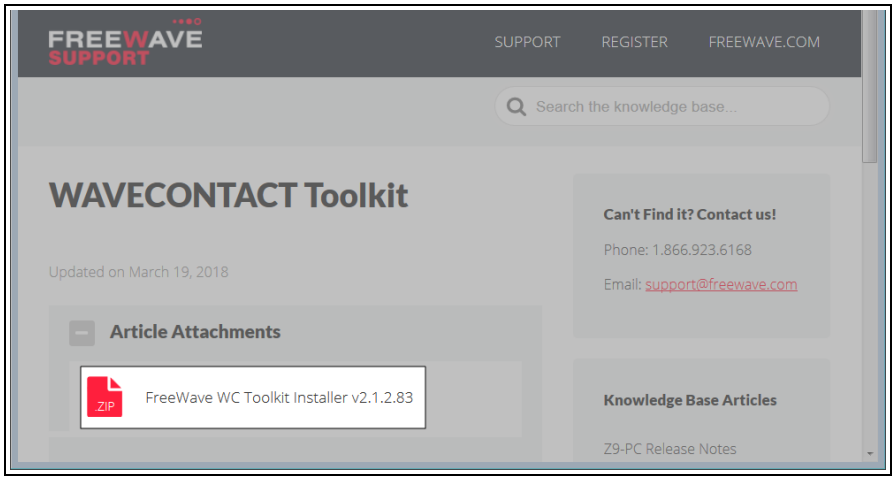


Figure 7: WAVECONTACT Toolkit window

The **Opening** dialog box opens.

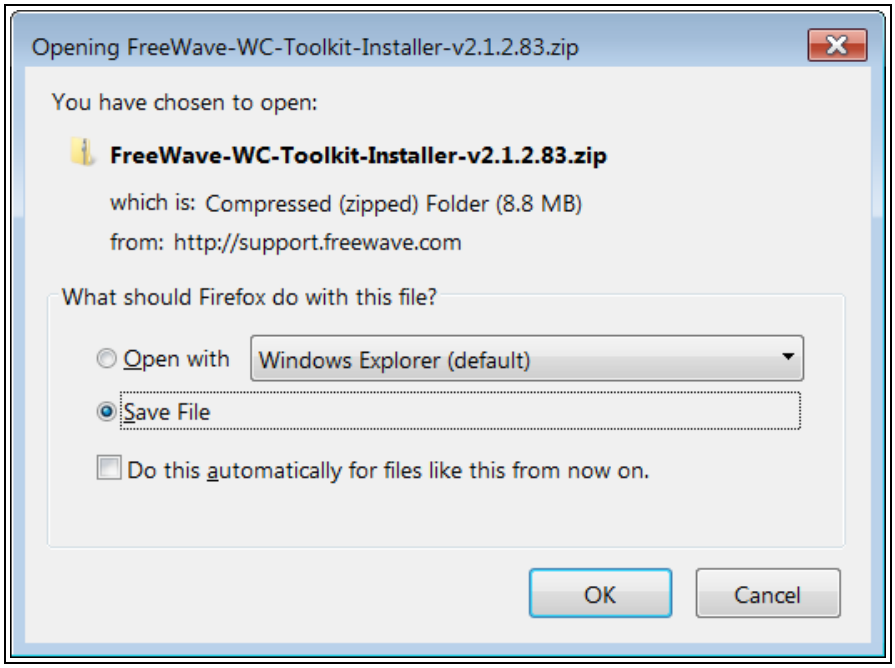


Figure 8: WC Toolkit Opening dialog box

> **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.

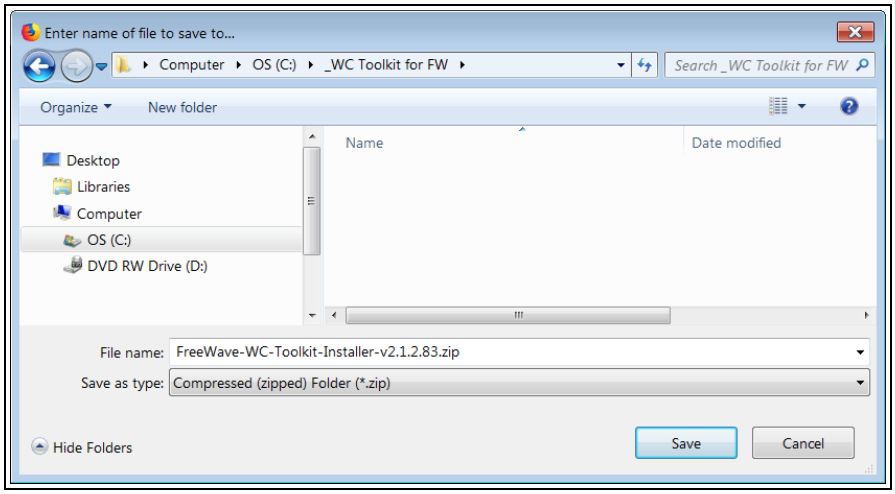


Figure 9: Enter name of file to save to dialog box

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.

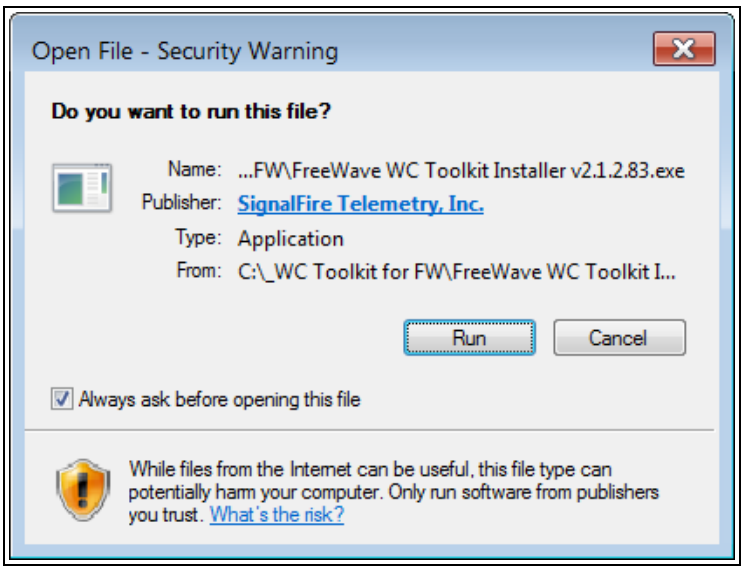


Figure 10: Open File - Security Warning dialog box

13. Click **Run**.
    The **User Account Control** dialog box opens.

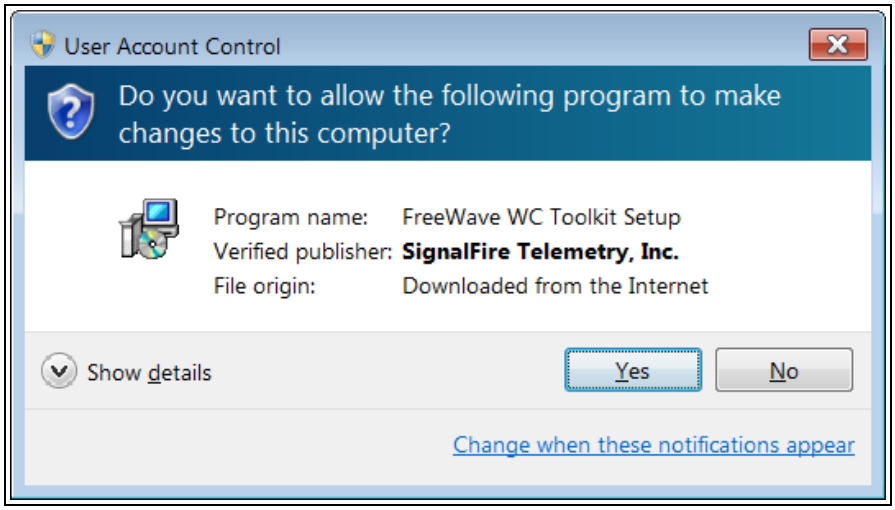


Figure 11: User Account Control dialog box

14. Click **Yes**.
    The **WC Toolkit Setup Wizard** starts.

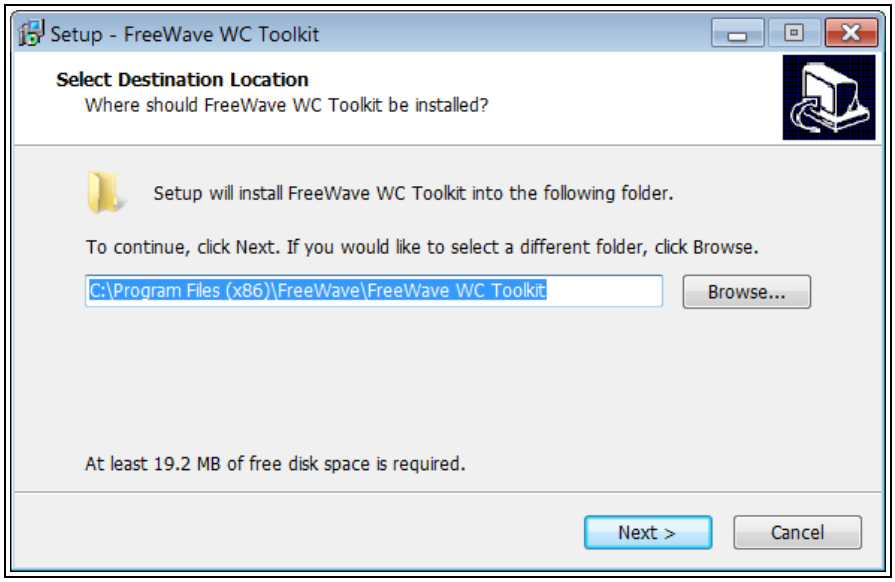


Figure 12: WC Toolkit Setup Wizard - Select Destination Location window

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

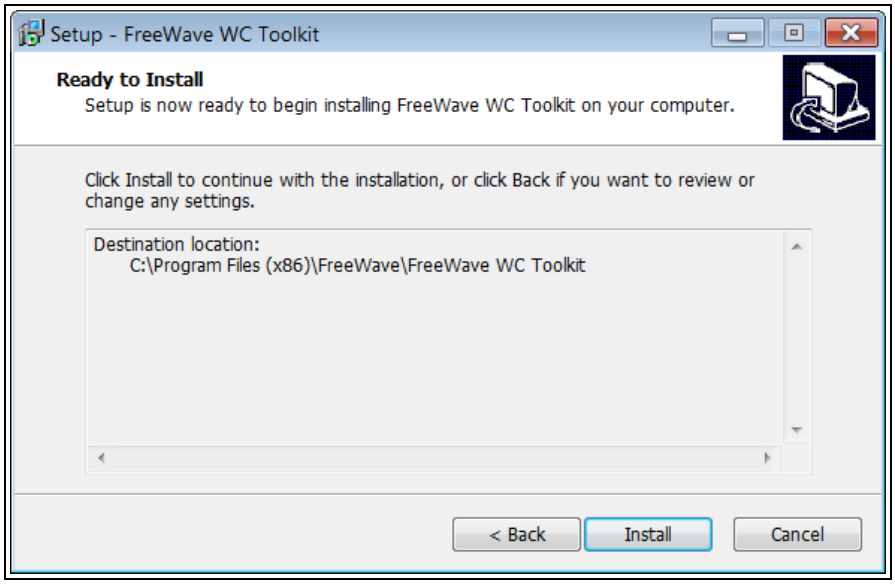


Figure 13: WC Toolkit Setup Wizard - Ready to Install window

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

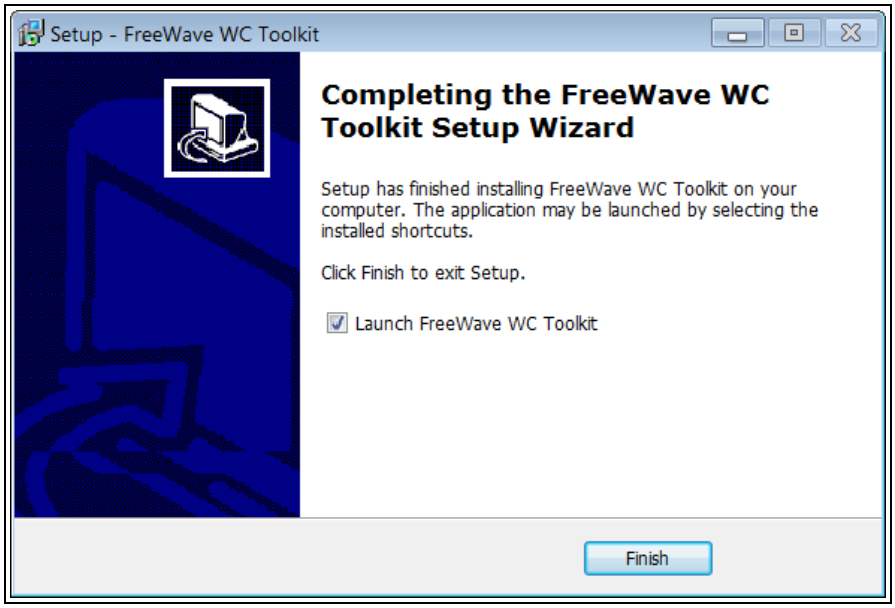


Figure 14: WC Toolkit Setup Wizard - Installation Complete window

17. Click **Finish** to open WC Toolkit.
    An **Update** message appears in the WC Toolkit window is an update is available.

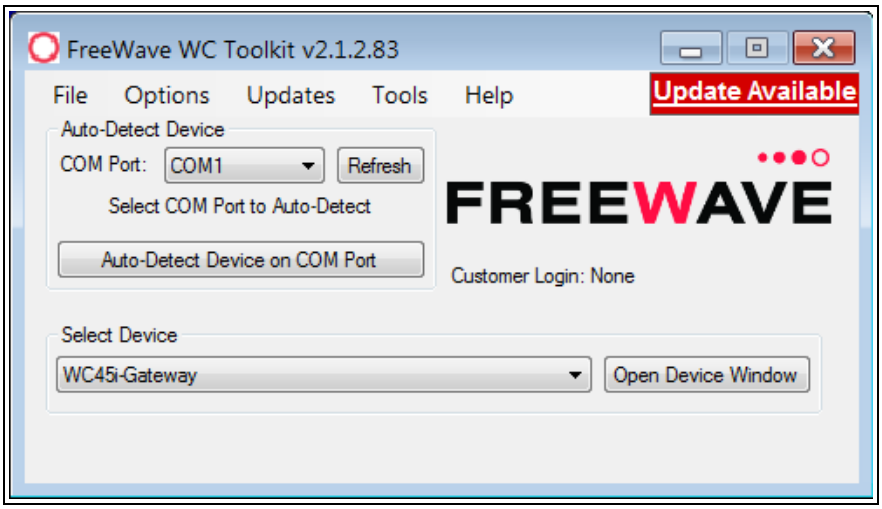


Figure 15: WC Toolkit - Update Available message

18. Continue with the WC Toolkit Update (on page 23) 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 56) 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.

1. Open the **WC Toolkit** software.
   The **Update Available** message appears in the window. (Figure 16)

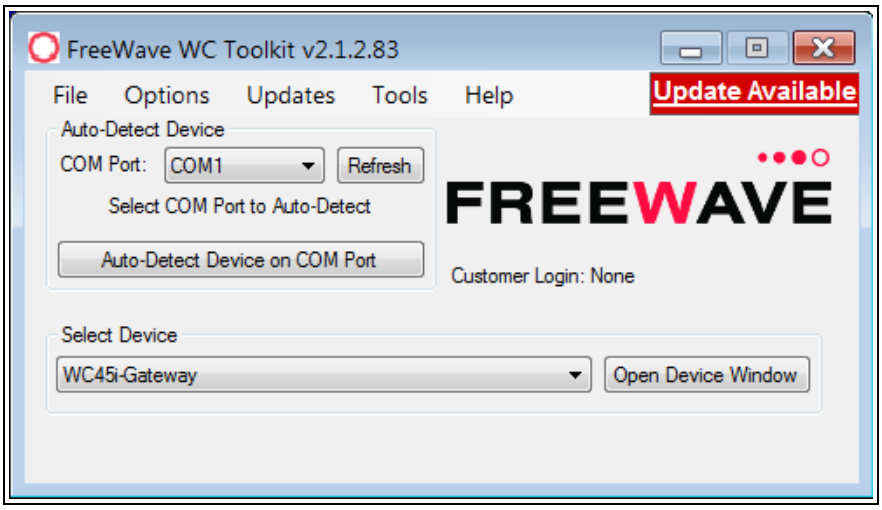


Figure 16: WC Toolkit - Update Available message

2. Click the **Update Available** message link.

Figure 17: Click the Update Available message link

The **Open File - Security Warning** dialog box opens.

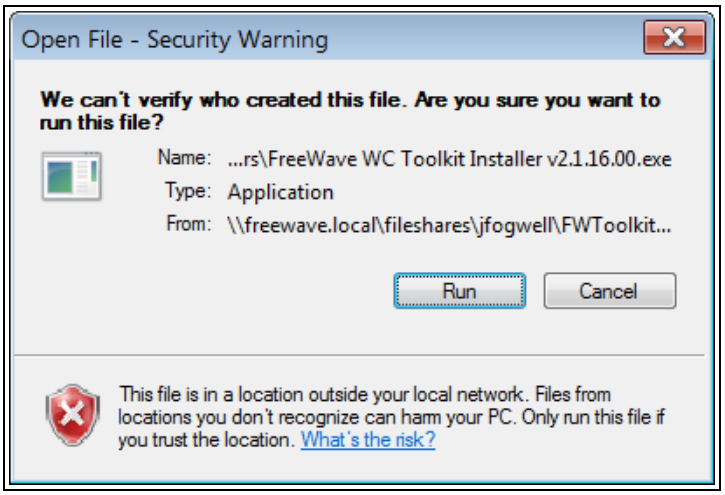


Figure 18: Open File - Security Warning dialog box

3. Click **Run**.
   The **User Account Control** dialog box opens.

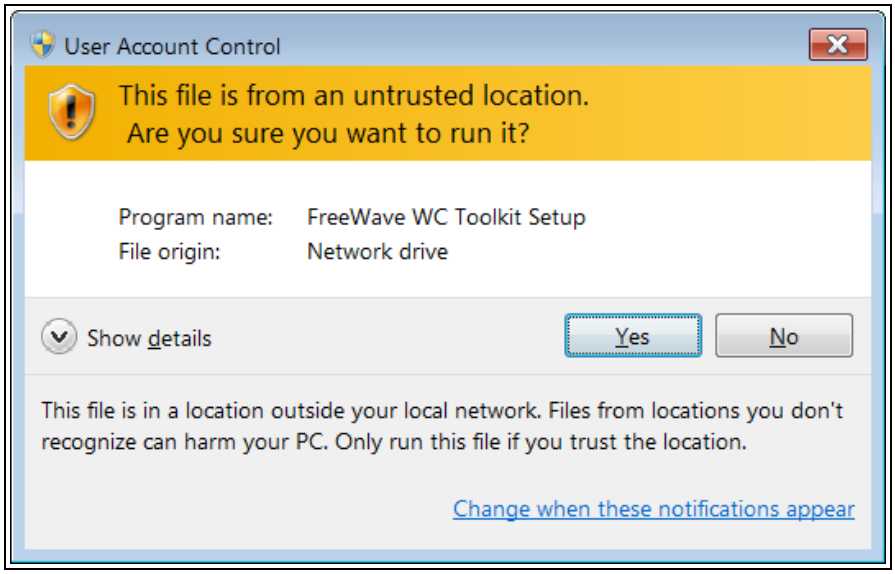


Figure 19: User Account Control dialog box

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 20)

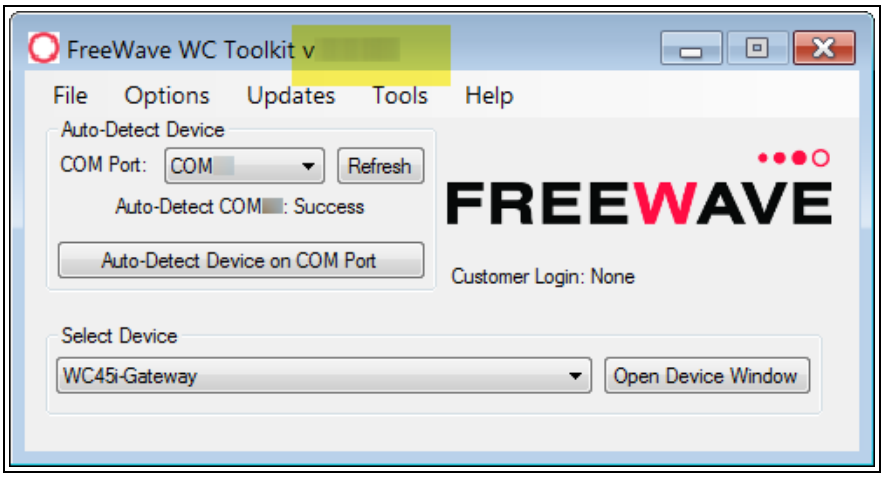


Figure 20: Select Device window

5. Continue with Configuration of the WC30i-TZ.

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.

Warning! Perform the Configuration steps in a safe location only.
AVERTISSEMENT: Suivez les étapes de cette section (Configuration) dans un endroit sûr uniquement.

The WC30i-TZ Wireless Flow Totalizer **MUST BE** set up for correct operation **before** it is placed in the field.

Configurable items include:

- Check-in period selection
- Modbus Slave ID setting
- Network selection
- Network Group selection
- Radio Mode selection

Important!: The WC30i-TZ Wireless Flow Totalizer is configured using the **WC Toolkit**. Download the **WC Toolkit** software from http://support.freewave.com/. Registration is required to use this website.

Warning! Debug and configuration information is available if the 4-pin to USB programming cable is connected to the **RS232 Config / Debug** connector using the debug port on the main board.
The USB converter cable (FreeWave Part #WC-USB-4PIN) must be used for this interface. Debug and configuration is done using the WC Toolkit.

Warning! Only connect to the Config / Debug connector port in a safe area!
Ensure that the maximum voltage applied to the configuration port is less than 5 VDC!
AVERTISSEMENT: Branchez le port de déboggage que dans une zone secure.
Assurez-vous que la tension électrique sur le port de configuration soit moins de 5 volt DC.

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 WC30i-TZ.

   Note: See WC Toolkit Installation (on page 16) and WC Toolkit Update (on page 23).

2. Verify the Gateway is installed and configured before continuing with the Endpoint configuration.
3. Connect the WC-USB-4PIN - 4-pin to USB programming cable to the computer and the WC30i-TZ.
4. Open the **WC Toolkit** software.
   The **Select Device** window opens. (Figure 21)

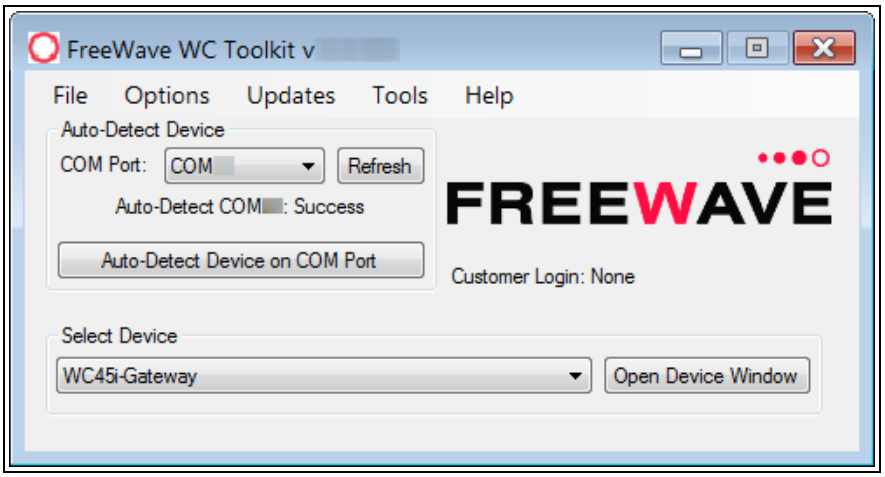


Figure 21: Select Device window

5. 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.
6. Click the **COM Port** list box arrow and select the COM port on the computer associated with the connected WC30i-TZ.

7. 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 WC30i-TZ device.

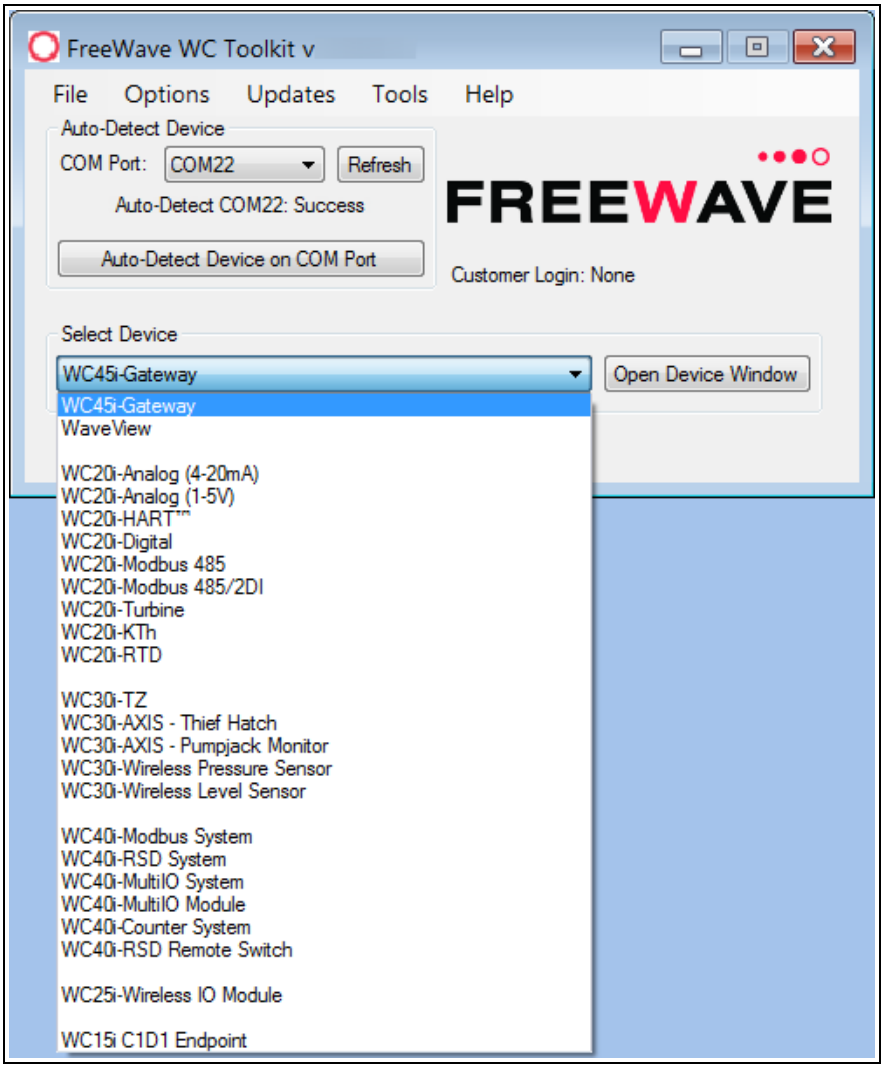


Figure 22: Select Device list box

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

> **Note**: See Device Configuration window (on page 56) for detailed information.

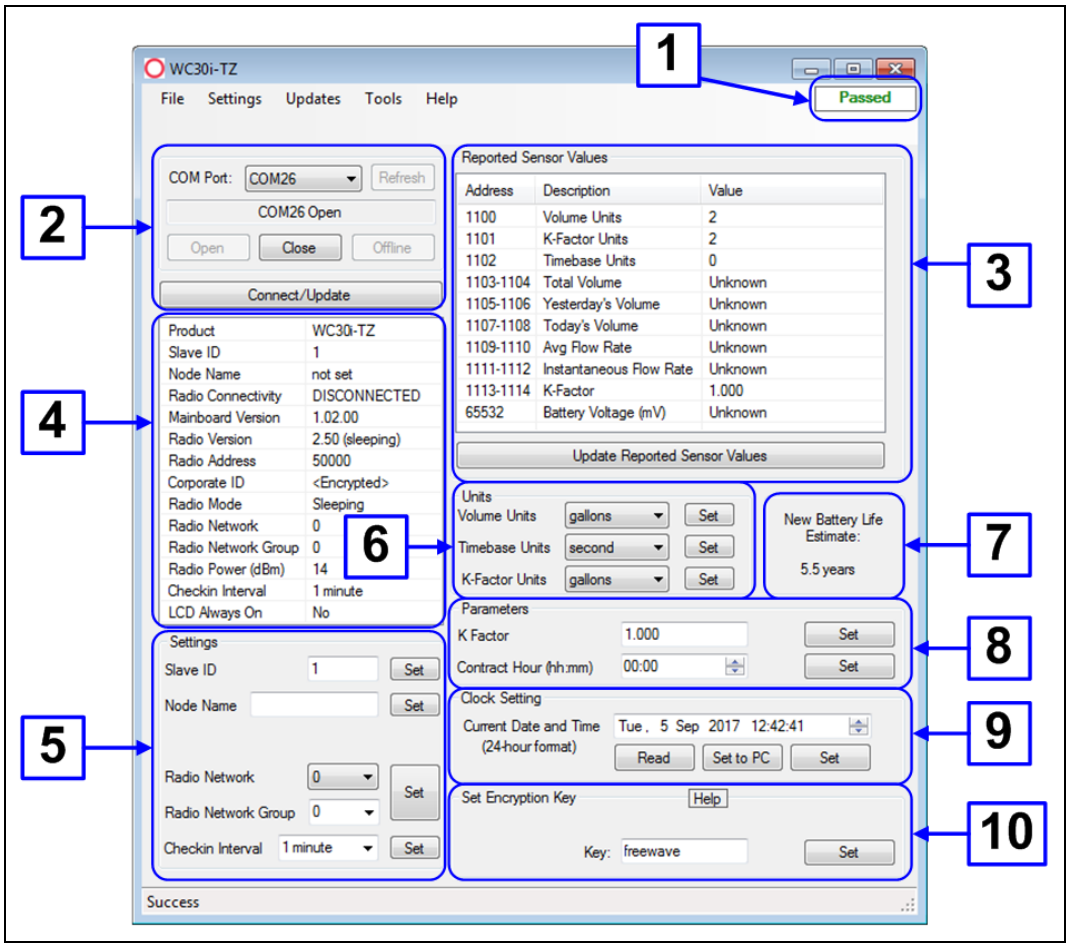


Figure 23: Device Configuration window: WC30i-TZ

8. 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 66) for additional information.

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

> **Note**: Each remote device connected to the Gateway MUST have a unique Modbus Slave ID (1-240).
> See Remote Modbus Registers (on page 79) for Modbus details.

> **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.

b. Click the **Set** button to save the information.
c. Optional: In the **Node Name** text box, enter a name for the Endpoint using a maximum of 10 characters.
d. Click the **Set** button to save the information.
e. Click the **Radio Mode** list box arrow and select either **Sleeping** or **Non-Sleeping**.

> **Caution**: Do NOT use the **Non-Sleeping** option with the WC30i-TZ because of rapid depletion of battery life.

f. Click the **Set** button to save the information.
g. Click the **Radio Network** list box arrow and select 0 (zero) to 7 for the assigned number.
h. Click the **Set** button to save the information.
i. Click the **Radio Network Group** list box arrow and select 0 (zero) to 29 for the network group assigned number.
j. Click the **Set** button to save the information.
k. Click the **Checkin Interval** list box arrow and select how often the Endpoint wakes up, reads the Modbus device, and transmits the register data to the Gateway.
l. Click the **Set** button to save the information.

9. In the **Units** area (#6), change these settings:
   a. Click the **Volume Units** list box arrow and select the unit the accumulated volumes and flow rate are presented in.
   b. Click the **Set** button to save the information.
   c. Click the **Timebase Units** list box arrow to configure the units used for the flow rates.
   d. Click the **Set** button to save the information.
   e. Click the **K-Factor Units** list box arrow and select the unit the flow meter uses for its k-factor.
   f. Click the **Set** button to save the information.
10. In the **Parameters** area (#8), change these settings:
   a. In the **K Factor** text box, enter the amount of pulses for the connected turbine flow meter.
   b. Click the **Set** button to save the information.
   c. Click the **Contract Hour (hh:mm)** spin box to control when the accumulated **Today's Volume** is moved to **Yesterday's Volume** and zero **Today's Volume**.

> **Note**: The contract hour is set in hh:mm in the 24-hour format.

> **Example**: 2:30pm is entered as 14:30.

d. Click the **Set** button to save the information.

11. In the **Clock Setting** area (#9), change these settings:
    a. Optional: Click the **Read** button to read the current time / date from the WC30i-TZ.
    b. Click the **Set to PC** button to synchronize the WC30i-TZ time to the connected computer for the battery back-up real-time clock.
    or
    Click the **Current Date and Time** spin box to manually enter the date and time of the WC30i-TZ for the battery back-up real-time clock.
    c. Click the **Set** button to save the information.
12. In the **Set Encryption Key** area (#10), 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.

> **Note**: When the WC30i-TZ 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.

13. Optional: Click the **Settings** menu and select **Set Encryption Key Unrecoverable** to permanently hide the key.
14. On the WC30i-TZ, press the **Check-in** button to send the current readings to the Gateway.
15. 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 TX light appears for 10 seconds.

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

16. Optional: Continue with:
    - Upgrade Mainboard Firmware (on page 33)
    - Activate LCD (on page 36)

- 30-day Logging (on page 39)
- Zero Volumes (on page 41)

17. Close the WC Toolkit software.
18. Remove the WC-USB-4PIN 4-pin to USB programming cable from the computer and the WC30i-TZ.
19. Use the 1” female NPT swivel fitting to directly mount the WC30i-TZ to a standard turbine flowmeter.

Note: See Control Drawing: 960-0087-02 (on page 78) for additional information.

7. Upgrade Mainboard Firmware

Firmware updates for the WC30i-TZ are completed using the RS232 Config / Debug connector port and WC Toolkit.

1. Verify the WC Toolkit software is installed on the computer connected to the WC30i-TZ.

   Note: See WC Toolkit Installation (on page 16) and WC Toolkit Update (on page 23).

2. Verify the Gateway is installed and configured before continuing with the Endpoint configuration.
3. Connect the WC-USB-4PIN - 4-pin to USB programming cable to the computer and the WC30i-TZ.
4. Open the **WC Toolkit** software.
   The **Select Device** window opens. (Figure 24)

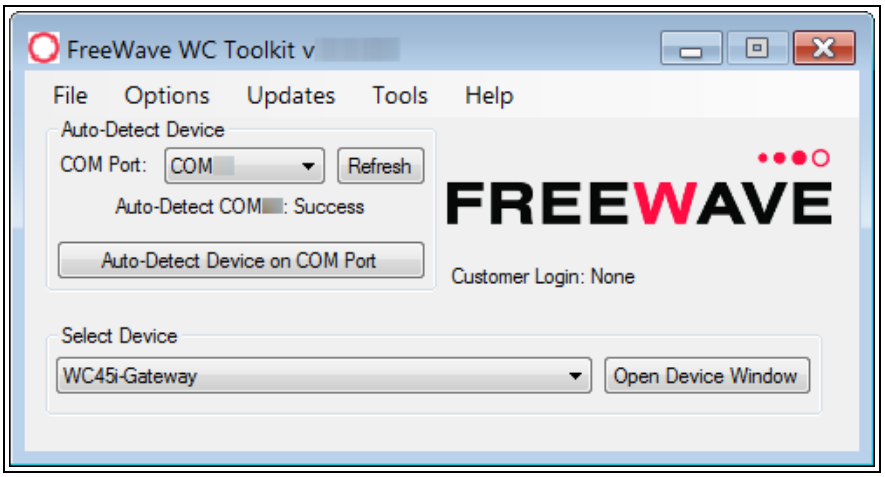


Figure 24: Select Device window

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 WC30i-TZ.
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.
   The **Device Configuration** window opens for the selected device.
6. On the **Updates** menu, click **Upgrade Mainboard Firmware**.

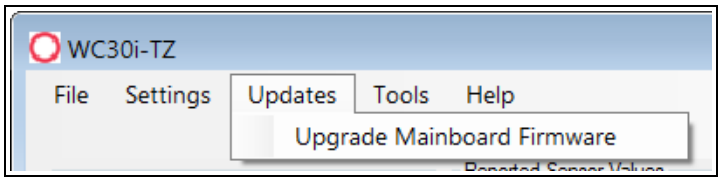


Figure 25: Updates menu > Upgrade Mainboard Firmware

The **Upgrade Mainboard Firmware** window opens.

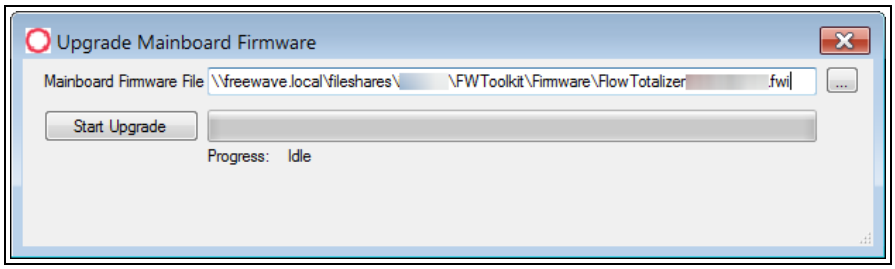


Figure 26: Upgrade Mainboard Firmware window

> **Note**: By default, the latest firmware file is selected from the update server.

7. Click the **Start Upgrade** button to load the file to the device.

8. Wait while the **Upgrade Mainboard Firmware** window progress bar shows the file transfer.

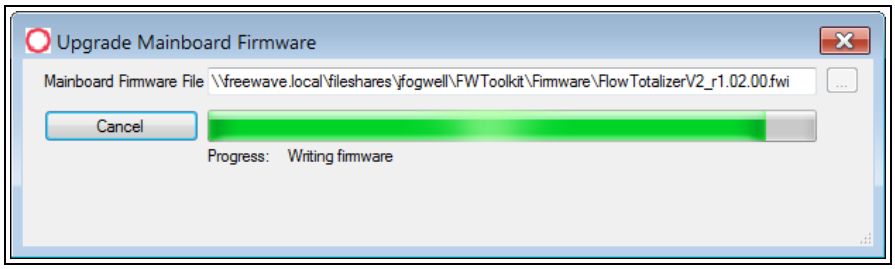


Figure 27: Progress bar of firmware update

The **Upgrade Mainboard Firmware** window shows that the upgrade was successful.

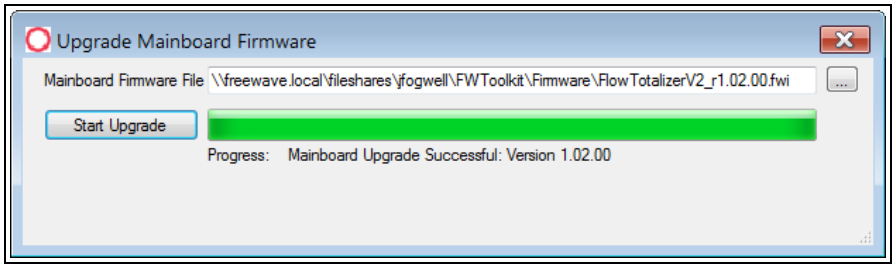


Figure 28: Successful firmware update message

9. Close the **Upgrade Mainboard Firmware** window.

8. Activate LCD

The WC30i-TZ uses a local LCD display (with back-light) to view flow totals, flow rates, and status information.

The LCD on the WC30i-TZ can be set to remain on always.

Note: By default, the LCD and back-light automatically turn off after 30 seconds unless configured to always be on.
It will come back on when the **LCD Power-on** button is pressed.

Caution: When the LCD is always on, it impacts the WC30i-TZ battery life.
See the Battery Life Estimates (on page 51) for detailed information.

- Activate LCD Always On (on page 37)
- Deactivate LCD Always On (on page 38)

8.1. Activate LCD Always On

1. Open the Device Configuration window (on page 56).
2. On the **Settings** menu, click **LCD Always On: ENABLE**.

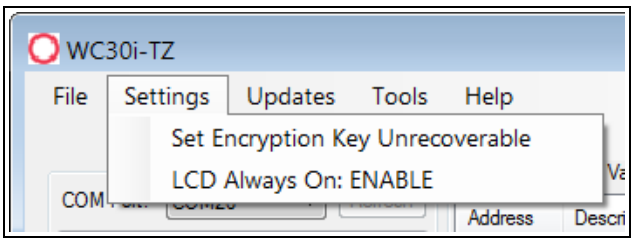


Figure 29: Settings menu > LCD Always On: ENABLE

A confirmation message appears.

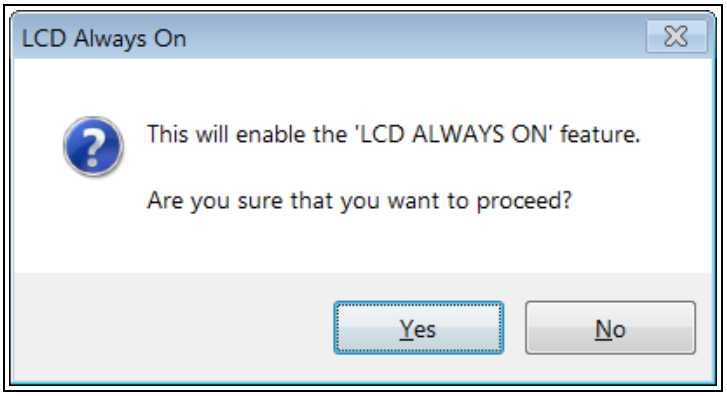


Figure 30: LCD Always On Confirmation message

3. Click the **Yes** button to continue.
4. Close the WC Toolkit software.

8.2. Deactivate LCD Always On

1. Open the Device Configuration window (on page 56).
2. On the **Settings** menu, click **LCD Always On: DISABLE**.

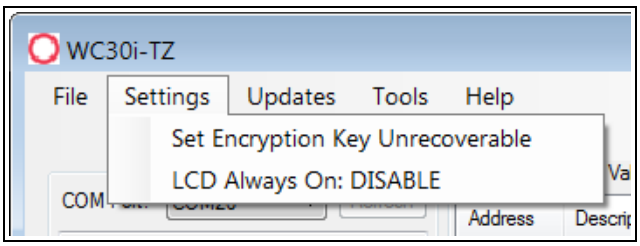


Figure 31: Settings menu > LCD Always On: DISABLE

A confirmation message appears.

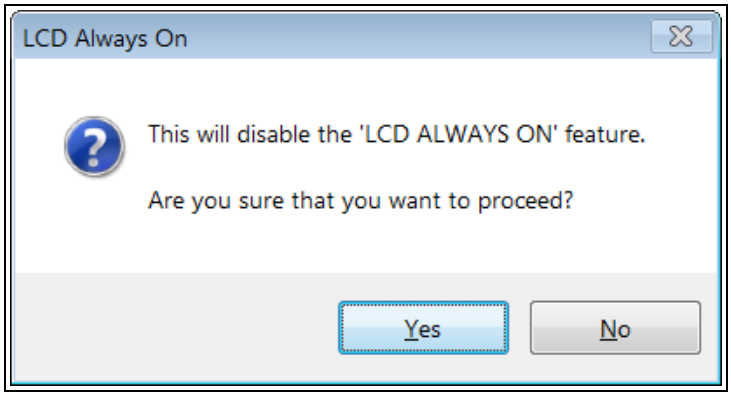


Figure 32: LCD Always On Confirmation message

3. Click the **Yes** button to continue.
4. Close the WC Toolkit software.

9. 30-day Logging

The WC30i-TZ keeps an on-board log of the last 30 days of flow totals.

Note: This log is accessed using WC Toolkit.

1. Open the Device Configuration window (on page 56).
2. On the **Tools** menu, click **Daily Log**.

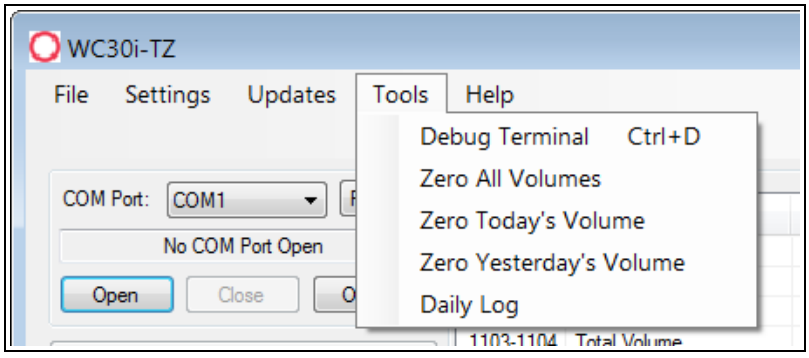


Figure 33: Tools menu > Daily Log

The Daily Volume Log window (on page 64) opens.

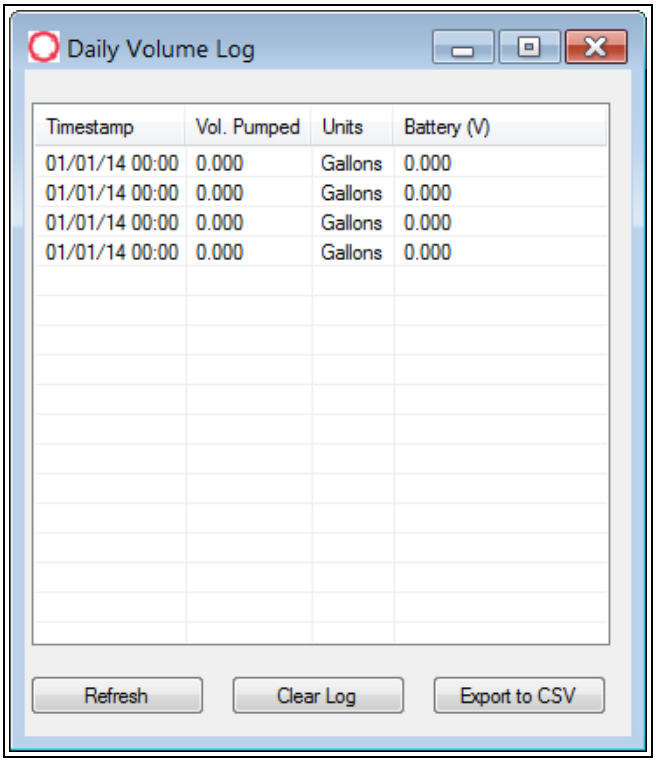


Figure 34: Daily Volume Log window

3. Click the **Refresh** button to read the log file.

> Tip: The log can be saved as a **.csv** file.

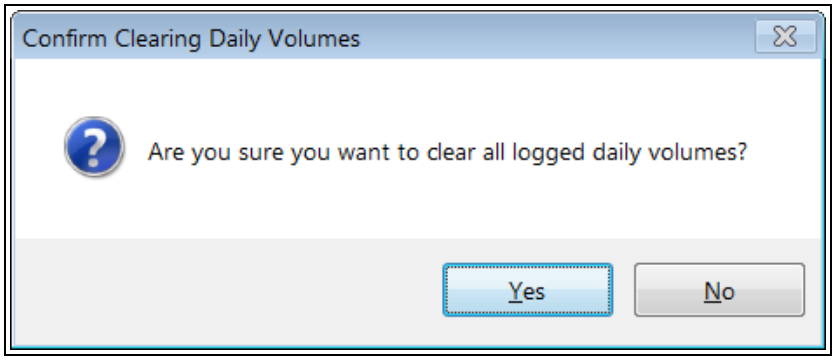
4. Optional: Click the **Export to CSV** button to open the **Save As** dialog box.
5. Use the dialog box to name and save the file in a file designated location.
6. Optional: Click the **Clear Log** button to erase all stored log information.
   A confirmation message appears.
7. 

Figure 35: Confirm Clearing Daily Volumes message

8. Close the **Daily Volume Log** window.

10. Zero Volumes

The stored volume information can be zeroed on the WC30i-TZ.

- Zero All Volumes (on page 42)
- Zero Today's Volume (on page 43)
- Zero Yesterday's Volume (on page 44)

10.1. Zero All Volumes

1. Open the Device Configuration window (on page 56).
2. On the **Tools** menu, click **Zero All Volumes**.

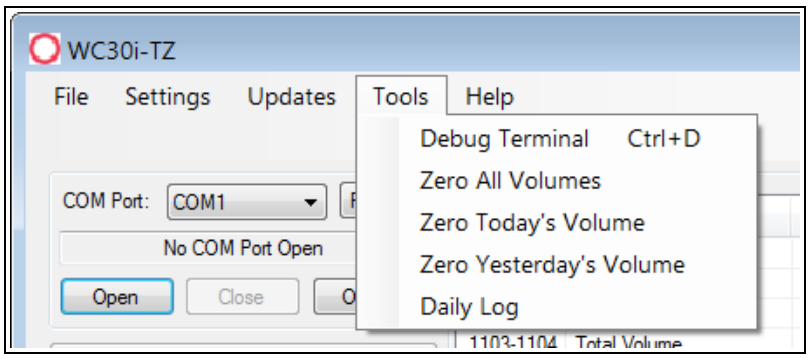


Figure 36: Settings menu > Zero All Volumes

A confirmation message appears.

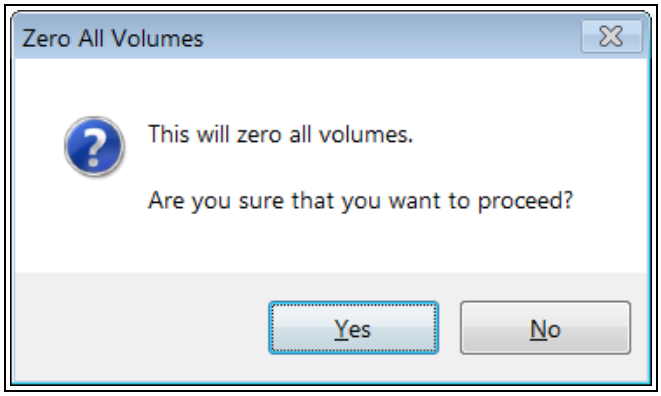


Figure 37: Zero All Volumes Confirmation message

3. Click the **Yes** button to continue.
4. Close the WC Toolkit software.

10.2. Zero Today's Volume

1. Open the Device Configuration window (on page 56).
2. On the **Tools** menu, click **Zero Today's Volume**.

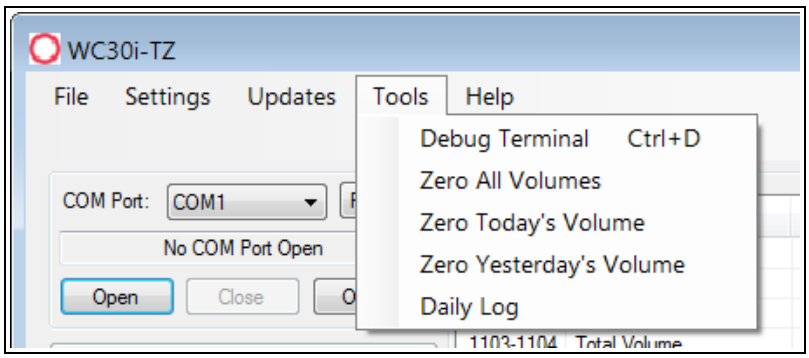


Figure 38: Settings menu > Zero Today's Volume

A confirmation message appears.

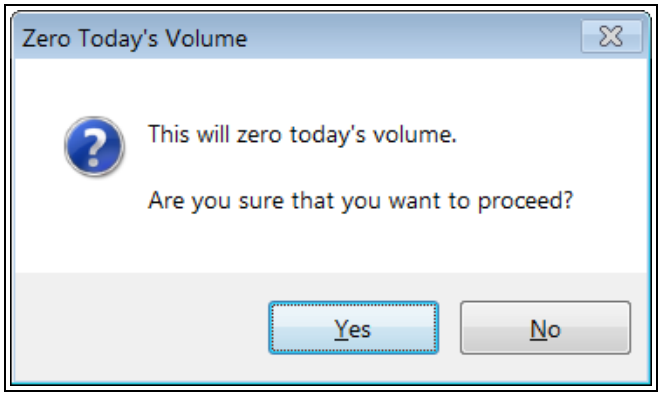


Figure 39: Zero Today's Volume Confirmation message

3. Click the **Yes** button to continue.
4. Close the WC Toolkit software.

10.3. Zero Yesterday's Volume

1. Open the Device Configuration window (on page 56).
2. On the **Tools** menu, click **Zero Yesterday's Volume**.

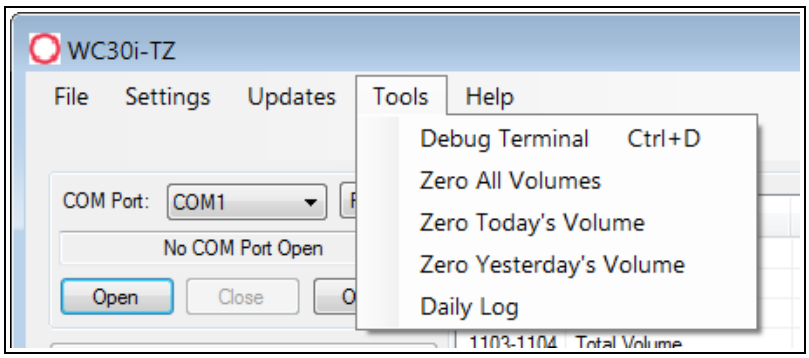


Figure 40: Settings menu > Zero Yesterday's Volume

A confirmation message appears.

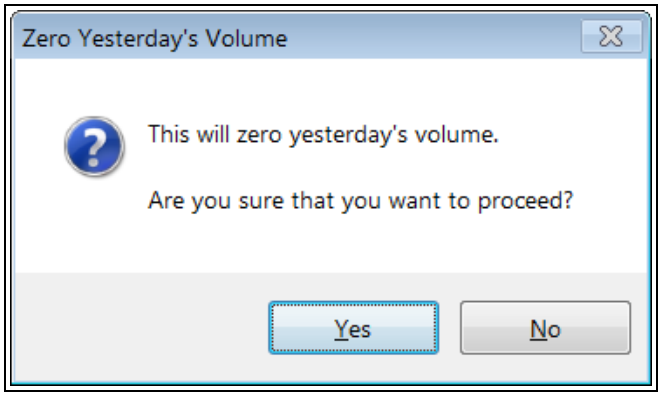


Figure 41: Zero Yesterday's Volume Confirmation message

3. Click the **Yes** button to continue.
4. Close the WC Toolkit software.

11. Mounting, Battery Replacement, Cleaning

- Mount the WC30i-TZ Wireless Flow Totalizer (on page 46)
  - The WC30i-TZ is supplied with a:
    - 2-pin connector for connection to the turbine flow meter magnetic pickup.
    - 1” female NPT swivel fitting to allow the WC30i-TZ to be directly mounted to a standard turbine flowmeter.

The nut on the union can be loosened to allow the WC30i-TZ to be rotated to the desired orientation.

Important!: Use Teflon tape on the NPT connections.

- Internal Lithium Battery Replacement (on page 47)
- Coin Cell Battery Replacement (on page 48)
- Cleaning Instructions (on page 50)

Note: See Available Accessories (on page 83) for additional equipment.

11.1. Mount the WC30i-TZ Wireless Flow Totalizer

Use the 1” female NPT swivel fitting to directly mount the WC30i-TZ to a standard turbine flowmeter.

Warning! The WC30i-TZ Wireless Flow Totalizer **must be** mounted in a location free of high vibrations. Over time, vibrations can damage the WC30i-TZ or battery pack and could impair its safety ratings.

Do NOT mount directly to continuous vibrating equipment such as pumps or compressors.
AVERTISSEMENT: WC30i-TZ Wireless Flow Totalizer de débit doit être monté dans un endroit sans vibrations élevées. Au fil du temps, les vibrations peuvent endommager le WC30i-TZ ou la batterie, ce qui pourrait nuire à ses cotes de sécurité. Ne pas monter directement sur des équipements vibrants continus tels que des pompes ou des compresseurs.

11.2. Internal Lithium Battery Replacement

Warning! Use of any battery other than the WAVECONTACT Internal Lithium Battery Pack (FreeWave Part # WC-1BAT-IS) will impair the protection provided by the equipment.
AVERTISSEMENT: L'utilisation d'une pile autre que la référence WAVECONTACT Internal Lithium Battery Pack (FreeWave Part # WC-1BAT-IS compromettra la protection fournie par l'équipement.

Note: See Available Accessories (on page 83) for the FreeWave Part # to order the correct replacement battery.

1. Unsnap and open the latch cover on the WC30i-TZ.
2. Slide the **On / Off Switch** to the **Off** position. (see #2 in Internal Connections (on page 12))

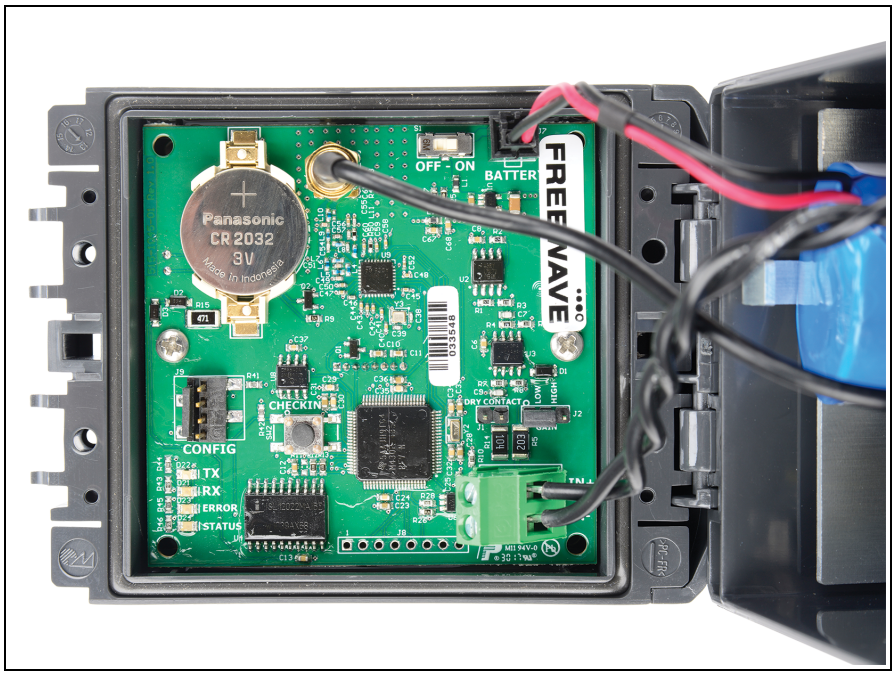


Figure 42: WC30i-TZ and WC30i-AXIS-BAT Internal Lithium Battery connection

3. Depress the locking clip on the **Internal Lithium Battery** connection and unplug the battery from the PCB.
4. Remove and replace the battery.
5. Connect the battery to the PCB battery connector.
6. Slide the **On / Off Switch** to the **On** position.
7. Close and snap the latch cover on the WC30i-TZ.

11.3. Coin Cell Battery Replacement

The **Coin Cell** battery is used to backup the real-time clock in the event that the main battery pack is unplugged.

Important!: The battery is a user-supplied **Panasonic CR2032 Coin Cell** battery.

Warning! Use of any battery other than a **Panasonic CR2032 Coin Cell** battery will impair the protection provided by the equipment.
AVERTISSEMENT: La sécurité intrinsèque et la protection du produit seront compromis par l'utilisation de batteries autres que celle fournie par FreeWave ayant comme numéro de pièce **Panasonic CR2032**.

Note: The **Coin Cell** battery can be changed with the Endpoint in place.

1. Unsnap and open the latch cover on the WC30i-TZ.
2. Slide the **On / Off Switch** to the **Off** position. (see #2 in Internal Connections (on page 12))
3. Carefully slide the **Coin Cell** battery out from its holding bracket.

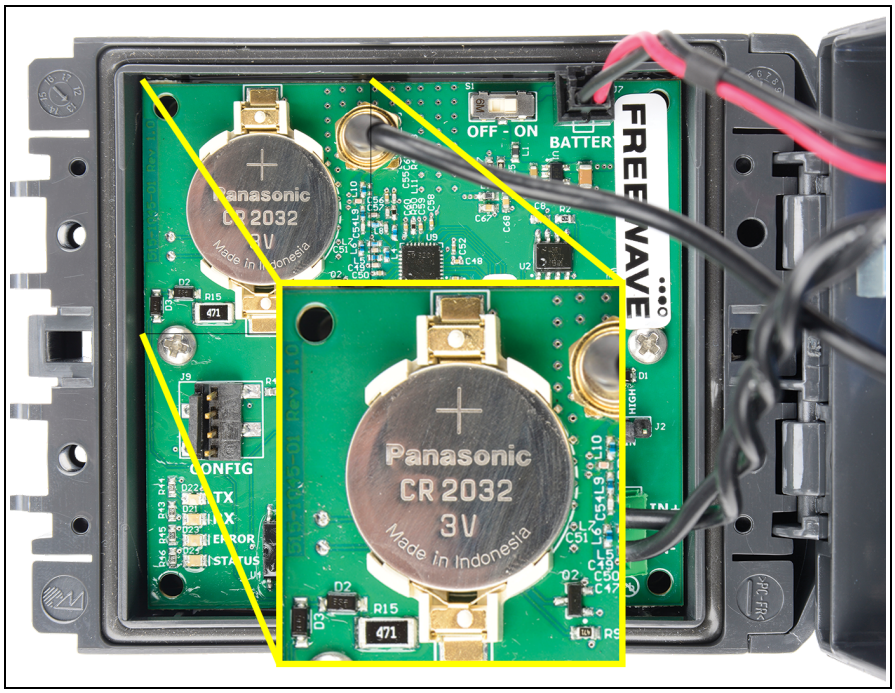


Figure 43: WC30i-TZ Coin Cell battery

4. Snap the replacement battery into the holding bracket.
5. Slide the **On / Off Switch** to the **On** position.
6. Connect the WC-USB-4PIN - 4-pin to USB programming cable to the computer and the WC30i-TZ.
7. Open the Device Configuration window (on page 56).

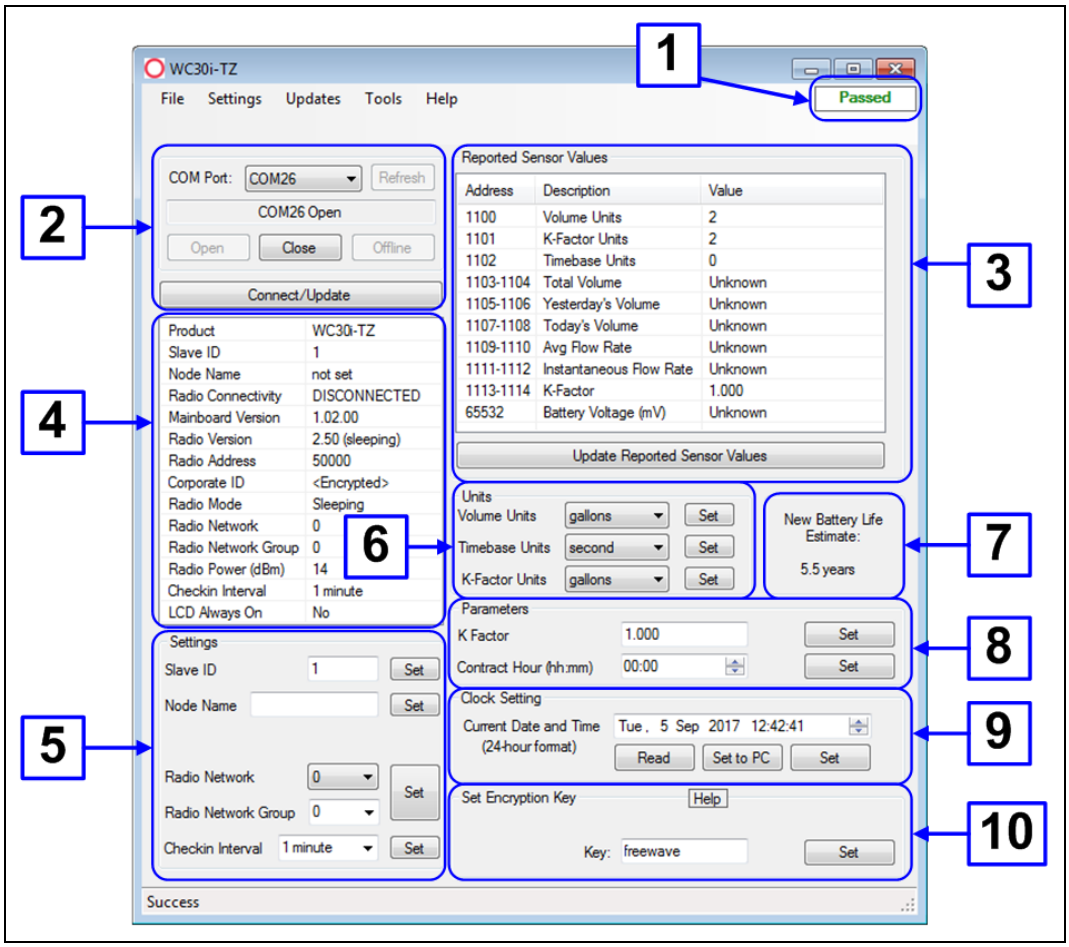


Figure 44: WC30i-TZ Device Configuration window

8. In the **Clock Setting** area (#9), change these settings:
   a. Click the **Set to PC** button to synchronize the WC30i-TZ time to the connected computer for the battery back-up real-time clock.
   or
   Click the **Current Date and Time** spin box to manually enter the date and time of the WC30i-TZ for the battery back-up real-time clock.
   b. Click the **Set** button to save the information.
9. Remove the WC-USB-4PIN 4-pin to USB programming cable from the computer and the WC30i-TZ.
10. Close and snap the latch cover on the WC30i-TZ.

11.4. Cleaning Instructions

The outside of the enclosure may be cleaned with water, mild soap, and a damp cloth as needed.

Caution: High pressure washing is NOT recommended.

Warning! Electrostatic Discharge Hazard!
Care must be taken to avoid the potential of creating a change on the enclosure or antenna.
Do NOT wipe with a dry cloth.
Do NOT brush against the enclosure with clothing or gloves.
AVERTISSEMENT: Risque de décharge électrostatique! Il faut veiller à éviter tout risque de changement de l'enceinte ou de l'antenne.
Ne pas essuyer avec un chiffon sec.
Ne pas brosser contre l'enceinte avec des vêtements ou des gants.

12. Battery Life Estimates

The WC20i and WC30i wireless Endpoints and WC30i-TZ Wireless Flow Totalizer contain an intrinsically safe battery pack.

The batteries in this pack:

- contain lithium thionyl chloride batteries with IS protection circuits.
- have high power density with extended temperature range operation.

Two main parameters factor into the battery life:

- the interval selection made in the **Checkin Interval** list box.
- the amount of time entered in the **Sensor On Time (sec)** text box.

This section includes:

- Battery Discharge / Alarm Threshold (on page 52)
- Battery Life Estimate Calculator (on page 52)
- View the Battery Life Estimator (on page 52)
- WC30i-TZ Wireless Flow Totalizer Battery Life Estimates (on page 54)

The vast majority of the battery capacity is used to power the attached sensor. It is important to minimize the sensor on time (warm up time) and use the longest update interval practical for the application.

FREEWAVE Recommends: Sensors requiring rapid update rates or long sensor on-times are best served with a WC20i-Solar kit.
See the WAVECONTACT Accessories Data Sheet for WC20i-Solar kit details.

12.1. Battery Discharge / Alarm Threshold

The WC20i, WC30i, and WC30i-TZ batteries exhibit a flat discharge curve, with a sharp voltage fall off at the end of their life.

Important!: Carefully monitor the battery voltage to determine when a battery is nearing end of life. The WC20i, WC30i, and WC30i-TZ report their battery voltage (which it measures with sensor powered) at each check-in interval.

FREEWAVE Recommends: A battery alarm threshold of 3.1V to 3.0V.
For critical measurements, a regular battery replacement schedule as preventive maintenance is recommended.

12.2. Battery Life Estimate Calculator

The WC Toolkit provides a battery life estimator, which updates whenever an operational parameter is changed.

Note: The WC Toolkit battery life estimator may be used offline when not connected to a WC20i or WC30i.

12.2.1. View the Battery Life Estimator

1. Verify the WC Toolkit software is installed on the computer connected to the WC30i-TZ.

   Note: See WC Toolkit Installation (on page 16) and WC Toolkit Update (on page 23).

2. Verify the Gateway is installed and configured before continuing with the Endpoint configuration.
3. Connect the WC-USB-4PIN - 4-pin to USB programming cable to the computer and the WC30i-TZ.
4. Open the **WC Toolkit** software.
   The **Select Device** window opens. (Figure 45)

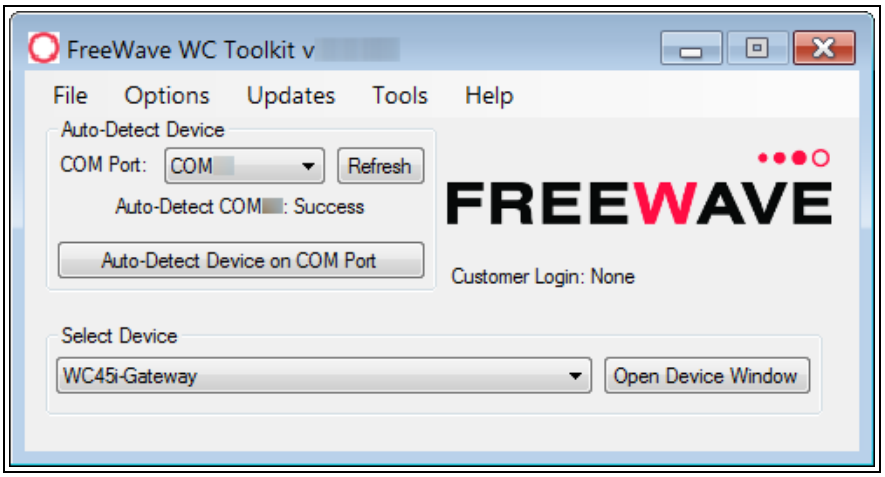


Figure 45: Select Device window

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 WC30i-TZ.
6. 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. Click the **Checkin Interval** list box arrow and select how often the Endpoint wakes up, reads the Modbus device, and transmits the register data to the Gateway.
8. Click the **Set** button to save the information.
9. On the WC30i-TZ Wireless Flow Totalizer:

   The calculated estimated battery life appears in area #7 of Figure 46.

> **Important!**: The area shows **ONLY an estimate** of how much longer the battery charge is expected to last based on a new battery.

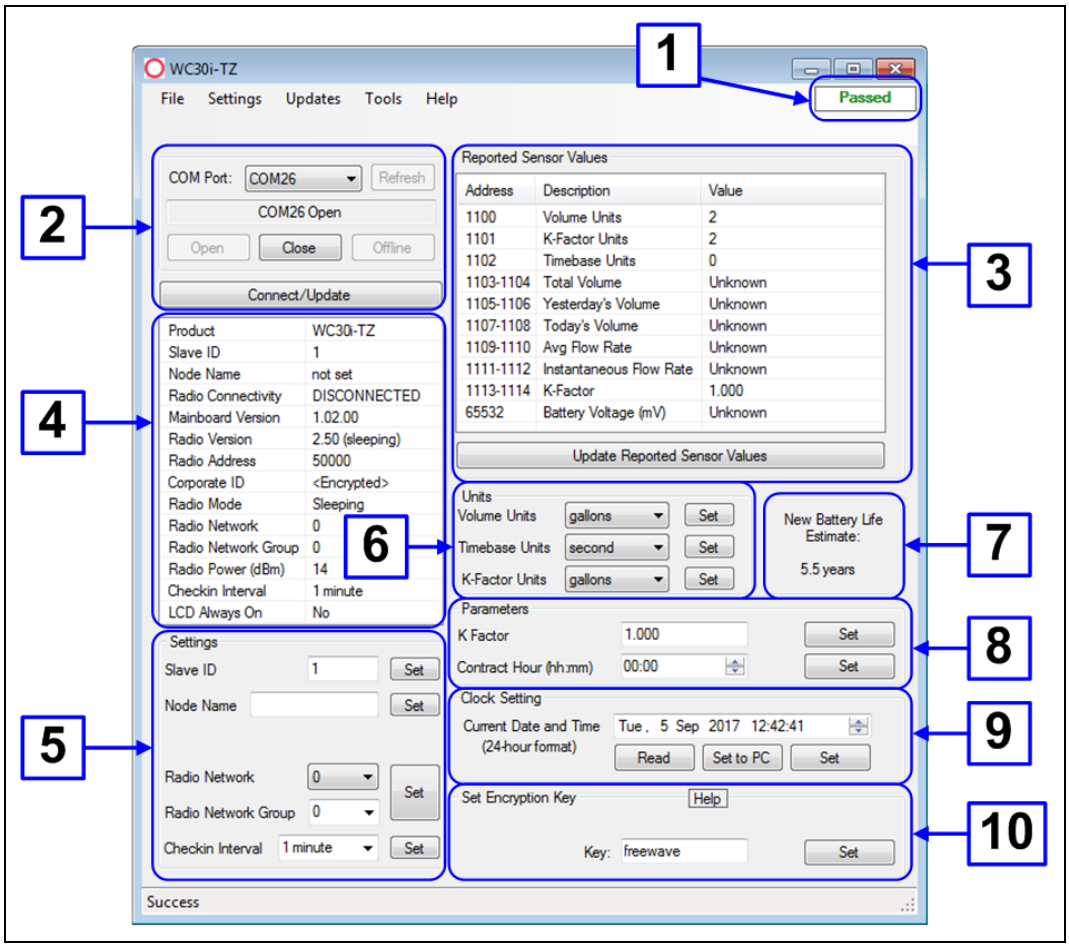


Figure 46: Device Configuration window: WC30i-TZ

12.3. WC30i-TZ Wireless Flow Totalizer Battery Life Estimates

WC30i-TZ Wireless Flow Totalizer		
Selection made in the **Checkin Interval** list box	**LCD Off (years)**	**LCD Always On (years)**
5 seconds	1.25	1.0
15 seconds	3.0	2.25
1 minute	5.5	4.0
2 minutes	6.75	4.5
5 minutes	7.5	5.0
10 minutes	8.5	5.25
30 minutes	9.0	5.5
60 minutes	9.5	5.75

13. WC Toolkit Software Environment

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

- Device Configuration window (on page 56)
  - Units area (on page 61)
  - Parameters area (on page 62)
  - Clock Setting area (on page 63)
- Daily Volume Log window (on page 64)

13.1. Device Configuration window

The **Device Configuration** window is used to configure the settings on the WC30i-TZ Wireless Flow Totalizer.

Access and Window Description

1. Verify the WC Toolkit software is installed on the computer connected to the WC30i-TZ.

   Note: See WC Toolkit Installation (on page 16) and WC Toolkit Update (on page 23).

2. Verify the Gateway is installed and configured before continuing with the Endpoint configuration.
3. Connect the WC-USB-4PIN - 4-pin to USB programming cable to the computer and the WC30i-TZ.
4. Open the **WC Toolkit** software.
   The **Select Device** window opens. (Figure 47)

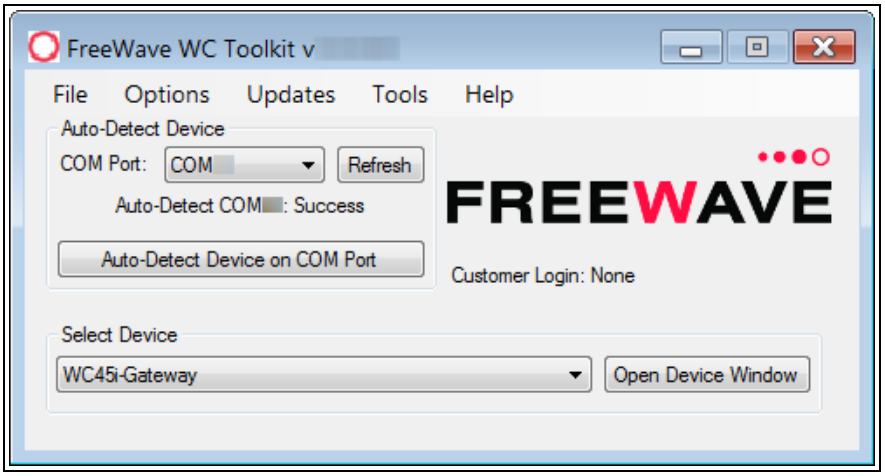


Figure 47: Select Device window

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 WC30i-TZ.
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 WC30i-TZ device.

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

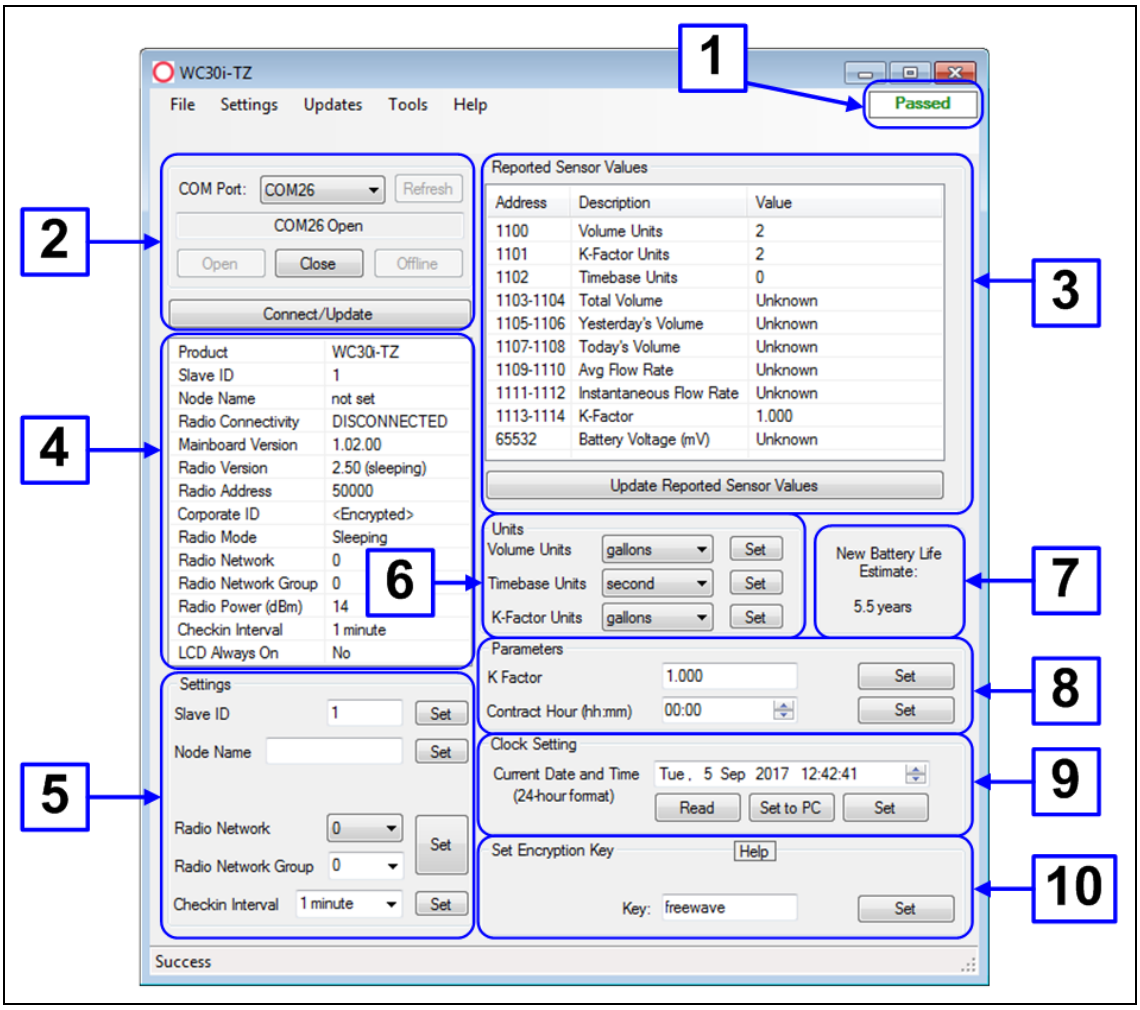


Figure 48: Device Configuration window: WC30i-TZ

Device Configuration window: WC30i-TZ		
Control Area	**Control Title**	**Control Description**
1 - **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. See Upgrade Mainboard Firmware (on page 33) for the upgrade procedure. **Note**: This information is read-only.

Device Configuration window: WC30i-TZ		
Control Area	**Control Title**	**Control Description**
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 WC30i-TZ.
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	**Connect / Update** button	Click the **Connect / Update** button to re-connect to the COM port of the WAVECONTACT device. **Note**: When the connection is made to the IP Address, full access to the Gateway is available as if a direct serial connection is used. This includes full remote configuration capability.
3 - **Reported Sensor Values** area		The **Reported Sensor Values** area shows the reported data values from the attached sensor. **Note**: This information is read-only.
4 - WC30i-TZ **Information** area		The **Information** area of the **Device Configuration** window shows connection information about the connected WAVECONTACT device. **Note**: This information is read-only.

Device Configuration window: WC30i-TZ		
Control Area	**Control Title**	**Control Description**
5 - **Settings** area		The **Settings** area is used to define the radio mode and radio network. **Note**: See the Settings area (on page 60) for detailed information about the settings.
6 - **Units** area		The **Units** area is used to designate the reporting units of the WC30i-TZ. **Note**: See the Units area (on page 61) for detailed information about the settings.
7 - **Battery Life Estimate** area		The **Battery Life Estimate** area shows ONLY an estimate of how long a fully charged battery is expected to last. **Note**: This information is read-only.
8 - **Parameters** area		The **Parameters** area is used to designate the quantity or time for the **Volume Units** list box and **K-Factor Units** list box in the **Units** area. **Note**: See the Parameters area (on page 62) for detailed information about the settings.
9 - **Clock Setting** area		The **Clock Setting** area is used to set the battery back-up real-time clock. **Note**: See the Clock Setting area (on page 63) for detailed information about the settings.
10 - **Set Encryption Key** area		The **Set Encryption Key** area is used to activate and define the encryption key for the WAVECONTACT device.
10 - **Set Encryption Key** area	**Help** button	Click to open the Encryption **Help** message.
10 - **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**.

Device Configuration window: WC30i-TZ		
Control Area	**Control Title**	**Control Description**
10 - **Set Encryption Key** area	**Set** button	Click the **Set** button to save the information.

13.1.1. Settings area

The **Settings** area is used to define the radio mode and radio network.

Device Configuration window: Settings area	
Control Title	**Control Description**
Set button	Click the **Set** button to save the information.
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.
Node Name text box	Optional: In the **Node Name** text box, enter a name for the Endpoint using a maximum of 10 characters.
Radio Mode list box	Click the **Radio Mode** list box arrow and select either **Sleeping** or **Non-Sleeping**. • **Sleeping**: Select **Sleeping** to reduce power consumption and to use the designated **Checkin Interval** list box to connect with the Gateway. • **Non-Sleeping**: Select **Non-Sleeping** to always be in communication with the Gateway. **Caution**: Do NOT use the **Non-Sleeping** option with the WC30i-TZ because of rapid depletion of battery life. **Note**: The default value is Sleeping.
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 66) for additional information.

Device Configuration window: Settings area	
Control Title	**Control Description**
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 66) for additional information.
Checkin Interval list box	Click the **Checkin Interval** list box arrow and select how often the Endpoint wakes up, reads the Modbus device, and transmits the register data to the Gateway. The options are: • 5 seconds • 15 seconds • 1 minute • 2 minutes • 4.5 minutes • 10 minutes • 15 minutes • 30 minutes • 60 minutes **Note**: The default value is 5 seconds.

13.1.2. Units area

The **Units** area is used to designate the reporting units of the WC30i-TZ.

Device Configuration window: Units area		
Control Area	**Control Title**	**Control Description**
6 - **Units** area	**Volume Units** list box	Click the **Volume Units** list box arrow and select the unit the accumulated volumes and flow rate are presented in. The options are: • Gallons • Barrels • Cubic Meters • Liters

Device Configuration window: Units area		
Control Area	**Control Title**	**Control Description**
6 - **Units** area	**Timebase Units** list box	Click the **Timebase Units** list box arrow to configure the units used for the flow rates. **Example**: If the **Volume Units** list box is set to **Gallons** and the **Timebase Units** list box is set to **Minute**, the flow rate is reported as gallons / minute. The options are: • Second • Minute • Hour • Day
6 - **Units** area	**K-Factor Units** list box	Click the **K-Factor Units** list box arrow and select the unit the flow meter uses for its k-factor. **Example**: if the turbine flow meter has a stated K-factor of 50,000 pulses per gallon, select **Gallons** in the **K-Factor Units** list box and enter 50000 for the **K Factor** text box in the **Parameters** area. The options are: • Gallons • Barrels • Cubic Meters • Liters

13.1.3. Parameters area

The **Parameters** area is used to designate the quantity or time for the **Volume Units** list box and **K-Factor Units** list box in the **Units** area.

Device Configuration window: Parameters area		
Control Area	**Control Title**	**Control Description**
8 - **Parameters** area	**K Factor** text box	In the **K Factor** text box, enter the amount of pulses for the connected turbine flow meter. **Example**: if the turbine flow meter has a stated K-factor of 50,000 pulses per gallon, select **Gallons** in the **K-Factor Units** list box and enter 50000 for the **K Factor** text box in the **Parameters** area.

Device Configuration window: Parameters area		
Control Area	**Control Title**	**Control Description**
8 - **Parameters** area	**Contract Hour (hh:mm)** spin box	Click the **Contract Hour (hh:mm)** spin box to control when the accumulated **Today's Volume** is moved to **Yesterday's Volume** and zero **Today's Volume**. **Note**: The contract hour is set in hh:mm in the 24-hour format. **Example**: 2:30pm is entered as 14:30.

13.1.4. Clock Setting area

The **Clock Setting** area is used to set the battery back-up real-time clock.

Device Configuration window: Clock Setting area		
Control Area	**Control Title**	**Control Description**
9 - **Clock Setting** area	**Current Date and Time** spin box	Click the **Current Date and Time** spin box to manually enter the date and time of the WC30i-TZ for the battery back-up real-time clock.
9 - **Clock Setting** area	**Read** button	Click the **Read** button to read the current time / date from the WC30i-TZ.
9 - **Clock Setting** area	**Set to PC** button	Click the **Set to PC** button to synchronize the WC30i-TZ time to the connected computer for the battery back-up real-time clock.

13.2. Daily Volume Log window

The WC30i-TZ keeps an on-board log of the last 30 days of flow totals.

Note: This log is accessed using WC Toolkit.

Access and Window Description

1. Open the Device Configuration window (on page 56).
2. On the **Tools** menu, click **Daily Log**.

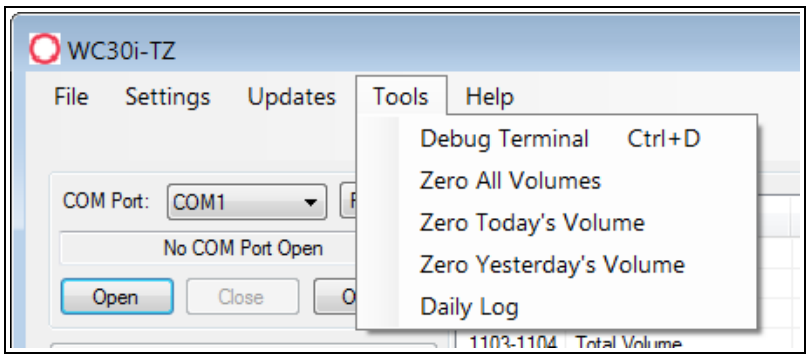


Figure 49: Tools menu > Daily Log

The **Daily Volume Log** window opens.

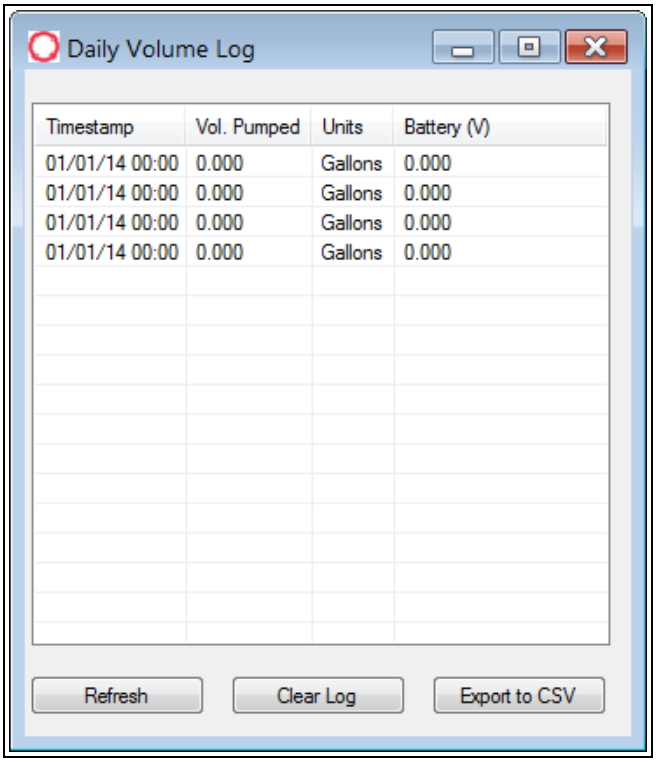


Figure 50: Daily Volume Log window

Daily Volume Log window		
Control Area	**Control Title**	**Control Description**
Daily Volume Log table	**Timestamp** column	The **Timestamp** column shows the date / time of the log entry.
	Vol. Pumped column	The **Vol. Pumped** column shows the volume pumped for that day.
	Units column	The **Units** column shows the units setting for the volume pumped, selected in the **Volume Units** list box in the **Units** area.
	Battery (V) column	The **Battery (V)** column shows the battery voltage when the entry was logged.
	Refresh button	Click the **Refresh** button to read the log file.
	Clear Log button	Click the **Clear Log** button to erase all stored log information.
	Export to CSV button	Click the **Export to CSV** button to open the **Save As** dialog box.

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 56).

Example: Using the Radio Network Group Selection: 0, 1, 2, or 3 (on page 67) 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 67)
- Radio Network Group Selection: 4, 5, 6, or 7 (on page 68)
- Radio Network Group Selection: 8, 9, 10, 11 (on page 69)
- Radio Network Group Selection: 12, 13, 14, 15 (on page 70)
- Radio Network Group Selection: 16, 17, 18, or 19 (on page 71)
- Radio Network Group Selection: 20, 21, 22, 23 (on page 72)
- Radio Network Group Selection: 28 or 29 (on page 74)

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

In the Device Configuration window (on page 56), 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 56), 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 56), 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 56), 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

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

In the Device Configuration window (on page 56), 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 56), 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

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

In the Device Configuration window (on page 56), 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		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 56), 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

Appendix A: Technical Specifications

Warning! Use of this equipment in a manner not specified by the manufacturer may impair the protection provided by the equipment.
The use of any parts not supplied by the manufacturer violates the safety rating of the equipment.
AVERTISSEMENT: L'utilisation de cet équipement d'une manière non spécifiée par le fabricant peut nuire à la protection fournie par l'équipement.
L'utilisation de pièces non fournies par le fabricant est contraire à la cote de sécurité de l'équipement.

Note: See the Control Drawing: 960-0087-02 (on page 78) for requirements when used in a Class I Division 1 area.
Reportez-vous à l'illustration de contrôle Control Drawing: 960-0087-02 (on page 78) pour connaître les exigences lorsqu'elle est utilisée dans une zone de classe I division 1.

Technical Specification: WC30i-TZ Wireless Flow Totalizer	
Specification	**Description**
Transmitter	
Frequency Range	902-928 MHz, FHSS, license-free ISM band compliant with FCC Part 15
Range	Maximum of 0.80 km (0.5 miles)
Receiver	
Minimum Input Voltage	Turbine Input • 20mV peak-to-peak (low gain) • 5mV peak-to-peak (high gain)

Technical Specification: WC30i-TZ Wireless Flow Totalizer	
Specification	**Description**
Input Frequency	• 1Hz to 4kHz (low gain) • 1Hz to 2kHz (high gain)
Interfaces	
Data Interface	Wireless data and diagnostics available as Modbus registers at Gateway
Internal Diagnostics	• Battery voltage • Signal Strength • Error conditions
Security	AES 128-bit Encryption
Real Time Clock	Real-time clock with battery backup
Input	Magnetic pickup • 4 KHz Maximum Frequency • 20 mV Minimum Amplitude

LCD	• 32-character display with **LCD Power-on** button activation
	• Local display with flow rate, totalizer, and diagnostics
	• **Coin Cell** battery
	  • The battery is a user-supplied **Panasonic CR2032 Coin Cell** battery.
	  • See Available Accessories (on page 83) for additional equipment.

Power Requirements	
Battery Pack	1 X D Lithium battery pack, field replaceable. • FreeWave Part #: WC-1BAT-IS • See Available Accessories (on page 83) for additional equipment. **Note**: C1D1 certified when used in a FreeWave system. In-situ replacement does NOT require a work ticket.
Battery Life	Up to 7.5 years, with a 5 minute **Check-in Interval** and the LCD **NOT** set to **Always On**.
Radio Power	40mW
General Information	
Operating Temperature	• -40°C to +60°C • -40°F to +140°F
LCD Display Temperature	• -20°C to +70°C • -4°F to +158°F
Humidity	0% to 100% condensing

Technical Specification: WC30i-TZ Wireless Flow Totalizer	
Specification	**Description**
Enclosure Size	• 92 D x 112 W x 226 H (mm) • 3.6 D x 4.4 W x 8.9 H (in.)
Connection	316SS, 1 inch female NPT swivel union connector for direct mount to turbine meter
Pickup Connector	Standard 2-pin Circular Connector

Safety Rating	• Intrinsically Safe
	• Class I Division 1 Groups C & D
	• EXia.
	• FCC / IC Certified
	  • Temp Code T3
	  • Conforms to UL Std. 913
	  • Certified to Can/CSA Std C22.2 No. 157

Appendix B: Control Drawing: 960-0087-02

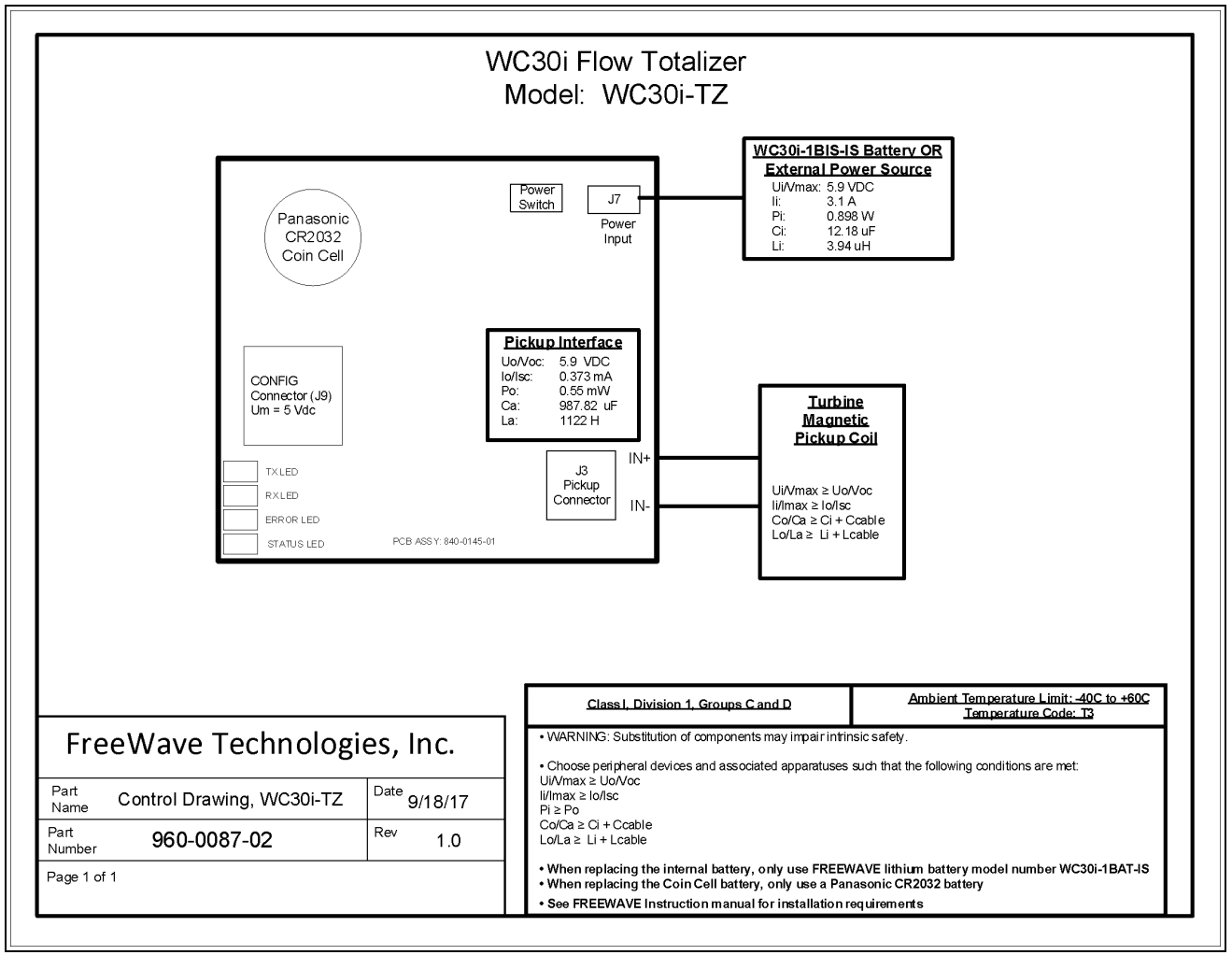


Figure 51: Control Drawing: WC30i-TZ Wireless Flow Totalizer

Appendix C: Remote Modbus Registers

The WC30i-TZ sends data to a WC45i-Gateway.

Every check-in period, the sensors are read and data is sent to the Gateway. The Gateway saves the data under the set Modbus ID in 16-bit registers.

- The data sent to the Gateway is available at the Gateway in registers where it is read by a Modbus RTU master device.
- The Endpoint must have a unique (to the network it is in) Modbus Slave ID.
  - The Gateway uses this Slave ID to store its unique data.

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

WC30i-TZ Modbus Registers

Register Number	Register Address (Offset)	Description	Data Type
41101	1100	Volume Units • 2 = gallons • 3 = barrels • 6 = liters • 7 = cu m	Int
41102	1101	K-Factor Units • 2 = gallons • 3 = barrels • 6 = liters • 7 = cu m	Int

WC30i-TZ Modbus Registers			
Register Number	**Register Address (Offset)**	**Description**	**Data Type**
41103	1102	Time Base Units • 0 = second • 1 = min • 2 = hour • 3 = day	Int
41104	1103	Flow Total (High Word)	Float
41105	1104	Flow Total (Low Word)	Float
41106	1105	Yesterday's Flow Total (High Word)	Float
41107	1106	Yesterday's Day Flow Total (Low Word)	Float
41108	1107	Current Day Flow Total (High Word)	Float
41109	1108	Current Day Flow Total (Low Word)	Float
41110	1109	Avg Flow Rate (High Word)	Float
41111	1110	Avg Flow Rate (Low Word)	Float
41112	1111	Instantaneous Flow Rate (High Word)	Float
41113	1112	Instantaneous Flow Rate (Low Word)	Float
41114	1113	Gear Meter K Factor (High Word)	Float
41115	1114	Gear Meter K Factor (Low Word)	Float
49988	9987 or 65524	Major revision number for the mainboard.	Int
49989	9988 or 65525	Minor revision number for the mainboard.	Int
49990	9989 or 65526	Major revision number for the radio.	Int
49991	9990 or 65527	Minor revision number for the radio.	Int
49995	9991 or 65528	Received signal strength of the last packet from the slave.	Signed Int
49996	9992 or 65529	Battery voltage in millivolts	Int
49997	9993 or 65530	Minutes until this slave will time out unless new data is received.	Int
49998	9994 or 65531	Number of registers cached for this slave device.	Int
49999	9995 or 65532	Remote device type. • 60 for the WC30i-TZ	Int

Appendix D: 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 82).
- 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.

Appendix E: LEDs

These are the WC30i-TZ LEDs available for field diagnostics.

WC30i-TZ LEDs	
Radio LEDs	**Description**
	• The Radio TX LED Flashes green each time a radio packet is sent. • This LED is rapidly Green blinking while searching for the radio network. • The Radio RX LED is Red blinking for each received radio packet.
Status LEDs	
	• The STATUS LED is not active. • The ERROR LED Red blinking to indicate an error condition.
Check-in button	
	Press the **Check-in** button to have the WC30i-TZ perform a check-in and send the current readings to the Gateway.

Appendix F: Available Accessories

These accessories are available from FreeWave for the WAVECONTACT products.

Available Accessories	
FreeWave Part #	**Description**
WC-USB-4PIN	4-pin to USB programming cable
WC-1BAT-IS	Replacement Battery for WC30i-TZ Wireless Flow Totalizer
Coin Cell battery	The battery is a user-supplied **Panasonic CR2032 Coin Cell** battery. **Note**: This **Coin Cell** battery can be purchased anywhere this type of battery is sold.

Appendix G: 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.

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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-FT.

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.

The WC30i-TZ Wireless Flow Totalizer device has been designed to operate with this antenna:

- San Jose Technology Inc. Model EEH-915

This antenna has a maximum gain of 5.8dBi.

Important!: Antennas not included in this list or having a gain greater than 5.8dBi are strictly prohibited for use with this device.
The required antenna impedance is 50 ohms.

FCC Notification of Power Warning

The WC30i-TZ Wireless Flow Totalizer 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.

IC Notifications

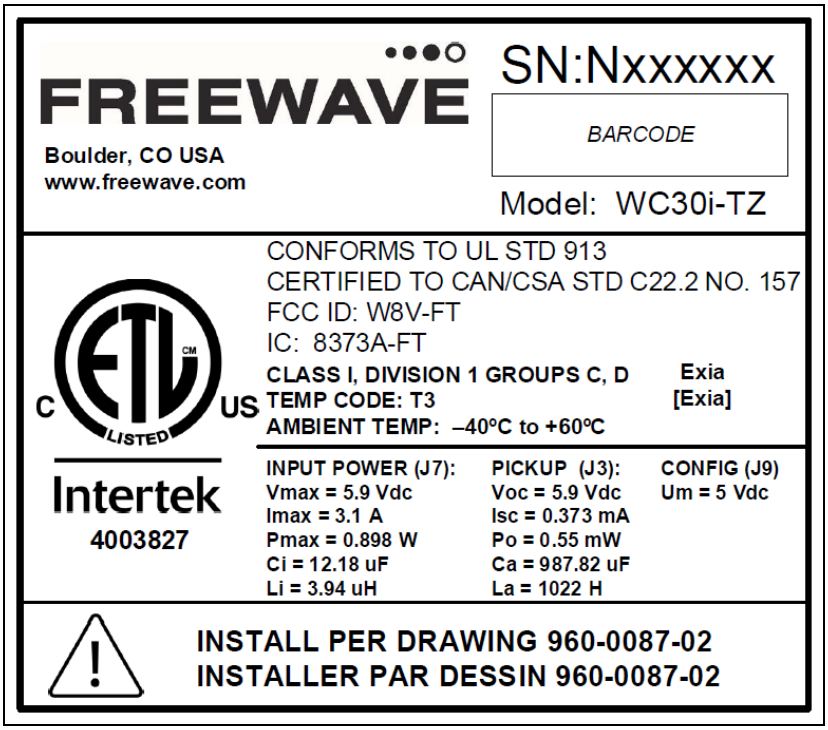
Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a maximum (or lesser) gain approved for this transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically 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.

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



WC30i-TZ Wireless Flow Totalizer ETL C1D1 FCC IC

Warning! Electrostatic Discharge Hazard!
Care must be taken to avoid the potential of creating a change on the enclosure or antenna.
Do NOT wipe with a dry cloth.
Do NOT brush against the enclosure with clothing or gloves.
AVERTISSEMENT: Risque de décharge électrostatique! Il faut veiller à éviter tout risque de changement de l'enceinte ou de l'antenne.
Ne pas essuyer avec un chiffon sec.
Ne pas brosser contre l'enceinte avec des vêtements ou des gants.

Important!: The associated apparatus provides intrinsically safe outputs.
L'appareil associé fournit des sorties à sécurité intrinsèque.
See the Control Drawing: 960-0087-02 (on page 78) for requirements when used in a Class I Division 1 area.

Warning! Use of any battery other than a **Panasonic CR2032 Coin Cell** battery will impair the protection provided by the equipment.
AVERTISSEMENT: La sécurité intrinsèque et la protection du produit seront compromis par l'utilisation de batteries autres que celle fournie par FreeWave ayant comme numéro de pièce **Panasonic CR2032**.

Warning! The WC30i-TZ Wireless Flow Totalizer **must be** mounted in a location free of high vibrations. Over time, vibrations can damage the WC30i-TZ or battery pack and could impair its safety ratings.

Do NOT mount directly to continuous vibrating equipment such as pumps or compressors.

AVERTISSEMENT: WC30i-TZ Wireless Flow Totalizer de débit doit être monté dans un endroit sans vibrations élevées. Au fil du temps, les vibrations peuvent endommager le WC30i-TZ ou la batterie, ce qui pourrait nuire à ses cotes de sécurité. Ne pas monter directement sur des équipements vibrants continus tels que des pompes ou des compresseurs.

FREEWAVE