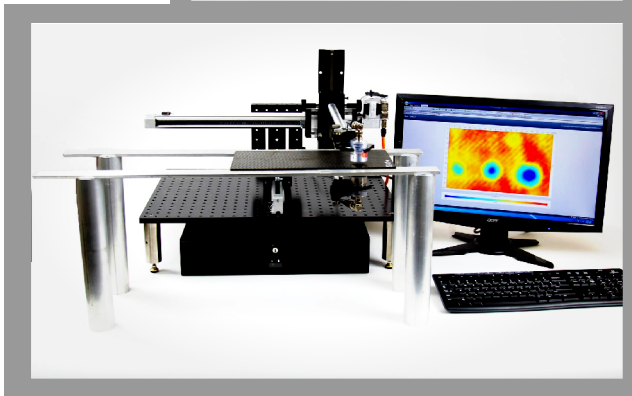
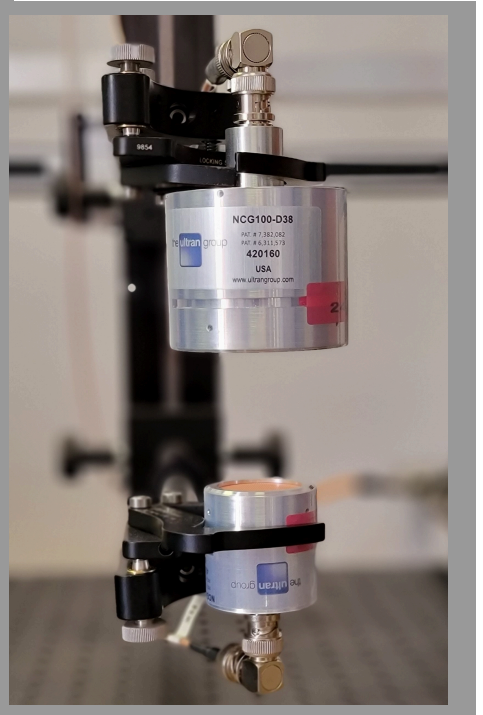




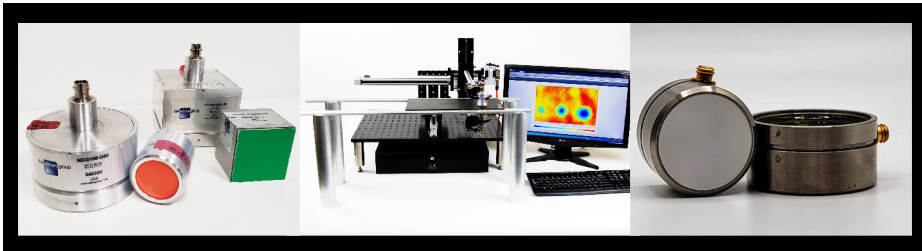
Ultrasound Redefined



**Ultrasonic Transducers
for Nondestructive Testing**

Who we are...

The Ultran Group is a world leader in the ultrasound marketplace for transducers and systems for non-destructive testing. Founded in 1977 we have continued to provide the highest dedication to our quality products and solutions. Working closely with our clients, our team of engineers, scientists and skilled technicians continue to focus on providing new technologies and solutions to our customers in this ever-changing world. Over 40 years of service and high-level customers in such markets as Aerospace, Lithium Ion Battery, Healthcare, Transportation Market, Ceramics and more has allowed us the opportunity to help our clients solve some of their most important challenges.

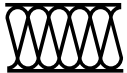
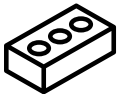
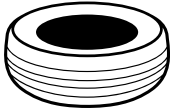


Reasons to choose The Ultran Group...

- All Transducers are designed, manufacture and tested in house to exacting standards.
- The ability to customize solutions to meet customers' needs and application requirements.
- Over 40 years of experience in the market with researched, tested, quality, and trusted solutions.
- Full turn-key analysis system solutions, including Ultran's proprietary SecondWave™ Studio.
- Ultran's patented Non-Contact Ultrasonic Transducers for very robust applications
- With Partners' found around the globe for help with installation and technical support

We provide NDT solutions for multiple materials and applications including...

- Carbon-Carbon Composites
- Ceramic Composites
- Honeycomb Panel Composites
- Rubber Products
- Glass Fiber Reinforced Polymer
- Wood (Solid and Composite)
- Aerospace Prepreg Structure
- Lithium Ion Battery Cells
- Food Industry
- Carbon Fiber Reinforced Polymers
- Insulation/ Polystyrene Foam
- Bonded Metal Delamination
- And more...



Types of solutions The Ultran Group provides...

- Cure Level
- Joint and Crack Inspection
- Bonded Delamination
- Non-destructive Testing
- Depth Measurement
- Porosity

Products that we offer...

- Non-Contact and Traditional Ultrasound Transducers
- Non-destructive Testing
- Turn-Key online production scanning solution

Contents

U710x Inspection System

- U710X System Page 9-12

The U710x scanning solution allows you a scalable, fast, and high sensitivity inspection solution. It has interchangeable transducer combinations to allow scanning multiple thicknesses and material types through the same system.

Features: Lab solution, R&D test solution, inline production scanning solution



Non-Contact Transducer (Air Coupled)

- Circular Page 13
- Square Page 14
- Frequency Range 30 kHz to 5 MHz

Measurements in air or other gaseous mediums. Commonly used for production and high volume manufacturing quality control of various materials, including composites, ceramics, polymers and more.



Features: (GMP™) Piezocomposite non-contact ultrasonic transducer. Constructed with aluminum housing and top mount BNC connector.

Contents

Non-Contact Focused Transducer (Air Coupled)

- Point Focused....Pages 15-17
- Line Focused....Pages 18-20
- Frequency Range 30 kHz to 2 MHZ

Focused Transducers for smaller beam profile at focal length, greater spatial resolution and higher energy intensity. Transducer enclosure is comparable to Non-Contact Transducer corresponding active diameter.

Features: (GMP™) Piezocomposite non-contact ultrasonic transducer, focus in air. Constructed with aluminum housing and top mount BNC connector.



Delayed Contact Transducer

- GMP™ (Gas Matrix Piezoelectric) Page 21
- W Series (High Bandwidth Conventional) Page 22
- K Series (High Sensitivity Conventional) Page 23
- Frequency Range 30 kHz to 5 MHZ

Delay lines offer improved resolution of flaws very near to the surface of a part and allow thinner range and more accurate thickness measurements of materials.

Features: Delayed contact ultrasonic transducer with polystyrene replaceable delay tip. Constructed with stainless steel housing and side mount BNC connector on "G" Series and side mount microdot (10-32) connector on the "W" and "K" series.



Contents

Direct Contact Transducer

- GMP™ (Gas Matrix Piezoelectric) Page 24
- W Series (High Bandwidth Conventional) Page 25
- K Series (High Sensitivity Conventional) Page 26
- Frequency Range 30 kHz to 10 MHz

Designed for use in direct contact with material surface. Ideal primarily for non-destructive testing.

Features: Constructed with stainless steel housing and side mount BNC connector on "G" Series and side mount microdot (10-32) connector on the "W" and "K" series.



Immersion Transducer

- GMP™ (Gas Matrix Piezoelectric) Page 27
- W Series (High Bandwidth Conventional) Page 28
- K Series (High Sensitivity Conventional) Page 29
- Frequency Range 30 kHz to 10 MHz

Designed for use in water and other noncorrosive liquids. Applications primarily for non-destructive testing.

Features: "G" & "W" units built standard with waterproof top mount UHF connectors. "K" Series side mount microdot connectors.



Contents

Dry Coupled Transducer

- GMP™ (Gas Matrix Piezoelectric) Page 30
- W Series (High Bandwidth Conventional) Page 31
- K Series (High Sensitivity Conventional) Page 32
- Frequency Range 200 kHz to 10 MHz

Low frequency transducer for high sensitivity and bandwidth. Designed for use in direct dry contact with test material (without a liquid coupling medium).

Features: Dry coupled ultrasonic transducer. Constructed with stainless steel housing and side mount BNC connector on "G" Series and side mount microdot (10-32) connector on the "W" and "K" series.



High Power Delivery Transducer

- Gas Matrix Piezocomposite (GMP™) Transducers for High Power Delivery (GPS) Page 33
- Frequency Range 30 kHz to 5 MHz

Based on GMP and other active materials, the company develop novel devices capable of generating immensely high acoustic power in gaseous, liquid, and solid media.

Features: Piezocomposite immersion ultrasonic transducer designed for higher power excitation. Constructed with waterproof stainless steel housing and top mount UHF connector.



Contents

High Performing Conventional NDT (SWC & SRD Models)

- SW-Series Direct Contact (SWC Models) Page 34
- Frequency Range 500 kHz to 5 MHz

Mid to high frequency shearwave transducer, producing transverse wave vibration in the horizontal plane relative to contact surface.



Features: Shearwave direct contact ultrasonic transducer. Constructed with stainless steel housing and side mount microdot (10-32) connector.

SW-Series Dry Coupled Transducers (SRD) Page 34

Mid to high frequency shearwave transducers, producing transverse wave vibration in the horizontal plane relative to contact surface. Designed for use in contact with test medium using a replaceable delay line.

Advanced Technology

- Very large low frequency Gas Matrix Piezocomposite (GMP™) Transducers Page 35
- Non-Contact Transducer Arrays Page 35

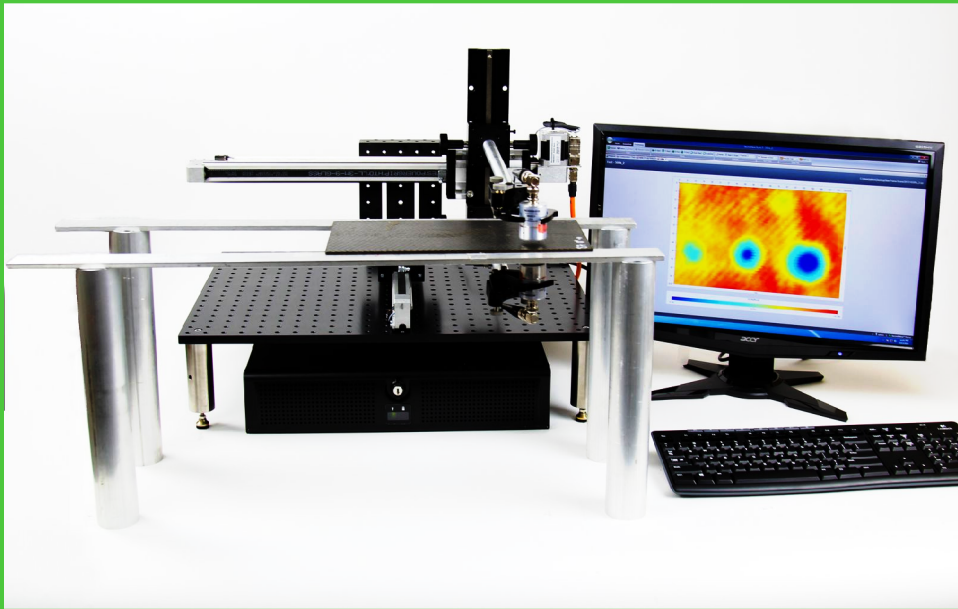
Transducer Construction / Characterization

- Transducer Construction Page 36
- Transducer Characterization Pages 37-38

Accessories

- Matching Inductance Networks (MID) Page 39
- Cables Page 39
- Polystyrene Delay Tips Page 39

U710x Scanning Frame Solution

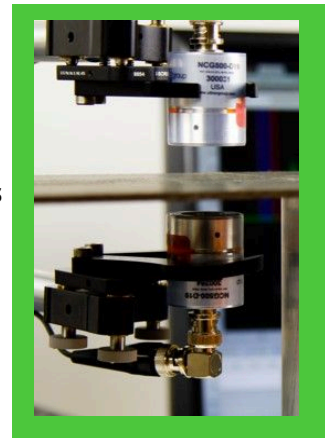


Overview

The U710x scanning system is a scalable, fast, and high-sensitivity inspection solution. Its provision for interchangeable transducer combinations enables scanning of multiple thicknesses and material types through the same system.

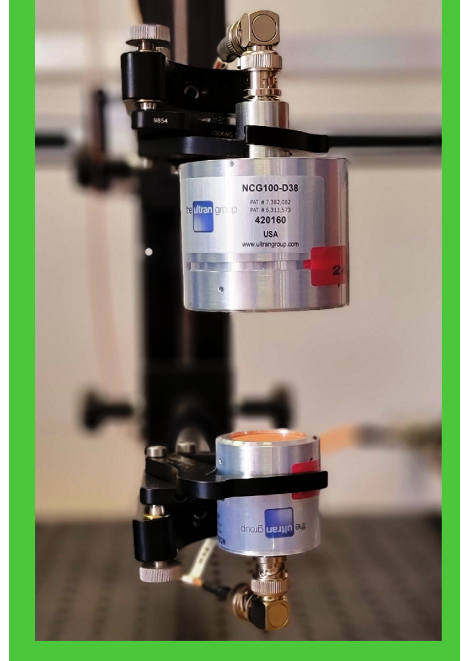
Features: Lab solution, R&D test solution, inline production scanning solution

- High throughput with XY scanning speed of up to 1 meter/sec.
- 100% inspection of uncured or cured parts.
- One-click inspection report generation.
- R&D and In-Line inspection with multiple channel options (2, 4, 8 & 16).
- Operator friendly software with graphical user interface.
- Scalable to customer's requirements.
- System allows simple change out of transducers to allow multiple materials to be inspected.
- Rental/Lease units are available for 3 month agreements

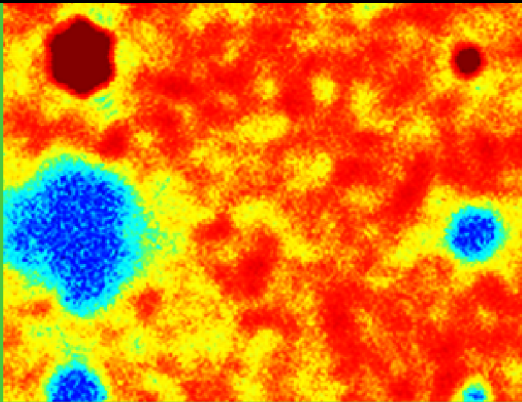


Solutions For Your Industry...

- Lithium Ion Batteries
- Composite Aerospace Structures
- Ceramics
- Carbon Composites
- Zirconia Blanks
- Honeycomb Panel Composites
- Prepreg Material
- Carbon Fiber Reinforced Polymers
- Refractory Magnesia
- Ceramic Matrix Composites
- Wood (Solid and Composite)
- Rubber Products
- Glass Fiber Reinforced Polymer
- Rubber Fabric Composite
- Insulation Foam
- Polystyrene Foam
- Food Processing



Our Expertise...



- Delamination between layers
- Density variations
- Porosity
- Void detection
- Inspection of joints and cracks
- Cure levels
- Distribution of electrolytes
- Charge level
- Gas voids
- Fiber distortion
- Bond quality between materials

Online Quality Inspection System

Ultran's Ultrasonic Production Line Inspection System is an online non-contact ultrasound multi-channel system. It is ideal for continuous feedback and analysis for quality control across moving web or piece-part production lines. This versatile system can be configured to accommodate any size material, customized to variable production and analysis applications/settings.



Specifications:

- **Transducer Modes:** Through Transmission, Pitch-Catch, Pulse-Echo
- **Frequency:** 20 kHz to 6.25 MHz
- **Sample Rate:** up to 125 MS/s
- **Measurements:** Pk-Pk Amplitude (dB and mV), Time of Flight (ToF us), FFT, Pk Loc (μs)
- **Material Characteristic Monitoring:** Attenuation, defects, delamination, porosity, velocity/density, thickness and time-of-flight



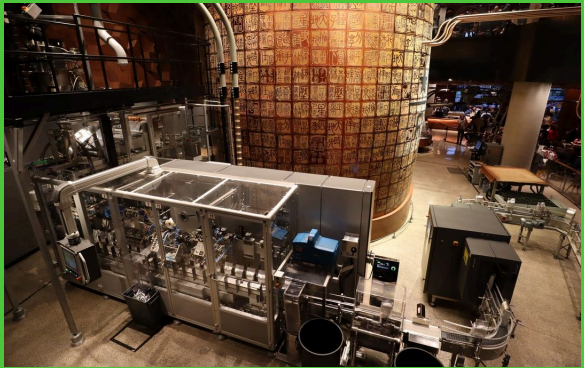
Applications:

- Carbon Composites
- Aerospace PrePreg
- Ceramic Composites
- Lithium Ion Battery Cells
- Honeycomb Panel Composites
- Carbon Fiber Reinforced Polymers
- Rubber Products
- Insulation/Polystyrene Foam
- Glass Fiber Reinforced Polymer
- Bonded Metal Delamination
- Wood (Solid and Composite)

This generic list highlights a broad spectrum of tried products/materials, and continues to grow as new products and applications are introduced

Online Inspection System Features:

- Motion control fixture designed for heavy use, 24/7 operation with a little to no maintenance; can be built to accommodate any size material, fully or partially enclosed to protect the transducers and mechanisms, with options for open or closed scanning bay.
- Non-Contact scanning allows total freedom from touch or potential contamination of materials.
- NEMA rate enclosures available for harsh environments. Enclosures contains all the system hardware; can be mobile or stationary.
- Fully automated turnkey system includes user-friendly interface, plug and play capabilities, configurable line widths and channel count, remote control options
- 100% inspection of uncured or cured parts
- Training packages available
- Extended warranty and services plan options
- Virtual Lab available for training
- Custom Software for scanning software



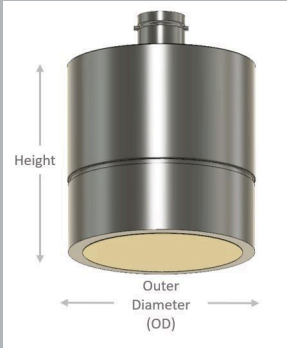
Non-Contact Transducers - NCG/NCT Series

NCU Circular Transducer

Ultran's patented Non-Contact (air-coupled) Ultrasonic Transducer with exceptionally high sensitivity, allows for extremely efficient acoustic coupling into air; especially suited for continuous inspection, commonly used for production and high volume manufacturing quality control of numerous materials.

Designed for use in air and other non-corrosive gaseous environments; All units are built with standard aluminum housing and BNC connectors.

Active Diameter										
	3 mm	7 mm	13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm	
Frequency	30 kHz				NCG30-D19	NCG30-D25	NCG30-D38	NCG30-D50	NCG30-D63	NCG30-D100
	50 kHz			NCG50-D13	NCG50-D19	NCG50-D25	NCG50-D38	NCG50-D50	NCG50-D63	NCG50-D100
	100 kHz			NCG100-D13	NCG100-D19	NCG100-D25	NCG100-D38	NCG100-D50	NCG100-D63	NCG100-D100
	140 kHz			NCG140-D13	NCG140-D19	NCG140-D25	NCG140-D38	NCG140-D50	NCG140-D63	NCG140-D100
	200 kHz			NCG200-D13	NCG200-D19	NCG200-D25	NCG200-D38	NCG200-D50	NCG200-D63	NCG200-D100
	350 kHz			NCG350-D13	NCG350-D19	NCG350-D25	NCG350-D38	NCG350-D50	NCG350-D63	
	500 kHz		NCG500-D7	NCG500-D13	NCG500-D19	NCG500-D25	NCG500-D38	NCG500-D50	NCG500-D63	
	700 kHz		NCT700-D7	NCT700-D13	NCT700-D19	NCT700-D25				
	1 MHz	NCT1-D3	NCT1-D7	NCT1-D13	NCT1-D19	NCT1-D25				
	2 MHz	NCT2-D3	NCT2-D7	NCT2-D13	NCT2-D19	NCT2-D25				
	3 MHz	NCT3-D3	NCT3-D7	NCT3-D13						
	4 MHz	NCT4-D3	NCT4-D7	NCT4-D13						
	5 MHz	NCT5-D3	NCT5-D7	NCT5-D13						



- Models at frequencies of 500 kHz and lower include Ultran proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

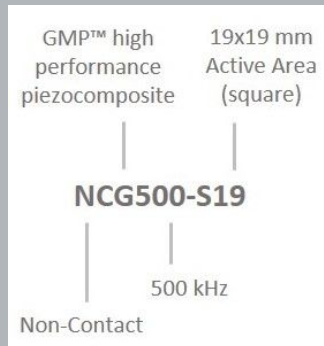
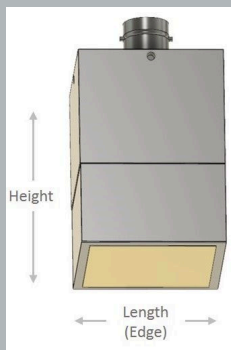
Non-Contact Transducers - NCG/NCT Series

NCU Square Transducer

Ultran's patented Non-Contact (air-coupled) Ultrasonic Transducer with exceptionally high sensitivity, allows for extremely efficient acoustic coupling into air.

Designed for use in air and other non-corrosive gaseous environments. All units are built with standard aluminum housing and BNC connectors.

Active Dimensions (Length x Width)							
	13x13 mm	19x19 mm	25x25 mm	38x38 mm	50x50 mm	63x63 mm	100x100 mm
Frequency	30 kHz	NCG30-S19	NCG30-S25	NCG30-S38	NCG30-S50	NCG30-S63	NCG30-S100
	50 kHz	NCG50-S13	NCG50-S19	NCG50-S25	NCG50-S38	NCG50-S50	NCG50-S100
	100 kHz	NCG100-S13	NCG100-S19	NCG100-S25	NCG100-S38	NCG100-S50	NCG100-S100
	140 kHz	NCG140-S13	NCG140-S19	NCG140-S25	NCG140-S38	NCG140-S50	NCG140-S100
	200 kHz	NCG200-S13	NCG200-S19	NCG200-S25	NCG200-S38	NCG200-S50	NCG200-S100
	350 kHz	NCG350-S13	NCG350-S19	NCG350-S25	NCG350-S38	NCG350-S50	NCG350-S63
	500 kHz	NCG500-S13	NCG500-S19	NCG500-S25	NCG500-S38	NCG500-S50	NCG500-S63
	700 kHz	NCT700-S13	NCT700-S19				
	1 MHz	NCT1-S13	NCT1-S19	NCT1-S25			
	2 MHz	NCT2-S13	NCT2-S19				
	3 MHz	NCT3-S13					
	4 MHz	NCT4-S13					
	5 MHz	NCT5-S13					



- Models at frequencies of 500 kHz and lower include Ultran proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Non-Contact Focused Transducers - NCG/NCT Series

Non-Contact Ultrasound Point (Spherical) Focused Transducers

Focused Transducers for smaller beam profile at focal length, greater spatial resolution and higher energy intensity. Transducer enclosure is comparable to Non-Contact Transducer corresponding active diameter. Models' frequency run from 30kHz to 2MHz on select models with compatible focal length.

Available Models below...not every combination is available, we also offer custom solutions outside the combinations listed below. Please contact us for any questions you may have.

30 kHz		Diameter		
Focal Length		38 mm	50 mm	63 mm
	76 mm	NCG30-D38-P76		
	100 mm	NCG30-D38-P100	NCG30-D50-P100	
	150 mm	NCG30-D38-P150	NCG30-D50-P150	NCG30-D63-P150



50 kHz		Diameter		
Focal Length		38 mm	50 mm	63 mm
	76 mm	NCG50-D38-P76		
	100 mm	NCG50-D38-P100	NCG50-D50-P100	
	150 mm	NCG50-D38-P150	NCG50-D50-P150	NCG50-D63-P150

- Models at frequencies of 500 kHz and lower include Ultran proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally



Non-Contact Focused Transducers - NCG/NCT Series

Non-Contact Ultrasound Point (Spherical) Focused Transducers...Con't

100 kHz		Diameter			
Focal Length		25 mm	38 mm	50 mm	63 mm
	50 mm	NCG100-D25-P50			
	76 mm	NCG100-D25-P76	NCG100-D38-P76		
	100 mm	NCG100-D25-P100	NCG100-D38-P100	NCG100-D50-P100	
	150 mm	NCG100-D25-P150	NCG100-D38-P150	NCG100-D50-P150	NCG100-D63-P150

140 kHz		Diameter			
Focal Length		25 mm	38 mm	50 mm	63 mm
	50 mm	NCG140-D25-P50			
	76 mm	NCG140-D25-P76	NCG140-D38-P76		
	100 mm	NCG140-D25-P100	NCG140-D38-P100	NCG140-D50-P100	
	150 mm	NCG140-D25-P150	NCG140-D38-P150	NCG140-D50-P150	NCG140-D63-P150

200 kHz		Diameter					
Focal Length		13 mm	19 mm	25 mm	38 mm	50 mm	63 mm
	25 mm	NCG200-D13-P25					
	38 mm	NCG200-D13-P38	NCG200-D19-P38				
	50 mm	NCG200-D13-P50	NCG200-D19-P50	NCG200-D25-P50			
	76 mm	NCG200-D13-P76	NCG200-D19-P76	NCG200-D25-P76	NCG200-D38-P76		
	100 mm	NCG200-D13-P100	NCG200-D19-P100	NCG200-D25-P100	NCG200-D38-P100	NCG200-D50-P100	
	150 mm		NCG200-D19-P150	NCG200-D25-P150	NCG200-D38-P150	NCG200-D50-P150	NCG200-D63-P150

350 kHz		Diameter					
Focal Length		13 mm	19 mm	25 mm	38 mm	50 mm	63 mm
	25 mm	NCG350-D13-P25					
	38 mm	NCG350-D13-P38	NCG350-D19-P38				
	50 mm	NCG350-D13-P50	NCG350-D19-P50	NCG350-D25-P50			
	76 mm	NCG350-D13-P76	NCG350-D19-P76	NCG350-D25-P76	NCG350-D38-P76		
	100 mm	NCG350-D13-P100	NCG350-D19-P100	NCG350-D25-P100	NCG350-D38-P100	NCG350-D50-P100	
	150 mm		NCG350-D19-P150	NCG350-D25-P150	NCG350-D38-P150	NCG350-D50-P150	NCG350-D63-P150

- Models at frequencies of 500 kHz and lower include Ultrasonics proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Non-Contact Focused Transducers - NCG/NCT Series

Non-Contact Ultrasound Point (Spherical) Focused Transducers...Con't

500 kHz		Diameter					
Focal Length		13 mm	19 mm	25 mm	38 mm	50 mm	63 mm
	25 mm	NCG500-D13-P25					
	38 mm	NCG500-D13-P38	NCG500-D19-P38				
	50 mm	NCG500-D13-P50	NCG500-D19-P50	NCG500-D25-P50			
	76 mm	NCG500-D13-P76	NCG500-D19-P76	NCG500-D25-P76	NCG500-D38-P76		
	100 mm	NCG500-D13-P100	NCG500-D19-P100	NCG500-D25-P100	NCG500-D38-P100	NCG500-D50-P100	
	150 mm		NCG500-D19-P150	NCG500-D25-P150	NCG500-D38-P150	NCG500-D50-P150	NCG500-D63-P150

700 kHz		Diameter			
Focal Length		7 mm	13 mm	19 mm	25 mm
	10 mm	NCT700-D7-P10			
	13 mm	NCT700-D7-P13			
	19 mm	NCT700-D7-P19	NCT700-D13-P19		
	25 mm	NCT700-D7-P25	NCT700-D13-P25		
	38 mm	NCT700-D7-P38	NCT700-D13-P38	NCT700-D19-P38	
	50 mm	NCT700-D7-P50	NCT700-D13-P50	NCT700-D19-P50	NCT700-D25-P50
	76 mm		NCT700-D13-P76	NCT700-D19-P76	NCT700-D25-P76
	100 mm		NCT700-D13-P100	NCT700-D19-P100	NCT700-D25-P100
	150 mm			NCT700-D19-P150	NCT700-D25-P150

1 MHz		Diameter				
Focal Length		3 mm	7 mm	13 mm	19 mm	25 mm
	7 mm	NCT1-D3-P7				
	10 mm	NCT1-D3-P10	NCT1-D7-P10			
	13 mm	NCT1-D3-P13	NCT1-D7-P13			
	19 mm	NCT1-D3-P19	NCT1-D7-P19	NCT1-D13-P19		
	25 mm		NCT1-D7-P25	NCT1-D13-P25		
	38 mm		NCT1-D7-P38	NCT1-D13-P38	NCT1-D19-P38	
	50 mm		NCT1-D7-P50	NCT1-D13-P50	NCT1-D19-P50	NCT1-D25-P50

2 MHz		Diameter			
Focal Length		3 mm	7 mm	13 mm	19 mm
	3 mm	NCT2-D3-P3			
	7 mm	NCT2-D3-P7			
	10 mm	NCT2-D3-P10	NCT2-D7-P10		
	13 mm	NCT2-D3-P13	NCT2-D7-P13		
	19 mm	NCT2-D3-P19	NCT2-D7-P19	NCT2-D13-P19	
	25 mm		NCT2-D7-P25	NCT2-D13-P25	
	38 mm		NCT2-D7-P38	NCT2-D13-P38	NCT2-D19-P38

- Models at frequencies of 500 kHz and lower include Ultran proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Non-Contact Focused Transducer - NCG/NCT Series

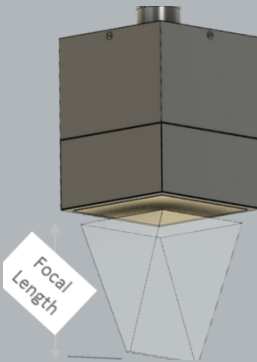
NCU Line (Cylindrical) Focused Transducers

Line focused transducers for shaped beam profile at focal length provide specific spatial characteristics. Transducer enclosure comparable to square NC Series of corresponding active dimensions.

Available Models below...not every combination is available, we also offer custom solutions outside the combinations listed below. Please contact us for any questions you may have.

Focal Length	30 kHz Active Dimensions (Length x Width)			
		38x38 mm	50x50 mm	63x63 mm
	76 mm	NCG30-S38-C76		
	100 mm	NCG30-S38-C100	NCG30-S50-C100	
	150 mm	NCG30-S38-C150	NCG30-S50-C150	NCG30-S63-C150

Focal Length	50 kHz Active Dimensions (Length x Width)			
		38x38 mm	50x50 mm	63x63 mm
	76 mm	NCG50-S38-C76		
	100 mm	NCG50-S38-C100	NCG50-S50-C100	
	150 mm	NCG50-S38-C150	NCG50-S50-C150	NCG50-S63-C150



- Models at frequencies of 500 kHz and lower include Ultran proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Non-Contact Focused Transducer - NCG/NCT Series

NCU Line (Cylindrical) Focused Transducers...Con't

100 kHz		Active Dimensions (Length x Width)			
Focal Length		25x25 mm	38x38 mm	50x50 mm	63x63 mm
	50 mm	NCG100-S25-C50			
	76 mm	NCG100-S25-C76	NCG100-S38-C76		
	100 mm	NCG100-S25-C100	NCG100-S38-C100	NCG100-S50-C100	
	150 mm	NCG100-S25-C150	NCG100-S38-C150	NCG100-S50-C150	NCG100-S63-C150

140 kHz		Active Dimensions (Length x Width)			
Focal Length		25x25 mm	38x38 mm	50x50 mm	63x63 mm
	50 mm	NCG140-S25-C50			
	76 mm	NCG140-S25-C76	NCG140-S38-C76		
	100 mm	NCG140-S25-C100	NCG140-S38-C100	NCG140-S50-C100	
	150 mm	NCG140-S25-C150	NCG140-S38-C150	NCG140-S50-C150	NCG140-S63-C150

200 kHz		Active Dimensions (Length x Width)					
Focal Length		13x13 mm	19x19 mm	25x25 mm	38x38 mm	50x50 mm	63x63 mm
	25 mm	NCG200-S13-C25					
	38 mm	NCG200-S13-C38	NCG200-S19-C38				
	50 mm	NCG200-S13-C50	NCG200-S19-C50	NCG200-S25-C50			
	76 mm	NCG200-S13-C76	NCG200-S19-C76	NCG200-S25-C76	NCG200-S38-C76		
	100 mm	NCG200-S13-C100	NCG200-S19-C100	NCG200-S25-C100	NCG200-S38-C100	NCG200-S50-C100	
	150 mm		NCG200-S19-C150	NCG200-S25-C150	NCG200-S38-C150	NCG200-S50-C150	NCG200-S63-C150

350 kHz		Active Dimensions (Length x Width)					
Focal Length		13x13 mm	19x19 mm	25x25 mm	38x38 mm	50x50 mm	63x63 mm
	25 mm	NCG350-S13-C25					
	38 mm	NCG350-S13-C38	NCG350-S19-C38				
	50 mm	NCG350-S13-C50	NCG350-S19-C50	NCG350-S25-C50			
	76 mm	NCG350-S13-C76	NCG350-S19-C76	NCG350-S25-C76	NCG350-S38-C76		
	100 mm	NCG350-S13-C100	NCG350-S19-C100	NCG350-S25-C100	NCG350-S38-C100	NCG350-S50-C100	
	150 mm		NCG350-S19-C150	NCG350-S25-C150	NCG350-S38-C150	NCG350-S50-C150	NCG350-S63-C150

- Models at frequencies of 500 kHz and lower include Ultrasonics proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Non-Contact Focused Transducer - NCG/NCT Series

NCU Line (Cylindrical) Focused Transducers...Con't

Focal Length	500 kHz		Active Dimensions (Length x Width)				
		13x13 mm	19x19 mm	25x25 mm	38x38 mm	50x50 mm	63x63 mm
	25 mm	NCG500-S13-C25					
	38 mm	NCG500-S13-C38	NCG500-S19-C38				
	50 mm	NCG500-S13-C50	NCG500-S19-C50	NCG500-S25-C50			
	76 mm	NCG500-S13-C76	NCG500-S19-C76	NCG500-S25-C76	NCG500-S38-C76		
	100 mm	NCG500-S13-C100	NCG500-S19-C100	NCG500-S25-C100	NCG500-S38-C100	NCG500-S50-C100	
	150 mm		NCG500-S19-C150	NCG500-S25-C150	NCG500-S38-C150	NCG500-S50-C150	NCG500-S63-C150

700 kHz		Active Dimensions (Length x Width)		
Focal Length		13x13 mm	19x19 mm	25x25 mm
	19 mm	NCT700-S13-C19		
	25 mm	NCT700-S13-C25		
	38 mm	NCT700-S13-C38	NCT700-S19-C38	
	50 mm	NCT700-S13-C50	NCT700-S19-C50	NCT700-S25-C50
	76 mm	NCT700-S13-C76	NCT700-S19-C76	NCT700-S25-C76
	100 mm	NCT700-S13-C100	NCT700-S19-C100	NCT700-S25-C100
	150 mm		NCT700-S19-C150	NCT700-S25-C150

1 MHz		Active Dimensions (Length x Width)		
Focal Length		13x13 mm	19x19 mm	25x25 mm
	19 mm	NCT1-S13-C19		
	25 mm	NCT1-S13-C25		
	38 mm	NCT1-S13-C38	NCT1-S19-C38	
	50 mm	NCT1-S13-C50	NCT1-S19-C50	NCT1-S25-C50
	76 mm	NCT1-S13-C76		
	100 mm	NCT1-S13-C100		

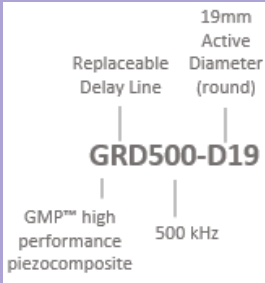
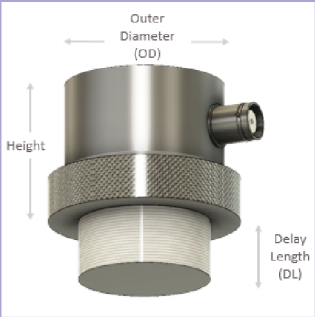
2 MHz		Active Dimensions (Length x Width)	
Focal Length		13x13 mm	19x19 mm
	13 mm	NCT2-S13-C13	
	19 mm	NCT2-S13-C19	
	25 mm	NCT2-S13-C25	
	38 mm	NCT2-S13-C38	NCT2-S19-C38
	50 mm	NCT2-S13-C50	NCT2-S19-C50
	76 mm	NCT2-S13-C76	

- Models at frequencies of 500 kHz and lower include Ultrasonics proprietary gas matrix piezoelectric (GMP™) composite.
- Models at 700 kHz and higher built with high performance polymer-based piezocomposite.
- US patents 6311573, 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Delayed Contact Transducers - G Series

Gas Matrix Piezocomposite (GMP™) Delayed Contact Transducers GRD Models

Low frequency transducers with Ultran proprietary gas matrix piezocomposite (GMP™) for high sensitivity and bandwidth. Designed for use with a replaceable delay line. Units built with stainless steel housing, side mount BNC connectors and include removable polystyrene delay line. Delay lines of varied lengths available upon request.



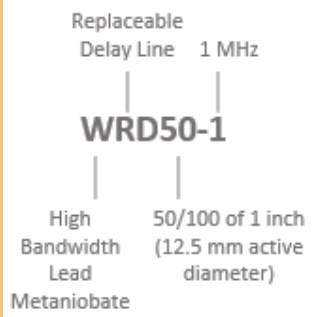
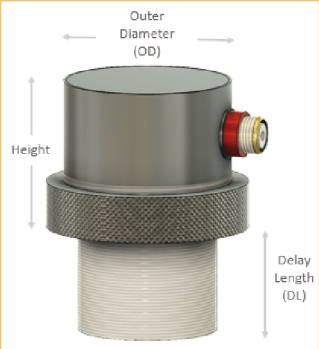
Active Diameter							
Frequency	13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm
	30 kHz	GRD30-D19	GRD30-D25	GRD30-D38	GRD30-D50	GRD30-D63	GRD30-D100
	50 kHz	GRD50-D13	GRD50-D19	GRD50-D25	GRD50-D38	GRD50-D50	GRD50-D100
	100 kHz	GRD100-D13	GRD100-D19	GRD100-D25	GRD100-D38	GRD100-D50	GRD100-D100
	140 kHz	GRD140-D13	GRD140-D19	GRD140-D25	GRD140-D38	GRD140-D50	GRD140-D100
	200 kHz	GRD200-D13	GRD200-D19	GRD200-D25	GRD200-D38	GRD200-D50	GRD200-D100
	350 kHz	GRD350-D13	GRD350-D19	GRD350-D25	GRD350-D38	GRD350-D50	GRD350-D63
	500 kHz	GRD500-D13	GRD500-D19	GRD500-D25	GRD500-D38	GRD500-D50	GRD500-D63

- US patents 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Delayed Contact Transducers - W Series

W-Series Delayed Contact Transducers WRD Models

Mid to high frequency transducers built with lead metaniobate piezoelectric material. Ideal for high bandwidth applications primarily for non-destructive testing. Designed for use in contact with the test medium using a replaceable delay line. All units built standard with stainless steel housing, side mount microdot connector and includes standard size polystyrene delay line.

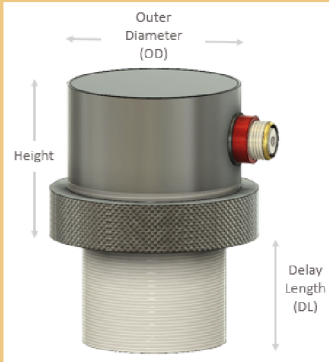


Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			WRD50-0.5	WRD75-0.5	WRD100-0.5
	1 MHz	WRD25-1	WRD37-1	WRD50-1	WRD75-1	WRD100-1
	2 MHz	WRD25-2	WRD37-2	WRD50-2	WRD75-2	WRD100-2
	5 MHz	WRD25-5	WRD37-5	WRD50-5	WRD75-5	WRD100-5
	10 MHz	WRD25-10	WRD37-10	WRD50-10		

Delayed Contact Transducers - K Series

K-Series Delayed Contact Transducers KRD Models

Mid to high frequency transducers built with PZT material. Ideal for high sensitivity applications, requiring greater signal amplitude. Designed for use in contact with test medium using a replaceable delay line. All units built standard with stainless steel housing, side mount microdot connector and includes standard size polystyrene delay line listed in the below table. Transducer enclosure identical to WRD Series of corresponding active diameter.



Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			KRD50-0.5	KRD75-0.5	KRD100-0.5
	1 MHz	KRD25-1	KRD37-1	KRD50-1	KRD75-1	KRD100-1
	2 MHz	KRD25-2	KRD37-2	KRD50-2	KRD75-2	KRD100-2
	5 MHz	KRD25-5	KRD37-5	KRD50-5	KRD75-5	KRD100-5
	10 MHz	KRD25-10	KRD37-10	KRD50-10		

Direct Contact Transducers - G Series

Gas Matrix Piezocomposite (GMP™) Direct Contact Transducers GC Models

Low frequency transducer with Ultrasonics proprietary gas matrix piezocomposite (GMP™) for high sensitivity and bandwidth. Designed for use in direct contact with material surface. All units built with standard high endurance wear plate, stainless steel housing and side mount BNC connectors.



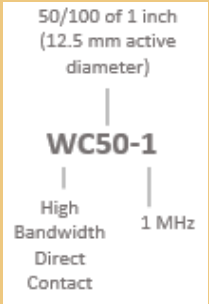
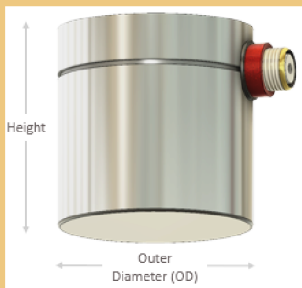
Active Diameter								
Frequency		13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm
	30 kHz		GC30-D19	GC30-D25	GC30-D38	GC30-D50	GC30-D63	GC30-D100
	50 kHz	GC50-D13	GC50-D19	GC50-D25	GC50-D38	GC50-D50	GC50-D63	GC50-D100
	100 kHz	GC100-D13	GC100-D19	GC100-D25	GC100-D38	GC100-D50	GC100-D63	GC100-D100
	140 kHz	GC140-D13	GC140-D19	GC140-D25	GC140-D38	GC140-D50	GC140-D63	GC140-D100
	200 kHz	GC200-D13	GC200-D19	GC200-D25	GC200-D38	GC200-D50	GC200-D63	GC200-D100
	350 kHz	GC350-D13	GC350-D19	GC350-D25	GC350-D38	GC350-D50	GC350-D63	GC350-D100
	500 kHz	GC500-D13	GC500-D19	GC500-D25	GC500-D38	GC500-D50	GC500-D63	

- US patents 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Direct Contact Transducers - W Series

W-Series Direct Contact Transducers WC Models

Mid to high frequency transducers built with lead metaniobate piezoelectric material. Ideal for high bandwidth applications primarily for non-destructive testing. Designed for use in direct contact with test material. All units built standard with alumina wear plate, stainless steel housing and side mount microdot connectors.

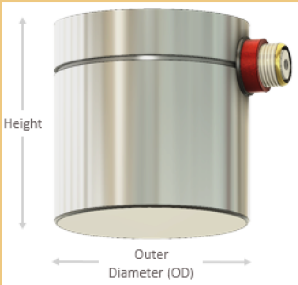


Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			WC50-0.5	WC75-0.5	WC100-0.5
	1 MHz	WC25-1	WC37-1	WC50-1	WC75-1	WC100-1
	2 MHz	WC25-2	WC37-2	WC50-2	WC75-2	WC100-2
	5 MHz	WC25-5	WC37-5	WC50-5	WC75-5	WC100-5
	10 MHz	WC25-10	WC37-10	WC50-10		

Direct Contact Transducers - K Series

K-Series Direct Contact Transducers KC Models

Mid to high frequency transducers built with PZT material. Ideal for sensitivity applications, requiring greater signal amplitude. Designed for use in direct contact with test material. All units built standard with alumina wear plate, stainless steel housing and side mount microdot connectors. Transducer enclosure identical to WC Series of corresponding active diameter.

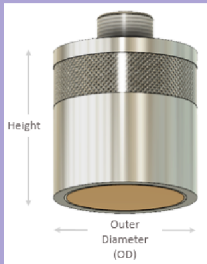


Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			KC50-0.5	KC75-0.5	KC100-0.5
	1 MHz	KC25-1	KC37-1	KC50-1	KC75-1	KC100-1
	2 MHz	KC25-2	KC37-2	KC50-2	KC75-2	KC100-2
	5 MHz	KC25-5	KC37-5	KC50-5	KC75-5	KC100-5
	10 MHz	KC25-10	KC37-10	KC50-10		

Immersion Transducers - G Series

Gas Matrix Piezocomposite (GMP™) Low Frequency Immersion Transducers GS Models

Low Frequency transducers with Ultran proprietary gas matrix piezocomposite (GMP™) for high sensitivity and bandwidth. Designed for use in water and other noncorrosive liquids. All units built standard with top mount waterproof UHF connectors. Models 25 mm and lower constructed with stainless housing; 38 mm and higher constructed with PEEK housing.



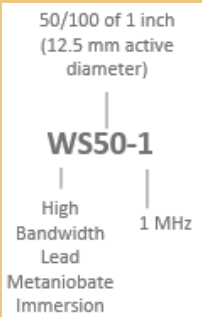
Active Diameter							
Frequency	13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm
	30 kHz	GS30-D19	GS30-D25	GS30-D38	GS30-D50	GS30-D63	GS30-D100
	50 kHz	GS50-D13	GS50-D19	GS50-D25	GS50-D38	GS50-D50	GS50-D63
	100 kHz	GS100-D13	GS100-D19	GS100-D25	GS100-D38	GS100-D50	GS100-D63
	140 kHz	GS140-D13	GS140-D19	GS140-D25	GS140-D38	GS140-D50	GS140-D63
	200 kHz	GS200-D13	GS200-D19	GS200-D25	GS200-D38	GS200-D50	GS200-D63
	350 kHz	GS350-D13	GS350-D19	GS350-D25	GS350-D38	GS350-D50	GS350-D63
	500 kHz	GS500-D13	GS500-D19	GS500-D25	GS500-D38	GS500-D50	GS500-D63

- US patents 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Immersion Transducers - W Series

W-Series Immersion Transducers WS Models

Mid to high frequency transducers built with lead metaniobate piezoelectric material. Ideal for high bandwidth applications primarily for non-destructive testing. Designed for use in water and other non-corrosive liquids. All units built standard with stainless steel housing and waterproof top mount UHF connectors.



Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			WS50-0.5	WS75-0.5	WS100-0.5
	1 MHz	WS25-1	WS37-1	WS50-1	WS75-1	WS100-1
	2 MHz	WS25-2	WS37-2	WS50-2	WS75-2	WS100-2
	5 MHz	WS25-5	WS37-5	WS50-5	WS75-5	WS100-5
	10 MHz	WS25-10	WS37-10	WS50-10		

Immersion Transducers - K Series

K-Series Immersion Transducers KS Models

Mid to high frequency transducers built with PZT material. Ideal for high sensitivity applications, requiring greater signal amplitude. Designed for use in water and other non-corrosive liquids. All units built standard with stainless steel housing and top mount UHF connectors. Transducer enclosure identical to WS Series of corresponding active diameter.

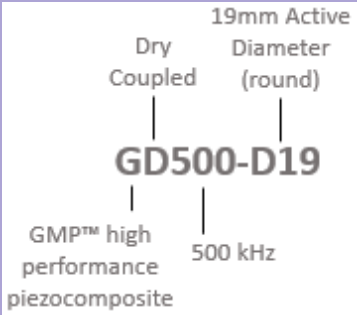
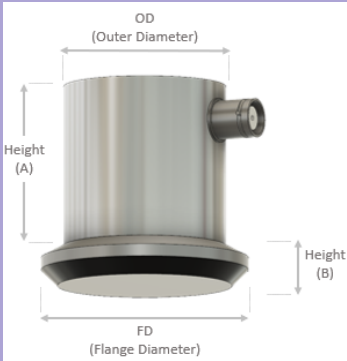


Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			KS50-0.5	KS75-0.5	KS100-0.5
	1 MHz	KS25-1	KS37-1	KS50-1	KS75-1	KS100-1
	2 MHz	KS25-2	KS37-2	KS50-2	KS75-2	KS100-2
	5 MHz	KS25-5	KS37-5	KS50-5	KS75-5	KS100-5
	10 MHz	KS25-10	KS37-10	KS50-10		

Dry Coupled Transducers - G Series

Gas Matrix Piezocomposite (GMP™) Low Frequency Dry Coupled Transducers GD Models

Low frequency transducers with Ultrasonics proprietary gas matrix piezocomposite (GMP™) for high sensitivity and bandwidth. Designed for use in direct contact with test material (without a liquid coupling medium). All units built standard with stainless steel housing and side mount BNC connectors.



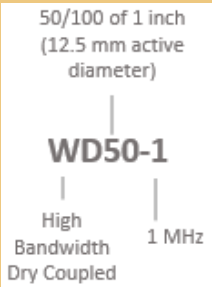
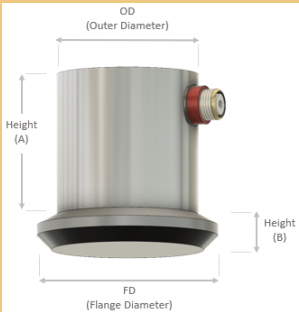
Active Diameter							
Frequency	13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm
200 kHz	GD200-D13	GD200-D19	GD200-D25	GD200-D38	GD200-D50	GD200-D63	GD200-D100
350 kHz	GD350-D13	GD350-D19	GD350-D25	GD350-D38	GD350-D50	GD350-D63	GD350-D100
500 kHz	GD500-D13	GD500-D19	GD500-D25	GD500-D38	GD500-D50	GD500-D63	

- US patents 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

Dry Coupled Transducers - W Series

W-Series Immersion Transducers WD Models

Mid to high frequency transducer built with lead metaniobate piezoelectric material. Ideal for high bandwidth applications primarily for non-destructive testing and medical diagnostics. Designed for use in direct dry contact with test material (without liquid coupling medium). All units built standard with stainless steel housing and side mount microdot connectors.

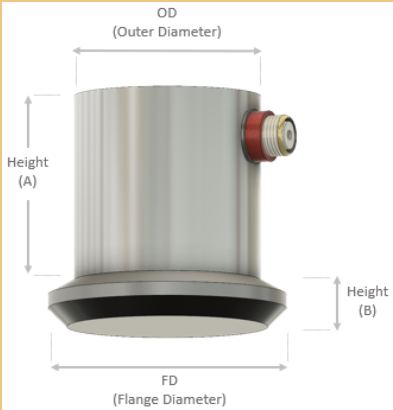


Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			WD50-0.5	WD75-0.5	WD100-0.5
	1 MHz	WD25-1	WD37-1	WD50-1	WD75-1	WD100-1
	2 MHz	WD25-2	WD37-2	WD50-2	WD75-2	WD100-2
	5 MHz	WD25-5	WD37-5	WD50-5	WD75-5	WD100-5
	10 MHz	WD25-10	WD37-10	WD50-10		

Dry Coupled Transducers - K Series

K-Series Immersion Transducers KD Models

Mid to high frequency transducers built with PZT material. Ideal for high sensitivity applications requiring greater signal amplitude. Designed for use in direct dry contact with test material (without a liquid coupling medium). All units built standard with stainless steel housing and side mount microdot connectors. Transducer enclosure identical to WD transducer of corresponding active diameter.



Active Diameter						
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			KD50-0.5	KD75-0.5	KD100-0.5
	1 MHz	KD25-1	KD37-1	KD50-1	KD75-1	KD100-1
	2 MHz	KD25-2	KD37-2	KD50-2	KD75-2	KD100-2
	5 MHz	KD25-5	KD37-5	KD50-5	KD75-5	KD100-5
	10 MHz	KD25-10	KD37-10	KD50-10		

High Power Delivery GMP™ Transducers - GPS Series

Gas Matrix Piezocomposite (GMP™) Transducers for High Power Delivery (GPS)

Available upon request, Ultratran can provide its GPS series transducers for high power delivery.

Combination of frequency and diameters can be included from the table below



Active Diameter							
Frequency	13 mm	19 mm	25 mm	38 mm	50 mm	63 mm	100 mm
	30 kHz	GPS30-D19	GPS30-D25	GPS30-D38	GPS30-D50	GPS30-D63	GPS30-D100
	50 kHz	GPS50-D13	GPS50-D19	GPS50-D25	GPS50-D38	GPS50-D50	GPS50-D100
	100 kHz	GPS100-D13	GPS100-D19	GPS100-D25	GPS100-D38	GPS100-D50	GPS100-D100
	140 kHz	GPS140-D13	GPS140-D19	GPS140-D25	GPS140-D38	GPS140-D50	GPS140-D100
	200 kHz	GPS200-D13	GPS200-D19	GPS200-D25	GPS200-D38	GPS200-D50	GPS200-D100
	350 kHz	GPS350-D13	GPS350-D19	GPS350-D25	GPS350-D38	GPS350-D50	GPS350-D63
	500 kHz	GPS500-D13	GPS500-D19	GPS500-D25	GPS500-D38	GPS500-D50	GPS500-D63

- US patents 7382082 and 7791253 - Prosecuted in the U.S. and Internationally

High Performing Conventional NDT (SWC & SRD Series)

SW-Series Direct Contact (SWC Models)

Mid to high frequency shearwave transducers, producing transverse wave vibration in the horizontal plane relative to contact surface. Designed for use in direct contact with test material. All units built standard with alumina wear plate, stainless steel housing, side mount microdot connectors.



		Active Diameter				
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			SWC50-0.5	SWC75-0.5	SWC100-0.5
	1 MHz	SWC25-1	SWC37-1	SWC50-1	SWC75-1	SWC100-1
	2 MHz	SWC25-2	SWC37-2	SWC50-2	SWC75-2	SWC100-2
	5 MHz	SWC25-5	SWC37-5	SWC50-5	SWC75-5	

SW-Series Delayed Contact (SRD Models)

Mid to high frequency shearwave transducers, producing transverse wave vibration in the horizontal plane relative to contact surface. Designed for use in contact with test medium using a replaceable delay line. All units built standard with stainless steel housing, side mount microdot connectors, and includes polystyrene delay line with standard size listed in the below table.



		Active Diameter				
Frequency		6.3 mm	9.5 mm	12.5 mm	19 mm	25 mm
	500 kHz			SRD50-0.5	SRD75-0.5	SRD100-0.5
	1 MHz	SRD25-1	SRD37-1	SRD50-1	SRD75-1	SRD100-1
	2 MHz	SRD25-2	SRD37-2	SRD50-2	SRD75-2	SRD100-2
	5 MHz	SRD25-5	SRD37-5	SRD50-5	SRD75-5	SRD100-5
	10 MHz	SRD25-10	SRD37-10	SRD50-10		

Advanced Technology

Ultran's newest technology includes large low frequency GMP™ transducers, non-contact arrays and contact/immersion phased array transducers for focused energy delivery. These developments are geared towards production line NDT and highly attenuative composites, ceramics and concrete.

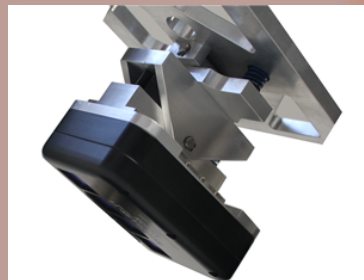
Very large low frequency GMP™

Large size and customizable transducers for inspection of attenuative and high thickness materials. Also ideal for energy delivery applications, such as food satiation.



Non-contact Transducer Arrays

Multi-channel non-contact transducers for high throughput inspection applications. Customized for moving web lines and piece part inspection, these transducers accompany Ultran's fully integrated advanced systems products.



Transducer Construction

Craftsmanship

Ultran has strict in-house quality control standards which result in high performance transducers for non-destructive testing.

Each transducer features careful alignment of acoustic and geometric axes and is encased in its own optimally shaped and sized housing with specially designed acoustically passive materials. Combined with our unique transducers-making technology, these features produce an optimum response from all our acoustic series.

Elements of a Piezoelectric Transducer

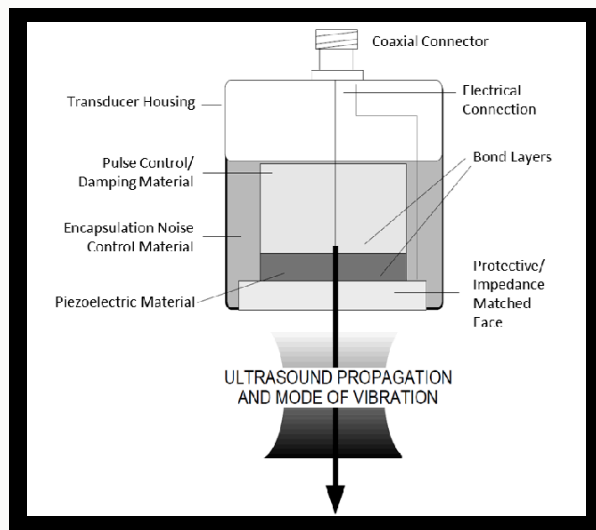
A transducer can be simple as a piezoelectric disc with leads attached to both faces.

Or it can be a complex device intended to evaluate a number of materials and interfaces.

In conjunction with the testing environment and a material's physical condition, a transducer device must be characterized by proper acoustics and mechanical construction.

Therefore, the design of a modern transducer requires a knowledge of materials and the associated physics.

Ultran's years of experience have led to the evolution of an array of transducer designs suitable for a vast number of materials and test conditions.

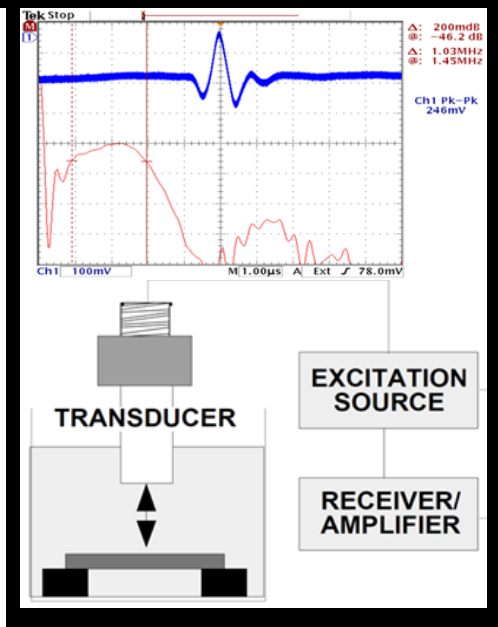


Transducer Characterization

Acoustic Parameters of a Transducer

Our transducers are measured and characterized by a number of key parameters which are listed in the table below

Nominal Frequency	This is the target nominal frequency of the transducer as identified by the model number.
Peak Frequency	This is the highest frequency response measured from the frequency spectrum.
Bandwidth Center Frequency (BCF)	This is the average of the lowest and highest points at a -6dB level of the frequency spectrum.
Bandwidth (BW)	This is the difference between the highest and lowest frequencies at a -6dB level of the frequency spectrum, also identified as the % of BCF or of PF.



Test Setup for Data A Report

The Oscilloscope trace (top left) includes the time domain response (top – blue) and frequency spectrum (below – red).

The schematic (bottom left) depicts the water immersion example for characterization of an acoustic transducer. A transducer is characterized by using hard, soft, or gaseous reference media depending upon its design and intended application.

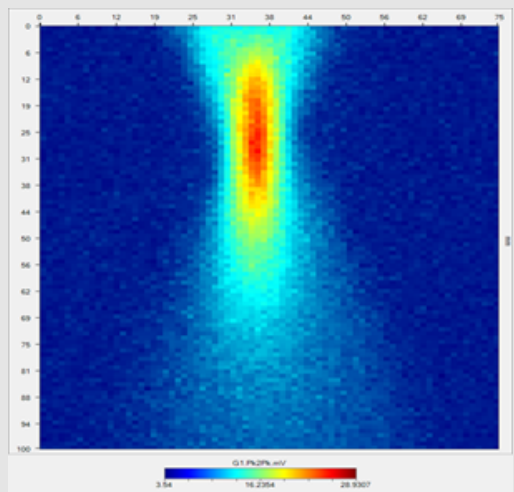
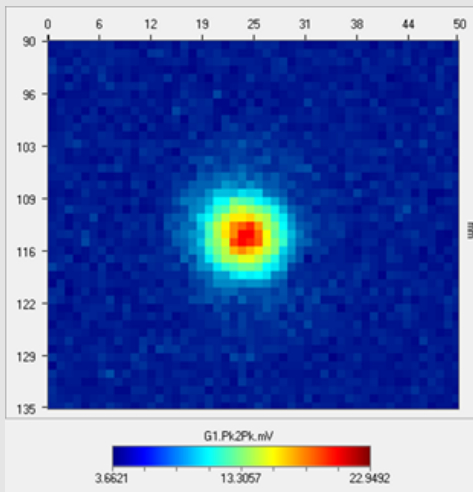
Transducer Characterization

Spatial and Acoustic Pressure/Intensity Measurements for Select Transducers

For Specialized transducers or upon customers request, Ultran may perform spatial beam profile measurements using the Ultran's U710x Ultrasonic Analysis System. Measurements are preformed using a immersible calibrated hydrophone for immersion transducers.

Sample Data for Focused Immersion Transducers

The profile images to the bottom left were captured for a focused immersion transducer to measure the focal parameters of this unit. The image to the bottom left is a graphical representation of the X-Y beam profile while the image to the bottom right represents the X-Z beam profile - measuring the focal depth. Numerical data is converted to acoustic pressure or intensity using a calibrated system.



Matching Inductance Networks (MID)				Cables			
Model	Frequency	Connector	Housing Material	Model	Length	Connector	Housing Material
MID-50	50 kHz	BNC	External Inline Matching	BB1-174	1 Foot (0.3m)	BNC to BNC	Coaxial Cable
MID-100	100 kHz	BNC	External Inline Matching	BB2-174	2 Feet (0.6m)	BNC to BNC	Coaxial Cable
MID-140	140 kHz	BNC	External Inline Matching	BB3-174	3 Feet (0.9m)	BNC to BNC	Coaxial Cable
MID-200	200 kHz	BNC	External Inline Matching	BB6-174	6 Feet (1.8m)	BNC to BNC	Coaxial Cable
MID-350	350 kHz	BNC	External Inline Matching	BB10-174	10 Feet (3m)	BNC to BNC	Coaxial Cable
MID-500	500 kHz	BNC	External Inline Matching	BB1-58	1 Foot (0.3m)	BNC to BNC	Coaxial Cable
MID-700	700 kHz	BNC	External Inline Matching	BB2-58	2 Feet (0.6m)	BNC to BNC	Coaxial Cable
MID-001	1 MHz	BNC	External Inline Matching	BB3-58	3 Feet (0.9m)	BNC to BNC	Coaxial Cable
MID-002	2 MHz	BNC	External Inline Matching	BB6-58	6 Feet (1.8m)	BNC to BNC	Coaxial Cable
MID-003	3 MHz	BNC	External Inline Matching	BB10-58	10 Feet (3m)	BNC to BNC	Coaxial Cable
MID-004	4 MHz	BNC	External Inline Matching	BB1-316	1 Foot (0.3m)	BNC to BNC	Coaxial Cable
MID-005	5 MHz	BNC	External Inline Matching	BB2-316	2 Feet (0.6m)	BNC to BNC	Coaxial Cable
MID-050	50 kHz	BNC	External Inline Matching	BB3-316	3 Feet (0.9m)	BNC to BNC	Coaxial Cable
Polystyrene Delay Lines				BB6-316	6 Feet (1.8m)	BNC to BNC	Coaxial Cable
Model	Frequency	Connector	Housing Material	BB10-316	10 Feet (3m)	BNC to BNC	Coaxial Cable
DL12	3.2 mm	8 mm	Replaceable Delay Tip	BU1-58	1 Foot (0.3m)	BNC to UHF	Coaxial Cable
DL25	6.3 mm	8 mm	Replaceable Delay Tip	BU2-58	2 Feet (0.6m)	BNC to UHF	Coaxial Cable
DL25-13	6.3 mm	12.5 mm	Replaceable Delay Tip	BU3-58	3 Feet (0.9m)	BNC to UHF	Coaxial Cable
DL25-15	6.3 mm	15 mm	Replaceable Delay Tip	BU6-58	6 Feet (1.8m)	BNC to UHF	Coaxial Cable
DL25-20	6.3 mm	20 mm	Replaceable Delay Tip	BU10-58	10 Feet (3m)	BNC to UHF	Coaxial Cable
DL25-30	6.3 mm	30 mm	Replaceable Delay Tip	BS1-174	1 Foot (0.3m)	BNC to SMB	Coaxial Cable
DL25-38	6.3 mm	38 mm	Replaceable Delay Tip	BS2-174	2 Feet (0.6m)	BNC to SMB	Coaxial Cable
DL25-50	6.3 mm	50 mm	Replaceable Delay Tip	BS3-174	3 Feet (0.9m)	BNC to SMB	Coaxial Cable
DL37	9.5 mm	8 mm	Replaceable Delay Tip	BS6-174	6 Feet (1.8m)	BNC to SMB	Coaxial Cable
DL37-13	9.5 mm	12.5 mm	Replaceable Delay Tip	BS10-174	10 Feet (3m)	BNC to SMB	Coaxial Cable
DL37-15	9.5 mm	15 mm	Replaceable Delay Tip	BS1-58	1 Foot (0.3m)	BNC to SMB	Coaxial Cable
DL37-20	9.5 mm	20 mm	Replaceable Delay Tip	BS2-58	2 Feet (0.6m)	BNC to SMB	Coaxial Cable
DL37-30	9.5 mm	30 mm	Replaceable Delay Tip	BS3-58	3 Feet (0.9m)	BNC to SMB	Coaxial Cable
DL37-38	9.5 mm	38 mm	Replaceable Delay Tip	BS6-58	6 Feet (1.8m)	BNC to SMB	Coaxial Cable
DL37-50	9.5 mm	50 mm	Replaceable Delay Tip	BS10-58	10 Feet (3m)	BNC to SMB	Coaxial Cable
DL50	12.5 mm	8 mm	Replaceable Delay Tip	BS1-316	1 Foot (0.3m)	BNC to SMB	Coaxial Cable
DL50-13	12.5 mm	12.5 mm	Replaceable Delay Tip	BS2-316	2 Feet (0.6m)	BNC to SMB	Coaxial Cable
DL50-15	12.5 mm	15 mm	Replaceable Delay Tip	BS3-316	3 Feet (0.9m)	BNC to SMB	Coaxial Cable
DL50-20	12.5 mm	20 mm	Replaceable Delay Tip	BS6-316	6 Feet (1.8m)	BNC to SMB	Coaxial Cable
DL50-30	12.5 mm	30 mm	Replaceable Delay Tip	BS10-316	10 Feet (3m)	BNC to SMB	Coaxial Cable
DL50-38	12.5 mm	38 mm	Replaceable Delay Tip	BM1-174	1 Foot (0.3m)	MNC to Microdot (10-32)	Coaxial Cable
DL50-50	12.5 mm	50 mm	Replaceable Delay Tip	BM2-174	2 Feet (0.6m)	MNC to Microdot (10-32)	Coaxial Cable
DL50-64	12.5 mm	63.5 mm	Replaceable Delay Tip	BM3-174	3 Feet (0.9m)	MNC to Microdot (10-32)	Coaxial Cable
DL75	19 mm	25 mm	Replaceable Delay Tip	BM6-174	6 Feet (1.8m)	MNC to Microdot (10-32)	Coaxial Cable
DL100	25 mm	25 mm	Replaceable Delay Tip	BM10-174	10 Feet (3m)	MNC to Microdot (10-32)	Coaxial Cable
DL150	38 mm	25 mm	Replaceable Delay Tip				
DL200	50 mm	25 mm	Replaceable Delay Tip				
DL200-50	50 mm	50 mm	Replaceable Delay Tip				
DL200-75	50 mm	75 mm	Replaceable Delay Tip				
DL200-100	50 mm	100 mm	Replaceable Delay Tip				
DL200-150	50 mm	150 mm	Replaceable Delay Tip				
DL250	63 mm	25 mm	Replaceable Delay Tip				
DL250-L75	63 mm	75 mm	Replaceable Delay Tip				
DL400	100 mm	25 mm	Replaceable Delay Tip				



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