



# VoluSense: Submersible

*Satellite connected **LEVEL** sensing through pressure principles, processed and enhanced by a proprietary Artificial Intelligence Architecture.*



## APPLICATIONS & BENEFITS

The Carbic VoluSense system gives the power to monitor fluid changes in tanks for an entire oilfield - all from any internet connected device. Example uses:

- Track hauls and pickups from any tank
- Eliminate the risk of leaks and overflows
- Reduce pumper visits
- Significantly improve HSE
- Monitor and measure fluid production into a tank
- Optimize trucking and hauling activity
- Improve fleet load factors

## FEATURES

VoluSense sensors install easily, require near no maintenance, and automatically send data to Carbic servers and software where it is accessible via any internet connected device:

- Retains accuracy across different fluid types and foaming
- Advanced satellite telemetry build in
- Ultra efficient solar power and battery system
- Intrinsically safe for Class I Div I Groups A-D hazardous locations



## DESCRIPTION & COMPONENTS

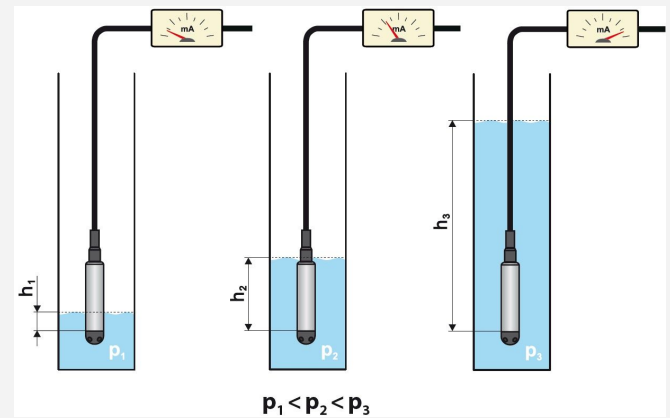
The Carbic level sensor system combines a piezoresistive level sensor with a communications module to allow oil and gas operators to measure and transmit level information from remote locations. There are three physical components to this system: (1) a main CPU module with battery and data transmitter, (2) a cabled pressure transducer suspended into the tank, and (3) a solar panel to provide power.

Carbic level sensors give operators a tool to understand exactly the current state, historical behavior, and changes in the volume of fluid inside a tank with unprecedented ease, accuracy, and flexibility.

As with all Carbic products, no additional equipment or expertise is needed to start bringing your oil field online. The system installs with zero external power. Telemetry or SCADA systems are also not needed. This is made possible by a number of breakthroughs and innovations pioneered by Carbic.

## TECHNOLOGY INVOLVED

The primary mechanism for reading the level in the tank leverages the relationship between hydrostatic pressure at a specific point in the tank (typically near the bottom) and the height of that fluid. Traditionally hydrostatic based methods for measuring storage tank levels were inadequate for applications with inconsistent fluid composition as the ability to convert pressure into fluid height relies on a consistent specific gravity of the fluid. With Carbic's proprietary cloud connection system and algorithms, rapidly recalibrating the sensor is possible with a mere manual gauge of the tank--no fluid samples or manual manipulation of the device needed.



## ADDITIONAL OPTIONS

- VoluSense comes bundled with access to Carbic software that will automatically deliver daily reports and customizable alarms to notify recipients when a storage tank may be behaving unusually (failures, blockages, etc).



- VoluSense can be paired with UltraFlow flow metering solutions to allow operators to monitor their entire field from a computer in the office.

## TECHNICAL SPECIFICATIONS

SPECIFICATIONS	
ACCURACY	
Measurement type	Liquid level SS316L probe
Repeatability	± 0.5%** full scale height
Calibration Process	Manually gauge the height of the tank and enter on device, or report to your Carbic representative
Fluid type	Crude oil, brine water, freshwater, emulsions
Measurement parameters	Hydrostatic pressure, fluid height, volume
TELEMETRY & COMMUNICATION	
Type	Terrestrial: 3G, 2.5G Satellite: LEO Global Network
Direction	Uplink and downlink (down accessible only by Carbic personnel)
Latency	~30s
Transmission Frequency	~24 - 100/day standard
External Power requirements	None (all supplied by included solar panel)
Local Inputs	4-20mA, HART, Modbus/RS485
Local Outputs	HART, Modbus/RS485
ELECTRICAL SPECIFICATION	
Battery size	10,400 mAh
Expected operating time (without power)	200 hours
Solar panel peak power	12 watts
Solar panel peak voltage	19.0 V
Safety mechanism	Intrinsically safe barrier
Total Number of cable inlets	2
MECHANICAL SPECIFICATIONS	
Components	CPU enclosure, solar panel, transducer, cabling, mounting-clamps
Process fitting range	Clamp or thread (usually 2-4" NPT)
Contact temp range	-20 to +80°C (-40 to +176°F)
Operating ambient temp range	32°F to 122°F (0°C to 50°C)
Mounting style (CPU)	Clamp-on
Dimensions (CPU)	193.80 x 117.60 x 78.49 mm (7.63 x 4.63 x 3.09 in.)
Mounting style (Solar Panel)	Clamp-on
Dimensions (Solar Panel)	357 x 302 x 30 mm (14.06 x 11.89 x 1.18 in)
Mounting style (Transducer)	Suspended through port
Aggregate weight	8.4 lbs

Enclosure materials	Polycarbonate Resin (UV Stabilized & Flame Retardant)
Enclosure Ratings	Flame Rating: UL94V-0 NEMA Rating: 1, 2, 4, 4X, 6, 6P, 12, 13 IP Rating: IP65, IP66, IP67, IP68
Module Rating specification	Class I, Division 2, Group D T3C with Class 1, Division 1 port (ISA 12.12.01-2015 / CSA C22.02 No. 213-15 / UL913)
Sensor Rating specification	Class 1, Division 1, Groups A,B,C,D, T3C (UL913)

*\*\* accuracy, repeatability and minimum and maximum flow rate range are based on field proving test conditions however they may vary depending on significant changes on fluid characteristics. To avoid discrepancies customer should upload in Carbic dashboard the re-calibration data.*

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