

**RADAR SENSOR
05.100.203 TFSR**



SMART Radar Waste Level Sensor

The SMART Radar Waste Level Sensor is suitable for the installation in (waste) waste collection systems up to 150 cm. It is used as a fill monitoring system. The system uses a **radar** sensor to determine an accurate filling level of a container or bin. The system also automatically disregards fixed obstacles so that they do not influence the filling level. The measurement frequency can be set to automatic the system then optimises the measurement frequency to get the maximum battery life while still detecting the filling level correctly. Also a fixed frequency is possible i.e. every 1 hour.

The battery and other parts of the unit can easily be changed and should last 5 years under typical circumstances.

The SMART Radar Waste Level Sensor is a standalone device.

- [Detection of all main waste fractions](#)
- Level measurement in open and closed containers and bins
- All data is send in real-time using [wireless data communication](#) (2G - 4G/5G CATM1 Lte)
- Automatic [detection of emptying](#) of the container
- Automatic [calibration](#)
- Ignores fixed obstructions and [garbage bags](#)
- [Fully Integrated system with replaceable battery](#)
- [Internal memory up to 1 year](#)
- [Measuring range 2 cm – 150 cm](#)
- GPS sensor([Optional](#))
- [Temperture](#) sensor



waste vision

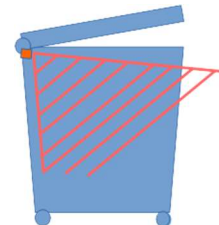
Radar Level Measurement system

The Waste Vision Radar level measurement system is a single module in which all functionality is included. It contains the logic and intelligence of the system, the battery, and the modem. New functionality can be added to the system by remotely (via 4/5G CATM1 LTE) updating the firmware of the system.

The housing of the level measurement unit is IP 67, impact-resistant and vandal-proof.

The main components are:

1. Processor
2. Memory
3. Real-Time clock
4. 4/5G CATM1 LTE modem
5. Ultrasonic sensors
6. Emptying sensor
7. GPS Sensor (Optional)



Processor

The processor used is the latest generation of processors. It has a high performance and is very power efficient. The processor controls the 4/5G CATM1 LTE modem, memory and all other system components.

Memory

In the memory the measurement data and settings are stored. The memory is non-volatile which means it will not lose its data upon loss of power. It will keep the data for 10 years even when there is no power supplied to

it. The memory can store 10.000 measurements. Additional memory can be added to the system in case there is a demand for larger storage of measurements, up to 100.000 measurements.

Real-Time clock

The real-time clock is used to determine the actual date and time. The RTC is equipped with its own battery, so it will keep on running for at least three weeks even if the main battery is empty or disconnected. The RTC automatically adjusts for summer / wintertime and leap years. Upon every connection with the central server the RTC is synchronized with the timeserver.

5G CATM1 LTE modem

The 5G CATM1 LTE modem provides the mobile communications. The modem has an industrial temperature range of -25°C tot 85°C. The modem can be used with SIMs of all major telecom providers. The antenna is integrated in the housing of the control unit.

The use of 5G CATM1 LTE ensures a secure and reliable way of sending data. In addition to a secure data transmission compared to communication networks such as Sigfox and LoRa, the great advantage of this protocol is that it can send large amounts of data from the server to the sensors, enabling remote updates of the built-in software known as "firmware" to be. In this way there is the possibility to add new functionalities to the sensors and add security updates should this be necessary.

Radar Sensor

The unit is equipped with a unique radar sensors to determine the filling level of the container. The use of a radar sensor makes sure that the system also works in containers where a plastic bag is used to store the waste. Equivalent systems that use ultrasound sensors will see a full container if a new empty plastic bag is put in the container after removing the full bag (see also 3.3.4). The sensor calibrate itself so the sensor knows how deep and how full the container is instead of just sending the distance.

Emptying sensor

The control unit has an integrated emptying sensor that detects when the containers is emptied. It will wake up the system so that is can reset its filling level and send a message to the Tardif web software.

Temperture sensor

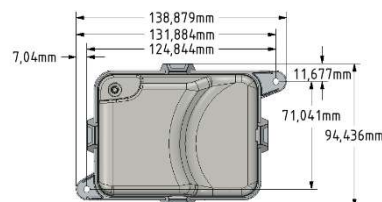
A temperature sensor is included in the system to monitor the temperature in a container. Alerts can be send to specific addresses and will be visible in the software for devices which reach a certain adjustable temperature limit.

GPS sensor

A GPS Sensor is optional available in the SMART Radar Sensor. The GPS sensor will tell you where your bins are and the location will automatically be adjusted in the software. The system will detect movement of a container and when a container is not moving anymore the new GPS position will be send after 5 minutes.

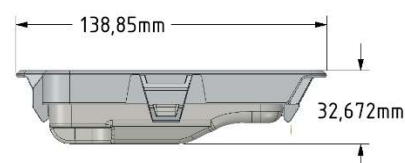
3.2.1 Operation

- Measuring range: from 2 to 150 cm
- Accuracy: 2 cm
- Temperture: -25 °C à 80 °C
- IP Classe : IP67



3.2.2 Dimensions

- L x B: 139 x 94 mm
- Height : 33 mm
- Weight : 200 g



Measurement Methodic Radar Sensor

The sensor measures the volume in the container, the distance to the waste, at specified configurable intervals. Thanks to the unique Radar recording technology, the measurement guarantees a measurement accuracy of more than 95%.

The Radar sensor can ignore a plastic bag which is used in a bin or can be mounted on the outside of a plastic Tank / Container. This is possible because of the unique Waste Vision radar technology that makes it possible to “see” through plastic.

The processor microcode, which can also be updated remotely in case of technical progress in calculation methods, uses an advanced signal processing algorithm

- Depth measurement by a radar sensor, with a standard measurement 1 x per hour
 - Exclusion of echoes by mechanical parts in the container such as uprights, chains, etc.)
 - Calculation and storage of the value of the filling degree at time T
- The calculated and stored measurements are sent at programmable intervals, normally 3 times a day.
The frequency of communication is adjustable, but it does affect the life of the battery.

The calculated and stored measurements are sent at programmable intervals, normally 3 times a day. The frequency of communication is adjustable (for extreme fast-filling containers) , but it does affect the life of the battery.

Data is sent to our web servers via a secure network separate from the public internet.

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