

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.

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)

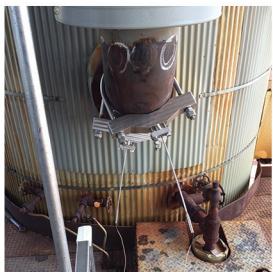
replace/augment intrusive methods

validation of coupons, ER probes, etc.

reduce costs

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

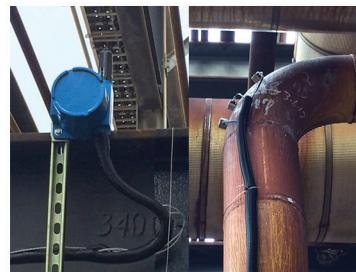




Ultra-high-temp probes with mounting bracket.



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.

specifications

digital sensor interface

transmitter

type	cellular (3G/4G-LTE)
encryption type	secure socket layer (SSL)
model no.	smartPIMS® Cellular
battery type	Li D-cell, 3.6 VDC, qty. 2
battery life	5 years (typical, based on 1 reading/day)
ultrasonic system	
channels	16 ultrasonic, 1 temperature
pulser voltage	±5V bipolar square wave
analog frequency	1-10 MHz (-3dB)
gain	-10dB to +70dB
digitizer frequency	40 Msps
certification	Class I, Div. 2, Groups A-D, T4, Class 1, Zone 2, IIC, T4 Ex II 3G, Ex ec IIC T4 Gc, T _{amb} -20°C to +60°C
enclosure	
type	instrumentation housing
material	cast aluminum
rating	NEMA 4X, IP66
temperature range	-4°F to +140°F (-20°C to +60°C)
dimensions (without antenna)	5.44" x 5.63" x 5.13" (138.1 x 142.9 x 130.2mm)
weight	5.5 lbs. (2.5 kg)

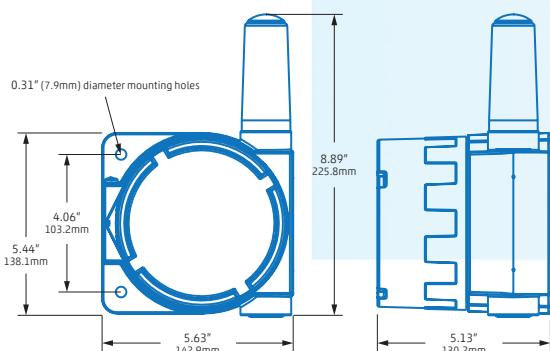
transducer cable

type	coaxial, 1/4" dia.
maximum length to transducer	standard 10' (3.0m) and 25' (7.6m), custom to 50' (15.2m)

transducers

	single-element contact	dual-element contact	delay-line contact
model	XD-101	XD-301	XD-201
application	general purpose	severe pitting	ultra-high-temp
frequency	5 MHz	5 MHz	7 MHz
active area (dia.)	0.25"/6.35mm	0.375"/10mm	0.375"/10mm
overall (dia. x h)	1.0 x 1.0" 25.4 x 25.4 mm	0.75 x 0.75" 19 x 19 mm	0.8 x 2.25" 20.3 x 57.2 mm
# of transducers	1-16	1-8	1-16
resolution	0.001"/0.025mm	0.001"/0.025mm	0.001"/0.025mm
thickness range^t	0.200-6.0" 5.1-150.0mm	0.040-6.0" 1.0-150.0mm	0.125-1.0" 3.0-25.0mm
temp range	-22 to +149 °F -30 to +65 °C	-22 to +300 °F -30 to +150 °C	-22 to +932 °F -30 to +500 °C
attachment	magnet/adhesive	magnet/adhesive	mechanical clamp

^tminimum resolutions stated as typical values, but will vary with pipe condition



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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"

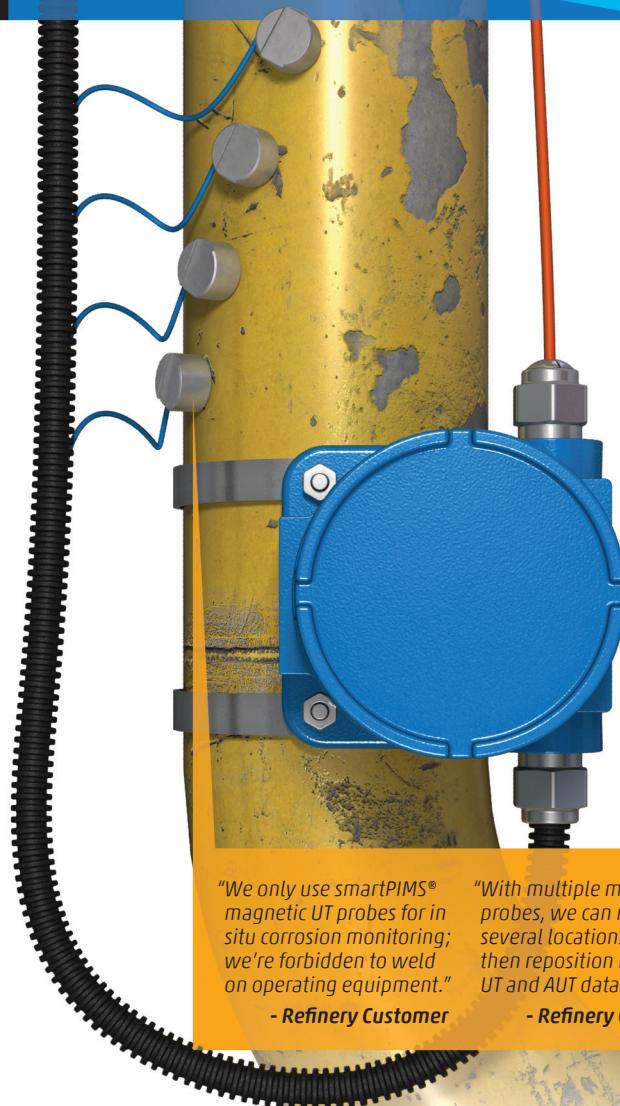
post-NDE screening of pits to monitor remaining thickness • measures down to 0.040" (1.02mm)

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



"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

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.

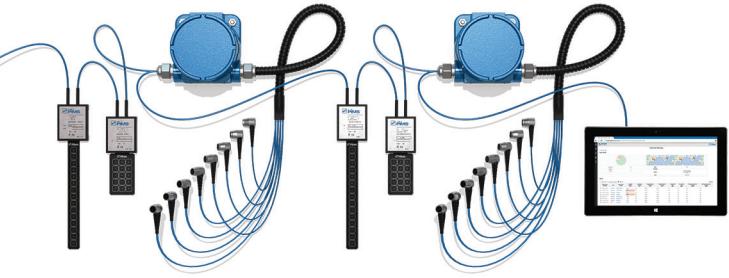
Transducers available to withstand -22°F (-30°C) to 932°F (500°C).

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.





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

digital sensor interface

transmitter

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
pulse voltage	±5V bipolar square wave
analog frequency	1-10 MHz (-3dB)
gain	-10dB to +70dB
digitizer frequency	40 Msps
certification	Class I, Div. 2, Groups A-D, T4, Class 1, Zone 2, IIC, T4 Ex II 3G, Ex ec IIC T4 Gc, Tamb -20°C to +60°C
enclosure	instrumentation housing
material / rating	cast aluminum / NEMA 4X, IP66
temperature range	-4°F to +140°F (-20°C to +60°C)
dimensions	5.44" x 5.63" x 5.13" (138.1 x 142.9 x 130.2 mm)
weight	5.2 lbs. (2.36 kg)
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	network power, data via RS-485-to-USB adapter
physical	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.

tablet datalogger

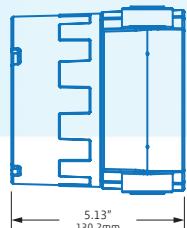
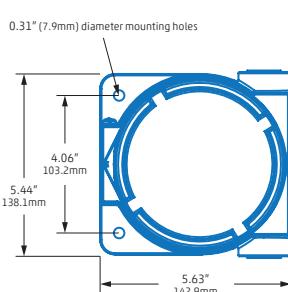
transducer cable

type	coaxial, 1/4" dia.
maximum length to transducer	standard 10' (3.0m) and 25' (7.6m), custom to 50' (15.2m)

transducers

	single-element contact	dual-element contact	delay-line contact
model	XD-101	XD-301	XD-201
application	general purpose	severe pitting	ultra-high-temp
frequency	5 MHz	5 MHz	7 MHz
active area (dia.)	0.25"/6.35mm	0.375"/10mm	0.375"/10mm
overall (dia. x h)	1.0 x 1.0" 25.4 x 25.4 mm	0.75 x 0.75" 19 x 19 mm	0.8 x 2.25" 20.3 x 57.2 mm
# of transducers	1-16	1-8	1-16
resolution	0.001"/0.025mm	0.001"/0.025mm	0.001"/0.025mm
thickness range[†]	0.200-6.0" 5.1-150.0mm	0.040-6.0" 1.0-150.0mm	0.125-1.0" 3.0-25.0mm
temp range	-22 to +150°F -30 to +65°C	-22 to +300°F -30 to +150°C	-22 to +932°F -30 to +500°C
attachment	magnet/adhesive	magnet/adhesive	mechanical clamp/gold foil

[†]minimum resolutions stated as typical values, but will vary with pipe condition



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 **SENSOR**
NETWORKS, INC
Inspection, Testing & Asset-Integrity Solutions

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.

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

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.



specifications



matPIMS™ 3×5 matrix permanently installed with RS-485 cable back to surface for data collection, pre-overwrap.

Fully coated and wrapped installation with RS-485 cable mounted in test station for data collection.

matPIMS™ 1×15 array permanently installed using viscoelastic putty to overcoat sensor strip and head before wrapping/backfill.

Modbus transmitter tablet datalogger	model no. M-PIMS115, M-PIMS35 protocol/communication Modbus / RS-485, 2-wire, max. 1000' (305m) power 10-24 VDC UT system channels 16 ultrasonic pulsar 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 3.1×2.6×1.15" (78.7 ×66×29.2mm) weight <1 lbs. (0.45 kg) cable standard 25' (7.6m)
performance	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 physical	network 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" × 7.48" × 0.78" / 2.73 lbs.

transducers			
model	M-PIMS115	M-PIMS35	Custom
application	general wall loss	general wall loss	general wall loss
frequency	7.5 MHz	7.5 MHz	7.5 MHz
active area (dia.)	0.25"/6.35mm	0.25"/6.35mm	0.25"/6.35mm
overall (w x h)	1.0×9.12" 25.4 × 231.6 mm	2.0×2.7" 50×68 mm	1.0 up to 100" 25.4 × up to 2540 mm
# of transducers	16 (15 active, 1 ref.)	16 (15 active, 1 ref.)	up to 32
resolution	0.001"/0.025mm	0.001"/0.025mm	0.001"/0.025mm
thickness range [†]	0.125-6.0" 3.0-150.0mm	0.125-6.0" 3.0-150.0mm	0.125-6.0" 3.0-150.0mm
temp range	-5 to +150°F -20 to +65°C	-5 to +150°F -20 to +65°C	-5 to +150°F -20 to +65°C
attachment	epoxy	epoxy	epoxy

[†]minimum resolutions stated as typical values, but will vary with pipe condition



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