SPARTAN HOPLO Collision Warning Radar Sensor User Manual

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Contents

Manual Statement

This device complies with Part 15 of 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.
Changes or modifications not expressly approved by Spartan Radar could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Product Description

The HOPLO sensor is a 79GHz FMCW millimeter wave radar built from scratch by the radar experts at Spartan Radar to withstand the most rugged operating conditions. The radar can detect stationary & moving targets and requires zero relative motion to function. By design, the HOPLO radar operates in virtually any environmental operating condition, meets IP69K requirements, and requires no maintenance.

The sensor has an industry leading azimuth FOV (field of view) of up to 140°, capable of providing more bumper-to-bumper coverage than any other radar on the market. Unlike other radar sensors that only report 1 target at a time, the HOPLO sensor can report up to 3 targets at the same time. Another unique feature of the HOPLO radar sensor is that it not only reports targets in up to 5 zones (longitudinal distance), but it also reports in up to 3 segments (lateral distance).
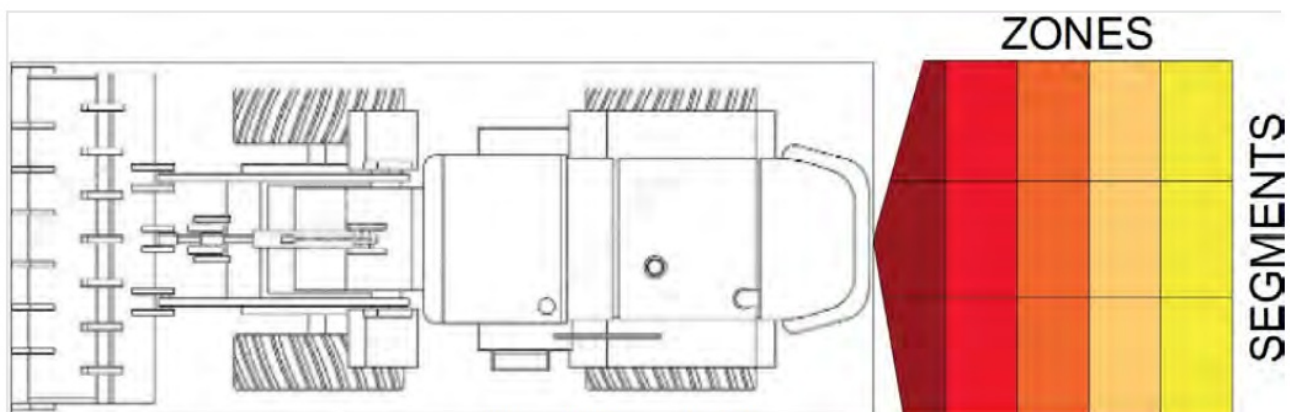

Figure 1: Segments & Zones

Precautions

- Electrical shock leading to harm to the product, machine, or operator may occur if the machine is energized during installation. Never work on live circuits!
- Do not attempt to disassemble the product as it may lead to personal injury and will void the warranty

Installation

HOPLO radar systems are designed to be the safest and most reliable object detection systems available. To aid in providing this elevated level of safety, the system should be powered directly to the machine's ignition circuit. Clean and robust electrical connections must be made to ensure the connection does not fail due to excessive vibration & environmental conditions experienced in extreme operating situations. A typical HOPLO system

consists of an operator display that goes in the cab (in-cab display), the harnesses that connect the display to the sensor, and the radar sensor itself.

The power wires break out of the HOPLO cabling on the main harness just before it connects to the in-cab display adapter. Use a DMM to verify the machine's ignition voltage is within the sensors supported range of 9-32VDC. Connect the red wire to ignition & the black wire to ground. This connection provides the power for both the in-cab display & the sensor. Connect the Sensor Trigger-In wire to the positive side of the machine's reverse circuit. The easiest place to connect to the machine's reverse circuit is generally at the reversing lights or back-up alarm. Use a DMM to verify that the reverse wire is also 9-32VDC when active and is only active when the machine is powered and in reverse.

Figure 2: Electrical Installation Diagram
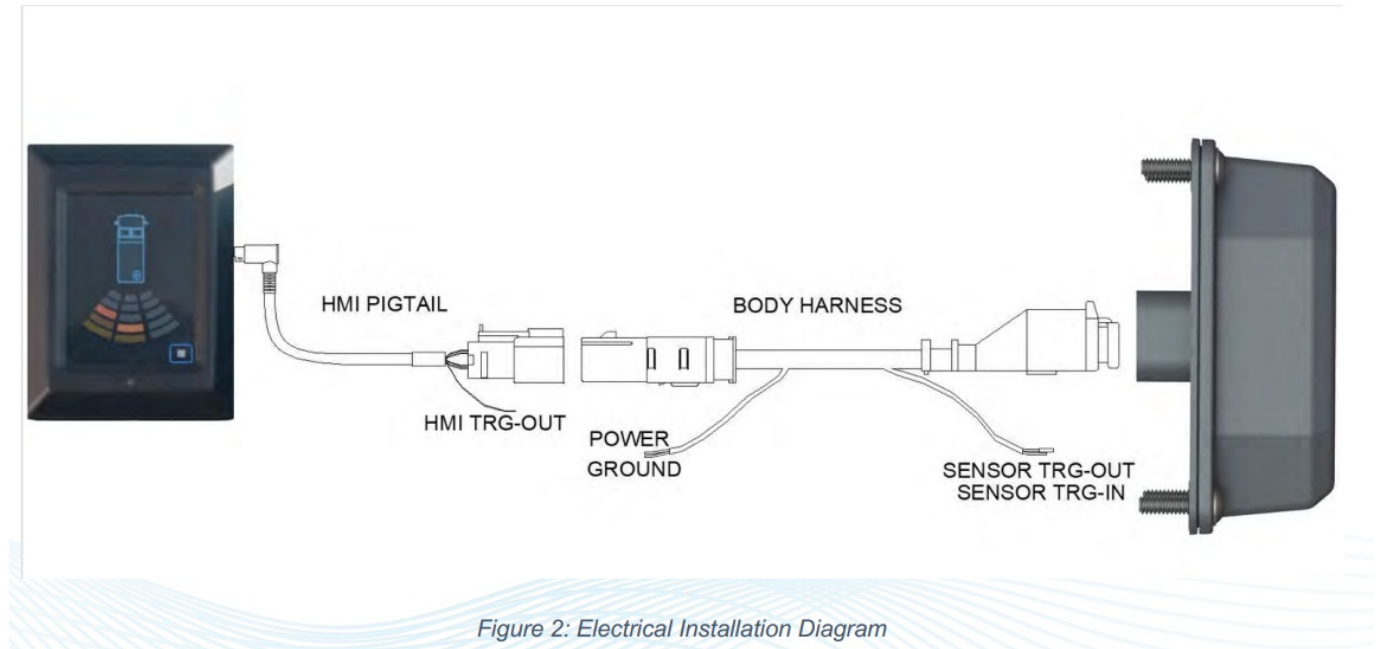
The default body harness length is 35'. If additional length is needed, additional 15' extension harnesses can be purchased, and daisy chained together. The extension harness inserts between the body harness and in-cab display adapter. Each extension used provides an additional pair of power and ground connections for installation flexibility.

CRITICAL NOTE: Only use one (1) pair of power and ground connections if using extensions. Using more than one can result in damage to the radar system or machine.

Figure 3: Extension Cable Diagram
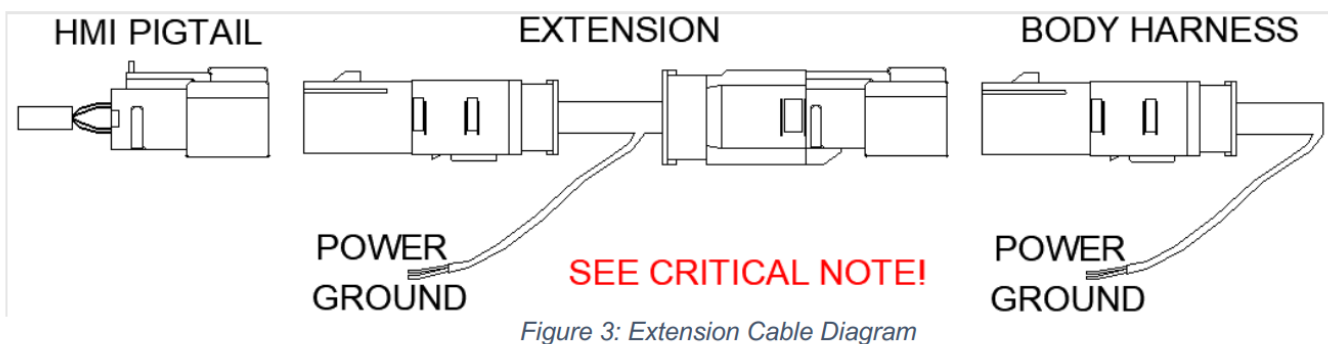
Mounting

It is recommended to mount the sensor in the desired mounting location and test the system for desired performance BEFORE permanently mounting. Select a location to mount the sensor that provides a clear & open view of the desired detection area. When choosing the mounting location be mindful of the sensor's keep-out regions shown in Figure 4. If the sensor cannot be mounted where there are not objects within the keep-out regions, performance should be verified before continuing the installation.
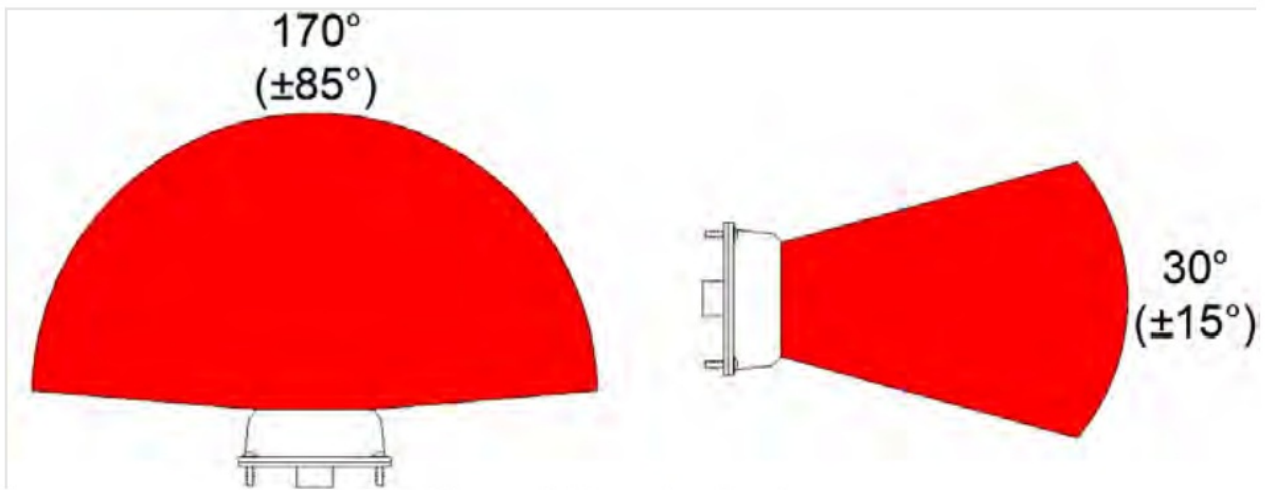
Figure 4: Keep Out Regions

The recommended mounting height for the radar is 2.0 – 3.0FT (0.6 – 1.0M) above the ground.
If the radar is mounted below this recommended height the radar sensor may experience nuisance detections due to ground clutter. If mounting the radar above the recommended height the radar may need to be angled down a few degrees to ensure desired objects are detected.

In installations where the sensor is not being mounting high and aimed down, it should be mounted within +/- 3° perpendicular to ground and within +/-6° rotationally relative to the ground as possible.
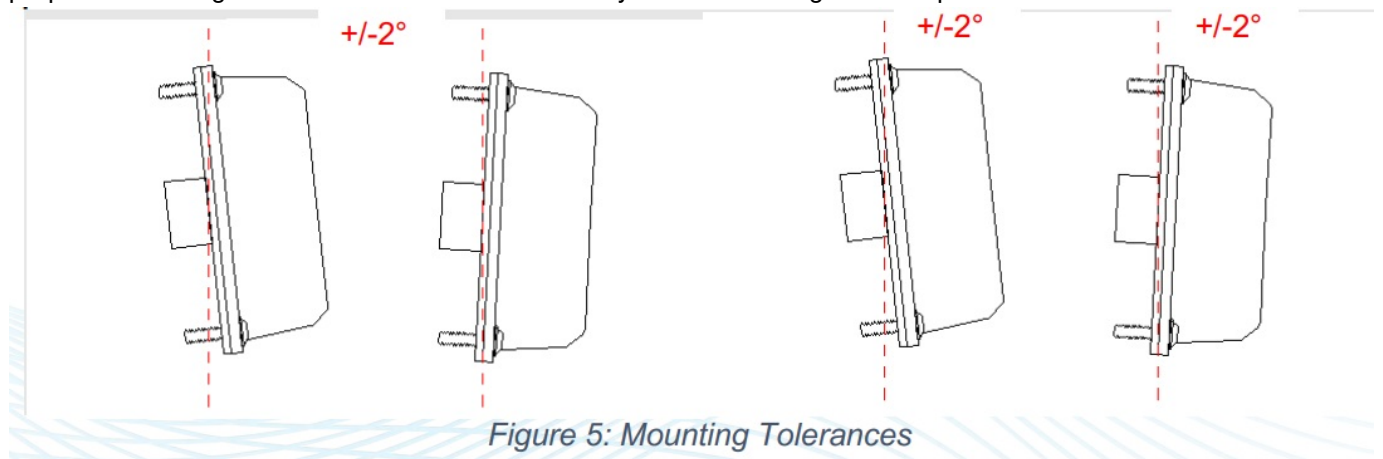

Figure 5: Mounting Tolerances

The HOPLO sensor is available with two different mounting brackets and can also be mounted flush without a bracket by drilling four 3.5mm (9/64") holes per the diagram in the Specifications section below. If flush mounting the radar, an additional 1-1/2" (38mm) or larger hole will need to be drilled in the panel to allow room for the cable connection. Do not apply more than 20 ft/lbs of torque when mounting the sensor.

The first mounting bracket is a 90° fixed bracket that will cover most installations and is the default one that ships with the radar. If the installation requires the radar to be angled due to the mounting location, a bracket with ±21.5° of flexibility is available. Only in rare cases should the sensor be angled down more than a few degrees.

Figure 6: Fixed & Adjustable Brackets

If using a bracket, use the bracket as a template to mark the bracket mounting holes on the machine. Drill the holes using a 9/64" or equivalent drill bit & affix the bracket using the supplied hardware. Do not apply more than 20 ft/lbs of torque when mounting the sensor.

Object Reflection

Radars emit energy and rely on the reflection of this energy from an object to detect it. The amount of reflected energy can vary greatly based on the distance to the object, the material composition, and the shape of the object. While most objects will be detected consistently, it is possible for an object to not be detected consistently by the radar. Always rely on mirrors, cameras, spotters, & common sense, do not rely solely on the radar to prevent accidents & injuries.

Specifications

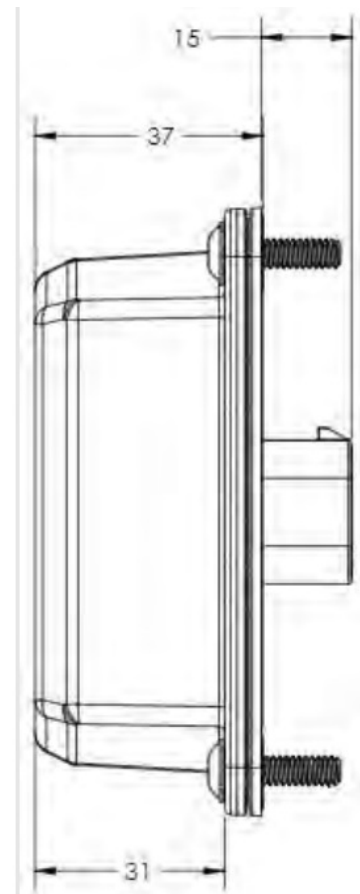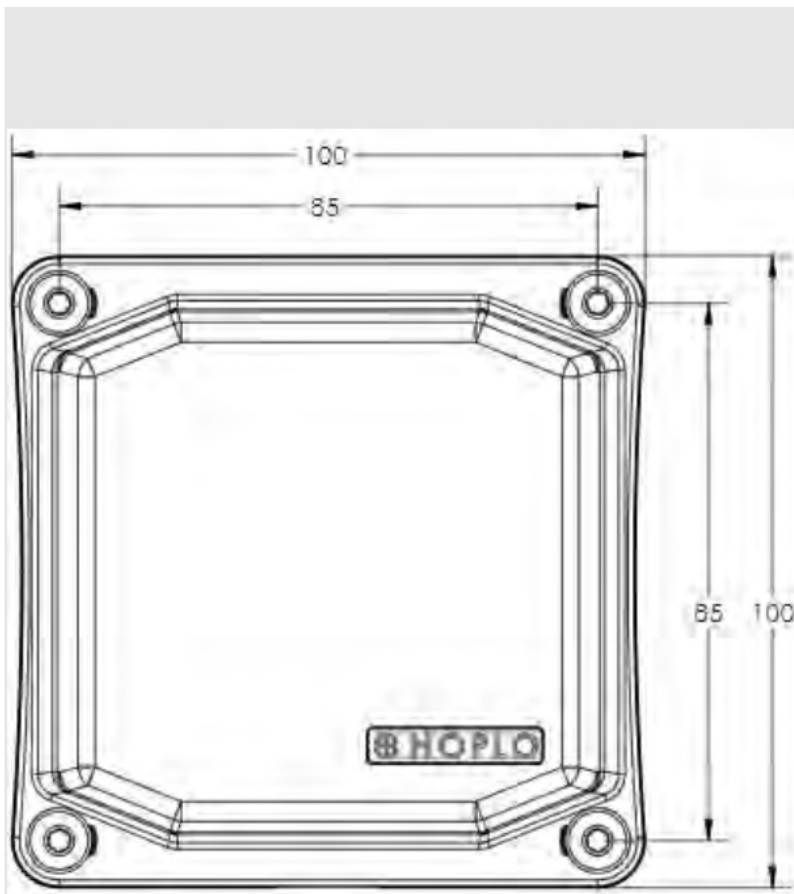|	
Transmitter	79GHz FMCW
Input Voltage	9-32VDC
Input Current	<.25A@24VDC
Detection Range	0.05m – 30m
Azimuth FOV	+/-70° (+1 0dBsm)
Vertical FOV	+/-12 {+10d8sm)
Protection Ingress Rating	IP69K
Vibration	Designed to exceed ISO16750 specifications
Shock	Designed to exceed ISO16750 specifications
Operating Temp	-40°C – +85°C
Storage Temp	-55°C – +105°C
Detection Time	<300mS
Communication	CAN J1939 compliant
CAN Message Update Rate	<100mS
Weight	70g (2.5oz)
Mounting	85x85mm (3.3×3.3″) pattern with 4 – 3.5mm (0.136″) holes with crush sleeves for #10 screws
Matina Cable Connection	TE 776286-1

Connector Pin-Out:

Pin	Description
3	POWER
4	CAN-H
5	CAN-L
6	TRG-IN
8	GROUND

Connector Pin-Out:
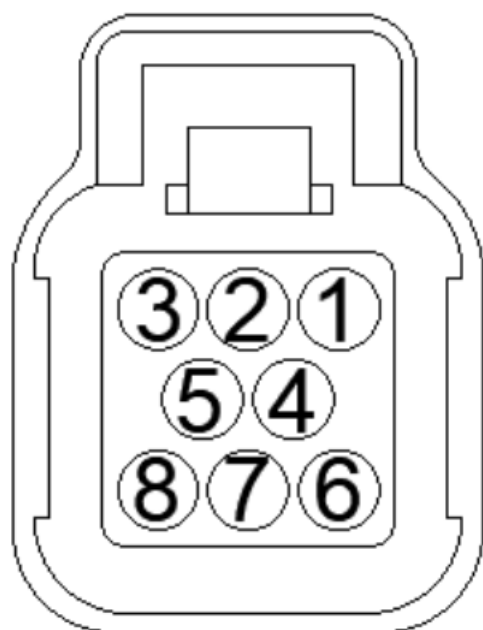
View from mating side

Dimensions: 100x100mm (3.9×3.9")

PRODUCT DESIGNED AND MANUFACTURED IN THE USA

Troubleshooting

Problem	Potential Resolution
The radar is constantly reporting a detection	• Verify the radar is mounted per the instructions in this manual • Verify there is nothing on the machine that the sensor is detecting. Move the sensor away from the vehicle and verify the detection goes away. If the detection goes away, the sensor mounting will need to be moved/adjusted.
The radar is not reporting a detection	• Verify the machine is in reverse, the reverse wire has a good electrical connection, and the reverse wire is 9-33V • Verify the object is within the sensors configured detection range
The in-cab display is displaying a "Sensor Failure" error	• Contact the Hoplo Support Team
The in-cab display is displaying a "Sensor Communication" error	• Verify the cable is not damaged • Verify the sensor is plugged in and has 9-32VDC

If the issue is not listed or is still not resolved after consulting this table, please contact the HOPLO support team at 1-833-526-5332 or HOPLO@SpartanRadar.com for further assistance.

Documents / Resources

SPARTAN HOPLO Collision Warning Radar Sensor [pdf] User Manual
DC 001 dba, 2BAHFHSENI, HOPLO Collision Warning Radar Sensor, HOPLO, Warning Sensor, Radar Sensor, Sensor, Warning Radar Sensor, HOPLO Warning Radar Sensor, Collision Warning Radar Sensor

References

- ⊗ **Hoplo Radar - Military-grade object detection for commercial fleets**