SENSOR® NETWORKS, INC

Inspection, Testing & Asset-Integrity Solutions

micro PIMS®

Intrinsically Safe

Wireless, Non-Intrusive Ultrasonic Sensors for Corrosion/Erosion Monitoring

microPIMS® I.S. is a 3rd-generation, star-network topology system which leverages SNI's success and experience in non-invasive corrosion/erosion monitoring. It is an intrinsically safe, fully wireless, non-intrusive, network of ultrasonic sensors. Powered by long-life batteries, it operates using long-range sub-gigahertz LoRaWan® wireless connectivity.

Each microPIMS sensor can be programmed to take thickness readings at any user-defined time interval. Data is automatically sent to private webPIMS™, cloud-based or on-premise LoRaWAN system + software back-end for analysis, trending and more.

- Accurate corrosion/erosion measurements required for monitoring asset integrity and fitness for service.
- When short- or long-term corrosion rate data is needed for monitoring crude-slate changes or to correlate operational system upsets, change of corrosion inhibitors, or injections rates.
- Corrosion/erosion of asset locations with difficult-to-access TML positions.
- Hazardous locations where injuries or loss-of-life risk is high.
- Brief period TML monitoring is needed, and re-positioning is required. Simple attachment to piping, vessels, and tanks.

Monitor "low spots"

post-NDE screening of pits to monitor remaining thickness • measures down to 0.040" (1 mm)

Reduce costs

reduce scaffolding and insulation removal/ refitting for internal corrosion monitoring • more accurate/reliable data improving operations

Monitor corrosion rate

accurate to 0.001" (0.025mm) historically problematic locations

Easy integration into existing LoRa Network

Add microPIMS LoRa sensors onto an existing LoRa Wan network • Connect microPIMS data to other software apps.

15-years at 1 reading/day (2x D-Size Batteries - 3.6VDC).

Two models: dual element (up to 275°F/135°C) **and ultra-high-temp** (up to 932°F/500°C).

Built-in thermocouple provides surface temperature readings for temperature-compensated thickness data.

Installed temporarily or permanentlyin under 15 minutes per sensor.

Wireless gateway supports up to 1,000+ microPIMS nodes and offers up to ~1 mile (1.6km) **range in industrial settings.**

Cellular or ethernet data back-haul through gateway.

ULCSA C1D1, ATEX / IECEx Zone 0 Hazardous-area certified.

DATA CONNECTION
SYSTEM OPTIONS

ULTRA-HIGH-TEMP
SINGLE-ELEMENT
DELAY-LINE
SENSOR

HIGH-TEMP
DUAL-ELEMENT
SENSOR

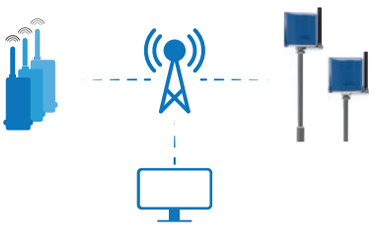
STAR NETWORK TOPOLOGY

- 10 x range over mesh networks
- More consistent & dependable battery life
- Allows for significantly more end points
- No repeaters needed
- Does not require line of site

SENSOR NETWORKS GATEWAY

FACILITIES EXISTING GATEWAY

Cellular or Ethernet



LoRaWAN to Cloud

microPIMS thickness data from the sensors is transmitted wirelessly from the LoRaWAN gateway to the webPIMS software and stored via the cloud where thickness, temperature, A-Scans, and other data can be analyzed or exported instantly, on demand.

ON-PREMISES

If utilizing cloud data storage is not an option, the On-Prem webPIMS data management system provides users with a local self-contained (in-the-fence) system.

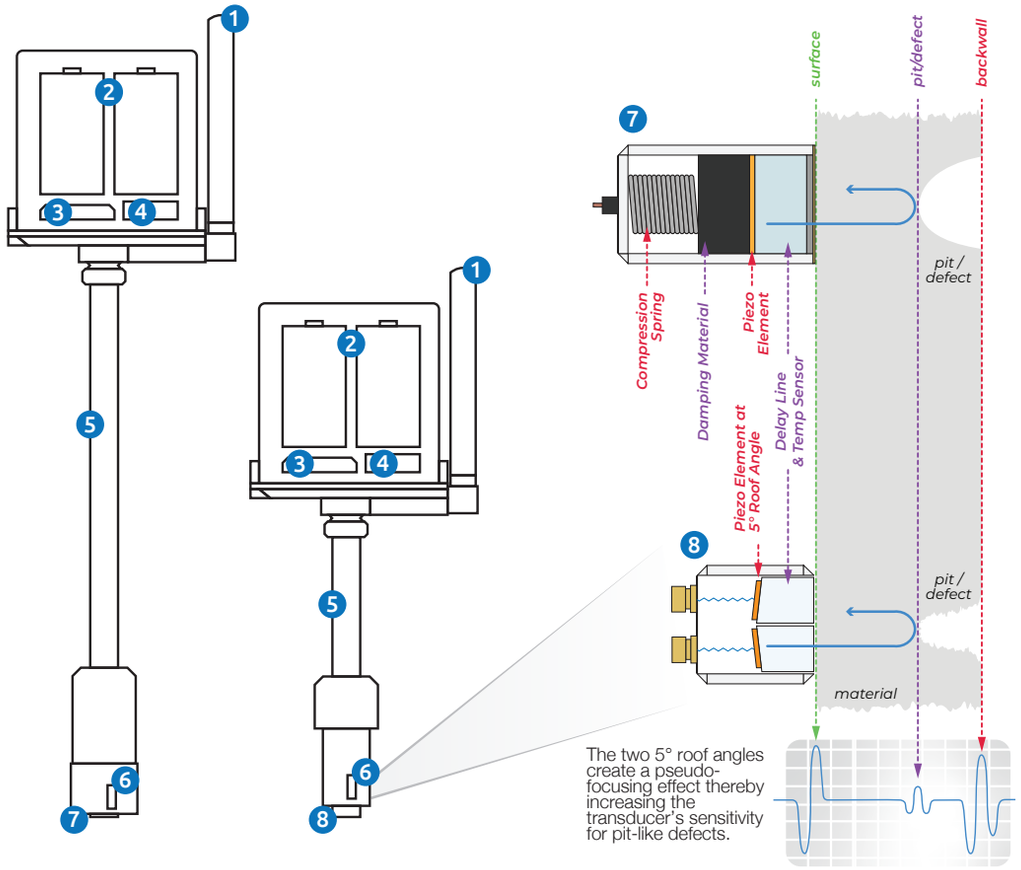
microPIMS thickness data from the sensor is transmitted through LoRaWAN gateways directly into the On-Prem system.

PRIVATE NETWORK INTEGRATION

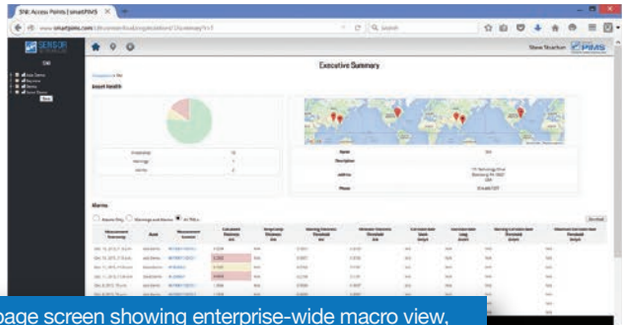
For facilities with a current LoRaWAN private network. Sensor Networks' microPIMS can be installed and connected directly to an existing network.

microPIMS I.S.
TECH EXPOSED

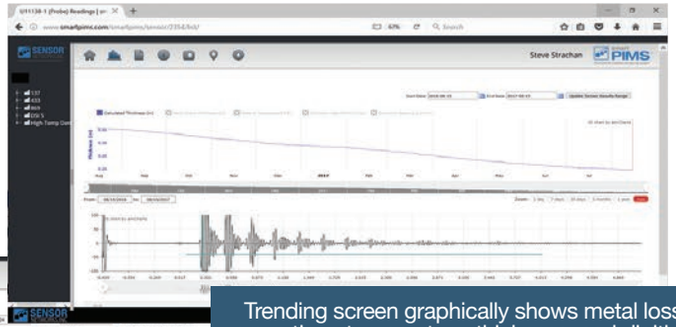
1. *LoRaWAN High-Gain Antenna*
2. *Two D-Cell batteries*
   provide 15 years of wireless operation. Commercially available (non-proprietary)
3. *LoRa Radio*
4. *Ultrasonic Testing PCB*
5. *Stainless Steel Heat Stand-Off*
6. *Temperature Sensor*
7. *Single-Element Ultra-High-Temp Transducer*
   capable of being installed on pipes up to 932°F (500°C)
8. *Spring-Loaded, Dual-Element Ultrasonic Transducer*
   enhances accuracy and can measure pits down to 0.040" (1 mm) remaining wall thickness on pipes / tubes as small as 1 in. Ø (24.5mm)



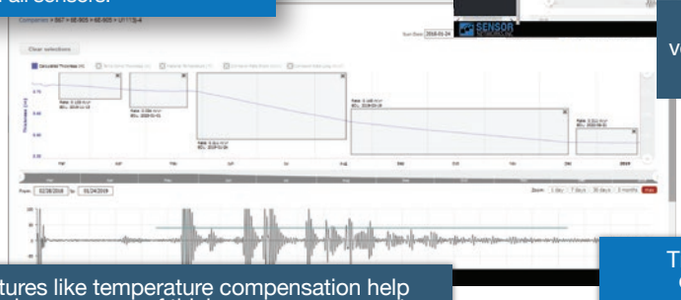
DATA MANAGEMENT
webPIMS™



Home page screen showing enterprise-wide macro view, including pie chart with sensor location, status, GPS, and latest readings of all sensors.



Trending screen graphically shows metal loss versus time, temperature, thickness, and digitized RF signals (A-Scans) for each measurement.



Features like temperature compensation help maximize accuracy of thickness measurements.

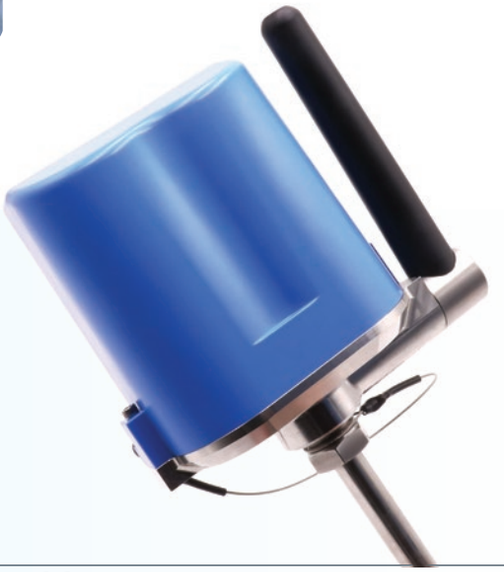
Time windows allow for corrosion-rate calculations due to episodic events.

High-Temp Dual attached with a magnetic clamp

Ultra-High-Temp attached with a band clamp

microPIMS specifications

	dual element	ultra-high-temp
elements	dual	single (delay line)
frequency	5 MHz	7 MHz
element diameter	0.375 in. (10mm)	0.375 in. (10mm)
measurement range	0.040-4″(1-100mm)	0.125-1″ (3-25mm)
sensor surface temperature	-40°F (-40°C) up to 275°F (135°C)	-40°F (-40°C) up to 932°F (500°C)
weight	20.5 oz. (580g)	31.0 oz. (880g)
size (height × housing dia.)	9½×2.8″ (241×70mm)	15½×2.8″ (394×70mm)



hazardous location rating intrinsic safety . . . . . See chart on the right
Ingress Protection Rating IP-67
resolution . . . . . 0.001″ (0.025mm)
battery life (typical)† . . . . . 15 yr. @ 1 reading/day 68°F (20°C)
construction . . . . . 303 stainless steel
mounting . . . . . magnetic base; band clamp
data . . . . . digital thickness, RF waveform, temperature, time/date stamp
data access . . . . . cloud-based via webPIMS™ portal or on-premise
local network . . . . . LoRaWAN (node to gateway)
connectivity . . . . . gateway to cloud (cellular or ethernet) OR on-premise
sensor count . . . . . 1,000+ microPIMS units per gateway
gateway* . . . . . outdoor; cast alum.; Approx. 12×6×4″ (305×152×102mm); 6.0lb (2.7kg)

† Typical Values. Results may vary site to site.
** Without antennas.*

UK CA 2503 CE 2776 Ex II 1 G Ex ia IIC T4 Ga, Ta = -40°C to +70°C
CML 21ATEX2356X | CML 21UKEX2357X | IECEx CML 21.0044X

NRTL LISTED MET c us
Ex ia IIC T4 Ga | Class I, Div 1, Gp A-D T4 Ex ia
Class I Zone 0, AEx ia IIC T4 Ga | Class I, Div 1 Gp A-D T4
Ta = -40°C to +70°C
E114158 - Hazardous Location

WARNING: USE ONLY TADIRAN TL-5930, SL-2780 OR XENO XL-205F BATTERIES
WARNING: SPECIAL CONDITIONS FOR SAFE USE, SEE INSTRUCTIONS

IP 67
BATTERY POWERED: 2 Cells, 7.2V, 0.94W
PROGRAMMING PORT: Um = 5V

Contains:
IC: 23069-CW24012
FCC: 2ANDP-CW24-012
Made in the USA

on-premises specifications

	rack mount configuration	desktop configuration
configuration	single-socket 1U rack size / 19 in.	desktop
weight	36.9 lbs (12.2 kg)	25.70 lbs (11.70 kg)
dimensions	17.1 in. (434 mm), 23.5 in. (596 mm)	6.88 in. (175 mm), 14.17 in. (360 mm), 17.87 in. (454 mm)
main power	110-230VAC / 50-60Hz	110-230VAC / 50-60Hz
haz area cert	none	none
operating system	Linux	Linux
LoRaWAN configuration	ResIoT - perpetual license	ResIoT - perpetual license
analysis application	webPIMS - perpetual license	webPIMS - perpetual license

MADE IN USA

Ver. 1.4

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