Lightning Warning and Critical Asset Protection System

Specifications Guide

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Warranty Summary

Wxline, LLC warrants that the products it distributes, and sells will be free from defects in materials and workmanship for a period of one year from the date of receipt by the end-user. If a product proves defective within the respective period, Wxline, LLC will provide timely repair or replacement of the product. The effectiveness of the Strike Guard and WAVE system is dependent on proper design, installation, monitoring, and maintenance for each unique facility.

Wxline, LLC makes no warranty of any kind, express or implied, except that the goods sold under this agreement shall be of the standard quality of Wxline, LLC and the buyer assumes all risk and liability resulting from the use of the goods, whether used singly or in combination with other goods. Wxline, LLC neither assumes nor authorizes any person to assume for Wxline, LLC any other liability in connection with the sale or use of the goods sold and there are no oral agreements or warranties collateral to or affecting this agreement.

Chapter 1

Design Specifications for Wxline Active Lightning Protection systems for Irrigation Applications

Since 2001 Wxline has provided and improved solutions for the most demanding lightning safety and equipment protection needs. Our industry leading Strike Guard and WAVE Siren Systems are installed to protect Golf Facilities and Country Clubs all over the world.

What is an Active Lightning Protection system? An Active Lightning Protection system is comprised of a local lightning detector that initiates the orderly, sequenced, and autonomous isolation of current-carrying conductors from critical assets such as irrigation control interfaces, pumps, satellites, and irrigation computers. Metal-enclosed electrical switchgear isolates the critical equipment from lightning surge currents and over-voltages that are common during local thunderstorms. Restoration of all system functions occurs automatically after the lightning alarm expires.

This guide aims to present the pertinent information to determine the components required for the implementation of Active Lightning Protection for complex irrigation systems with available options for human safety including lightning detection, audible and visual alerts, and digital notification. The specifier and irrigation designer is presented with example designs for TORO and RainBird systems and their respective satellite and two-wire systems. Each example details the required part numbers from Wxline for the active lightning protection system.

Each irrigation project holds special consideration for the unique characteristics of the site. The examples provided in this guide are based on the most common implementations. Wxline builds each system specific to the requirements of the project and is prepared to provide custom solutions based on the project specifications.

To ensure proper installation and operation of Strike Guard and WAVE Siren systems, it is recommended that final Commissioning and Testing be performed by a Wxline Certified Field Technician or Partnering Installation Service Provider.

For proper implementation of Wxline equipment in the United States you must consider the National Electrical Code and local codes; for installations outside of the USA, follow the electrical code of the locality of installation.

For additional information about the options presented in this guide, or for personalized assistance with a project, please contact Wxline directly.

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The Strike Guard Lightning Warning System

The Strike Guard Lightning Warning System is comprised of a self-powered Lightning Sensor, a Lightning Data Receiver (also referred to as "the LDR" or "the Receiver"), and a fiber-optic communications link.

The Strike Guard Lightning Detection Sensor

The Sensor monitors cloud and cloud-to-ground lightning within 20 miles/32 kilometers and categorizes lightning threats by proximity:

Lightning within 32 km (20 miles): CAUTION
Lightning within 16 km (10 miles): WARNING
Lightning within 8 km (5 miles): ALARM
No Lightning ALARM events for 30 minutes.

Patented optical signal processing and proprietary optical-coincidence technology prevent false alarms.

Functions of the Sensor
1. Receives and processes the optical and radio emissions of lightning discharges within 20 miles of the Sensor.
2. Classifies lightning signals by estimated range to the discharge.
3. Rejects background noise.
4. Transmits serial data messages to the Lightning Data Receiver via a lightning-proof fiber-optic link.
5. Performs a periodic self-test of Sensor functions including battery charge level and transmits confidence messages to the Lightning Data Receiver to ensure that a healthy Sensor and viable communications link are available.
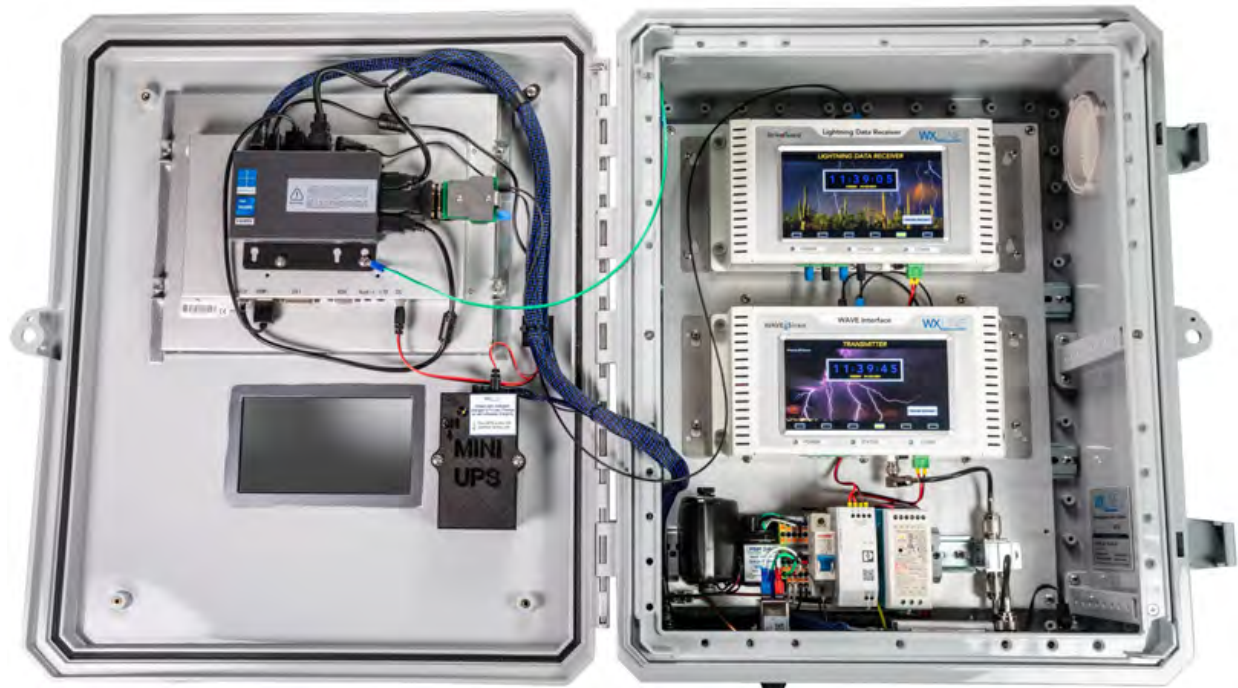
The Strike Guard Lightning Data Receiver

When the Sensor detects lightning, it sends data in real-time via lightning-proof Fiber-Optic Cable to the Receiver, which is typically installed in a maintenance building, an office environment like the Clubhouse or Pro Shop where personnel can monitor the status.

The Receiver displays Sensor Status, Receiver Status, and CAUTION, WARNING and ALARM indicators. It features a computer-compatible output for Strike View Software and fiber-optic and contact closure relays to automate the activation of the WAVE Siren Warning System.

Functions of the Strike Guard Receiver
1. Receives serial data transmissions from the Strike Guard Lightning Sensor and decodes the lightning and status messages.
2. Provides user-set options and thresholds for issuing lightning alarms via front panel LEDs, audio transducers and contact-closure signaling.
3. The LDRv2 provides touch-screen user-interface, data logging, audible alarm, countdown-timer from Alarm, integral battery back-up and expanded output options.
4. Provides continuous operation with battery backup when commercial power fails.
5. Indicates Sensor status information and Lightning Data Receiver battery level information.

Strike View Software

Strike View Software runs on a Windows PC and receives data directly from the Strike Guard Lightning Data Receiver via Fiber-Optic Cable to RS232 Converter. Strike View expands upon the information presented by the Strike Guard Lightning Data Receiver. Lightning history reports, email and text message notifications, audible and visual lightning alarms, and the Countdown to ALL-CLEAR help users categorize lightning data, analyze storm progression, and estimate time to resume operations.

Functions of Strike View Software
1. Display lightning counts in three ranges categories: CAUTION (<32 kilometers), WARNING (<16 kilometers), and ALARM (<8 kilometers)
2. Enable user-set email and/or text message alerts for lightning and all-clear conditions
3. Deliver audible and visual alerts at user-set thresholds
4. Display system state indicators, lightning data logging, and histogram
5. Display countdown to "No Lightning Detected"
6. Display lightning status information and countdown timer on web browser for remote viewing. **(Strike View Pro)**

Strike View Pro Software

Strike View Pro Server adds advanced programming tools which enable users to provide real-time Lightning status information to internet connected devices. A built-in SFTP server allows Strike View Pro to upload the status of the system into a web directory which can be viewed on any web browser.

Unlike restrictive apps that are not compatible with some devices, Strike View Pro allows remote viewing of the on-site lightning conditions from anywhere in the world regardless of platform.

WAVE SYSTEM

The WAVE Transceiver

When Strike Guard detects lightning, Mode information is sent to the Transceiver via fiber-optic communications, triggering the WAVE Transceiver to broadcast digitally encrypted messages to all WAVE Siren Stations and WAVE Sequencers. WAVE relies on RF communication to operate in noisy environments and over challenging terrain. Upon receipt of the RF signal, the WAVE Siren Stations sound audible horns and flash visible lights and the WAVE Sequencer initiates the controlled shutdown of the irrigation system. Using two-way communication, a report is sent back to the WAVE Transceiver confirming activation of the WAVE Siren Stations and Sequencers.

Functions of the WAVE Transceiver

1. Automatic or manual wireless system actuation
2. Programmable hours of operation
3. Comprehensive, automatic system status monitoring
4. Automated activation of external contact closure
5. Manual Selection of desired transmission via high capacitive touchscreen.
6. Two-way Radio Frequency communication with WAVE Siren Stations and WAVE Sequencers

Chapter 2
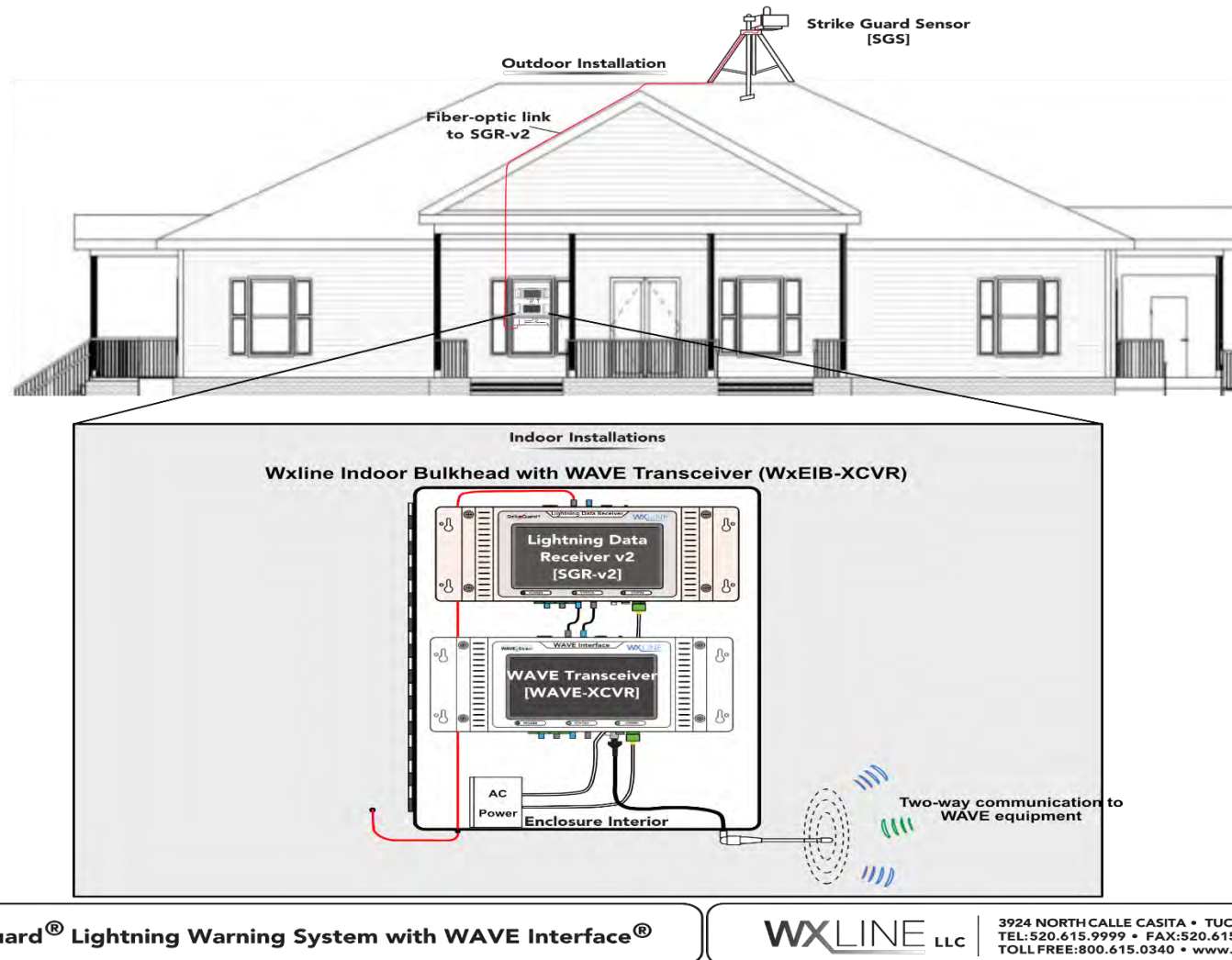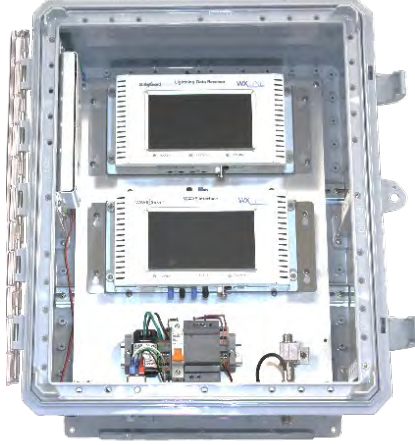## The Strike Guard Lightning Warning Base System Overview

Figure 1: Strike Guard Lightning Warning System with WAVE Transceiver

Parts List required Base System only:

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning System v2	SG001-LDRv2	Strike Guard Sensor, mounting hardware, and tripod; Lightning Data Receiver v2 with alarms, 4 relays, battery back-up and PC-ready output; 30-meter simplex fiber-optic cable. Includes USB memory stick with User's Guides.	
Wxline Equipment Indoor Bulkhead with WAVE Transceiver	WxEIB-XCVR	Strike Guard Lightning Data Receiver (sold separately) & WAVE Transceiver are assembled and mounted in a 20 x 16 x 10-inch enclosure with clear door and complete lightning protection for incoming conductors and power supply. Factory-assembled for plug-and-play functionality.	

The Strike Guard Lightning Warning System Overview with User provided PC
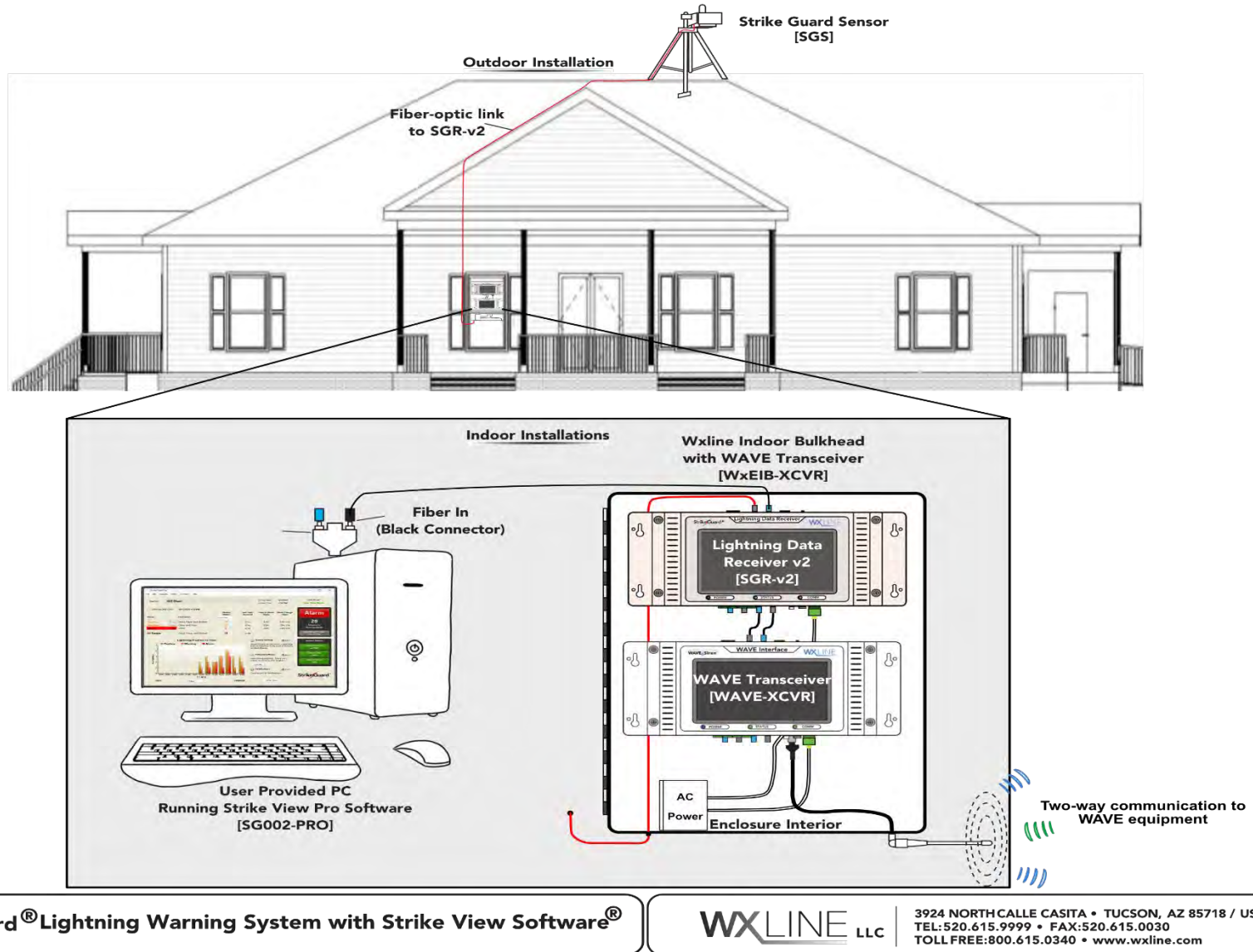

Figure 2: Strike Guard Lightning Warning System Overview

Parts List required with User Provided PC:

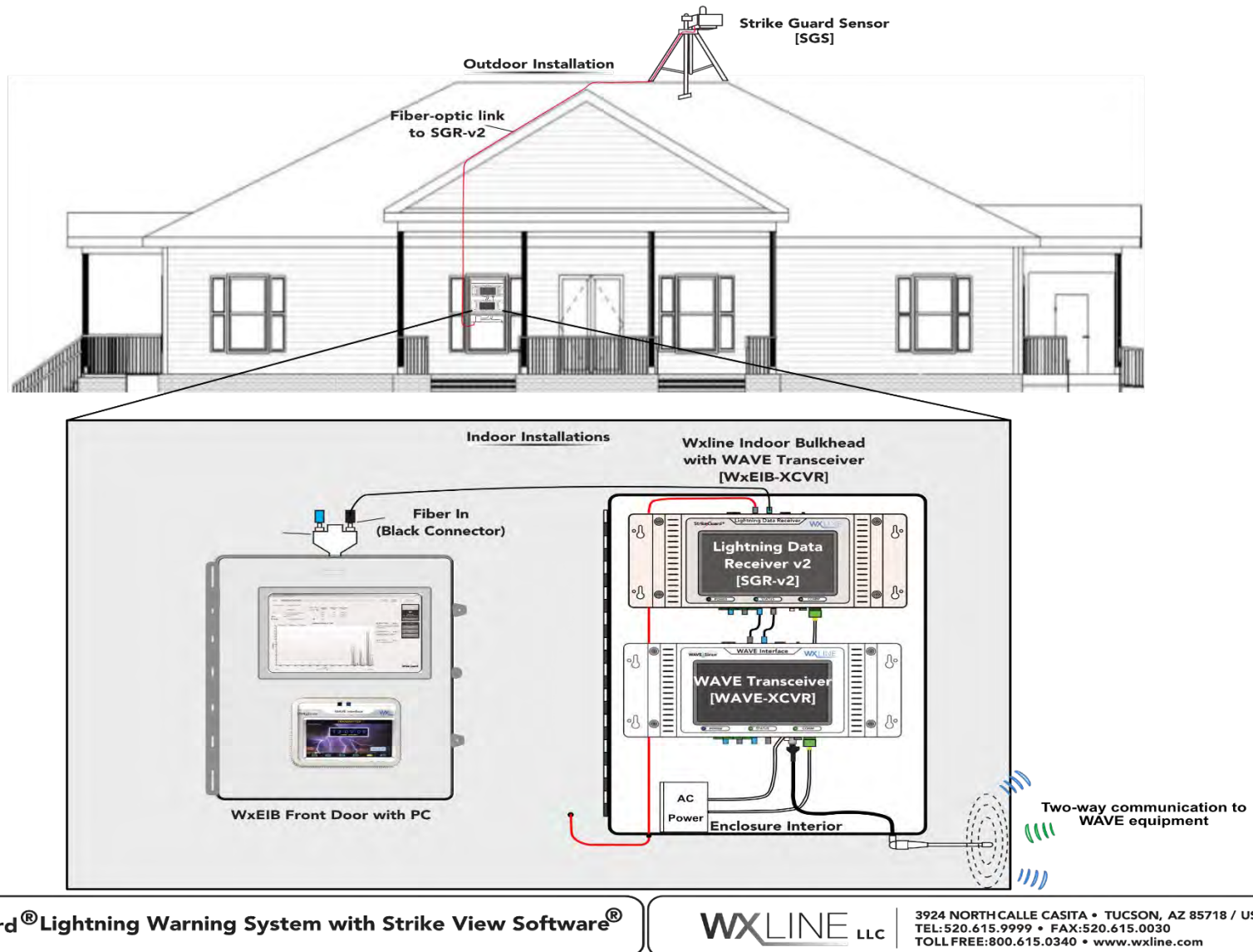| Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning System v2	SG001-LDRv2	Strike Guard Sensor, mounting hardware, and tripod; Lightning Data Receiver v2 with alarms, 4 relays, battery back-up and PC-ready output; 30-meter simplex fiber-optic cable. Includes USB memory stick with User's Guides.	
Wxline Equipment Indoor Bulkhead with WAVE Transceiver	WxEIB-XCVR	Strike Guard Lightning Data Receiver (sold separately) & WAVE Transceiver are assembled and mounted in a 20 x 16 x 10-inch enclosure with clear door and complete lightning protection for incoming conductors and power supply. Factory-assembled for plug-and-play functionality.	
Strike View Server PRO Software	SG002-PRO	Strike View Server PRO Software, Strike Guard RS232 to Fiber-Optic Converter, 10-meter simplex Fiber-Optic Cable, USB memory stick with License, User's Guides and Strike View PRO installers. Includes widget hosting.	

Base System with Wxline PC

Figure 3: Strike Guard Lightning Warning System with WxEIB & PC

Part list Required for system with Wxline PC:

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning System v2	SG001-LDRv2	Strike Guard Sensor, mounting hardware, and tripod; Lightning Data Receiver v2 with alarms, 4 relays, battery back-up and PC-ready output; 30-meter simplex fiber-optic cable. Includes USB memory stick with User's Guides.	
Wxline Equipment Indoor Bulkhead with WAVE Transceiver, Wxline PC, Strike View PRO Software	WxEIB-PC-XCVR-SV-PRO	Strike Guard Lightning Data Receiver & WAVE Transceiver assembled and mounted in a 20 x 16 x 10-inch enclosure with flat-panel industrial Wxline PC mounted on door with the latest Microsoft Windows and Strike View PRO Software installed and registered for plug-and-play functionality.	

Chapter 3

WAVE Siren Stations

WAVE Siren Station horns are modular in design to provide audible notification specific to the desired coverage area and application. Based on coverage area and sound pressure level requirements, Siren Stations can be ordered with up to four 100 W re-entrant high efficiency compression driven horns.

Siren Stations can be activated by the end users from the Interface Transceiver via the Manual Alerts or the Manual Output pages. Two-way communication enables alert confirmation and Station status reporting on the WAVE Interface Transceiver.

Functions of the WAVE Siren Station
1. Automatic multi-stage notifications with adjustable volume controls
2. Automatic self-tests with status indicators
3. Programmable hours of operation
4. Solar- or AC-powered Siren Stations available
5. ALL-Clear notifications
6. Two-way communication with WAVE Interface Transceiver

WAVE Siren Station Options

Dual Horn, AC Power

Dual Horn with Strobe, Solar Power

Strobe only, AC Power

Power Configuration

AC Power 120v or 240v

Solar Power or Dual Power Option

Audible Notifications

1 – 4 Horns per Station
131dB Max Volume per Horn

Visual Notifications

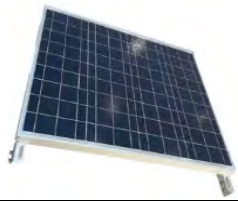Multi Color Strobes & Stack Lights

LED Sign Boards, 1, 2 & 3 stage alert option

Audible Visual Alert System

Station Configuration Selection:

Specify Quantity

Product	Part Number	Product Description	Product Image
WAVE Siren Station Single	WAVE-XCVR-SS01	Multi-function, Single remote siren station with one all-weather 120-degree directional horn, radio receiver, AC-power supply with rechargeable battery backup, mounting plate, and antenna.	
WAVE Siren Station Dual	WAVE-XCVR-SS02	Multi-function, Double remote siren station with two all-weather 120-degree directional horns, radio receiver, AC-power supply with rechargeable battery backup, mounting plate, and antenna.	
WAVE Siren Station Triple	WAVE-XCVR-SS03	Multi-function, Triple remote siren station with three all-weather 120-degree directional horns, radio receiver, AC-power supply with rechargeable battery backup, mounting plate, and antenna.	
WAVE Siren Station Quad	WAVE-XCVR-SS04	Multi-function, Quad remote siren station with four all-weather 120-degree directional horns, radio receiver, AC-power supply with rechargeable battery backup, mounting plate, and antenna.	

Product	Part Number	Product Description	Product Image
WAVE Light Stack Station	WAVE-XCVR-SS0STAC3	Light Stack-only station. Multi-function, Remote Strobe Station with radio receiver, AC power supply with battery back-up, mounting plate and antenna. Tri-colored light stack illuminates to show Strike Guard System Mode: AMBER LED CAUTION light indicates lightning within 20 miles; RED LED ALARM light indicates lightning within 10 or 5 miles. GREEN LED light indicates - ALL CLEAR no lightning detected.	
WAVE Strobe Station "Strobe Only"	WAVE-XCVR-SS0S	Strobe-only station. Multi-function, Remote Strobe Station with one high-intensity strobe, radio receiver, AC power supply with rechargeable battery back-up, mounting plate and antenna [A second strobe can be added].	
WAVE Siren Station - add Solar option	add -SO Example WAVE-XCVR-SS03-SO	Add solar option with quick-connect and mounting hardware to Strike Guard and WAVE package.	
WAVE Siren Station - add Strobe option	add -ST Example WAVE-XCVR-SS02-SO-ST	Add high intensity Strobe light with quick-connect and mounting bracket to Strike Guard and WAVE package.	

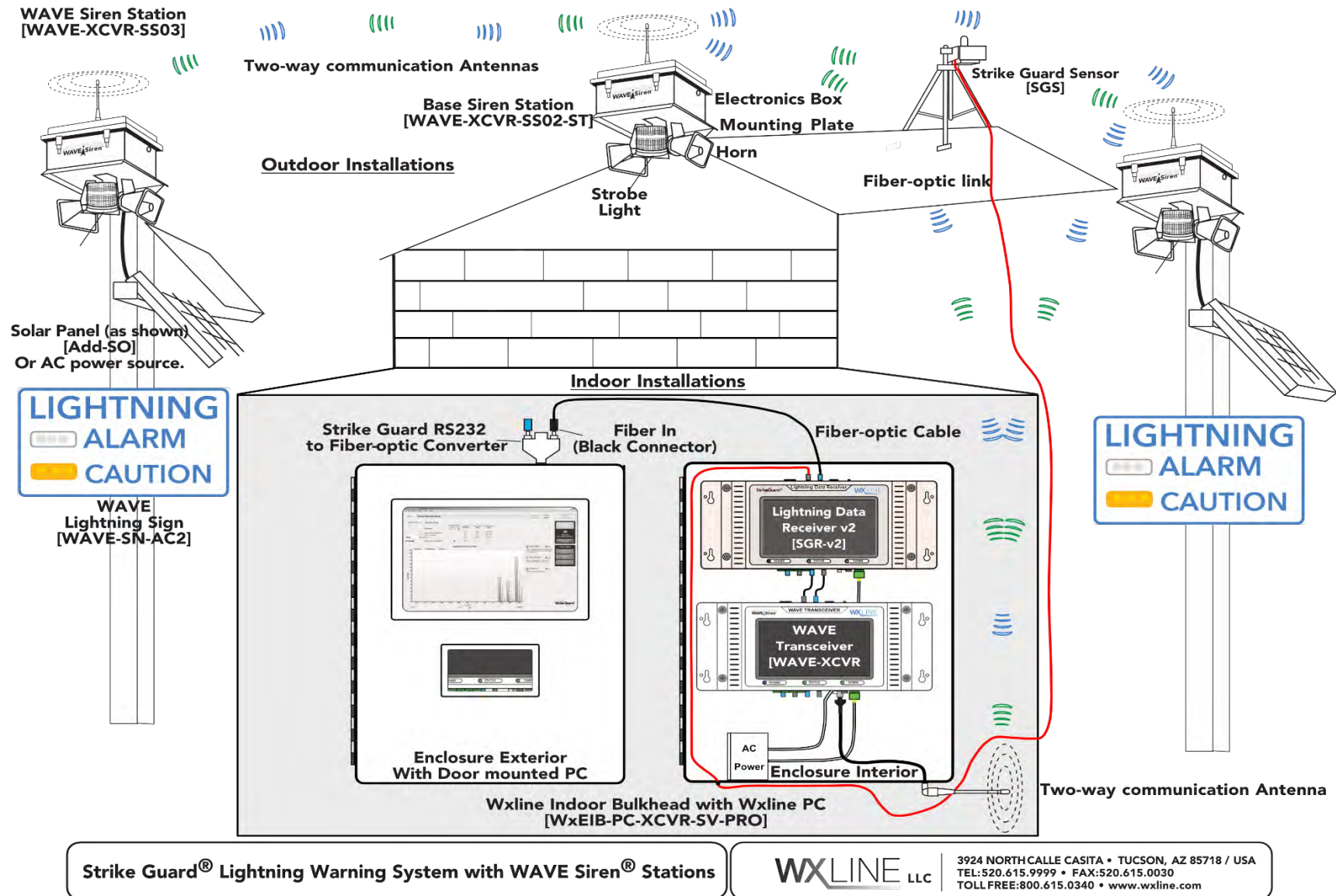## Full System Overview for Human Safety Applications

WAVE Siren Station [WAVE-XCVR-SS03]

Two-way communication Antennas

Base Siren Station [WAVE-XCVR-SS02-ST]

Outdoor Installations

Electronics Box

Mounting Plate

Horn

Strobe Light

Strike Guard Sensor [SGS]

Fiber-optic link

Solar Panel (as shown) [Add-SO] Or AC power source.

Indoor Installations

LIGHTNING ALARM CAUTION

WAVE Lightning Sign [WAVE-SN-AC2]

Strike Guard RS232 to Fiber-optic Converter

Fiber In (Black Connector)

Fiber-optic Cable

Lightning Data Receiver v2 [SGR-v2]

WAVE Transceiver [WAVE-XCVR

AC Power

Enclosure Exterior With Door mounted PC

Enclosure Interior

Two-way communication Antenna

LIGHTNING ALARM CAUTION

Wxline Indoor Bulkhead with Wxline PC [WxEIB-PC-XCVR-SV-PRO]

Strike Guard® Lightning Warning System with WAVE Siren® Stations

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Figure 4: Strike Guard Lightning Warning System with LED Signage

Chapter 4

Critical Asset Protection

Wxline specializes in the protection of critical assets and equipment such as central irrigation control computers and satellite field control terminals from the devastating electrical surges that result from lightning strikes.

These critical assets are protected by safely and automatically shutting down and electrically isolating vulnerable equipment when lightning is detected.

The WAVE Sequencer on-board a Wxline Critical Asset Protection Bulkhead executes a pre-programmed shut-down sequence when a lightning alert is issued. The sequencer then executes a pre-programmed start-up sequence after the lightning alert expires.

The following packages feature customized designs for the protection of Toro and RainBird irrigation system components. Please include the equipment listed for the package that matches your project requirements.

This package should be specified along with the appropriate base equipment and automated alert system components (Referred to as Wxline Base System - **SG001-BASE**) previously outlined in this guide.

NOTE: | A base system with Strike Guard Lightning Detection System and WAVE Transceiver is required to provide critical asset protection (WAVE Sequencer) and threat notification (WAVE Siren Station).

Overview of Active Lightning Protection

Figure 5: Overview of Active Lightning Protection

Critical Asset Protection System Components Parts List

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning System v2	SG001-LDRv2	Strike Guard Sensor, mounting hardware, and tripod; Lightning Data Receiver v2 with alarms, 4 relays, battery back-up and PC-ready output; 30-meter simplex fiber-optic cable. Includes USB memory stick with User's Guides.	
Wxline Equipment Indoor Bulkhead with WAVE Transceiver, Wxline PC, Strike View PRO Software Includes: Enclosure, WAVE Transceiver, Wxline PC, Strike View PRO Software Sold Separately: Strike Guard Lightning Data Receiver	WxEIB-PC-XCVR-SV-PRO	Strike Guard Lightning Data Receiver & WAVE Transceiver assembled and mounted in a 20 x 16 x 10-inch enclosure with flat-panel industrial Wxline PC mounted on door with the latest Microsoft Windows and Strike View PRO Software installed and registered for plug-and- play functionality. Strike View Pro includes the Wxline-hosted Strike View Widget for web-based lightning mode monitoring. Includes custom hosted website for lightning status. Bulkhead connectors include USB, HDMI, Ethernet, and power. Factory-assembled for plug-and-play implementation.	
WAVE Siren Station Triple with Solar and Strobe	WAVE-XCVR-SS03-SO-STA	Multi-function, Triple remote siren station with three all-weather 120-degree directional horns, one high-intensity strobe, radio receiver, 55-WATT Solar panel with upgraded battery back-up, mounting plate, and antenna.	

| Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL-DUAL	CAPB-XCVR CENTRAL DUAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to two central irrigation controllers, computer, and related hardware.	
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL	CAPB-XCVR CENTRAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to central irrigation controller computer and related hardware.	
Central Critical Asset Protection Bulkhead Direct Connect	CAPB-CENTRAL- DC	The Strike Guard base installation combines with the CAPB-CENTRAL to provide a single location hub, with the Strike Guard Lightning Data Receiver interfacing directly to the CAPB CENTRAL-DC. This configuration does not require a WAVE Transceiver.	
Remote Critical Asset Protection Bulkhead	CAPB-XCVR-REMOTE	Automatic wireless remote power-disconnect features a WAVE Sequencer XCVR (included) provides eight programmable 12VDC Main and two Auxiliary Outputs, and fully assembled and tested relay isolation bank to manage power source disconnection and reconnection for protection of power source facilities & irrigation satellites during local thunderstorms.	
Pump Station Critical Asset Protection Bulkhead	CAPB-XCVR-PUMP	WAVE Sequencer XCVR-based remote wireless- Transceiver or local Strike Guard direct (wired) connect for contact-closure relay signaling to initiate automated lightning alarm shut-down/start-up of irrigation pump stations.	

Product	Part Number	Product Description	Product Image
Isolation Transformer	**WxIT**	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories. Includes provision of AC power-in options, multiple output circuits with over-current protection, input AC power surge suppression, and ground lug for bonding to the ground electrode that is used for irrigation equipment protection.	
1-Stage Lightning Sign	WAVE-SN-A1	High-visibility 32 inch by 16-inch Billboard-like sign displays "LIGHTNING – ALARM" condition via high-intensity LED lights. Default: Clear = Alarm. Sign is added to WAVE Siren Station through quick connect (6 ft. cable). Note: Up to Four (4) WAVE-SN-AC - Signs may be connected per v2 Siren Station. CONTACT WXLINE FOR CUSTOM DESIGNS.	
2-Stage Lightning Sign	WAVE-SN-AC2	High-visibility 32 inch by 18-inch Billboard-like sign displays "LIGHTNING – CAUTION and ALARM" conditions via high-intensity LED lights. Default: Amber = Caution, Clear = Alarm. Sign is added to WAVE Siren Station through quick connect cable. (Specify length. Max 25ft)	
CAPB Strobe Option	STROBE-CAPB	High-intensity RED Strobe illuminates to show CAPB is in protected state during Lightning Alarm Mode. Strobe flashes until ALARM expires.	

Chapter 5
Isolation Transformer Implementation

Figure 6: Wxline Isolation Transformer

Wxline Isolation Transformer (WxIT)

The Wxline Isolation Transformer allows for the turn-key implementation of a separately derived system (SDS) for new system installations or for retrofit to existing irrigation central control systems. This SDS is compatible with a local ground electrode common to field wiring surge suppression devices.

The WxIT provides significant hardening of a central computer and related accessories from lightning damage by way of:

- low-pass filtering of commercial power
- fast transient suppression
- a low surge impedance path to a ground electrode
- effective equipotentialization of commercial AC power and field power and / or communication conductors

Simplified Electrical Diagram
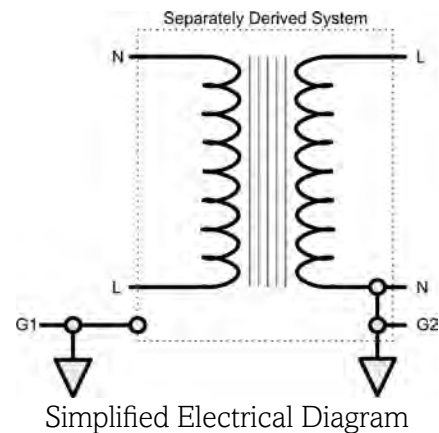
The WxIT delivers:
- Improved reliability of irrigation control computers in a lightning environment
- Fully isolated, separately derived source AC service
- Full compatibility with the ground electrode used for irrigation equipment protection
- Improved power quality and overcurrent protected AC outlets
- Efficient toroid transformer technology with quiet operation
- Ground-fault indicator, AC-in indicator, and protected voltage-out indicator
- Compatibility with UPS systems
- Effective electrical protection for new systems, or retrofit to existing installations
- Compatibility with Wxline Critical Asset Protection Bulkheads
- Available in 120/240 VAC configuration

The following power source is required within 6 ft. of the Isolation Transformer.

110/120 VAC: A dedicated branch circuit rated for 20 amp and 50/60 Hz.
220/240 VAC: A dedicated branch circuit rated for 10 amp and 50/60 Hz.

Specify the socket and plug type for power connection on the Transformer.

Chapter 6

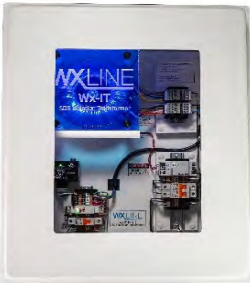## Asset Protection Overview for RainBird ICI 2-Wire Irrigation System
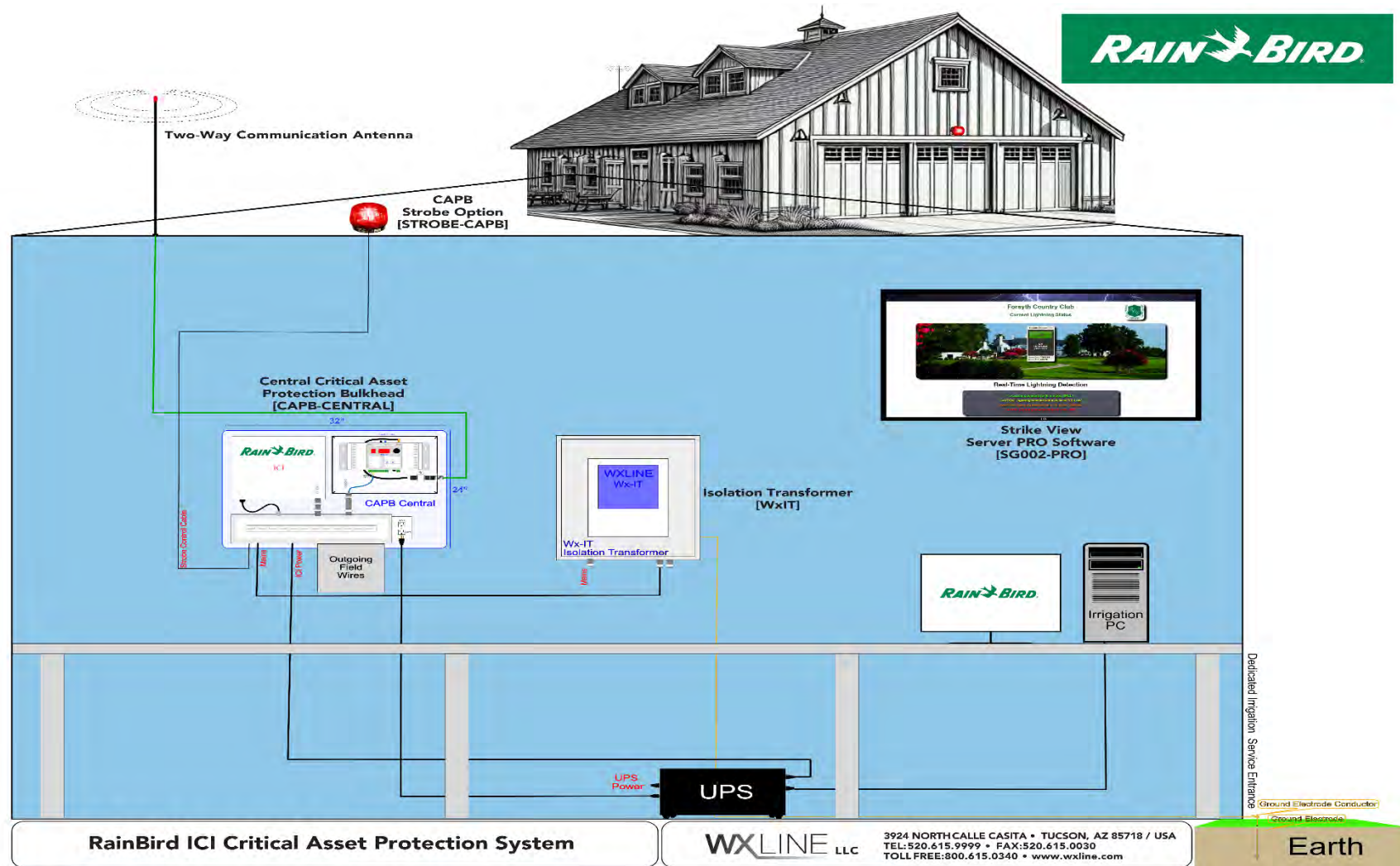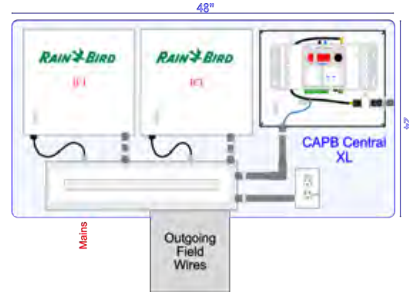

Figure 7: Asset Protection Overview RainBird ICI

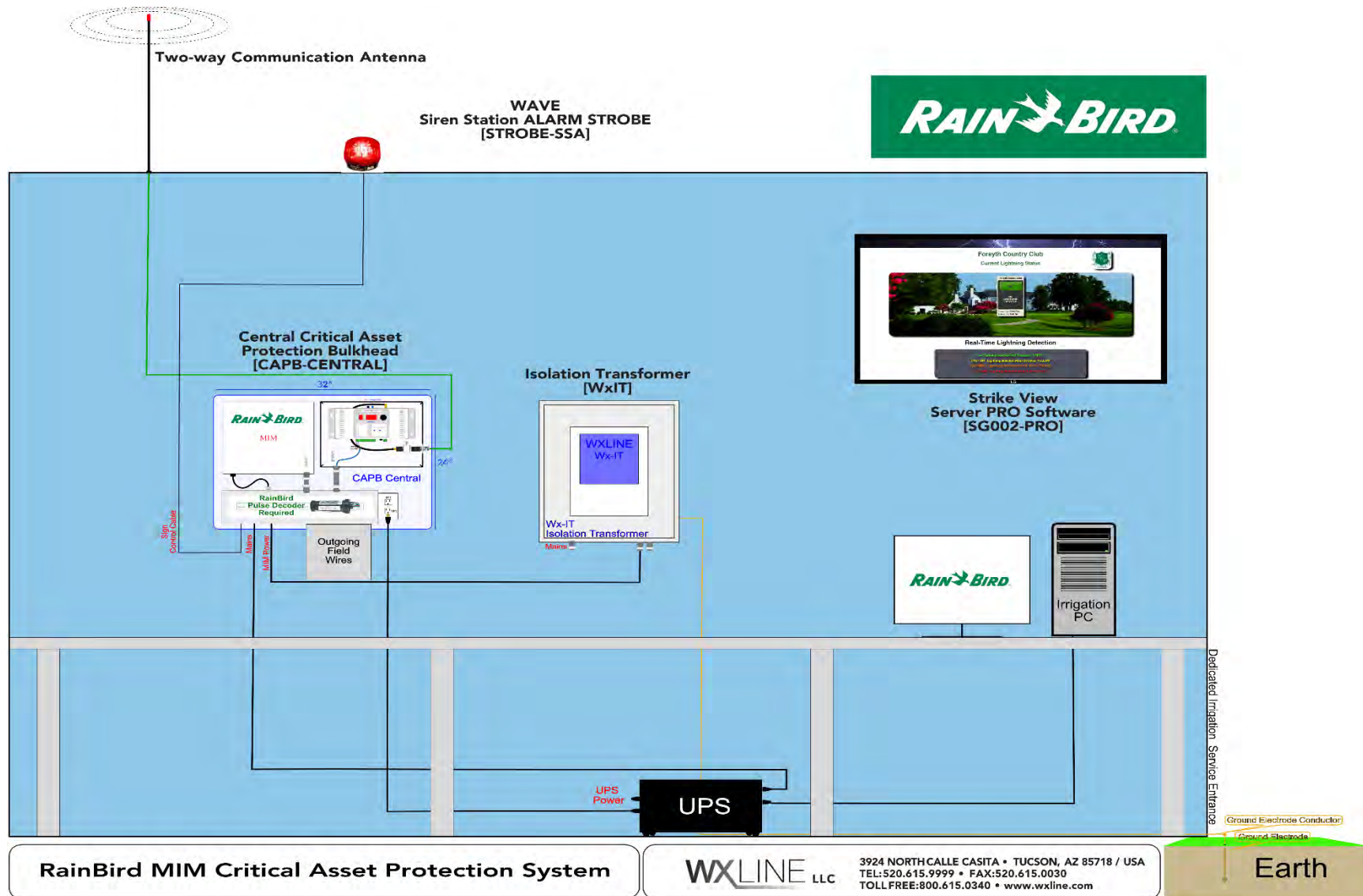| Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL	CAPB-XCVR CENTRAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to central irrigation controller computer and related hardware.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories. Includes provision of AC power-in options, multiple output circuits with over-current protection, input AC power surge suppression, and ground lug for bonding to the ground electrode that is used for irrigation equipment protection.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
RainBird IC-IN	IC-IN	Rainbird IC-IN allows WAVE Sequencer to communicate with the Irrigation Control Interface. (Part acquired from RainBird)	

Asset Protection Overview for Dual RainBird ICI 2-Wire Irrigation System

Figure 8: Asset Protection Overview for Dual Rain Bird ICI

Dual RainBird ICI System Overview Parts Lists:

Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL-DUAL	CAPB-XCVR CENTRAL DUAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to two central irrigation controllers, computer, and related hardware.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
RainBird IC-IN	IC-IN	Rainbird IC-IN allows WAVE Sequencer to communicate with the Irrigation Control Interface. (Part acquired from RainBird)	

Asset Protection Overview for RainBird MIM Irrigation System

Figure 9: Asset Protection Overview for RainBird MIM

RainBird MIM 2-Wire System Overview Part List:

Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL	CAPB-XCVR CENTRAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to central irrigation controller computer and related hardware.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
Remote Critical Asset Protection Bulkhead	CAPB-XCVR-REMOTE	Automatic wireless remote power-disconnect features a WAVE Sequencer XCVR (included) provides eight programmable 12VDC Main and two Auxiliary Outputs, and fully assembled and tested relay isolation bank to manage power source disconnection and reconnection for protection of power source facilities & irrigation satellites during local thunderstorms.	
RainBird Puls Decoder	PLS-DCDR	Rainbird Pulse Decoder allows WAVE Sequencer to communicate with the MIM of the Irrigation system (Part acquired from RainBird)	

Direct Connect RainBird ICI System Overview Parts List

Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead Direct Connect	CAPB-CENTRAL- DC	The Strike Guard base installation combines with the CAPB-CENTRAL to provide a single location hub, with the Strike Guard Lightning Data Receiver interfacing directly to the CAPB CENTRAL-DC. This configuration does not require a WAVE Transceiver.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
RainBird IC-IN	IC-IN	Rainbird IC-IN allows WAVE Sequencer to communicate with the Irrigation Control Interface. (Part acquired from RainBird)	

Chapter 7

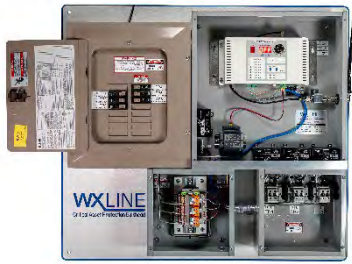## Overview for Toro Smart Hub Irrigation System
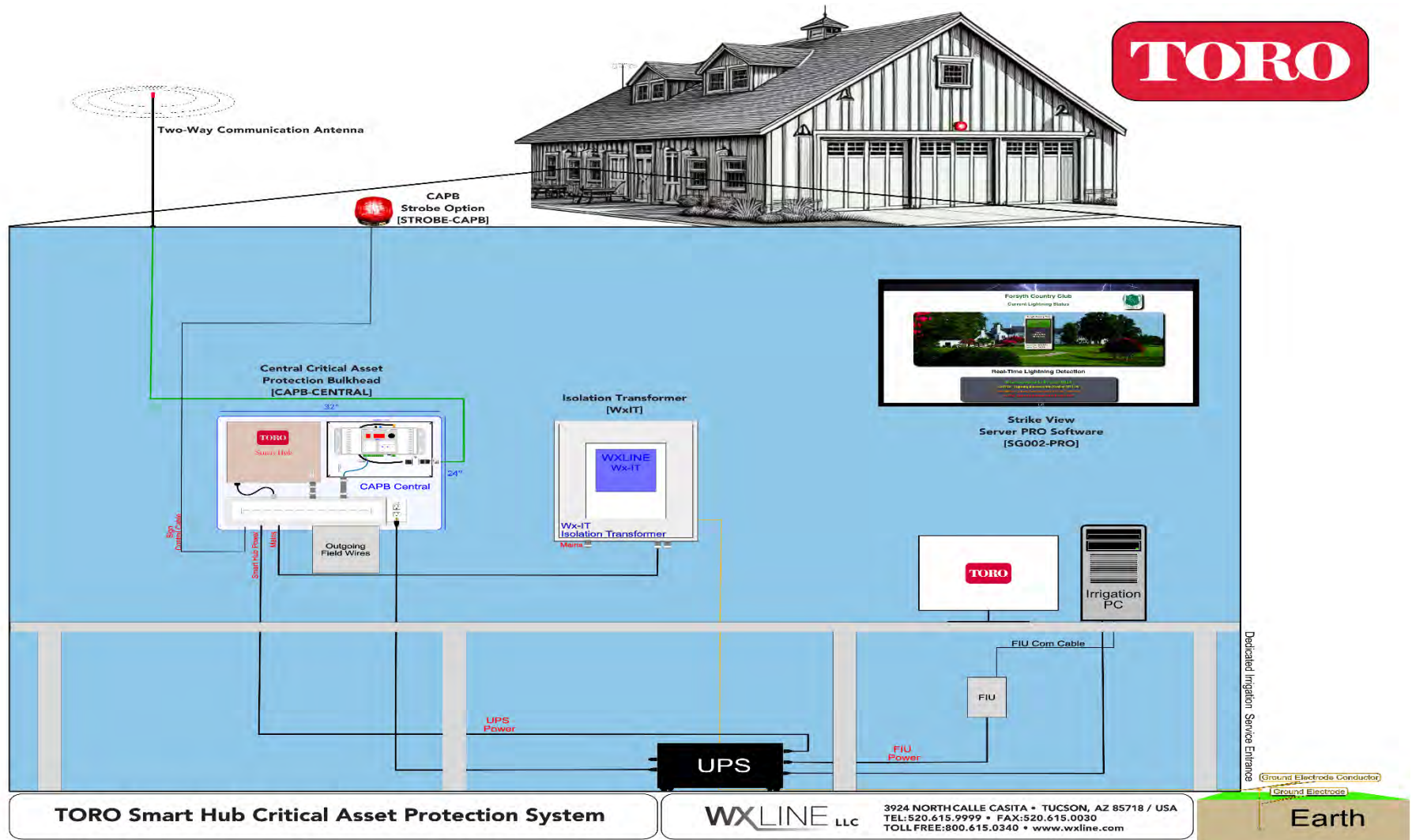
Figure 10: Overview for Toro Smart Hub Irrigation System

Toro Smart Hub System Overview Parts List

Product	Part Number	Product Description	Product Image
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL	CAPB-XCVR CENTRAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to central irrigation controller computer and related hardware.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
Remote Critical Asset Protection Bulkhead	CAPB-XCVR-REMOTE	Automatic wireless remote power-disconnect features a WAVE Sequencer XCVR (included) provides eight programmable 12VDC Main and two Auxiliary Outputs, and fully assembled and tested relay isolation bank to manage power source disconnection and reconnection for protection of power source facilities & irrigation satellites during local thunderstorms.	

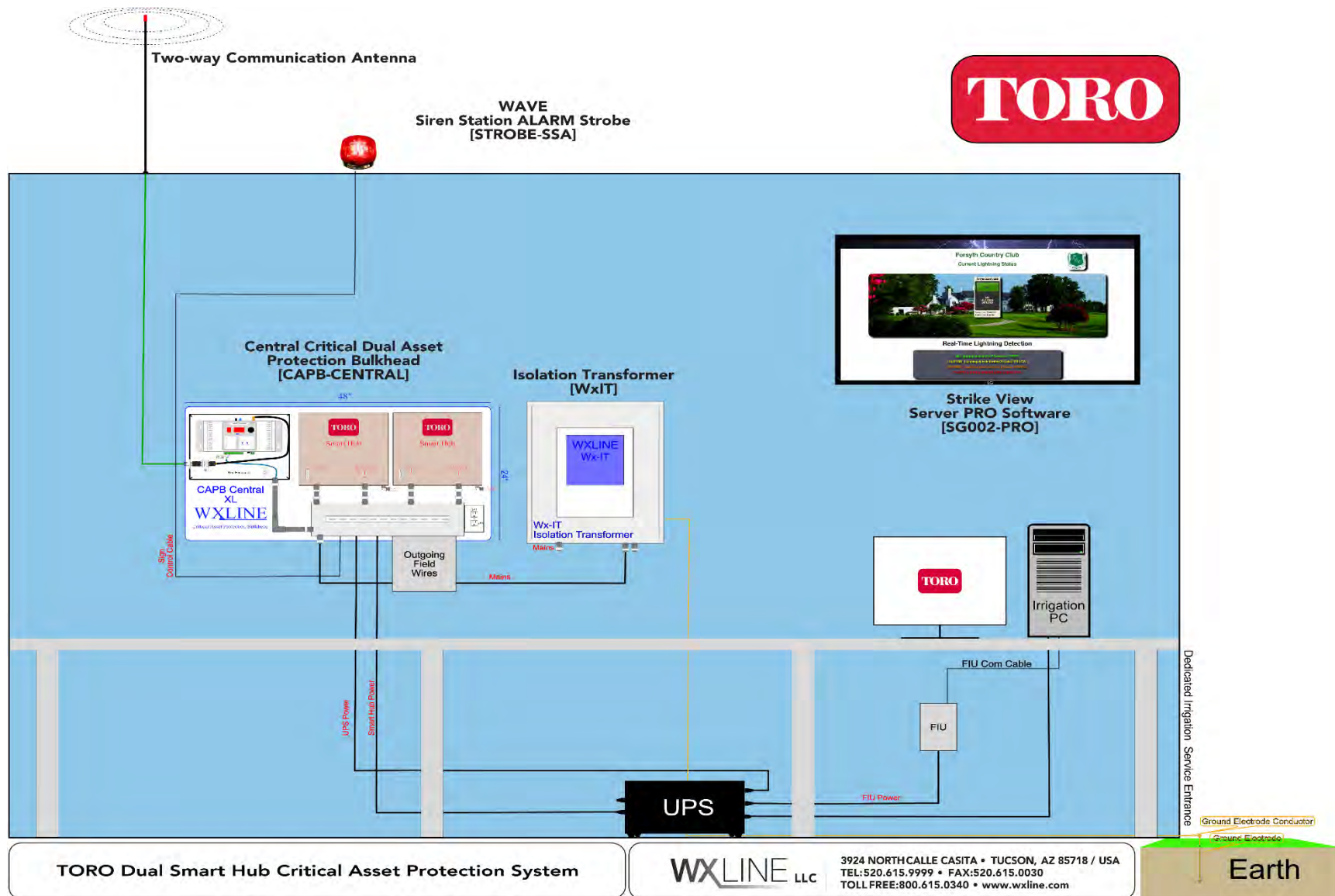# Asset Protection Overview for Dual Toro Smart Hub Irrigation System

Figure 11: Asset Protection Overview for Dual Toro Smart Hub Irrigation System

Toro Dual Smart Hub System Overview Parts List:

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning BASE System	SG001-BASE	Strike Guard, Strike View and WAVE Transceiver Base installation system includes SG001v2, WAVE Transceiver and Bulkhead with PC and Strike View PRO.	
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL-DUAL	CAPB-XCVR CENTRAL DUAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to two central irrigation controllers, computer, and related hardware.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
Remote Critical Asset Protection Bulkhead	CAPB-XCVR-REMOTE	Automatic wireless remote power-disconnect features a WAVE Sequencer XCVR (included) provides eight programmable 12VDC Main and two Auxiliary Outputs, and fully assembled and tested relay isolation bank to manage power source disconnection and reconnection for protection of power source facilities & irrigation satellites during local thunderstorms.	

Chapter 8

Unique Irrigation System Options
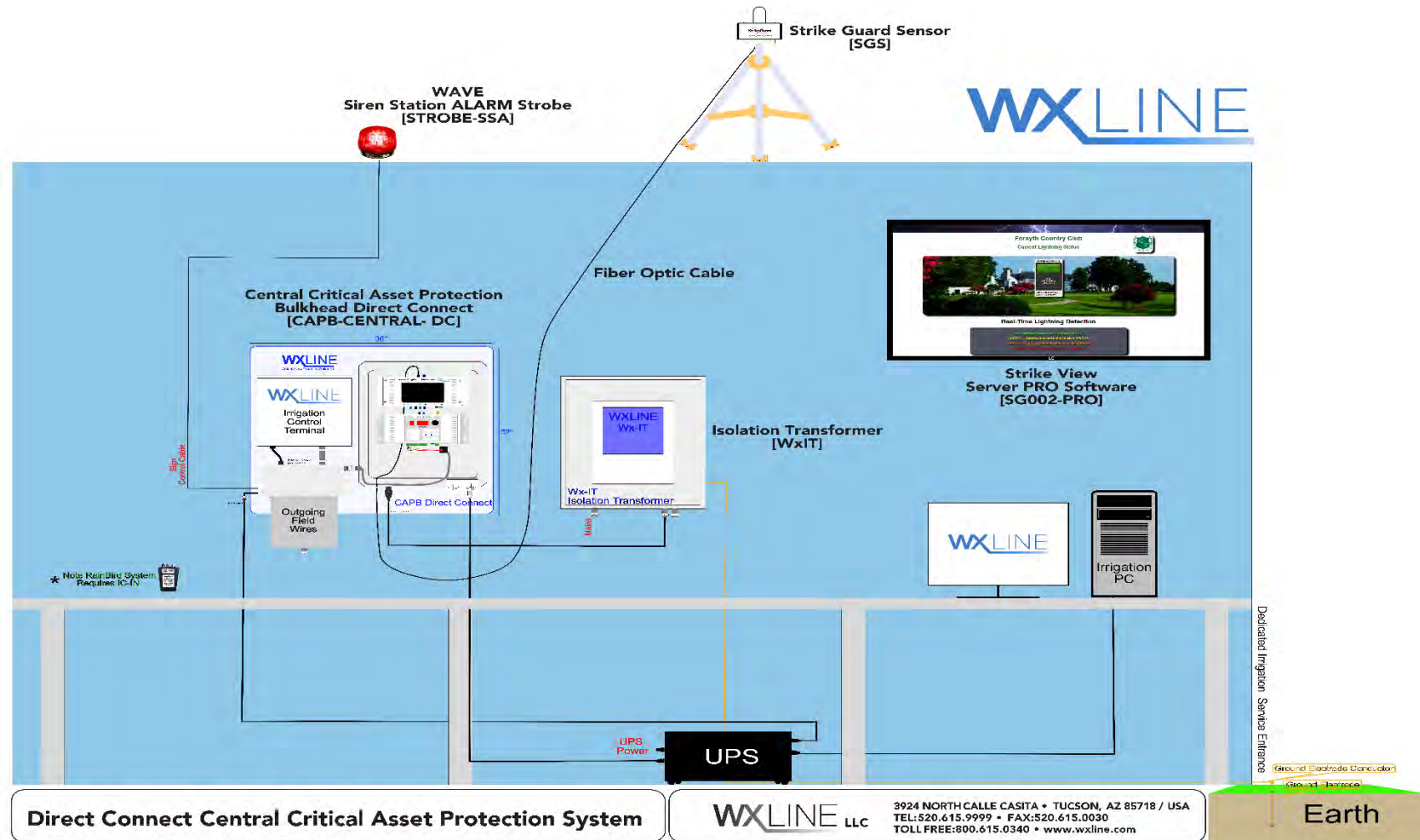
Direct Connect Central Critical Asset Protection System

Figure 12: Direct Connect Central Critical Asset Protection System

Direct Connect System Overview Parts List

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning BASE System	SG001-BASE	Strike Guard, Strike View and WAVE Transceiver Base installation system includes SG001v2, WAVE Transceiver and Bulkhead with PC and Strike View PRO.	
Central Critical Asset Protection Bulkhead Direct Connect	CAPB-CENTRAL-DC	The Strike Guard base installation combines with the CAPB-CENTRAL to provide a single location hub, with the Strike Guard Lightning Data Receiver interfacing directly to the CAPB CENTRAL-DC. This configuration does not require a WAVE Transceiver.	
Isolation Transformer	WxIT	Fully metal-enclosed Isolation Transformer provides a separately derived system for irrigation components and related accessories.	
WAVE Siren Station ALARM Strobe	STROBE-SSA	High-intensity RED Strobe illuminates during Lightning ALARM Mode until Alarm expires. This feature is added to a new Siren Station. REQUIRES WAVE TRANSMITTER MODEL v2 or WAVE-TR01-v2-I.	
RainBird IC-IN	IC-IN	Rainbird IC-IN allows WAVE Sequencer to communicate with the Irrigation Control Interface. (Part acquired from RainBird)	

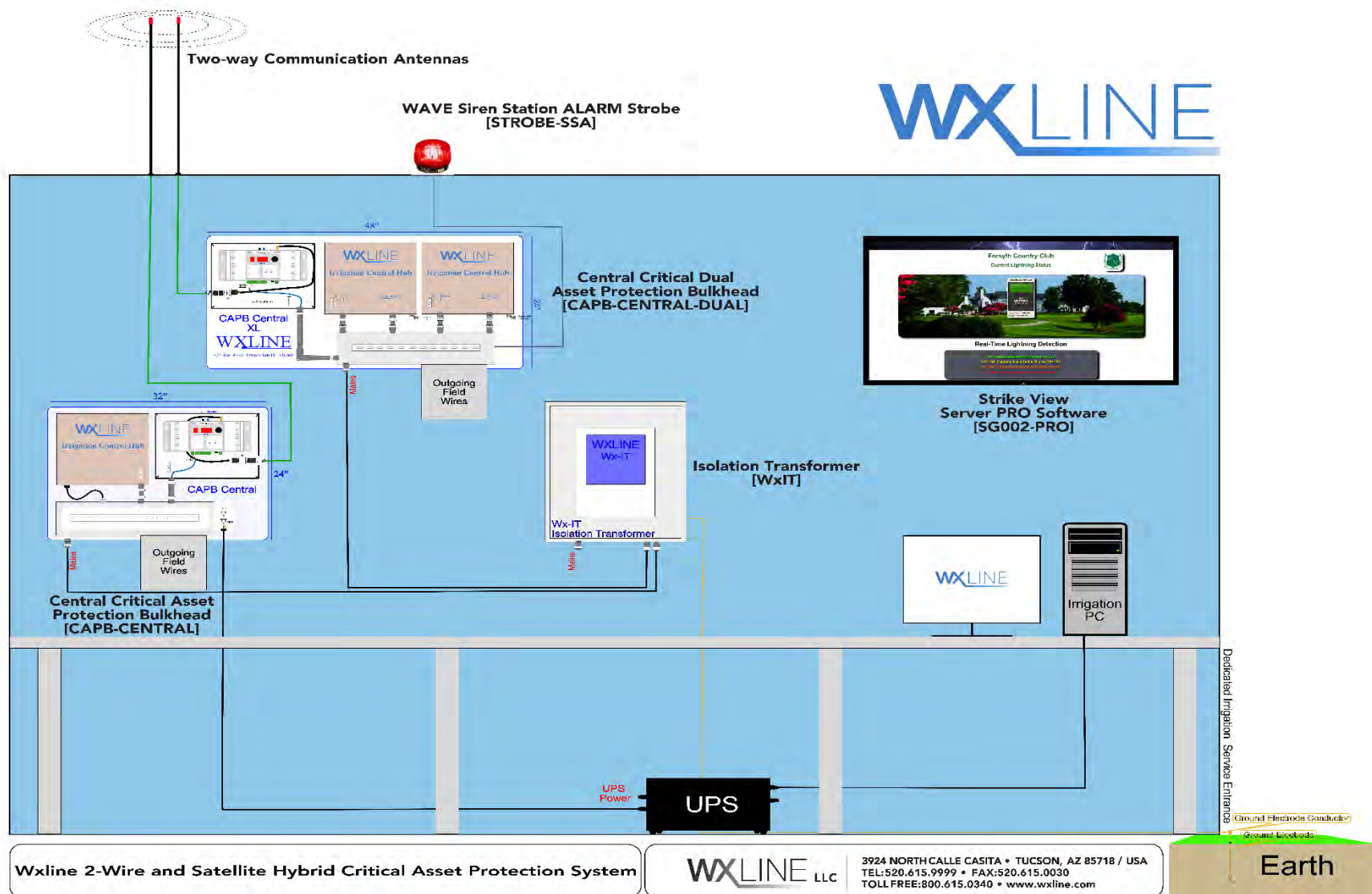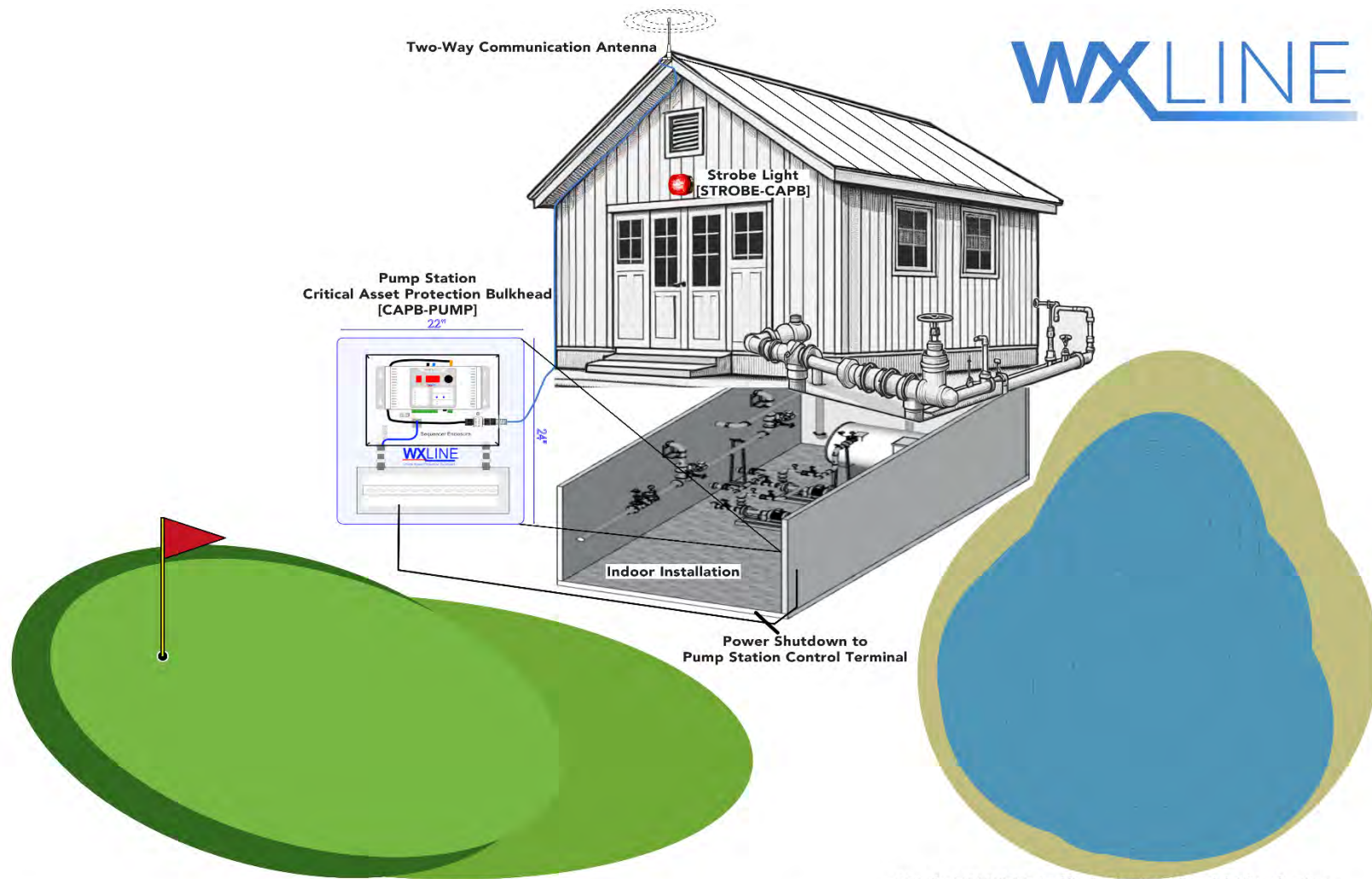# Full System Overview for Human Safety and Critical Asset Protection

Figure 13: Wxline 2-Wire & Satellite Hybrid CAPB

Critical Asset Protection Full System Overview Parts List

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning BASE System	SG001-BASE	Strike Guard, Strike View and WAVE Transceiver Base installation system includes SG001v2, WAVE Transceiver and Bulkhead with PC and Strike View PRO.	
WAVE Siren Station Triple with Solar and Strobe	WAVE-XCVR-SS03-SO-STA	Multi-function, <u>Triple</u> remote siren station with <u>three</u> all-weather 120-degree directional horns, one high-intensity strobe, radio receiver, 55 WATT Solar panel with upgraded battery back-up, mounting plate, and antenna.	
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL-DUAL	CAPB-XCVR CENTRAL DUAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to two central irrigation controllers, computer, and related hardware.	
Central Critical Asset Protection Bulkhead	CAPB-XCVR-CENTRAL	CAPB-XCVR CENTRAL provides automatic lightning protection-by-isolation and/or grounding of field conductors connected to central irrigation controller computer and related hardware.	

Pump Station Critical Asset Protection System

Figure 14: Pump Station Critical Asset Protection System

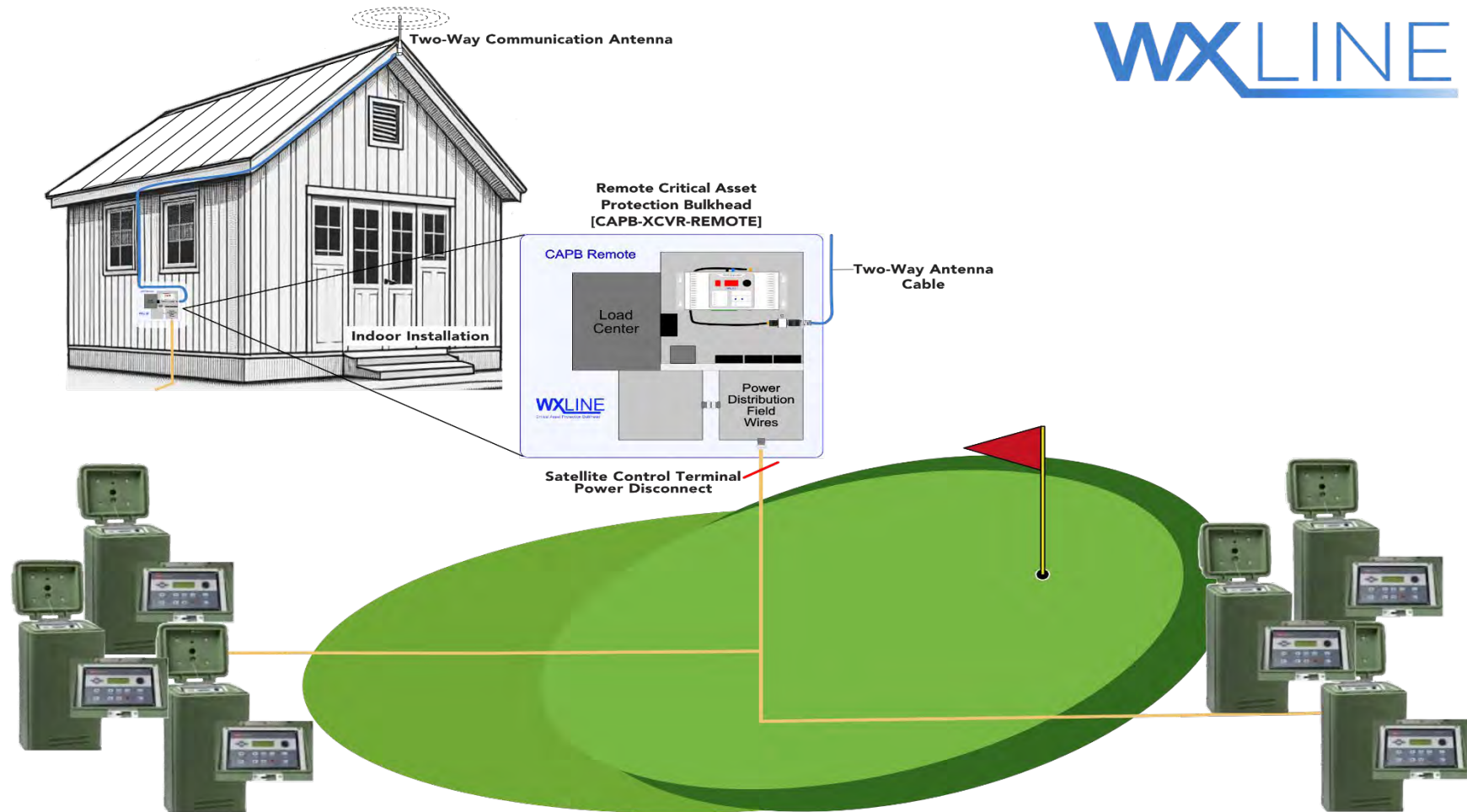## Pump Station Critical Asset Protection System Overview Parts List

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning BASE System	SG001-BASE	Strike Guard, Strike View and WAVE Transceiver Base installation system includes SG001v2, WAVE Transceiver and Bulkhead with PC and Strike View PRO.	
Pump Station Critical Asset Protection Bulkhead	CAPB-XCVR-PUMP	WAVE Sequencer XCVR-based remote wireless-Transceiver or local Strike Guard direct (wired) connect for contact-closure relay signaling to initiate automated lightning alarm shut-down/start-up of irrigation pump stations.	
CAPB Strobe Option	STROBE-CAPB	High-intensity RED Strobe illuminates to show CAPB is in protected state during Lightning Alarm Mode. Strobe flashes until ALARM expires.	

Satellite Control Remote Critical Asset Protection System

Figure 15: Satellite Control Remote Critical Asset Protection System

Satellite Control Remote Critical Asset Protection System Overview Parts

Product	Part Number	Product Description	Product Image
Strike Guard Lightning Warning BASE System	SG001-BASE	Strike Guard, Strike View and WAVE Transceiver Base installation system includes SG001v2, WAVE Transceiver and Bulkhead with PC and Strike View PRO.	
Remote Critical Asset Protection Bulkhead	CAPB-XCVR-REMOTE	Automatic wireless remote power-disconnect features a WAVE Sequencer XCVR (included) provides eight programmable 12VDC Main and two Auxiliary Outputs, and fully-assembled and tested relay isolation bank to manage power source disconnection and reconnection for protection of power source facilities & irrigation satellites during local thunderstorms.	
CAPB Strobe Option	STROBE-CAPB	High-intensity RED Strobe illuminates to show CAPB is in protected state during Lightning Alarm Mode. Strobe flashes until ALARM expires.	

Chapter 9

System Enhancement Options:

Product	Part Number	Product Description	Product Image
1-Stage Lightning Sign	**WAVE-SN-A1**	High-visibility 32 inch by 16 inch Billboard-like sign displays "LIGHTNING – ALARM" condition via high-intensity LED lights. Default: Clear = Alarm. Sign is added to WAVE Siren Station through quick connect cable. (Specify length - Max 25ft)	
2-Stage Lightning Sign	**WAVE-SN-AC2**	High-visibility 32 inch by 18-inch Billboard-like sign displays "LIGHTNING – CAUTION and ALARM" conditions via high-intensity LED lights. Default: Amber = Caution, Clear = Alarm. Sign is added to WAVE Siren Station through quick connect cable. (Specify length - Max 25ft)	
3-Stage Lightning Sign	**WAVE-SN-AWC3**	High-visibility 32 inch by 24-inch Billboard-like sign displays "LIGHTNING – CAUTION, WARNING, and ALARM" conditions via high-intensity LED lights. Default: Amber = Caution, Red = Warning, Clear = Alarm. Sign is added to WAVE Siren Station through quick connect cable. (Specify length - Max 25ft)	
CAPB Strobe Option	**STROBE-CAPB**	High-intensity RED Strobe illuminates to show CAPB is in protected state during Lightning Alarm Mode. Strobe flashes until ALARM expires.	

WX LINE

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