

HotSense™ monitoring in the nuclear environment

for **Wall Thickness** and **Gas Void** measurements

Minimise operational and safety risks, maximise productivity with enhanced asset intelligence.

Ultrasonic transducers ideal for Wall Thickness and Gas Void measurements for use in applications across **nuclear and energy sectors**.

Keywords: gas void, wall thickness, in-service monitoring, extreme environments, nuclear, energy

Key Features:

- ▶ HotSense™ transducers proven to operate continuously within nuclear plant environments for permanent fixed-point monitoring of **asset integrity and gas void measurement**.
- ▶ Assets can be monitored in-service without the need for shut down, plant access or isolation.
- ▶ -55°C/-67°F to +380°C/715°F (+550°C/1020°F on request) wide operating temperature range for in-service monitoring
- ▶ Time and temperature stable signal for maximum reliability
- ▶ No observed performance degradation in testing after exposure to 11 MGy of gamma and 2.6×10^{18} c⁻² neutron fluence
- ▶ A truly high temperature transducer powered by the Ionix HPZ piezoceramic



Key benefits:

- ▶ *Increase safety by reducing exposure of personnel to hazardous environments*
- ▶ *Minimise the radiation dose by reducing the time spent by personnel in the plant location*
- ▶ *Reduce the total time and cost required to collect key measurements by removing the challenges of restricted access - no need for rope access or scaffolding, faster data acquisition to enhance decision making and safety*
- ▶ *Maximise plant productivity by reducing downtime and operational complexity*

Deployment

Can be installed on live plant in minutes and designed to survive the harshest of environments

- No welding option for pipes – Ionix clamps are safe to use and can be removed and repositioned
- Welded stud deployment option for vessels. Compatible with legacy stud mountings
- Standard transducer <50 mm total deployed height – ideal for deployment in tight spaces
- Coupling survives aggressive thermal cycling to support stable thickness measurements

1. Data collection

Installed HotSense™ transducers offer maximum compatibility and flexibility for data collection – contact Ionix for details:

- Route cables from the transducer to walkways or ground level for simple measurement collection with standard ultrasonic flaw detectors or thickness gauges.
- Collect data remotely and autonomously using HotSense™ certified monitoring systems.
- Option to use the TRND™ hybrid approach to facilitate data collection and reduce time at the asset.

2. Cabling

- HotSense™ transducers feature nuclear plant compatible construction materials (as reviewed by EPRI, USA) including passivated 316 and 304 steel external components.
- A high temperature mineral insulated metal sheathed cable is used to connect to the transducer in hot zones or under installation and in locations where the cabling contacts critical assets.
- Flexible RG316 cabling can be used for cable routing in low temperature regions and locations when the cabling does not contact the asset.

3. Standard Specification – Transducer, Deployment and Ultrasonic Response

PARAMETER	VALUE	UNIT
Operating Temperature	-55 to +380 (550 on request)	°C
Delay Line Material	304 Stainless Steel	-
Delay Line Length	25	mm
Alternative delay line lengths by special request		
Delay Line Form	Cylindrical, 10 mm spot contact	-
Ruggedisation	Certified to IP66 and IP68. Stainless steel construction	-
Standard Cable Length	300 mm MIMS + 1m RG316	-
Connector Type	00 Lemo receptacle as standard	-
Active Element Diameter	10	mm
Transducer Centre Frequency	3.25	MHz
+ compatible with both 2.25 MHz and 5 MHz flaw detectors / UT hardware		
-6 dB Bandwidth	80	%
Signal to Noise Ratio	> 20	dB

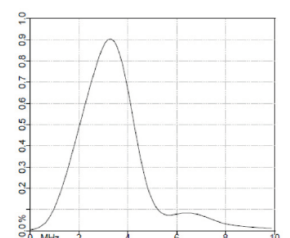
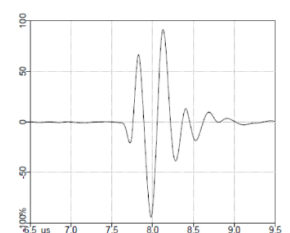
*Other variations available via special request.
For other specification requirements please contact our sales team.

PARAMETER	VALUE	VARIABLES
Material Mounts/Clamps	316 Stainless Steel	-
Standard Clamp Sizes for Pipes	NPS 2" to NPS 16"	Other sizes available via special request
Standard Stud for Vessels	M8 x (40 - 60 mm) Spacing	52.5 +/- 5 mm Other sizes available via special request
Standard Stud Spacing	52.5 +/- 5mm	Other sizes available via special request
Stud Torque Resistance	>20 N.m	-
Total Mass (Transducer + deployment)	1.0 - 1.4 kg	Dependent on deployment method

Flexible integration and monitoring system options. Can be used with a wide range of flaw detectors, local, remote, or wireless data collection systems.

Measurement resolution from 0.01 mm

Contact Ionix for further information and to find a solution for your application.



CERTIFICATION

Ex II 1 GD Ex ia IIC T* Ga / Ex ia IIC T* Da
CE IP 66 / 68