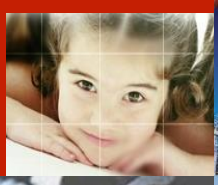
Ultrasonic Transducer

High Quality Ultrasonic Transducer
for NDT and Medical Applications

HAGISONIC
(주) 하기소닉








General Information

Hagisonic - Advanced Technology for Ultrasonic Transducers

Hagisonic was incorporated in 1999 by researchers who had worked with ultrasonic method in the nondestructive evaluation division for Korea Research Institute of Science and Technology. Hagisonic is a venture company with a capacity to perform vigorous research and has patented the advanced technology of its own along with the expertise for ultrasonic transducers. We have successfully developed and produced a wide variety of products that compete with the best in the world. Owing to the best quality of our products, those have been supplied to eminent big steel companies such as Japanese steel companies as well as POSCO. Also, we have offered ultrasonic transducers to a number of industries in medical field as well as nondestructive testing.

Ultrasonic Transducers for Every Application

Hagisonic offers a number of standard and special transducers and accessories for virtually every application including nondestructive testing and medical application. This catalogue describes our extensive range of standard transducers and related accessories. For application to require a non-standard product, we offer the best quality of special probes.

Best Quality and Service

Our quality program is certified to the international quality standard ISO-9001 which enables Hagisonic to quickly serve the marketplace with products of exceptional quality.

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Table of Contents

Transducer performance 2

How To Order 3

Contact Transducers 4

- ➢Standard Contact
- ➢Fingertip Contact
- ➢Removable Delay Line Fingertip Contact
- ➢Protective Face Combination Contact

Angle Beam Transducers 7

- ➢Standard Angle Beam & Wedges
- ➢Integrated Plastic Wedge Angle Beam

Dual Element Transducer 9

Immersion Transducers 10

- ➢Standard Case Style
- ➢Slim Line Case Style
- ➢Miniature Case Style

High Frequency Transducers 12

Thickness Gauging Transducer 13

Special Transducer 14

- ➢Dual Beam Transducer for Automatic Ultrasonic Testing of Thick Steel Plates(I)
- ➢Dual Beam Transducer for Automatic Ultrasonic Testing of Thick Steel Plates(II)
- ➢Dual Beam Transducer for Semi-Automatic Ultrasonic Testing of Thick Steel Plates
- ➢Immersion Transducer for Automatic Ultrasonic Testing of Hot-Rolled Steel
- ➢Dual Beam Transducer for Manual Weld Inspection
- ➢Angle / Dual Probe for Railroad Automatic Inspection
- ➢Angle / Dual Probe for Railroad Manual Inspection
- ➢Angle / Normal Beam Probe for Automatic Inspection of the Axle and Wheel of a Train
- ➢Immersion Probe for Nuclear Fuel Lot
- ➢Immersion Probe for Atomic Power Plant Inspection
- ➢Angle Probe for UST in pipe
- ➢Immersion Probe for On-line Inspection of Automobile Components
- ➢Immersion Probe for On-line Inspection of Small Components

Medical Ultrasonic Transducer 23

AE Sensor 24

Accessories 28

Transducer Certification 29

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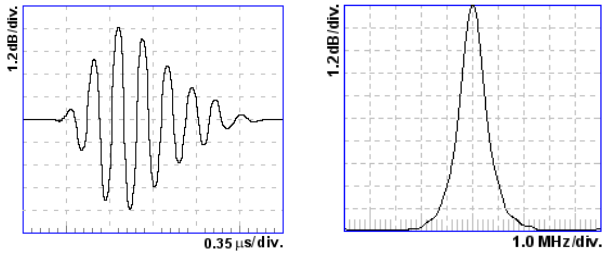
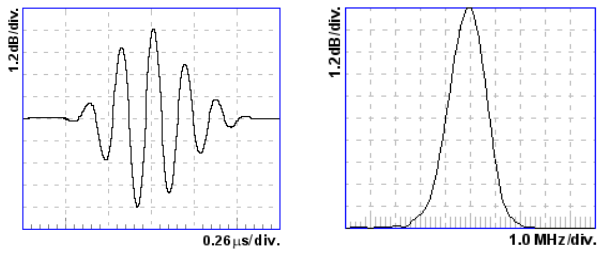
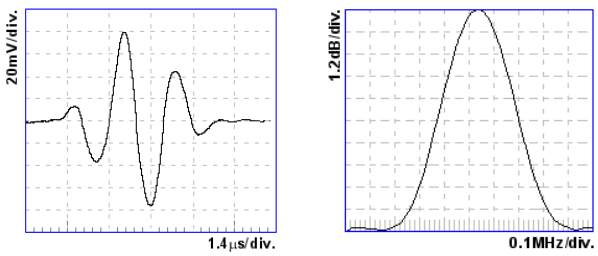
Transducer Performance

Transducer Series

Series	Bandwidth % at –6dB	Sensitivity	Applications
P	10～30%	Very High	The P series is intended to provide excellent sensitivity in those situations where axial resolution is not of primary importance. (For instance, coarse-grained and attenuative material, deeper material penetration, bulk-body flaw detection.) Typically this series will have a longer waveform duration and a relatively narrow frequency bandwidth. 
M	30～50%	High	The M series is intended to provide medium pulse, medium damping-best combination of sensitivity and resolution. This series are applied to most common NDT testing and general purpose. 
B	50～120%	low	The B series is intended to provide good axial or distance resolution. This series are suitable for application such as thickness measurement and near-surface flaw detection. Sensitivity is usually lower than of the P and M series. 

How To Order

1. You can select probes throughout the catalog. Each page gives details such as frequency, size, style and type.
2. You can select what probes you need through transducer selection tables. See below.
3. If you need special probes except a list of the catalog, please call and inquire at the office.

Transducer Selection

I. Transducer Series

P	Series
M	Series
B	Series

II. Transducer Type (Refer to each page)

1	Standard Contact
2	Fingertip Contact
3	Removable Delay Line Fingertip Contact
4	Protective Face Combination Contact
5	Standard Angle Beam
6	Integrated Plastic Wedge Angle Beam
7	Immersion
9	Dual

III. Focal Types (Immersion Transducer)

S	Spherical Focus
C	Cylindrical Focus
N	Non-focus

IV. Cable Connector Style to Transducer

SB	Straight BNC Plug
RB	Right Angle BNC Plug
M	Microdot
RM	Right Angle Microdot
SU	Straight UHF Plug
L1	LEMO FFA.1S
L0	LEMO FFA.00

V. Cable Connector Style to Instrument

SB	Straight BNC Plug
SU	Straight UHF Plug
M	Microdot
L1	LEMO FFA.1S
L0	LEMO FFA.00
BU	Burndy (UTG Bantam)

VI. Cable Grade

58	RG 58/U, 50 Ohm
174	RG 174/U, 50 Ohm
P174	RG 174/U, 50 Ohm, parallel cable
178	RG 178/U, 50 Ohm

Transducer Part Number Notation

P101-RB-S

- P — Transducer Series
- 101 — Transducer Type
- RB — Connector Style
- S — Focal Type

Cable Part Number Notation

SB-174-SU

- SB — Connector to Transducer
- 174 — Cable Grade
- SU — Connector to Instrument

Contact Transducer

A contact transducer is a single element longitudinal wave transducer intended for general purpose ultrasonic inspection.

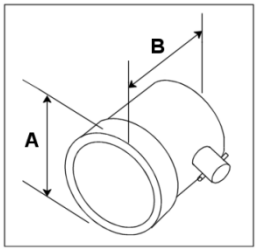
Main Feature :

- All probes are designed for use in rugged industrial environments.
- All probes can be used to test a wide variety of materials.

Application :

- Straight beam flaw detection and thickness gauging.
- Detection of sizing of delaminations.
- Material sound velocity measurements.
- Inspection of plates, billets, bars, forgings, castings, extrusions, and a wide variety of other metallic and non-metallic materials.

Standard Contact Transducer

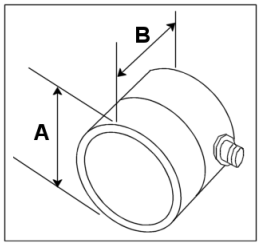


Element Size(inch)	A (inch)	B (inch)
0.5	1.15	1.50
0.75	1.40	1.50
1.0	1.65	1.50

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
0.5	1.00	P101-RB	M101-RB	B101-RB
1.0	1.00	P102-RB	M102-RB	B102-RB
2.25	0.75	P103-RB	M103-RB	B103-RB
2.25	1.00	P104-RB	M104-RB	B104-RB
5.0	0.50	P105-RB	M105-RB	B105-RB
5.0	0.75	P106-RB	M106-RB	B106-RB
10.0	0.50	P107-RB	M107-RB	B107-RB

- All transducers feature ceramic wearplates for the best combination of acoustic matching and durability and stainless steel housings to resist corrosion.
- Stainless steel case and right angle BNC connector.

Fingertip Contact Transducer



Element Size(inch)	A(inch)	B(inch)
0.25	0.50	0.66
10(mm)	15(mm)	17(mm)
0.50	0.75	0.66

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
2.25	0.25	P201-RM	M201-RM	B201-RM
2.25	10(mm)	P201-5-RM	M201-5-RM	B201-5-RM
2.25	0.50	P202-RM	M202-RM	B202-RM
5.0	0.25	P203-RM	M203-RM	B203-RM
5.0	10(mm)	P203-5-RM	M203-5-RM	B203-5-RM
5.0	0.50	P204-RM	M204-RM	B204-RM
10.0	0.25	P205-RM	M205-RM	B205-RM
10.0	10(mm)	P205-5-RM	M205-5-RM	B205-5-RM
10.0	0.50	P206-RM	M206-RM	B206-RM

- Fingertip contact transducer is a small diameter probe with a right angle mounted Microdot connector.
  (Consult us for straight Microdot and others.)
- Stainless steel case.

Contact Transducer

A contact transducer is a single element longitudinal wave transducer intended for general purpose ultrasonic inspection.

Removable Delay Line Fingertip Contact Transducer

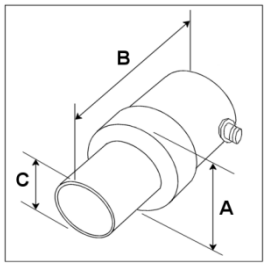
Removable delay line contact transducers are specifically designed for thickness gauging and flaw detection of thin materials.

Main Feature :

- Delay line transducer provides excellent near surface resolution.
- Higher frequency improves resolution.
- Delay line transducer improves ability to measure thin materials or find small flaws.

Application :

- Precision thickness gauging.
- Straight beam flaw detection.
- Inspection of parts with limited contact area.



Element Size(inch)	A (inch)	B (inch)	C (inch)
0.25	0.51	0.835	0.30
0.50	0.875	1.375	0.595

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
2.25	0.25	P301-RM	M301-RM	B301-RM
2.25	0.50	P302-RM	M302-RM	B301-RM
5.0	0.25	P303-RM	M303-RM	B301-RM
5.0	0.50	P304-RM	M304-RM	B301-RM
10.0	0.25	P305-RM	M305-RM	B301-RM
10.0	0.50	P306-RM	M306-RM	B301-RM

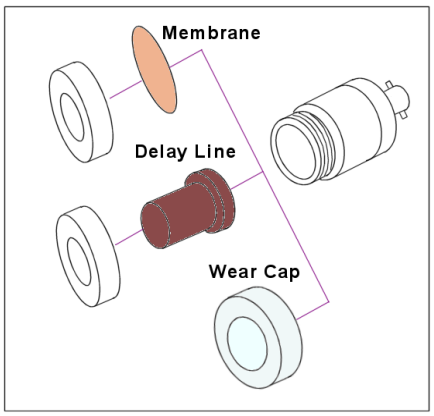
- All delay line transducers have right angle mounted Microdot connector.
(Consult us for straight Microdot and others.)
- Stainless steel case.
- Each transducer comes with a room temperature delay line.

Contact Transducer

A contact transducer is a single element longitudinal wave transducer intended for general purpose ultrasonic inspection.

Protective Face Combination Contact Transducer

A protective face combination contact transducer is a single element longitudinal wave contact transducer which is designed to allow one transducer to be used with three different types of protective face : membrane, wear cap or delay line.

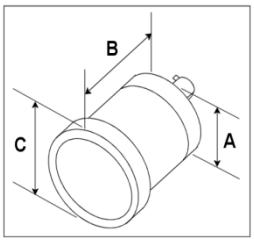


Main Feature :

- Protective face combination contact transducers provide versatility by offering removable three different types of protective face.
- Cases are threaded for easy attachment to the delay line, protective membrane, and wear cap options.
- All models have BNC connectors.

Application :

- Thickness gauging.
- Straight beam flaw detection.
- Inspection of plates, billets, bars and forgings.

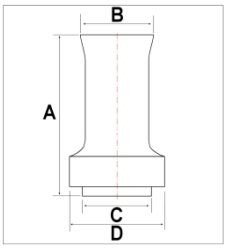


Element Size(inch)	A (inch)	B (inch)	C (inch)
0.5	0.75	1.20	0.94
1.0	1.25	1.20	1.44

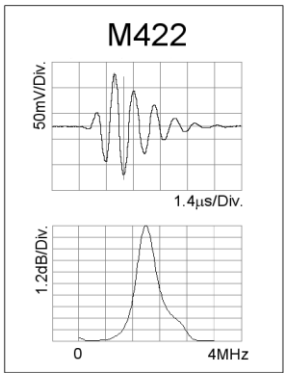
Freq. (MHz)	Size (inch)	Part No.	
		P	M
1.0	0.5	P401-SB	M401-SB
1.0	1.0	P402-SB	M402-SB
2.25	0.5	P403-SB	M403-SB
2.25	1.0	P404-SB	M404-SB
5.0	0.5	P405-SB	M405-SB

Accessories

	Part No.	
	Transducer Element Diameter(inch)	
	0.5	1.0
Membranes (Pkg. Of 12 pcs)	HM-01	HM-02
Wear caps (Pkg. Of 12 pcs)	HW-01	HW-02
Delay line 1.0" long	HD-01	HD-02
Delay line 1.5" long	HD-03	HD-04
High-Temp. Delay line 1.0" long	HD-05	HD-06
High-Temp. Delay line 1.5" long	HD-07	HD-08



Element Size(inch)	A (mm)	B (mm)	C (mm)	D (mm)
1.0	59.0	33.0	29.0	45.0



Freq. (MHz)	Size (inch)	Part No.	
		P	M
1.0	1.0	P421-L	M421-L
2.0	1.0	P422-L	M422-L
4.0	1.0	P423-L	M423-L
5.0	1.0	P424-L	M424-L

Angle Beam Transducer

Angle beam transducers are single element transducers used with a wedge to introduce a refracted shear wave or longitudinal wave into a test piece.

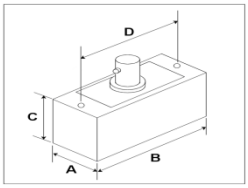
Standard Angle Beam Transducer and Wedges

Main Feature :

- Lucite wedges are designed to produce shear waves of a particular angle in a specified material with minimal wedge noise.
- All transducers are utilize captive screws for fastening the probe to the wedge and have top-mount BNC connectors.

Application :

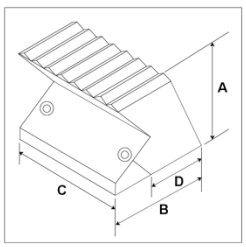
- Flaw detection and sizing.
- Inspection of pipes, tubes, forgings, castings, as well as machined and structural components for weld defects or cracks.



	Element Size(inch)	
(inch)	.75 x .75	0.5 x 1.0
A	0.85	0.725
B	1.25	1.51
C	0.75	0.75
D	1.00	1.31

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
0.5	0.5 x 1.0	P501-SB	M501-SB	B501-SB
1.0	0.5 x 1.0	P502-SB	M502-SB	B502-SB
2.25	.75 x .75	P503-SB	M503-SB	B503-SB
2.25	0.5 x 1.0	P504-SB	M504-SB	B504-SB
5.0	0.5 x 1.0	P505-SB	M505-SB	B505-SB

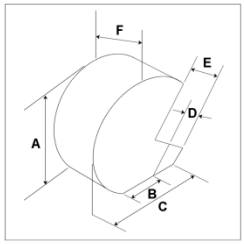
WSR wedge



Style WSR (Serrated Wedge) is used for standard angle beam transducers and offers excellent signal/noise ratios.

	A	B	C	D
30 °	1.30"	1.30"	1.60"	0.76"
45 °	1.30"	1.41"	1.60"	0.78"
60 °	1.30"	1.50"	1.60"	0.67"
70 °	1.35"	1.77"	1.60"	0.85"
90 °	1.20"	1.34"	1.60"	-

AWS wedge



Style AWS Wedges are “Snail” wedges specifically designed for our AWS Transducers and display optimum signal/noise ratios.

	A	B	C	D	E	F
45 °	1.99"	0.89"	1.74"	0.50"	0.87"	1.25"
60 °	1.98"	0.69"	1.97"	0.50"	0.91"	1.25"
70 °	1.88"	0.77"	1.88"	0.50"	0.93"	1.25"

Angle Beam Transducer

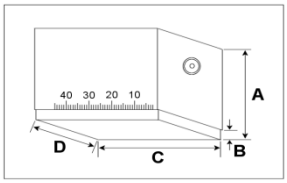
Angle beam transducers are single element transducers used with a wedge to introduce a refracted shear wave or longitudinal wave into a test piece.

Integrated Plastic Wedge Angle Beam

Main Feature :

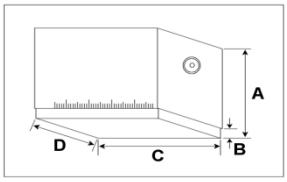
- All types are single element transducer for transmission and reception of sound pulses.
- They are great for applications where a better signal-to-noise or repeatability is required.
- Miniature type is excellent choice for limited access applications.
- All transducers are equipped with right angle LEMO connectors.

(I) IWA (Integrated Large Wedge Angle Beam)



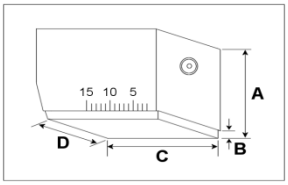
This type is used for testing of large objects made of non-alloyed and low-alloyed steel.
(e.g. thick walled containers, axle shafts, all types of thick welds.)

(II) SIWA (Small Integrated Wedge Angle Beam)



They enable to test small parts as well as large objects.
The case dimensions are ideal for manual testing.

(III) MIWA (Miniature Integrated Type Wedge Angle Beam)



Miniature type is much used for weld testing in the container and boiler sector, especially for the detection of cracks on screws, bolts and highly stressed machine parts. Another applications are corrosion detection and for testing assembly weld seams on pipelines.

Part No.	Element Size(mm)	A(mm)	B(mm)	C(mm)	D(mm)
IWA	20 x 22	45	5	53.5	29
MIWA	8 x 9	22	2	24	14
SIWA	14 x 14	31	3	37	21.5

Part No.	Freq. (MHz)	Angle (°)	Size (mm)	Part No.		
				P	M	B
IWA	2	45/60/70	20 x 22	P551-L	M551-L	B551-L
MIWA	4	45/60/70	8 x 9	P552-L	M552-L	B552-L
SIWA	2	45/60/70	14 x 14	P553-L	P553-L	P553-L
SIWA	5	45/60/70	14 x 14	P554-L	P554-L	P554-L

Dual Element Transducer

Dual element transducers consist of two crystal elements housed in the same case, separated by an acoustic barrier. 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 transducer 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.

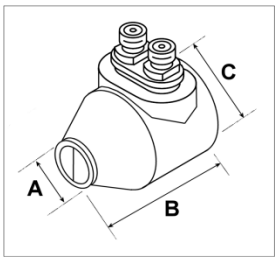
Dual Beam Transducer for Automatic Ultrasonic Testing of Thick Steel Plates

Main Feature :

- Improves near surface solution.
- Couples well on rough or curved surfaces

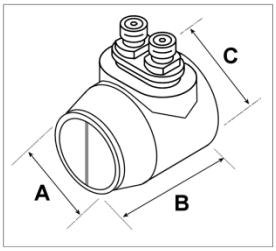
Application :

- Well thickness measurement
- Detection of porosity, inclusions, cracks, and laminations in castings and forgings.



Element Size(inch)	A (inch)	B (inch)	C (inch)
0.25	0.36	1.00	0.78
0.375	0.47	1.00	0.78
0.50	0.60	1.00	0.78

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
1.0	0.5	P901	M901	B901
2.25	0.25	P902	M902	B902
	0.375	P903	M903	B903
	0.5	P904	M904	B904
5.0	0.25	P905	M905	B905
	0.375	P906	M906	B906
	0.5	P907	M907	B907
10.0	0.25	P908	M908	B908



Element Size(inch)	A (inch)	B (inch)	C (inch)
0.25	0.38	1.00	0.78
0.375	0.50	1.00	0.78
0.50	0.62	1.00	0.78

Freq. (MHz)	Size (inch)	Part No.		
		P	M	B
1.0	0.5	P911	M911	B911
2.25	0.25	P912	M912	B912
	0.375	P913	M913	B913
	0.5	P914	M914	B914
5.0	0.25	P915	M915	B915
	0.375	P916	M916	B916
	0.5	P917	M917	B917
10.0	0.25	P918	M918	B918

Immersion Transducer

Single element immersion transducers are longitudinal wave transducers typically used in manual, semi-automatic, and automatic scanning systems.

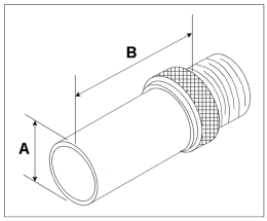
Main Feature :

- Superior near-surface resolution can be achieved when compared to contact transducers.
- Spherical or cylindrical focusing can be accomplished using acoustically matched lenses.
- Focal length must be specified.
- All transducers feature stainless steel housings to resist corrosion.

Application :

- Automated scanning.
- On-line thickness gauging.
- High speed flaw detection in pipe, bar, tube, plate, and other similar components.
- Time-of-flight and amplitude based imaging.
- Material analysis and velocity measurements.

Standard Case Style



Element Size(inch)	A (inch)	B (inch)
0.375	0.63	1.55
0.5	0.63	1.55
1.0	1.25	1.82

Freq. (MHz)	Size (inch)	Focus	Part No.		
			P	M	B
1.0	0.5	S/C/N	P701-SU	M701-SU	B701-SU
1.0	1.0	S/C/N	P702-SU	M702-SU	B702-SU
2.25	0.5	S/C/N	P703-SU	M703-SU	B703-SU
2.25	1.0	S/C/N	P704-SU	M704-SU	B704-SU
5.0	0.375	S/C/N	P705-SU	M705-SU	B705-SU
5.0	0.5	S/C/N	P706-SU	M706-SU	B706-SU

Focus: S=Spherical, C=Cylindrical, N=Non-focus

- All transducers have waterproof UHF connectors.
- Other connectors may be special ordered.

Immersion Transducer

Single element immersion transducers are longitudinal wave transducers typically used in manual, semi-automatic, and automatic scanning systems.

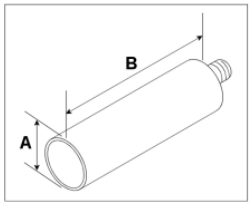
Main Feature :

- Superior near-surface resolution can be achieved when compared to contact transducers.
- Spherical or cylindrical focusing can be accomplished using acoustically matched lenses.
- Focal length must be specified.
- All transducers feature stainless steel housings to resist corrosion.

Application :

- Automated scanning.
- On-line thickness gauging.
- High speed flaw detection in pipe, bar, tube, plate, and other similar components.
- Time-of-flight and amplitude based imaging.
- Material analysis and velocity measurements.

Slim Line Case Style



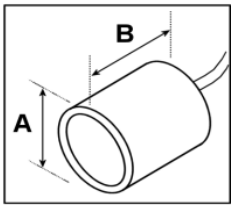
Element Size(inch)	A (inch)	B (inch)
0.25	0.38	1.45

- Slim line case style transducers with small diameter cases are designed for immersion applications where transducer size limitations exist.
- All transducers have Microdot connectors.

Freq. (MHz)	Size (inch)	Focus	Part No.		
			P	M	B
2.25	0.25	S/C/N	P731-M	M731-M	B731-M
5.0	0.25	S/C/N	P732-M	M732-M	B732-M
10.0	0.25	S/C/N	P733-M	M733-M	B733-M

Focus: S=Spherical, C=Cylindrical, N=Non-focus

Miniature



Element Size(inch)	A (inch)	B (inch)
0.125	0.20	0.28
0.25	0.39	0.28

- Built-in cable.
- Well thickness measurement and flaw detection.
- Miniature type is excellent choice for limited access applications.

Freq. (MHz)	Size (inch)	Focus	Part No.		
			P	M	B
1.0	0.25	S/C/N	P751	M751	B751
2.25	0.125	S/C/N	P752	M752	B752
	0.25	S/C/N	P753	M753	B753
5.0	0.125	S/C/N	P754	M754	B754
	0.25	S/C/N	P755	M755	B755
10.0	0.125	S/C/N	P756	M756	B756
	0.25	S/C/N	P757	M757	B757

Focus: S=Spherical, C=Cylindrical, N=Non-focus

High Frequency Polymer Transducer

High frequency polymer transducers have broadband characteristic which results in a comparatively higher resolution. Furthermore, the close impedance match of polymers to water produces a better transfer of sound energy.

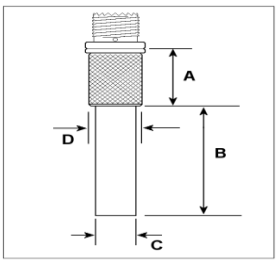
Main Feature :

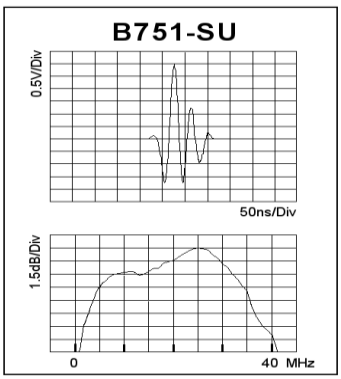
- Heavily damped broadband design provides excellent time resolution.
- Frequency range from 40MHz to 120MHz.
- Focusing allows for very small beam diameters.
- Immersion and focusing type.

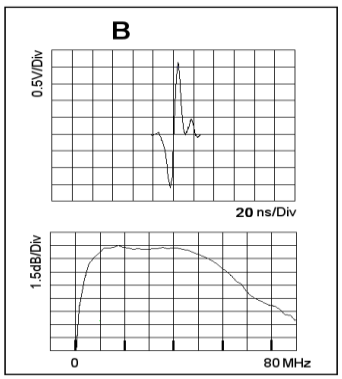
Application :

- Acoustic microscopy.
- On-line or quick inspection of semiconductor packaging specimen.
- High resolution flaw detection such as inspection for microporosity or microcracks.

High Frequency Straight Beam Probes with Polymer Elements







Part No.	A(mm)	B(mm)	C(mm)	D(mm)	Freq. (MHz)
B751-SU	20.0	40.0	14.0	18.5	40
B752-SU	20.0	40.0	14.0	18.5	80

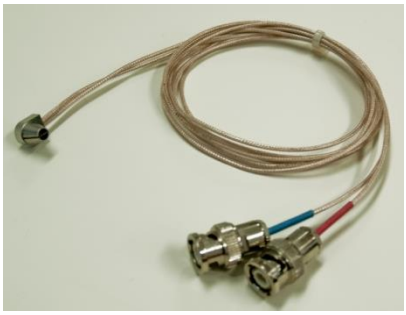
- All transducers have UHF connectors or right angle Microdot connectors.
- Probe cable RG-174.
- Stainless steel case.

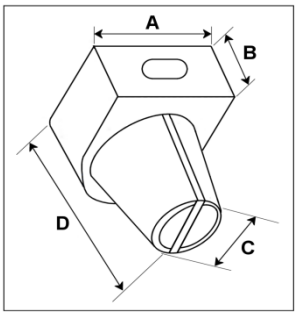
Thickness Gauging Transducer

Thickness gauging transducers are single or dual element contact transducers designed primarily for use with precision thickness gauges. They may also be used with most standard flaw detection instruments.

Main Feature :

- Separate transmitter and receiver elements.
- Built-in cable.
- Straight beam flaw detection and thickness gauging.
- The range measured in thickness is from 0.06” to 8.0” (1.5 mm – 200 mm).





Part No.	A (mm)	B (mm)	C (mm)	D (mm)	Freq. (MHz)
971-SB	9.6	5.0	5.0	13.0	5

- Probe cable RG-178 with BNC cable.
- Stainless steel case.

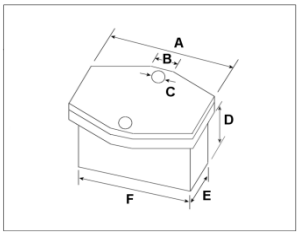
Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

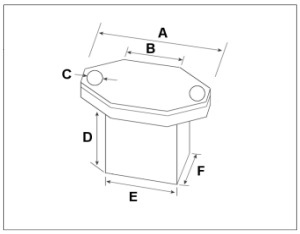
Dual Beam Transducer for Automatic Ultrasonic Testing of Thick Steel Plates(I)

M951

M954



M952



Part No.	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	Tolerance (mm)	Freq. (MHz)	Temperature Range
M951-L1	36.0	6.0	Φ4.5	23.0	14.0	30.0	+0 -0.1	5	≤ 60℃
M951H-L1-S M951H-L1-L M951H-M									≤ 110℃
M952-L1	33.0	16.0	Φ4.5	23.0	18.0	14.0	+0 -0.1	5	≤ 60℃
M952H-L1									≤ 110℃
M954-L1	36.0	6.0	Φ4.5	23.0	14.0	30.0	+0 -0.1	2.25	≤ 60℃
M954H-L1									≤ 110℃

Main Feature :

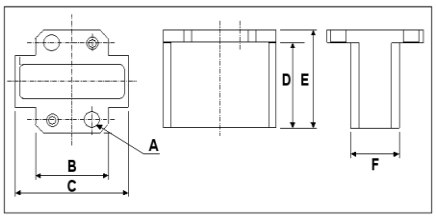
- Detection of flaws bigger than 2mm in size and ranging from 3 to 70 mm in depth.
- Probe cable similar to RG-174 and twin cable.
- Brass case.

Special Transducers

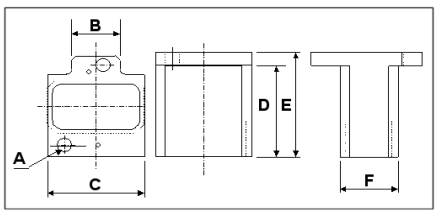
The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These include the modification of transducer case design, element size and shape or the connector type and location. The customer may require transducers with custom electrical and acoustic performance including non-standard frequencies, resolution, sensitivity, bandwidth or focusing. Special wedges, delay lines and cables are also designed.

Dual Beam Transducer for Automatic Ultrasonic Testing of Thick Steel Plates(II)

M963



M964



Part No.	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	Freq. (MHz)
M963-BU	Φ4.8	19.0	34.0	24.0	28.0	14.0	5
M964-L1	Φ4.5	12.0	25.0	24.0	29.0	15.0	5

Main Feature :

- Detection of flaws bigger than 2 mm in size and ranging from 3 to 70 mm in depth.
- Probe cable RG-174, parallel cable.
- Stainless steel case.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

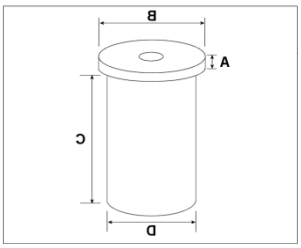
Dual Beam Transducer for Semi-Automatic Ultrasonic Testing of Thick Steel Plates

Main Feature :

- Straight beam flaw detection and thickness gauging.
- Good near resolution.
- Vertical scanning by longitudinal waves.

Application:

- Semi-automatic inspection of thick steel plate.
- Remaining wall thickness measurement.
- Detection of porosity, inclusions, cracks, and laminations in castings and forgings.



Part No.	A(mm)	B(mm)	C(mm)	D(mm)	Freq. (MHz)
RD4M30D (M941-L1)	5.0	34.0	60.0	30.0	4

- LEMO connectors : FFA.00 / FFA.1S
- Other connectors may be special ordered.
- Probe cable RG-174, parallel cable.
- Brass steel case.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Immersion Transducer for Automatic Ultrasonic Testing of Hot-Rolled Steel

This transducers are immersion transducers designed for Surface roughness testing in hot-rolled process.

MODEL : P711

Main Feature & Applications :

- Frequency : 15MHz
- Surface roughness testing in hot-rolled process
- Single ultrasonic element for transmission and reception of sound pulses.
- Inspection of pipes, tubes, bar, as well as structural components for weld defects or cracks.
- Time-of-flight and amplitude based imaging.
- Vertical scanning by longitudinal waves.
- Stainless steel case.(SUS304)

Dual Beam Transducer for Manual Weld Inspection

This transducer is well known in the nuclear industry for inspection of critical weld areas in pipes and pressure vessels.

MODEL : P931

Main Feature & Application :

- Frequency : 1MHz
- Inspection of coarse grain austenitic steel.
- Automated scanning of pipe and pressure vessels.
- Detection and sizing of flaw.
- Stainless steel case.(SUS304)
- Right angle Microdot connector.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Angle / Dual Probe for Railroad Automatic Inspection

Detects internal flaws in rails by means of these 3 type transducer installed on the ultrasonic rail inspection car.

RIA1

RIA2

MODEL :
- **RIA1** : 3MHz, 35°
- **RIA2** : 2MHz, 70°

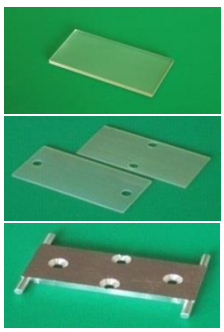
Main Feature & Applications :
- Angle beam probes with integrated plastic wedges for transverse waves.
- Single ultrasonic element for transmission and reception of sound pulses.
- Probe for angle scanning with transverse waves.
- High resolution and good flaw detectability.
- Probe cable RG 174 with a BNC (P-316/U) connector.
- Inspection of pipes, tubes, forgings, castings, as well as machined and structural components for weld defects of cracks.

RID

MODEL : RID

Main Feature & Applications :
- Frequency : 4MHz
- Separate transmitter and receiver elements.
- Probe for angle scanning with transverse waves.
- High resolution and good flaw detectability.
- Probe cable RG 174 with a BNC (P-316/U) connector.
- Detection of porosity, inclusions, cracks, and laminations in castings and forgings.

Accessories



Description	Material & Spec.	Remark
1. Shoe	Plexiglas	• Available both angle beam probe and dual beam
2. Sealer	Rubber	• To be ordered separately
3. Probe holder	Aluminum	• One of probe holders for automatic Inspection

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Angle / Dual Probe for Railroad Manual Inspection

Detects internal flaws in rails by means of these 3 type transducer installed on a cart which is guided over the rail by hand.

RIMA1

RIMA2

MODEL :
- **RIMA1** : 2MHz, 45°
- **RIMA2** : 2MHz, 70°

Main Feature & Applications :
- Angle beam probes with integrated plastic wedges for transverse waves.
- Single ultrasonic element for transmission and reception of sound pulses.
- Probe for angle scanning with transverse waves.
- High resolution and good flaw detectability.
- Probe cable RG 174 with a GR connector.

RIMD

MODEL : RIMD

Main Feature & Applications :
- Frequency : 5MHz
- Separate transmitter and receiver elements.
- High resolution and good flaw detectability.
- Probe cable RG 174 with a GR connector.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Angle / Normal Beam Probe for Automatic Inspection of the Axle and Wheel of a Train

These transducers are designed to detect internal flaws, crack, attenuation in rail wheels and axles.

TXA1

TXA2

MODEL :
- **TXA1** : 2MHz, 45°
- **TXA2** : 2MHz, 17°

Main Feature & Applications :
- Probe for angle scanning with transverse waves.
- Single ultrasonic element for transmission and reception of sound pulses.
- High resolution and good flaw detectability.
- Stainless steel case.
- Inspection of pipes, tubes, forgings, castings, as well as machined and structural components for weld defects of cracks.
- Angle beam probes with integrated plastic wedges for transverse waves.
- Probe cable RG 174 with a UHF connector.

TXN1

MODEL : TXN1

Main Feature & Applications :
- Frequency : 2MHz
- Probe for angle scanning with longitudinal waves.
- Single ultrasonic element for transmission and reception of sound pulses.
- High resolution and good flaw detectability.
- Stainless steel case.
- Inspection of pipes, tubes, forgings, castings, as well as machined and structural components for weld defects of cracks.
- Angle beam probes with integrated plastic wedges for longitudinal waves.
- Probe cable RG 174 with a UHF connector.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Immersion Probe for Nuclear Fuel Lot

This transducer is used in non-destructive inspections of nuclear fuel lot and consist of transmitting and receiving element.

MODEL : IPNF

Main Feature & Applications :

- Frequency : 10MHz
- The ultrasonic pitch-catch testing.
- Vertical scanning by longitudinal waves.
- Probe cable : UT-20
- Stainless steel case.

Immersion Probe for Atomic Power Plant Inspection

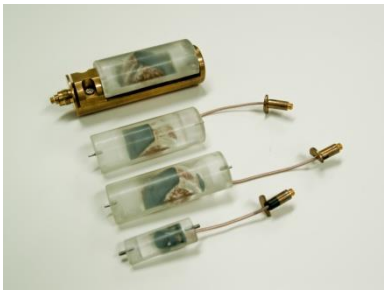
MODEL : IPAP

Main Feature & Applications :

- Frequency : 2.25MHz
- Single ultrasonic element for transmission and reception of sound pulses.
- Immersion focusing type.
- Probe for vertical scanning with longitudinal waves.
- Probe cable RG 174 with Microdot connector.

Angle Probe for UST in pipe

Pipe inspections are performed using shear waves refracted from a longitudinal wave by means of a acryl wedge. Refracted shear wave angles are 60 °, 88 °.



MODEL :

- **T1-1** : 2.25MHz, 60°
- **T1-2** : 2.25MHz, 60°
- **T1-3** : 2.25MHz, 88°

Main Feature & Applications :

- Angle beam probes with integrated plastic wedges for transverse waves.
- Probe for angle scanning with transverse waves.
- Probe cable RG 178 with a Microdot connector.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Immersion Probe for On-line Inspection of Automobile Components

This immersion transducers are used in on-line inspection of automobile components. Frequency are designed to produce 10MHz.

MODEL :
- **IPAC1** : 10MHz, focal length-90mm
- **IPAC2/3** : 10MHz, focal length-30mm
- **IPAC4/5** : 10MHz, focal length-20mm

Main Feature & Applications :
- Single ultrasonic element for transmission and reception of sound pulses.
- High speed flaw detection in welding point, pipe, bar and tube.
- Time-of-flight and amplitude based imaging.
- Vertical scanning by longitudinal waves.
- Focal beam immersion type.
- Stainless steel case.
- Probe cable RG 174 with a LEMO.FFA.1S connector.

Immersion Probe for On-line Inspection of Small Components

This immersion transducers are used in on-line inspection of internal flaws in wire rods by means of pitch-catch testing.

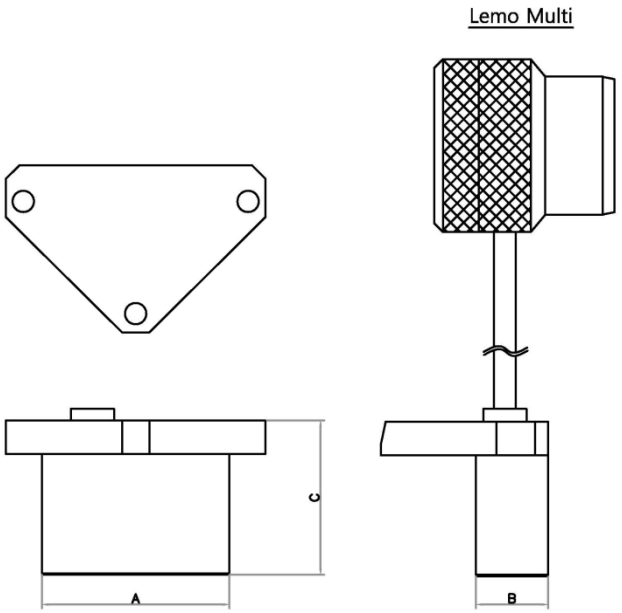
MODEL :
- **IPL1/3** : 5MHz, transmitter
- **IPL2/4** : 5MHz, receiver

Main Feature & Applications :
- Through-transmission testing.
- High speed flaw detection in plate, bar and wires.
- Vertical scanning by longitudinal waves.
- Immersion transducer.
- Stainless steel case.
- Probe cable RG 174 with a LEMO.FFA.1S connector.

Special Transducers

The special transducers are ultrasonic transducers for specific ultrasonic testing applications. These 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 wedges, delay lines and cables are also designed.

Product Name: HPK Ultrasonic Multi Transducer
Model : B955-L1



Model : B955-L1

- Separated Transducers[TR probe]
- Cable: 1.2m, Connector: LEMO(FFA)x3, LEMO(PCA)x1

Part No.	A(mm)	B(mm)	C(mm)	Freq. (MHz)	Temperature Range
M955-1	65	25	53.7	5	≤ 100℃

Medical Ultrasonic Transducer

This probe is designed to measure broadband ultrasonic attenuation and the speed of sound in bone.

Immersion Probe for Bone Density Measurement

This immersion transducers are designed to calculate SOS(Speed of Sound) and BUA(Broadband Ultrasound Attenuation) at calcaneus. Focal type is used in bone tissue scanning.

IPBD1

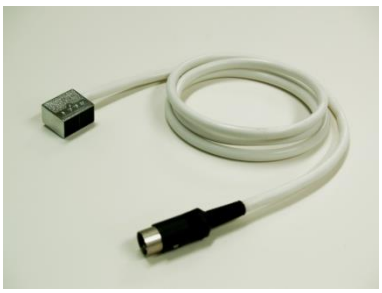
IPBD2

MODEL :
- **IPBD1** : 0.5MHz
- **IPBD2** : 0.5MHz, Focal beam type

Main Feature & Applications :
- The probe for calcaneus density measurement.
- The ultrasonic pulse-echo/pitch-catch testing.
- High resolution and good flaw detectability.
- Osteoporosis examination in bone.
- Probe cable RG 174 with a BNC connector.

Contact Dual Probe for One-Side Bone Density Measurement

This immersion transducer is designed to measurement of the speed , dispersion, and attenuation of ultrasonic waves propagating along the bone.



MODEL : CDBD

Main Feature & Applications :
- Frequency : 2MHz
- The probe for phalanx density measurement.
- The ultrasonic one-side pitch-catch testing.
- Osteoporosis examination in bone.
- Probe cable RG 174 with a BNC connector.

AE Sensor

Acoustic Emission(AE) is a powerful method for examining the behavior of materials deforming under stress. AE may be defined as a transient elastic wave generated by the rapid release of energy within a material. Materials “talk” when they are in trouble : with AE sensor you can “listen” to the sounds of cracks growing, fibers breaking and many other modes of active damage in the stressed material. Small-scale damage is detectable long before failure, so AE can be used as a non-destructive technique to find defects during structural proof tests and plant operation.

Application :

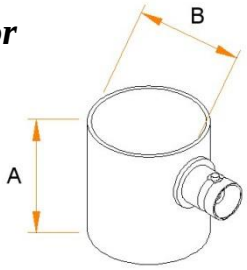
- Behavior of materials: metals, ceramics, composites, rocks, concrete :
  - Crack propagation, Yielding, Fatigue, Corrosion, Stress corrosion, Creep, Fiber fracture
- Nondestructive testing during manufacturing processes:
  - Material processing.
  - Phase transformation in metals and alloys.
  - Detection of defects such as pores, quenching cracks, inclusions, etc.
  - Fabrication.
- Monitoring structures:
  - Continuous monitoring.(metallic structures, mines, etc.)
  - Periodic testing.(pressure vessels, pipelines, bridges, cables, etc.)
  - Leak detection.

AE Sensor

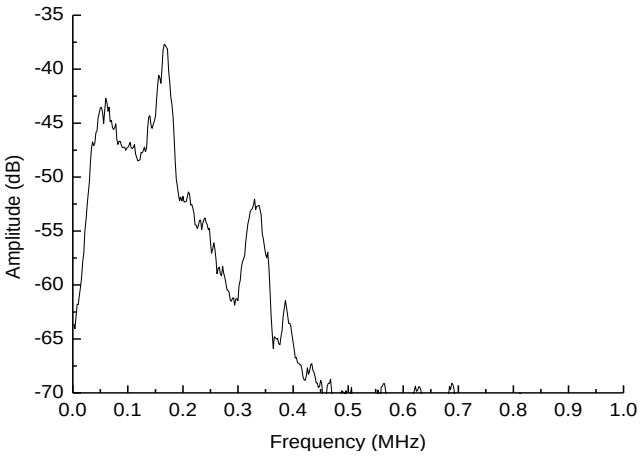
General Purpose Sensors

Model	Dimension AXB (mm)	Resonant Frequency (kHz)	Operation Frequency Range (kHz)
HaGi-AE-R6	31 x Φ29	65	35-100
HaGi-AE-R15S	22 x Φ19	150	50-400
HaGi-AE-R15	31 x Φ29	150	50-400
HaGi-AE-R15I	31 x Φ29	150	50-400
HaGi-AE-R30S	22 x Φ19	300	150-400
HaGi-AE-R30	31 x Φ29	300	150-400
HaGi-AE-R30I	31 x Φ29	300	150-400
HaGi-AE-R50S	22 x Φ19	500	100-700
HaGi-AE-R50	31 x Φ29	500	100-700
HaGi-AE-R80S	22 x Φ19	800	200-1000
HaGi-AE-R80	31 x Φ29	800	200-1000

HaGi-AE-R15 Sensor



Frequency response (HaGi-AE-R15)



Specifications
- Model : HaGi-AE-R15
- Resonant Frequency : 150KHz
- Operation Frequency Range : 50-200

Dimension
- A-31mm
- B-Φ29mm

Physical
- Connector : BNC
- Case Material : Stainless Steel
- Face Material : Ceramic
- Seal : Epoxy
- Element Size : Φ12.7mm

Calibration
- Based on ASTM E1106
  - Source : glass capillary (ID:50, OD:70) breaking
  - Test target : 300mm steel block

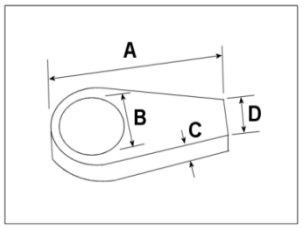
HaGi-AE-R15I Sensor

Specifications
- Integral Preamplifier Acoustic Emission Sensor
- 40dB preamplifier and filter

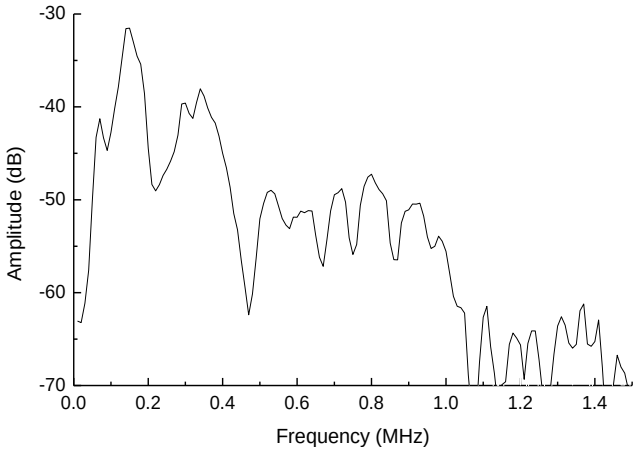
AE Sensor

Miniature Sensors

AE-SC Sensor



Frequency response



Specifications

- Model : AE-SC
- Resonant Frequency : 150KHz
- Operation Frequency Range : 50-1000KHz

Dimension

- A-15mm
- B-Φ8.25mm
- C-4.0mm
- D-5.0mm

Physical

- Cable : RG 178
- Connector : BNC
- Case Material : Aluminum
- Face Material : Ceramic
- Seal : Epoxy
- Element Size : Φ8.25mm

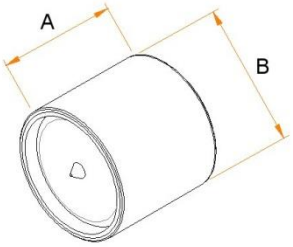
Calibration

- Based on ASTM E1106
  - Source : glass capillary (ID:50, OD:70) breaking
  - Test target : 300mm steel block

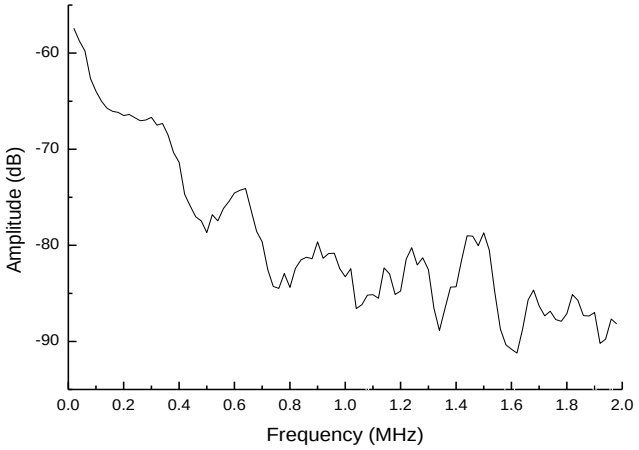
AE Sensor

Wideband Sensors

AE-WD1 Sensor



Frequency response



Specifications

- Model : AE-WD1
- Operation Frequency Range : ~2000KHz

Dimension

- A-43mm
- B-Φ51mm

Physical

- Cable : RG 174
- Connector : BNC
- Case Material : Aluminum
- Seal : Epoxy
- Element Size : Φ6mm

Calibration

- Based on ASTM E1106
  - Source : glass capillary (ID:50, OD:70) breaking
  - Test target : 300mm steel block

Accessories

Cables and Adaptors

- We offer a variety of cable grades and adaptors to meet your specific application needs.
- Custom cables and adaptors are available upon request.
- Cable lengths are commonly manufactured on request.
- Special cables are available upon request.

Cables

Description	Cable Type	Part No.
BNC to BNC	174 P174 178	SB-174-SB SB-P174-SB SB-178-SB
BNC to Right Angle BNC	"	See cable part number notation on page 3
BNC to Microdot	"	
BNC to Right Angle Microdot	"	
BNC to UHF	"	
BNC to LEMO FFA.00	"	
BNC to LEMO FFA.1S	"	
BNC to BURNDY	"	
Microdot to Microdot	"	
Microdot to Right Angle Microdot	"	
Microdot to UHF	"	
Microdot to LEMO FFA.00	"	

Description	Cable Type	Part No.
Microdot to LEMO FFA.1S	174 P174 178	M-174-L1 M-P174-L1 M-178-L1
Microdot to BURNDY	"	See cable part number notation on page 3
UHF to UHF	"	
UHF to LEMO FFA.00	"	
UHF to LEMO FFA.1S	"	
UHF to BURNDY	"	
LEMO FFA.00 to LEMO FFA.00	"	
LEMO FFA.00 to LEMO FFA.1S	"	
LEMO FA.00 to BURNDY	"	
LEMO FFA.1S to LEMO FFA.1S	"	
LEMO FFA.1S to BURNDY	"	
BURNDY to BURNDY	"	

Please, consult us for other connector styles and cable types.
RG-174 parallel(P174) cable is used to fit dual element transducers.

Adaptors

Description	Part No.
BNC Male to BNC Male	BB1
BNC Male to UHF Female	BU1
BNC Male to UHF Male	BU2
BNC Female to UHF Male	BU3
Right Angle UHF Male to UHF Female	UU1
UHF Male to UHF Male	UU2
UHF Female to UHF Female(Flange)	UU3
UHF Tee Female to Female/Male	UU4
UHF Tee Female to Female/Female	UU5

Description	Part No.
BNC Tee Female to Female/Male	BB2
BNC Tee Female to Female/Female	BB3
LEMO 00 Male to BNC Female	LB1
LEMO 00 Female to BNC Male	LB2
LEMO 00 Female to BNC Female	LB3
LEMO 00 Female to UHF Male	LU1

Transducer Certification

Real Time Waveform and Frequency Spectrum

The time response of a search unit is established from the rf waveform of the echo received from a given target using the pulse-echo or pitch-catch procedure. This response is used as the basis for evaluating other operation and recovery parameters of the search unit such as waveform duration and damping.

The frequency response(also known as frequency spectrum) is a measure of the amplitude of the pulse-echo response from a given target as a function of frequency. This response is used as the basis for establishing other operating parameters of the search unit including peak frequency, center frequency, bandwidth.

HAGISONIC CO.,LTD.

Transducer Certification

TRANSDUCER DESCRIPTION

Part No. : 1Z20×22NA
Serial No. : 29-002
Designation : Contact

Frequency : 1MHz
Element Size : 20×22

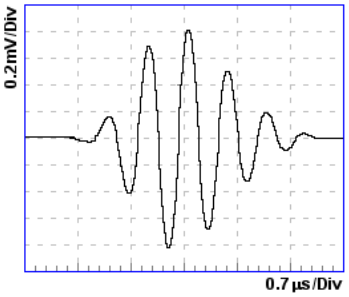
TEST EQUIPMENT

UI-23 Portable ultrasonic flaw detector

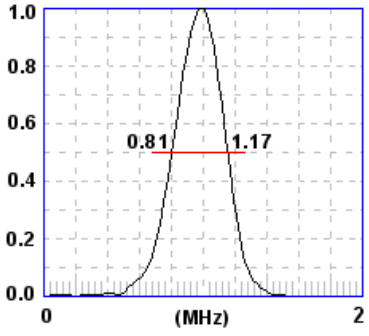
TEST CONDITIONS

Input Impedance : 50 Ohm
Receiver Setting : 20dB gain
Bandwidth of receiving amplifier : Super broad
Target : Back wall of 50mm steel block
Contact Couplant : Machine oil
Cable : RG-174/U 35cm

Signal Waveform



Frequency Spectrum



TEST DATA

Waveform Duration	Spectrum Measurements
-14dB Level : 1.100µs	Center Freq. : 0.99MHz
-20dB Level : 1.135µs	Peak Freq. : 0.98MHz
-40dB Level : 1.170µs	-6dB Bandwidth : 36.0%

Deviation of center frequency : 1.0 %

Measurements of peak and center frequency, upper and lower –6dB frequency, bandwidth, and waveform duration are made according to ASTM-E 1065 and are tabulated on the test form.

ACCEPTED BY _____DATE :

Transducer Certification

Beam Profiles

Transverse Profiles-Transverse profiles are obtained by scanning the target(usually either a steel ball or rod) through the sound beam at selected distances away from the face of the search unit. To establish beam patterns or beam symmetry, the beam should be plotted in two orthogonal directions at the near-far field transition or other selected distances, or both, as agreed by the users.

On-Axis Profiles-On-axis profile is obtained from the transverse profile by recording the amplitude of the center of the transverse plots as a function of distance from the face of the search unit and provide data on depth of field and focal length.

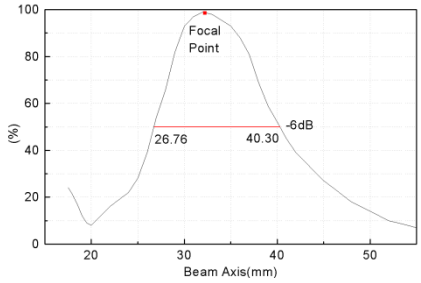
HAGISONIC CO.,LTD.

Transducer Certification

TRANSDUCER DESCRIPTION

Part No. : IPAC2 Frequency : 10MHz
Serial No. : 03-001 Element Size : 6mm DIA.
Designation : Spherical Focusing

On-Axis Profile



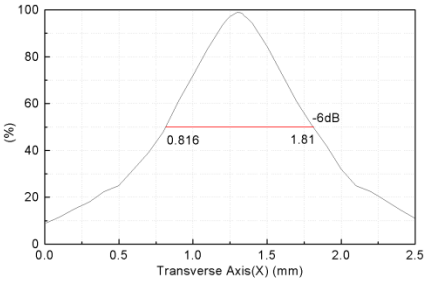
TEST EQUIPMENT

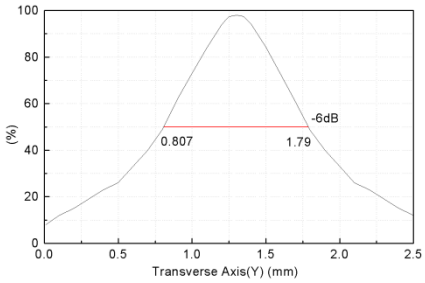
Pulser-Receiver / Scanner : Sonix Flex-Scan

TEST CONDITIONS

Pulser Energy : 4
High Pass Filter : 1.0MHz
Low Pass Filter : 5.0MHz
Gain : 23dB
Target : 3mm steel ball
Contact Couplant : Machine oil
Cable : RG-174/U 35cm

Transverse Profile





TEST DATA

Focal Length : 32mm
Depth of Field : 13.54mm(-6dB level)
Beam Diameter(-6dB level)
X : 0.994mm
Y : 0.983mm
Symmetry : 0.99

Measurements are made according to ASTM-E 1065 and are tabulated on the test form.

ACCEPTED BY _____DATE :

Acoustic Properties of Materials

Material	Mass Density (Kg/m^3)	Longitudinal Velocity (m/s)	Shear Velocity (m/s)	Acoustic Impedance ($10^6 Kg/m^2 s$)
Acrylic resin(Perspex®)	1,180	2,730	1,430	3.22
Aluminum	2,700	6,320	3,130	17.06
Beryllium	1,820	12,900	8,880	2.35
Brass	8,560	4,280	2,030	36.64
Brass, naval	8,420	4,430	2,120	37.30
Cadmium	8,640	2,780	1,500	24.02
Copper	8,930	4,660	2,260	41.61
Epoxy resin	1,100-1,250	2,400-2,900	1,100	2.77-3.6
Glass, quartz	2,600	5,770	3,520	15.00
Gold	19,320	3,240	1,200	62.60
Inconel®	8,500	5,820	3,020	49.47
Iron,cast	6,950-7,350	3,500-5,600	2,200-3,200	25-40
Lead	11,340	2,160	700	24.49
Lucite®	1,180	2,680	1,260	3.16
Manganese	7,390	4,660	2,350	34.44
Mercury	13,560	1,450	-	19.66
Molybdenum	10,200	6,250	3,350	63.75
Platinum	21,400	3,960	1,670	84.74
Plexiglas®	1,270	2,760	-	3.51
Polyethylene	900	1,940	-	1.75
Polystyrene	1,056	2,340	-	2.47
Polyvinylchloride,PVC hard	1,400	2,395	1,060	3.35
Quartz, natural	2,650	5,730	-	15.18
Rubber, soft	900	1,480	-	1.33
Silicon rubber	1,010	1,030	-	1.04
Silver	10,490	3,600	1,590	37.76
Steel, 1020	7,710	5,890	3,240	45.41
Steel, 4340	7,800	5,850	3,240	45.63
Steel, 302, austenitic stainless	8,030	5,660	3,120	45.45
Steel, 347, austenitic stainless	7,910	5,740	3,090	45.40
Steel, 410, martensitic	7,670	5,390	2,990	41.34
Tin	7,290	3,320	1,670	24.20
Titanium	4,500	6,070	3,110	27.32
Tungsten	19,250	5,180	2,870	99.72
Uranium	18,700	3,370	1,980	63.02
Water(20℃)	1,000	1,480	-	1.48
Zinc	7,100	4,170	2,410	29.61
Zirconium	2,480	4,650	2,250	30.13

ISO 9001 Certified

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