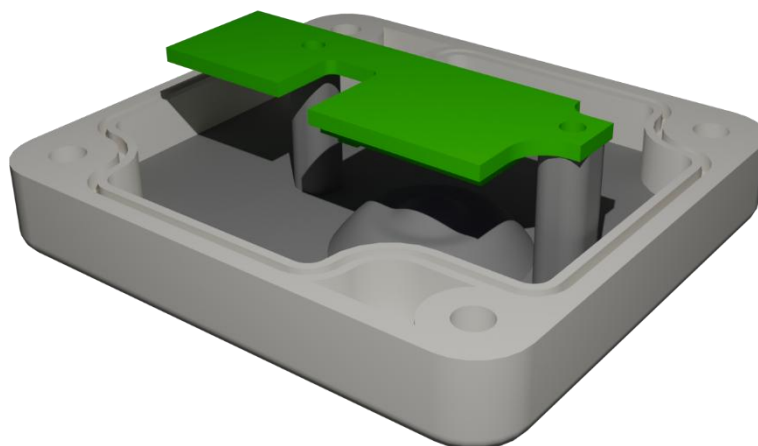# Technical manual
Radar Module

Features

The ELSYS Radar module is a peripheral for the Elsys ELT LoRa sensor to enable distance measurement using radar technology. The radar module sits under the lid with no protruding parts, making the ELT with the radar module discrete and easy to install.

Use cases

- Distance measurement
- Level measurement
- Smart parking

Theory of operation

The radar module employs pulse-coherent radar technology to measure the distance to the nearest target by emitting a high-frequency pulse and analyzing the returned signal. It offers selectable distance-measuring algorithms, allowing adaptation across various applications. The module includes an internal lens to achieve a narrow detection range, and the reported distance is calibrated to reflect the distance from the top of the module lid to the target.

Technical Specifications

Parameter	Min	Max	Unit
Operating temperature	-40	60	°C
Operating frequency range	57	64	GHz
Distance accuracy (@25 °C)	2.67	2.83	mm
Distance resolution (@25 °C)	1.2	2.4	mm
Distance range	0.15	15.0	m

Installation

Insert the radar module connector into the terminal block of the ELT.

To enable the radar, set the ELT external configuration to "Radar".

Use the Sensor Settings app and NFC to configure the radar.

Note: Take care when handling the delicate flex cable.

Radar Settings

Setting	Explanation
Range start	Near distance for the measurement range.
Range stop	Far distance for the measurement range.
Reference shape	Planar or Generic Expected surface of the object you're measuring. For planar surfaces such as water, set to "Planar". For other surfaces, use "Generic". **Note**: Using "Generic" will increase power consumption about four times compared to "Planar".
Peak sorting algorithm	Strongest or Closest "Closest" returns the object closest to the sensor. "Strongest" returns the object with the highest amplitude (strongest reflection). "Strongest" is useful if you want to measure "through" something, such as an inner ceiling or if a static object is in between the sensor and the area of interest. "Closest" on the other hand can be used to measure an object that has a more reflective surface behind it. There is no difference in power consumption between the two modes.
Median Filter	On or Off With the filter off, the sensor will do a single radar measurement to measure the distance. When the filter is activated, the sensor will do three to five radar measurements depending on the quality and take the median of the measurements. **Note:** Turning median filter on increases the power consumption approximately 3-5 times.

If the expected measuring interval is known, it is recommended to set the range start and stop values to only cover that specific range. This minimizes power consumption and maximizes accuracy. Accuracy up to one meter is generally ±1 mm, ±5 mm up to 8 meters and ±10 mm above 8 meters.

Measurements are inherently temperature compensated by means of each measurement being preceded by a short calibration radar pulse every sampling.

Error messages

In case of communication or data errors, the sensor will report error codes using the debug handle (see ELSYS Uplink Payload Description).

Value	Error
0x01	No communication with module
0x02	Invalid range
0x03	Config not written
0x04	Invalid configuration, check range
0x05	Protocol error
0x06	No target detected in range

Conformity

RED: 2014/54/EU
RoHS: 2011/65/EC
REACH: EC 1907/2006

FCC: ID 2AQ6KA1201
Contient IC: ID 24388-A121