

Aboveground Storage Tank (AST) Floating Roof - Solution Sheet

FR-Tracker 2.0™ Safety System – Developed in close cooperation with the petroleum industry

Application Challenge

It is necessary to detect tank conditions that lead to accidents. Real-time monitoring of inclination, product and water on deck, vibration/acceleration, and temperature is a proven method for early identification of tank failure events.

Syscor's Solution

The FR-Tracker 2.0 safety system is rapidly deployable as an effective and reliable floating roof monitoring system, due to:

1. Compliance:

Syscor's Intrinsically Safe, WirelessHART Field Transmitters (PCU-X00/01/11) seamlessly integrate with existing DCS/SCADA and asset management systems.

2. Wireless Installation on In-Service Tanks:

Sensor Units 1, 2, 3, and 4 (Placement-top right): Syscor's PCU-X11 Incliner, Right Hand Circular-Polarization (RHCP) antenna, and optional Hydrocarbon Detector with Water Level (HCDW) sensor probe(s) are mounted to the floating roof deck using the Floating Roof Mounting Bracket. Three strong magnets secure the bracket onto flat steel surfaces (3M tape can be used for non-metallic roofs). The bracket may be bolted to an optional Swivel Base which enables rapid deployment and extraction (see "Placement"-diagram B). At least three Sensor Units with Inclinerometers are required for deck inclination monitoring capability. If monitoring for product or water on deck, Syscor's HCDW(s) must be wired to the Sensor Units.

Syscor's PCU-X00 Repeater on the roof platform transmits data from the deck's Sensor Units to the WirelessHART Gateway and operator's interface (see "Placement"-diagram C). An optional Inclinerometer may be mounted to the ladder with the Universal Mounting Bracket (see "Placement"-diagram A). An optional PCU-X01 Sensor Hub with HCDW (Sensor Unit 5) may be mounted to the floating roof centre for detection of plugged drains and hydrocarbons.

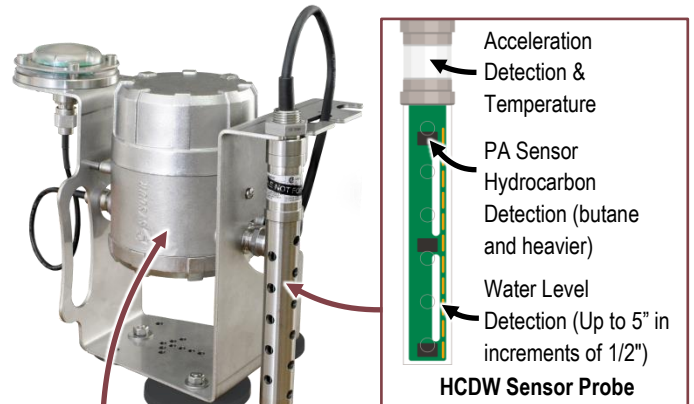
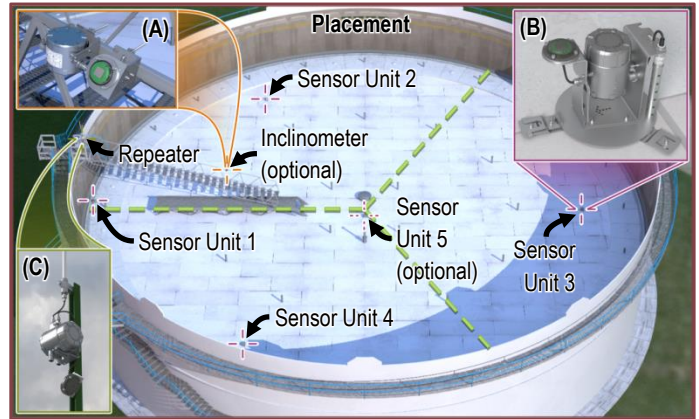
No tank alteration is required.

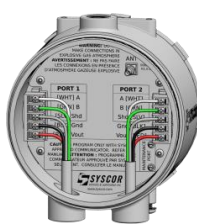
3. Materials Innovation:

Syscor's Polymer Absorption (PA) Sensors provide accurate and reliable hydrocarbon detection in air (humid or dry), within water bodies, and even in ice. Each HCDW sensor probe contains PA sensors and 5" of water level measurement in 1/2" increments.

4. Sensor Fusion Technology:

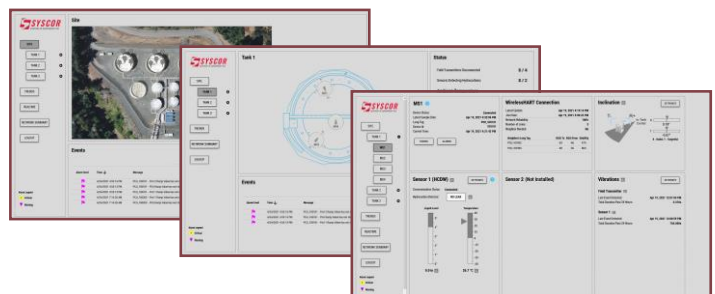
Redundant Sensor Units across the floating roof deck reduces false alarm probability. The Sensor Units with optional HCDW sensor probe(s) collect long-term data that can be used to schedule and inform tank maintenance activities.

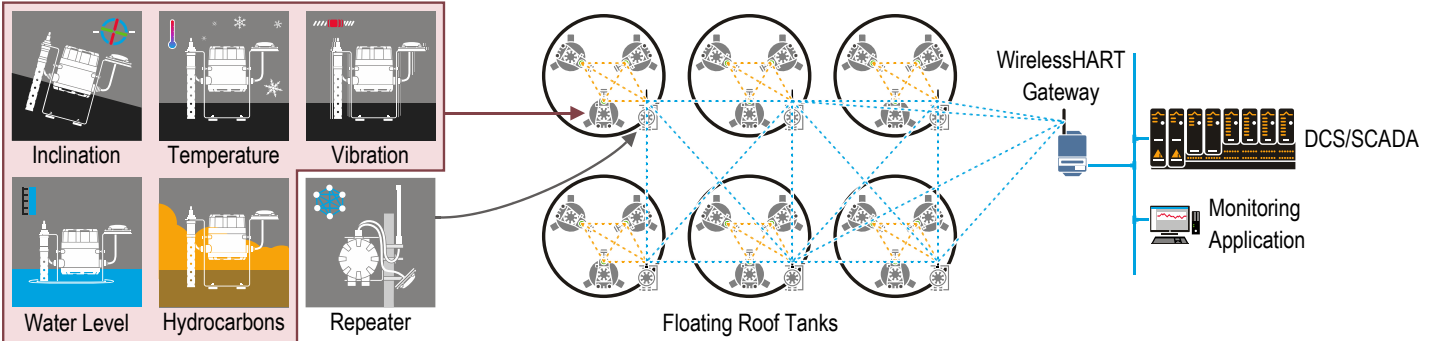




Field Transmitter (PCU)

- Uses the WirelessHART protocol and is scalable and easily integrated within existing mesh networks.
- Optional to use as a ladder-mounted Inclinerometer (A), Sensor Unit (B), or Repeater ().
- Up to 10 years of Li-SOCL2 battery life based on 1-minute update rate and 4-cell battery.
- Optional Tracker monitoring interface (below) is highly scalable and allows unlimited data point tags — excellent for large scale, geographically dispersed, and complex monitoring applications.





Specifications

Functional Specifications

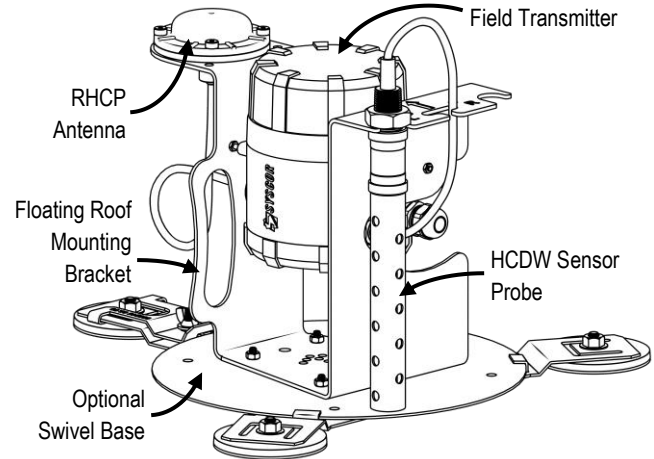
Internal Sensors	Temperature, vibration, inclinometer/accelerometer
External Sensors	Syscor's HCD and HCDW sensor probes connect directly to the Field Transmitter via cable and are secured to the Floating Roof Mounting Bracket
Wireless Comm.	WirelessHART IEC 62591 2.4 GHz DSSS
Wireless Data Update Rate	User-selectable; 1 minute to 1 hour

Physical Specifications

Power Supply	Field replaceable, Intrinsically Safe, Li-SOCl ₂ battery pack; up to 10 yr. battery life depending on application and update rate. 2-cell battery pack: 7.2V 19.0Ah 136.8Wh 4-cell battery pack 7.2V 38.0Ah 273.6Wh Enclosure: Fully potted, ABS plastic
Communication	Maintenance Port for communication with HART field communicator
Enclosure	Housing: Stainless Steel SS316
Antenna Options 2.4GHz	- All Field Transmitters: Omni-directional/Hemi-spherical, Right hand circular polarized, patch antenna, N-type, 4.9dBi peak gain - PCU-X00 Repeater: Omni-directional, high gain antenna, N-Type, 8dBi peak gain (in addition to the RHCP patch antenna) - Optional lightning arresters are available
Antenna Port	N-Type female
Sensor Probe Ports	1/2in. NPT
Sensor Wiring Connections	Screw terminals for 4x1 conductor 20 AWG tinned copper wire
Weight	Field Transmitter-3.75kg [8.3lbs]; HCDW-500g [17.6oz.]; Patch antenna- 5.6g [1.9oz.]; Floating Roof Mounting Bracket-1.9kg [4.18lbs]; 2-cell battery pack- 300g [10.6oz.]; 4-cell battery pack-600g [21.2oz.]
Mounting Options	Floating Roof Mounting Bracket with magnets and optional swivel base.

Performance Specifications

Electromagnetic Compatibility	Meets all relevant requirements of EN 62479:2010 and EN-61326-1:2013
Vibration and Acceleration	Ultra-low-power, high performance, three-axis linear accelerometer; Dynamically selectable range from 0g to 16g; Acceleration and velocity detection
Inclinometer	High accuracy (0.1°), dual-axis digital inclinometer/accelerometer sensor Digital inclination data, 0.025° resolution Digital acceleration data, 0.244mg resolution ±1.7g accelerometer measurement range
Temp. Sensor	8 bit resolution; worst case accuracy ± 2°C [3.6°F]
Operating Temp.	-40°C to +60°C [-40°F to +140°F]



Learn More

FR-Tracker 2.0	syscor.com/solutions/frtracker/
PCU-X01 Sensor Hub	syscor.com/downloads/PCU01DDS_WiHART-Sensor_Hub.pdf
PCU-X11 Inclinometer	syscor.com/downloads/PCU01DDS_WiHART-Inclinometer.pdf
PCU-X00 Repeater	syscor.com/downloads/PCU01DDS_WiHART-Repeater.pdf
Hydrocarbon Detector with Water Level (HCDW) Sensor Probe	syscor.com/downloads/HCDW01DDS_HCDW-Sensor.pdf
Field Transmitter Battery Pack	syscor.com/downloads/BATTERY01DDS_Field-Transmitter-Battery-Packs.pdf
Antennas	syscor.com/products/antennas/
Floating Roof Mounting Bracket	syscor.com/downloads/BACKET01DDS_FR-Mounting-Bracket.pdf
Swivel Base	syscor.com/downloads/BACKET01DSS_AST-Swivel-Base.pdf
Instrumentation Cable	syscor.com/downloads/CBL01DDS_4x1-Cable.pdf
Monitoring Software	syscor.com/products/software

Syscor reserves the right to change product designs, specifications, and information without notice.



Certifications

Note: Certifications apply to the complete system (Field Transmitter (IP67) + sensor probes (IP68))

<p>USA : FCC: 2AAZE-000697 Intrinsic Safety: CSA 19CA70174889X Class I, Division 1, Groups C and D, T4 Class I, Zone 0 AEx ia IIB T4 Ga</p>	<p>Canada: IC: 11413A-000697 Intrinsic Safety: CSA 19CA70174889X Class I, Division 1, Groups C and D, T4 Ex ia IIB T4 Ga</p>	<p>Europe: Intrinsic Safety: SIRA 18ATEX2249X Ex ia IIB T4 Ga CE₂₀₁₃</p>	<p>IECEX: Intrinsic Safety: IECEX CSA 18.0031X Ex ia IIB T4 Ga</p>
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