non-intrusive ultrasonic sensors for corrosion/erosion monitoring

Sensor Networks’ smartPIMS® Cellular non-intrusive ultrasonic corrosion/erosion monitoring system is battery powered with integral SIM card and cellular radio. The Digital Sensor Interface (DSI) unit is programmed to take thickness measurements at any user-defined time interval, then send the data to webPIMS™, a cloud based back-end for analysis, trending and more. Use smartPIMS® Cellular for:

- Frequent data collection to resolve corrosion-rate or pitting issues.
- Quick, easy installation—temporary or permanent.
- Areas difficult or expensive to access and not conducive to manual data collection.

Operates on battery (5-7 years at 1 reading/day).
Cellularly transmits data to webPIMS™.
Offers 16 single- or 8 dual-element UT sensor channels.
Transducers available to withstand -22°F (-30°C) to 932°F (500°C).
Maintains 1 mil (0.001" / 0.025mm) resolution and 0.040" (1mm) minimum wall thickness.
Sensors install buried or above-ground, temporarily or permanently.
ATEX, IECEx, UL/CSA and Japanese hazardous-area certifications.

monitor corrosion rate
resolution to 0.001" (0.025mm) • high-risk areas • historically problematic locations

monitor "low spots"
post-NDE screening of pits to monitor remaining thickness • measures down to 0.040" (1.02mm)

replace/augment intrusive methods
validation of coupons, ER probes, etc.

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

“We only use smartPIMS® magnetic UT probes for in situ corrosion monitoring; we’re forbidden to weld on operating equipment.”
- Refinery Customer

“We with multiple magnetic probes, we can measure several locations and then reposition based on UT and AUT data.”
- Refinery Customer

Ultra-high-temp probes with mounting bracket.

smartPIMS® Cellular with 8 dual-element sensors installed inside CML ports.

smartPIMS® Cellular with 3 dual-element sensors installed on overhead line.

Dual-element sensor attachment can be either magnetic housing, or via strap with temporary or permanent couplant.

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PIMS: Permanently Installed Monitoring System.
non-intrusive ultrasonic sensors for corrosion/erosion monitoring

Sensor Networks’ smartPIMS® Modbus non-intrusive ultrasonic corrosion/erosion monitoring system connects directly to a PC or laptop to take isolated measurements, or integrates with your SCADA/DCS system for polling at any user-defined time interval. Data can be readily transmitted to webPIMS™, a cloud based back-end for analysis and trending, or simply exported to XML or CSV as necessary for reporting purposes. Use smartPIMS® Modbus for:

- Infrequent data collection (mid-stream applications).
- Hardwiring to a plant’s control system (downstream or offshore).
- Service companies collecting data (refineries).
- Manual data collection (power generation).

**monitor corrosion rate**
resolution to 0.001" (0.025mm) • high-risk areas • historically problematic locations

**monitor “low spots”**
post-NDE screening of pits to monitor remaining thickness • measures down to 0.040" (1.02mm)

**replace/augment intrusive methods**
validation of coupons, ER probes, etc.

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

Connects via Modbus (RS-485) to tablet/PC or SCADA/DCS. Outputs data to XML or CSV file, or directly to webPIMS.

Up to 32 units connect on multi-drop network extending as far as 1000' (305m).

Offers 16 single- or 8 dual-element UT probe channels.

Transducers available to withstand -22°F (-30°C) to 932°F (500°C).

Maintains 1 mil (0.001" / 0.025mm) precision and 0.040" (1mm) minimum wall thickness.

Sensors install buried or above-ground, temporarily or permanently.

ATEX, IECEx, UL/CSA and Japanese hazardous-area certifications.

“We only use smartPIMS® magnetic UT probes for in situ corrosion monitoring; we’re forbidden to weld on operating equipment.”
- Refinery Customer

“We only use smartPIMS® magnetic UT probes for in situ corrosion monitoring; we’re forbidden to weld on operating equipment.”
- Refinery Customer

“With multiple magnetic probes, we can measure several locations and then reposition based on UT and AUT data.”
- Refinery Customer
Multi-drop systems with up to 32 smartPIMS® DSIs and/or matPIMS™ connect to control room or directly to laptop/PC.

Buried probes attached to pipe and connected to a smartPIMS® Modbus DSI in an above-ground enclosure.

Multiple smartPIMS® Modbus DSIs networked for monitoring dozens of TMLs.

### Specifications

| Model No. | SmartPIMS® Modbus
|-----------|-------------------|
| Protocol/Communication | Modbus / RS-485, 2-wire, max. 1000' (305m)
| Power | 10-24 VDC

#### UT System

| Channels | 16 ultrasonic, 1 temperature
| Pulsed Voltage | ±5V bipolar square wave
| Analog Frequency | 1–10 MHz (-3dB)
| Gain | -10dB to +70dB
| Digitizer Frequency | 40 Msps

#### Dimensions

| Overall (Dia. x H) | 5.44" x 5.63" x 5.13" (138.1 x 142.9 x 130.2mm)
| Weight | 5.2 lbs. (2.36 kg)

#### Model Options

- **XD-101**: For general purposes. 5 MHz contact sensor delay-line for monitoring TMLs.
- **XD-201**: Ultra-high-temp 7 MHz contact sensor delay-line for monitoring TMLs.
- **XD-301**: For severe pitting conditions. 5 MHz contact sensor delay-line for monitoring TMLs.

#### Other Features

- **Transducer Cable**: Type coaxial, ¼" dia. or 3/8" dia.
- **Maximum Length to Transducer**: Standard 10' (3.0m) and 25' (7.6m), custom to 50' (15.2m)
- **Processor**: Intel i5-4200U 1.6GHz w/ 3MB L3 cache (dual-core)
- **Memory/Storage**: 8 GB RAM / M2-SATA SSD, 64 GB
- **Operating System**: Windows 10
- **Power**: 10-24 VDC
- **Connections**: Network power, data via RS-485-to-USB adapter

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**DATA LOGGERS**

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**PIMS: Permanently Installed Monitoring System.**
non-intrusive ultrasonic sensors for corrosion/erosion monitoring

Sensor Networks’ matPIMS™ non-intrusive corrosion-monitoring sensor array (array, matrix, etc.) collect thickness data over a surface area. Data is transmitted to a SCADA/DCS system via Modbus (RS-485) for frequent polling, or manually offloaded using a PC/laptop. Use matPIMS™ for:

• Large area monitoring post fix/repair (midstream).
• Directly assessing trouble spots (midstream).
• Sand and slurry erosion monitoring (upstream).
• Slurry and mixing asset erosion (mining).
• DOT monitoring requirements.

Connects via Modbus (RS-485) to tablet/PC or SCADA/DCS.

Up to 32 matPIMS and/or smartPIMS single units connect on a multi-drop network extending as far as 1000’ (305m).

Offloads data to XML/CSV file or directly to webPIMS.

Available in 1x15, 3x5 and custom arrays, each with one reference calibration sensor mounted in head shell.

Transducers rated to -5°F (-20°C) to 150°F (65°C).

Sensors permanently installed, either buried or above-ground.

Powered by laptop or hard-wired.

Not hazardous-location rated.

**monitor corrosion rate**
resolution to 0.001” (0.025mm) • high-risk areas • historically problematic locations

**monitor “low spots”**
post-NDE screening of pits to monitor remaining thickness • measures down to 0.125” (3mm)

**replace/augment intrusive methods**
validation of coupons, ER probes, etc.

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

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<td>attachment</td>
<td>epoxy</td>
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*Minimum resolutions stated as typical values, but will vary with pipe condition.*

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**Modbus**:
- Protocol/communication: Modbus / RS-485, 2-wire, max. 1000' (305m)
- Power: 10-24 VDC
- Channels: 16 ultrasonic
- Pulsed voltage: ±5V bipolar square wave
- Analog frequency: 1–10 MHz (-3dB)
- Gain: -10dB to +70dB
- Digitizer frequency: 40 Msps
- Type: custom
- Material: Delrin
- Temperature range: -5°F to +150°F (-20°C to +65°C)
- Dimensions: 3.1” x 2.6” x 1.15” (78.7 x 66 x 29.2 mm)
- Weight: <1 lbs. (0.45 kg)

**UT System**
- Pulser voltage: ±5V bipolar square wave
- Analog frequency: 1–10 MHz (-3dB)
- Gain: -10dB to +70dB
- Digitizer frequency: 40 Msps
- Type: custom
- Material: Delrin
- Temperature range: -5°F to +150°F (-20°C to +65°C)
- Dimensions: 3.1” x 2.6” x 1.15” (78.7 x 66 x 29.2 mm)
- Weight: <1 lbs. (0.45 kg)

**Tablet Datalogger**
- Processor: Intel i5-4200U 1.6GHz w/ 3MB L3 cache (dual-core)
- Memory/Storage: 8 GB RAM / M2-SATA SSD, 64 GB
- Operating System: Windows 10
- Connections: power, data via RS-485-to-USB adapter
- Drop/Shock resistance: MIL-STD-810G
- Environmental: IP65, 14–131°F (-10 to +55°C)
- Dimensions/Weight: 11.4” x 7.48” x 0.78” / 2.73 lbs.