

## Quick Start Guide

*Radar-Based Sensors for Detection and Measurement of Moving and Stationary Targets*

This guide is designed to help you set up and install the R-GAGE T30R sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at [www.bannerengineering.com](http://www.bannerengineering.com). Search for p/n 217048 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

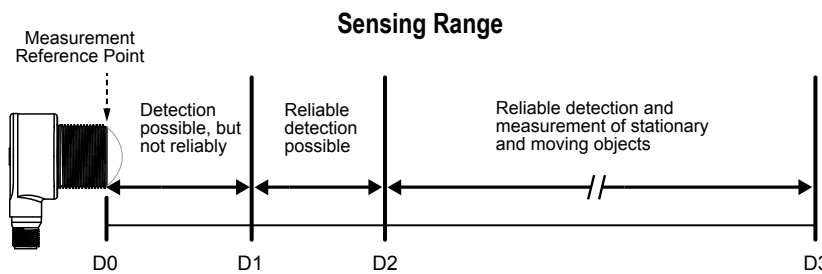


**WARNING:**

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Overview

Figure 1. Sensing Range



Model	D0 (m)	D1 (m)	D2 (m)	D3 (m)
T30R-1515 Models	0	0.15	0.20	15
T30R-1515-C Models	0	0.10	0.10	6
T30R-1515-L Models	0	0.15	0.20	25
T30R-4545 Models	0	0.30	0.30	10

## Features and Indicators

Figure 2. T30R Features



	LED	Color	Description
1	Power	Green	Power ON
2	Signal Strength	Red	Flashes in proportion to the signal strength
3	Output 1	Amber	Target is within the taught analog span or discrete output status
4	Output 2	Amber	Discrete output status
5	NO/NC	Amber	Normally open/normally closed status of discrete output Dual discrete models have two LEDs
6	n/a	n/a	Output Teach buttons

## Installation Instructions

### Install the Software

**Operating System**

Microsoft® Windows® operating system version 10 <sup>1</sup>

**Hard Drive Space**

500 MB

**Third-Party Software**

.NET

**USB Port**

Available USB port



**Important:** Administrative rights are required to install the Banner Radar Configuration software.

1. Download the latest version of the software from [www.bannerengineering.com/us/en/products/sensors/software/radar-configuration.html](http://www.bannerengineering.com/us/en/products/sensors/software/radar-configuration.html).

<sup>1</sup> Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.



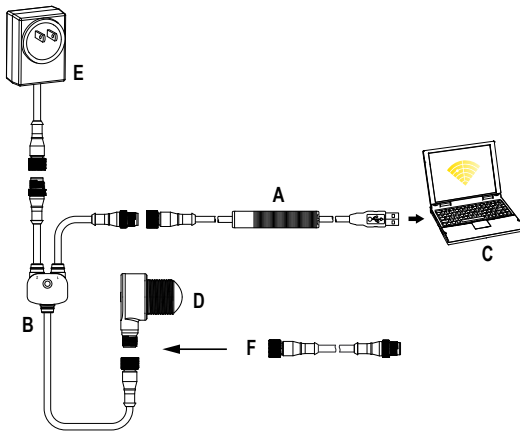
2. Navigate to and open the downloaded file.
3. Click **Install** to begin the installation process.
4. Depending on your system settings, a popup window may appear prompting to allow Banner Radar Configuration to make changes to your computer. Click **Yes**.
5. Click **Close** to exit the installer.

## Mount the Device Using the Threaded Barrel

1. If your device came with a lock washer, place the lock washer on the barrel of the device.
2. Insert the barrel of the device through a hole or a bracket.
  - If desired and available, insert the device through an appropriately sized hole in the machine or equipment at the desired location.
  - If a bracket is needed, insert the device into the bracket.
3. Thread the mounting nut onto the barrel of the device, finger tight.
4. If using a bracket, mount the device and the bracket to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.
5. Check the device alignment, aiming it near parallel to, or down towards, the ground.
 

If aiming at a target, alignment and signal strength can be checked via the red Signal Strength LED or the Banner Radar Configuration Software.
6. Tighten the nut.
7. If using a bracket, tighten the mounting screws to secure the device and the bracket in the aligned position.

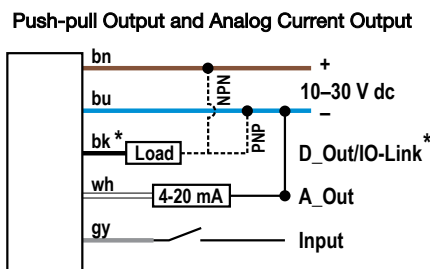
## Connect to the Sensor



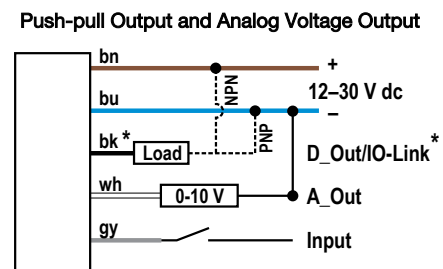
- A = Pro Converter Cable (MQDC-506-USB)  
 B = Splitter (CSB-M1251FM1251M)  
 C = PC running Banner Radar Configuration software  
 D = T30R  
 E = Power Supply (PSW-24-1 or PSD-24-4)  
 F = Optional 5-Pin to 5-Pin Double-Ended Cordset (ex. MQDEC3-515SS)

## Wiring

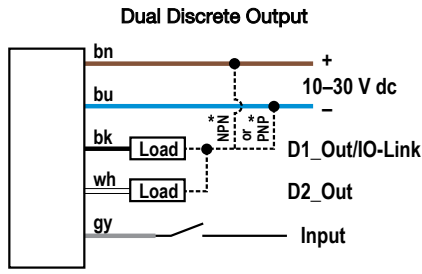
Quick disconnect wiring diagrams are functionally identical.



\* Push-Pull output. User-configurable PNP/NPN setting.



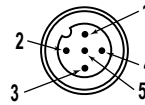
\* Push-Pull output. User-configurable PNP/NPN setting.



\* Push-Pull output. User-configurable PNP/NPN setting.

**Key:**

- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black
- 5 = Gray (Connect for use with remote input or Banner Radar Configuration software)



## Getting Started

Power up the sensor, and verify that the power LED is ON green.

### Connect to the Sensor

1. Connect the sensor to the splitter cable from the PRO-KIT.
2. Connect the external power and Pro Converter cable to the splitter cable.
3. Connect the Pro Converter cable to the PC.
4. Open the Banner Radar Configuration Software.
5. Go to **Sensor > Connect** on the **Navigation** toolbar. The **Connection** screen displays.
6. Select the correct **Sensor Model** and **Com Port** for the sensor.
7. Click **Connect**. The **Connection** screen closes and the sensor data displays.

## Specifications

### Range

The sensor can detect an object at the following ranges, depending on the material of the target:

- T30R-1515 models:
  - Detection Range: 0.15 m to 15 m (0.5 ft to 49.2 ft)
  - Measurement Range: 0.2 m to 15 m (0.7 ft to 49.2 ft)
- T30R-1515-C models:
  - Detection Range: 0.1 m to 6 m (0.33 ft to 19.7 ft)
  - Measurement Range: 0.1 m to 6 m (0.33 ft to 19.7 ft)
- T30R-1515-L models:
  - Detection Range: 0.15 m to 25 m (0.5 ft to 82 ft)
  - Measurement Range: 0.2 m to 25 m (0.7 ft to 82 ft)
- T30R-4545 models:
  - Detection Range: 0.3 m to 10 m (1.0 ft to 32.8 ft)
  - Measurement Range: 0.3 m to 10 m (1.0 ft to 32.8 ft)

### Operating Principle

Frequency modulated continuous-wave (FMCW) radar

### Operating Frequency

122 GHz

### Frequency Range

T30R-1515 and T30R-4545: 122 GHz to 123 GHz  
 T30R-1515-C: 120.5 GHz to 123 GHz

### Supply Voltage (Vcc)

**Analog Voltage models:** 12 V DC to 30 V DC  
**Analog Current and Dual Discrete models:** 10 V DC to 30 V DC  
 Use only with a suitable Class 2 power supply (UL) or Limited Power Supply (CE)

### Power and Current Consumption, exclusive of load

**Power consumption:** < 2.4 W  
**Current consumption:** < 100 mA at 24 V DC

### Supply Protection Circuitry

Protected against reverse polarity and transient overvoltages

### Linearity<sup>2</sup>

T30R-1515 and T30R-4545  
 <± 20 mm at < 500 mm  
 <± 4 mm at > 500 mm  
 T30R-1515-C: < ± 4 mm

### Delay at Power-up

< 300 ms

### Maximum Torque

2.3 N-m (20 in-lbs)

### Repeatability<sup>3</sup>

< 1 mm

### Maximum Output Power

EIRP: 100 mW, 20 dBm

### Output Protection

Protected against output short-circuit

### Remote Input

Allowable Input Voltage Range: 0 to Vsupply  
 Active High (internal weak pull-down): High state > (Vsupply - 2.25 V) at 2 mA maximum  
 Active Low (internal weak pull-up): Low state < 2.25 V at 2 mA maximum

### Response Time

Analog update rate: 2 ms  
 Discrete output response: 6 ms  
 Speeds given for fast mode. See the Instruction Manual for additional details.

### Indicators

**Power LED:** Green, power on

**Signal Strength LED:**

Red Flash: weak signal

Red Solid: 4x threshold

**Output LEDs:** Amber, target within taught analog span/discrete output status

**NO/NC LED:** Amber, normally open/normally closed status of discrete output  
 See Figure 2 on page 1

### Construction

**Housing:** PBT

**Window:** COP

<sup>2</sup> Reference target with RCS = 1m<sup>2</sup>.  
<sup>3</sup> Repeatability < 10 mm at Excess Gain < 10x.

**Output Configuration**

Analog Outputs:

**Current models**

Discrete Output (Black Wire): IO-Link, push/pull output, configurable PNP or NPN output

Analog output (White Wire): 4 mA to 20 mA

**Voltage models**

Discrete Output (Black Wire): IO-Link, push/pull output, configurable PNP or NPN output

Analog output (White Wire): Configurable 0 V to 10 V or 0.5 V to 4.5 V

**Dual Discrete models**

Discrete Output 1 (Black Wire): IO-Link, push/pull output, configurable PNP or NPN output

Discrete Output 2 (White Wire): Configurable PNP or NPN, or Pulse Frequency Modulated (PFM) output

**Output Ratings**

Analog Outputs:

• **Current Output (T30R....-I.. models):** 1 kΩ maximum load resistance at 24 V; maximum load resistance =  $[(V_{CC} - 4.5)/0.02 \Omega]$ • **Voltage Output (T30R....-U.. models):** 2.5 kΩ minimum load resistance

Discrete Outputs:

• **Current rating = 50 mA maximum each**

Black wire specifications per configuration		
IO-Link Push/Pull	Output High	$\geq V_{supply} - 2.5 V$
	Output Low	$\leq 2.5V$
PNP	Output High	$\geq V_{supply} - 2.5 V$
	Output Low	$\leq 1V$ (loads $\leq 1 \text{ Meg}\Omega$ )
NPN	Output High	$\geq V_{supply} - 2.5 V$
	Output Low	$\leq 2.5 V$

White wire specifications per configuration		
PNP	Output High	$\geq V_{supply} - 2.5 V$
	Output Low	$\leq 2.5 V$ (loads $\leq 70 \text{ k}\Omega$ )
NPN	Output High	$\geq V_{supply} - 2.5 V$
	Output Low	$\leq 2.5 V$

**Connections**

Integral M12 quick disconnect

150 mm (6 in) PUR-jacketed cable with an M12 quick disconnect

Models with a quick disconnect require a mating cordset

**Vibration and Mechanical Shock**

All models meet MIL-STD-202F, Method 201A (Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G acceleration) requirements. Method 213B conditions H&amp;I.Shock: 75G with device operating; 100G for non-operation

**Operating Temperature**

-40 °C to +65 °C (-40 °F to +149 °F)

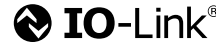
**Temperature Effect** $\leq \pm 10 \text{ mm}$  from -40 °C to +65 °C (-40 °F to +149 °F)**Environmental Rating**

IP67

**Certifications**IND. CONT. EQ.  
E224071

LISTED

UL Environmental Rating: Type 1

Banner Engineering Europe Park Lane,  
Culliganlaan 2F bus 3, 1831 Diegem,  
BELGIUMTurck Banner LTD Blenheim House,  
Blenheim Court, Wickford, Essex SS11  
8YT, Great Britain

ETSI EN 305 550-1 V.1.2.1  
ETSI EN 305 550-2 V.1.2.1  
FCC/CFR-47 part 18; This device complies with part 18 of the FCC Rules.  
for others, contact Banner Engineering  
Country of Origin: USA

**Advanced Capabilities**

Available only in dual discrete models

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