

# JOJO MONITOR

# Tank Level



## Device Limitations/ Implementation Restraint Description

The purpose of this document is to describe the design and implementation restraints of the JoJo Tank Level device.

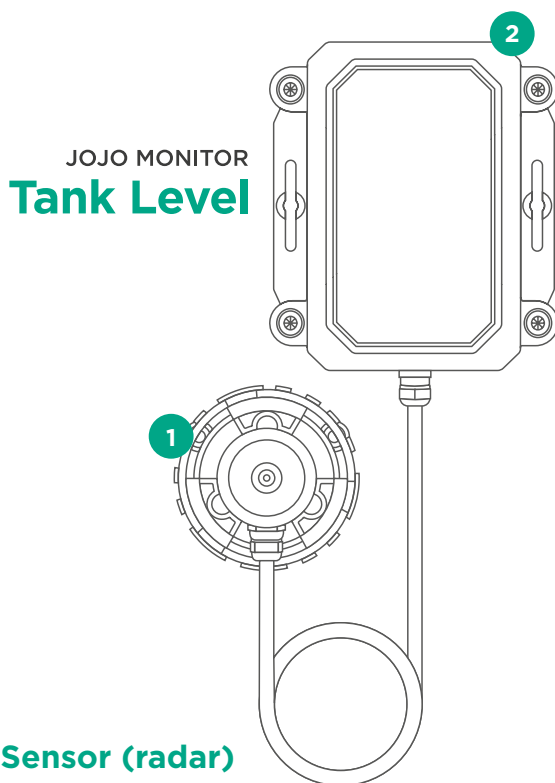
# Device Limitations/Implementation Restraint Description

## The product scope

The JoJo Tank Level device is a low power battery operated device equipped with a radar range measurement sensor. The primary use of the device is to measure the water level within a tank. The device is intended for long term operation with minimal to no maintenance.

## Important

Please refer to the *Usage and Installation guidelines* available on our website or on the inside of the packaging for detailed information on best practises, technical guidelines, and recommendations based on your tank type. This document will not cover any of the above mentioned, and will specifically focus on implementation restraints.



### Range

The measurable range of the sensor is from 150mm to 5000mm. If the range is increased, accuracy will be affected as a result. Any signals received that are under 100mm will be ignored by the device (*refer to penetration of plastics section for more detail*).

## Penetration

### Of Plastics

The sensor is capable of penetrating most thin plastics. This said, these will still cause some reflection and can be detected by the sensor. To combat this, any signals received by the sensor that are under 100mm are ignored. Therefore any plastic placed in front of the sensor will need to be wholly within this range of the front of the radar.

### Of Tank filters

The sensor is unable to penetrate metal filters and should not be placed above anything metallic.

To reduce the impact of plastic filters on the measurements, the filter and device should be placed as close as possible to each other (*as detailed in the penetration of plastics section*).

### Of Water condensation

Very thin layers of water can be penetrated by the sensor, such as light condensation.

When water accumulates under the sensor to the extent that large visible water droplets form, the signal will be attenuated. This is common on large curved surfaces (like a tank lid/roof).

It is therefore recommended to have a clear visible path from the sensor to the measurement surface (we advise drilling a hole beneath the sensor, *please refer to our usage and installation guidelines on our website for more detail*).

## Mounting

### Orientation

The sensor is directional and relies on a reflected signal coming back from the surface it is measuring. If the sensor is not placed perpendicular to the surface, the reflected signal can miss the sensor's received antenna. It is therefore important to ensure that the sensor is mounted 100% level. Installation guidelines are available on our website.

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## Location

Although the sensor is directional, the transmitted signal can be viewed as a cone getting wider the further the signal travels.

When placed close to the edge of a tank there can be interference with the side wall and result in inaccurate readings. Placement as close to the centre of the tank is recommended (*refer to our website for detailed guidelines based on your tank type*).

## Radiation exposure statement

**Note:** this applies to the sensor while it is active and performing a measurement.

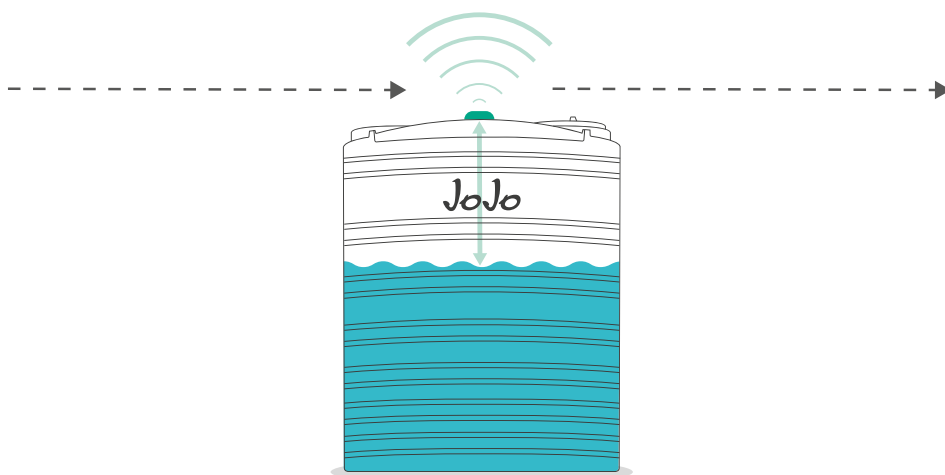
This equipment complies with the Canadian exposure limits set forth for an uncontrolled environment. The equipment should be installed and operated with a minimum distance of 200mm between the sensor and your body.

## 2 Device

### Battery life

Performing a range measurement as well as Bluetooth and Sigfox communication requires power from the battery. Heavy use of Bluetooth will impact the device's battery life.

Increasing the rate at which the device performs range measurements or Sigfox transmissions, as well as heavy use of Bluetooth, will impact the device's battery life.



## Communication/coverage

Long distance communication from the monitor device via a Low Power Network (LPWAN) is dependent on the coverage provided by Sigfox.

Though a significant portion of South Africa is covered, there are areas in the country which do not have Sigfox coverage.

An area that has coverage could still have poor signal, typically due to a hill or high rise buildings blocking the signal between the base station and the device. This can result in the occasional message from the device not reaching the Sigfox network.

Signal coverage is hampered when placed indoors or underground. When placed underground or within a basement of a building, it is very likely that communication between the device and network will not occur. In such instances, custom-engineered solutions are required.

## Mounting

The radio and antenna is located within the main monitor device enclosure and separated from the sensor. Communication to and from the monitor device via Bluetooth and Sigfox will be negatively affected when placed within a metal panel or enclosure.

## Temperature

The operation temperature of the device is between -20° C to 65° C. In high temperature areas, it is advised to mount the device in a shaded location.

