

Ultrasonic Probes

Ultrasonics



A global leader in
technology-driven
inspection solutions
that deliver productivity,
quality and safety to
our customers

Table of Contents

	Page		Page
Transducer Performance		High Temperature Dual Element Transducers	
Alpha Series Features	4	HT400A (to 1000° F)	17
Benchmark Series Features	4	KBA560V (to 750° F)	17
Gamma Series Features	4	Standard Dual Element Transducers	
Frequency Color Coding	4	DU Style (Replaceable Delay)	18
Contact Transducers		DU-F Style, Benchmark Series	18
RHP Style Standard	5	FAST™ Probes	18
XLC Style Extended Life	5	Immersion Transducers	
F Style Fingertip	6	ISS/IS Styles	19
Delay Line Contact Transducers		IPS/IR Styles	20
DFR Style Removable Delay	6	Velocity System Transducers	21
K-PEN Pencil Type Probe	7	Near Field and Focusing Information	21
ZIP Probes	7	Thickness Gauging Transducers	
Protective Face Contact Transducers		Precision Gauging	22
PFCR/PFCS Combination Styles	8	Dual Element Corrosion Gauging	23
PMCR/PMCS Membrane Styles	9	Special Probes and Applications Laboratory	
PWCCR/PWCCS Styles	10	Special Probes & Applications	24
Angle Beam Transducers		Phased Array Transducers	25
SWS/AWS Styles, Gamma	11	Accessories	
SWS/AWS Styles, Benchmark	12	Cables/Adaptors/Search Tubes	26
Miniature Angle Beam Transducers		Couplants	27
MSW-QC Quick Change, Gamma	13	Test Blocks	28
MSW-QC, Alpha & Benchmark	14	Transducer Certification	30
MSWS Style (Captive Screws)	15	Tables and Formulas	31
ABFP Style (Potted Wedge)	16	Transducer Kits	32
SMSWS Style (Subminiature)	16	Inquiry Form	34
Fingertip Dual Element Transducers			
ADP Style (Potted Cable)	17		
RC Dual Style (Replaceable Cable)	17		
FDU Style (Replaceable Cable)	17		

Transducer Performance

GE Inspection Technologies offers three series of transducers: **Alpha**, **Gamma**, and new **Benchmark**. To determine which of these series is best for your application, please read the technical information on this page. If you need assistance, contact one of our Transducer Product Specialists (717-242-0327) or your local sales representative.

Real time waveform and frequency certification is included with every transducer at no charge (refer to the Technical Information section for details).

Alpha Series Features

- Recommended for applications where resolution is the primary consideration.
- Suitable for applications such as thickness measurement and near-surface flaw detection.
- Very short pulse—mechanically damped to the limit of current technology.
- Gain is usually lower than that of the Gamma and Benchmark Series.
- Broadband—typical 6 dB bandwidths range from 50% to 100%.
- Typical Alpha waveforms (right) exhibit one to two full ring cycles, depending on frequency, size and other parameters.

Benchmark Series Features

- Proprietary **BENCHMARK COMPOSITE®** (piezocomposite) active elements.
- Penetration in attenuative materials is far superior to conventional transducers.
- High signal to noise on coarse grain metals, fiber reinforced composites, et al.
- Short pulse—resolution usually superior to Gamma Series.
- Gain is usually higher than that of the Gamma and Alpha Series.
- Very broadband—typical 6 dB bandwidths range from 60% to 120%.
- Low acoustic impedance element improves performance of angle beam, delay line, and immersion probes—excellent match to plastic and water.

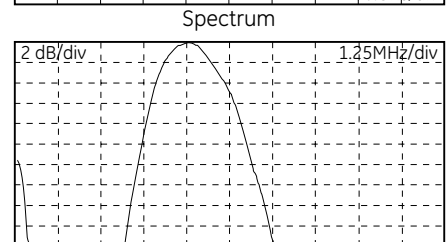
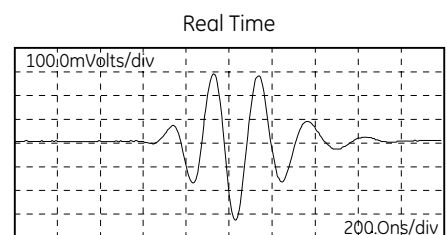
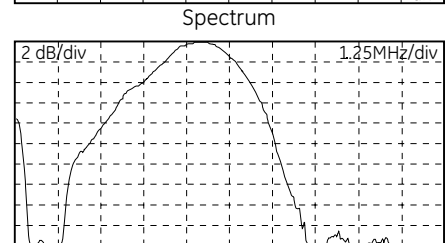
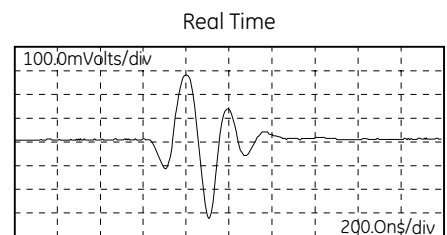
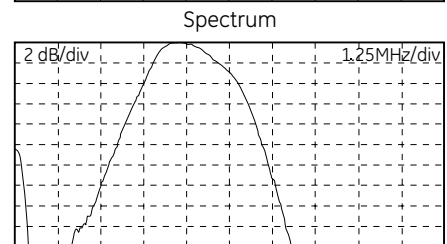
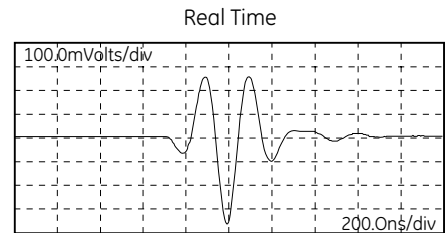
Gamma Series Features

- General purpose transducers, recommended for the majority of applications.
- Medium pulse, medium damping—best combination of gain and resolution.
- Matching electrical network ensures maximum gain and optimum waveform for general use.
- Medium bandwidth—typical 6 dB bandwidths range from 30% to 50%.
- Typical Gamma waveform exhibits three to four full ring cycles, depending on frequency, size and other parameters.

Frequency Color Coding

For easy identification of frequency, most GE Inspection Technologies transducers are color coded as follows:

Frequency (MHz)	.50	1.0	2.25	3.50	5.00	10.00
Color	Gray	Red	Yellow	Blue	Green	Black

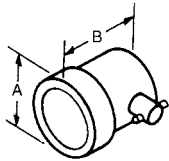


Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.

RHP and XLC Style Contacts

Standard Contact Transducers are designed for abusive "scrubbing" applications. Gamma series are for applications where sensitivity and penetration are essential. Alpha series have maximum bandwidth for axial resolution. RHP style probes feature ceramic wearplates for the best combination of acoustic matching and durability and stainless steel housings to resist corrosion. New XLC (Extended Life Contact) style probes have special, high durability wearplates for the most abusive applications. Both styles feature an improved comfort grip and color band for frequency identification. CR models have right angle mounted BNC connectors and the CS models have top-mounted BNC connectors.



Element Ø	A	B
.500	1.15	1.50
.750	1.40	1.50
1.000	1.65	1.50

Standard Contact Transducers—RHP and XLC Styles

Freq. (MHz)	Size (in.)	Product Codes				Freq. (MHz)	Size (in.)	Product Codes			
		Style	Alpha Series	Gamma Series	Accessories			Style	Alpha Series	Gamma Series	Accessories
.5	.750	RHP		250-043-CR	Cables 6' BNC C-016 6' LEMO C-018	.500	RHP		243-043-CR	Cables 6' BNC C-016 6' LEMO C-018	
		RHP		250-123-CS			RHP		243-123-CS		
	1.00	RHP		260-043-CR			RHP		243-050-CR		
		RHP		260-123-CS			XLC		243-150-CS		
1.0	.500	RHP		241-043-CR		3.5	.750	RHP			253-043-CR
		RHP		241-123-CS				RHP			253-123-CS
	.750	RHP		251-043-CR			XLC		253-050-CR		
		RHP		251-123-CS			XLC		253-150-CS		
	1.00	RHP		261-043-CR			RHP		263-043-CR		
		RHP		261-123-CS			RHP		263-123-CS		
		XLC		261-050-CR			XLC		263-050-CR		
		XLC		261-150-CS			XLC		263-150-CS		
2.25	.500	RHP	142-043-CR	242-043-CR	5.0	.500	RHP	144-043-CR	244-043-CR		
		RHP	142-123-CS	242-123-CS			RHP	144-123-CS	244-123-CS		
		XLC		242-050-CR		RHP	154-043-CR	254-043-CR			
		XLC		242-150-CS		RHP	154-123-CS	254-123-CS			
	.750	RHP	152-043-CR	252-043-CR		1.00	RHP	164-043-CR	264-043-CR		
		RHP	152-123-CS	252-123-CS			RHP	164-123-CS	264-123-CS		
		XLC		252-050-CR							
		XLC		252-150-CS							
	1.00	RHP	162-043-CR	262-043-CR		10.0	.500	RHP		246-043-CR	
		RHP	162-123-CS	262-123-CS				RHP		246-123-CS	
		XLC		262-050-CR							
		XLC		262-150-CS							

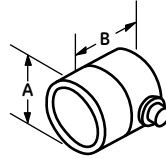
Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.



F Style Contact

F Style Contact transducers are small diameter fingertip probes with a right angle mounted Microdot connector. Gamma Series are recommended for applications where high sensitivity and penetration are essential. Alpha Series are designed for optimum damping and resolution. Benchmark Series, with Benchmark Composite® elements, are best for punching through highly attenuative materials.



Element Ø	A	B
.250	.50	.66
.375	.63	.66
.500	.75	.66

Fingertip Contact Transducers—F Style

Freq. (MHz)	Size (in.)	Product Codes				Accessories	Freq. (MHz)	Size (in.)	Product Codes			Accessories
		Benchmark Series	Alpha Series	Gamma Series					Benchmark Series	Alpha Series	Gamma Series	
2.25	.250	822-000	122-000	222-000	Cables	5.0	.250	824-000	124-000	224-000	Cables	
	.375	832-000	132-000	232-000			.375	834-000	134-000	234-000		
	.500	842-000	142-000	242-000			.500	844-000	144-000	244-000		
3.5	.250		123-000	223-000	6' BNC C-012	10.0	.250		126-000	226-000	6' BNC C-012	
	.375		133-000	233-000			.375		136-000	236-000		
	.500		143-000	243-000			.500		146-000	246-000		
					6' LEMO C-022					6' LEMO C-022		

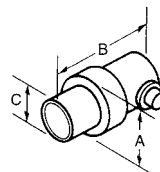
DFR Style Removable Delay Line Contact

DFR Style Removable Delay Line Fingertip Transducers are specifically designed for thickness gauging and flaw detection of thin materials. High frequency and critical damping results in a high performance transducer, which exhibits excellent resolution capability. All DFR Style Transducers have right angle mounted Microdot connectors.



Removable Delay Line—DFR Style

Freq. (MHz)	Size (in.)	Product Codes			Accessories
		Alpha Series	Delay Line 10-PK .38" Lg	Delay Line 10-PK .5" Lg	
2.25	.250	122-660	D-050	D-051	Cables
	.500	140-500		D-052	
3.5	.250	123-660	D-050	D-051	6' BNC C-012
	.500	144-660	D-050	D-052	
5.0	.250	126-660	D-050	D-051	6' LEMO C-022
	.500	140-602		D-052	
10.0	.250	127-660	D-050	D-051	Delay Line Couplant XD-740
	.125	118-660	D-050	D-051	
Mini-DFR 20.0	.125	518-650	MD-502		Spring Loaded VEE Block H-007*



Element Ø	A	B	C
.125 or .250	.51	.835	.30
.500	.875	1.375	.595
Mini-DFR			
.125	.41	.765	.19

*H-007 fits .125" and .25" units only with exception of Mini DFR.

Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.

K-PEN Replaceable Delay Line Pencil Probe

K-PEN's are high resolution pencil type probes. They are designed for applications requiring an extremely small contact area, such as tightly curved surfaces of turbine blades or remaining wall thickness measurements from a pit bottom. They can be used with most flaw detectors, precision thickness gauges, and general pulser / receiver units. Probes come with interchangeable delay tips that are tapered to a .065" and .090" contact diameter. Replacement delays are available in packs of 10. The straight model features a removable handle, which also allows it to be used as a fingertip probe. All models have Microdot connectors.



K-PEN Probes

Freq. (MHz)	Product Codes					
	Straight K-PEN	45° K-PEN	Right Angle K-PEN	.065" Tip Delay 10-PK	.090" Tip Delay 10-PK	6' BNC Cable
7.5	389-042-200	389-042-880	389-042-870	387-003-109	387-003-110	C-012
20.0	389-030-290	389-041-270	389-040-660			

ZIP Probes for Testing Composite and Other Attenuative Plastics

Zero Interface (ZIP) Probes are highly damped, low frequency delay line transducers designed for composite inspection. ZIP delay lines are acoustically matched to most composite and other plastic materials. This eliminates or minimizes the delay line interface echo, significantly improving near surface resolution. The low frequency characteristics of ZIPs make them excellent for penetrating thick or highly attenuative cross-sections. ZIPs can also be used on many smooth surfaced materials without couplant.



Zero Interface Probes (ZIP)

Freq. (MHz)	Size (in.)	Product Codes	Product Codes	
			Cables	Delay Line
0.45	1.00	560-130	6' BNC C-016	D-071
1.5	.500	560-131	6' BNC C-012	D-072
2.25	.375	560-132		D-073

Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.

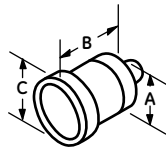
PFCR and PFCS Style Contacts

The Protective Face Combination transducers are designed to allow one basic transducer to be used with three different types of protective face: membrane, wear cap, or delay line. All models have BNC connectors, PFCR are right angle mount and PFCS are top-mount.

Style PM Kit includes a knurled ring, gland nut, wrench, 12 membranes, and a 2 oz. bottle of couplant (transducer not included).

Style PWC Kit includes a knurled ring, three wear caps, and a 2 oz. bottle of couplant (transducer not included). This option may not be usable if near surface resolution is critical.

Style PHTD Kit includes a knurled ring, either 1" or 1.5" long high temperature delay line, and a 2 oz. bottle of couplant (transducer not included).



Element Ø	A	B	C
.500	.75	1.20	.94
.750	1.00	1.20	1.19
1.000	1.25	1.20	1.44

Protective Face Combination Transducers—PFCR/PFCS Style

Freq. (MHz)	Size (in.)	Product Codes		Freq. (MHz)	Size (in.)	Product Codes	
		Gamma Series PFCR Style	Gamma Series PFCS Style			Gamma Series PFCR Style	Gamma Series PFCS Style
1.0	.500	241-240	241-260	3.50	.500	243-240	243-260
	.750	251-240	251-260		.750	253-240	253-260
	1.00	261-240	261-260		1.00	263-240	263-260
2.25	.500	242-240	242-260	5.0	.500	244-240	244-260
	.750	252-240	252-260		.750	254-240	254-260
	1.00	262-240	262-260		1.00	264-240	264-260

Accessories—PFCR/PFCS

	Product Codes	Transducer Element Ø		
		.500"	.750"	1.00"
		Spare Membranes Pkg. of 12 pcs.	PM-020	PM-021
Spare Wear caps Pkg. of 12 pcs.	PC-123	PC-122	PC-121	
Hi-Temp. Delay Line* 1.0" Long	PD-027	PD-031	PD-035	
Hi-Temp. Delay Line* 1.5" Long	PD-029	PD-033	PD-037	
6" BNC cable		C-016		
Membrane, Wear cap & Delay line Couplant		XD-740		

Protective Face Option Kits—PFCR/PFCS

Kit Style	Product Codes		
	Transducer Element Ø		
	.500"	.750"	1.00"
PM	PK-120	PK-140	PK-160
PWC	PK-220	PK-240	PK-260
PHTD (1" Delay)*	PK-320	PK-340	PK-360
PHTD (1.5" Delay)*	PK-420	PK-440	PK-460

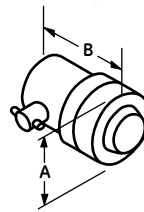
* High Temp (PHTD) delay line: maximum temperature 400°F, maximum contact time 10 seconds; cool to ambient before reuse.

Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.

PMCR and PMCS Style Contacts

Protective Membrane Contact Transducers are excellent for coupling to rough or uneven surfaces. The membrane will conform to surface irregularities providing better coupling to the test material. PMCR and PMCS Style contacts are designed for quick, easy membrane replacement and have color-coded grips identifying transducer frequency. The PMCR Style has right angle BNC connectors while the PMCS Style has straight top-mount BNC connectors.



Element Ø	A	B
.500	1.13	1.75
.750	1.41	1.75
1.000	1.63	1.75

Protective Membrane Transducers—PMCR/PMCS Style

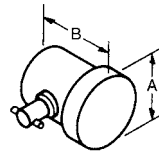
Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes		
		Gamma Series	Membranes 1 dozen	Accessories			Gamma Series	Membranes 1 dozen	Accessories
1.0	.500	241-241-PMCR 241-261-PMCS	PM-020	Cables 6' BNC C-016	3.5	.500	243-241-PMCR 243-261-PMCS	PM-020	Cables 6' BNC C-016
	.750	251-241-PMCR 251-261-PMCS	PM-021			.750	253-241-PMCR 253-261-PMCS	PM-021	
	1.00	261-241-PMCR 261-261-PMCS	PM-022			1.00	263-241-PMCR 263-261-PMCS	PM-022	
2.25	0.500	242-241-PMCR 242-261-PMCS	PM-020	6' LEMO C-018	5.00	.500	244-241-PMCR 244-261-PMCS	PM-020	6' LEMO C-018
		252-241-PMCR 252-261-PMCS	PM-021			.750	254-241-PMCR 254-261-PMCS	PM-021	
	0.750	262-241-PMCR 262-261-PMCS	PM-022	Membrane Couplant XD-740		1.00	264-241-PMCR 264-261-PMCS	PM-022	Membrane Couplant XD-740
		0.750	262-241-PMCR 262-261-PMCS			PM-022	1.00	264-241-PMCR 264-261-PMCS	

Contact Transducers

Single Element Contact Transducers are longitudinal wave transducers designed for general purpose manual ultrasonic inspection where test materials are relatively flat and smooth. Contact transducers provide high sensitivity for better penetration and are ruggedly constructed for extended service life under the roughest testing conditions.

PWCCR and PWCCS Style Contacts

Protective Wear Cap Contact Transducers have expendable wear caps which are easily replaced when worn. This means unlimited economy when the job calls for "scrubbing" which would normally destroy a standard contact probe. The PWCCR Style has right angle mounted BNC connectors while the PWCCS Style has straight top-mount BNC connectors. High temperature delay lines are also available for applications to 400°F.



Element Ø	A	B
.500	1.0	1.12
.750	1.25	1.12
1.000	1.50	1.12

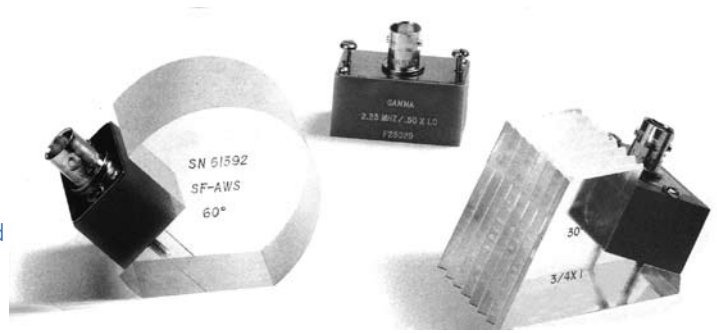
Protective Wear Cap/Delay Line Transducers—PWCCR/PWCCS

Freq. (MHz)	Size (in.)	Product Codes				Freq. (MHz)	Size (in.)	Product Codes			
		Gamma Series	Wear Cap 10 pc. Kit	HT Delay Line Kit*	Accessories			Gamma Series	Wear Cap 10 pc. Kit	HT Delay Line Kit*	Accessories
1.0	.500	241-250-PWCCR 241-270-PWCCS	PC-221	PK-050-1" PK-060-1.5"	Cables 6' BNC C-016 6' LEMO C-018	3.5	.500	243-250-PWCCR 243-270-PWCCS	PC-221	PK-050-1" PK-060-1.5"	Cables 6' BNC C-016 6' LEMO C-018
	.750	251-250-PWCCR 251-270-PWCCS	PC-241	PK-070-1" PK-080-1.5"			.750	253-250-PWCCR 253-270-PWCCS	PC-241	PK-070-1" PK-080-1.5"	
	1.00	261-250-PWCCR 261-270-PWCCS	PC-261	PK-090-1" PK-100-1.5"			1.00	263-250-PWCCR 263-270-PWCCS	PC-261	PK-090-1" PK-100-1.5"	
2.25	.500	242-250-PWCCR 242-270-PWCCS	PC-221	PK-050-1" PK-060-1.5"	Wear Cap Couplant XD-740	5.0	.500	244-250-PWCCR 244-270-PWCCS	PC-221	PK-050-1" PK-060-1.5"	Wear Cap Couplant XD-740
	.750	252-250-PWCCR 252-270-PWCCS	PC-241	PK-070-1" PK-080-1.5"			.750	254-250-PWCCR 254-270-PWCCS	PC-241	PK-070-1" PK-080-1.5"	
	1.00	262-250-PWCCR 262-270-PWCCS	PC-261	PK-090-1" PK-100-1.5"			1.00	264-250-PWCCR 264-270-PWCCS	PC-261	PK-090-1" PK-100-1.5"	

* High Temp (HT) Delay Line: maximum temperature 400°F, maximum contact time 10 seconds; cool to ambient before reuse.

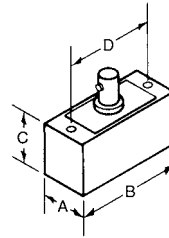
Angle Beam Transducers

Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.



SWS and AWS Style Angle Beam, Gamma Series

SWS and AWS Style Angle Beam Transducers are designed to fit on removable wedges. Refracted shear wave angles may be specified as required. The AWS series are designed to meet or exceed all of the requirements outlined in AWS Structural Welding Code D1.1. All SWS and AWS transducers utilize captive screws for fastening the probe to the wedge and have top-mount BNC connectors. High temperature wedges are for temperatures up to 400° F.



Element Size	A	B	C	D
.50 dia.	.72	1.0	.75	.81
.50 x 1.0	.725	1.51	.75	1.31
.75 x 1.0	1.00	1.5	.75	1.31
1.0	1.22	1.65	.75	1.38
.625 x .625	.725	1.25	.75	1.00
.625 x .750	.725	1.25	.75	1.00
.750 x .750	.85	1.25	.75	1.00

Standard Angle Beam—SWS and AWS Styles, Gamma Series

Freq. (MHz)	Size (in.)	Product Codes				Freq. (MHz)	Size (in.)	Product Codes			
		Gamma Series	Standard Wedge	Hi-Temp Wedge*	Accessories			Gamma Series	Standard Wedge	Hi-Temp Wedge*	Accessories
0.50	1.0 Dia	260-600	W-021 45° W-022 60° W-023 70° W-025 90°	W-081 45° W-082 60° W-083 70°	Cables 6' BNC C-016 6' LEMO C-018 Wedge Couplant XD-740	2.25 AWS Series	.63 x .63	292-603	W-104 45° W-105 60° W-106 70°		
	.5 Dia	241-600	W-009 45° W-010 60° W-011 70° W-013 90°	W-076 45° W-077 60° W-078 70°			.63 x .75	292-601	W-104 45° W-105 60° W-106 70°		
		.5 x 1	291-600	W-015 45° W-016 60° W-017 70° W-019 90°			W-070 45° W-086 60° W-071 70°	.75 x .75	292-604	W-104 45° W-105 60° W-106 70°	
	1.0	.75 x 1	291-605	W-051 45° W-052 60° W-053 70° W-054 90°				.5 Dia	243-600	W-009 45° W-010 60° W-011 70° W-013 90°	W-076 45° W-077 60° W-078 70°
1.0 Dia		261-600	W-021 45° W-022 60° W-023 70° W-025 90°	W-081 45° W-082 60° W-083 70°	.5 x 1	293-600	W-015 45° W-016 60° W-017 70° W-019 90°	W-070 45° W-086 60° W-071 70°		Cables 6' BNC C-016	
.5 Dia		242-600	W-009 45° W-010 60° W-011 70° W-013 90°	W-076 45° W-077 60° W-078 70°	6' LEMO C-018 Wedge Couplant XD-740	1.0 Dia	263-600	W-021 45° W-022 60° W-023 70° W-025 90°	W-081 45° W-082 60° W-083 70°		6' LEMO C-018
		.5 x 1	292-600	W-015 45° W-016 60° W-017 70° W-019 90°		W-070 45° W-086 60° W-071 70°	.5 Dia	244-600	W-009 45° W-010 60° W-011 70° W-013 90°	W-076 45° W-077 60° W-078 70°	
2.25	.75 x 1	292-605	W-051 45° W-052 60° W-053 70° W-054 90°			.5 x 1	294-600	W-015 45° W-016 60° W-017 70° W-019 90°	W-070 45° W-086 60° W-071 70°		
	1.0 Dia	262-600	W-021 45° W-022 60° W-023 70° W-025 90°	W-081 45° W-082 60° W-083 70°		.75 x 1	294-605	W-051 45° W-052 60° W-053 70° W-054 90°			
		.5 Dia	244-600	W-009 45° W-010 60° W-011 70° W-013 90°	W-076 45° W-077 60° W-078 70°	1.0 Dia	264-600	W-021 45° W-022 60° W-023 70° W-025 90°	W-081 45° W-082 60° W-083 70°		
	.5 x 1					294-600	W-015 45° W-016 60° W-017 70° W-019 90°	W-070 45° W-086 60° W-071 70°			

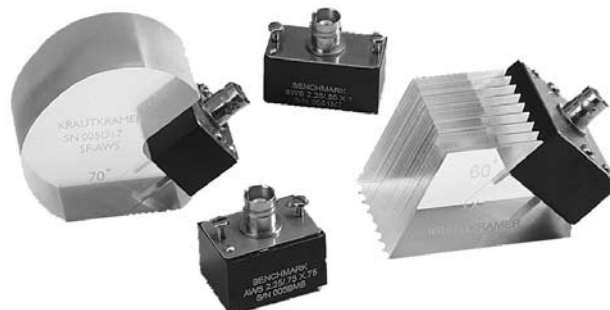
* Duty Cycle: at 400°F, maximum contact time is 10 seconds; cool to ambient before reuse. Note: Standard wedge angles are specified for carbon steel.

Angle Beam Transducers

Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.

SWS and AWS Style Angle Beam, Benchmark Series

Benchmark series SWS and AWS Style Angle Beam Transducers feature proprietary BENCHMARK COMPOSITE® active elements. They are available in the same range of sizes and fit the same removable wedges as the Gamma series. Benchmark series offer a superior combination of sensitivity, resolution, and penetration for punching through highly attenuative materials. They are especially beneficial when signal to noise ratio is a problem, for example coarse grain materials and fiber reinforced composites. The AWS models meet all requirements of Structural Welding Code D1.1.



Standard Angle Beam—SWS and AWS Styles, Benchmark Series

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes									
		Benchmark Series	Standard Wedge	Accessories			Benchmark Series	Standard Wedge	Accessories							
1.0	.5 Dia	841-600	W-009 45° W-010 60° W-011 70° W-013 90°	Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740	3.5	.5 Dia	843-600	W-009 45° W-010 60° W-011 70° W-013 90°	Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740							
	.5 x 1	891-600	W-015 45° W-016 60° W-017 70° W-019 90°			.5 x 1	893-600	W-015 45° W-016 60° W-017 70° W-019 90°								
	.75 x 1	891-605	W-051 45° W-052 60° W-053 70° W-054 90°			.75 x 1	893-605	W-051 45° W-052 60° W-053 70° W-054 90°								
	1.0 Dia	861-600	W-021 45° W-022 60° W-023 70° W-025 90°			1.0 Dia	863-600	W-021 45° W-022 60° W-023 70° W-025 90°								
2.25	.5 Dia	842-600	W-009 45° W-010 60° W-011 70° W-013 90°		Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740	5.0	.5 Dia	844-600		W-009 45° W-010 60° W-011 70° W-013 90°	Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740					
	.5 x 1	892-600	W-015 45° W-016 60° W-017 70° W-019 90°				.5 x 1	894-600		W-015 45° W-016 60° W-017 70° W-019 90°						
	.75 x 1	892-605	W-051 45° W-052 60° W-053 70° W-054 90°				.75 x 1	894-605		W-051 45° W-052 60° W-053 70° W-054 90°						
	1.0 Dia	862-600	W-021 45° W-022 60° W-023 70° W-025 90°				1.0 Dia	864-600		W-021 45° W-022 60° W-023 70° W-025 90°						
2.25 AWS Series	.63 x .63	892-603	W-104 45° W-105 60° W-106 70°			Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740	5.0	.63 x .63		892-603		W-104 45° W-105 60° W-106 70°	Cables 6'BNC C-016 6' LEMO C-018 Wedge Couplant XD-740			
	.63 x .75	892-601	W-104 45° W-105 60° W-106 70°											.63 x .75	892-601	W-104 45° W-105 60° W-106 70°
	.75 x .75	892-604	W-104 45° W-105 60° W-106 70°													

Note: Standard wedge angles are specified for carbon steel.

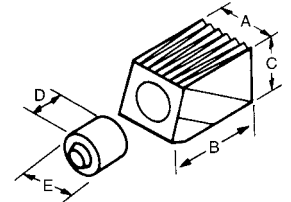
Angle Beam Transducers

Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.



MSW-QC Style Angle Beam, Gamma Series

MSW-QC Style are miniature angle beam transducers that screw directly into our "Quick Change" Lucite wedges. All MSW-QC transducers have top-mount Microdot connectors. Gamma series utilize conventional monolithic ceramic elements and are recommended for regular inspection of non-attenuative materials. 10.0 MHz MSW-QC transducers are available only in Gamma series.



Wedge Angle	Replaceable Wedge .25"					Wedge Angle	Replaceable Wedge .375"					Wedge Angle	Replaceable Wedge .50"				
	A	B	C	D	E		A	B	C	D	E		A	B	C	D	E
45°	.45	.75	.37	.41	.47	45°	.55	.89	.47	.56	.50	45°	.70	1.05	.55	.70	.62
60°	.45	.84	.44	.41	.47	60°	.55	1.04	.55	.56	.50	60°	.70	1.24	.64	.70	.62
70°	.45	1.00	.50	.41	.47	70°	.55	1.19	.58	.56	.50	70°	.70	1.41	.68	.70	.62
90°	.45	.95	.50	.41	.47	90°	.55	1.15	.61	.56	.50	90°	.70	1.39	.73	.70	.62

Miniature Angle Beam Transducers—MSW-QC Style

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes		
		Gamma Series	Standard Wedge	Accessories			Gamma Series	Standard Wedge	Accessories
1.0	.500	241-590	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	Cables 6' BNC C-012 6' LEMO C-022 Wedge Couplant XD-740	3.5 cont.	.500	243-590	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
	.375	231-590	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°			.250	224-590	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°	
1.5	.500	241-595	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	Cables 6' BNC C-012 6' LEMO C-022 Wedge Couplant XD-740	5.0	.375	234-590	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	
	.250	222-590	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°			.500	244-590	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
2.25	.375	232-590	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	Cables 6' BNC C-012 6' LEMO C-022 Wedge Couplant XD-740	10	.250	226-590	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°	
	.500	242-590	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°			.375	236-590	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	
3.5	.250	223-590	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°	Cables 6' BNC C-012 6' LEMO C-022 Wedge Couplant XD-740	10	.500	246-590	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
	.375	233-590	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°						

Note: Standard wedge angles are specified for carbon steel.

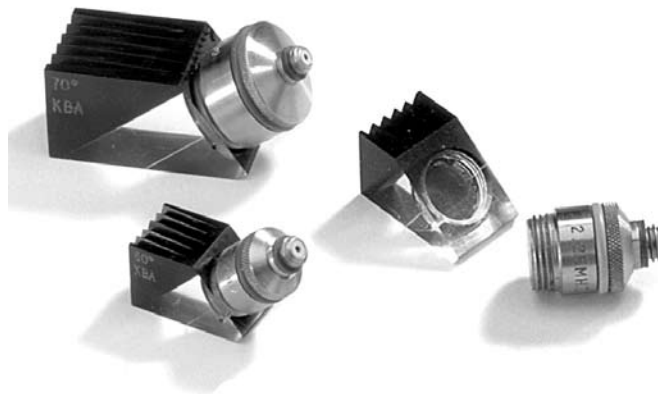
Angle Beam Transducers

Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.

MSW-QC Style Angle Beam, Benchmark and Alpha Series

Benchmark and Alpha series MSW-QC Miniature Angle Beam Transducers are available in the same range of sizes and fit the same standard "Quick Change" wedges as the Gamma series. Their one-piece stainless steel case insures long service life. All MSW-QC probes are color coded by frequency and have top mounted Microdot connectors.

Benchmark series probes feature proprietary BENCHMARK COMPOSITE® active elements. They offer a superior combination of sensitivity, resolution, and penetration for punching through highly attenuative materials. They are especially beneficial when signal to noise ratio is a problem, for example coarse grain materials and fiber reinforced composites. Alpha series MSW-QC probes are made with highly damped monolithic ceramic elements and are recommended when very short pulse lengths are required for axial resolution.



Miniature Angle Beam Transducers–MSW-QC Style

Freq. (MHz)	Size (in.)	Product Codes			Accessories	Freq. (MHz)	Size (in.)	Product Codes			Accessories
		Benchmark Series	Alpha Series	Standard Wedge				Benchmark Series	Alpha Series	Standard Wedge	
1.0	.500	241-591	141-591	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°		3.5 cont.	.500	243-591	143-591	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
	.375	231-596	131-596	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°			.250	224-591	124-591	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°	
1.5	.500	241-596	141-596	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	Cables 6' BNC C-016 6' LEMO C-022	5.0	.375	234-591	134-591	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	Cables 6' BNC C-012 6' LEMO C-022
	.250	222-591	122-591	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°			.500	244-591	144-591	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
2.25	.375	232-591	132-591	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	Wedge Couplant XD-740	7.5	.250	225-591	125-591	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°	Wedge Couplant XD-740
	.500	242-591	142-591	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°			.375	235-591	135-591	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°	
3.5	.250	223-591	123-591	W-200 30° W-201 45° W-202 60° W-203 70° W-204 90°			.500	245-591	145-591	W-210 30° W-211 45° W-212 60° W-213 70° W-214 90°	
	.375	233-591	133-591	W-220 30° W-221 45° W-222 60° W-223 70° W-224 90°							

Note: Standard wedge angles are specified for carbon steel.

Angle Beam Transducers

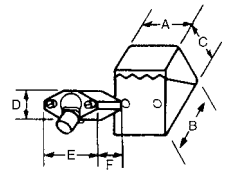
Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.

MSWS Style Angle Beam

MSWS Angle Beam Transducers are designed to fit removable lucite wedges. Refracted shear wave angles may be specified as required. All MSWS transducers have captive screws for fastening the probe to the wedge and are fitted with Microdot connectors. High temperature wedges are for use at temperatures up to 400°F.



Wedge Angle	Replaceable Wedge .25"						Wedge Angle	Replaceable Wedge .50"					
	A	B	C	D	E	F		A	B	C	D	E	F
45°	.47	.60	.30	.31	.48	.34	45°	.73	.96	.42	.56	.73	.50
60°	.47	.65	.35	.31	.48	.34	60°	.73	1.08	.50	.56	.73	.50
70°	.47	.70	.38	.31	.48	.34	70°	.73	1.16	.54	.56	.73	.50
90°	.47	.90	.38	.31	.48	.34	90°	.73	1.56	.58	.56	.73	.50



Miniature Angle Beam Transducers—MSWS Style

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes		
		Gamma Series	Standard Wedge	Accessories			Gamma Series	Standard Wedge	Accessories
1.0	.500	241-580	W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°		5.0	.250	224-580	W-028 45° W-030 60° W-032 70° W-034 80° W-036 90°	
	.250		222-580					W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°	
2.25	.500	242-580	W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°	6' LEMO C-022	10.0	.250	226-580	W-028 45° W-030 60° W-032 70° W-034 80° W-036 90°	6' LEMO C-022
	.250		223-580					W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°	
3.5	.500	243-580	W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°					W-040 45° W-042 60° W-044 70° W-046 80° W-048 90°	

Note: Standard wedge angles are specified for carbon steel.

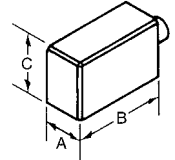
Angle Beam Transducers

Angle Beam Transducers are single or dual element transducers designed for weld inspection or flaw detection where flaws have an angular orientation with respect to the material surface. Weld inspections are performed using shear waves refracted from a longitudinal wave by means of a lucite wedge. Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.



ABFP Style Angle Beam

ABFP Style, fingertip, fixed angle, shear wave transducers are available in standard angles for inspecting steel and aluminum. Custom angles for other materials may be special ordered. Their small size makes them ideal for weld inspection in restricted access areas. All ABFP Transducers are equipped with right angle Microdot connectors. Top mounted connectors may be special ordered.



Fingertip Potted Angle Beam Transducers—ABFP Style

Freq. (MHz)	Size (in.)	Product Codes				Accessories
		45°	60°	70°	90°	
2.25	.187 x .187	292-640	292-641	292-642	292-643	Cables 6' BNC C-012
	.250 x .250	292-620	292-621	292-622	292-623	
5.0	.187 x .187	294-640	294-641	294-642	294-643	6' LEMO C-022
	.250 x .250	294-620	294-621	294-622	294-623	
10.0	.187 x .187	296-640	296-641	296-642	296-643	6' LEMO C-022
	.250 x .250	296-620	296-621	296-622	296-623	

Element Dimensions	A	B	C
.187 x .187	.32	.70	.57
.25 x .25	.50	1.0	.55

Note: Part numbers above are for carbon steel. For aluminum, specify frequency, size, and refracted angle in aluminum.

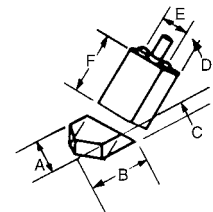
SMSWS Style Angle Beam

SMSWS Angle Beam Transducers are subminiature transducers designed to fit removable lucite wedges. Refracted shear wave angles may be specified as required. All SMSWS transducers have standard screws for fastening the probe to the wedge and have top-mount miniature Microdot connectors.



Subminiature Angle Beam—SMSWS Style

Freq. (MHz)	Size (in.)	Product Codes		Accessories
		Gamma Series	Standard Wedge	
2.25	.125	212-585	W-120 45°	Cables 6' BNC C-047
			W-121 60°	
			W-122 70°	
			W-123 90°	
5.0	.125	214-585	W-120 45°	Wedge Couplant XD-740
			W-121 60°	
			W-122 70°	
			W-123 90°	
10.0	.125	216-585	W-120 45°	
			W-121 60°	
			W-122 70°	
			W-123 90°	

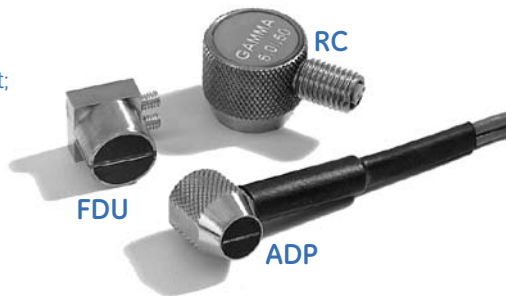


Angle	Wedge Dimensions					
	A	B	C	D	E	F
45°	.31	.25	.21	.19	.23	.28
60°	.31	.42	.21	.19	.23	.28
70°	.31	.42	.21	.19	.23	.28
90°	.31	.72	.34	.19	.23	.28

Note: Standard wedge angles are specified for carbon steel.

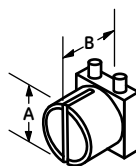
Dual Element Transducers

Dual Element Contact Transducers are longitudinal wave transducers with a split element; one half functions as a transmitter while the other functions as a receiver. Each half-element is angled slightly toward the other forming the “roof” angle. This “roof” angle effectively focuses the sound beam. These transducers are excellent for thin range flow detection and thickness gauging. Because they have a discrete transmitter and receiver, better signal to noise ratios are achieved compared to single element transducers.



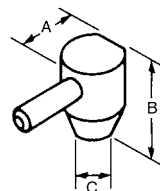
ADP, RC, and FDU Style Dual Element

Dual Element Transducers are for general flow detection and thickness gauging on materials with irregular or pitted surfaces. The ADP and RC models are color coded for quick frequency identification. The low profile ADP model has a potted BNC cable. The RC Dual models have a 4-pin LEMO connector which allows for quick and easy cable replacement. All FDU models have mini Microdot threaded connectors. All models may be contoured to fit ID and OD curvatures.



FDU

Element Ø	A	B
.250	.38	.50
.375	.50	.50



ADP/RC

Element Ø	A	B	C
.250	.50	.64	.36
.375	.63	.64	.47
.500	.75	.68	.60

Fingertip Dual Element Transducers—ADP/RC/FDU Styles

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes		
		ADP Dual	RC Dual*	FDU Dual			ADP Dual	RC Dual*	FDU Dual†
2.25	.250	222-700	222-681	222-680	5.0	.250	224-700	224-681	224-680
	.375	232-700	232-681	232-680		.375	234-700	234-681	234-680
	.500	242-700	242-681			.500	244-700	244-681	
3.5	.250	223-700	223-681	223-680	7.5	.375	135-700		
	.375	233-700	233-681	233-680					
	.500	243-700	243-681						

* Standard BNC Cable (C-088) or Heavy Duty BNC Cable (C-089) sold separately

† Standard BNC Cable (C-014) sold separately

HT400A and KBA560V Style High Temperature Dual Element Transducers

HT400A and KBA560V models are available with replaceable BNC cables and can be used for both flow detection and thickness gauging applications. Model HT400A can be used intermittently on materials up to 1000° F. Model KBA560V can be used intermittently on materials up to 750°F.



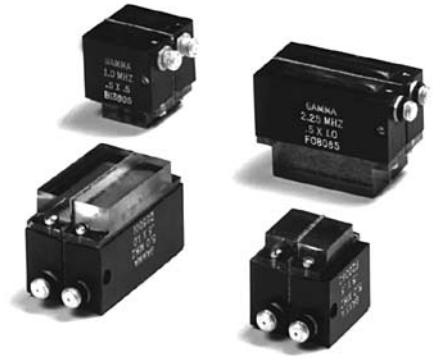
High Temperature Transducers*

Freq. (MHz)	Size (in.)	Product Codes		
		Model	Gamma Series	Accessories
5.0	.250	HT400A	224-760	Cables 6' BNC Standard: C-102 Armored: C-101
	.375	KBA560V	544-230	Cable 6' BNC C-067

*Duty Cycle: KBA560V—750°F, maximum contact time is 10 seconds; HT400A—1000°F, maximum contact time is 5 seconds; cool to ambient before reuse.

Dual Element Transducers

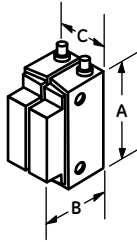
Dual Element Contact Transducers are longitudinal wave transducers with a split element; one half functions as a transmitter while the other functions as a receiver. Each half-element is angled slightly toward the other forming the “roof” angle. This “roof” angle effectively focuses the sound beam. These transducers are excellent for thin range flaw detection and thickness gauging. Because they have a discrete transmitter and receiver, better signal to noise ratios are achieved compared to single element transducers.



DU Style Dual Element

DU Dual Element Transducers with replaceable delays are excellent general-purpose probes for applications with flat or curved surfaces. High temperature delays are also available for inspections at temperatures up to 400°F. All DU transducers have standard Microdot connectors for easy replacement.

Element Size	A	B	C
.500 x .500	.75	.85	.78
.500 x 1.00	1.38	.92	.78



Standard Dual Element Transducers–DU Style

Freq. (MHz)	Size (in.)	Product Codes			Accessories
		Gamma Series	Delay Set	HT Delay Set*	
1.00	.5 x .5	291-750	DS-620	DS-720	Cables 6' BNC C-024
	.5 x 1	291-740	DS-640	DS-740	
2.25	.5 x .5	292-750	DS-620	DS-720	Coulplant XD 740
	.5 x 1	292-740	DS-640	DS-740	
5.0	.5 x .5	294-750	DS-620	DS-720	Coulplant XD 740
	.5 x 1	294-740	DS-660	DS-760	

*Duty Cycle: at 750°F, maximum contact time is 10 seconds; cool to ambient before reuse.

DU-F Style Dual Element, Benchmark Series

Benchmark series DU-F Style Dual Element Transducers feature proprietary BENCHMARK COMPOSITE® active elements. Benchmark series offer a superior combination of sensitivity, resolution, and penetration for punching through highly attenuative materials. They are especially beneficial when signal to noise ratio is a problem, for example coarse grain materials and fiber reinforced composites. Close tolerance, integral delays assure consistent performance.



Standard Dual Element Transducers–DU-F Style

Freq. (MHz)	Size (in.)	Product Codes	
		Benchmark Series	Accessories
2.25	.5 x .5	292-751	Cable 6' BNC C-024
	.5 x 1	292-741	
5.0	.5 x .5	294-751	Cable 6' BNC C-024
	.5 x 1	294-741	

FAST™ Probes for Rapid Manual Weld Inspection

Benchmark series FAST™ Probes are dual, high angle, longitudinal wave probes with proprietary BENCHMARK COMPOSITE® elements. They are primarily for inspection using the FAST™ method developed by SPIN (LLC). FAST™ high speed, manual weld scanning can reduce inspection costs for fabrication shops, field welding organizations, or any industry that performs inservice NDE of components. For a detailed Product Bulletin, contact our sales department.

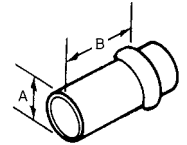


FAST™ Probes

Model	Freq. (MHz)	Useful Depth	Product Codes
FAST1	5.0	0" to 0.6"	389-016-880
FAST2	5.0	0" to 1.5"	389-016-900
FAST3	5.0	0.5" to 4"	389-016-780

Immersion Transducers

Single Element Immersion Transducers are longitudinal wave transducers typically used in manual, semi-automatic, and automatic scanning systems. Scanning parts with irregular or complex geometries is possible because of the conforming "water path" layer between the probe and the inspected material. Superior near-surface resolution can be achieved when compared to contact transducers. Angle beam inspection is possible by simply angling the probe or search tube in relation to the part surface. Spherical (point) or cylindrical (line) focusing can also be accomplished using acoustically matched lenses. Focal length must be specified.



ISS and IS Style Element

ISS and IS Immersion Transducers are for general ultrasonic immersion inspections requiring element diameters between .25" and 1.0". Available in Alpha, Gamma, and BENCHMARK COMPOSITE® series, they can be focused for critical applications to improve near-surface resolution or sensitivity to small discontinuities. All ISS and IS Transducers have waterproof UHF connectors. BNC connectors may be special ordered. Gamma Series are recommended for applications where high sensitivity and penetration are required. Alpha Series (where available) are designed for optimum damping and resolution. New Benchmark Series (where available), with BENCHMARK COMPOSITE® elements, offer a superior combination of sensitivity, resolution, and penetration for punching through highly attenuative materials.

Element Ø	A	B
.250	.63	1.55
.375	.63	1.55
.500	.63	1.55
.750	1.0	1.77
1.00	1.25	1.82

Immersion Transducers—ISS and IS Styles

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes				
		*Focus	Alpha Series	Gamma Series			Benchmark Series	*Focus	Alpha Series	Gamma Series	Benchmark Series
1.0	.250	N		221-300	5.0	.250	S C N	124-280 124-290 124-300	224-280 224-290 224-300	824-300	
	.375	N		231-300		.375	S C N	134-280 134-290 134-300	234-280 234-290 234-300	834-280 834-290 834-300	
	.500	S C N		241-280 241-290 241-300		.500	S C N	144-280 144-290 144-300	244-280 244-290 244-300	844-280 844-290 844-300	
	.750	S C N		251-360 251-370 251-380		.750	S C N	154-360 154-370 154-380	254-360 254-370 254-380	854-360 854-370 854-380	
	1.00	S C N		261-360 261-370 261-380		861-360 861-370 861-380	1.00	S C N	164-360 164-370 164-380	264-360 264-370 264-380	864-360 864-370 864-380
2.25	.250	S C N	122-280 122-290 122-300	222-280 222-290 222-300	10.0	.250	S C N	126-280 126-290 126-300	226-280 226-290 226-300	822-300	
	.375	S C N	132-280 132-290 132-300	232-280 232-290 232-300		.375	S C N	136-280 136-290 136-300	236-280 236-290 236-300	832-300	
	.500	S C N	142-280 142-290 142-300	242-280 242-290 242-300		.500	S C N	146-280 146-290 146-300	246-280 246-290 246-300	842-280 842-290 842-300	
	.750	S C N	152-360 152-370 152-380	252-360 252-370 252-380		.750	S C N	156-360 156-370 156-380	256-360 256-370 256-380	852-360 852-370 852-380	
	1.00	S C N	162-360 162-370 162-380	262-360 262-370 262-380		862-360 862-370 862-380	.250	S C N	127-280 127-290 127-300		
3.5	.250	S C N	123-280 123-290 123-300	223-280 223-290 223-300	15.0	.250	1.5"S	127-302 (TTC-100)			
	.375	S C N	133-280 133-290 133-300	233-280 233-290 233-300		833-280 833-290 833-300	.375	S C N	137-280 137-290 137-300		
	.500	S C N	143-280 143-290 143-300	243-280 243-290 243-300		843-280 843-290 843-300	.500	S C N	147-280 147-290 147-300		
	.750	S C N	153-360 153-370 153-380	253-360 253-370 253-380		853-360 853-370 853-380	25.0	.250	S C N	129-280 129-290 129-300	
	1.00	S C N	163-360 163-370 163-380	263-360 263-370 263-380		863-360 863-370 863-380					

Note: Waterproof cables are in Accessories Section.

* Focus: S = Spherical; C = Cylindrical, N = Non-focus. Focal length must be specified. For available focal lengths, see table at the end of the Immersion Transducers section.

Immersion Transducers

Single Element Immersion Transducers are longitudinal wave transducers typically used in manual, semi-automatic, and automatic scanning systems. Scanning parts with irregular or complex geometries is possible because of the conforming "water path" layer between the probe and the inspected material. Superior near-surface resolution can be achieved when compared to contact transducers. Angle beam inspection is possible by simply angling the probe or search tube in relation to the part surface. Spherical (point) or cylindrical (line) focusing can also be accomplished using acoustically matched lenses. Focal length must be specified.

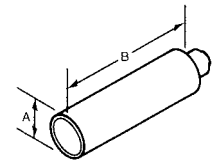
IPS Style Immersion

IPS Immersion Transducers with small diameter cases are designed for immersion applications where transducer size limitations exist. The Alpha series are designed for maximum bandwidth and resolution capabilities. The Gamma series are for increased sensitivity and penetration. All IPS Transducers have Microdot connectors. For best results the connector should be sealed with a nonwater soluble grease.



Immersion Transducers-IPS Style

Freq. (MHz)	Size (in.)	Product Codes			Freq. (MHz)	Size (in.)	Product Codes				
		*Focus	Alpha Series	Gamma Series			Accessories	*Focus	Alpha Series	Gamma Series	Accessories
1.0	.250	N		221-340	10	.250	S	126-320	226-320	Cable 6' BNC C-012	
			C	126-330			226-330				
			N	126-340			226-340				
2.25	.250	S	122-320	222-320	15	.125	S	117-320		Cable 6' BNC C-012	
			C	122-330			222-330	C	117-330		
			N	122-340			222-340	N	117-340		
3.5	.250	S	123-320	223-320	15	.250	S	127-320		Cable 6' BNC C-012	
			C	123-330			223-330	C	127-330		
			N	123-340			223-340	N	127-340		
5.0	.250	S	124-320	224-320	22	.125	S	118-320		Cable 6' BNC C-012	
			C	124-330			224-330	C	118-330		
			N	124-340			224-340	N	118-340		
					25	.250	S	129-320		Cable 6' BNC C-012	
			C					C	129-330		
			N					N	129-340		



Element Ø	A	B
.125	.38	1.45
.250	.38	1.45

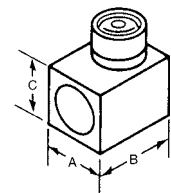
* Focus: S = Spherical; C = Cylindrical; N = Non-focus. Focal length must be specified. For available focal lengths, see table at the end of the Immersion Transducers section.

IR Style Immersion

IR Immersion Transducers are used where .25" to .5" diameter probes are desired, but where space constraints exist that prohibit the use of standard ISS Style transducers. IR Style transducers have a right angle mounted UHF connector and will fit into a 1.5 cubic inch area. The IR is available in both the Alpha and Gamma series and can be focused for critical applications to improve near-surface resolution or sensitivity to small discontinuities.

Immersion Transducers-IR Style

Freq. (MHz)	Size (in.)	Product Codes		Freq. (MHz)	Size (in.)	Product Codes					
		*Focus	Alpha Series			Gamma Series	*Focus	Alpha Series	Gamma Series		
1.0	.250	N		221-420	3.5	.250	N	123-420	223-420		
			C					C	123-410	223-410	
			S					S	123-400	223-400	
	.375	N		231-420		.375	.375	N	133-420	233-420	
			C						C	133-410	233-410
			S						S	133-400	233-400
.500	N		241-420	.500	.500	N	143-420	243-420			
		C	241-410			C	143-410	243-410			
		S	241-400			S	143-400	243-400			
2.25	.250	N	122-420	222-420	5.0	.250	N	124-420	224-420		
			C	122-410			222-410	C	124-410	224-410	
			S	122-400			222-400	S	124-400	224-400	
	.375	N	132-420	232-420		.375	.375	N	134-420	234-420	
			C	132-410				232-410	C	134-410	234-410
			S	132-400				232-400	S	134-400	234-400
.500	N	142-420	242-420	.500	.500	N	144-420	244-420			
		C	142-410			242-410	C	144-410	244-410		
		S	142-400			242-400	S	144-400	244-400		



Element Ø	A	B	C
.250, .375, .500	.75	.94	.75

* Focus: S = Spherical; C = Cylindrical; N = Non-focus. Focal length must be specified. For available focal lengths, see table at the end of the Immersion Transducers section. Note: Waterproof cables are available in Accessories Section.

Immersion Transducers

Single Element Immersion Transducers are longitudinal wave transducers typically used in manual, semi-automatic, and automatic scanning systems. Scanning parts with irregular or complex geometries is possible because of the conforming "water path" layer between the probe and the inspected material. Superior near-surface resolution can be achieved when compared to contact transducers. Angle beam inspection is possible by simply angling the probe or search tube in relation to the part surface. Spherical (point) or cylindrical (line) focusing can also be accomplished using acoustically matched lenses. Focal length must be specified.

Velocity System Immersion Transducers

These transducers are specifically designed for use with through transmission GE Inspection Technologies Velocity Systems. These transducers are available in either the ISS Style or IR Style housing and are provided with standard waterproof UHF connectors.



Velocity System Immersion Transducers ISS/IR Styles

Freq. (MHz)	Product Codes	
	Style ISS	Style IR
5.0	144-301	144-421

Immersion Transducer Focal Lengths

$$N = \frac{(\text{Dia.})^2 \times (\text{Freq.})}{4 \times \text{Velocity}}$$

Dia. = Crystal diameter
 Freq. = Frequency of probe
 Velocity = Velocity of material

Freq. (MHz)		Element Ø					
		1.0	.75	.50	.375	.25	.125
1.00	N	4.3	2.4	1.1			
	Min	2.0	1.5	1.0			
	Max	3.0	2.0	1.0			
2.25	N	9.6	5.4	2.4	1.4	.6	
	Min	2.0	1.5	1.0	.8	.5	
	Max	6.0	4.0	2.0	.8	.5	
3.5	N	15.0	8.4	3.7	2.1	.9	
	Min	2.0	1.5	1.0	.8	.5	
	Max	8.0	6.0	2.5	.5	.5	
5.0	N	21.0	12.0	5.4	3.0	1.3	.3
	Min	2.0	1.5	1.0	.8	.5	.3
	Max	8.0	8.0	4.0	2.0	.8	.3
10.0	N		24.0	10.7	6.0	2.7	.7
	Min		1.5	1.0	.8	.5	.3
	Max		8.0	6.0	4.5	1.5	.3
15.0	N			16.0	9.0	4.0	1.0
	Min			1.0	.8	.5	.3
	Max			6.0	6.0	2.0	.5
25.0	N					6.7	1.7
	Min					.5	.3
	Max					2.0	1.0

This table lists the near field lengths and minimum and maximum practical focal lengths in water expressed in inches. To find the approximate near field length in steel, divide all N values by 4.

N = Near field length.
 Min = Minimum practical focal length.
 Max = Maximum practical focal length.

Single Element Transducers

For use with precision thickness gauges

Precision thickness gauging transducers are single element, delay line and contact transducers designed primarily for use with GE Inspection Technologies precision thickness gauges. They may also be used with most standard flaw detection instruments. A wide variety is available to satisfy virtually any inspection requirement on most metals and nonmetals with relatively smooth, parallel front and back surfaces. Depending on probe selection and material conditions, most precision gauges can measure from 0.005 to 15.00 inches in steel and plastic.



CL3 and CL3 DL Compatible Transducer Specifications

Model	Transducer Type	Contact Ø	Nominal Frequency	Measuring Range (steel unless noted)	Product Code
Alpha 2DFR	Delay, Standard Housing	7.6 mm (0.30")	15 MHz	0.25 mm to 25 mm (0.010" to 1.0")	113-527-660
Alpha 2A, Mini DFR	Delay, Small Housing	4.8 mm (0.19")	20 MHz	0.25 mm to 5 mm (0.010" to 0.200")	113-518-655
CA211A	Contact, Standard	19.1 mm (0.75")	5 MHz	2 mm to 381 mm (0.080" to 15.0")	113-544-000
CA215	Contact, Standard	12.7 mm (0.50")	5 MHz	2 mm to 51 mm (0.080" to 2.0")	113-124-011
Alpha 2F	Contact, Fingertip	9.7 mm (0.38")	10 MHz	2 mm to 254 mm (0.80" to 10.0")	113-526-000
Alpha DFR-P	Plastics, Delay Line	7.6 mm (0.30")	22 MHz	0.13 mm to 3.8 mm (0.005" to .150") Plastics only	113-118-661

For instrument and transducer connection use a 022-505-604 cable (Microdot to right angle Lemo connector), or a 022-504-925 (Microdot to straight Lemo Connector)

CL 300 and CL 304 Compatible Transducer Specifications

Model	Transducer Type	Contact Ø	Nominal Frequency	Measuring Range (steel unless noted)	Product Code
Alpha 2DFR	Delay, Standard Housing	7.6 mm (0.30")	15 MHz	0.25 mm to 25 mm (0.007" to 1.0")	113-527-660
Alpha 2A, Mini DFR	Delay, Small Housing	4.8 mm (0.19")	20 MHz	0.13 mm to 5 mm (0.005" to 0.200")	113-518-655
CA211A	Contact, Standard	19.1 mm (0.75")	5 MHz	1.5 mm to 381 mm (0.060" to 15.0")	113-544-000
Alpha 2F	Contact, Fingertip	9.7 mm (0.38")	10 MHz	1.5 mm to 51 mm (0.060" to 10.0")	113-526-000
KBA125	Plastics, Contact	4.6 mm (0.18")	20 MHz	0.25 mm minimum (0.010" minimum) Plastics only	113-518-006
K-Pen CL304 Only	Pencil Style Transducer	1.7 mm or 2.3 mm (.065" or .090")	20 MHz	Dependent on application and required CL 304 special menu setting	389-030-290

Dual Element D-Meter Probes

Compatible with the D-Meter line of ultrasonic thickness gauges

Standard probes are readily available to satisfy a wide range of remaining wall thickness applications including: high-temperature, through-coating, erosion/corrosion, thin materials, areas of limited access, tough-to-penetrate materials (coarse-grained/nonmetals), external pitting, wear resistance, boiler tubing, small diameter piping and tubing, and general-purpose applications.

DIALOG Intelligent Probes are automatically recognized by the DM4 Family of instruments for quick setup, best performance, and test documentation. The model FH2E-D-REM contains a built-in membrane switch with no additional cable lines to send and store readings in the DM4 DL's onboard data logger at a press of the index finger of the probe hand.



Label	Model	Designation	Probe Cable	Contact Ø	Measuring Range in Steel	Temp Range	Product Code
A	FH2E	Fingertip	Potted	.380"	.030" - 2.0"	< 130° F	113-552-005
B	FH2E-D**	Fingertip	Potted	.380"	.030" - 2.0"	< 130° F	113-552-007
C	FH2E-D-REM**	Remote Send	Potted	.380"	.030" - 2.0"	< 130° F	113-552-009
D	KB550FH*	Fingertip	Potted	.375"	.060" - 2.0"	< 130° F	113-550-001
E	DA312	Thin Materials	KBA532	.300"	.025" - 1.0"	< 130° F	083-056-906
F	KBA525	5mm Footprint	Potted	.200"	.025" - 2.0"	< 130° F	113-516-002
G	DA312B16*	3mm Footprint	Potted	.120"	.025" - 5.0"	< 130° F	083-066-934
H	KBA560	General Purpose	KBA531	.625"	.060" - 8.0"	< 450° F	113-544-210
I	KBA560-D**	General Purpose	KBA531	.625"	.060" - 8.0"	< 250° F	113-544-213
J	DA301	General Purpose	KBA533	.475"	.050" - 8.0"	< 140° F	083-056-904
K	DA303	Penetration	KBA533	.635"	.200" min.	< 140° F	083-506-905
L	DP-104	High Penetration	KBA532	1.25"	.200" min.	< 140° F	113-561-104
M	FH2E-WR	Wear Resistant	Potted	.550"	.030" - 2.0"	< 130° F	113-552-006
N	KBA560-WR	Wear Resistant	KBA531	.700"	.060" - 8.0"	< 450° F	113-544-212
O	FH2E-D-WR**	Wear Resistant	Potted	.550"	.030" - 2.0"	< 130° F	113-552-008
P	HT400* HT400A†	High Temperature	KBA535 KBA536	.500"	.040" - 10.0"	< 1000° F	113-524-760 113-224-760
Q	KB550BTH*	Studded Boiler Tube	C-BTH	.375"	.060" - 2.0"	< 130° F	113-550-003

* 2 - PT Calibration required on DM4E, DM4, DM4 DL

** DIALOG INTELLIGENT Probes when used with DM4E, DM4, DM4 DL and DMS 2

† DMS and DMS 2 ONLY

Specifications are subject to change without notice.

Applications and Special Probes Lab

The GE Inspection Technologies Applications Lab has a long history of providing a broad spectrum of services to our customers. Experienced Application Engineers and Specialists will work closely with the customer to provide technical assistance and custom designed products to solve challenging ultrasonic testing applications.

Applications Support Group

This group specializes in the evaluation of customer supplied samples to provide practical recommendations and solutions for ultrasonic testing problems. Typical applications include thickness and velocity measurements, flaw detection and evaluation and material characterization. This group also provides applications support for small, integrated ultrasonic testing systems. The Applications Lab is fully equipped with a large selection of ultrasonic instrumentation to aid in providing total testing solutions.

Special Probes Group

The Special Probes Group designs and manufactures custom transducers for specific ultrasonic testing applications. This may include the modification of transducer case design, element size and shape or the connector type and location. The customer may require transducers with custom electrical and acoustic performance including non-standard frequencies, resolution, sensitivity, bandwidth or focusing. Special test fixtures, custom wedges, delay lines and cables are also designed and built to meet customer specifications.

Examples of Special Probes Types

- I.D. and O.D. Bore Probes.
- Special Paintbrush Probes.
- Coarse Grain Inspection Probes.
- Special Focused Probes.
- High Temperature Probes.
- Multiple Transducer Probes.
- Advanced Flaw Sizing Probes.
- Radiation Resistant Probes.
- Industrial Linear, Phased, and Annular Arrays.



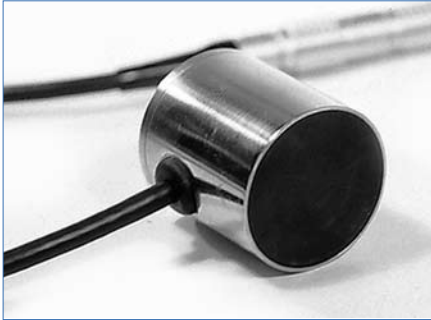
For further assistance from the Applications Lab, please copy and complete the customer inquiry form and fax it to (717)-242-4170—make extra copies for additional inquiries. You can also phone the Applications Lab at (717)-242-0327 or visit GE Inspection Technologies on the Internet at www.ge.com/inspectiontechnologies

Phased Array Transducers

Principles of Phased Array Transducers

By sequentially firing the individual elements of an array transducer at slightly different times, the ultrasonic wavefront can be focused or steered in a specific direction.

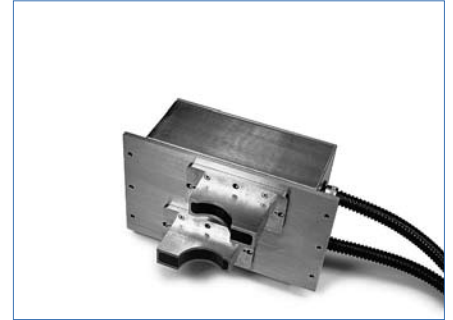
Additionally, electronically phasing the order and sequential firing speeds of an array allows for "sweeping" or "panning" through a selection of beam angles or across an area of inspection without manually manipulating the transducer.



Annular Phased Array



Linear Phased Array



Curved Phased Array

Key Features

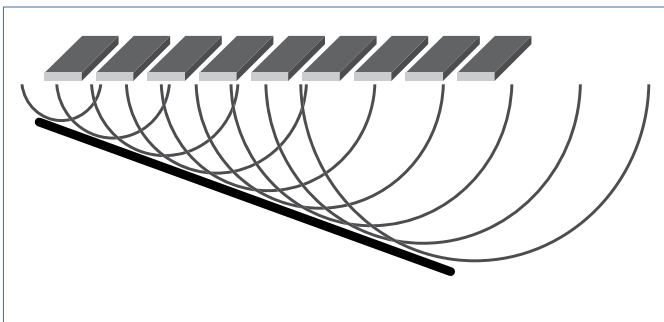
- Electronic focal length adjustments.
- Electronic linear scanning.
- Electronic beam steering/angulation.

Key Benefits

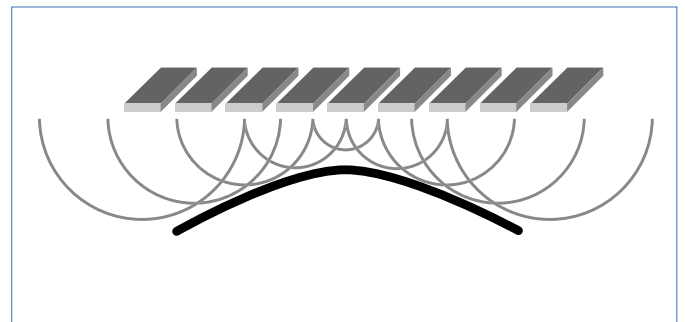
- Reduced manual manipulation.
- Reduced scanning surface contact area necessary (footprint).
- Reduced need for multiple inspections with specifically angled or focused probes.
- Increased inspection speed and efficiency.
- Increased coverage of inspection area.

General Specifications

- Frequency: 1 MHz to 7.5 MHz (10 MHz in some cases).
- Piezoelectric material: Proprietary BENCHMARK COMPOSITE®.
- Number of elements: 16–256 elements (application dependent).
- Pitch: 0.2 mm minimum.
- Bandwidth (-6dB): 60% - 80% typical.
- Crosstalk: > 30dB.
- Element sensitivity variation: ± 2 dB.
- Cable options: Detachable connector or potted cable.



Phased Array Steering

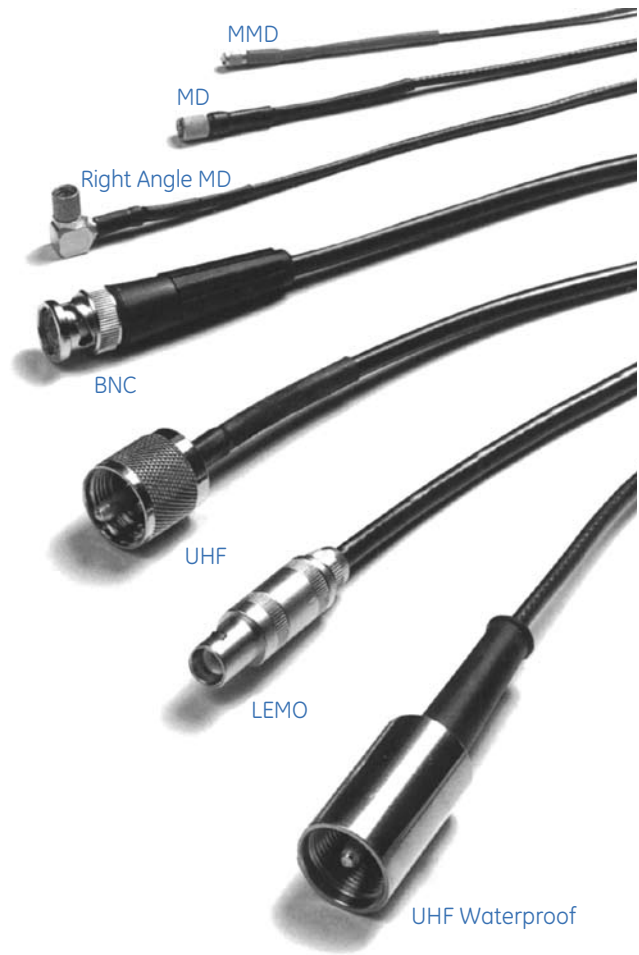


Phased Array Focusing

Accessories

Cables

GE Inspection Technologies offers a complete selection of transducer cables and adaptors with the most commonly used connections. Cables are designed with reinforced connector-cable junctions for long service life. Custom transducer cables and adaptors are available upon request. Call or write for price and delivery.



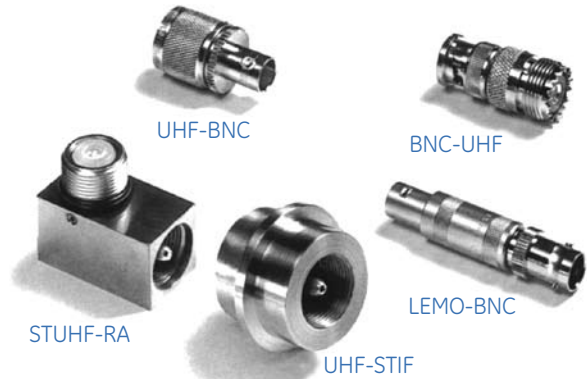
Description	Length (feet)	Cable Type	Product Codes
BNC to MMD	6.0	RG178	C-047
BNC to MD	6.0	RG174	C-012
BNC to MD	12.0	RG174	C-011
UHF to MMD	6.0	RG174	C-030
LEMO to MD	6.0	RG174	C-022
BNC to Right Angle MD	6.0	RG174	C-033
BNC to BNC	6.0	RG58	C-016
BNC to BNC	12.0	RG58	C-021
UHF to BNC	6.0	RG58	C-027
LEMO to BNC	6.0	RG58	C-018
UHF to UHF (non-waterproof)	6.0	RG58	C-020
UHF to UHF (non-waterproof)	12.0	RG58	C-025
LEMO to UHF (non-waterproof)	6.0	RG58	C-035
BNC to Waterproof UHF	6.0	Belden 8218	C-013
UHF to Waterproof UHF	6.0	Belden 8218	C-029
Dual BNC to MMD	6.0	MD 250-3909	C-014
Dual BNC to MD	6.0	RG174	C-024
Dual UHF to MD	6.0	RG174	C-034
RC Dual to BNC	6.0	RG174	C-088
RC Dual to BNC, Heavy Duty	6.0	RG174	C-089
KBA560V to BNC Dual	6.0	RG174	C-067
HT400A to BNC Dual, Armored	6.0	RG174	C-101
HT400A to BNC Dual, Standard	6.0	RG174	C-102

Special cables available on request.

Adaptors

Type	Description	Product Codes
BNC-UHF	Adapts transducer or instrument with BNC connector to cable with UHF connector	A-025
UHF-BNC	Adapts transducer or instrument with UHF connector to cable with BNC	A-026
LEMO-BNC	*Adapts instrument with LEMO #1 connector to BNC	A-030
STUHF-RA	Right angle adaptor for type STUHF, 3/4" diameter search tube	A-032
UHF-STIF	Adapts transducer with UHF connector to 1.375" flange tpe search tube	A-031
DM-BNC	Adapts LEMO plug on D-meter probe cable to dual BNC connectors	A-045
BNC-BNC	Couples BNC cable to another BNC cable	A-010

Special adaptors available on request.



Search Tubes

The STUHF stainless steel immersion search tube has an outside diameter of .735" and is for use with all immersion transducers with UHF (threaded) connectors.



Length (in.)	Product Codes	Length (in.)	Product Codes
1.5	ST-010	12.0	ST-016
2.0	ST-011	18.0	ST-018
3.0	ST-012	24.0	ST-015
4.5	ST-013	36.0	ST-019
6.0	ST-014		

Special lengths available on request.

Accessories

Exosen Couplants (General Purpose)

GE Inspection Technologies Exosen ultrasonic couplant is specially formulated for ultrasonic coupling in all general applications. Exosen is available in five standard viscosities and has the following properties:

- Water soluble.
- Low sulphur and halogens.
- Non-toxic and nonflammable.
- Antiseptic–non-irritating–pleasantly scented–safe.
- High viscosity grades ideal for vertical and overhead surfaces.
- Rust preventative added.
- Shelf life of one year when stored between 50°F and 80°F and out of direct sunlight.

Please order by product code from the table.

Couplant Grade	Equivalent Viscosity	1 gallon	Case of Four 1 gallon	5 gallon	55 gallon
Exosen 10	30 Oil	X-220	X-225	X-240	X-260
Exosen 14	40 Oil	X-320	X-325	X-340	X-360
Exosen 20	90 Oil	X-420	X-425	X-440	X-460
Exosen 30	Heavy Pourable	X-520	X-525	X-540	X-560
Exosen 40	Semisolid			X-640	X-660

Note: MSDS included with each Exosen shipment. Letter of certification available upon request. Empty 8 ounce squeeze bottle included with each gallon of Exosen.

XL Couplant

(Laboratory and Smooth Surfaces)

GE Inspection Technologies XL ultrasonic couplant is specifically made for laboratory testing of transducers and for contact testing of materials having smooth surface finish of 62 microinches RMS or better in both general production and laboratory testing.

Quantity	Product Codes
8 ounce squeeze bottle	XL-820
16 ounce squeeze bottle	XL-840
1 gallon container	XL-860
5 gallon container	XL-880

Note: Letter of certification included with each Hitempo shipment.

SLC Couplant

(Curved, Rough, Vertical, and Overhead Surfaces)

GE Inspection Technologies SLC couplant is a thick highly attenuative couplant ideal for making thickness measurements on very rough surfaces that would not be possible with thinner couplants. Its high viscosity also makes it an excellent couplant for use on vertical and overhead surfaces.

Quantity	Product Codes
4 ounce container	X-080

ZGM Couplant

(High Temperature)

ZGM is a highly viscous, high temperature couplant manufactured by GE Inspection Technologies. It is designed for use on surfaces with temperatures of 400°F (minimum) to 1000°F. Primarily intended for wall thickness measurement, ZGM contains a solid filler that melts at high temperature.

Quantity	Product Codes
100 g. (3.5 oz.) tube	XZ-471

Exosen Couplants

(General Purpose)

GE Inspection Technologies Hitempo is an excellent high temperature couplant for inspection on surfaces at temperatures up to 550°F. Its high viscosity (toothpaste consistency) makes it ideal on vertical and overhead surfaces.

Quantity	Product Codes
2.8 ounce tube	XH-010
Dozen 2.8 ounce tubes	XH-015

Note: Letter of certification included with each Hitempo shipment.

Delay Line, Wedge and Protective Face Couplant

This couplant is for use between the face of the transducer and the delay line, wedge, membrane, or wear cap with which it is used.

Quantity	Product Codes
2 ounce squeeze bottle	XD-740

Accessories

Type DC Block (AWS type)

For shear wave distance calibration. Contains a 1.0" radius overlaying a 2.0" radius on 180° half circle.

Dimensions:

2.0" radius section is .50" thick;

1.0" radius section is 1.0" thick.

Product Code: 118-540-290



Type SC Block (AWS type)

For shear wave sensitivity calibration. Contains two .062" diameter sidedrilled holes. Distance from front surface to center of holes is .178" and .521".

Dimensions: 3.000" x 1.250" x .905".

Product Code: 118-540-330



AWS Resolution Block

For checking resolution capabilities of angle beam transducers. Contains three sets of three .062" diameter thru holes for 45°, 60°, and 70°.

Dimensions: 6" x 3" x 1"

Product Code: 118-540-350



Angle Beam Block (Miniature Size)

Substitute for DSC Block for general angle beam calibration. Contains 1.0" radius opposite a 2.0" radius, and a 5/64" sidedrilled, flat bottom hole .750" deep

Dimensions: 1.0" thick.

Product Code: 118-540-260



IOW Beam Profile Block (English or Metric)

For beam profile measurement of angle beam transducers and for measurement of transducer angles.

Dimensions: 12" x 3" x 2"

Product Code: 118-540-240



Type DSC Block (AWS type)

For shear wave distance and sensitivity calibration. Contains a 1.0" radius opposite a 3.0" radius. The 3.0" radius includes a radius slot .375" deep x .032" wide. Also contains 0° reference point for checking exit point on wedge, and a .125" diameter side-drilled thru hole and corresponding markings at 45°, 60°, and 70° for measuring actual refracted angle. Dimensions: 1.0" thick

Product Code: 118-540-300



Step Blocks

For Thickness and linearity calibration. Available in 4-step version with thickness of .250", .500", .750", and 1.00"; or 5-step version, with thickness of .100", .200", .300", .400", and .500".

4-Step Product Code: 118-540-320. 5-Step

Product Code: 118-540-310



Type DS Block (AWS type)

For longitudinal distance and sensitivity calibration. Contains a 2.0" high section between two 4.0" high sections.

Dimensions: 6.0" x 4.0" x 2.0"

Product Code: 118-540-340



IIW Block Type 1

For calibration of shear and longitudinal transducers, and for verification of shear wedge exit point and refracted angle. Also can be used to check resolution and sensitivity.

Dimensions: 12" x 4" x 1"

Product Code: 118-540-270



IIW Block Type 2

Modified version of original IIW Type 1. Includes a 2.0" radius x .250" deep cut-out and additional side-drilled holes for resolution studies.

Dimensions: 12" x 4" x 1"

Product Code: 118-540-280



NAVSHIPS Test Block

Used in accordance with NAVSHIPS Specification 0900-006-3010. Section 6, for distance amplitude correction, sensitivity levels and flaw depth information.

Contains six 3/64" diameter side-drilled holes at distances from 1/4" to 2 3/4"

Dimensions: 12" x 3" x 1 1/4"

Product Code: 118-540-370



30FBH Resolution Block

For determining resolution and sensitivity capabilities and to produce area/amplitude plots for normal beam transducers.

Contains ten flat bottom holes each of diameters 3/64", 5/64", and 8/64" at test metal distances from .050" to 1250"

Dimensions: 11" x 1 1/2"

Product Code: 118-540-230



ASME-625 Reference Plate

For longitudinal, shear, and surface wave sensitivity calibrations. Contains six flat bottom holes: three 4/64" diameter holes, one each at a depth of .050", .250", and .50", and one 4/64" hole 1.500" deep, one 8/64" hole 1.625" deep, and one 16/64" hole 1.750" deep.

Dimensions: 12" x 6" x 1/2"

Product Code: 118-540-360



Accessories

Test Blocks, continued

Miniature Resolution Block

For checking resolution capabilities and calibrating high resolution test equipment. Contains four 3/16" wide and 5/8" long, milled slots to simulate flat plate reflectors at metal travel distances of .015" , .020" , .025" , and .030" , and six flat bottom holes, three each with diameters of 3/64" and 1/64" at metal travel distances of .020" , .025" , and .030" .

Dimensions: 3 5/8" x 1 x 1/8" .

Product Code: 118-540-250.

ASME Calibration Blocks

Provided with one flat bottom hole with diameter and depth per specifications. Special Order.

ASTM Distance/Amplitude Block Set

(19 Blocks) All 19 blocks have the same size test hole. Hole size must be specified when ordering (3/64" , 5/64" , or 8/64"). The metal travel distances, for the set are: 0006, 0012, 0025, 0037, 0050, 0062, 0075, 0087, 0100, 0125, 0175, 0225, 0275, 0325, 0425, 0475, 0525, and 0575.

Product Code: 118-540-028.

ASTM Area/Amplitude Block Set

(8 Blocks) Includes the following blocks: 1-0300, 2-0300, 3-0300, 4-0300, 5-0300, 6-0300, 7-0300, and 8-0300.

Product Code: 118-540-018.

ASTM Distance/Area Amplitude Set

(10 Blocks) Includes the following blocks: 3-0300, 5-0012, 5-0025, 5-0050, 5-0075, 5-0150, 5-0300, 5-0600, 8-0300, and 8-0600.

Product Code: 118-540-019

Single ASTM Blocks

For measuring the sensitivity and/or resolution of normal beam transducers. Machined to E-127-64 dimension requirements. Available with flat bottom holes from 1/64" to 8/64" diameter, with test metal distances from .062" to 6.00". Prices for other lengths and diameters furnished on request. Block identification is as follows: first digit indicates hole diameter in 64ths, next four digits indicate test metal distance in hundredths of an inch. Therefore, a 3-0050 block would have a 3/64" diameter FBH at .500" TMD. Special Order.



Notes: (Apply to all test blocks)

1. Product codes listed are for steel test blocks only. Please order all steel blocks by product code listed for each type. All other block materials should be ordered on an individual basis by description.
2. Please see price list for ordering and delivery information.
3. GE Inspection Technologies' test blocks are machined to engineering specifications and to precision tolerances from ultrasonically inspected and approved material.
4. All blocks and sets listed include quality hardware cases except single ASTM blocks.
5. Steel blocks are nickel plated unless otherwise requested.

Transducer Certification

Real Time Waveform and Frequency Spectrum

The real time waveform and frequency spectrum certifies the natural, unbiased, unfiltered waveform and the degree of damping and shows the frequency components of the gated signal. A highly damped unit such as an Alpha Series transducer gives optimum resolution while displaying a broad frequency spectrum. This is necessary for thickness gauging of thin materials or when inspecting for near-surface flaws. A transducer that is not as highly damped will have greater penetrating power but less resolution and a narrower frequency spectrum. Product code TC-911

GE Inspection Technologies

Transducer Certificate of Conformity
Compliant to ASTM E-1065 Guidelines

Date:	9/3/2005
Product Code:	112-204-001
Serial Number:	03B Y 2
Description:	PAW-HDCH P50AC 50.150.144

Test Setup:

Test Target: .375" Plexiglas

Energy Impedance: 3
250

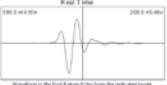
UTA S/N: HM00113

UTA Cal Due Date: 5/8/2006

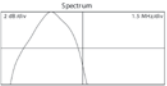
Q-scope S/N: 8023004

Q-scope Cal Due Date: 10/31/2005

Software: FNT000 R au: H




Waveform to the first Return Echo from the indicated target.



Test Data:	
Sensitivity(A to dB):	-33.80 dB
Pulse Duration@ 20dB:	4.44E-07 Sec
Peak Frequency:	4.70E+06 Hz
Center Frequency:	4.93E+06 Hz
% Bandwidth@ -6dB:	75.0 %
Inspector:	JPT

The accuracy of the transducer described above has been confirmed by factory standard test equipment and laboratory reference standards available to the National Institute of Standards and Technology. This facility's Quality System is registered to ISO 9001:2000 and is compliant with: ISO 9001 and NADCAP.

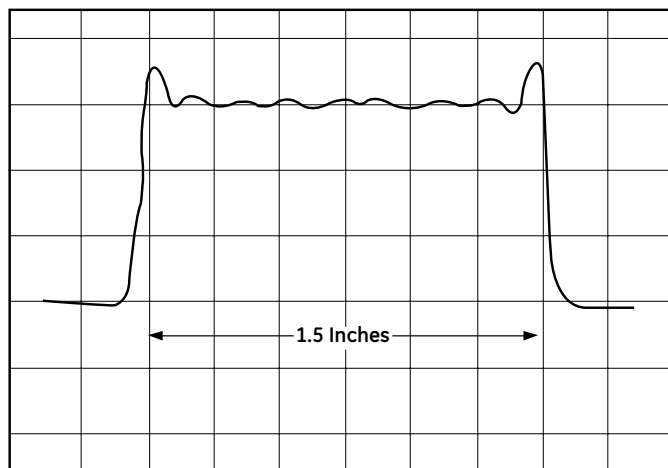


GE Inspection Technologies, LP
50 Industrial Park Rd.
Lewisburg, PA 17044
Tel: 717.242.0327
Fax: 717.242.2906
GEInspectionTechnologies.com

021-247-287, Rev D

Beam Profile

The beam profile plot is made by moving the transducer across a small rod reflector in an immersion tank. Ball or wire reflectors are also commonly used. The beam profile gives the relative intensity and width of the sound beam at a given distance from the transducer face. Product code TC-913



Tables and Formulas

dB vs. Amplitude Ratio Chart

dB	Ratio	dB	Ratio	dB	Ratio	dB	Ratio
0	1.00:1	5	1.78:1	11	3.55:1	17	7.08:1
.5	1.06:1	6	2.00:1	12	3.98:1	18	7.94:1
1	1.12:1	7	2.24:1	13	4.47:1	19	8.91:1
2	1.26:1	8	2.51:1	14	5.01:1	20	10.00:1
3	1.41:1	9	2.82:1	15	5.62:1	40	100.00:1
4	1.58:1	10	3.16:1	16	6.31:1	60	1000.00:1

Near Field Length (N) in Water (Inches)

Frequency (MHz)	Element Ø (inches)			
	1.00	.75	.50	.25
1.0	4.3	2.4	1.07	.27
2.25	9.6	5.4	2.4	.60
5.0	21.4	12.0	5.4	1.3
10.0	43	24	10.7	2.7

To find approx. length in steel, divide the above values by 4.

Velocity and Acoustic Impedance of Common Materials

Material	Longitudinal Velocity		Sheer Velocity		Acoustic Impedance
	$\frac{\text{in.}}{\text{sec.}} \times 10^6$	$\frac{\text{cm.}}{\text{sec.}} \times 10^5$	$\frac{\text{in.}}{\text{sec.}} \times 10^5$	$\frac{\text{cm.}}{\text{sec.}} \times 10^5$	$\frac{\text{gm.}}{\text{cm}^2\text{sec.}} \times 10^5$
Air	.013	.33	-	-	.0004
Aluminum	.25	6.3	.12	3.1	17.0
Aluminum Oxide	.39	9.9	.23	5.8	32.0
Beryllium	.51	12.9	.35	8.9	23.0
Boron Carbide	.43	11.0	-	-	26.4
Brass	.17	4.3	.08	2.0	36.7
Cadmium	.11	2.8	.059	1.5	24.0
Copper	.18	4.7	.089	2.3	41.6
Glass (crown)	.21	5.3	.12	3.0	18.9
Glycerin	.075	1.9	-	-	2.42
Gold	.13	3.2	.047	1.2	62.6
Ice	.16	4.0	.08	2.0	3.5
Inconel	.22	5.7	.12	3.0	47.2
Iron	.23	5.9	.13	3.2	45.4
Iron (cast)	.18	4.6	.10	2.6	33.2
Lead	.085	2.2	.03	.7	24.6
Magnesium	.23	5.8	.12	3.0	10.0
Mercury	.057	1.4	-	-	19.6
Molybdenum	.25	6.3	.13	3.4	64.2
Monel	.21	5.4	.11	2.7	47.6
Neoprene	.063	1.6	-	-	2.1

Material	Longitudinal Velocity		Sheer Velocity		Acoustic Impedance
	$\frac{\text{in.}}{\text{sec.}} \times 10^6$	$\frac{\text{cm.}}{\text{sec.}} \times 10^5$	$\frac{\text{in.}}{\text{sec.}} \times 10^6$	$\frac{\text{cm.}}{\text{sec.}} \times 10^5$	$\frac{\text{gm.}}{\text{cm}^2\text{sec.}} \times 10^5$
Nickel	.22	5.6	.12	3.0	49.5
Nylon, 6-6	.10	2.6	.043	1.1	2.9
Oil (SAE 30)	.067	1.7	-	-	1.5
Platinum	.13	3.3	.067	1.7	69.8
Plexiglass	.11	2.7	.043	1.1	3.1
Polythylene	.07	1.9	.02	.5	1.7
Polystyrene	.093	2.4	.04	1.1	2.5
Polyurethane	.070	1.9	-	-	1.9
Quartz	.23	5.8	.087	2.2	15.2
Rubber, Butyl	.07	1.8	-	-	2.0
Silver	.14	3.6	.06	1.6	38.0
Steel, mild	.23	5.9	.13	3.2	46.0
Steel, stainless	.23	5.8	.12	3.1	45.4
Teflon	.06	1.4	-	-	3.0
Tin	.13	3.3	.07	1.7	24.2
Titanium	.24	6.1	.12	3.1	27.3
Tungsten	.20	5.2	.11	2.9	101.0
Uranium	.13	3.4	.08	2.0	63.0
Water	.0584	1.48	-	-	1.48
Zinc	.17	4.2	.09	2.4	29.6

Useful Formulas

Near Field Length =	$D^2F / 4C$ or $D^2 / 4\lambda$
Beam Spread	$\text{SIN} \gamma = C / DF \times 1.22$ or $1.22\lambda / D$
Snell's Law	$\text{SIN} \alpha / \text{SIN} \beta = C_1 / C_2$
Skip Distance =	$2T \times \text{TAN} \beta$
V-Path =	$2T / \text{COS} \beta$
Surface Distance (Projected) =	$S.P. \times \text{SIN} \beta$
Depth (1st Leg) =	$S.P. \times \text{COS} \beta$
Depth (2nd Leg) =	$2T - (S.P. \times \text{COS} \beta)$
Depth (3rd Leg) =	$(S.P. \times \text{COS} \beta) - 2T$
Wavelength =	C / F
Frequency =	C / λ
Acoustic Impedance =	$Z = C \times d$
% of Reflected Sound Pressure =	$R_p = (Z_2 - Z_1) / (Z_2 + Z_1)$
Coefficient of Transmission =	$T_p = 2Z_2 / (Z_2 + Z_1)$
Total Beam Width =	$TBW = (\text{Depth} - N) (2\text{TAN} \gamma) + T \times \text{Element Diameter}$

Transit Time =	$TT = 2T / C$
Center Frequency =	$F_c = (F_1 + F_2) / 2$
% Bandwidth =	$(F_1 - F_2) / F_c \times 100\%$
Q Factor =	$F_c / (F_1 - F_2)$
Circumference of a Circle =	$\pi \times \text{Diameter}$
Distance =	Speed x Time
RPM =	Speed / Circumference
Maximum Scanning Speed (x, y)	$(\text{Min. Flaw Length} + \text{EBW}) \times \text{PRR}$
Maximum Scanning Speed (polar)	$\text{RPM} \times \text{Diameter} \times \text{Clock interval (ft per min.)}$
dB Difference =	$20 \text{ Log } (A_1 / A_2)$
dB Ratio =	$\text{Inv log dB} / 20$
Water Equivalent = (steel)	$WE = F (\text{water}) \times (C(\text{water})) / (C(\text{steel}))$ (F= Focal length)
MAXB =	$\text{SIN}^{-1} (ID / OD)$
Focal Length =	$R = F (n - 1) / n$
Cylinder Offset Technique	Offset (X) = Outside Radius x SIN α

Symbol Key	
λ =	Wavelength
D =	Probe Diameter
F =	Probe Frequency
C =	Acoustic Velocity
d =	Density
α =	Incident Angle
β =	Refracted Angle
T =	Part Thickness
S.P. =	Sound Path
N =	Near Field
γ =	Divergence 1/2 angle

Transducer Kits

Transducer Kits combine the most popular transducers and accessories necessary for general ultrasonic testing applications. Discount priced and organized in a hard shell carrying case, the kit contents are easily accessible, convenient for storage, and economical.

Basic Contact Kit—Product Code 118-450-020

Contains a wide assortment for weld inspection, lamination detection, corrosion/erosion and thin gauge materials.

Qty.	Product Codes	Description
1	113-292-603	*2.25 MHz, .63" x .63" AWS Style, Single Element
1	113-242-591	2.25 MHz, .5" MSW-QC Style, BMC Single Element Angle Beam Probe
1	113-262-043	2.25 MHz, 1" CR Style, Single Element Contact Probe
1	113-544-000	5 MHz, .5" CA211A Style, Single Element Contact Probe
1	113-252-241	2.25 MHz, .75" PMCR Style, Single Element Membrane Probe

Qty.	Product Codes	Description
1	113-527-660	15 MHz, .25" ALPHA 2 DFR Style, Single Element Delay Line Probe
1	113-292-751	2.25 MHz, .5" x .5" DU-F Style, Dual Element Contact Probe
1	113-224-681	5 MHz, .25" RC Style, Dual Element Contact Probe
1	C-012	BNC-MD Coaxial Cable
1	C-016	BNC-BNC Coaxial Cable
1	C-024	BNC-MD Dual Coaxial Cable
1	C-088	BNC-RC Dual Coaxial Cable

Qty.	Product Codes	Description
1	D-050	Delay Lines for 113-527-660 (10 pcs.)
1	PM-021	Protective Membrane for 113-253-241 (12 pcs.)
1	W-104, 106	45° and 70° Lucite Wedge**
1	W-211, 212, 213	45°, 60° and 70° Lucite Wedge**
1	XD-740	Wedge/Delay Line Couplant
1	118-540-198	5 Step Reference Standard .1"-5"
1	118-800-020	Hardshell Carrying Case

Basic AWS Weld Inspection Kit Part No. 118-450-500

Contains transducers and accessories required for testing weldments to specification AWS D1.1.

Multi-Purpose Contact Kit Part No. 118-450-510

Contains the most commonly used transducers for a variety of angle beam, lamination, corrosion, general flaw, and thickness testing.

Basic Angle Beam Kit Part No. 118-450-030

Contains an assortment for weld and other angle beam inspections.

Qty.	Product Codes	Description
1	113-292-603	2.25 MHz, .63" x .63" AWS Style, Single Element Angle Beam Probe
1	113-292-601	2.25 MHz, .63" x .75" AWS Style, Single Element Angle Beam Probe
1	113-292-604	2.25 MHz, .75" x .75" AWS Style, Single Element Angle Beam Probe
1	113-262-043	2.25 MHz, 1" dia. CR-RHP, L-Wave Contact Probe
1	W-104	45° Lucite Wedge**
1	W-105	60° Lucite Wedge**
1	W-106	70° Lucite Wedge**
1	C-016	BNC-BNC Coaxial Cable
1	B-196	DSC Reference Standard
1	XL-820	8 oz. Couplant
1	118-800-020	Hardshell Carrying Case

Qty.	Product Codes	Description
1	113-544-000	5 MHz, .5" dia. CA211A Style, Single Element Contact Probe
1	113-262-043	2.25 MHz, 1" dia. CR Style, Single Element Contact Probe
1	113-527-660	15 MHz, .25" Alpha 2 DFR Style, Delay Line Probe
1	113-224-700	5 MHz, .25" dia. ADP Style, Dual Element Probe
1	113-244-591	5 MHz, .5" dia. MSW-QC Style, Benchmark Angle Beam Probe
2	W-211	45° Lucite Wedge**
2	W-212	60° Lucite Wedge**
2	W-213	70° Lucite Wedge**
2	C-016	BNC-BNC Coaxial Cable
2	C-012	BNC-MD Coaxial Cable
1	118-540-198	5 Step Reference Standard, 1"-5"
1	XL-820	8 oz. Couplant
1	118-800-020	Hardshell Carrying Case

Qty.	Product Codes	Description
1	113-29-642	5 MHz, .18" x .18" ABFP Style, Single Element Angle Beam Probe
1	113-216-585	10 MHz, .125" SMSWS Style, Single Element Angle Beam Probe
1	113-294-600	5 MHz, 5" x 1" SWS Style, Single Element Angle Beam Probe
1	113-224-591	5 MHz, .25" MSWQC Style, Benchmark Single Element Angle Beam Probe
1	118-540-196	DSC Reference Standard
1	C-047	BNC-MMD Coaxial Cable
1	C-016	BNC-BNC Coaxial Cable
1	C-012	BNC-MD Coaxial Cable
1 ea.	W-120, 122	45° and 70° Lucite Wedge**
1 ea.	W-015, 017	45° and 70° Lucite Wedge**
1 ea.	W-201, 202, 203	45°, 60° and 70° Lucite Wedge**
1	XL-820	8 oz. Couplant
1	118-800-020	Hardshell Carrying Case

Transducer Kits

High Temperature Kit

Part No. 118-450-530

Contains dual element delay line, and angle beam transducers for flaw detection at elevated temperatures to 1000°F.

Qty.	Product Codes	Description
1	113-224-760	5 MHz, .25" dia. HT400A Style, Dual Element (1000°F max)
1	113-242-270	2.25 MHz, .5" dia. PWCCS Style, Single Element Delay Line
1	113-292-600	2.25 MHz, .5" x 1" SWS Style, Single Element Angle Beam
1 ea.	W-070, 086	45° and 60° High Temperature Wedge (400°F max)
1	PK-050	High Temperature Delay Line Kit for 2, 42-270 (400°F max)
1	C-016	BNC-BNC Coaxial Cable
1	C-067	Dual MD-BNC Coaxial Cable
1	C-102	BNC-HT400/400A Probe Cable
2	XH-010	2 oz. Tube HITEMPO Couplant (ambient to 550°F)
1	XZ-471	3.5 oz. Tube ZGM Couplant (400-1000°F)
1	118-540-198	5 Step Reference Standard 1"-.5"
1	118-800-020	Hardshell Carrying Case

Basic Immersion Kit

Part No. 118-450-040

Contains an assortment of spherically focused transducers which exhibit good resolution and sensitivity and are ideal for determining which type of transducers are best suited for the testing situation.

Qty.	Product Codes	Description
1	113-127-302	15 MHz, .25" 155 Style Probe with 1.5" Spherical Focus
1	113-136-280	1.0 MHz, .38" 15 Style Probe with 3" Spherical Focus
1	113-254-360	5 MHz, .75" 155 Style Probe with 6" Spherical Focus
1	113-244-280	5 MHz, .5" 155 Style Probe with 2" Spherical Focus
1	118-560-007	UHF RA-UHF Isolated Coaxial Adaptor
1	C-016	BNC-BNC Coaxial Cable
1	A-025	BNC-UHF Adaptor
1	118-800-020	Hardshell Carrying Case

Corrosion Survey Kit

Part No. 118-450-520

Contains the most popular dual element flaw detection transducers for corrosion detection in materials from ambient to 1000°F.

Qty.	Product Codes	Description
1	113-224-700	5 MHz, .25" dia. ADP Style Dual Element Probe
1	113-544-210	5 MHz, .375" dia. KBA560 Style, Dual Element Probe (450°F max)
1	113-224-760	5 MHz, .25" dia. KBA-HT400A Style
1	113-292-751	2.25 MHz, .5" x .5" DU-F Style, Dual Element Probe
1	113-244-241	5 MHz, .5" dia. PMCR Style, Single Element Membrane Probe
1	C-067	BNC-KAB560 Coaxial Cable
1	C-016	BNC-BNC Coaxial Cable
1	C-024	BNC-MD Coaxial cable
1	C-102	BNC-HT400/400A Probe Cable
2	XH-010	2 oz. Tube HITEMPO Couplant (ambient to 550°F)
1	XZ-471	3.5 oz. Tube ZGM Couplant (400-100°F)
1	118-540-198	5 Step Reference Standard, 1"-.5"
1	XD-740	Wedge/Delay Line and Membrane Couplant
1	118-800-020	Hardshell Carrying Case

**Refracted angle in carbon steel @ 70°F.

Applications Lab – Customer Inquiry Form

***Please complete this form and fax it to the GE Inspection Technologies Applications Lab at (717) 242-4170**

Name: Title: Date: / /

Company Name: Phone:

Address: City:

State: ZIP: Fax: E-mail:

Brief Description of the Ultrasonic Application:

Material Type: Dimensions: Shape:

Test Method: Contact Immersion Scan Method: Manual Mechanical In-Line

Current Ultrasonic Instrument:

Test Objective:

.....

.....

Special Concerns: Restricted Access Temperature Radiation Surface Condition

Flaw Type(s): Size: Location:

Please include a sketch of the test part

I am interested in Special Transducers for this application:

Type: Single Element Dual Element Array Frequency:MHz

Element Size: Damping: Alpha(High) Gamma (Low) Connector:

Focus: Flat Spherical (Spot) Cylindrical (Line) Focal Distance:



Regional Contact Information

GE Inspection Technologies

50 Industrial Park Road
Lewistown, PA 17044
USA
+1 717 242 0327

GE Inspection Technologies

Robert-Bosch-Strasse 3
50354 Huerth
Germany
+49 2233 6010

GE Inspection Technologies

5F, Hongcao Building
421 Hongcao Road
Shanghai 200233
China
+86 800 820 1876 (China toll free)
+86 21 3414 4620 (ext. 6029)



GE Inspection Technologies: productivity through inspection solutions

GE Inspection Technologies provides technology-driven inspection solutions that deliver productivity, quality and safety. We design, manufacture and service Ultrasonic, Remote Visual, Radiographic and Eddy Current equipment and systems. Offering specialized solutions that will help you improve productivity in your applications in the Aerospace, Power Generation, Oil & Gas, Automotive or Metals Industry.

Visit www.ge.com/inspectiontechnologies for more information.