

FLOWCOMMAND

UltraFlow™ Series

*Satellite connected and non-intrusive **flow meters** with ultrasonic sensing technology*



APPLICATIONS & BENEFITS

This FlowCommand UltraFlow system gives the power to measure and monitor fluid movement for an entire oilfield - all from any internet connected device. Example uses:

- Measure any oilfield fluid - raw streams, oil, wastewater, etc
- Monitor, measure and improve well production
- Reduce well downtime
- Track facility performance
- Improve equipment performance

FEATURES

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

- Instant installation that only requires a screwdriver
- Retains accuracy with wide variety of fluids and pipe sizes
- Advanced satellite telemetry build in
- Ultra efficient battery
- Intrinsically safe for Class I Div II Groups A-D hazardous locations



DESCRIPTION & COMPONENTS

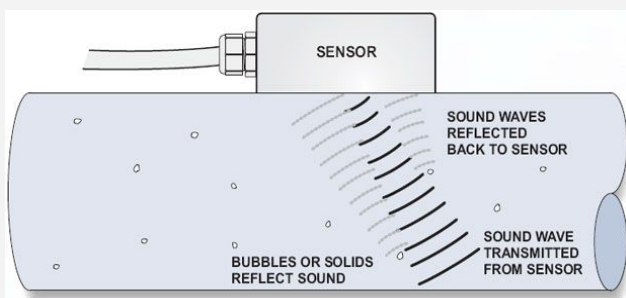
The UltraFlow system combines a sonic-based flow meter with a communications module to allow oil and gas operators to measure and transmit flow information from remote locations. There are three physically components to this system: (1) a main CPU module with battery and satellite transmitter, (2) an ultrasonic transducer, and (3) a solar panel to provide power.

UltraFlow gives operators the power to know exactly what is happening with flow streams from any well, facility, pipeline by allowing the tracking of any pipe-contained fluid movement with unprecedented ease, accuracy, and flexibility.

As with all FlowCommand products, no additional equipment or expertise is needed to start bringing your oil field online. UltraFlow installs with zero pipe intrusion, zero external power, and zero telemetry or SCADA system are needed. This is made possible by a number of breakthroughs and innovations pioneered by FlowCommand.

TECHNOLOGY INVOLVED

The primary mechanism for reading activity in the pipe is through the ultrasonic acoustic waves sent and received by the transducer. These waves are powerfully transmitted through the pipe wall, any scaling or paraffin buildup, and reflect off of the many bubbles, gas or solids present in the flowstream.



The proprietary onboard processor performs a spectral frequency analysis of the waves to calculate a flow profile. From the profile of these sound waves, a mix of on-board and cloud-based algorithms compute a fluid velocity in the pipe.

Unlike most sonic-based metering systems that require significant amounts of external power, UltraFlow uses algorithms to intelligently and dynamically manage its power system; this system allows the sensor to automatically manage its own power usage and supply merely with a solar panel the size of a tablet. And as with all FlowCommand sensors, the UltraFlow series sensors collect relevant data throughout the operation and sends it to cloud based software via satellite.

ADDITIONAL OPTIONS

- UltraFlow comes bundled with access to FlowCommand software that will automatically deliver daily reports and customizable alarms to notify recipients when a flow stream may be behaving unusually (well going down, etc).



- The CPU module in UltraFlow has the capability to read and transmit data from any piece of equipment with a HART or modbus output protocol
- UltraFlow can be paired with VoluSense tank monitoring solutions to allow operators to monitor their entire field from a computer in the office

TECHNICAL SPECIFICATIONS

SPECIFICATIONS	
ACCURACY	
Measurement type	Proprietary ultrasonic based frequency-shift and transit-time algorithmic evaluation
Pre-calibration accuracy	5% ± 2.5%
Repeatability	0.5% ± 0.25%
Calibration Process	Provide to FlowCommand an approximate figure of the average flowrate of the target flow stream, the system then requires 36 hours to accumulate data
Post-calibration accuracy	1% ± 0.5%
Measurement parameters	Velocity, volumetric, and totalized flow
Fluid types	All liquids with particles or gases of 100 microns or larger and minimum concentrations of 75 ppm
Flow rate range	0.008 to 40 ft/sec (0.0025 to 12.2 m/sec)
TELEMETRY & COMMUNICATION	
Type	Satellite (with GSM bands as available option)
Direction	Uplink and downlink (down accessible only by FC personnel)
Latency	~30s
Frequency	~5 - 100/day standard
Power requirements	None (all supplied by included solar panel)
Inputs	4-20mA, HART, Modbus/RS485, MicroUSB
Outputs	4-20mA, HART, Modbus/RS485, MicroUSB, sat-modem
ELECTRICAL SPECIFICATION	
Battery size	10,000 mAh
Expected operating time (without power)	200 hours
Solar panel peak power	1.5 amps 9 watts
Solar panel peak voltage	6.0 V
Safety mechanism	Intrinsically safe barriers
Transducer cable	20 ft (6m), shielded coaxial pair
Total Number of cable inlets	2
MECHANICAL SPECIFICATIONS	
Components	CPU enclosure, solar panel, transducer, cabling, mounting-clamps
Pipe size range	1/2" to 180" (12.5 mm to 4.5 m) ID
Pipe material requirements	Carbon steel, stainless steel, ductile iron, copper, FRP, or any other that sufficiently conducts sound
Contact temp range	-40°F to 300°F (-40°C to 150°C)
Operating ambient temp range	-28°F to 180°F (-30°C to 80°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)	220 x 255 x 5mm (8.7 x 10.1 x 0.2 in)
Mounting style (Transducer)	Clamp-on
Dimensions (Transducer)	85 x 35 x 38mm (3.375 x 1.375 x 1.5 in)
Aggregate weight	4.2 lbs
Enclosure materials	Polycarbonate and aluminum weather-proof
Couplant	High temperature resistant hydrophobic gel
Rating specification	Non-incendive for Class I, Division 2, Groups A, B, C & D locations.

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VoluSense™ Series

*Satellite connected and non-intrusive **level sensors** with radar sensing technology*



APPLICATIONS & BENEFITS

The FlowCommand 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 no maintenance, and automatically send data to FlowCommand servers and software where it is accessible via any internet connected device:

- Non-contact; no issues with clogging or freezing
- Instant installation that only requires a screwdriver
- Retains accuracy across various fluid types and foaming
- Advanced satellite telemetry build in
- Ultra efficient battery
- Intrinsically safe for Class I Div I Groups A-D hazardous locations



DESCRIPTION & COMPONENTS

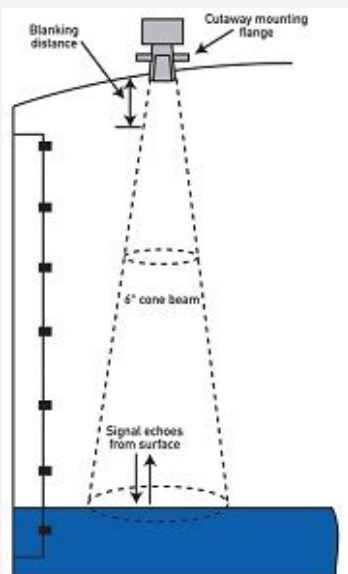
The VoluSense system combines a radar-based level sensor, a communications and power module, and a solar panel to allow oil and gas operators to measure and transmit information about stored fluid in remote locations.

VoluSense gives operators the power to know exactly how much fluid is in a tank, entering a tank, or exiting a tank at any moment. And as always, all this data is available to you anywhere there is an internet connection. This revolutionary technology instantly delivers volume sensing at 1/10th the cost of traditional systems.

And as with all FlowCommand products, no additional equipment or expertise is needed to start bringing an oil field online. VoluSense installs with zero modification needed to existing tanks - simply screw the radar antenna into any standard 2" NPT port on the top of the target tank, mount the solar panel and CPU unit, and all data about the fluid in your tank will be online. There are no extra steps. No external power, telemetry, or SCADA systems are needed. This is made possible by a number of breakthroughs and innovations pioneered by FlowCommand.

TECHNOLOGY INVOLVED

A module transmits radar waves from a send/receive module that is mounted at the top of the tank (and that protrudes approximately 6" into the tank). These waves bounce off of the surface of the fluid inside of the tank.



The proprietary onboard processor examines the millions of waves that return to the module, and examines the amount of time each wave takes to return back.

After the device performs complicated filtering logic, the processor algorithmically computes a fluid level inside of the tank or storage container based on the amount of time that certain waves take to bounce off the tank floor, walls, and fluid in the tank.

And as with all FlowCommand sensors, the VoluSense series sensors collect relevant data throughout the operation and sends it to cloud based software via satellite. VoluSense uses algorithms to intelligently and dynamically manage its power system; this system allows the sensor to automatically manage it's own power usage and supply merely with a solar panel the size of a tablet.

ADDITIONAL OPTIONS

- VoluSense comes with access to FlowCommand software that will automatically deliver daily reports and customizable alarms to notify recipients when fluid in a tank may be behaving unusually (overflow risk, leaks, etc).



- The CPU module in VoluSense has the capability to read and transmit data from any piece of equipment with a HART or modbus output protocol
- 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	Proprietary radar based transit-time algorithmic evaluation
Pre-calibration accuracy	± 3% of max range
Repeatability	± 0.25%
Calibration Process	Provide an approximate height of the fluid in the storage tank at the time of calibration using the keypad on the CPU unit
Post-calibration accuracy	± 0.5% of max range
Measurement parameters	Total volume, change in volume
Fluid types	Oil, water, wastewater, chemicals with vapors, condensate - contact FlowCommand for questions about others
Tank height range	12 - 240 ft (4 - 70 m)
TELEMETRY & COMMUNICATION	
Type	Satellite (with GSM bands as available option)
Direction	Uplink and downlink (down accessible only by FC personnel)
Latency	~30s
Frequency	~5 - 100/day standard
Power requirements	None (all supplied by included solar panel)
Inputs	4-20mA, HART, Modbus/RS485, MicroUSB
Outputs	4-20mA, HART, Modbus/RS485, MicroUSB, sat-modem
ELECTRICAL SPECIFICATION	
Battery size	10,000 mAh
Expected operating time (without power)	250 hours
Solar panel peak power	1.5 amps 9 watts
Solar panel peak voltage	6.0 V
Safety mechanism	Intrinsically safe barriers
Radar cable	Up to 500 ft (150m), shielded coaxial pair
Total Number of cable inlets	2
MECHANICAL SPECIFICATIONS	
Components	CPU enclosure, solar panel, radar, cabling, mounting-clamps
Port size	2" NPT
Operating ambient temp range	-28°F to 180°F (-30°C to 80°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)	220 x 255 x 5mm (8.7 x 10.1 x 0.2 in)

Mounting style (Radar)	Screw-in (2" NPT port required)
Dimensions (Radar)	100 x 450mm (4.0 x 17.6 in)
Antenna material	Teflon
Aggregate weight	7.6 lbs (3.3 kgs)
Enclosure materials	Polycarbonate, aluminum weather-proof, stainless steel
Rating specification	Non-incendive for Class I, Division I, Groups A, B, C & D locations.

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