



UNITENSE TECH LIMITED

Optical Gas Leak Detection

Next-Generation Sensing Solutions for Low-GWP & Natural Refrigerants

Chillventa 2026 Exhibition & European OEM Corporate Profile



Company & Technology Pedigree

Bridging academic spectroscopic research with high-volume industrial manufacturing.

Leadership & Research Pedigree



Dr. Shimei Chen, Founder & CTO

Holding a Ph.D. from The Hong Kong Polytechnic University, Dr. Chen spearheads Unitense's deep-tech engineering team. Incubated at the Hong Kong Science and Technology Park (HKSTP), Unitense specializes in advanced infrared laser spectroscopy and optical gas fluidics.

Our core mission is eliminating sensor poisoning, baseline drift, and recurring replacement overheads for global HVAC&R OEMs as the industry transitions to flammable low-GWP refrigerants.

Proprietary Optical Technology



NDIR Architecture

Dual-wavelength narrow-band infrared absorption eliminates false alarms from ambient VOCs, humidity, and chemical cleaners.



CaF2 Optical Lenses

High-transmittance calcium fluoride optical windows provide complete immunity to chemical etching and optical degradation.



Zero-Drift Baseline

Proprietary digital filtering algorithms maintain baseline drift within $\leq 2\%$ LFL with zero-point noise suppressed below 10 ppm.

European Regulatory Mandate



EU F-Gas Regulation (EU 2024/573)

Accelerated quota phase-downs strictly penalize high-GWP HFCs. Heat pump and chiller manufacturers are compelled to rapidly adopt mildly flammable A2L blends (R32, R454B) and natural refrigerants (R290 propane).

IEC / EN 60335-2-40 & EN 378

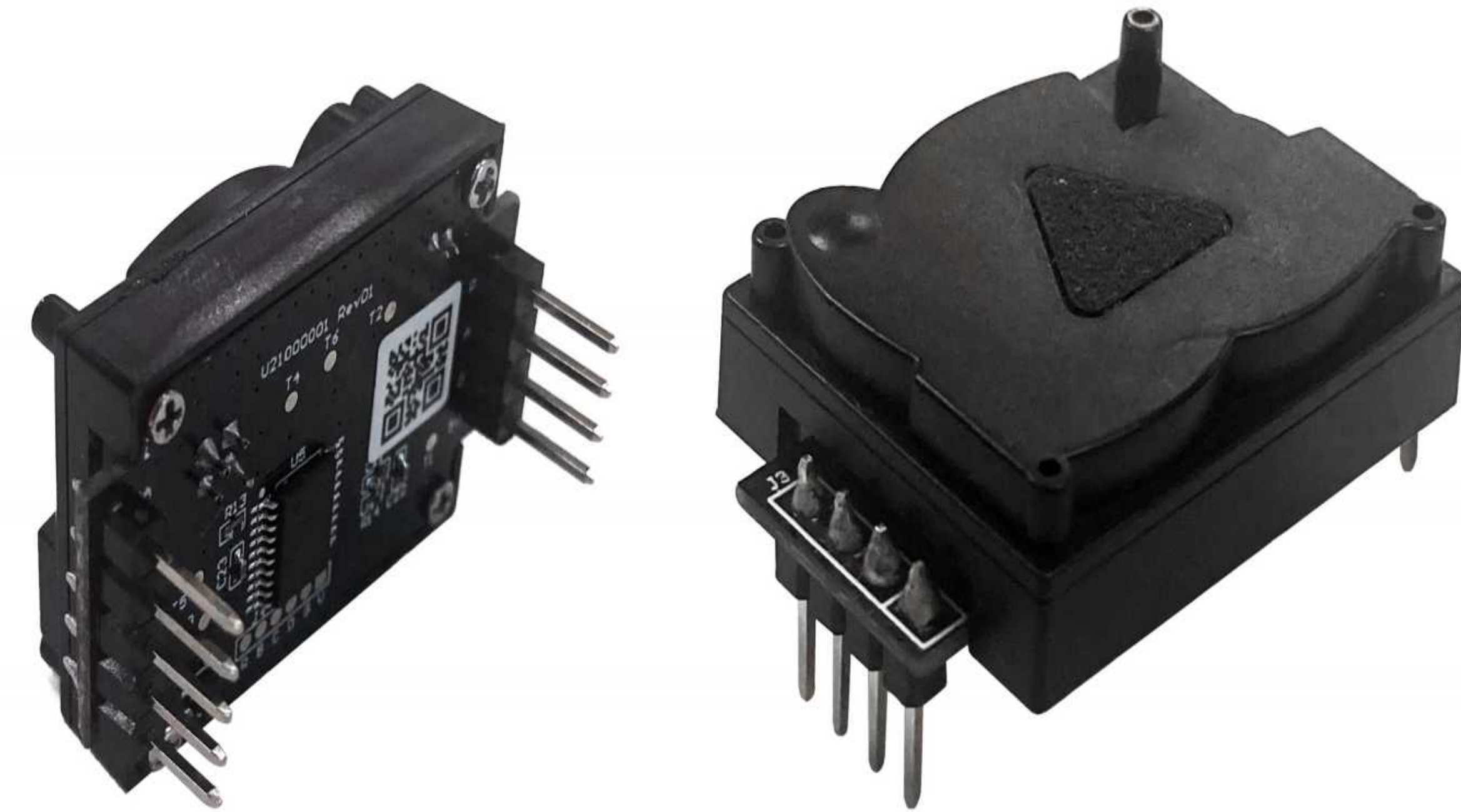
International safety directives enforce mandatory continuous leak detection on equipment with flammable refrigerants. Sensors must reliably trigger automatic ventilation and isolation shut-off valves without false trips.

Precision Product Portfolio

Targeted optical detection engines engineered for HVAC OEMs, plant safety, and field sniffers.

U9601 Compact OEM Module

- **Ultra-Lightweight & Compact:** Weighs only 5.7 grams in an ultra-low-profile PCB package, designed for direct indoor/outdoor HVAC chassis mounting.
- **Target Refrigerants:** Pre-calibrated for A2L blends (R32, R454A/B/C) and R290 propane across 0–50% LFL (extendable to 100% LFL).
- **15-Year Operational Lifespan:** NDIR optical architecture eliminates sensor poisoning, matching the full lifecycle of residential and commercial heat pumps.
- **Versatile Output Protocols:** Standard UART TTL (3.3V) and PWM outputs, with optional I2C for effortless mainboard integration.
- **Fast Response & Precision:** Response time under 30 seconds with accuracy within $\pm 3\%$ LFL and baseline drift $\leq 2\%$ LFL.



U9606 Fast Flow-Through Sensor

- **Integrated Flow-Through Chamber:** Dual push-in pneumatic fittings designed for pumped gas sampling loops and aspirated leak sniffers.
- **Rapid Tunable Response:** Adjustable response times from 1.5 to 60 seconds via digital filtering presets for instantaneous leak localization.
- **Trace-Level ppm Detection:** Standard 0–50% LFL range with optional customization down to trace-level 0–2000 ppm for precision sniffing tools.
- **Dual Signal Interface:** Standard 5-pin output featuring simultaneous UART TTL and linear 0.4 V – 2.0 V analog voltage.
- **High Measurement Stability:** $\pm 3\%$ LFL measurement accuracy with long-term stability maintained within $\leq 2\%$ LFL.



Product Specifications Matrix



Specification	U9601 Compact OEM	U9603 Industrial Metal	U9606 Fast Flow-Through
Target Gases	R32, R454B, R290	A2L, R290, Combustibles	R32, R454A/B/C, R290
Form & Weight	Ultra-Light PCB (5.7g)	Sintered Mesh Metal (18.5g)	Dual Pneumatic Ports (45g)
Response Time	< 30 seconds	< 30 seconds	1.5 ~ 60 seconds (tunable)
Operating Life	15 Years maintenance-free	> 10 Years continuous	> 10 Years continuous
Interface Output	UART TTL (3.3V), PWM, I2C	UART TTL, 0.4V–2V Analog	UART TTL, 0.4V–2V Analog
Primary Application	Heat pumps, VRF splits	Chillers & machinery rooms	Handheld sniffers & test rigs

Operational Lifespan Benchmark



Unitense Optical NDIR



Semiconductor (MOS)



Catalytic Pellistor



Electrochemical Cell



Unitense optical sensors match the full 15-year lifecycle of European heat pump platforms, eliminating calibration drift, recurring maintenance dispatches, and chemical poisoning risks.

OEM Integration & Customization



-  **Configurable Optical Chambers:** Custom optical path lengths supporting trace ppm sniffing down to 50% / 100% LFL safety shut-off thresholds.
-  **Flexible Protocols & I/O:** Native support for UART TTL (3.3V/5V), PWM, and 0.4–2.0V analog outputs, with optional I2C and RS485 Modbus integration.
-  **Rapid Prototyping & Engineering:** Direct co-engineering on mechanical enclosure constraints, PCB footprint adaptation, and firmware filtering algorithms.
-  **Automated Multi-Point Calibration:** 100% factory gas-calibrated across full operating temperature ranges (–30°C to 60°C) for plug-and-play assembly.



Partner with Unitense

Visit our booth at Chillventa 2026 to evaluate live sensor demonstrations and discuss OEM integration.

[Hong Kong Science Park \(HKSTP\)](#) | info@unitense.com | www.unitense.com