



# TracXP™ TXP-WTA

## Wireless Sensor Transmitter

### Instruction Manual



**IMPORTANT:** Read and understand contents of this manual prior to operation. Keep these user instructions for reference.

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# 1 Safety Information

## 1.1 Read Before Installation and Operation

### IMPORTANT



AVERTISSEMENT: Lire attentivement les instructions avant de metre en marche.



CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

ATTENTION: POUR DES RAISONS DE SÉCURITÉ, CET ÉQUIPEMENT DOIT ÊTRE UTILISÉ, ENTRETENU ET RÉPARÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ. ÉTUDIER LE MANUE D'INSTRUCTIONS EN ENTIER AVANT D'UTILISER, D'ENTREtenir OU DE RÉPARER L'ÉQUIPEMENT.



CAUTION: KEEP EXPLOSION PROOF COVER TIGHT WHILE CIRCUITS ARE ALIVE.

ATTENTION: GARDEZ LE COUVERCLE ANTI-EXPLOSION SERRÉ PENDANT QUE LES CIRCUITS SONT VIVANTS.

CAUTION: USE SUPPLY WIRES SUITABLE FOR 40°C ABOVE SURROUNDING AMBIENT.



ATTENTION: UTILISER DES FILS D'ALIMENTATION QUI CONVIENNENT A UNE TEMPERATURE DE 40°C AU-DESSUS DE LA TEMPERATURE AMBIANTE.

WARNING - EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2

BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION

LA SUBSTITUTION DES COMPOSANTS PEUT PROVOQUER UNE ADAPTATION À LA CLASSE I, DIVISION 2.

LES BATTERIES NE DOIVENT ÊTRE CHANGÉES QUE DANS UNE ZONE QUI N'EST PAS DANGEREUSE.

WARNING- EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION

NE PAS BRANCHER OU DÉBRANCHER LORSQU'IL EST SOUS TENSION, SAUF SI LA ZONE EST CONNUE POUR ÊTRE NON HASARDEUX.

## 1.2 WARNINGS

- Calibrate TXP-WTA Sensor Transmitters that communicate to the TracXP wireless monitoring system with a known concentration of gas at start-up. Check calibration on a regular schedule (at least every 90 days). More frequent inspections are encouraged to spot problems such as dirt, oil, paint, grease or other foreign materials on the sensor filter.
- Do not paint any part of the TXP-WTA Sensor Transmitter or corresponding components.
- Do not use the TXP-WTA Sensor Transmitter if any enclosure is damaged or cracked or has missing components.
- Make sure covers, internal boards, and antenna connections are securely in place before operation.
- Use only approved Smart Sensor Modules that are compatible with the TXP-WTA Sensor Transmitter.
- Periodically test for correct operation of the system's alarm events by exposing the TXP-WTA Sensor Transmitter to a known concentration of gas above the High Alarm set-point.
- Do not expose TracXP devices to electrical shock or continuous severe mechanical shock.
- Protect TracXP devices from dripping liquids and high-power sprays.
- Use only for applications described within this manual.



## 2 Product Overview

### 2.1 Introduction

The TracXP Wireless TXP-WTA Sensor Transmitter is available with 900 MHz or 2.4GHz frequency to meet your communication requirements. The TXP-WTA Sensor Transmitter can be configured in single or dual sensor configurations to allow redundant readings for critical operations or monitoring combination gases. The TXP-WTA Sensor Transmitter's smart sensors allow users to easily change sensor types. The TXP-WTA Sensor Transmitter also supports integral and remote sensor options. Intuitive non-intrusive magnetic interface makes set up and programming quick and easy. Power options include standard 3.6V disposable Lithium battery for portability or a 12-24V DC power option for longer term or permanent installations.

### 2.2 Key Features

- 900 MHz or 2.4 GHz Radios
- Operates on one "D" size Lithium Battery (Standard)
- Optional 12-24V DC Power Board
- 4-20 mA Input option
- Dual Sensor Capable w/ Integral & Remote Sensor Options
- Magnetic Mount Option
- Hazardous Location Rating
- 3 Alarm Levels, 1 Fault, 1 Comm Status
- Two Password Levels for Security
- Multiple Antenna Options

### 2.3 Ratings and Certifications

- FCC 15.247 & Industry Canada (IC),
- CSA Certified for Class 1, Division 2

### 2.4 Specifications

The following section provides detailed information regarding specifications of the TXP-WTA Sensor Transmitter.

#### 2.4.1 Input Power Options

- Disposable, Internal D-Cell Lithium Battery (Standard)
- Optional 12 - 24V DC Board

#### 2.4.2 Sensor Input

- Single or Dual Electrochemical or Infrared
- 4-20 mA Input Option

#### 2.4.3 Standard Output

- Frequency-Hopping Spread Spectrum (FHSS) Wireless Modem w/ Data Encryption
- 900MHz Power Adjustable From 10mW to 1.0 watt/0-30dBm
- 2.4GHz Output Set At 125mW/21dB

#### 2.4.4 Display

- 64 x 128 Pixel LCD w/ One-Hour Trend
- Bar Graph & Engineering Units Display

2.4.5 Ambient temperature

- -40°F to 131°F (-40°C to +55°C)
- \*See Smart Sensor Specifications

2.4.6 Humidity

- 0-95% RH Non-Condensing

2.4.7 Wireless Performance

- 2.4GHz freq. range: 2400 - 2483.5 MHz w/ 42 hops
- 2.4GHz indoor range: Up to 1500 feet w/ 7dBi collinear antenna
- 2.4GHz outdoor RF LOS (Line of Site) range: Up to 2 miles with high-gain antenna
- 900MHz frequency range: 902 - 928 MHz w/ 50 hops
- 900MHz indoor/urban range: Up to 3000 feet w/ 2dBi dipole antenna
- 900MHz outdoor RF LOS range: Up to 2-3 miles w/ high-gain antenna

2.4.7.1 *Power Consumption (900 MHz Models)*

2mA during “sleep” mode, 40mA while receiving beacon, up to 1 amp during 1 watt “transmit” mode. Transmit power may be set from 10mW to 1 watt (see Section 8.1.9)

NOTE: 1-watt operation is not recommended or necessary for most applications as it can cause an unnecessary load on the battery thereby significantly reducing battery life.

Power Consumption (2.4 GHz Models)

2mA during “sleep” mode, 170mA during 125mW broadcasts.

2.4.7.2 *Maximum Transmit (TX) Power (900 MHz Models (EIRP based on a 2dBi gain antenna))*

30dBm at highest 1W power setting. Transmit power may be set from 10mW, 200mW, 400mW and 1 watt (see Section 8.1.9)

NOTE: 1-watt operation is not recommended or necessary for most applications as it can cause an unnecessary load on the battery thereby significantly reducing battery life.

2.4.7.3 *Maximum Transmit (TX) Power (2.4 GHz Models (Conducted; no antenna))*

Transmit power is fixed at 125mW (21dBm)

2.4.7.4 *Receive (TX) Sensitivity (900 MHz Models)*

100 dBm

2.4.7.5 *Receive (TX) Sensitivity (2.4 GHz Models)*

95 dBm

2.4.7.6 *Radio Frequency (900 MHz Models)*

Hopping occurs between 902 – 928 MHz

2.4.7.7 *Radio Frequency (2.4 GHz Models)*

Hopping occurs between 2400 – 2483.5 MHz

2.4.7.8 *Memory*

Non-volatile memory retains configuration values in the event of power outages.



## 2.5 Sensor Options

Gas		Range
Ammonia	NH <sub>3</sub>	
Arsine	AsH <sub>3</sub>	
Carbon Dioxide	CO <sub>2</sub> (IR)	
Carbon Monoxide	CO	
Chlorine	Cl <sub>2</sub>	
Combustibles	(IR)	
Ethylene Oxide	C <sub>2</sub> H <sub>4</sub> O	
Formaldehyde	CH <sub>2</sub> O	
Hydrogen	H <sub>2</sub>	
Hydrogen Chloride	HCl	
Hydrogen Cyanide	HCn	
Hydrogen Fluoride	HF	
Hydrogen Sulfide	H <sub>2</sub> S	
Nitric Oxide	NO	
Nitrogen Dioxide	NO <sub>2</sub>	
Oxygen	O <sub>2</sub>	
Ozone	O <sub>3</sub>	
Phosphine	PH <sub>3</sub>	
Sulfur Dioxide	SO <sub>2</sub>	
Vinyl Chloride	C <sub>2</sub> H <sub>3</sub> Cl	
4-20 mA input option	--	--

\*For additional gas / sensor options, please contact your TracXP representative

### 3 Installation Instructions

#### 3.1 System Diagrams

Refer to the following diagrams for identification of system components that may be referred to in this manual.



Figure 3-1 – Complete Transmitter (Single Sensor, Dual Sensor & Poly Versions)

### 3.1.1 External system Diagram

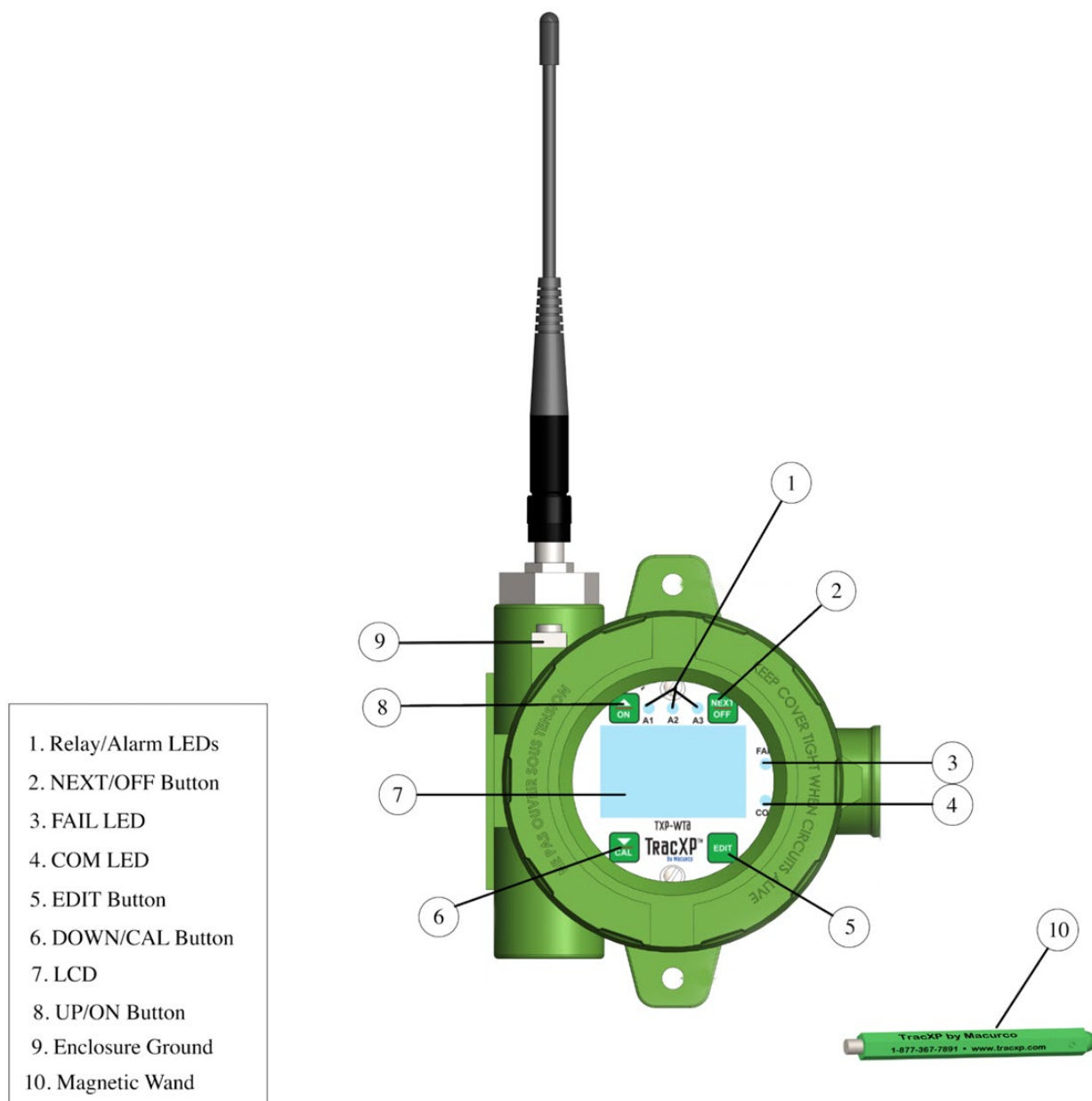


Figure 3-2 – External System Diagram

### 3.1.2 Transmitter Diagram

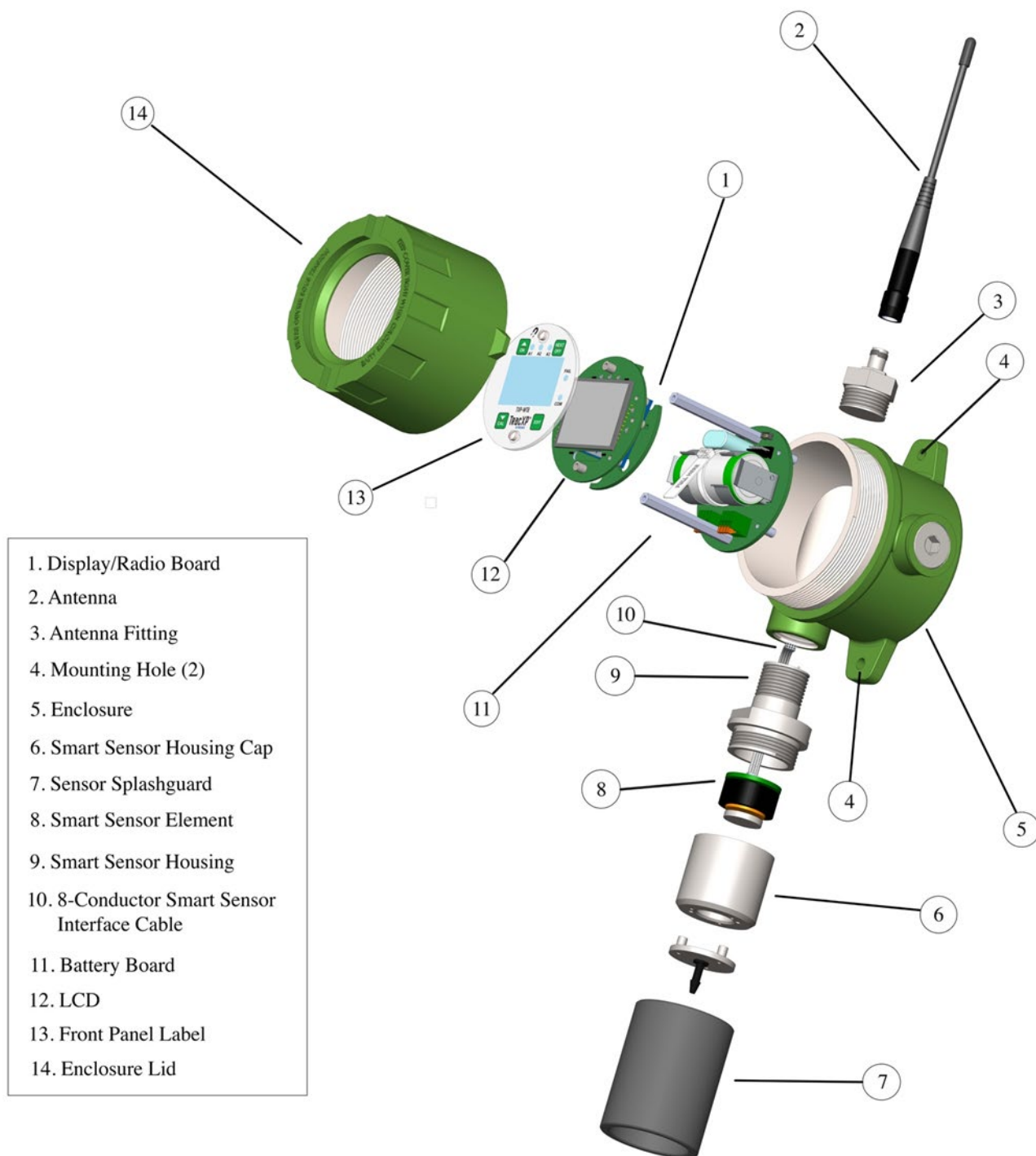


Figure 3-2 – Transmitter Exploded View

## 4 Product Description



WARNING - EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2; BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION

LA SUBSTITUTION DES COMPOSANTS PEUT PROVOQUER UNE ADAPTATION À LA CLASSE I, DIVISION 2; LES BATTERIES NE DOIVENT ÊTRE CHANGÉES QUE DANS UNE ZONE QUI N'EST PAS DANGEREUSE.

### 4.1 LCD Readouts

Figure 3-1 shows the primary data display screens for displaying sensor readings, radio status and current alarm conditions.

- The Single Channel Eunit (Engineering Unit) and One-Hour Trend screens on the left side of Figure 3 2 are available even if the TXP-WTA Sensor Transmitter is equipped with Dual Sensors they each have individual screens.
- The Sensor Readout screen has a large digital value with Eunits, a bar graph with Alarm 1, Alarm 2 and Alarm 3 levels indicated across the bar and a 16-character Measurement Name field for user ID of this measurement location.
- The NEXT key toggles to the One-Hour Trend screen which indicates the alarms levels horizontally across the screen and trends the most recent one hour of readings.
- The right screen shows the Dual Monitor readout available only when two smart sensors are enabled.
- Single Channel screens are also available in the Dual mode which totals 5 data displays for dual channel units.

NOTE: To exit the menu, swipe NEXT until the home screen is displayed. If the entire menu has not been cycled through, the device will automatically return to the home screen after several minutes of inactivity.

#### 4.1.1 LCD Status Icons

The upper left LCD corner displays status of the TXP-WTA Sensor Transmitter and provides an indication of general health of the wireless network over time. These status icons and the COM LED are useful tools for evaluating RF communication and the current state of the TXP-WTA Sensor Transmitter.

##### Zzz Icon

- Indicates sensor is asleep and saving power.

##### SNIFF Icon

- Awakes every six seconds—indicated by the flashing SNIFF icon—to read the gas sensor's signal and update displayed gas value.

Following a sniff, if conditions described in Section 3.2 have been met, the TXP-WTA Sensor Transmitter will wake up the radio and broadcast gas value and alarms over the airwaves to the controller and/or wireless relay.

NOTE: The sniff icon may be replaced by other status icons to indicate problems as described below:

### 📶 - Server Out-of-Range Icon

- Appears if the Server's beacon was not received at the most recent attempt to broadcast.

### RNG Icon

- Appears briefly at the beginning of each broadcast attempt to indicate the radio is awaiting the Server's beacon.
- If the beacon is not received after a few seconds, the broadcast is terminated unsuccessfully, and the icon is displayed instead of the SNIFF icon.

### 📶📶 - Server Previously Out-of-Range Icon

- Will appear instead of the SNIFF Icon if subsequent attempts receive the beacon and broadcasts successfully.
- Useful in determining if intermittent communication failures are a result of this TXP-WTA Sensor Transmitter having problems receiving the Server's beacon as opposed to the controller not receiving the TXP-WTA Sensor Transmitter broadcast packet.

NOTE: Duration and frequency of "out-of-range" conditions are stored in the Controller Event Log table described in Wireless Receiver Instruction Manual.

### 🔋 - Low Battery Icon

- Appears during sniffs when the 3.6-volt lithium battery is near end of life.

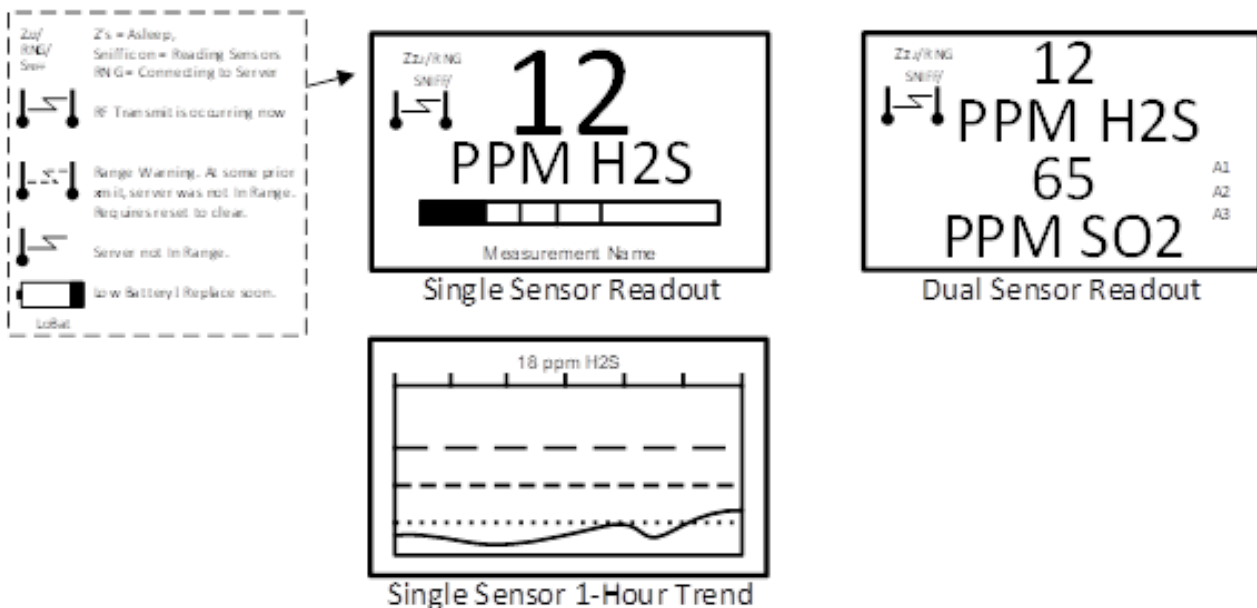


Figure 4-1 – Readout Screen

## 4.2 RF Broadcast Cycle and Conserving Battery Life

Most TXP-WTA Sensor Transmitter battery power is consumed as the radio communicates to the wireless network. Each broadcast cycle consists of the following operations.

1. Power up the radio.
2. Listen for the Server's beacon.
3. Synchronize to the Server's hopping pattern to become "In Range", transmit data packet out of the antenna and return to sleep mode.
  - a. This sequence takes from .25 to 1 second to complete.
  - b. If the TXP-WTA Sensor Transmitter radio fails to synchronize hopping with the Server upon the initial attempt it waits 6 seconds and tries again, then waits 6 seconds and tries once more.
  - c. If the third attempt fails, an "Out of Range" icon is displayed, and the TXP-WTA Sensor Transmitter goes to sleep and the scheduled broadcast cycle repeats.

NOTE: Transmit power levels are adjustable (900 MHz models only) and the lower the power setting the longer the battery will last (see Section 4.4).

4. Every 6 seconds, the sensor performs a "sniff test" to detect level of target gas present at the sensor. At each "sniff test", the Zzz's "Sleep Mode" icon is briefly replaced by a status icon as described above in Section 3.1.1. At this time, the LCD readout updates to indicate gas value measured during the sniff test. The radio stays OFF and no broadcast occurs unless the gas value trips A1, A2 or A3 alarms, the Wakeup Timer expires (maximum of 5-minutes) or the conditions shown below are met.

The TXP-WTA Sensor Transmitter's radio may broadcast over the airwaves if:

- Every time the Wakeup Timer Menu expires (see Section 8.1.3).

NOTE: This is important since the controller reports "Comm Error" for channels when no data is received after [Wakeup Timer X 5]. For example, if the TXP-WTA Sensor Transmitter Wakeup Timer is set to broadcast every 5 minutes, the controller will indicate a Comm Error alarm for this channel if data is not received after approximately 25 minutes.

- After each 6 second sniff test if there is an A1, A2 or A3 alarm

NOTE: FAIL" alarms do not increase radio broadcast rates.

- Upon entry into CAL MODE, upon entry into CAL PURGE and again upon completion of the CAL PURGE. A status bit in the broadcast packet advises controllers and wireless relays that this TXP-WTA Sensor Transmitter's channel is being calibrated and alarms are inhibited.

NOTE: Oxygen sensors cause 20.9% controller readings during CAL MODE while all others cause zero readings (see CAL MODE Section 5.3).

- If the reading rises or falls by >2% of full scale since the most recent broadcast. This is to ensure a live reading at the controller and/or wireless relay even though the Wakeup Timer might be set for a longer interval (5 minutes max).
- At the end of a Warmup interval (see Section 8.2.1).
- As menu items are edited and again upon returning the LCD to the readings display.



NOTE: A broadcast may be forced manually by holding the UP key for several seconds until the display shows “Release Key”.

### 4.3 Battery Board

NOTE: The TXP-WTA Sensor Transmitter battery should be replaced at 3.3 volts (see Section 5.4.2).

#### Electronic Key Features

- Lower Battery Board (Figure 3 2) is connected by a cable to the upper Display / Radio Board (Figure 3 3).
- 3.6-volt lithium ‘D’ cell battery will continuously power the unit for up to one year.

NOTE: The WTA battery may be replaced by pulling the “Pull Here” tab to remove the current battery. Insert a NEW “D” cell battery (PN: 83-703C-0000-00) into the battery holder observing correct polarity.

- S1 & S2 are for connecting the Smart Sensor Housing to the Battery Board
- Terminal blocks TB1 and TB2 are for connecting to Sensor Separation Kit with a 15’ data cable (see Section 5.5.1).

**IMPORTANT:** DO NOT TURN THE TRANSMITTER’S POWER ON UNTIL THE CONTROLLER DESIGNATED AS ‘SERVER’ IS FULLY OPERATIONAL AND READY TO COMMUNICATE TO THE TRANSMITTER. BATTERY LIFE IS REDUCED IF THE WTA IS ON FOR EXTENDED PERIODS OF TIME WHILE UNABLE TO COMMUNICATE TO THE SERVER.

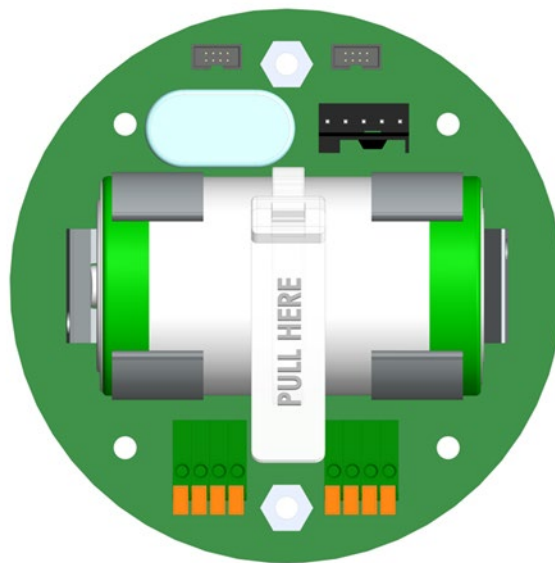


Figure 4-2 – Battery Board

### 4.4 Display / Radio Board

TracXP systems support both 900 MHz and 2.4 GHz FHSS networks determined by the radio module mounted to the Display / Radio Board. The 900 MHz radio module mounts to the back of the Display transmitter as shown in Figure 3 3. The is a MMCX (Micro-Miniature Coaxial) RF connector on the pigtail cable from the antenna fitting that plugs into the radio connector on 900MHz models



The 2.4 GHz radio module also mounts to the back of the Display transmitter as shown in Figure 3 3. Its u.FL RF connector attaches to the coax pigtail of the antenna fitting required for 2.4 GHz models.

A slender 5 conductor cable connects between the Display / Radio Board and the Battery Board bolted to the bottom of the enclosure.

NOTE: The Display / Radio Board accepts either the 900 MHz or 2.4 GHz radio module. A Shield Board is not shown but, must be removed to access the radio modules and RF connectors.

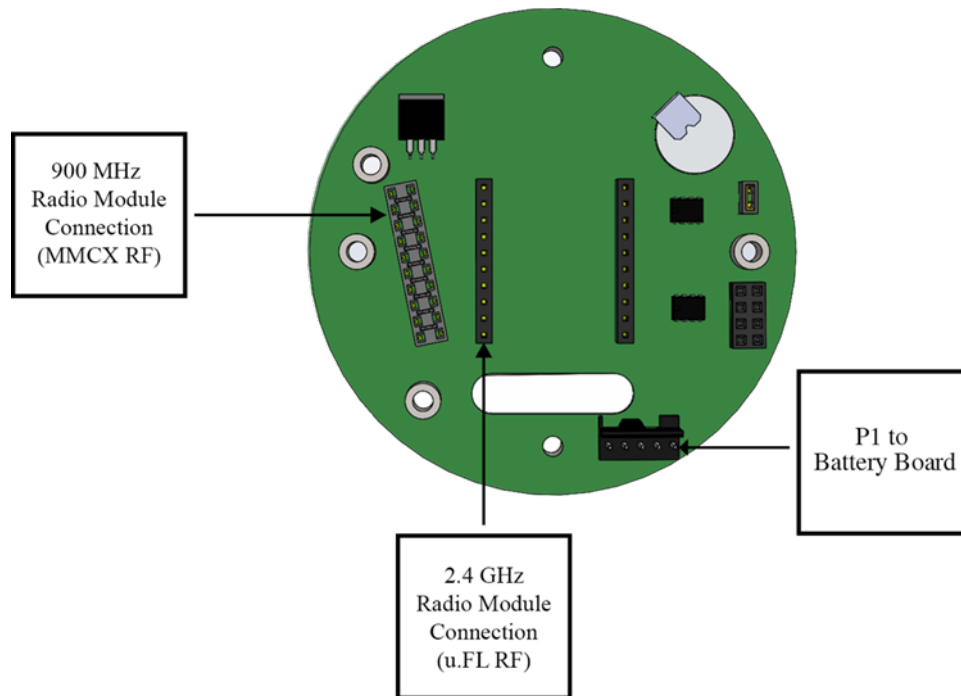


Figure 4-3 – Display / Radio Board

## 5 Installation Instructions

### 5.1 Ratings and Certifications

The enclosure is NRTL (Nationally Recognized Testing Laboratory) certified for Division 1 hazardous area installations for explosion-proof Class 1 Groups A, B, C, D (see Figure 4-1). The TXP-WTA Sensor Transmitter is designed to meet ISA 92.0.01 Part 1 for Toxic Monitors. The standard antenna fitting has an RP-TNC connector and is suitable for Division 2 classified areas. An optional explosion-proof dipole antenna is also available for Division 1 classified areas. Figure 4-2 shows both antenna styles.

### 5.2 Sensor Location

Correct sensor location can be affected by factors such as:

- Air Movement - Air movement by fans, prevailing winds and convection should be carefully evaluated to determine if a leak is more likely to raise gas levels in certain areas within the facility.
- Gas Density in Relation to Air - Vapor density of a gas determines if it will rise or fall in air when there are no significant currents.
- Personnel Traffic
- Emission Sources
- Environmental Variables

NOTE: Lighter than air gases should have the TXP-WTA Sensor Transmitters mounted 12-18 inches (30-45 centimeters) above the potential gas leak and heavier than air gases should be this distance below.

NOTE: Even though TXP-WTA Sensor Transmitters are designed for rugged service and harsh environments, they should be protected against unnecessary environmental damage from water, snow, shock, vibration and dirt.

### 5.3 Mounting the Enclosure

Standard enclosures of TXP-WTA Sensor Transmitters are cast aluminum explosion-proof (NEMA 7), as shown in Figure 4-1, and the polycarbonate enclosure shown in Figure 4-2. Modular design simplifies the installation of the TXP-WTA Sensor Transmitter. The TXP-WTA Sensor Transmitter antenna should typically be mounted with line-of-site access to the controller and/or WAR antenna(s). If a quality line-of-site angle is not possible, the TXP-WTA Sensor Transmitter will usually still function properly at the following ranges—however, obstructions should still be kept to a minimum.

- 2.4 GHz frequency range: 2400 - 2483.5 MHz with 42 hops
- 2.4 GHz indoor/urban range: Up to 1500 feet with 7dBi collinear antenna
- 2.4 GHz outdoor RF LOS range: Up to two miles with high-gain antenna
- 900 MHz frequency range: 902 - 928 MHz with 50 hops
- 900 MHz indoor/urban range: Up to 3000 feet with 2dBi dipole antenna

**WARNING: QUALIFIED PERSONNEL SHOULD PERFORM THE INSTALLATION ACCORDING TO APPLICABLE ELECTRICAL CODES, REGULATIONS AND SAFETY STANDARDS. ENSURE CORRECT CABLING AND SEALING FITTING PRACTICES ARE IMPLEMENTED. INSTALL THE**

**SENSOR TRANSMITTER TO A WALL OR BRACKET USING THE PRE-DRILLED MOUNTING FLANGES WITH I.D. 0.3 ON 5.0' CENTERS (SEE FIGURE 4-1)**

**CAUTION: THE SENSOR ELEMENT SHOULD NEVER BE INSTALLED POINTING UPWARD.**

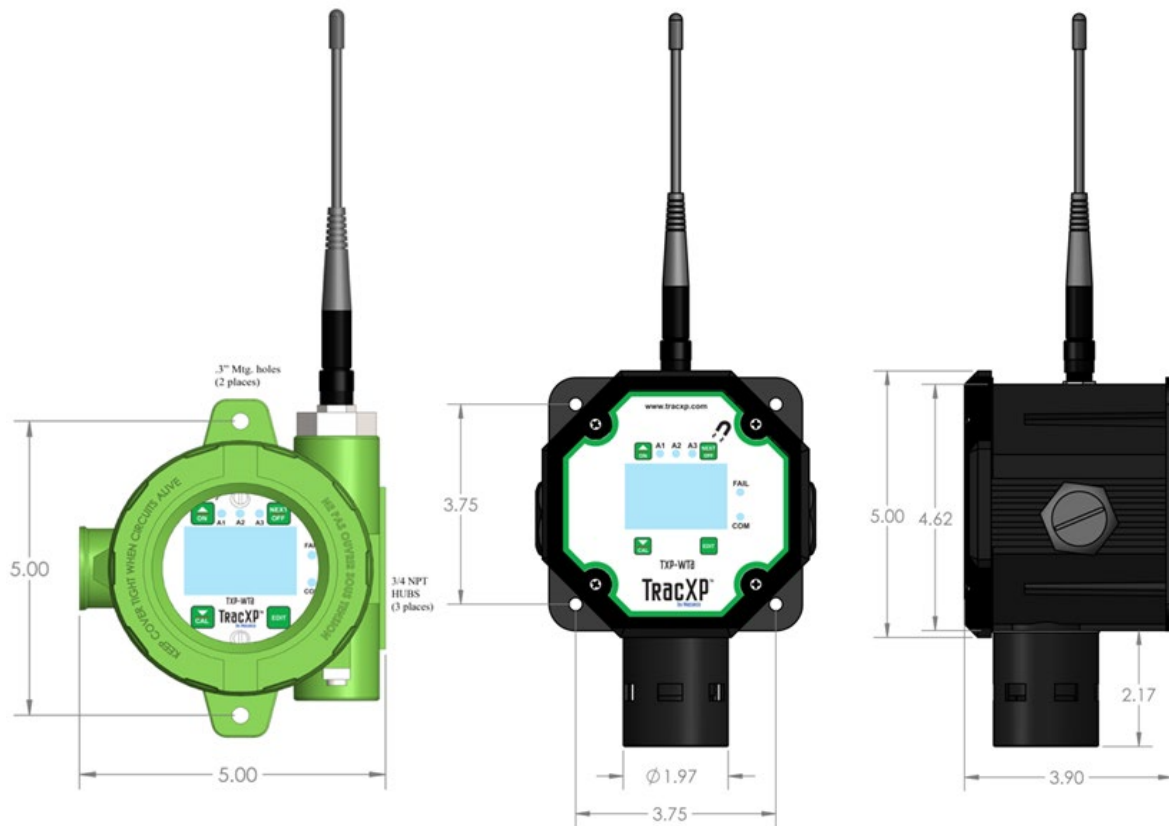


Figure 5-1 – Mounting Diagrams (Aluminum and Polycarbonate Enclosures)

### 5.3.1 Magnetic Mount Option

TracXP offers a magnetic mounting option which includes two magnets affixed to the pre-drilled mounting holes securely attaching the transmitter to a solid steel structure.

#### Magnet Specifications

- Aluminum Enclosure
  - Diameter: 2" - 2.5"
  - Pull Strength: 125 to 250lb
  - Screw Size: 3/8" or .375" max.
  - Magnetic Mount Kit for Aluminum Enclosure PN: 83-7000-0001-00
- Poly Enclosure
  - Diameter: 1.4" – 1.5"
  - Pull Strength: 60 to 70lb
  - Screw Size: #10/32 x 3/4" Nominal
  - Magnetic Mount Kit for Poly Enclosure PN: 83-7000-0003-00

NOTE: All other magnets of varying dimensions and pull strength are not approved until tested and verified by TracXP.



Figure 5-2 – Sensor Transmitter Magnetic Mount Option

## 5.4 Antenna Transmission Range

The distance radio signals can travel is dependent upon several factors including:

- Antenna Design
- Transmitter Power
- Free-space Losses

In order for a wireless link to work, the available system operating margin (TX power - RX Sensitivity + Antenna gains) must exceed the free-space loss and all other losses in the system. For best RF line-of-site, the combined height of both antennas must exceed the Fresnel Zone diameter.

Distance Between Antennas	Fresnel Zone Diameter	Freespace Loss (dB)
1000 ft. (300 m)	16 ft. (4.9 m)	81
1 Mile (1.6 km)	32 ft. (9.7 m)	96
5 miles (8 km)	68 ft. (20.7 m)	110

Example:

A 2.4 GHz TracXP system has following parameters:

- RF TX power setting = 21 dBm (125 mW)
- RF RX sensitivity = -95 dBm (this is a constant)
- Antenna gain (standard equipped rubber collinear) = 7dBi x 2 = 14dBi

The system operating margin is  $21 - (-95) + 14 = 130$  dBm. This is enough to transmit 5 miles if free space was the only loss in the system. For this to be the case, the antennas must be mounted with a combined height greater than 68ft above all obstructions (including the ground) to keep the Fresnel zone clear. In practice, however, there are many losses in the system besides just Free-space and it is recommended there be at least 20dB extra system operating margin.

RF “Rules of Thumb”:

- Doubling the range with good RF “Line of Sight” (LOS) requires an increase of 6 dB.
- Doubling the range without good RF LOS requires an increase of 12 dB.
- Doubling the power increases dBm by 3.

#### 5.4.1 Antenna Selection & Location

**NOTE:** A site survey using test radios is highly recommended.

It is important to ensure that the area surrounding the proposed location of the antenna is clear of objects that may affect the antenna's performance and efficiency, such as:

- Other Antennas
- Trees
- Powerlines

It is also vital that you ensure the support structure and mounting arrangement is adequate to support the antenna under all anticipated environmental conditions.

**NOTE:** The choice of appropriate mounting hardware is also important for both minimizing corrosion and maintaining site intermodulation performance.

Most installations with ranges under 1,000 feet require only the standard equipped rubber antennas as shown in Figure 4-3. Distances up to 2 miles may be achieved by equipping the TXP-WTA Sensor Transmitter with a YAGI directional antenna aimed toward a mast mounted fiberglass omnidirectional antenna at the controller and/or wireless relay base station.

**NOTE:** Always minimize obstructions between the TXP-WTA Sensor Transmitter and the controller or wireless relay base station antenna.

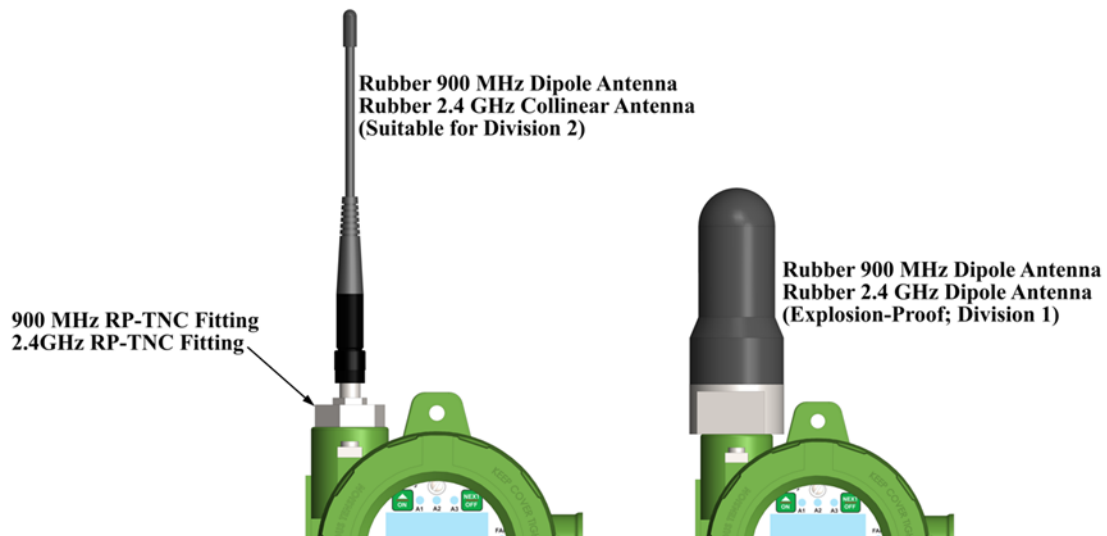


Figure 5-3 – Local Antennas

#### 5.4.2 System Grounding

Direct grounding of the TXP-WTA Sensor Transmitter enclosure via a good electrical connection to a well-designed grounding system is essential. This will protect your system, reduce the damage that can occur during lightning strikes and reduce noise.

## 6 Operating Instructions

### 6.1 Using the Magnetic Keypad

Each TXP-WTA Sensor Transmitter is supplied with an 83-700N-0000-00 (AL and SS) or 83-700M-0000-00 (Poly) magnetic wand for non-intrusive magnetic keypad operation.

Keys are identified as UP, DOWN, NEXT and EDIT and function similar to touch keys except a “swiping” motion of the magnet is used instead of pressing a key.

In this manual, a “swipe” means:

1. Place the magnet against the enclosure’s glass cover above the key and pull it away in the same motion.
2. Each “swipe” equals one press of the key.

NOTE: In the following procedure “Swiping” the magnet is a Momentary hold. It’s like using the magnet to “Press & Release” a button. Be careful not to “swipe” too close to one of the other keys and activate it by mistake.

To modify a menu item:

1. Using the UP and DOWN keys to move the selector arrow on the left side of the display next to the item to be edited.
2. Swipe the EDIT key to display the flashing cursor below the letter/number to be edited.
3. Swipe UP/DOWN to change that character to the desired letter/number.
4. Swipe NEXT to move the cursor to the next letter/number to be edited.
5. After you are finished entering all the letter/numbers needed, swipe EDIT to save the changes and exit the edit text mode.



Figure 6-1 – Magnetic Wand

NOTE: There are two different magnetic wands available (83-700N-0000-00) and (83-700M-0000-00). Although they will both function on the TracXP units, it is best to use the same magnet type that was received with your product.

### 6.2 Cycling Sensor Transmitter Power On / Off

It is not necessary to remove the non-intrusive enclosure’s cover to cycle power ON or OFF. If the LCD readout is blank the TXP-WTA Sensor Transmitter is OFF.

POWER ON – Apply Power

1. Hold the magnet over the UP key in the upper left front panel for a few seconds
2. When the LCD shows Release Key, pull the magnet away and power will remain ON.

POWER OFF – Disengage Power

1. Hold the magnet over the NEXT key in the upper right front panel.
2. When the LCD shows EDIT to Accept, swipe the magnet over the EDIT key and power will turn OFF.

## CAL Mode – Routine Calibrations

NOTE: Calibration is the most important function for ensuring correct gas readings at the TXP-WTA Sensor Transmitter.

The CAL MODE (flow chart shown in Figure 5-3) is designed to make calibration quick, easy and error free. A successful ZERO and SPAN calibration requires only four keystrokes. CAL MODE is always followed by an adjustable CAL PURGE time period (see Section 8.2.2). CAL PURGE holds the output at a safe value to prevent alarms being tripped by the upscale span calibration gas.

Follow these TXP-WTA Sensor Transmitter calibration guidelines:

- Calibration accuracy is only as good as the calibration gas accuracy. TracXP recommends calibration gases with NIST (National Institute of Standards and Technology) traceable accuracy to increase the validity of the calibration.
- Do NOT use Cal Gas that has been stored for extended periods of time in temperatures outside of the specifications printed on the label (example: in a hot vehicle). This can reduce the level of H<sub>2</sub>S in calibration gas significantly, for example.
- Do not use a gas cylinder beyond its expiration date.
- Always calibrate a sensor before installation.
- After applying gas, allow the reading to stabilize before span calibration. (usually 2 minutes)
- Calibrate on a regular schedule. (TracXP recommends once every 3 months, depending on atmospheric conditions, exposure to target gas, poisons and contaminants.)
- Calibrate only in a clean atmosphere, which is free of background gas.

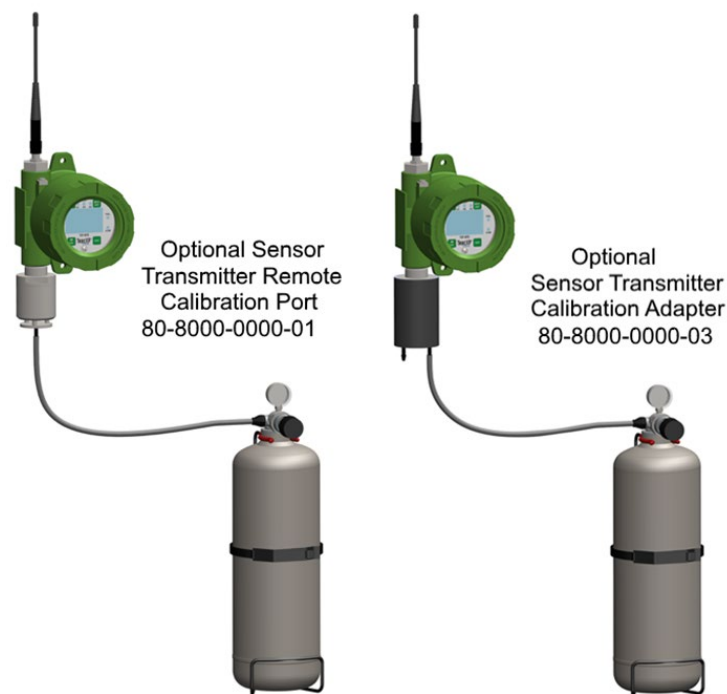


Figure 6-2 – Calibration Gas Input



Use the following step-by-step procedure to perform ZERO and SPAN calibrations.

NOTE: During TXP-WTA Sensor Transmitter calibrations, alarms are inhibited and “CAL MODE” is displayed on the controller.

A gas reading is usually considered “STABLE” when there is no change in the reading for minimum of 30 seconds.

1. To enter the CAL MODE from normal operation, swipe the CAL / DOWN key and within 5 seconds swipe the EDIT key.
2. Using the Cal-Cup (80-8000-0000-03) apply a clean ZERO gas or be sure there is no background target gas in the monitored area. After the reading is stable swipe the EDIT key to perform a ZERO calibration.
3. If the ZERO calibration is successful, the sensor automatically enters Span Cal Mode.
4. Apply the correct SPAN gas at .5 liters/min. After the reading is stable swipe the EDIT key to perform a SPAN calibration.

WARNING: THE SPAN GAS USED MUST MATCH THE VALUE SPECIFIED SINCE THIS IS WHAT THE SENSOR TRANSMITTER WILL INDICATE AFTER A SUCCESSFUL SPAN CALIBRATION THE CAL SPAN VALUE MUST BE EDITED IF IT BECOMES NECESSARY TO APPLY A DIFFERENT GAS CONCENTRATION (SEE SECTION 7.2.6).

5. If the SPAN calibration is successful, the display flashes “REMOVE CAL GAS” and starts the CAL PURGE delay (see Section 8.2.2).

NOTE: During CAL PURGE, toxic TXP-WTA Sensor Transmitters transmit a 0% of Full Scale (No Gas) reading to the TXP-WCR Controller to prevent alarms by residual upscale SPAN values. Oxygen TXP-WTA Sensor Transmitters transmit a 20.9% oxygen reading during CAL PURGE to avoid tripping low oxygen alarms. These levels are transmitted until the WTA finishes CAL PURGE.

6. CAL MODE is complete after the end of the CAL PURGE delay.

The flow chart in Figure 5 3 illustrates the above procedure from left to right.

- UP, CAL, NEXT & EDIT labels indicate keystrokes using the magnetic wand.
- The CAL MODE information screen (top of the chart) is available for advanced users to see Offset / Gain calibration constants and live analog to digital converter (A/D) counts. Span Gas calibration values may also be edited from this screen.
- Holding the UP key, for 6 seconds during CAL MODE, displays this screen.

NOTE: The sensor life is displayed on the last screen view before returning to the home screen.



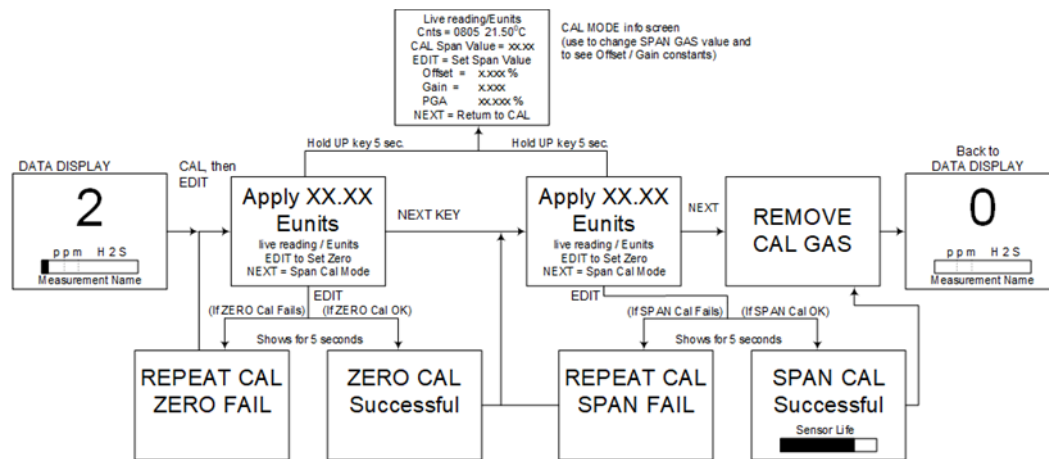


Figure 6-3 – Cal-Mode Flow Chart and Menus

### 6.3 Alarm Operation

All alarm decision making is done by the TXP-WTA Sensor Transmitter with the results broadcast to the controller and/or wireless relay. TXP-WTA Sensor Transmitters have five front panel LEDs to indicate: Alarm 1, Alarm 2 and Alarm 3, FAIL and COM (communication).

- Alarm LEDs only flash during alarm events to conserve battery life.
- Low Battery is indicated by an icon on the LCD and by flashing the FAIL LED.
- ONLY LEVEL ALARMS (A1, A2, A3) INCREASE WIRELESS BROADCASTS TO EVERY 6 SECONDS!
- Alarms may be set to trip upon increasing and decreasing readings (see Section 7.3.3).

#### 6.3.1 Understanding Fail Alarm Operation

The FAIL alarm indicates system related problems, such as:

- missing sensor
- sensor failures
- inability to synchronize to the Server, and excessive negative readings

The Fault Alarm Menu described in Section 7.3 allows setting how far below zero (negative) the reading may fall prior to tripping the FAIL alarm.

**CAUTION:** MISSING OR FAILED SENSORS ALWAYS TRIP THE FAIL ALARM. FAIL ALARM CONDITIONS DO NOT CAUSE THE RADIO BROADCAST RATE TO INCREASE TO 6 SECONDS.

#### 6.3.2 Low Battery Condition

The nominal battery voltage is 3.6 volts.

TXP-WTA Sensor Transmitters trip their Low Batt alarm at < 3.3 volts. This causes the Low Batt icon to appear in the upper left corner of the display and the Fail LED to flash.

At 3.2 volts, the TXP-WTA Sensor Transmitter enters the Replace Battery mode.

In Replace Battery mode:

- There may not be sufficient power to transmit a signal to the controller and/or wireless relay it is connected to, which will most likely result in a Comm Error (see Section 3.2).
- The TXP-WTA Sensor Transmitter will alternate, every six seconds, between the Replace Battery Screen (Figure 5 4) and the screen which was previously being monitored.

NOTE: The TXP-WTA Sensor Transmitter will continue in this manner until the battery is replaced (see Section 3.3) or the battery no longer carries a sufficient voltage to power the unit.

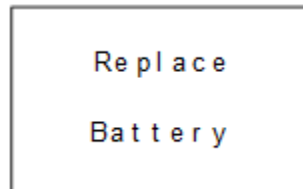


Figure 6-4 – Replace Battery Screen

## 6.4 Smart Sensor Modules

Each TXP-WTA Sensor Transmitter may be supplied with either one, or two, Smart Sensor Modules:

- Mounted locally to the TXP-WTA Sensor Transmitter enclosure,
- up 15 feet away with the Sensor Separation Kit.

Smart Sensor Modules utilize a unique Smart Sensor Interface to transfer necessary configuration parameters from the smart sensor's memory to the TXP-WTA Sensor Transmitter whenever a new sensor is installed. The "Smart Sensor Info" screen appears at:

- power up,
- anytime a sensor module is removed and installed again.

NOTE: If a sensor module is installed that does not match gas type of the previous sensor, the operator must manually approve the new sensor for the TXP-WTA Sensor Transmitter to accept the new gas type (Figure 5 4).

Local TXP-WTA Sensor Transmitters have a smart sensor module cable connected to S1 (Channel 1) and/or S2 (Channel 2) of the Battery Board (see Figure 3 2).

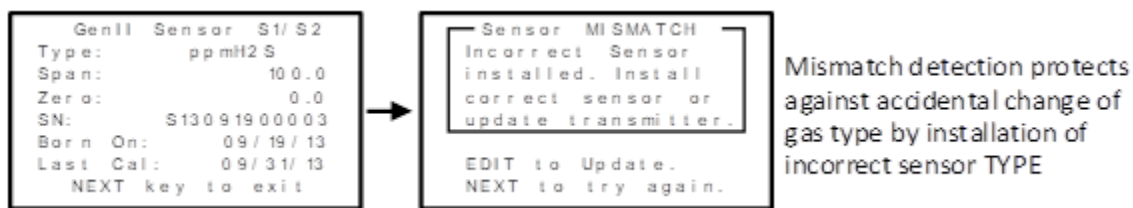


Figure 6-5 – Smart Sensor Info / Error Screen

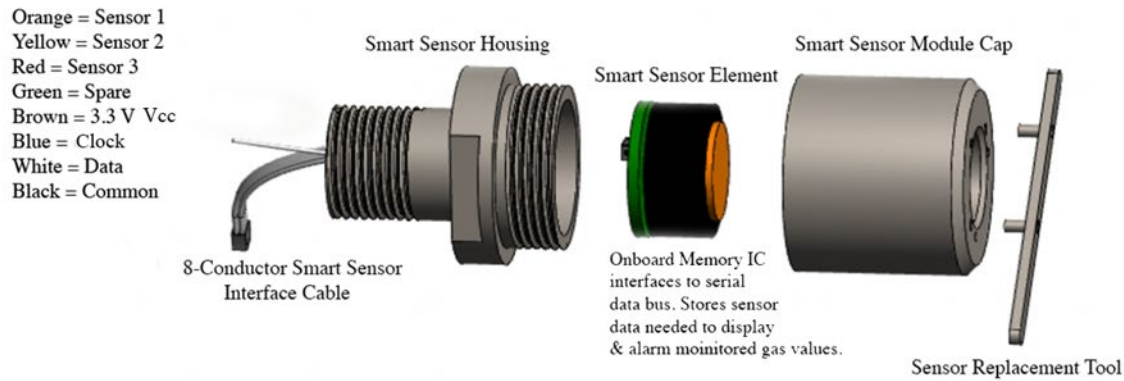


Figure 6-6 – Smart Sensor Module (80-8000-00A0-10)

#### 6.4.1 Sensor Separation Kit

Smart Sensor Modules may be remote mounted up to 15 feet using the Sensor Separation Kit connected to TB1 or TB2 of the Battery Board (see Figure 3 2). The Sensor Separation Kit comes with 15 feet of data cable and assures proper communication over the Smart Sensor Interface.

NOTE: Alternate cable types and longer distances are not approved and may result in poor performance.

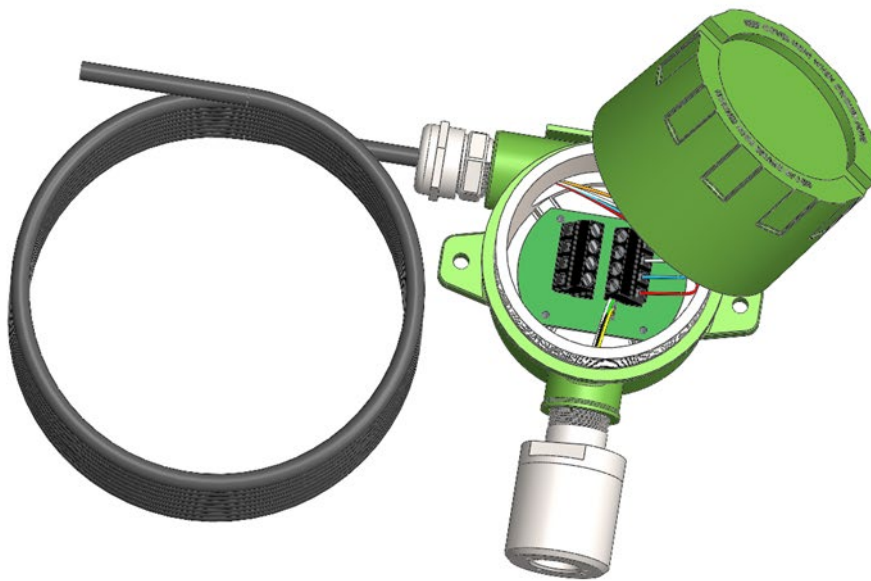


Figure 6-7 – Sensor Separation Kit

## 7 Setup Menus

### 7.1 Menu Structures

Sensor transmitter configuration parameters are stored in its non-volatile menu database.

To access menus, swipe the EDIT key from any data display.

The menu database displays the Main Menu with a path to Channel 1, Channel 2, Device Setup and Help Menus.

- Channel 1 and Channel 2 have two separate but identical menu structures which determine how readings and alarms function for each channel.

Menus contain nominal default values from the factory which may be edited by the operator to better match the application.

Chapter 7 is dedicated to describing Channel Menus.

Device Setup contains menus not pertaining to either channel but to the unit as a whole, including:

- Security
- Clock/Calendar
- Delays
- Wireless Networking Communication

Chapter 8 is dedicated to describing Device Setup Menus.

Main Menu

### 7.2 Main Menu

The Main Menu screen is shown in Figure 6 1. The UP/DOWN keys maneuver the pointer while EDIT enters sub-levels of menu items. All Main Menu items have at least one page of sub-menus indicated by the > symbol (right hand pointing arrow) at the end of each line. Change a menu item by:

1. Swipe UP/DOWN key so that the arrow on the left is pointing to the desired menu item.
2. Swipe the EDIT key to display the cursor.
3. Swipe UP/DOWN to change that character.
4. Swipe NEXT to advance the cursor.
5. Swipe EDIT again to load the new item and remove the cursor.
6. Swipe NEXT to reverse out of the sub-menu.

The Main Menu is the pathway to Channel 1 / 2 Menus, Device Setup Menus and the Help pages.

NOTE: A channel should only be activated if it has a sensor connected to the Battery Board. The Device Setup group contains parameters affecting the entire TXP-WTA Sensor Transmitter regardless of channel.

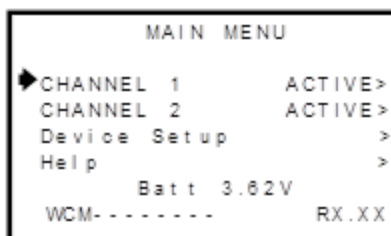


Figure 7-1 – Main Menu

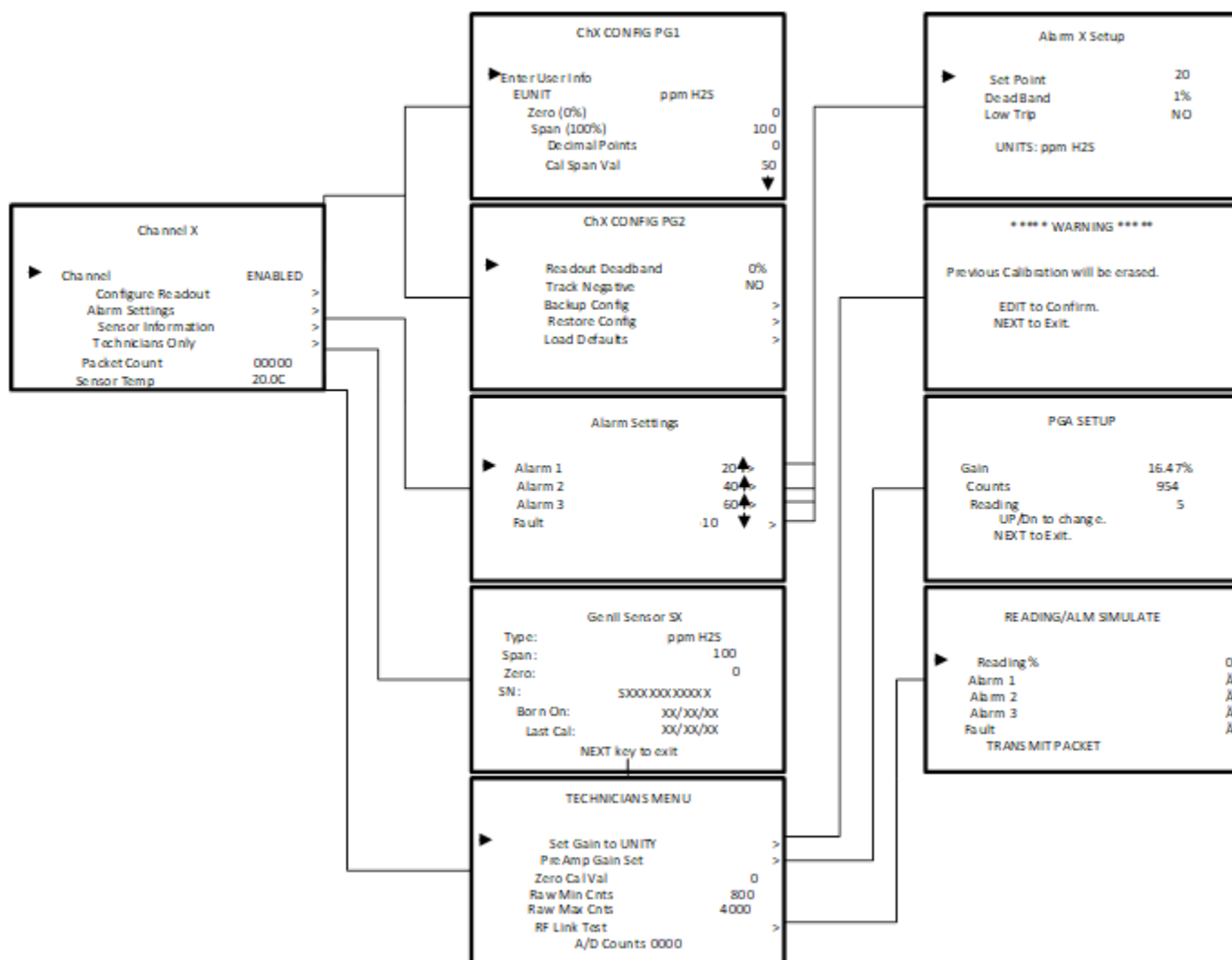


Figure 7-2 – Channel Configuration Menu Tree

## 8 Channel Setup Menus

The Channel 1 / 2 Menus accessed from the Main Menu are shown in Figure 7 1.

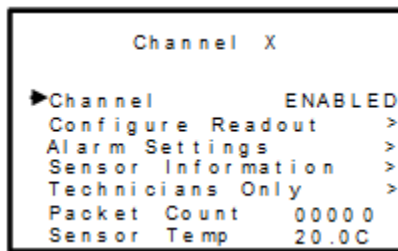


Figure 8-1 – Channel Setup Menus

### 8.1 Channel Enable / Inactive

Use the top menu in the group to make this channel either “ENABLED” or “INACTIVE”.

NOTE: Channels should only be activated if a sensor is connected (see Section 5.5).

### 8.2 Configure Readout

The Configure Readout group shown in Figure 7 2 has 2 pages of menus for controlling how sensor signals are displayed and how alarms are activated for this channel.

NOTE: Backup Config. and Load Defaults are used if there is an issue with the wireless system. These features allow the user to back-up the Smart Sensor or restore the smart sensor element to factory defaults (see Section 7.2.9).

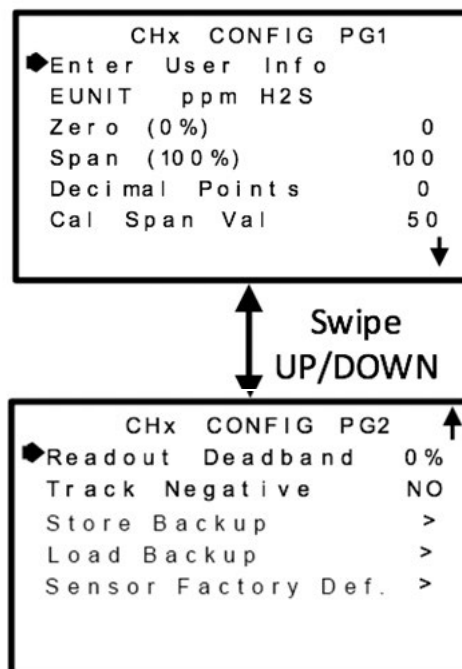


Figure 7-2 – Configure Readout Setup Menus

### 8.2.1 Measurement Name

The Measurement Name field may be edited to contain virtually any 16-character ASCII string. It is typically used to describe the monitored point by user tag # or other familiar terminology.

### 8.2.2 EUnit

Eunit (engineering unit) may have up to a 10-character ASCII field and is used to clearly identify the target gas and units of measure such as %, ppm or ppb.

### 8.2.3 Zero (0%)

Zero (0%) defines the reading to be displayed when the monitored value = 0% of full scale.

### 8.2.4 SPAN (100%)

Span (100%) defines the reading to be displayed when the signal = 100% of full scale. The highest numeric reading allowed is 9999 including negative polarity sign and one decimal point. Polarity is only indicated for negative readings.

### 8.2.5 Decimal Points

Decimal Points determine the resolution of the LCD readings, and may be set to 0, 1 or 2 decimal points. Example: ZERO readings for 0, 1 & 2 DPs respectively are 0, 0.0 and 0.00.

### 8.2.6 CAL Span Val

Cal Span Val sets the upscale gas value that must be applied when performing Span calibrations. This is typically at least 50% of the full-scale range. Calibration accuracy is dependent on this setting matching the value of target gas in the span gas cylinder used during routine Span calibrations (see Section 5.3).

### 8.2.7 Readout Dead Band

Readout Dead band allows forcing low readings to continue to read zero. This is useful when there are very small, safe, levels of background target gas that cause fluctuating readouts above zero. The highest amount of dead band allowed is 5% of the full-scale range. Example: If the range is 0 – 10.0 ppm, setting Dead band to 3% would mean the readout continues to display 0.0 until the value exceeds .3 ppm.

### 8.2.8 Track Negative

Track Negative, set to NO, causes negative values to read the Zero (0%) value in data displays. The CAL MODE readout will display negative values regardless of this setting. Negative values below the Fault set point will still cause the Fault alarm to trip (see Section 5.4.1).

### 8.2.9 Backup Config

Backup Config allows users to store the Channel Menu parameters into non-volatile memory for restoration later, if incorrect values are accidentally entered or uploaded.

### 8.2.10 Restore Config

Restore Config restores the Channel Menu database to the values from the most recent Backup Config. The special keystroke sequence of 4 consecutive UP keys is required to perform the Restore operations.

### 8.2.11 Load Defaults

Users are encouraged to modify the Channel parameters described in this section when it helps tailor the TXP-WTA Sensor Transmitter to their project. However, at some point it may be desirable to return all of these settings to

their original factory defaults values. Each smart sensor has a protected database containing a copy of the original factory default values which the TXP-WTA Sensor Transmitter user cannot modify.

NOTE: The Load Defaults Menu retrieves these original factory default values from the smart sensor and repopulates all Channel Menus to match.

### 8.3 Alarm Settings

The Alarm Settings page includes the Alarm 1, 2, 3 and Fault Menus shown in Figure 7 3. Alarm conditions are indicated by “A1”, “A2”, “A3” and “FAULT” LCD icons on data displays and by flashing the A1, A2, A3 and FAIL LED’s. The FAIL LED also flashes if the TXP-WTA Sensor Transmitter detects a missing or defective sensor. Up or Down pointing arrows indicate if the alarm is set for a high or low trip respectively.

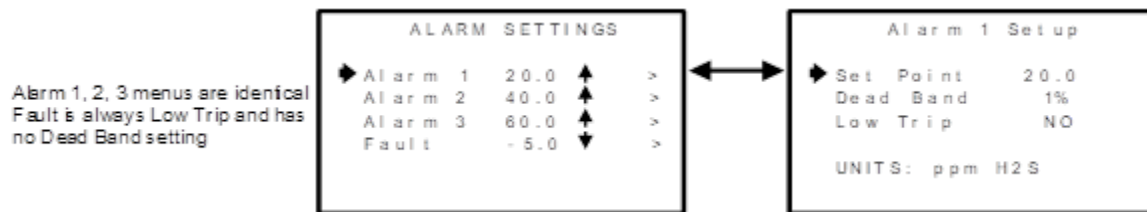


Figure 8.3 – Alarm Settings Menus

#### 8.3.1 Set Point

Set Point enters the Eunit value where the alarm trips. The Fault Set Point may only be set for negative values between 0% and -10% of range and is always Low Trip. This makes it function as a FAULT alarm and trip when the monitored value is out-of-range negative.

#### 8.3.2 Dead Band

Dead Band for A1, A2 and A3 have a minimum value of 1% and a maximum value of 10%. Dead Band is useful for preventing alarm cycling when the monitored value is hovering around the set point.

EXAMPLE: With a range of 0-100 ppm, if Dead-Band equals 5% and the set point is 20 ppm, after tripping at 20 ppm the value must drop below 15 ppm to reset. Dead Band for the Fault alarm is fixed at 1%.

#### 8.3.3 Low Trip

Low Trip for A1, A2 and A3 set to YES causes the alarm to trip as the value falls below the set point. The Fault alarm is always a Low Trip.



## 8.4 Sensor Information

The Sensor Information page shown in Figure 7 4 displays important values for the Smart Sensor installed. The TXP-WTA Sensor Transmitter Smart Sensor interface automatically detects new Smart Sensor Modules and updates this page any time a new sensor is installed.

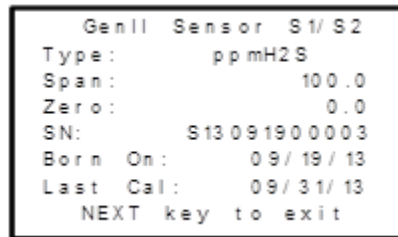


Figure 8-4 – Smart Sensor Module Information Screen

NOTE: Type, Span, Zero, SN (Serial Number) and Born On date are set at the factory and may not be modified.

- Type indicates what kind of sensor is plugged into this TXP-WTA Sensor Transmitter channel.
- Span / Zero indicate the nominal gas range for this sensor but not necessarily what the user's range must be. For example, the nominal Span of an H2S sensor might be 100 ppm but the user may decide to set his TXP-WTA Sensor Transmitter Span for only 50 ppm. See Preamp Gain Section 8.5.2 to learn how to set the TXP-WTA Sensor Transmitter span for a different range than the Smart Sensor's nominal Span.
- Born On Date shows when the sensor was originally configured at the factory.
- Last Cal date updates each time the CAL MODE is performed (see Section 6.3).

## 8.5 Technicians Only

**WARNING: USERS OF THESE MENUS MUST HAVE A DETAILED UNDERSTANDING OF THEIR FUNCTIONS. MONITORING OF TARGET GASES, PROCESSING OF ALARMS, AND WIRELESS COMMUNICATIONS SHOULD NOT BE RELIED UPON WHILE EDITING THESE MENUS! BACK UP THE CURRENT CONFIGURATION PRIOR TO ALTERING ANY TECHNICIAN MENUS IN CASE RESTORE IS REQUIRED LATER (SEE SECTION 8.2.10).**

The TECHNICIAN ONLY Menu group in Figure 8-5 contains items that are factory configured depending upon the type of sensor input connected to the TXP-WTA Sensor Transmitter. They should not be tampered with after installation. If configured incorrectly, some items will prevent accurate monitoring of target gases. Access requires a special key sequence of four consecutive UP keystrokes to prevent accidental modification of critical items.

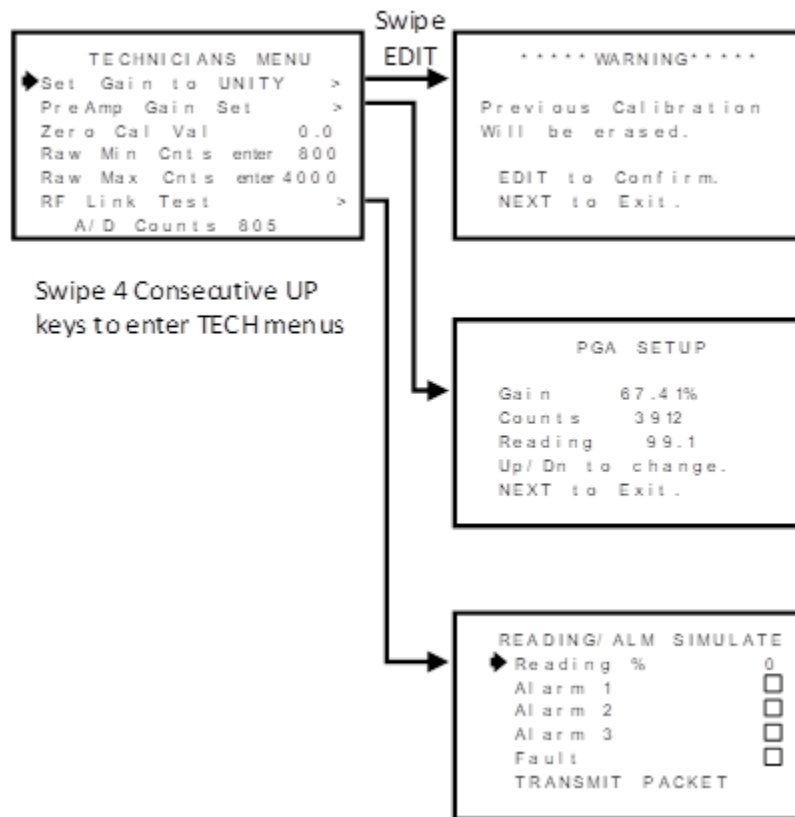


Figure 8-5 – Technicians Menu Tree

#### 8.5.1 Set Gain to Unity (TECHNICIANS ONLY!)

Set Gain to UNITY allows resetting previous calibration OFFSET to zero and GAIN to one. This is the definition of UNITY. A calibration should be performed after setting UNITY (see Cal Mode Section 5.3).

#### 8.5.2 PreAMP Gain Adjust (PGA) (TECHNICIANS ONLY!)

Gas sensors have a very wide output signal range, across the many gas types, and there are several full-scale ranges for each type. Preamp Gain is the adjustment that matches the sensor element's signal range to the Smart Sensor's input signal conditioning circuits.

The Preamp Gain value is saved into non-volatile memory on the Smart Sensor module. Altering the Preamp Gain automatically resets previous calibration OFFSET and GAIN values to UNITY as described in see Section 7.5.1.

If it is determined the Preamp Gain value is incorrect:

1. Apply the desired up-scale target gas value to the sensor.
2. Use the UP/DOWN keys to obtain the correct Reading value.

NOTE: Counts are the 12-bit binary A/D value with an active range value of 800 – 4000 for 0-100% of full scale.

Example Scale:

Counts	800	1200	1600	2400	4000
% of Scale	0	25	50	75	100

CAUTION: FOR STANDARD INSTALLATIONS THIS IS A FACTORY ADJUSTMENT. DO NOT USE THE PREAMP GAIN MENU FOR CALIBRATING SENSORS. IT SHOULD ONLY BE ADJUSTED IF A NEW MEASUREMENT GAS OR INPUT RANGE IS REQUIRED.

#### 8.5.3 ZERO CAL VALUE (TECHNICIANS ONLY!)

The Zero Cal Value Menu entry allows the zero-calibration value to be set for something other than a zero reading. In rare cases, it may be necessary to perform Zero calibrations at some other engineering unit reading than zero.

**IMPORTANT! DO NOT EXCEED 25% OF FULL SCALE.**

#### 8.5.4 RAW MIN / MAX COUNTS (TECHNICIANS ONLY!)

The Raw Min / Max Counts Menus determine the range of 12-bit analog to digital (A/D) converter counts that define 0 and 100% of full scale. The default range is 800 – 4000 counts. Raw Min A/D counts create 0% readings, and Raw Max A/D counts create 100% readings.

The corresponding Zero 0% and Span 100% readouts that appear on data displays are entered in the Channel Configuration Menu described in see Sections 8.2.3 and 8.2.4. Live A/D count input values may be viewed on the Preamp Gain screen and the CAL MODE Information screens described see Sections 8.5.2 and 8.5.3.

#### 8.5.5 RF LINK TEST (TECHNICIANS ONLY!)

The RF LINK TEST shown in Figure 7 6 is a diagnostics tool which allows readings of 0%, 25%, 50%, 75% or 100% of the full-scale range to be broadcast to any controller and/or wireless relay on the same network. Alarms may also be sent by filling the check box.

After the menu is ready:

1. Point to the TRANSMIT PACKET Menu.
2. Swipe the EDIT key—the broadcast is made every time the EDIT key is swiped.

NOTE: RF LINK TEST is very useful for troubleshooting and testing a new installation.

**IMPORTANT! WTC & WAR RELAYS DO ACTIVATE IF ALARMS BOXES ARE CHECKED!**

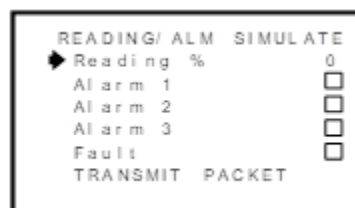


Figure 8-6 – RF Link Test

#### 8.5.6 Sensor Comp Table (TECHNICIANS ONLY!)

Signals from electrochemical sensor elements used in TXP-WTA Sensor Transmitter Smart Sensor modules may be affected by temperature extremes. Sensor transmitter Smart Sensor Modules are equipped with an on-board temperature sensor which TXP-WTA Sensor Transmitter temperature of the sensor element.

Sensor types have a matching Temperature Compensation profile which is stored with each Smart sensor in the table shown in Figure 7 7.

To view the hidden TEMP COMP TABLE:

REV – 1.3

[34-2900-0207-4 ]

35 | Page

1. Access the TECHNICIANS MENU.
2. Hold the DOWN key until the table appears.

S1 TEMP COMP TABLE	
► Data Point	20.0C
Gain	1.000
% Offset	0.000
<hr/>	
Comped	0.0
Un Comped	0.0
Sensor Temp	23.5C

Figure 8-7 – Temperature Compensation Table

The temperature Data Points scroll by in 10-degree C increments from -40C to + 60C with each swipe of the EDIT key.

Each Data Point has an associated Gain and Offset value. Electrochemical sensors may be less sensitive to the target gas at lower temperatures than at higher temperatures and therefore require higher gain when cold and less gain when hot. To accomplish this, Temp Comp Table Gain is typically 1.000 at 20C and increases gradually at the colder Data Points and decreases at warmer. Some sensors may also have a shift in zero output at extreme temperatures.

The Offset values add or subtract in % of full scale using the following formula:

- $\text{Gain (Uncomped - Offset) = Comped.}$

NOTE: The Offset values entered with a negative number add to the reading. Sensor Temp is a live readout from the current temperature of the sensor element.

## 8.6 Packet Count

Packet Count appears at the bottom of the Channel 1 / 2 Menus. Packet Count is a 5-digit decimal number indicating the number of transmissions the TXP-WTA has transmitted since the counter was last reset (up to 65,535 transmissions).

NOTE: This is a useful diagnostic tool for comparing how many times the TXP-WTA Sensor Transmitter transmits to the number of transmissions received by controllers over a period

When the TXP-WTA Sensor Transmitter is in dual channel mode, each channel will display the number of transmissions for that channel independently, on its respective channel menu (Figure 8-1).

To reset the TX Counter:

1. Move the cursor to the Packet Count line and select EDIT, or
2. Cycle power to the TXP-WTA Sensor Transmitter.

## 8.7 Sensor Temp Reading

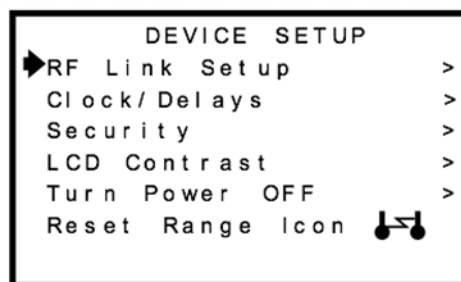
The last item on the Channel Menu page is a live reading of the Smart Sensor Module's temperature. This reading is used if the sensor element requires temperature compensation (see Section 8.5.6).

## 9 TXP-WTA Device Setup Menus

The Device Setup group shown in Figure 8 1 contains parameters affecting the entire TXP-WTA Sensor Transmitter regardless of channel.

These parameters include:

- RF Network Communication Setup
- Time/Date & Warmup/Purge Delays
- Security Level, Pass Code & Contact Name or Number
- Display Contrast
- Power Off
- Reset Range Icon that indicates a previously Out of Range instance



The "Reset Range Icon" menu only appears if the WTA was out of range of the Server during a previous broadcast attempt. To reset the Range Icon select the Reset Range Icon option.

Figure 9-1 – Device Setup Menus

### 9.1 RF Link Setup

RF LINK SETUP provides access to a group of menus for configuring how the TXP-WTA Sensor Transmitter broadcasts its data to the TracXP wireless network. Items tagged with an asterisk affect power consumption and battery life.

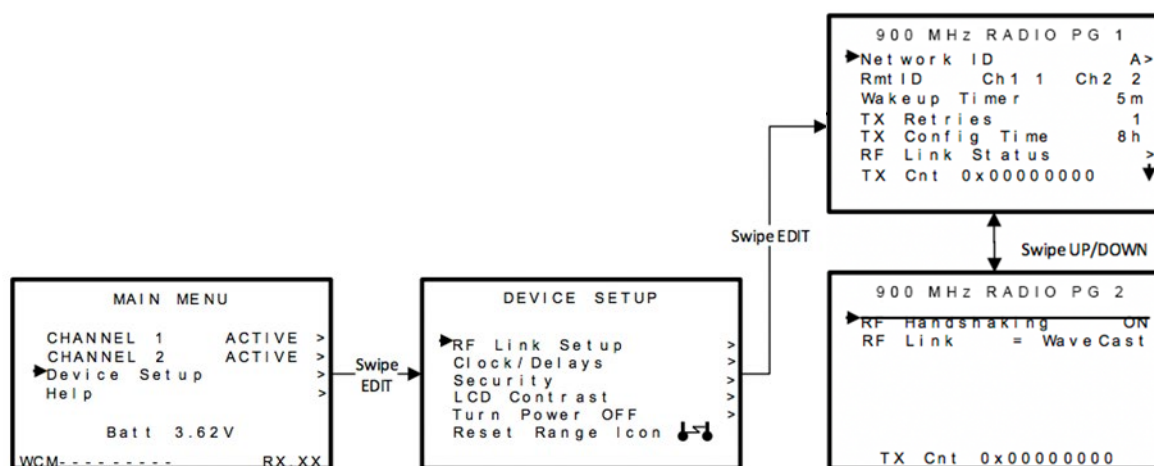


Figure 9-2 – RF Link Setup Menu

#### 9.1.1 Network ID

TracXP devices utilize the Network ID setting to assign 1 of 26 unique hopping patterns.

TracXP devices utilize 26 unique Network ID settings ranging from 'A' to 'Z'.

A TXP-WTA Sensor Transmitter will not indicate Server In-Range status or communicate with any controller and/or wireless relay operating on a different Network ID. This feature allows a maximum of 26 TracXP wireless systems to be located within communication range of each other without interference.

Networks M through Z are encrypted networks. When one of these networks is selected, the data will be encrypted via proprietary methods to ensure that only devices on that network, which hold the encryption key, will be able to decipher the data being transmitted.

**IMPORTANT!** Explore what frequencies are appropriate for the final location of any wireless system.

#### 9.1.2 RMT ID (Remote ID)

TracXP wireless systems allow up to 32 RTU's (Remote Transmitting Unit's) per network.

**IMPORTANT!** Dual sensor TXP-WTA Sensor Transmitters have two RMT IDs and they are always consecutive.

For example, setting Sensor 1 of a dual WTA to RMT ID 05 will automatically set Sensor 2 to RMT ID 06. The WTA RMT ID numbers are used by the controller and wireless relay to control which channels the sensor readings are displayed on, and how its relays are tripped.

**NOTE:** It is not necessary for TXP-WTA Sensor Transmitter RMT IDs and controller channel numbers to match.

A separate menu on the controllers and/or wireless relays allow for random matching of channel numbers to TXP-WTA Sensor Transmitter RMT IDs. This is useful for creating “zones” where TXP-WTA Sensor Transmitters with the same gas type may be displayed on consecutive controller and/or wireless relay channels.

#### 9.1.3 \*Wakeup Timer

The Wakeup Timer Menu determines how often the TXP-WTA Sensor Transmitter broadcasts its data when there is no A1, A2 or A3 LEVEL ALARM. Active alarms override the Wakeup Timer and schedule broadcasts 6-seconds after each previous broadcast. The Wakeup Timer range is 1 minute – 5 minutes with 5 minutes being the default value.

**NOTE:** Broadcast intervals will actually be a few seconds longer than the value entered since the TXP-WTA Sensor Transmitter radio module must be powered up and achieve Server In-Range status prior to broadcasting.

**IMPORTANT:** More frequent RF broadcasts deplete the battery faster!

#### 9.1.4 \*TX Retries

The TX Retries Menu allows EVERY broadcast to be repeated up to 5 times with a 200mS delay between each repeated broadcast. Each repeated broadcast will appear as a separate blink of the TXP-WTA Sensor Transmitter's TX LED and the controller and/or wireless relays RX LED.

The default setting of 1 should only be increased if there is no other way to improve communications success. Increasing TX Retries may be a viable way to improve communications if there are other high- power RF radiators near TracXP antennas, and it is not possible to relocate the antennas. Power consumption increases with radio broadcasts, and battery life will be affected by raising the TX Retries setting.

Transmissions will perform as follows for the TX Retries settings:

1. TX Retries set to 1, 2 or 3: the TXP-WTA Sensor Transmitter automatically transmits one, two and three times respectively.

2. TX Retries set to 4: the TXP-WTA Sensor Transmitter transmits until an acknowledgement is received from the Server or four times, whichever comes first.
3. TX Retries set to 5: the TXP-WTA Sensor Transmitter transmits until an acknowledgement is received from the Server or five times, whichever comes first.

#### 9.1.5 \*TX Config Time

TX CONFIG TIME may be set from 0 to 18 hours and determines how often the TXP-WTA Sensor Transmitter broadcasts all of the CHANNEL CONFIG parameters to the controller and/or wireless relay.

Broadcasts normally include only monitored gas values and alarm status, but at least hourly, all configuration is sent to the controllers to assure identical readings at all locations. The configuration data is also broadcast automatically whenever any of these parameters are edited, or manually by holding the UP key until the display shows Release Key. This longer broadcast takes approximately 1 second to complete.

Setting TX Config Time to 0 means that the TXP-WTA Sensor Transmitter will not send the Channel Config parameters to the controller and/or wireless relay automatically.

To send these parameters to the controller and/or wireless relay:

1. Hold the magnetic wand on the UP key until the display shows Release Key, then release the key by pulling the magnet away.

#### 9.1.6 RF Link Status

RF Link Status opens another screen that shows if the TXP-WTA Sensor Transmitter is In-Range of the Server and what the battery voltage is currently. The radio remains active during this display so that the range status is displayed in real time. Battery voltage is also displayed on the MAIN MENU.

\* TX Retries (900 MHz and 2.4 GHz), RF Handshaking (900 MHz) and TX Power (900 MHz) Menu settings are available to improve communications reliability by increasing the quantity and power of wireless broadcasts.

**IMPORTANT!** Ensure proper selection and location of antennas before increasing TX Retries and TX Power settings. Battery life will be reduced by increasing these settings. Proper selection and location of antennas is more important to successful communications and will not sacrifice battery life.

#### 9.1.7 \*RF HANDSHAKING (900 MHz MODELS ONLY)

RF Handshaking must be OFF if there is more than one controller and/or wireless relay receiving TXP-WTA Sensor Transmitter broadcasts.

- The default OFF setting causes every TXP-WTA Sensor Transmitter broadcast to repeat 3 times in rapid succession (these appear as a single blink of the TX LED and are unrelated to TX Retries).
- The ON setting requests an Acknowledge, or, "Handshake" from the Server.

With RF Handshaking = ON, the TXP-WTA Sensor Transmitter broadcasts only once if the Acknowledge is received, and up to 3 times if an Acknowledge is not received.

**IMPORTANT!** THE ON SETTING ALLOWS MORE EFFICIENT COMMUNICATIONS BUT MUST ONLY BE UTILIZED WHEN BROADCASTING TO A SINGLE CONTROLLER OR WIRELESS RELAY CONFIGURED AS SERVER. MULTIPLE CONTROLLERS/WIRELESS RELAYS, LISTENING ON THE SAME NETWORK ID, WILL HAVE ACKNOWLEDGE DATA COLLISIONS IF THE SENSOR TRANSMITTER RF HANDSHAKING = ON.



RF HANDSHAKING = OFF may be used for any application. OFF is required when broadcasting to a controller and/or wireless relay configured as a Server with other controllers or wireless relays on the same network configured as Clients.

#### 9.1.8 \*RF LINK

The RF Link will change the mode in which the TXP-WTA Sensor Transmitter will communicate. The default setting is the Wavecast mode which is discussed in detail in Chapter 8. By selecting RF Link the mode may be changed to Legacy Mode, which is discussed Chapter 10.

#### 9.1.9 \*TX POWER (900 MHz MODELS ONLY)

TX Power (900 MHz models only) may be set for 10mW, 200mW, 400mW and 1 watt (EIRP based upon a 2 dBi antenna). Since TXP-WTA Sensor Transmitters are battery powered the TX Power setting should be as low as possible to sustain reliable communication. The maximum TX Power setting is 30db (1 watt) and each time TX power is reduced by half, antenna transmit power is reduced by 3dB.

NOTE: 1-watt operation is not recommended or necessary for most applications as it can cause an unnecessary load on the battery thereby significantly reducing battery life.

Under normal operations the TX Power cannot be set to 1 watt. If conditions exist that require TX POWER set to 1 watt, perform the following:

1. On page 2 of the 900mHZ Radio menu, swipe the down key until the selecting arrow is at the very bottom next to RF Link=....
2. Hold the magnetic wand on the up key until A1 & A3 LEDs flash, after about 5 seconds.
3. Now 1 watt is available for selection.

2.4 GHz variation: The TX Power Menu is not available in 2.4 GHz models and is fixed at 125mW conducted.

#### 9.1.10 TX CNT (TRANSMIT COUNTER)

TX Cnt. (Transmit Counter) appears at the bottom of the RF LINK page 1 and is an 8-digit hexadecimal counter that appears as 0x00000000. The highest count would be 0xFFFFFFFF, or 4,294,967,295 decimals. It is useful as a diagnostic tool for counting how many times the TXP-WTA Sensor Transmitter broadcasts over any given period.

To reset the TX CNT:

1. Hold the CAL/DOWN key when on the RF Link Setup Menu.

When in dual channel mode, this number combines the transmissions from each channel.

## 9.2 Clock, Warm up and CAL Purge Delays

The TXP-WTA Sensor Transmitter is equipped with a Real-Time Clock and Calendar, so Time and Date must be set to correctly match its location. They are set at the factory in a 24-hour format but may require adjustment to match the location's time and date after shipment.

Warm Up and Cal Purge time delays are also available to prevent unwanted alarm trips. Figure 8 3 shows the menu for these items.



### 9.2.1 Warm Up Timer

The WARMUP timer has a default setting of 60 seconds but may be between 0 – 254 seconds. The primary purpose of the warmup timer is to allow sensor stabilization after power up.

### 9.2.2 CAL Purge Timer

The CAL PURGE timer has a default setting of 60 seconds but may be set between 0 – 254 seconds. The primary purpose is to allow sensor stabilization after a Span calibration (see Section 5.3). A purge interval is needed after the span calibration, because up-scale readings will linger until the span gas exits the TXP-WTA Sensor Transmitter. Alarms are inhibited during the CAL PURGE interval.

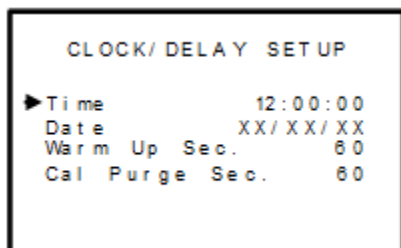


Figure 9-3 – Clock & Calendar / Delay Timer Menu

## 9.3 System Security

The SYSTEM SECURITY Menu in Figure 8 4 offers two levels of protection.

- A LOW level allows CAL MODE sensor calibrations but requires the 4-digit Pass Code prior to altering menus.
- HIGH level locks the entire menu database, plus CAL Mode, until the correct Pass Code is entered.
- LOW and HIGH security levels always allow viewing of configuration menus, but they may not be modified.

Contact Name is a 12-character ASCII field available for displaying a phone number, or name, of personnel who manage the Pass Code.

Lost Pass Codes may be recovered by entering the locked security menu and holding the UP key for 5 seconds. The 4-digit code appears near the bottom of the screen.

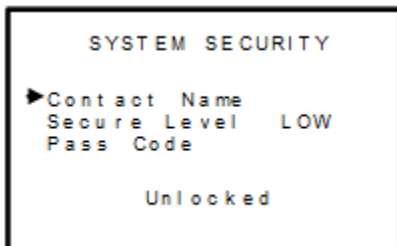


Figure 9-4 – System Security Menu

## 9.4 LCD Contrast Adjust

LCD Contrast Adj. may be set for optimum viewing using the menu shown in Figure 8 5.

To adjust:

1. Swipe the UP/DOWN keys.
2. Swipe NEXT to save and exit.

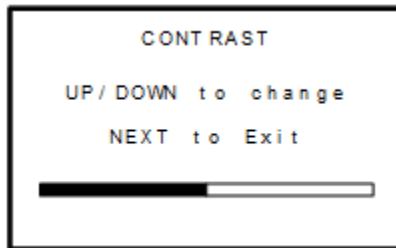


Figure 9-5 – LCD Contrast Adjust Menu

## 9.5 Turn Power Off

There are two ways to power down the TXP-WTA Sensor Transmitter.

1. Use this menu in the DEVICE SETUP group.
2. With any Data Display on the screen, hold the NEXT key for several seconds. When the Warning screen appears swipe the EDIT key to turn the transmitter off.

Power should be turned off prior to replacing the battery. Otherwise, a large storage capacitor will keep the TXP-WTA Sensor Transmitter powered for up to 10 minutes even after the battery is removed.

NOTE: The TXP-WTA Sensor Transmitter powered by external DC Voltage cannot be turned off through any menu items. Power must be removed to turn off.

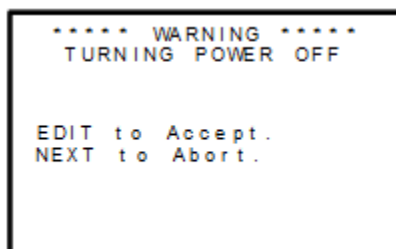


Figure 9-6 – Turn Power Off Menu

## 9.6 Reset Range Icon

The **Reset Range Icon** Menu only appears if the TXP-WTA Sensor Transmitter has experienced an Out-of-Range (📶) condition, but later recovered to achieve Server In-Range status. In this case, the TXP-WTA Sensor Transmitter latches the Server Previously Out-of-Range condition and displays the associated icon (📶) on readouts to indicate a potential problem with communications to this TXP-WTA Sensor Transmitter.

*NOTE: It is important to Reset the unit back to the desired Server In-Range icon (📶) either by using this menu or by cycling transmitter power.*

The following is a description of how to use the range icons as wireless network troubleshooting tools:

The TXP-WTA Sensor Transmitter displays one of three RANGE ICONS (📶,📶,📶) to indicate if its radio has been achieving the Server In-Range status necessary to broadcast its data.

- 📶 is desired since it indicates **every** attempt to broadcast since power up has been successful.
- 📶 indicates, during the **most recent** attempt, the Server could not be found.
- 📶 indicates the most recent attempt was successful, however, an earlier attempt was unsuccessful.

If the wireless controller is experiencing comm errors, there are two probable causes:

1. The TXP-WTA Sensor Transmitter is not achieving “Server In-Range” status and therefore not broadcasting.
2. The TXP-WTA Sensor Transmitter broadcasts but the data is either not received by the controller or the TXP-WTA Sensor Transmitter is receiving the acknowledgment of the transmission from the controller.

TXP-WTA Sensor Transmitter range icons help isolate #1 or #2 since if the desired 📶 is displayed, #2 must be the problem. However, if intermittent controller comm errors occur, and 📶 is displayed it is likely the TXP-WTA Sensor Transmitter is not reliably achieving a Server In-Range status.

## 10 TracXP Antenna Selection

### 10.1 Antenna Selection

#### 10.1.1 Dipole and Collinear Antennas

##### Key Qualities & Notes

- Connected to the Radio via a length of coax cable.  
NOTE: If the cable is larger than 6mm diameter (1/4 inch), be aware of sideways tension on the connection. Thick cables have large bending radii and sideways force on the connector can cause a poor connection
- The polarity of these antennas is the same as the main axis, and they are normally installed vertically. If the antenna is mounted vertically, it is only necessary to mount the other antennas vertically for optimum “coupling” – this is easy to achieve.
- They can be mounted horizontally (horizontal polarity), however the antenna at the other end of the wireless link would need to be mounted perfectly parallel for optimum performance.
- NOTE: This is very difficult to achieve over distance.
- It is important the antenna mounting bracket is well connected to “earth” or “ground” for good lightning surge protection.
- RF Antenna’s provide the best performance when installed with at least 1 to 2 wavelengths clearance of walls or steelwork. 900MHz antennas require at least 2 Feet of clearance and 2.4GHz should have 6 inches. Antennas may be mounted with less clearance, but the signal will be reduced with less clearance. This will not cause a problem if the distance between the transmitter and controller is short.

The wavelength is based on the frequency—for example:

- Wavelength in meters =  $300 / \text{frequency in MHz}$
- Wavelength in feet =  $1000 / \text{frequency in MHz}$

Antennas may be mounted with less clearance, but radiation will be reduced. If the radio path is short this won’t matter. It is important the antenna mounting bracket to be well connected to “earth” or “ground” for good lightning surge protection.

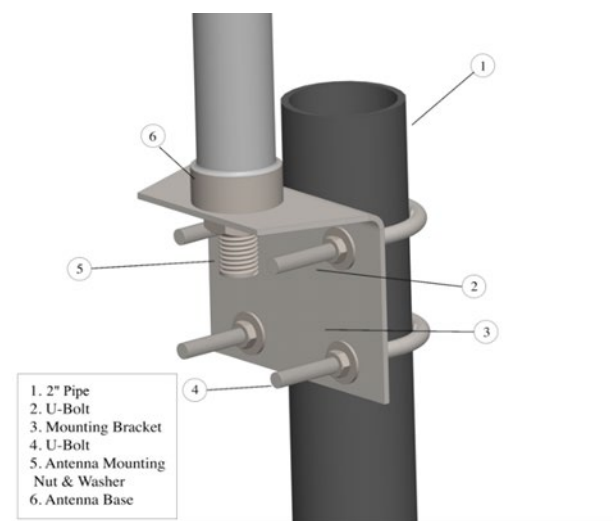


Figure 10-2 – Dipole Antenna Installation Diagram

### 10.1.2 Yagi Antennas

NOTE: Care needs to be taken to ensure the Yagi is aligned correctly to achieve optimum performance. If a Yagi has drainage holes in the dipole element, do not mount with the drain hole up. It can fill with water and cause a negative impact on radio effectiveness.

#### Key Qualities & Notes

- Directional along the central beam of the antenna.
- Folded element is located towards the back.
- Antenna should be pointed in the direction of the transmission.
- In networks spread over wide areas, it is common for a central unit to have an omni-directional antenna and the remote units to have Yagi antennas.

NOTE: In the case of having an omni-directional antenna, as the omni-directional antenna will be mounted with vertical polarity, then the Yagi antennas must also have vertical polarity.

- Two Yagi antennas can be used for a point-to-point link.

NOTE: In the case of two Yagi antennas being used, they can be mounted with the elements horizontally to give horizontal polarity.

- Should be mounted with at least 1 to 2 wavelengths of clearance from other objects.

NOTE: There is a large degree of RF isolation between horizontal and vertical polarity (approx. -30dB) so this installation method is a good idea if there is a large amount of interference from another system close by transmitting vertical polarity.

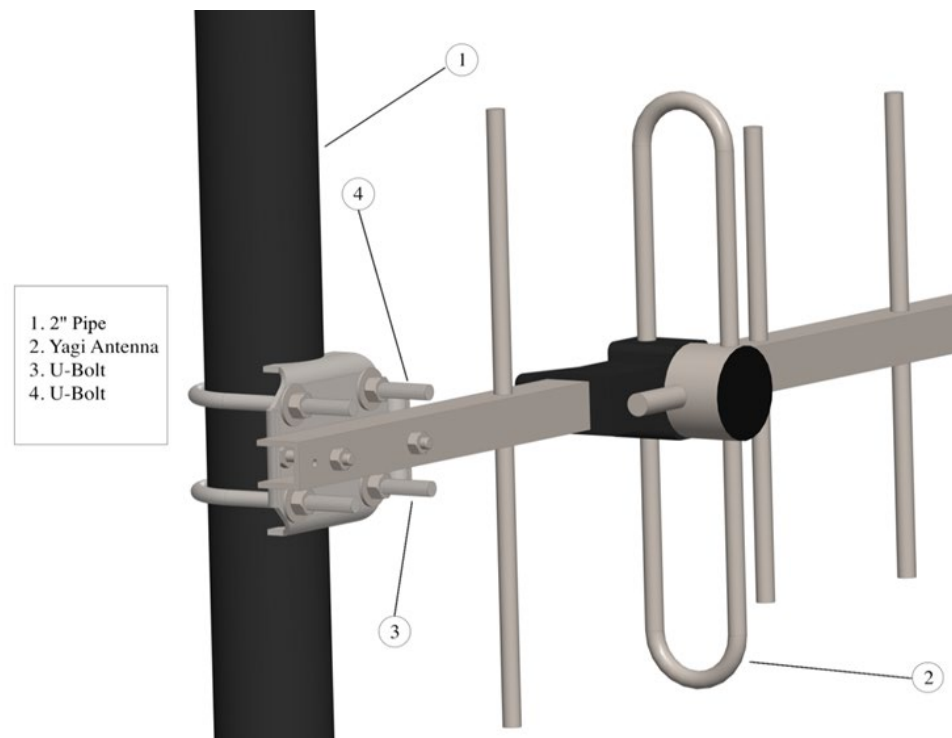


Figure 10-2 – Yagi Antenna Installation Diagram

### 10.1.3 Mounting Near Other Antennas

**NOTE:** Avoid mounting your network's antenna near any other antenna even when the other antenna is transmitting on a different radio band. High RF energy of the transmission from a close antenna can deafen a receiver. This is a common cause of problems with wireless systems.

Because antennas are designed to transmit parallel to the ground rather than up or down, vertical separation between antennas is a lot more effective than horizontal separation. If mounting near another antenna cannot be avoided, mounting it beneath or above the other antenna is better than mounting beside it.

Using different polarity to the other antenna (if possible) will also help to isolate the RF coupling.

### 10.1.4 Coax Cables

If a coax cable connects to the antenna via connectors, it is very important to weatherproof the connection using sealing tape. Moisture ingress into a coax cable connection is the most common cause of problems with antenna installations.

A three-layer sealing process is recommended:

1. Add an initial layer of electrical PVC tape.
2. Add a second layer of self-vulcanizing weatherproofing tape.
3. Add a final layer of electrical PVC tape.

Allowing a drip "U loop" of cable before the connection allows:

- Water to drip off the bottom of the U instead of into the connection
- Reduces installation strain
- Provides spare cable length in case later the original connectors need to be removed (the cable can be cut back, and new connectors fitted)

Avoid installing coax cables together in long parallel paths. Leakage from one cable to another has a similar effect as mounting an antenna near another antenna.

## 10.2 Surge Protection & Grounding

Voltage surges can enter the gas detection system via:

- Antenna connections
- Power supply connections
- Connections to other equipment
- The earth or ground connection

Surges are electrical energy following a path to earth and the best protection is achieved by draining the surge energy to earth via an alternate path. Wireless devices need to have a solid connection to earth via a ground stake or ground grid if the soil has poor conductivity. Solid connection means a large capacity conductor (not a small wire) with no coils or sharp bends. All other devices connected to the controller need to be grounded to the same ground point. There can be significant resistance between different ground points leading to very large voltage differences during lightning activity. As many wireless units are damaged by earth potential surges due to incorrect grounding as direct surge voltage.

It is very difficult to protect against direct lightning strikes but the probability of a direct strike at any one location is very small. Unfortunately, power line surges and electromagnetic energy in the air can induce high voltage surges from lightning activity several miles away.

#### 10.2.1 Antenna Grounding

Electromagnetic energy in the air will be drained to ground via any and every earth path. An earth path exists between the antenna and the TXP-WTA Sensor Transmitter and to protect against damage, this earth path current must be kept as small as possible.

This is achieved by providing better alternate earth paths.

It is important to ground the antenna to the same ground point as the TXP-WTA Sensor Transmitter. Antennas are normally mounted to a metal bracket which should be grounded to the TXP-WTA Sensor Transmitter earth connection. Surge energy induced into the antenna will be drained first by the mount's ground connection, second by the outside shield of the coax cable to the ground connection on the radio and third by the internal conductor of the coax cable via the radio electronics. This third earth path causes damage unless the other two paths provide a better earth connection allowing surge energy to bypass the electronics.

When an antenna is located outside of a building and outside of an industrial plant environment, external coax surge diverters are recommended to further minimize the effect of surge current in the inner conductor of the coax cable.

Coax surge diverters have gas-discharge element which breaks down in the presence of high surge voltage and diverts any current directly to a ground connection. A surge diverter is not normally required when the antenna is within a plant or factory environment, as the plant steelwork provides multiple parallel ground paths and good earth grounding will provide adequate protection without a surge diverter.

#### 10.2.2 Connection to Other Equipment

Surges can enter the wireless unit from connected devices, via I/O, serial or Ethernet connections. Other data devices connected to the wireless unit should be well grounded to the same ground point as the wireless unit.

NOTE: Special care needs to be taken where the connected data device is remote from the wireless unit requiring a long data cable. As the data device and the wireless unit cannot be connected to the same ground point, different earth potentials can exist during surge conditions.

There is also the possibility of surge voltages being induced on long lengths of wire from nearby power cables. Surge diverters can be fitted to the data cable to protect against surges entering the wireless unit.

The same principle applies to I/O devices is not close to the wireless unit, the risk of surge increases. Surge diverters for I/O wiring are available to protect the wireless unit.

## 11 TXP-WTA Legacy Mode

TXP-WCR Controllers are not compatible with TXP-WTA Transmitters in legacy mode.

When using a TXP-WTA with other TracXP products—such as the TXP-C20, TXP-C40, and TXP-C16 or other legacy type controllers—it is necessary to operate wirelessly in Legacy Mode.

To Enter Legacy Mode:

1. Swipe the EDIT key to enter the Main Menu.
2. Select "Device Setup" with the Up & Down Arrows the swipe EDIT.
3. Select 'RF Link Setup' and swipe EDIT.
4. Scroll to the bottom of page 2 and select 'RF Link' then swipe EDIT.
5. Enter the key sequence of four up arrows and when you see the \*\*\*\*Warning\*\*\*\*, swipe EDIT.
6. Your WTA is now in Legacy Mode and now you can scroll to the top of page 1 and select the Hop Channel and System ID to match the controller.

All other transmitter settings function as discussed in the TXP-WTA Sensor Transmitter manual.





## 12 Optional Add-ons

### Explosion-Proof Antenna

Contact TRacXP for specific information



### Splashguard with Calibration Port

PN: 80-8000-0000-02

Sensor Head Splash Guard w/ Remote Cal Port



### Dual Sensor Y-Adapter

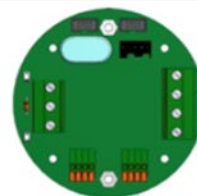
PN: 80-8900-00Y0-00

“Y” Fitting for dual sensors



### External Power Board

Contact TRacXP for specific information



### External Power (can be connected to 4-20mA LEL Methane sensor)

Contact TRacXP for specific information



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## 14 Macurco Gas Detection Product limited warranty

Macurco warrants the TXP-WTA gas detector will be free from defective materials and workmanship for a period of two (2) years from the date of manufacture, provided it is maintained and used in accordance with Macurco instructions and/or recommendations. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM THE PURCHASE DATE. Macurco shall not be liable for any incidental or consequential damages for breach of this or any other warranty, express or implied, arising out of or related to the use of said gas detector. The manufacturer or its agent's liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are the return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts.

## Macurco Gas Detection

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