User Manual

Series: XTR-WRC-24, XTR-WRC-900

Wireless Remote-Control Switch Transmitter/Relay Receiver System

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Section1 Before You Install and Use Your Equipment

1.1 Symbols & Safety Information

Listed below are the International Symbols used on the product, or in this manual.

Danger: Electric Shock Hazard

Warning: Refer to Documentation and Users Guide

General Safety Guidelines

- Follow all safety guidelines outlined in this guide and/or marked on the unit.
- Never install or operate this product outside the specifications listed in this guide.
- Never install and operate in flammable or explosive environments.
- Install your unit in a location that is out of the reach of unauthorized personnel.
- Always install additional disconnect and safety devices to provided added protection.
- Never operate this product outside the environmental limits specified in this guide.

Electrical Safety Guidelines

- Never attempt maintenance or service while power is connected.
- Installation and all wiring should be done by a trained professional.

Note: Personnel entrusted with installation, setup and operation of this product must be suitably qualified and trained. The required knowledge and experience can be gained via training courses and appropriate on-the-job instruction. Personnel should have this document available to them at all times when working with this product.

RF Safety Guidelines

- Only operate this product with the antenna provided or optional antennas listed in this guide.
- Never install and operate this product where there will always be people closer than 20 cm.
- Never operate multiple units within 20 cm or less from each other.
- Never operate other RF transmitters of the same frequency within 20 cm or less of this product.

1.2 Condition of Use

Imagine Instruments LLC products are not designed, intended or authorized for use in medical applications, applications intended to sustain or support life, in any nuclear facilities or any other application where the failure of the product could create a situation where catastrophic property damage, personal injury or death may occur. In the event that the Customer purchases or uses any Imagine Instruments LLC products for any such unintended or unauthorized application, the Customer shall indemnify and hold harmless Imagine Instruments LLC and its officers, directors, employees, agents, affiliates, successors and assigns against all claims, costs, damages and expenses (including reasonable attorneys' and expert witness' fees) arising out of or in connection with, directly or indirectly, any claim for property damage, personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Imagine Instruments LLC was negligent regarding the design or manufacture of the subject product.

1.3 Unpacking

Unpack your product carefully and inspect for any shipping damage. Notify the carrier immediately if you find damage.

The following items are included with your system:

- Two Antennas
- Transmitter / Receiver Set
- This User's Guide

Section 2 Introduction

2.1 Product Description

The XTR-WRC Series Wireless Remote-Control System allows for remotely activating equipment from a distance of up to 1 mile for XTR-WRC -24 or up to 6 miles for XTR-WRC -900 using license free wireless radio communication. Units are equipped with contact closure inputs that are used to control open-collector outputs. Models are available with 1 or 2 control lines. The control inputs are activated with any type, non-powered dry-contact switch or relay contacts in an automated control system (such as a PLC). The provided control relay outputs are SPDT type and operate with DC a maximum load capacity of 10 Amps max.

2.2 Available Models & Options

Model Number	Description	Control Lines
XTR-WRC-24-1	2.4 GHz Wireless Control Transmitter/Receiver Set	1
XTR-WRC-900-1	900 MHz Wireless Control Transmitter/Receiver Set	1
XTR-WRC-24-2	2.4 GHz Wireless Control Transmitter/Receiver Set	2
XTR-WRC-900-2	900 MHz Wireless Control Transmitter/Receiver Set	2

Optional Items

Model Number	Description
DRWC-24-LRANT	2.4 GHz Long Distance Antenna Set
DRWC-900-LRANT	900 MHz Long Distance Antenna Set

Section 3 Specifications

3.1 Specifications

Models: XTR-WRC-24-1, XTR-WRC-24-2

Radio Frequency: ISM 2.4 GHz
RF Power Output: 79mW
RF Data Rate: 250 kbps
Regulatory: FCC Part 15 Compliance (No license required)
Control Lines: (see model chart)
Receive Sensitivity: -103 dBm
Antenna Connection: RP-SMA
Antennas: 5dbi, Omni-directional (Included)
Transmit/Receive Distance (with included antenna set)
US/CA Model: Indoor/Urban 100ft, Outdoor Line-of-site 600ft
Transmit/Receive Distance (with optional antenna set)
US/CA Model: Indoor/Urban 300ft, Outdoor Line-of-site 1 Mile
Transmitter/Receiver Code Matching: Factory set
Wire Connection: Terminal Blocks, 14-24AWG
Switch Input: Non-powered, Dry-contact only.
Control Output: Relay SPDT 10A 120V AC Max
Operating Temperature: -22 to 113 ºF (-30 to 45 ºC)
Operating Power: 12 - 14V DC @ 2W max
Enclosures: NEMA 4X, Powder Coated Aluminum (4.5 x 4.5 x 2.8")

Models: XTR-WRC-900-1, XTR-WRC-900-2

Radio Frequency Band: 902 MHz to 928 MHz
RF Power Output: 250mW
RF Data Rate: 10 kbps
Regulatory: FCC Part 15 Compliance (No license required)
Control Lines: See model chart
Receive Sensitivity: -110 dBm
Antenna Connection: RP-SMA
Antennas: 7dbi, Omni-directional (Included)
Transmit/Receive Distance (with included antenna set) Indoor/Urban 1000ft, Outdoor Line-of-site 3 miles, (with optional antenna set) Indoor/Urban 1600ft, Outdoor Line-of-site 6 miles.
Transmitter/Receiver Code Matching: Factory set
Wire Connection: Terminal Blocks, 14-24AWG
Switch Input: Non-powered, Dry-contact only.
Control Output: Relay SPDT 10A 120V AC Max
Operating Temperature: -22 to 113 ºF (-30 to 45 ºC)
Operating Power: 12 - 14V DC @ 3W max
Enclosures: NEMA 4X, Powder Coated Aluminum (4.5 x 4.5 x 2.8")

3.2 Environmental Operating Conditions

This product has been designed to provide performance and durability over its lifetime. To keep this product working correctly it should be handled with care and only operated within the following recommended environmental operating conditions.

- An ambient operating temperature range of -10 to130 ºF (-23 to 54 ºC)
- A relative humidity of 0-90% Non-condensing

3.3 Regulatory Approvals, Location Use & Export Compliance

REGULATORY APPROVALS

Models: WIDXL-24

FCC(USA) - MCQ-XBEE3
IC (Canada) - 1846A-XBEE3

Models: WIDXL-900

FCC(USA) - MCQ-XB900HP
IC (Canada) - 1846A-XB900HP

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

Statement of CE Conformity

Imagine Instruments LLC is committed to compliance with the laws and regulations in each country into which we ship our products. Please contact us to learn the current status of CE compliance for this product.

Location Use

Standard models of this product are limited to the sale and use in USA and Canada only. Additional models are available for use in Europe (EU), Australia, New Zealand and Japan. Please contact us for model number and availability.

Export Compliance Policy

Customer shall not, directly or indirectly, export, re-export, transfer, furnish or ship products in violation of any applicable export control laws or regulations of any country having jurisdiction over the products, including any and all US law or US Government export controls. Customer agrees, at Customer's own expense, to comply with all applicable export laws and will, in accordance with the indemnification provisions of these Terms and Conditions, indemnify, defend and hold Imagine Instruments LLC, Its officers, owners, agents and employees harmless from any claim against Imagine Instruments LLC due to Customer's violation or alleged violation of any export laws.

Section 4 Installation

4.1 General Guidance

Your wireless control system must be installed and maintained as described in this guide to ensure reliable safe operation. Confirm the voltage and current draw of your connected load to the control output is consistent with the design specifications of this product and your application will not exceed the maximum load capacity listed.

4.2 Mounting and Area Environment

This product has been designed for indoor or protected outdoor use. Ensure that the unit has sufficient area for proper antenna positioning. See below.

********** CAUTION **********

Never operate this product in areas where flammable liquids, gases or any other flammable materials are or might be present.

4.3 Antenna Installation, Positioning and Connection

Proper antenna installation and positioning is important and will allow you to achieve maximum performance and distance between your transmitter and receiver unit. This will reduce the possibility of a lost connection during operation.

Antenna Basics

When installing your transmitter and receiver it is important to install both units in such a way as to optimize the position of both antennas within what's known as the "Fresnel Zone". A Fresnel Zone can be thought of as a football shaped invisible tunnel between two antennas that provides an optimum path for the RF signals between your transmitter and receiver.

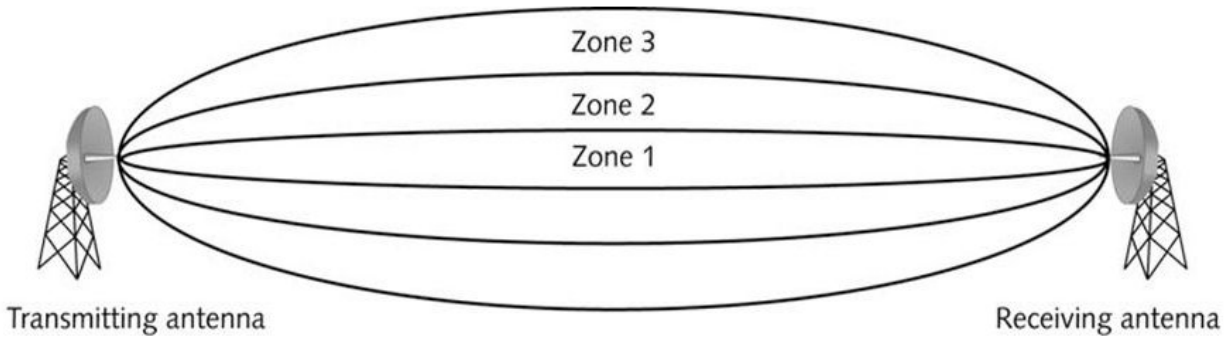

Figure 1. The "Fresnel Zone"

In order to achieve maximum distance, the path in which the RF signals travel must be free of all obstructions. Obstacles in the path will decrease the transmit/receive distance. Also, if the antennas are mounted too low to the ground, most of the Fresnel zone ends up being obstructed by the earth resulting in significant reduction in transmit/receive distance. Your antennas should be mounted as high off of the ground as possible.

NOTE:

It is important to understand that your application environment may change over time due to new equipment, buildings or another RF device being installed. There can also be change within your building such as new construction, etc. If new obstacles are added between your switch transmitter and relay receiver you may need to move and reposition your antennas.

Connecting Your Antennas

Your control system has been shipped to you with standard antennas. In some difficult installations you may wish to place a remote antenna farther away to maximize transmission range to the receiver. A remote antenna kit option can be ordered that include an antenna extension cable and antenna mounting bracket. Please note that very long antenna extension cables will always add loss to the signal strength. The longer the cable the more signal will be lost over the cable. Because of this the length of the cable should be kept as short as possible. Use of any other antenna then what's supplied with your system or what's available as an option may void FCC and IC regulatory compliance.

Antenna Placement (Standard Included Omni Antennas)

Vertical Antenna Placement

If the antenna for one of your units is mounted in a vertical position you should mount the antenna of the opposing unit in the same polarization.

Figure 2. Vertical Antenna Example

Horizontal Antenna Placement

If the antenna for one of your units is mounted in a horizontal position you should mount the antenna of the opposing unit in the same polarization.

Antenna Placement (Optional Long-Distance Yagi Antennas)

Horizontal Antenna Placement

The optional long-distance Yagi antennas must be mounted in the horizontal position as shown in the picture below. Antennas should be mounted pointed at each other.

Figure 3. Horizontal Antenna Example

4.4 Antenna Cables

In some Wireless Control System installations antenna extension cables are needed between the transmitter or receiver and the antennas being used. This is mainly because the antennas need to be mounted higher off the ground, or out of the way of physical obstructions to obtain a clearer line-of-site for the RF signal path.

The one drawback in using antenna extension cables is the resulting signal loss. Signal loss through a length of coaxial cable is primarily a function of two things: Length and Frequency. The longer the length of a piece of coaxial cable, the more signal is lost. The higher the frequency of the signal passing through the coaxial cable, the higher the loss over a given length. Coaxial cable loss is normally specified in dB loss per foot of cable.

The cable between the Transmitter / Receiver box and antenna should never exceed 20 ft.

Section 5 Setup & Wiring

5.1 Powering Your Unit

For proper operation and safety your system must always be earth grounded.

WARNING: Electrical Shock Hazard

All wiring should be done by a qualified suitably trained person only.

CAUTION: Ensure all control output connections are well insulated.

Note: Fusing is recommended in series with control outputs.

Powering Supply Wiring

Both the Transmitter and Receiver operate on 12-14V DC. A power supply with a 3W or higher operating capacity is sufficient. Power to operate both the transmitter and receiver are connected to Terminal 1 (+) and Terminal 2 (-). See below example.

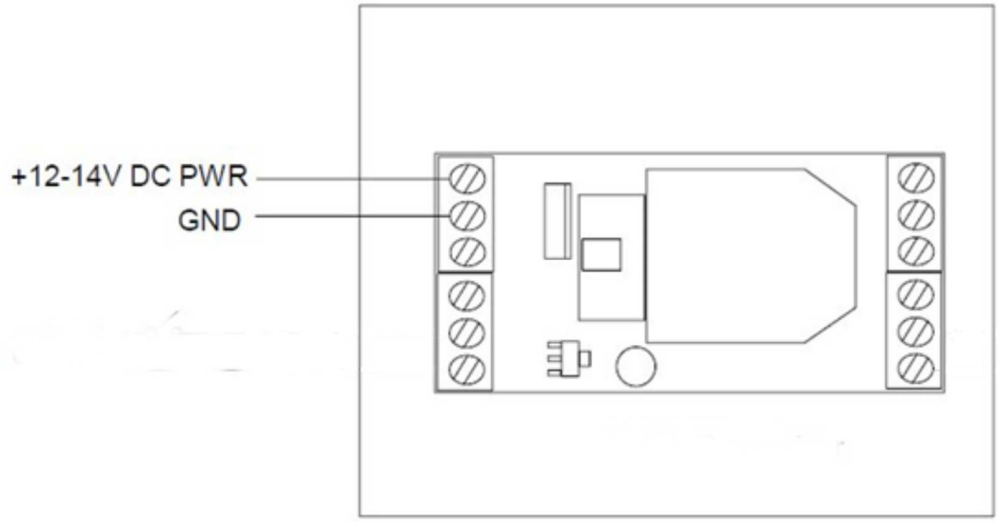

Figure 4. Power Supply Connection

Battery Power with Solar Charging Operation

Your switch Transmitter board can also be powered with a 12V DC rechargeable deep-cycle battery, solar panel and solar charge controller. The solar panel and charge controller will re-charge the battery each sunny day. This setup will provide uninterrupted power to your switch transmitter.

Section 6 – General Operation & Mounting

6.1 Basic System Operation & Factory Settings

This Wireless Remote-Control System allows for remotely activating equipment using license free radio communication. Contact closure inputs on the Transmitter are used to control relay outputs on the opposing unit within the system. Inputs are activated with dry-contact manual switches or connected to a PLC for automated control.

Factory Settings

Units are sold and shipped as a "Matched Pair". Factory code setting ensures matched pair units only communicates with each other. Multiple matched pair systems can be used within the same area without interfering with each other. Each unit receives a factory code that is printed on the product label.

6.2 Status LED

On the front of both the transmitter and receiver there is a yellow "Status" light (LED). This status light will blink on and off continuously when the unit is powered correctly, and the unit is functioning normally. The light does not indicate communication between units. If the light is not blinking continuously when the unit is powered there is something wrong with the unit and it will not transmit or receive signals.

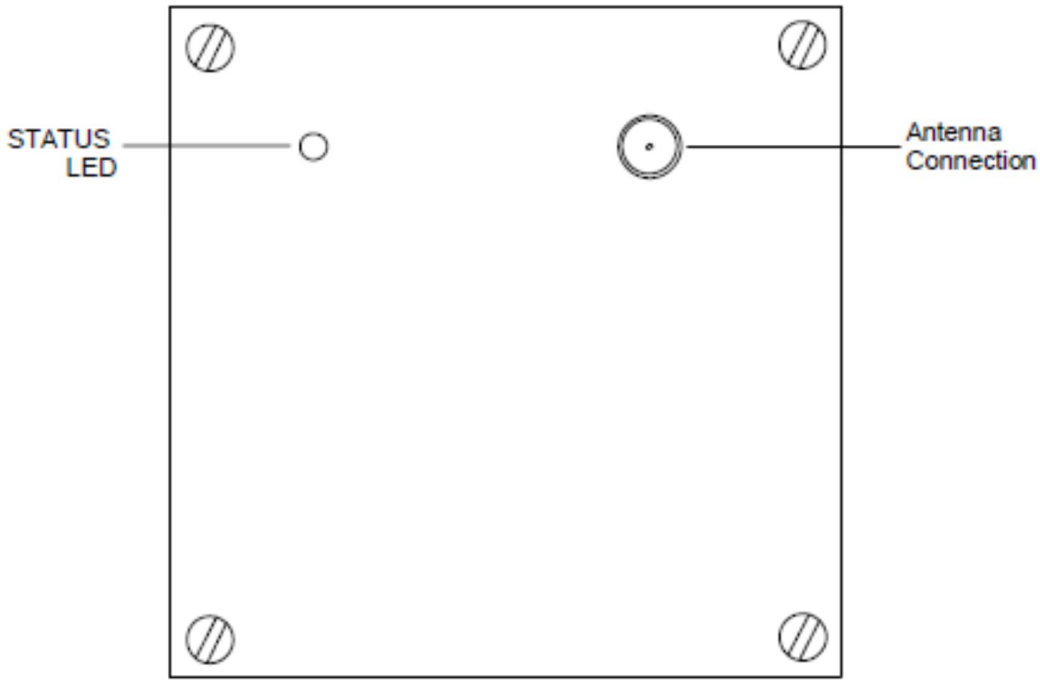

Figure 5. Status LED

6.3 Bench Test Prior to Field Installation

Even though your system has been factory tested prior to shipping we recommend that you bench test the system yourself before you permanently install the units in the field. Bench testing the system will allow you to confirm that the system is working and let you become familiar with how the system works. This will help you understand what the problem might be if you fail to get the relay to switch on and off after your field install the system.

Here is the recommended bench test procedure…

1. Place the Transmitter and Receiver on a bench or table about 4 feet apart from each other.
2. Connect power to both units shown in this manual (12V DC).
3. Observe that the yellow "Status" light on both units are blinking on and off continuously.
4. Short the switch input connection on the Transmitter (a short piece of wire can be used)
5. Observe that when you apply and then remove the switch input shorting wire that the relay in the Receiver unit is switching on and off accordingly. You should be able to hear the relay clicking as it energizes and then releases. You can also connect a Ohm meter across the relay normally open contacts and see that the connection changes state.

Now that you have bench test the system and have seen that it works you can move on to your field installation.

6.4 Recommended Field Installation Procedure

Receiver Installation

When field installing your system, we recommend that you permanently install the control receiver first. Make sure to follow all the recommendations and guidance outlined in the Antenna installation section of this user guide. Antennas should be mounted in the correct polarization and as high off the ground as possible.

Transmitter Installation

When field installing the Transmitter, we recommend that you temporarily make the Transmitter a portable unit be connecting a small 12V DC battery to the unit and use a piece of shorting wire to simulate the switch you will connect to the input. By doing this you can move the Transmitter and antenna around until you get a good solid signal connection between the Transmitter and Receiver. We recommend that you have an additional person during the installation so they can monitor the Receiver unit and let you know when the relay is turning on and off as you try shorting the switch input. This 2-person operation (communicating by Cell Phone) is especially useful when the distance between the Transmitter and receiver is a great distance apart. After finding the optimum location for the Transmitter and antenna they can be permanently mounted.

6.5 Enclosure Dimensions

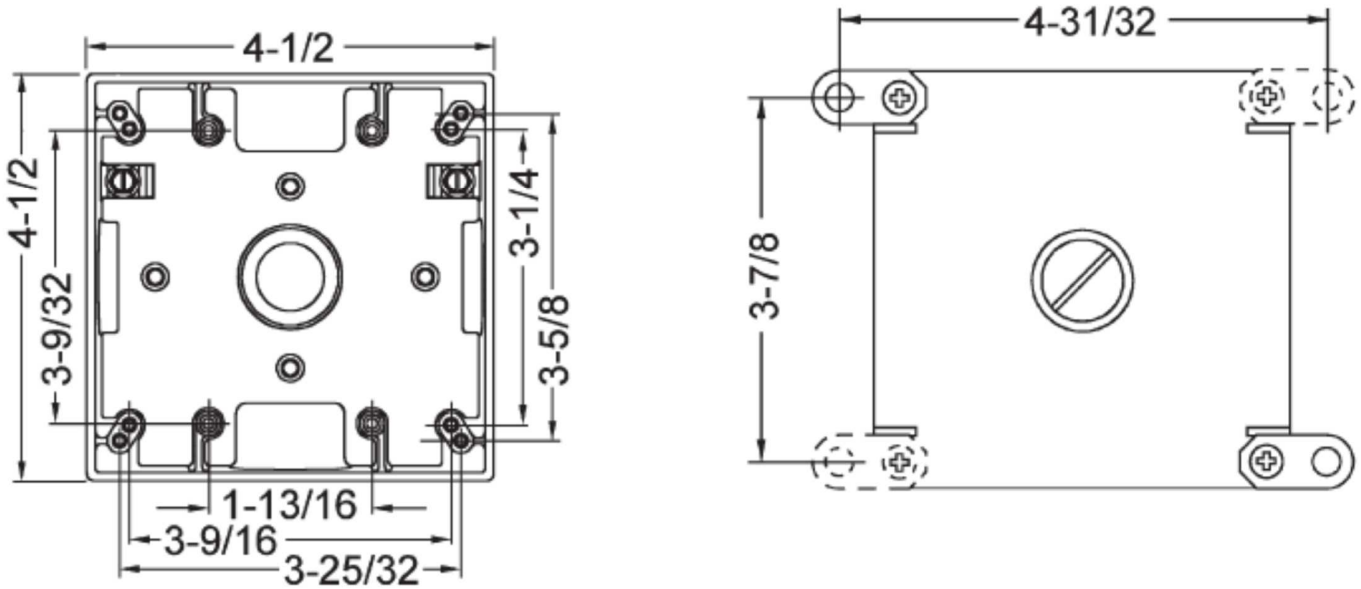

Figure 6. Enclosure Dimensions (Rear View)

Enclosure Mounting

The Transmitter and Receiver enclosures are mounted with the metal ear tabs shown in the picture below. Self-tapping screws are provided to secure the ear tabs to the enclosure body.

The enclosures are standard metal conduit boxes that have ½" NPT holes allowing the use of standard conduit fittings or cable glands for wire entry and exit. Hole plugs are provided to seal-off any unused holes.

Figure 7. Enclosure Mounting Tabs

Section 7 – Connecting Switch Inputs & Control Outputs

7.1 Connecting Transmitter Switches

On models XTR-WRC-24 or XTR-WRC-900 there are switch inputs on only one side of the system. Switch inputs are only on what we call "the transmitter". The switch inputs connected to the transmitter must be "dry-contact type. That means you do not need to supply any type of power on the input circuit. The input is a two-wire connection that can be a simple mechanical switch, a level or flow switch, or the contacts of a relay. If you apply power to any of the switch inputs, you will damage the unit.

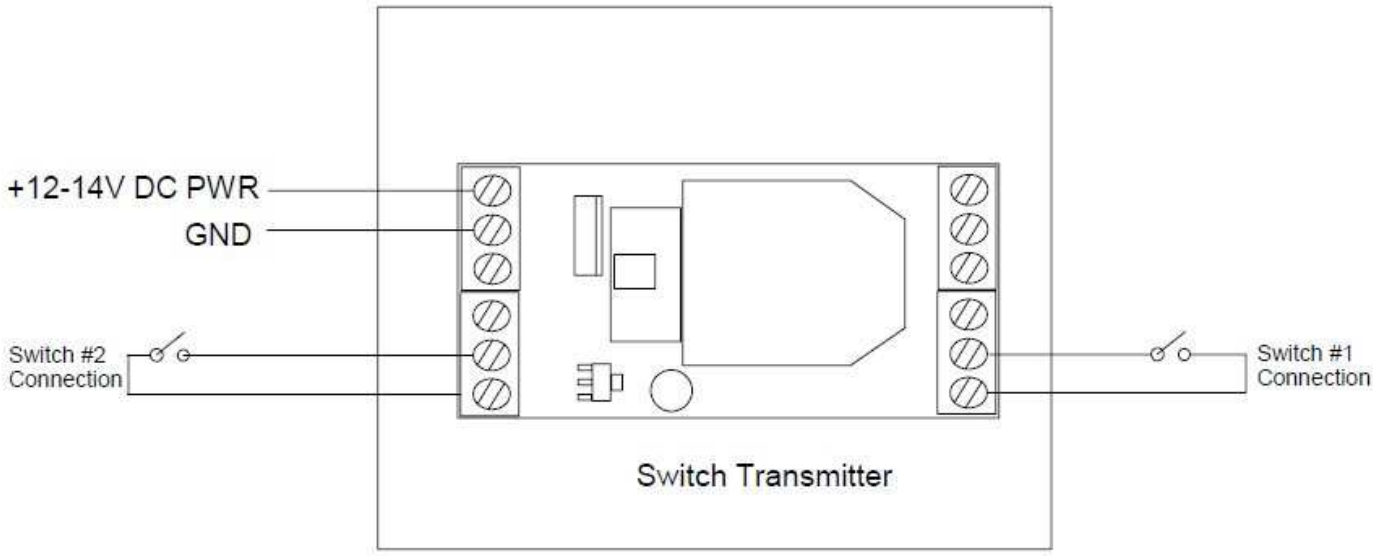

Figure 8. Transmitter Switch Connection

7.2 Connecting Output Relays

On models XTR-WRC-24 or XTR-WRC-900 there are control outputs on only one side of the system. Control outputs are only on what we call "the receiver". The control outputs are 10A SPDT mechanical relays. Connection to the relay is made by use of standard ¼" push-on disconnects.

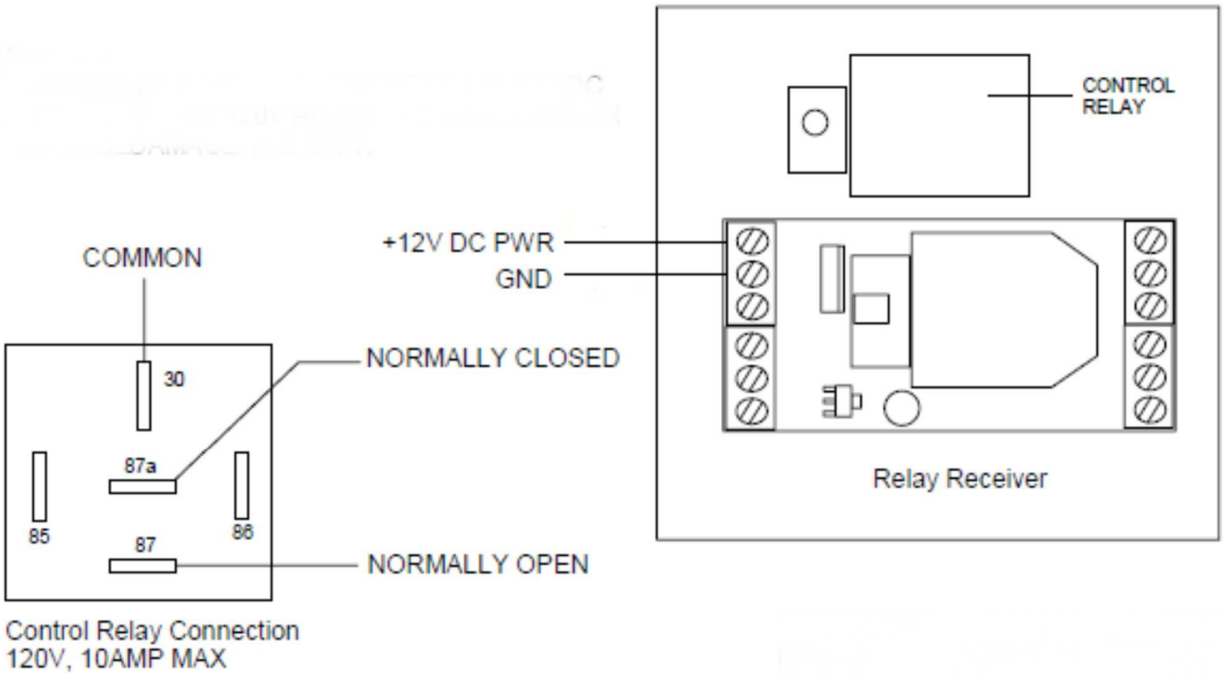

Figure 9. Output Relay Connection

Section 8 Maintenance

8.1 Maintenance

This product has been designed to be maintenance free during its lifetime. Periodic inspection should take place to ensure that the following has not occurred during use:

- Ensure the unit is still mounted securely and has not become loose due to vibration.
- With power removed Ensure all wiring connection are still tight and well insulated.
- Ensure the unit is free of moisture, grease, dirt or any other foreign material.

If the outside of this product has become soiled, it may be wiped clean with a lightly damp cloth. Allow the unit to air dry for a least 48 hours after cleaning before use. Only clean the unit when

Section 9 Warranty & Liability

9.1 Warranty/Product Returns

Imagine Instruments LLC as expressed as "Company" in this document.

All Product orders are subject to written acceptance by Company by a duly authorized agent of Company. This product is covered by a Limited Warranty for a period of 5 years from the date of purchase which applies to defective Products only. COMPANY EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Company will only accept the return of defective Products. Such returns must be pre-approved by Company in writing and an RMA (Return Material Authorization) number must be issued by Company before Company will accept such return. Return shipments not pre-approved by Company will be refused. Company will inspect pre-approved returns to determine whether they are defective, which determination by Company is final. Products must be returned in the same or equivalent container and packaging materials in which they were originally shipped. Customer retains title to any Products returned. Return freight cost is the responsibility of Customer. If Company determines a Product is defective, it may repair or replace the defective Product.

9.2 Limitation of liability

COMPANY'S LIABILITY ON ANY CLAIM OF ANY KIND, INCLUDING NEGLIGENCE, FOR ANY LOSS OR DAMAGE ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM THE MANUFACTURE, SALE, DELIVERY, RESALE, REPAIR OR USE OF ANY PRODUCTS COVERED BY OR FURNISHED HEREUNDER, SHALL IN NO CASE EXCEED THE LESSER OF THE COST OF REPAIRING OR REPLACING PRODUCTS FAILING TO CONFORM TO THE WARRANTIES CONTAINED HEREIN, IF ANY, OR THE PRICE OF THE PRODUCTS OR PART THEREOF WHICH GIVES RISE TO THE CLAIM. IN NO EVENT WILL COMPANY BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONTINGENT DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS, GOODWILL, USE OR OTHER INTANGIBLE LOSS (EVEN IF COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES), RESULTING FROM: (I) THE USE OR THE INABILITY TO USE PRODUCTS PURCHASED FROM COMPANY; (II) THE COST OF PROCUREMENT OF SUBSTITUTE PRODUCTS RESULTING FROM ANY PRODUCTS PURCHASED OR OBTAINED FROM COMPANY; OR (III) ANY OTHER MATTER RELATING TO PRODUCTS PURCHASED FROM COMPANY.

Additional "Terms & Conditions" apply. Please visit www.imagineinstruments.com to read the complete Imagine Instruments LLC "Terms & Conditions" statement.

Section 10 Repair & Service

10.1 Repair / Service

An RMA (Return Merchandise Authorization) number must be obtained before the product is returned to us. Please call us to obtain an RMA number. Any product received without a RMA will be returned to the customer. The cost and method of shipping the product back to us is the sole responsibility of the customer. We recommend a track-able form of shipping to guarantee your package arrives to us. If a package is sent without proof of delivery, Imagine Instruments LLC is not responsible for proving receipt of the package.

All products come with a minimum one-year warranty unless otherwise noted on the products data sheet. Warranty replacements must have an RMA issued and be returned to imagine Instruments LLC prior to us sending the replacement. The return cost of insurance and shipping is the sole responsibility of the customer. Imagine Instruments LLC will pay for the return shipping of the replacement and chooses the method of delivery.

After receiving your RMA number, please ship your unit to the Product Return address listed in section 10.2 below. Make sure you write the RMA number on the mailing label.

10.2 Contact Information

General Mail & Product Returns
Imagine Instruments LLC
4500 Williams Drive
Ste 212-318
Georgetown, TX 78633

Phone Numbers:
Local: (512) 778-6850
Toll Free: (855) 574-6243

Email:
General Information/ Customer Service – info@imagineinstruments.com
Sales Department – sales@imagineinstruments.com