Seeker Radar Sensor
User's Manual

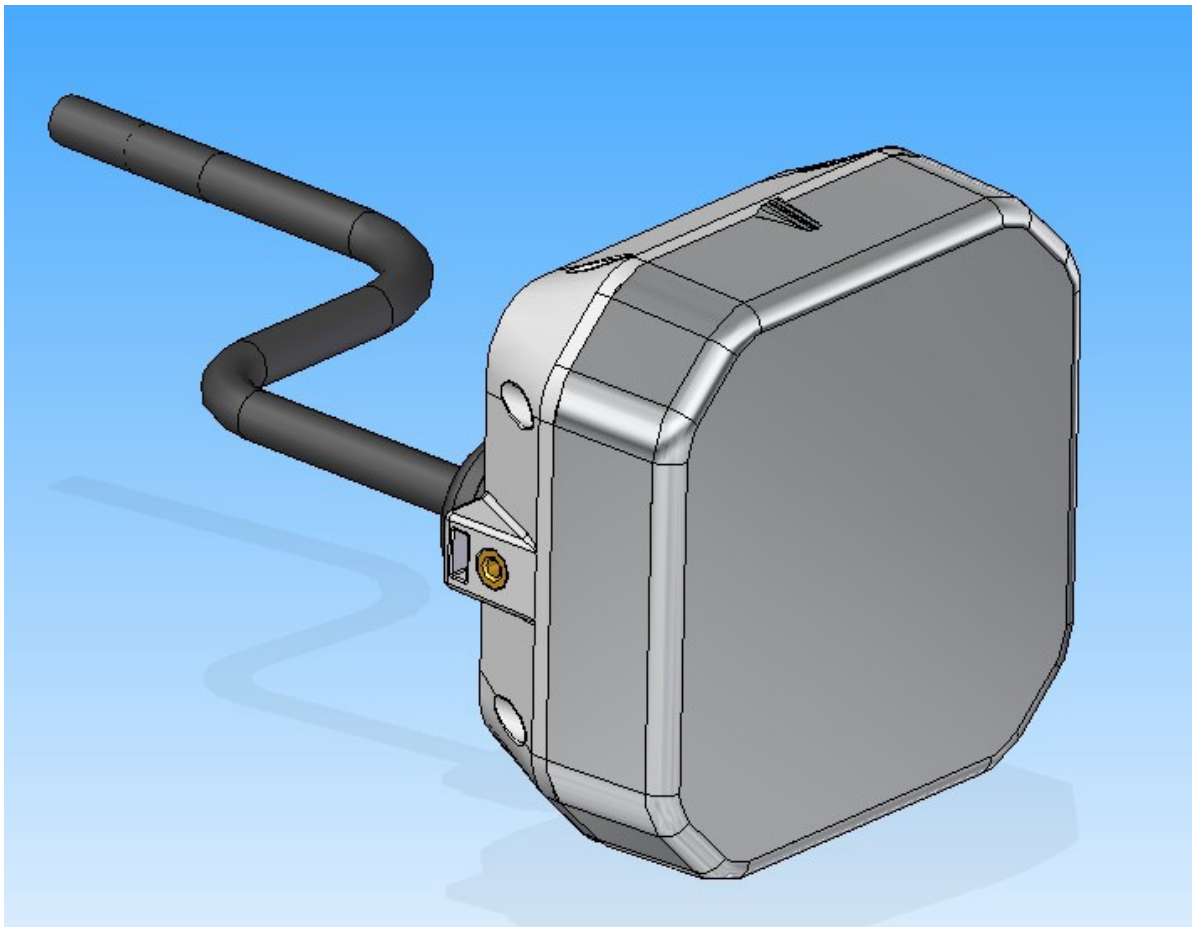

Table of Contents

1 Introduction

The Seeker radar sensor is a state-of-the-art motion detection system. It uses low power K-band radar signals to extract Doppler information from moving targets. Sophisticated software algorithms are combined with the latest in digital technologies to maximize target identification, motion detection performance, and minimize false activations. The sensor is able to detect speed, direction of motion, and set user configured criteria for target detection.

The Seeker radar sensor is ideally suited for the detection of people, automobiles, and even low flying small aircraft. Detection distance is based on many factors including the strength of the radar signal reflected back from the object. This signal strength varies from different objects and the Seeker radar sensor has various controls to maximize the detection of various targets. Such controls include Motion Sensitivity, Range Sensitivity, Detection Direction, Minimum and Maximum Speed. The Seeker radar sensor features dual relays (normally open and normally closed) to indicate when motion is detected.

The amount of time that the relays remain on, after target detection is lost, is configurable upon order of the unit or by using the optional Relay Activation Application. A unit can be ordered with a preset configuration or be ordered so that the configuration can be changed by the user with the optional Relay Activation Application. Included with the Relay Activation Application is the GTS Adapter which connects the sensor to a computer via a USB connection so changes can be made to the configuration.

The Seeker radar sensor is designed for both indoor and outdoor and usage. The housing is designed to IP67 which protects it from dust and the effects of immersion in water 1 meter deep for 30 minutes. The unit is designed for continuous outdoor use and is not designed to be used underwater.

2 System Information

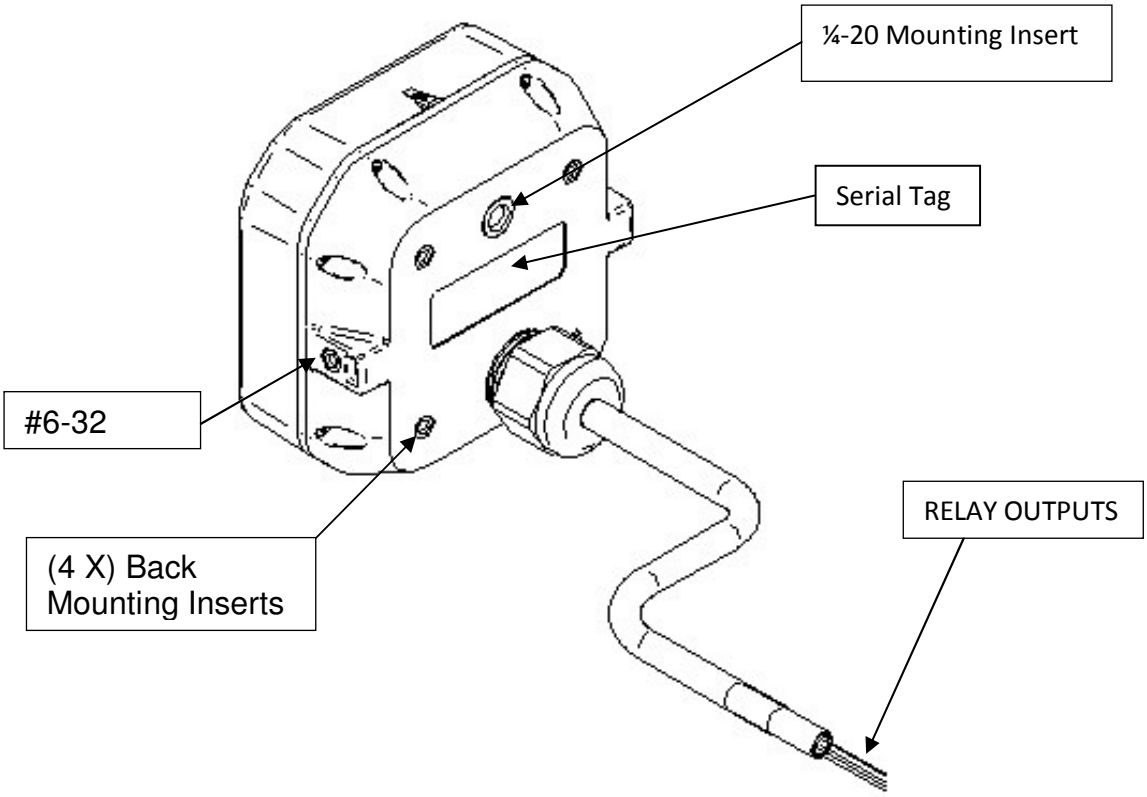

Figure 1

3 Theory of Operation

The Seeker radar sensor transmits a radio frequency of 24.125 Gigahertz, in compliance with Federal Communications Commission Part 15 Regulations. The transmitted signal is focused by an antenna, like a flash light, and emits from the front of the Seeker radar sensor housing. When the transmitted signal interacts with a moving target, it returns at a different frequency because there is relative motion between the two objects (radar unit and target). This is a physics principle known as the Doppler effect. Targets approaching the radar will return an echo higher in frequency than the transmitted frequency. Targets moving away from the radar, receding, will return a lower frequency signal.

The Seeker radar sensor is able to detect and measure the frequency difference of a moving target. It uses this information in combination with the user selected or order configured parameters to detect targets and activate the relay outputs.

4 Installation

The Seeker radar sensor includes inserts located on the sides and back of the unit for flexible installation options (see Figure 1). Two sizes of inserts are supplied on the back which are (4) #6-32 and (1) ¼-20. Standard size screws can be used and it is recommended that stainless steel screws be used if the unit will be exposed to moisture. Depending upon the thickness of the mounting bracket used, be sure that the screws are long enough to clamp the bracket to the housing but not so long that if over tightened the screws will not push the insert out of the housing. Contact GTS Engineering Technologies if you require a special mounting bracket for your application.

Once the unit is mounted, make all connections to the wiring harness before applying power to the unit. After testing the operation, seal all exposed connections from water.

Aim the radar at the desired target area and ensure a clear and unobstructed view.

Wiring Diagram

Brown/White	10 - 28 VDC
Brown	Ground
Blue/White	N.O. Relay
Blue	N.O. Relay
Green/White	N.C. Relay
Green	N.C. Relay
Orange/White	D+
Orange	D-

5 Configuration Setting

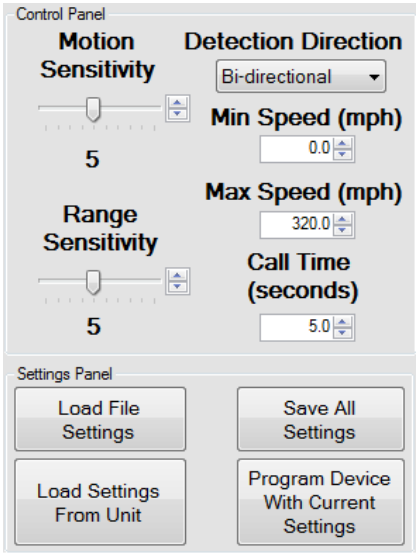

Figure 2

The Seeker radar sensor can be ordered with a preset configuration or an optional software application can be purchased to allow the user to self-configure for varied applications.

A PC with Windows 7 or XP is required to run the configuration software and allows the user to configure the sensor as follows:

1. Motion sensitivity, which determines how sensitive the unit is to moving motion. This setting ranges from 1 (least sensitive) to 10 (most sensitive). Default setting is 5.
2. Range sensitivity, which determines the how far the unit should detect. This setting ranges from 1 (short range) to 10 (long range). Default setting is 5.
3. Detection direction, which can be selected to bi-directional detection, approaching detection only, or receding detection only. Default setting is bi-directional.
4. Min speed, minimum speed of interest. This setting can be adjusted between 0 – 319.9 mph, but it must be less than the max speed. Default setting is 0 mph.
5. Max speed, maximum speed of interest. This setting can be adjusted between 0.1 – 320.0 mph, but its must be greater than then min speed. Default setting is 320.0 mph.
6. Call time, amount of time that the sensor relay stays on after the last detection is lost. This setting can be adjusted between 0.1 – 60 seconds. Default setting

is 5.0 seconds.

7. Load File Settings – load previously saved settings onto screen.
8. Save all Settings – save current displayed settings to a file.
9. Load Settings From Unit – load setting from the connected sensor unit.
10. Program Device with Current Settings – program current settings to the connected sensor unit. Non-volatile storage. The radar sensor will retain these setup parameters even during power down cycles.

6 Calibration

The Seeker radar sensor is a digital technology design and does not require calibration.

7 Care and Maintenance

The Seeker radar sensor is designed to be a reliable and trouble free unit. Following these basic care guidelines will help ensure good service.

1. As with most electrical and electronic equipment, the unit needs to be protected from moisture. If moisture penetrates the housing, remove power and send the unit to GTS for repair.

2. Do not exceed power input limits.

3. Proper handling – handle from the housing not by the cord

8 Troubleshooting

If problems do arise, recheck the operating information in this manual and then check the following before contacting GTS Engineering Technologies regarding the problem.

Problem

No target detected: Ensure the system has power then wave your hand towards and away from the face of the unit to activate the relay. Measure the output from the normally open or normally closed wire using a multimeter set at 200 Ohms or less.

Lack of Range: Ensure radar has a clear, unobstructed view of target. Check configuration settings.

9 Technical Specifications

Radar Frequency:	24.125 ± 0.1 GHz (K-band)
Output Power:	E.I.R.P. 20 dBm
Sensor Method:	Doppler
Horizontal Beamwidth:	24º
Vertical Beamwidth:	12º
Detection Range:	Adjustable, results vary based on target size and environment. Typical 250 foot maximum for human target in center of radar beam on flat unobstructed ground.
Detection Sensitivity:	Adjustable
Detection Speed:	0.1 - 320 MPH (windowed by minimum and maximum speed)
Detection Direction:	Bi-directional, approaching only, receding only
Relay Call Time:	0.1 to 60 seconds
Input Voltage:	10 VDC to 28 VDC – reverse voltage protected
Power Consumption:	< 300 mA
NO and NC Relays:	Current Limit Protection
	On resistance 20 Ohms
	Load voltage 350 V
	Load current 150 mA
Size:	3.15 In. x 3.15 In. x 1.5 In
Weight:	
Mounting:	Multi-point mounting, sides and back, threaded inserts
Temperature:	-30ºC to +65ºC

10 FCC Compliance

The Seeker radar sensor has been tested and found to comply with the limits pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. Operation of this equipment in an area likely to cause harmful interference in which case the user will be required to correct the interference. Changes or modification to the device not expressly approved by GTS Engineering Technologies will void the warranty.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference

2. This device must accept any interference received, including interference that may cause undesired operations.

11 Warranty

18 Month Consumer Limited Warranty

GTS Engineering Technologies products are warranted to be free from defects in materials or workmanship for 18 months from the date of purchase. Within this period, GTS will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not apply to (1) cosmetic damage, such as scratches, nicks and dents, (2) consumable parts, such as batteries, unless product damage has occurred due the a defect in materials or workmanship, (3) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes, (4) damage caused by service performed by anyone who is not an authorized service provider of GTS Engineering Technologies, or (5) damage to a product that has been modified or altered without the written permission of GTS Engineering Technologies. In addition, GTS Engineering Technologies reserves the right to refuse warranty claims against products or services that are obtained and / or used in contravention of the laws of any country.

Repairs have a 90 day warranty. If the unit sent in is still under its original warranty, then the new warranty is 90 days or to the end of the original 18 month warranty, depending upon which is longer.

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