1 YEAR WARRANTY

CE

OMEGA™

User's Guide

Shop online at omega.com

e-mail: info@omega.com
For latest product manuals:
www.omegamanual.info

XW-ED, XW-EDA-PRO, XW-EDA, XW-EDA-PRO

Long Range Wireless Transmitter

omega.com info@omega.com

Servicing North America:

U.S.A. Headquarters: Omega Engineering, Inc.
800 Connecticut Ave. Suite 5N01, Norwalk, CT 06854
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

ANATEL
Agência Nacional de Telecomunicações
03701-20-10266
Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Table of Contents

Notes, Warnings, and Cautions

The following labels identify information that is especially important to note:

Note: Provides you with information that is important to successfully setup and use the XW Transmitter.

Caution or Warning: Tells you about the risk of electrical shock.

Caution, Warning, or Important: Tells you of circumstances that can affect the instruments functionality and must refer to accompanying documents.

Tip: Provides helpful hints.

Safety and EMC Considerations

ESD Warning:

Warning: The following parts of the unit are ESD (Electro-Static Discharge) sensitive:

- Antenna
- Metal Connectors for signal and power
- Metal body of sensor probes

EMC (Electromagnetic Compatibility Considerations):

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use twisted-pair wires for differential signal connections.
- Install Ferrite Bead(s) on a signal wire close to the instrument if EMC problems persist.
- Failure to follow all instructions and warnings may result in injury.

Introduction

The XW Series Transmitters provide a wireless interface to a range of digital probes, digital I/O, analog process signals, and precision analog temperature sensors (thermocouple and RTD). The transmitter is IEEE 802.15.4 compliant operating at 2.4 GHz and is designed to transmit up to 1000 m (3280') outdoors and 100 m (328') indoors to a ZW-REC coordinator. Its robust NEMA 4 [1] packaging allows for harsh conditions with the option of DC power or battery power. The integrated Smart Core features provide the value of data assurance to retain data even when your power goes out, programmable logic for triggering I/O, easy configuration through SYNC configuration software, and event logging.

Figure 1

Included with Your XW Transmitter

- 2.4 GHz Antenna
- Mounting Kit
- CR2032 Coin-Cell Battery (Pre-Installed)
- 2x C-Cell Batteries
- Micro USB Cable

Additional Material Needed

- Computer or Laptop with Windows 7 OS and newer
- SYNC by Omega Configuration Software
  (Downloadable on the Omega website)
- ZW-REC
- Micro USB Cable for ZW-REC
- Interconnecting probe extension cable (optional)
- AC Adaptor (optional)

Manuals / Software

The latest User's Manual, Quick Start Guide, and SYNC software are available to download on the Omega website.

[1] Probes may not be NEMA 4 rated. NEMA 4 rating only applies to the XW Transmitter.

Hardware Setup

Connecting your Antenna

The XW Transmitter comes with a 2.4 GHz Antenna.

Figure 2

Figure 3

Step 1: Line up the supplied 2.4 GHz antenna with the receiving connector on the XW Transmitter. See **Figure 2**.

Step 2: Turn the plastic knurl on the antenna in a clockwise direction. See **Figure 3** for result.

Important: Hand tighten the antenna onto the XW Transmitter.

Important: Before powering up the XW Transmitter ensure the supplied antenna is properly installed. Running the XW Transmitter without an antenna, or with an unapproved antenna, may cause damage to the device and/or cause operation outside of regulatory compliance. Omega Engineering accepts no liability and issues no warranty for devices operated improperly.

Connecting your Sensors

The XW Transmitter works with a wide variety of sensors. Most sensors come packaged in a probe and each probe is suited to different applications. Some probes may contain multiple sensors. The XW Transmitter automatically detects connected sensors on power up and transmits that data to the SYNC configuration software.

For a complete list of sensors compatible with the XW Transmitter, please visit the Omega website.

Probe Installation

8-pin digital probes, including Omega Smart Probes, can be plugged in at this point. Digital I/O or Analog connections should be made after the XW Transmitter is setup. To install or change a probe, follow these directions:

Step 1: Ensure the XW Transmitter is powered OFF.

Step 2: Take note of the Key Position on the XW Transmitter. See **Figure 4**. Align this key with the keyway in the mating connector on the XW Transmitter.

Note: The keyway locations in this manual assume the device is standing in the position displayed in **Figure 4**.

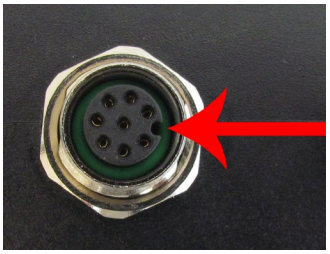


Figure 4

Step 3: Turn the metal knurl of the probe in a clockwise direction while leaving the probe body stationary. Ensure that the probe or interconnecting cable is inserted to the base of the knurl to maintain a NEMA 4 rating on the XW Transmitter.

Step 4: To remove the probe, grasp the plastic knurl only and turn it in a counter clockwise direction. Do NOT rotate the probe body.

Caution: Do not rotate the body of the probe or the cable. Do not use pliers, vice grips or other tools on probes. Hand-tighten and hand-loosen only.

Powering the XW Transmitter

Once the antenna and probe are installed the XW Transmitter may be powered on.

The XW Transmitter can be powered using two alkaline C-Cell batteries, the external M8 connector, or both. The XW Transmitter automatically switches from the internal batteries to the external power if available. If the external power is removed, the XW Transmitter switches back to the internal batteries.

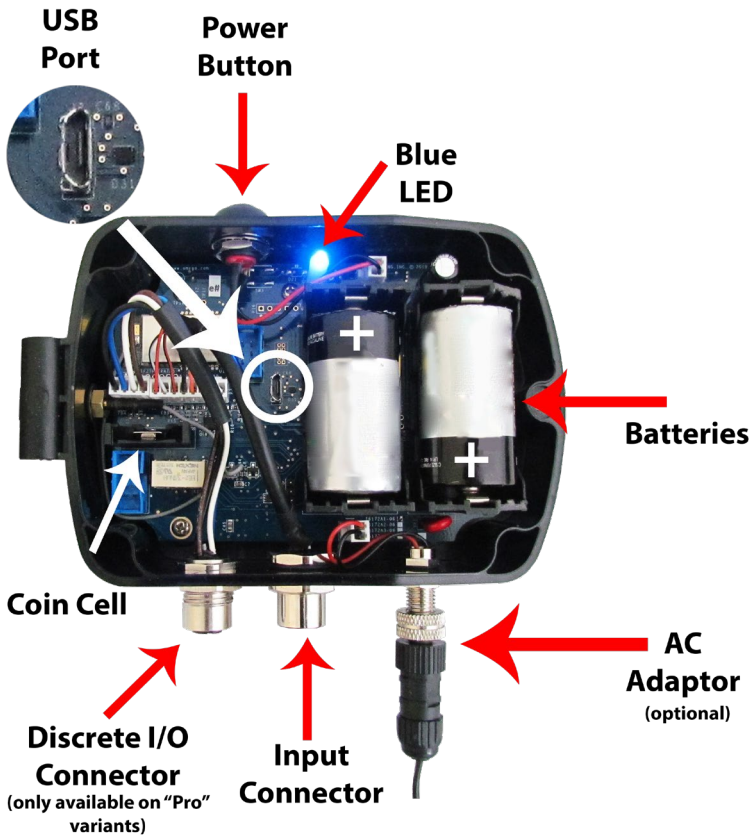


Figure 5

Installing Batteries

To install the batteries, follow these steps:

Step 1: Unscrew the lid of the transmitter using a Philips-head screwdriver and open the device.

Note: The battery orientation is marked on the battery holders and is shown in **Figure 5**.

Step 2: Install the supplied alkaline C-Cell batteries.

Removing Batteries

Step 1: Insert a screwdriver under the battery on the right and gently loosen it. See **Figure 5.**

Step 2: After removing the battery on the right first, you will have room to remove the remaining battery.

Caution: Use only 1.5V alkaline batteries in the XW Transmitter. Other battery chemistries may damage your device or lead to reduced battery life.

Coin Cell Battery and Replacement

The XW Transmitter comes with a pre-installed CR2032 Lithium Coin Cell Battery. Pull the tab to begin powering the real time clock. This battery keeps the real time clock for the XW Transmitter running even when the unit is not powered and has an expected life of more than 10 years under room temperature conditions. If it needs to be replaced, follow these directions:

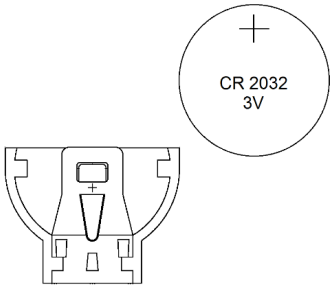


Figure 6

Step 1: Carefully remove the battery from the holder.

Caution: Do not use conductive pliers or other grasping tools that may short the battery terminals.

Step 2: Take note of the proper orientation as shown in **Figure 6.**

Note: Based on the orientation of the XW Transmitter in **Figure 5,** the positive end of the battery should be facing upward towards the Power Button.

Step 3: Insert the new Coin Cell battery.

Important: The positive battery terminal contact the large terminal and faces the top of the XW Transmitter.

AC Adapter

The XW Transmitter may also be powered using line power through an AC adaptor. The power connector can accept $5V_{dc}$ to $36V_{dc}$ and $24V_{ac}$. An optional Safety Qualified adaptor (UNIV-AC-100/240-5-M8) [2] is available to simplify installation. To install an external power connector, follow these directions.

Figure 7

Figure 8

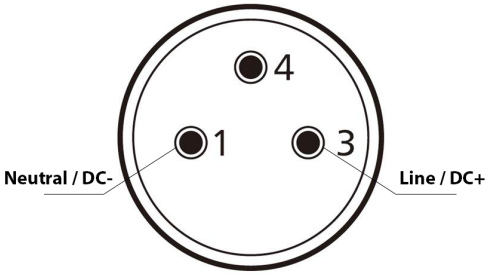


Figure 9

Step 1: Remove the dust cap on the XW Transmitter Power Connector. See **Figure 7**.

Step 2: Align the sockets in the connector with the pins on the XW Transmitter. See **Figure 8**.

Step 3: Insert the connector and rotate the metal knurl clockwise while holding the connector body steady.

Caution: Hand tighten only. The connector should be firmly connected to maintain proper operating protection (NEMA 4 ingress protection). Some exposed threads are normal when the connector is mated.

[2] AC Adaptor is not NEMA 4 rated.

Power Button

The Power Button is located on the top of the XW Transmitter. It allows for powering on and powering off the device.

Figure 10

When you press the power button, the blue LED light will illuminate immediately.

- **Turn On:** Press and Release the external ON/OFF button to turn on the device. The blue light will illuminate.
- **Turn Off:** Hold the external ON/OFF button for longer than 7 seconds until you see the blue light is turned off, then release the button.
- **Reset**: When the device is ON, push and release the ON/OFF button to reset the device. The blue light will blink.

Configuring your ZW-REC

Ensure your ZW-REC is setup, running, and connected to the computer running SYNC. SYNC will pull the IP Address, Network Mask, Gateway, and Network ID from your ZW-REC.

Step 1: Turn on your PC and ensure that SYNC is downloaded, installed, and running.

Step 2: Plug in your ZW-REC to your computer with a Micro USB cable.

Note: For a complete guide on how to setup your ZW-REC, refer to the Quick Start Guide available on the Omega website.

Figure 11

Important: The latest version of the ZW-REC firmware is required. Please ensure you are using the latest version by visiting the Omega website.

Connecting your XW Transmitter

Step 1: Ensure the XW Transmitter is powered on.

Step 2: Connect the XW Transmitter to your computer via Micro USB cable. See **Figure 12**.

Note: SYNC will auto-detect your XW Transmitter. If the auto-detect feature fails, please click  in SYNC to search for connected devices, or refer to the section titled **Connecting to SYNC – Manual**.

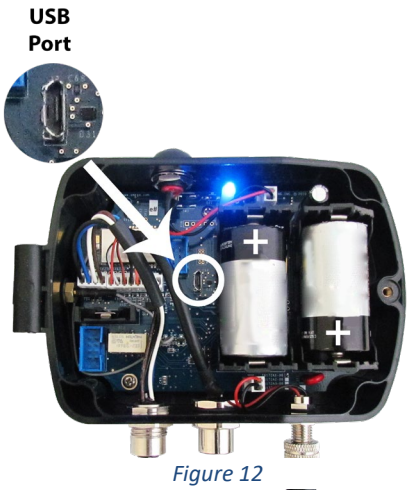


Figure 12

Connecting to SYNC – Auto Detect

Before you begin, ensure your XW Transmitter and ZW-REC are connected to the computer running SYNC.

Step 1: Once the XW Transmitter is connected via Micro USB cable and is auto-detected, click **Next**.

Note: If SYNC does not auto-detect the XW Transmitter, click  to search for connected devices.

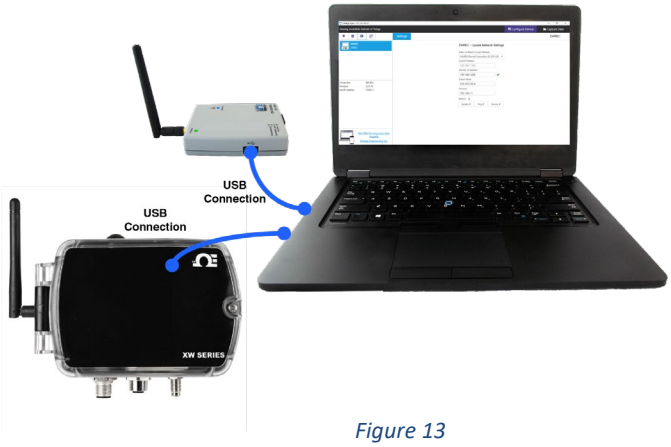


Figure 13

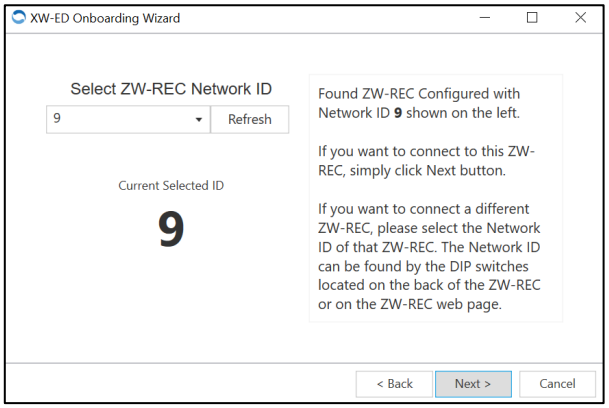


Figure 14

Step 2: SYNC will detect the Network ID of the previously connected ZW-REC (Default is 0). Click **Next**.

Note: The Network ID is a unique identification number that allows a device to be identified within a network. In the case of having multiple ZW-RECs, you will have to choose which ZW-REC you would like to connect to by selecting the Network ID of your preferred ZW-REC.

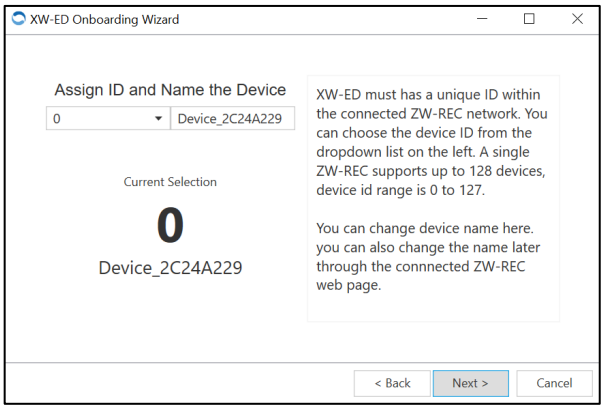


Figure 15

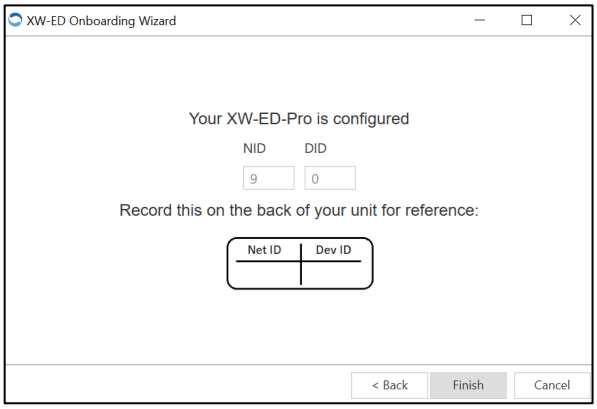


Figure 16

Step 3: Assign a unique Device ID to your XW Transmitter.

Note: The Device ID is a specific number (between 0 and 127) assigned to your XW-ED that will identify this device to the receiver it was assigned to.

Step 4: Assign a device name to your XW Transmitter.
Step 5: Review your selections and click **Finish**.

The blue LED will begin to flash quickly and turn off to display that a connection was successfully established. The LED will flash again each time a new reading is transmitted.

Note: If you have successfully connected your XW Transmitter to SYNC, skip ahead to section **Viewing Your Transmitter**.

Connecting to SYNC - Manual

Step 1: Power on your XW Transmitter and connect the device to your computer via USB cable.

Step 2: Click on the [+] icon located on the top left of the SYNC interface.

Step 3: Proceed through the **Add Device Wizard**.

Step 4: Click **End Device / Probe**. See **Figure 17**.

Figure 17

Note: The connection type and parameters must be accurate for a proper connection to be established. Failure to accurately setup communication parameters may result in communication errors.

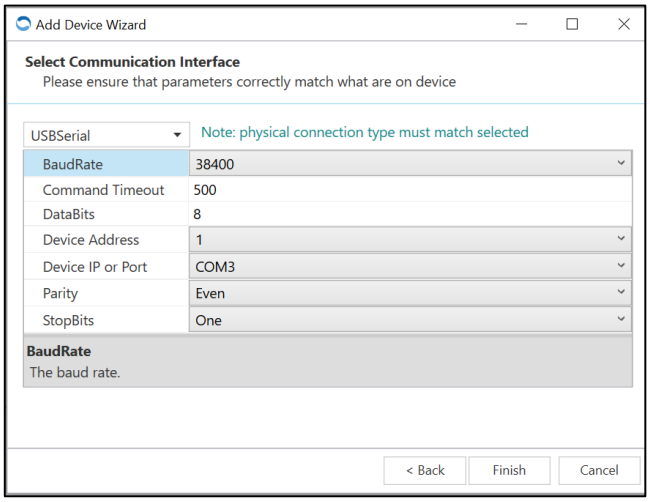


Figure 18

Communication Interface

- **Connection Type**: Select the type of connection you have between your XW Transmitter and your computer. The XW Transmitter connects to your computer via **USBSerial** as displayed in **Figure 18**.

Note: The connection type must be accurate for a proper connection to be established.

- **Command Timeout:** The maximum time (in milliseconds) for a command to be completed before the command is aborted. The default command timeout is 500 milliseconds. It is recommended that this section be left alone to avoid communication errors.
- **Device IP or Port:** The COM port number that your device is connected to on your computer.

Important: The following parameters should **NOT** be changed.

- **Device Address:** If your device is attached to a Bus Network such as Modbus or RS485, the device address is the Bus Network ID it will be assigned to. The default address is 1. This should only be changed when seeking a specific Bus Network.
- **BaudRate:** Controls bits per second.
- **DataBits:** The number of 'bits' in each character sent.
- **Parity:** A means of checking correctness of character by adding an extra 'bit' to the character and setting the value based on all the other bits in the character.
- **StopBits:** The number of 'bits' used to indicate the end of the character.

Customize Device Settings

To customize the device settings of your transmitter, click the **Device Settings** Configuration Tab.

Sensor Setting

Transmission Interval must be set by the ZW-REC and controls the frequency that readings are sent from the transmitter to the receiver.

XW Transmitter Network Setting

This section allows you to change the PAN ID/Network ID and the Device ID of the XW Transmitter separate from the Add Device Wizard.

System Functions

- **Reset User Hours:** Resets the operation hours of the XW Transmitter as displayed in SYNC.
- **Update Current Time:** Changes the XW Transmitter's internal clock to sync with the clock of the computer it is connected to.

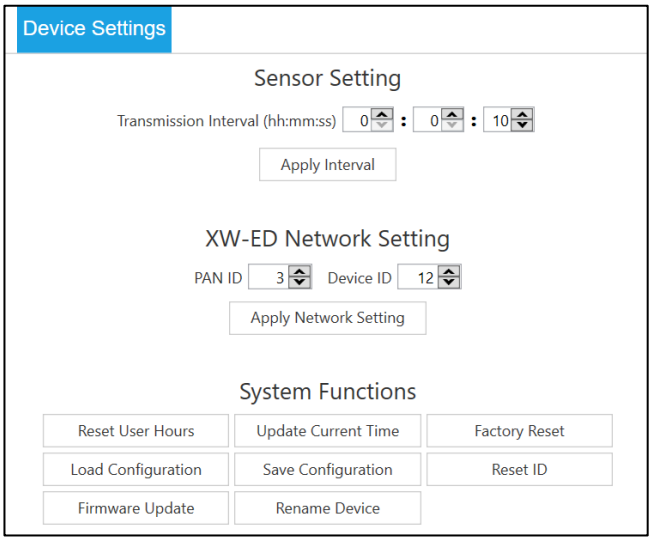


Figure 19

Important: Click **Update Current Time** when setting up the XW Transmitter for the first time to ensure accurate date and time are reflected in the data logging.

- **Factory Reset:** Resets the XW Transmitter to its factory settings.
- **Load Configuration:** Allows the user to load a configuration file (.json) from the computer the XW Transmitter is connected to.
- **Save Configuration:** Saves the current configuration set for the XW Transmitter into a .hex file.
- **Reset ID:** Allows the user to reset the Network ID and the Device ID of the XW Transmitter through the XW Transmitter Onboarding Wizard.
- **Firmware Update:** Allows the user to load a firmware update file (.hex) from the computer the XW Transmitter is connected to.
- **Rename Device:** Allows the user to change the name of the XW Transmitter.

Viewing Data on the ZW-REC Page

Once your XW Transmitter has been successfully connected to your ZW-REC, you will be able to view the transmitter on the ZW-REC webpage.
You may navigate to the ZW-REC webpage through SYNC by clicking the **Home Page** button as seen in **Figure 20**.

Alternatively, you may navigate to the ZW-REC webpage by typing the ZW-REC IP Address into your web browser.

8-pin digital probes, including Omega Smart Probes that have already been connected, will transmit readings to the ZW-REC webpage. See **Figure 21**.

To configure Digital I/O, Analog connections, or view wiring diagrams of the XW Transmitters, proceed through this manual to find the relevant connection type.

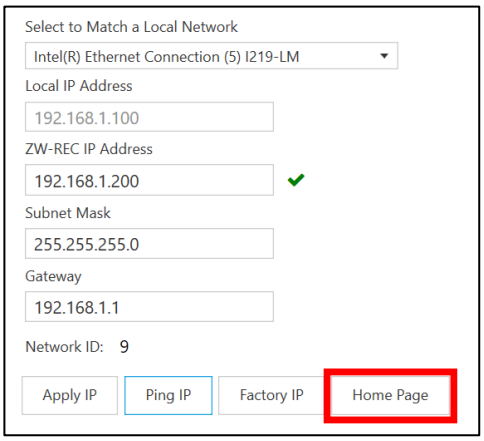


Figure 20

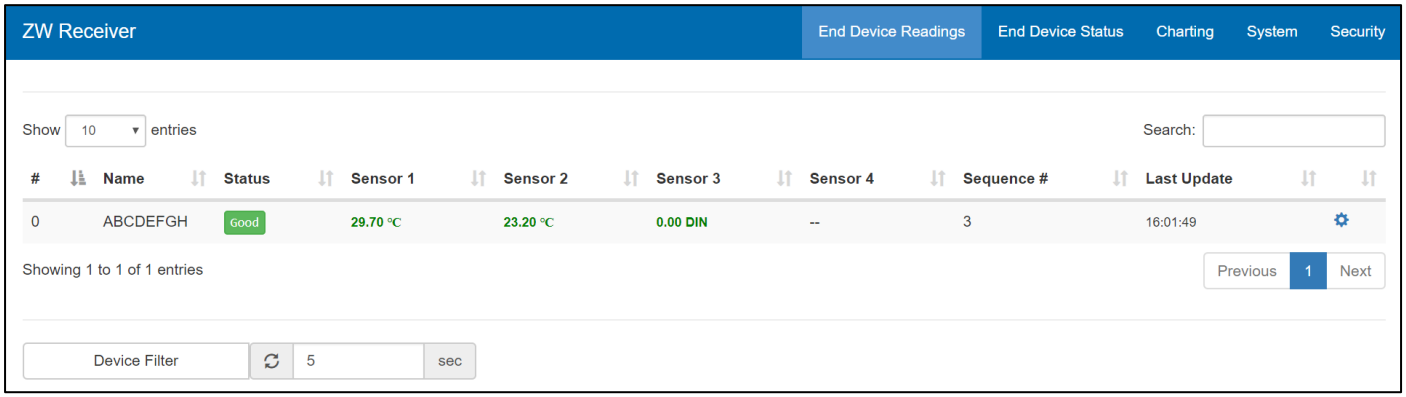


Figure 21

XW-ED Wiring

The XW-ED is a versatile transmitter that can accept a wide variety of digital probes, function as a rate/timer/totalizer, or as an mA/mV meter.

Digital Probes

The XW-ED is configured to use digital probes by default. Simply attach your probe to the 8-Pin M12 connector and the XW-ED will automatically connect it. SYNC can then be used to setup smart probe specific options. Please refer to your smart probe User's Manual for more details.

Note: Probes should be connected to the XW-ED before starting SYNC. If you have a Probe with Digital I/O connected to an XW-ED-PRO, the Probe Digital I/O will show up before the XW-ED-PRO Digital I/O in SYNC and on the ZW-REC Web interface.

Digital Input (Timer/Totalizer)

The XW-ED also functions as a flexible Digital Input with Timer and Totalizer functions. To use these features, change the input type to **Digital** on SYNC.

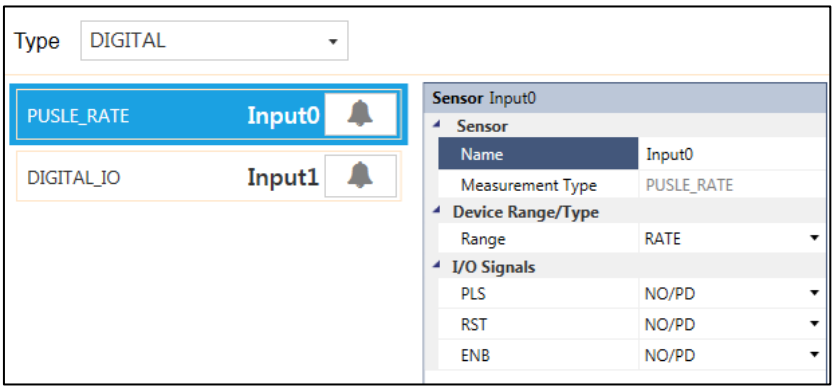


Figure 22

Select the type of digital input is selected in the Device Range/Type pull-down in the side bar. The following types are available:

Selection	Measurement	Description
DIN	Digital Input	3-bit Binary Digital Input
RATE	Frequency	Measure the Frequency of Rising or Falling Edges
WIDTH	Pulse Width	Measure the Active time of a signal
DUTY	Duty Cycle	Measure the % of Active time of a signal
DELAY	Delay Timer	Measure the time Between the Rising or Falling Edges of 2 Signals
CNT	Up Counter / Totalizer	Counter with Enable and Reset
U/D_CNT	Up/Down Counter / Totalizer	Counter with Direction and Reset

Note: Descriptions of the Digital Range/Types are available in **Appendix A** of this User's Manual.

Each digital measurement type has three inputs. The functions of each of these inputs change with the selected type and can be seen in SYNC and are described in the chart below:

Figure 23

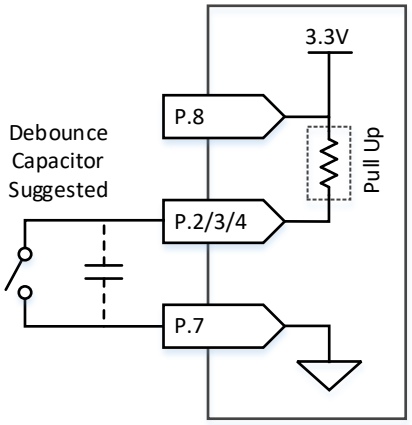
Rear view of Filed Connector Shown

	Frequency, Pulse Width, Duty Cycle	Delay	Up / Down Counter	Digital Input
Pin 1	NC			
Pin 2	Enable	Pulse B	Direction	Input 3
Pin 3	Pulse	Pulse A	Pulse	Input 1
Pin 4	Reset	Reset	Reset	Input 2
Pin 5	Shield			
Pin 6	NC			
Pin 7	GND			
Pin 8	3.3V Output			

Each of the three input pins can be independently set to either have an internal 1.5k Pull Up or Pull Down and can be set to be either Active High or Active Low. Internally supplied 3.3 power is available for biasing [3].

Some typical Circuits are show below:

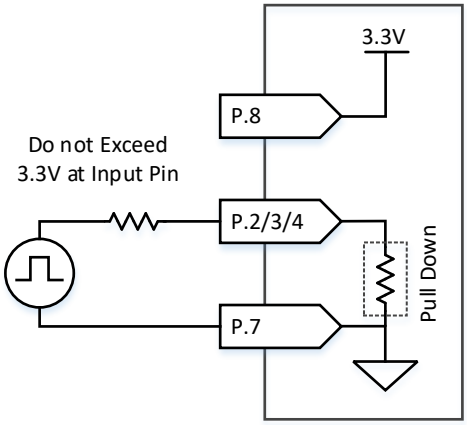
Relay or Switch



For Active High Select Normally Closed
For Active Low Select Normally Open

Figure 24

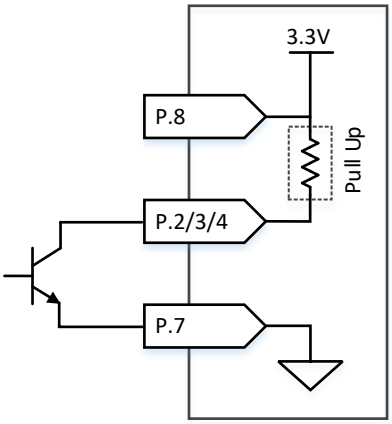
Pulse / TTL Input



For Active High Select Normally Open
For Active Low Select Normally Closed

Figure 25

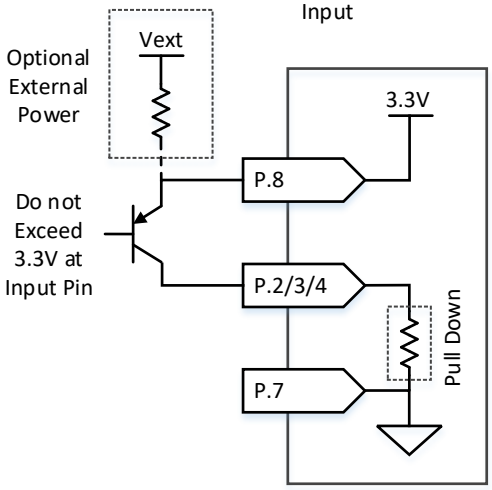
NPN or N-MOS Transistor Input



For Active High Select Normally Closed
For Active Low Select Normally Open

Figure 26

PNP or P-MOS Transistor Input



For Active High Select Normally Open
For Active Low Select Normally Closed

Figure 27

[3] 150 mA max. Using internal power or internal pullups will reduce battery life.

Process Input

The XW-ED can also accept up to two 0-24 mA or 0-1.0 V_{DC} process inputs. Select either **Single Process** or **Dual Process** from the Type selection and then choose the Device Range/Type option in the side bar.

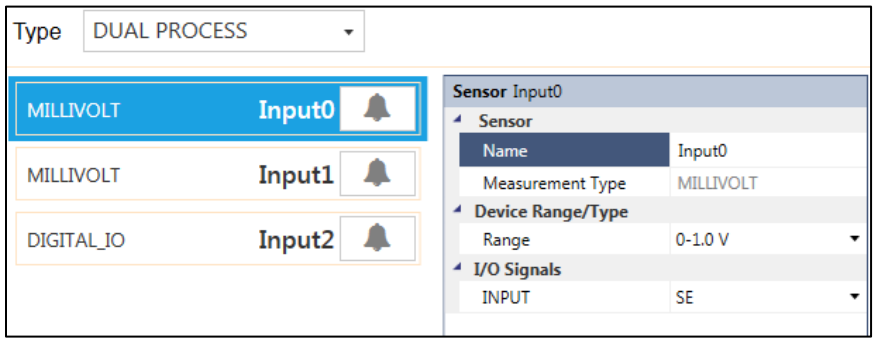


Figure 28

Note: When using Dual Process, the Device Range/Type section is only available for Input 0. Input 1 is always the same type as Input 0.

Warning: Be sure to setup the unit before plugging in Process inputs.

Figure 29

Rear view of Filed Connector Shown

	Frequency, Pulse Width, Duty Cycle
Pin 1	NC
Pin 2	Input 1
Pin 3	Input 0
Pin 4	NC
Pin 5	Shield
Pin 6	NC
Pin 7	GND
Pin 8	3.3V Output

XW-EDA Wiring

The XW-EDA model supports thermocouples, RTD's, and precision process inputs. The sensor inputs signals are provided on an M12, 4-pin female connector and are logically broken into 2 unique channels.

Thermocouple

The Thermocouple Input interface provides interfaces to type J, K, T, E, N, R, S, B and C thermocouples with the capability of enabling or disabling the open detect feature.

To use these features, change the input type to **Single TC** or **Dual TC** using SYNC.

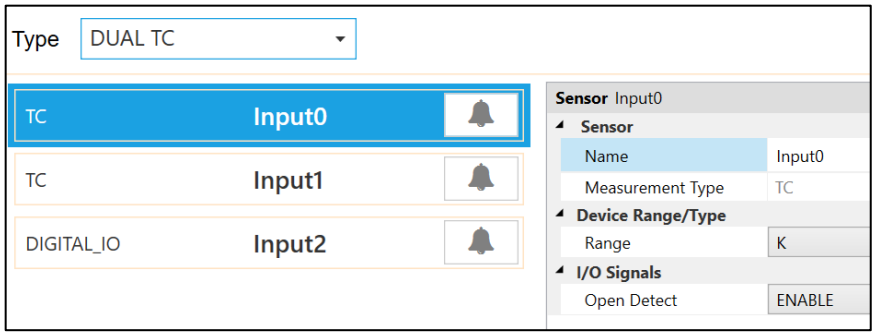


Figure 30

	Thermocouple
Pin 1	TC 2 Negative
Pin 2	TC 1 Positive
Pin 3	TC 1 Negative
Pin 4	TC 2 Positive

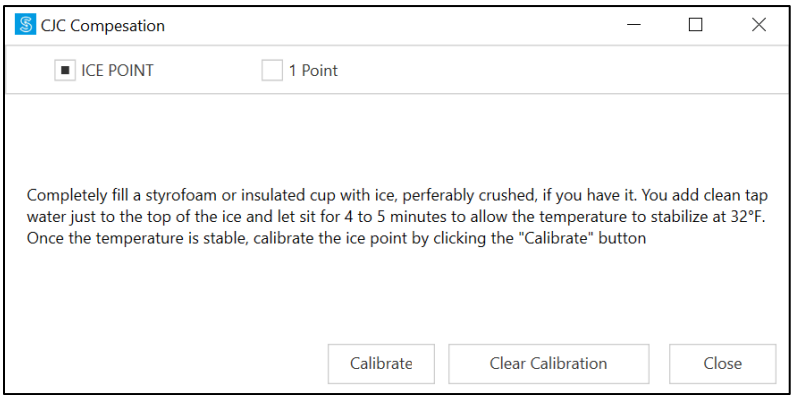
Figure 31

Rear view of Filed Connector Shown

Cold Junction Compensation

The thermocouple input interface offers cold junction compensation calibration. To achieve proper Ice Point calibration, you must be able to immerse your thermocouple into an environment that is stabilized at 0°C (32°F).

To use this calibration feature, change the input type to **Single TC** or **Dual TC** using SYNC (see **Figure 30**) and click **Calibration** beneath the input interface**.** Once the Thermocouple is stable in the 0°C environment, click calibrate.



Process

Input

The Process Input (Single & Dual) accept up to two 0-24 mA, 0-0.1 V_{DC}, 0-1.0 V_{DC}, or 0-10 V_{DC} process inputs. To use these features, change the Input Type selection to **Single Process or Dual Process** and then choose the **Device Range/Type** option in the side bar.

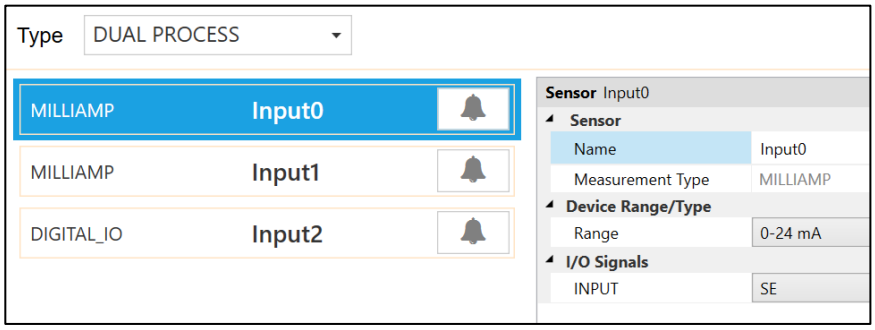


Figure 32

Note: When using Dual Process, the Device Range/Type section is only available for Input 0. Input 1 is always the same type as Input 0.

Warning: Be sure to setup the unit before plugging in Process inputs.

Figure 33

Rear view of Filed Connector Shown

	Voltage	Current
Pin 1	Input 1	Input 1
Pin 2	Input 2	Input 2
Pin 3	Ground 2	Ground 2
Pin 4	Ground 1	Ground 1

RTD

Input

The RTD Input interface provides interfaces to type 100, 500, and 1000 ohm 385 Curve, 100 ohm 392 Curve, and 100 ohm 3916 Curve RTD devices in 2, 3 and 4 wire configurations. A single RTD connection is supported.

To use these features, change the input type to **RTD** using SYNC.

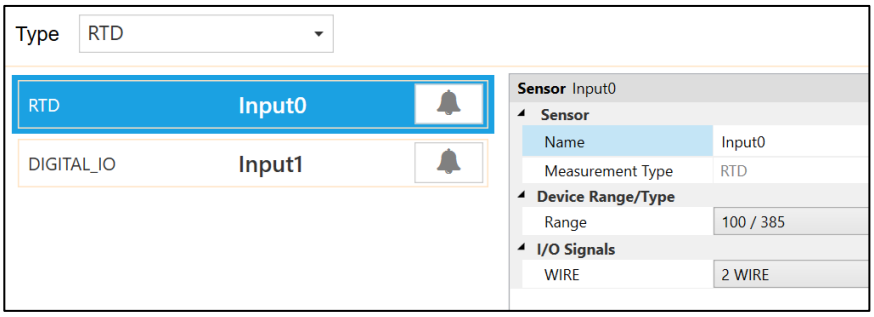
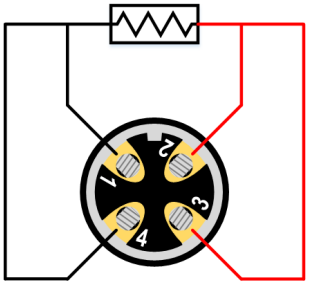


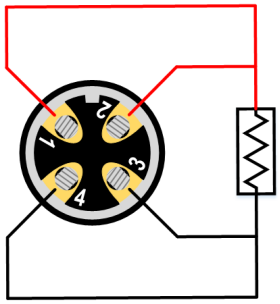
Figure 34

Wiring diagrams are displayed below.

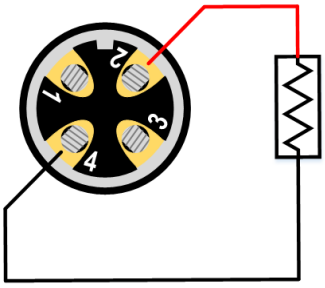
- **2 Wire RTD Connections:** Most useful with high-resistance sensors or in applications where a great deal of accuracy is not required.
- **3 Wire RTD Connections:** This connection is best suited for devices like strain gauges and is most often seen in industrial process and monitoring applications.
- **4 Wire RTD Connections:** A 4 Wire RTD configuration is primarily used in laboratories and other settings where great accuracy is necessary.



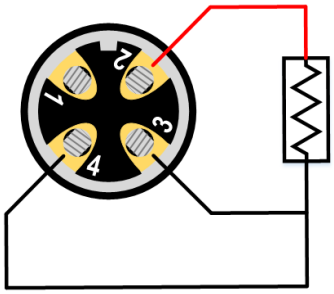
RTD 4 Wire Option 1



RTD 4 Wire Option 2



RTD Wire 2



RTD Wire 3

XW-ED-PRO and XW-EDA-PRO Wiring

The XW-ED and XW-EDA Pro versions support 2 Discrete Open Drain Digital Inputs / Outputs on the 4 Pin M12 Male connectors. To connect an input or output a standard M12 4pin cable can be used. Omega also offers an optional field installable M12 connector.

Important: For the XW-ED-PRO, Digital I/O is only available when the input is set to Process or Digital or if an Omega Smart Probe is used. Older zSeries probes will automatically disable the Digital I/O.

Pro Discrete Input / Output Connector

Figure 35

Rear view of Filed Connector Shown

Pin 1	Input / Output 0
Pin 2	Input / Output 1
Pin 3	Ground
Pin 4	Ground

Input Settings

To use a pin as an input make sure it is set to Active Low (default) in the **Output** Tab in SYNC. The Input can then be set as Active High or Low in the Input Tab.

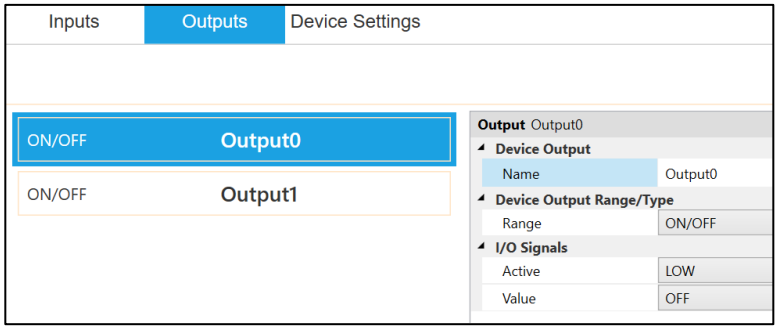


Figure 36

Each pin has an internal pull-up, but in order to save power, the internal pull-up is only active when the unit takes a reading. The state of both pins is always shown on the ZW-REC as the last input. Refer to the following table to decode the input state.

Input 1	Input 0	Reading
Inactive	Inactive	0
Inactive	Active	1
Active	Inactive	2
Active	Active	3

Output Settings

To use a pin as an output, set up the Output Options and assign the output to an Alarm using SYNC.

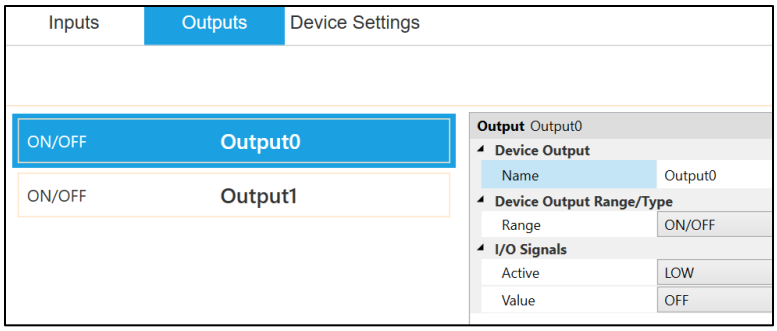


Figure 37

Output options are set in the Output Tab of Omega Sync. Each output can be configured as either Active High or Active Low. When configured as Active High the output conducts normally and becomes high impedance when activated. When configured as Active Low the Open Drain output is high impedance normally and will conduct when activated. It is recommended to change the input type to match the output type so that the output state will be correctly represented in logs.

- **ON / OFF:** Controls on/off functions. I/O signals can be changed between Active High, Active Low, and inactive

Option	Value	Description
Active	LOW	When the output is inactive, it is in a high impedance state.
	HIGH	When the output is active, it is in a high impedance state.
Value	OFF	Set output inactive.
	ON	Set output active.

- **PWM:** Pulse Width Modulation controls the amount of power given to a device by cycling the on/off phases of a digital signal. PWM consists of a duty cycle and frequency. The Duty Cycle measures the amount of time a signal is in the ON state as a percentage. The frequency controls how fast the PWM cycle is repeated. Users can select between the following settings:

Option	Value	Description
Rate	100 Hz	Signal has constant 100 Hz frequency with 0-100% Duty Cycle.
	10 Hz	Signal has constant 10 Hz frequency with 0-100% Duty Cycle.
	1 Hz	Signal has constant 1 Hz frequency with 0-100% Duty Cycle.
	0.1 Hz	Signal has constant 0.1 Hz frequency with 0-100% Duty Cycle.
Signal Type	Active LOW	When the output is inactive, it is in a high impedance state.
	Active HIGH	When the output is active, it is in a high impedance state.
Level	0-100%	Sets the duty cycle from 0-100%.

Alarms

Alarms are set by clicking the icon on the desired input signal found in the **Input** Configuration Tab. Setup the threshold and alarm type in the **Condition** section and then select which output to turn on in the **Action** section. The alarm can be set to be latching or non-latching in the **Recovery** section. If the alarm is set to be latching, press the reset button on the XW Transmitter to clear the Alarm.

The alarm state is now viewable on the ZW-REC webpage by monitoring the DIN input.

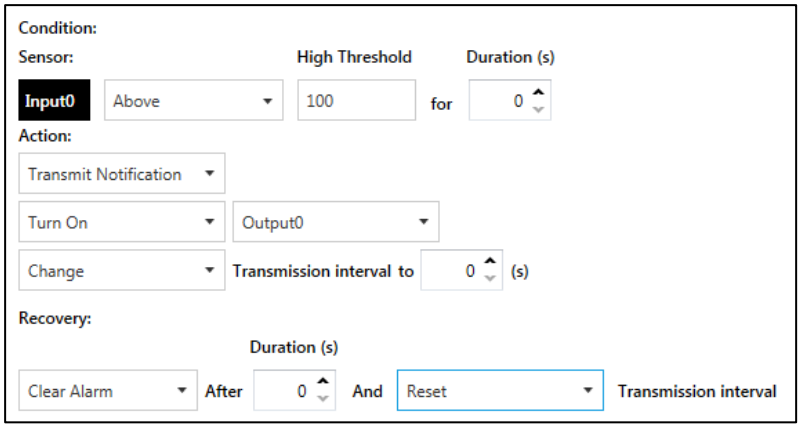


Figure 38

Note: When alarms are enabled readings are taken once per second. This greatly reduces battery life, therefore an AC Adaptor is recommended.

ON/OFF Control

To configure ON/OFF Control on a device, navigate to the Output configuration tab in SYNC and click on the icon located to the right of the available outputs. Clicking the icon will open the Define ON/OFF Control dialog box as seen in **Figure 36**. Choose the input with the active alarm that you would like to control and set your preferred parameters.

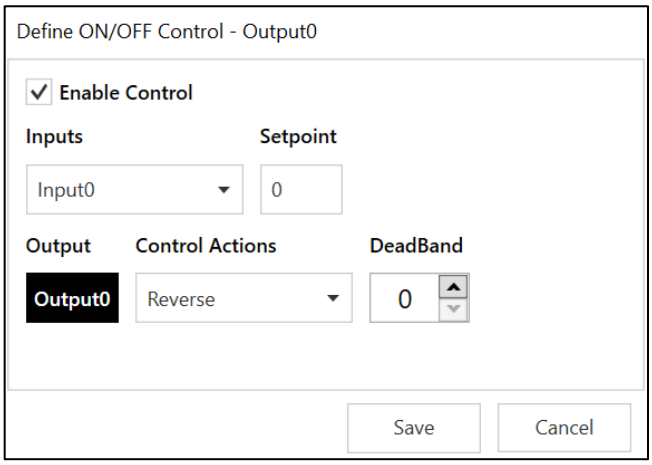


Figure 39

The **Setpoint** establishes the target process value and the **Deadband** establishes the range from the Setpoint that the process value can accept before the output is activated. When **Reverse** control is selected, the output is on when the process value is below the **Setpoint**. When **Direct** control is selected, the output is on when the process value is above the **Setpoint**.

Once the ON/OFF Control parameters have been set, click **Save** to finalize the settings.

More functions are constantly being developed for the XW Transmitter and other smart devices. Check the latest SYNC version for the newest updates.

Appendix A: Digital Input Diagrams

The following information provides descriptions and diagrams of the available I/O capabilities of the XW-ED and XW-ED-PRO.

Digital Input

- **DIN:** The Digital I/O functions present a bit mapped image of the signals present on the corresponding channel signal lines. The Digital I/O signal lines may be read as inputs to initiate control functions and to activate alarms.

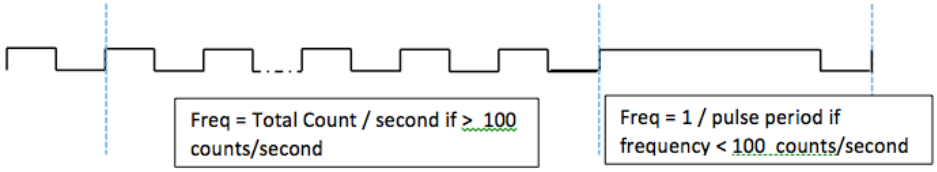
I/O Signal	Description
INP_1, INP_2, INP_3	Inputs may be treated as simple ON/OFF switch inputs.

Pulse Measurements

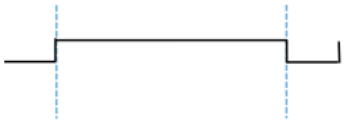
Pulse measurements include Pulse Rate (Frequency), Pulse Width, Duty Cycle, and Pulse Delay. Pulse measurements contain the following customizable I/O signals:

I/O Signal	Description
CLK_A	Detects the positive or negative pulse edge depending on the signal type and modifier chosen.
RST	Resets the value to 0 when active.
ENB	Enables measurement when active. Holds the last measurement when inactive.
CLK_B (Delay only)	Serves as the second signal line and is measured alongside CLK_A to determine the Pulse Delay.

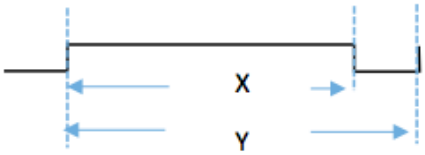
- **RATE:** The Rate (Pulse Rate Frequency) function measures the number of OFF to ON transitions in 1 second. Rate counters may be used to measure the frequency of external signals and are often used to measure speed/flow by coupling a magnetic transducer to a toothed wheel or impeller-based flow transducers.



- **WIDTH:** The Pulse Width function measures the time (in seconds) that the CLK (clock) signal is in the ON state. Width timers may be used to measure the frequency of external signals and are often used to measure speed by coupling a magnetic transducer to a toothed wheel or impeller-based flow rate transducers.

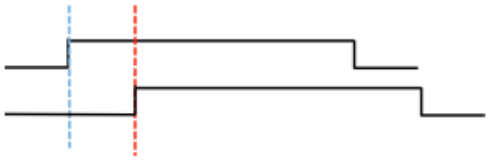


- **DUTY:** The Duty Cycle function measures the percentage of time the CLK (clock) is high as a percentage of the total time of the signal. The Duty Cycle function may be used to measure the percent 'power' or servo control position being controlled by a PWM (pulse width modulation signal.



Duty Cycle = x/y%

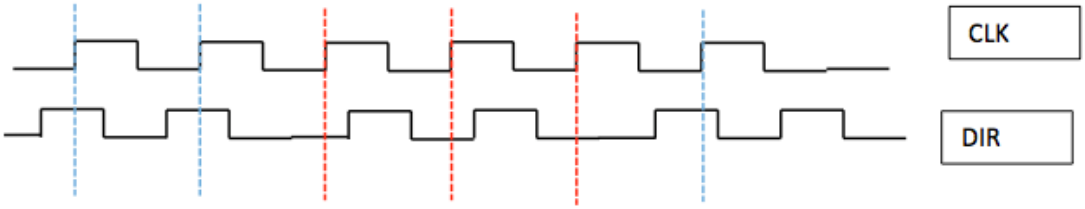
- **DELAY:** The Pulse Delay function measures the delay in time between Signal Line 1 (CLK 1) and Signal Line 2 (CLK 2) turning 'ON.' The Pulse Delay function may be used to measure the time between two signals turning on or the phase angle of AC signals with suitable signal conditioning.



Counter Measurements

I/O Signal	Description
CLK_A	Measures the positive or negative pulse depending on the signal type and modifier chosen.
RST	Resets the counter to 0 depending on the signal type and modifier chosen.
ENB	Sensor starts measuring depending on the signal type and modifier chosen.
DIR (Up/Down only)	Determines what aspect of the pulse is counter (Up or Down) depending on the signal type and modifier chosen.

- **CNT:** The Counter function measures the number of OFF to ON transitions on the CLK signal. The counter function may be used to measure the number of occurrences of an external event.



- **U/D_CNT:** The Up/Down Counter function measures the number of OFF to ON transitions on the CLK signal. The Up/Down Counter function may be used to measure the number of occurrences of an external event or the positioning of external devices based on a suitable transducer.

Appendix B: Specifications

Wireless Communication

Standard: IEEE 802.15.4, DSSS
Frequency: 2.4 GHz (2400 to 2483.5 MHz), 16 channels
Network Topology: Star topology
Transmit Power: 9.5 dBm
Receiver Sensitivity: -96 dBm
Range: Up to 1000 m* (3280') outdoor and 100m* (328') indoor
**without obstruction*

Power

Input Voltage: 5 to 36 V_{DC}, 24 V_{AC} ±10%
Input Power: 0.8 W maximum
Alkaline Battery: Two C-Cell 1.5 Vdc (included)
Lifetime: With Alarms or Control Active: Up to 3 months

Sleep Time	Battery Life**
10 Seconds	1.5 Years
60 Seconds	3.5 Years
10 minutes	4.5 Years

***At 25°C with good reception*

Lithium Back-Up* Battery**: CR2032 (included)
****RTC back-up only*
Safety Qualified AC Power Adaptor (optional):
Nominal Output: 5 V_{DC} @ 0.6 A
Input: 100 to 240 V_{DC}, 50/60 Hz
Operating Temperature: 0 to 40°C (32 to 104°F)

Environmental

Operating Conditions:
Base Unit: -20 to 70°C (-4 to 158°F), 90% RH non-condensing
CR2032 Battery: -20 to 60°C (-4 to 140°F), 90% RH
Alkaline Battery: -18 to 55°C (-0.4 to 131°F), 90% RH non-condensing

Packaging

Enclosure Material: Polycarbonate
Enclosure Protection: NEMA 4 (IP65)
Enclosure Dimensions: 135.9 L x 82 W x 39 mm D (5.35 x 3.23 x 1.56")

General

Agency Approvals: ECCN, EAR99, EMC 2014/30/EU, LVD 2014/35/EU, RED 2014/53/EU
Software: Compatible with OMEGA Sync and OEG
Compatible Probes: Smart Probes, zSeries****
*****when using zSeries Probes with the Pro version, the Discrete I/O will be disabled*

XW-ED and XW-ED-PRO Inputs

Digital Inputs

Type	Range	Accuracy
Frequency	0.01Hz to 100Hz	±0.5%
Frequency	100Hz to 1000Hz	±1Hz averaged over 1s
Counter	0 to +8388608	±1 count max
Up / Down Counter	-8388608 to +8388608	±1 count max
Pulse Width (T_{pw})	0.2ms min	±50uS ±1%
Pulse Delay (T_{pp})	0.2ms min	±50uS ±1%
Duty Cycle	1% to 99%	±50uS *F

Process Inputs

Type	Range	Accuracy
Current	0-24mA	±0.1mA
Voltage	0-1V	±5.0mV

XW-EDA and XW-EDA-PRO Inputs

Thermocouple

Type	Range	Accuracy*
J	-210°C to 1200°C	0.4°C
K	-160°C to 1372°C	0.4°C
T	-190°C to 400°C	0.4°C
E	-220°C to 1000°C	0.4°C
N	-100°C to 1300°C	0.4°C
R	40°C to 1788°C	0.5°C
S	100°C to 1768°C	0.5°C
B	640°C to 1820°C	0.5°C
C	0°C to 2320°C	0.4°C

*At 25°C CJC
Accuracy: ±0.05°C per C

RTD

Type	Range	Accuracy
385, 4 Wire	-200°C to 850°C	0.3°C
385, 3 Wire	-200°C to 850°C	0.3°C
385, 2 Wire	-200°C to 850°C	0.6°C
392, 4 Wire	-200°C to 660°C	0.3°C
392, 3 Wire	-200°C to 660°C	0.3°C
392, 2 Wire	-200°C to 660°C	0.6°C
3916, 4 Wire	-200°C to 660°C	0.3°C
3916, 3 Wire	-200°C to 660°C	0.3°C
3916, 2 Wire	-200°C to 660°C	0.6°C

Process Inputs

Type	Range	Accuracy
Current	0-24mA	±10uA
Voltage	0-10V_{DC}	±5.0mV
Voltage	0-1V_{DC}	±0.5mV
Voltage	0-0.1V_{DC}	±0.05mV

Appendix C: Troubleshooting and Help

Symptom: My XW-ED/XW-ED-PRO shows “OPEN” or “NaN” on the ZW-REC webpage.

Solutions:

- Check that the probe is connected properly, and the input connector is wired correctly.
- If using thermocouple short pins 2 and 3 together for Channel 0 and Pins 1 and 4 together for channel 1. If the unit displays room temperature check your thermocouple for breaks.

Symptom: All my transmitters are missing after power cycling the ZW-REC.

Solution: On the ZW-REC System page make sure the “Enable Energy Scan at Startup” box is not checked. If transmitters are set for long sleep times they will show up after they transmit next.

Symptom: Blue Light blinks on and off rapidly. XW-ED does not show up on the ZW-REC webpage.

Solution: Use Omega Sync to check that NID is the same as the ZW-REC and that the DID is not used by another device.

Symptom: Blue Light is on solid and reset button is not working.

Solution: Remove power, Batteries and Coin Cell from unit. Wait 5 seconds before applying power again.

Symptom: My transmitters sometimes appear as “Lost” on the ZW-REC webpage.

Solutions:

- Try to reposition your receiver or transmitter away from other wireless devices, microwaves, motors, and other potential sources of interference. Make sure the antennas for all devices are pointed upwards.
- Try using a different RF channel that does not overlap with existing WiFi channels being used. All transmitters must be power cycled after changing the RF Channel. (See ZW-REC User’s Manual).

Appendix D: Mounting your XW Transmitter

Step 1: Position the unit where you would like to mount it. Mark the location of the top center of the unit.

Step 2: Unscrew the lid screw using a Philips head screwdriver to open the XW Transmitter and access the mounting points.

Step 3: Refer to Figure 24 to mark and drill four pilot holes as indicated. Use the included drywall anchors if needed.

Step 4: Use the included screws to secure the XW Transmitter.

Tip: When mounting the unit, be sure to leave room on the top to access the power button and on the bottom and side for the probe and antenna.

Tip: Mount the unit away from any large metal obstructions such as posts, catwalks, or large machinery.

Tip: For the best wireless range do not collocate the XW Transmitter with other 2.4Ghz wireless equipment such as Bluetooth, Zigbee, or any other wireless router or access points not belonging to the same wireless network.

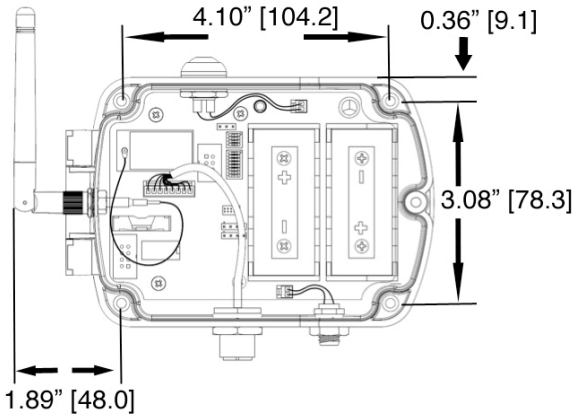


Figure 40

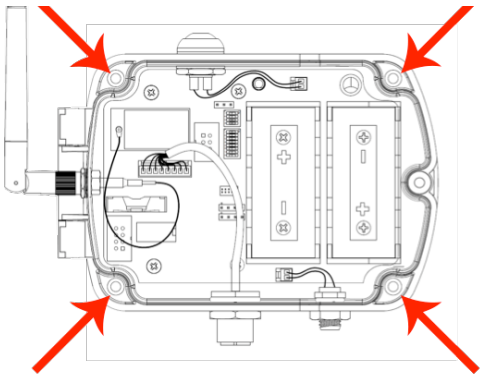


Figure 41

Appendix E: Safety and Regulatory Compliance

Safety:

EN 61010-1 3rd Edition

EMC:

EN 61326-1:2013

Radio:

EN 300 328 V1.8.1: 2012-04

CE:

The product herewith complies with the essential requirements and other relevant provisions of the Radio Equipment Directive 2014/53/EU, the EMC Directive 2014/30/EU, and the Low Voltage Directive 2014/35/EU, and carries the CE-marking accordingly.

The following CE Mark CE ⓘ is affixed to this equipment.
The CE declaration is available at the website listed on the cover page of this manual.

FCC / IC:

Part 15C, Class DTS Intentional radiator
Contains TX FCC ID: TYOJN5168M5
Contains Industry Canada ID IC: 7438A-CYO5168M5

FCC Radiation Exposure Statement:

This portable equipment with its antenna complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. To maintain compliance, follow the instructions below:

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna or keep it to a minimum while using this equipment.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at omega.com

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Communications-Based Acquisition Systems
- Data Logging Systems
- Wireless Sensors, Transmitters, & Receivers
- Signal Conditioners
- Data Acquisition Software

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M5745/0720