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# Introduction

## Radar Sensor RRS24F-ST3

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# Important information

This document is designed to familiarize the user with the unit so that the unit is used for its correct purpose. This document provides important information. Following these instructions helps to avoid hazards and repair costs, and to reduce failure times.

## 1 Important information

This document is designed to familiarize the user with the unit so that the unit is used for its correct purpose. This document provides important information. Following these instructions helps to avoid hazards and repair costs, and to reduce failure times.

### 1.1 Obligation to Read

This document must be carefully read, understood and applied by all persons who are involved in the operation of the unit or system. For your own safety, please read the Safety Instructions section with particular care. Following all instructions exactly will ensure that neither yourself nor any other person is put at risk and will avoid damage to the unit or system. Please contact the customer service of Jenoptik Robot GmbH if you have any questions that are not dealt with in this document.

### 1.2 Target Group

This document is aimed at qualified staff that has been specially trained to operate the unit.

### 1.3 Storing the document

This document must be kept for future use and made available to the staff at any time. Excerpts are not allowed.

### 1.4 FCC / IC Compliance Information

This K-Band RADAR device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and with RSS-210 of Industry Canada.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Operation is subject to the following two conditions:

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1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

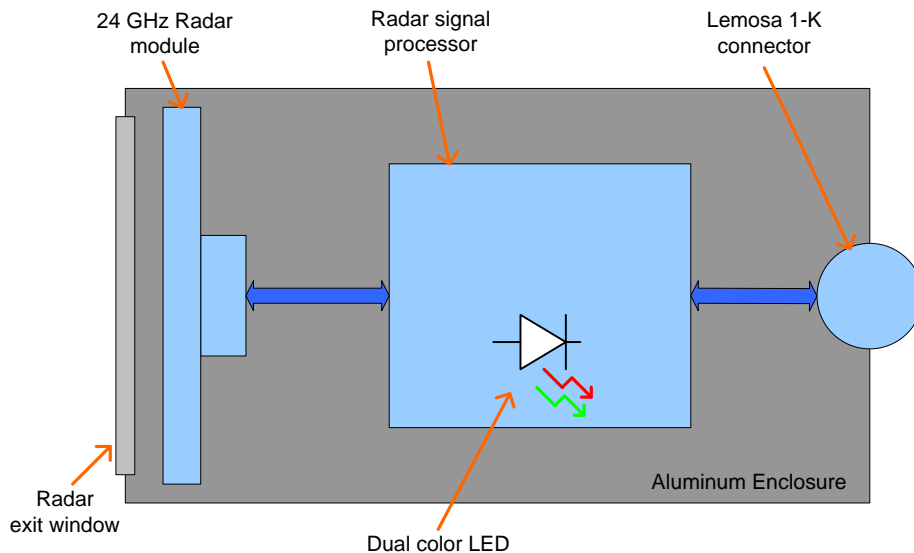
Changes or modifications made to this equipment not expressly approved by JENOPTIK Robot GmbH may void the FCC authorization to operate this equipment.

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## 2 Product Information

The sensor includes an advanced 24 GHz Radar module and a high-performance Radar signal pro-cessor, all sealed within a compact and rugged aluminum case. Communication and power is carried through a single screened cable that locks into an 8-Pol 1-K socket from Lemosa.



The 24 GHz Radar module is mounted directly behind a plastic “window”, or Radom, in the front face of the enclosure. Microwave energy passes exclusively through this Radom.

Multiple RRS24F-ST3 can jointly monitor traffic from different directions. To avoid interference each sensor must then operate on a different frequency. Three frequencies are available:

- Frequency Set 1: 24,08 GHz
- Frequency Set 2: 24,12 GHz
- Frequency Set 3: 24.16 GHz

The active frequency set must be selected prior to starting the transmitter. Other frequencies are not available.

In the rear face is a dual color (red / green) LED visible. The light from this LED is indicative of the status of the sensor.

LED Color	Sensor Status
Orange	Sensor power is available; Radar signal processor is being initialized.
Green	Sensor waiting for commands from host
Red blinking	Sensor failure
Off	Sensor in measurement mode from host

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### Radar Sensor RRS24F-ST3

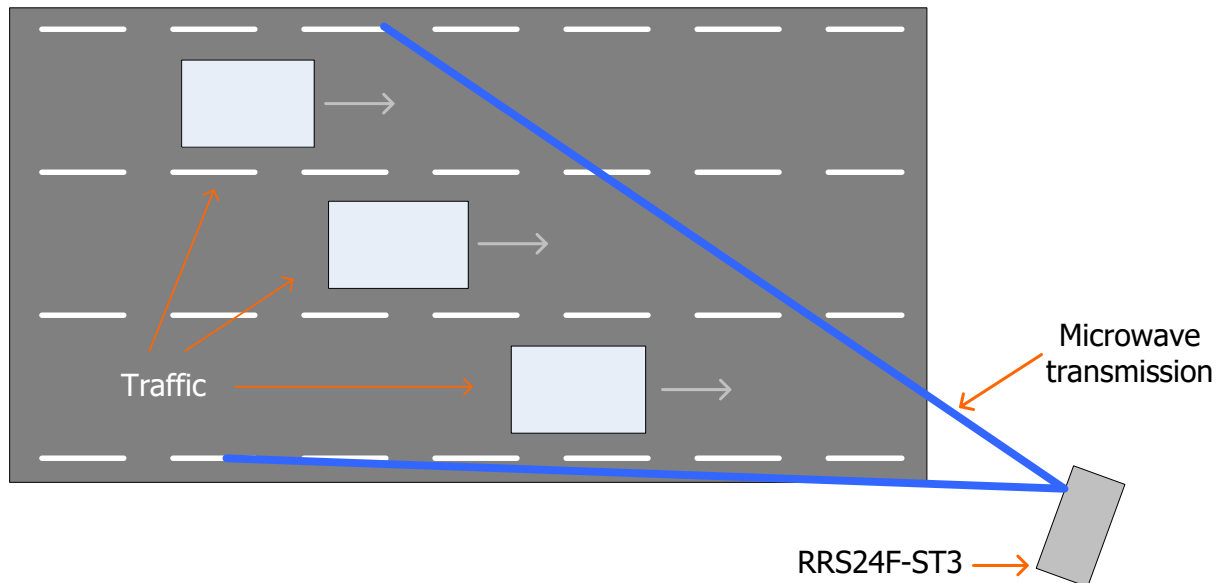
#### 2.1 Positioning the sensor



Both sides of the enclosure have 20 mm wide grooves to accept horizontal or vertical guides. The guides are secured to the sensor by 2x M6 bolts (left / right) in the threaded inserts.

Microwave energy from the Radar module passes normally through the plastic Radom in the front of the case (left side in this photograph). The sensor is typically pointed directly into the traffic to be monitored.

A typical arrangement of the sensor is next to the road such that the microwave transmission is directed along the lanes of traffic.



Each vehicle reflects some of the microwave energy back to the sensor, to be received by the Radar module. The Radar signal processor recovers from the received signal:

- the speed of each vehicle in the field of the microwave transmission.
- the position of each vehicle in a 2D Cartesian co-ordinate system.

Up to 32 vehicles can be simultaneously monitored by the sensor.

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Speed and position of each vehicle is updated more than 100x each second. These values contribute to up to 32 tracks, each associated with a specific vehicle. Should a track cross one of multiple user defined trigger lines, then the current speed and position of that vehicle is transmitted automatically to the host – typically a SmartCamera system – for evidence collection.

#### 2.2 Connection to SmartCamera system

The sensor is typically connected directly to a "SmartCamera" system from Jenoptik Robot. All parameterization and control of the sensor is done using the customized fields of the camera GUI. A single cable carries the 115,2-kbaud serial interface and provides power to the sensor from the camera.

For complete information regarding the application of the sensor to traffic monitoring consult the documentation provided with the SmartCamera system.

#### 2.3 Technical Data RRS24F-ST3

##### Speed range and accuracy

Speed: 10 km/h to 300 km/h

Accuracy:	$\pm 3$ km/h	(speed $\leq 100$ km/h)
	$\pm 3$ %	(speed $> 100$ km/h)

##### Position measurement range

Distance:  $\leq 600$ -meter

Angle:  $\pm 20^\circ$  from normal

##### Frequency

Three user selectable frequency ranges are available:

Set 1: 24,08 GHz

Set 2: 24,12 GHz

Set 3: 24,16 GHz

##### Transmitter

Transmitter power:  $< 20$ dBm (regulated)

##### Enclosure

Weight: 1 kg

Dimensions: 137 mm x 120 mm x 50 mm (W x H x D)

IP: IP67