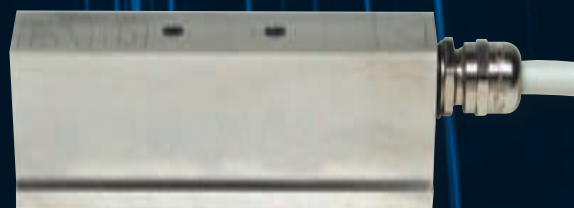


# PHASED-ARRAY ULTRASOUND PROBE CATALOG

2005–2006



920-068B



**R/D**  
TECH®

# The Company

R/D Tech designs and manufactures eddy current and ultrasound test systems for manual and automated non-destructive testing. These systems are used throughout the world for the analysis of defects caused by processes like welding, extrusion, and casting, as well as wear, corrosion, and fatigue.

Our broad field of activity includes nuclear, fossil and hydroelectric power plants, oil refineries, pipeline construction and maintenance, aerospace and automobile industries, and industrial production.

## R/D Tech Ultrasonic Transducers

R/D Tech Ultrasonic Transducers is a division of R/D Tech that designs and manufactures multi-element ultrasound probes for NDT inspections. We produce an unmatched quality of precision composite ceramic that ensures the highest sensitivity and consistency for our probes. Our engineering team has a high level of experience in developing standard and custom products in ultrasonic technologies. Using an innovative design platform and through wise capital and human investments, we are able to deliver the highest quality probes quickly and at a reasonable price.

We invite you to browse this catalog to find out more about R/D Tech® ultrasound phased-array probes and their applications.

## Warranty

R/D Tech offers a one-year warranty on all the phased-array probes sold. These products are guaranteed against all defects in materials and manufacturing.

All products covered by this warranty must be examined by R/D Tech and receive their approval in advance before any repairs or replacement are made. Any shipping costs are at the expense of the customer.

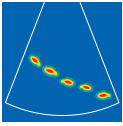
The warranty excludes defects and deterioration due to normal wear and tear, or caused by an external accident such as:

- Incorrect assembly
- Poor maintenance
- Incorrect usage
- Exposition to temperatures out of the range of  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  for storage or  $10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  for operation.
- Excessive voltage (max. 180 V for 7.5 MHz and below, max. 100 V for 10 MHz and above)
- Use of unqualified couplant
- Unforeseen modifications of the product

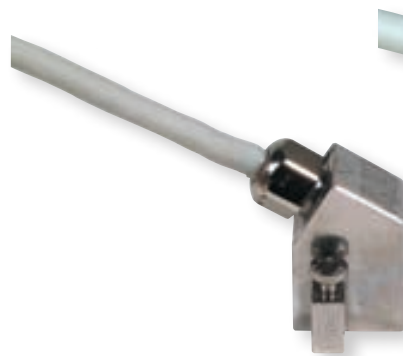
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# ANGLE BEAM PROBES



5L10-A0-TOP



5A16-A1



2L64-A2

Angle beam probes are used with a wedge to transmit a refracted shear or longitudinal wave into a test piece. They are designed for a wide range of applications and can be used to vary the refracted beam angle or the skew of the beam, depending on the wedge orientation.

## Advantages

- Many different wedges can be chosen for the same probe to suit any angle beam applications.
- Probes are designed to keep the probe/wedge combination with a low profile for easier access in restricted areas.
- Wave layers with acoustic adaptation to Rexolite®
- Captive anchoring screws are provided with the probe.

## Typical Applications

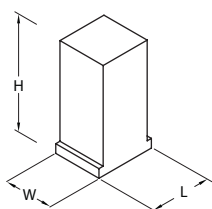
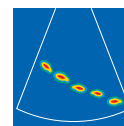
### A0-, A1-, and A2-type probes

- Manual or automated inspection of 6.35- to 38-mm (0.25- to 1.5-in.) thick welds
- Detection of flaws and sizing
- Inspections of castings, forgings, pipes, tubes, and machined and structural components for cracks and welding defects

### A3-, A4-, and A5-type probes

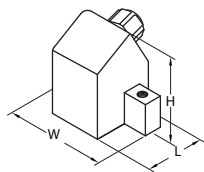
- Deep penetration applications

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

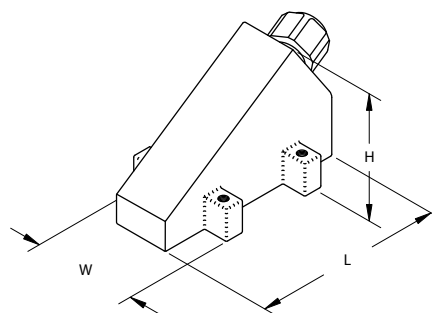


A0 casing

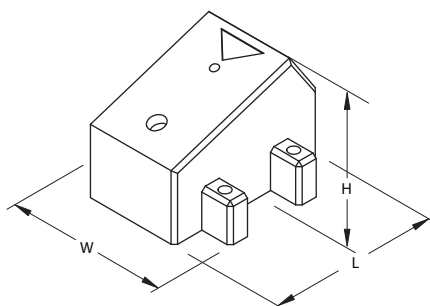
Cable connector can either come out from the side or the top.



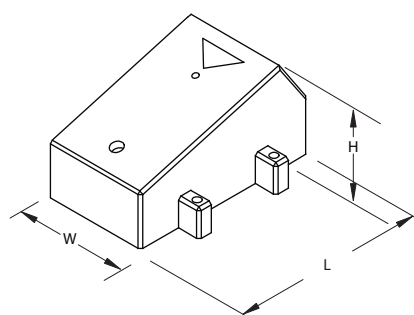
A1 casing



A2 casing



A3 casing



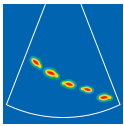
A4 and A5 casing

## Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch (mm)	Elevation (mm)	External dimensions mm (in.)		
					L	W	H
5L10-A0-SIDE	5.0	10	0.60	6.0	12 (0.50)	10 (0.40)	23 (0.90)
5L10-A0-TOP	5.0	10	0.60	6.0	12 (0.50)	10 (0.40)	23 (0.90)
10L10-A0-SIDE	10.0	10	0.60	6.0	12 (0.50)	10 (0.40)	23 (0.90)
10L10-A0-TOP	10.0	10	0.60	6.0	12 (0.50)	10 (0.40)	23 (0.90)
2L16-A1	2.25	16	0.75	12.0	17 (0.67)	29 (1.14)	25 (0.98)
5L16-A1	5.0	16	0.62	10.0	17 (0.67)	29 (1.14)	25 (0.98)
10L32-A1	10.0	32	0.31	7.0	17 (0.67)	29 (1.14)	25 (0.98)
2L64-A2	2.25	64	0.75	12.0	53 (2.09)	29 (1.14)	35 (1.38)
5L64-A2	5.0	64	0.59	10.0	53 (2.09)	29 (1.14)	35 (1.38)
5L16-A3	5.0	16	1.20	19.2	35 (1.38)	35 (1.38)	25 (0.98)
3L16-A3	3.5	16	1.60	25.6	35 (1.38)	35 (1.38)	25 (0.98)
2L16-A4	2.25	16	2.00	32.0	57 (2.25)	45 (1.80)	30 (1.20)
1L16-A4	1.5	16	2.80	44.8	57 (2.25)	45 (1.80)	30 (1.20)
2L32-A5	2.25	32	0.75	24.0	29 (1.15)	42 (1.67)	25 (0.98)
5L32-A5	5.0	32	0.60	19.2	29 (1.15)	42 (1.67)	25 (0.98)

These probes come standard with an OmniScan® Connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.



# WEDGES FOR ANGLE BEAM PROBES



SA0-N45S



SA1-L45L



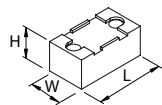
SA2-N55S



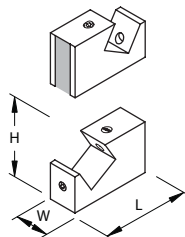
SA2-0L

## Advantages

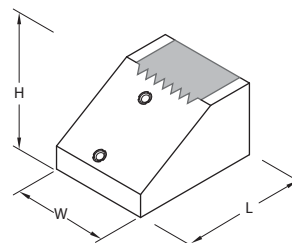
- Available in standard refracted angles of 0, 45, 55, and 60 degrees in steel for angle beam inspection from 30 to 70 degrees, SW or LW
- New attenuating material to eliminate parasite echoes
- Stainless steel screw receptacles provide a firm anchoring of the wedge to the probe.
- Lateral electronic scanning replacing the hand skewing movement
- Many wedge options can be added to improve the quality of the inspection: irrigation, mounting holes for the wedge holder to work with any R/D Tech® scanner, and carbide pins to increase wear resistance.
- Wedge design made to perform manual or automated scans
- Wedges can be customized to create different refracted angles with all kinds of shapes.



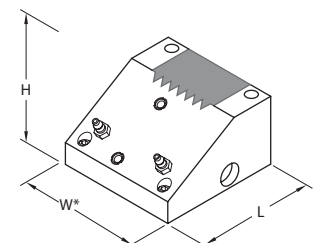
SA0-0L P



SA0-N45S P

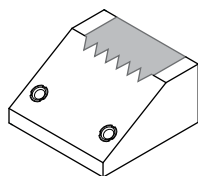


SA1-L45S P



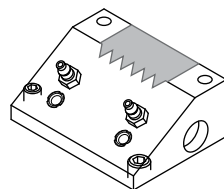
SA1-L45S IHC

## R/D Tech offers two options for the wedges:



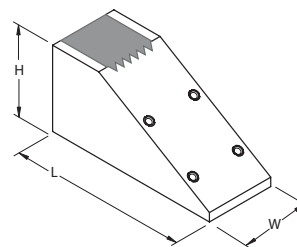
### P (plain)

Designed for manual inspections with gel couplant or water but not fed from an irrigation system.

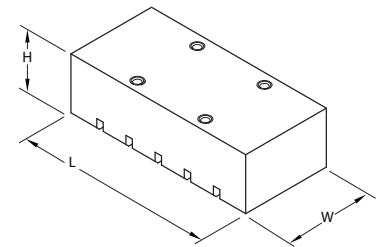


### IHC

(irrigation, holes, and carbides) Same as P but with irrigation, scanner yoke attachment points, and four carbide inserts to reduce wear.

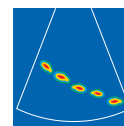


SA2-N45S P



SA2-0L P

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

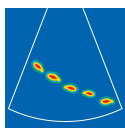


## Wedge Specifications and Dimensions

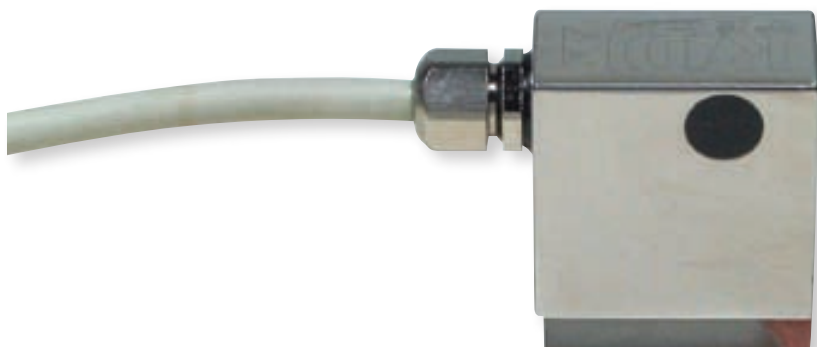
Part number	Probe type	Nominal refracted beam angle in steel	Sweep (deg.)	Probe orientation	External dimensions mm (in.)			
					L	W	W*	H
SA0-0L	A0	0° LW	N/A	N/A	23 (0.89)	12 (0.48)	N/A	11 (0.42)
SA0-N45S	A0	45° SW	30 – 60	Normal	32 (1.10)	11 (0.44)	N/A	25 (1.00)
SA0-N45L	A0	45° LW	30 – 60	Normal	28 (1.27)	11 (0.44)	N/A	20 (0.80)
SA0-N60S	A0	60° SW	30 – 60	Normal	32 (1.27)	11 (0.44)	N/A	21 (0.85)
SA1-0L	A1	0° LW	N/A	N/A	29 (1.14)	30 (1.18)	30 (1.20)	20 (0.79)
SA1-N45S	A1	45° SW	30 – 60	Normal	30 (1.20)	30 (1.18)	40 (1.57)	17 (0.67)
SA1-N45L	A1	45° LW	30 – 60	Normal	28 (1.10)	30 (1.18)	40 (1.57)	24 (0.94)
SA1-N60S	A1	60° SW	45 – 70	Normal	27 (1.06)	30 (1.18)	40 (1.57)	16 (0.65)
SA1-N60L	A1	60° LW	45 – 70	Normal	28 (1.10)	30 (1.18)	40 (1.57)	21 (0.83)
SA1-L45S	A1	45° SW	30 – 60	Lateral	45 (1.77)	35 (1.38)	45 (1.77)	27 (1.06)
SA1-L45L	A1	45° LW	30 – 60	Lateral	45 (1.77)	35 (1.38)	45 (1.77)	42 (1.65)
SA2-0L	A2	0° LW	N/A	N/A	66 (2.60)	30 (1.18)	30 (1.18)	20 (0.80)
SA2-N45S	A2	45° SW	30 – 60	Normal	77 (3.03)	30 (1.18)	40 (1.57)	38 (1.48)
SA2-N45L	A2	45° LW	30 – 60	Normal	66 (2.60)	30 (1.18)	40 (1.57)	34 (1.34)
SA2-N55S	A2	55° SW	30 – 70	Normal	69 (2.7)	30 (1.18)	40 (1.57)	43 (1.69)
SA2-N60S	A2	60° SW	45 – 70	Normal	77 (3.02)	30 (1.18)	39 (1.54)	40 (1.58)
SA2-N60L	A2	60° LW	45 – 70	Normal	67 (2.64)	30 (1.18)	40 (1.57)	35 (1.38)
SA3-0L	A3	0° LW	N/A	N/A	38 (1.50)	37 (1.46)	N/A	20 (0.79)
SA3-N45S	A3	45° SW	30 – 60	Normal	55 (2.16)	37 (1.46)	N/A	30 (1.18)
SA3-N45L	A3	45° LW	30 – 60	Normal	55 (2.16)	37 (1.46)	N/A	49 (1.93)
SA3-N60S	A3	60° SW	45 – 70	Normal	58 (2.28)	37 (1.46)	N/A	32 (1.26)
SA3-N60L	A3	60° LW	45 – 70	Normal	53 (2.08)	37 (1.46)	N/A	40 (1.57)
SA3-L45S	A3	45° SW	30 – 60	Normal	50 (1.97)	49 (1.93)	N/A	26 (1.02)
SA3-L45L	A3	45° LW	30 – 60	Normal	48 (1.89)	52 (2.05)	N/A	33 (1.30)
SA3-L60S	A3	60° SW	45 – 70	Normal	56 (2.20)	52 (2.05)	N/A	31 (1.22)
SA3-L60L	A3	60° LW	45 – 70	Normal	48 (1.89)	50 (1.97)	N/A	28 (1.10)
SA4-0L	A4	0° LW	N/A	N/A	59 (2.32)	47 (1.85)	N/A	20 (0.79)
SA4-N45S	A4	45° SW	30 – 60	Normal	90 (3.54)	47 (1.85)	N/A	51 (2.00)
SA4-N45L	A4	45° LW	30 – 60	Normal	89 (3.50)	47 (1.85)	N/A	85 (3.35)
SA4-N60S	A4	60° SW	45 – 70	Normal	86 (3.38)	47 (1.85)	N/A	45 (1.77)
SA4-N60L	A4	60° LW	45 – 70	Normal	83 (3.27)	47 (1.85)	N/A	68 (2.68)
SA4-L45S	A4	45° SW	30 – 60	Normal	63 (2.48)	74 (2.91)	N/A	32 (1.26)
SA4-L45L	A4	45° LW	30 – 60	Normal	63 (2.48)	81 (3.19)	N/A	51 (2.00)
SA4-L60S	A4	60° SW	45 – 70	Normal	69 (2.72)	76 (2.99)	N/A	37 (1.45)
SA4-L60L	A4	60° LW	45 – 70	Normal	63 (2.48)	78 (3.07)	N/A	43 (1.69)

\* Width for wedges with carbide pins

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.



# ANGLE BEAM PROBES WITH INTERNAL WEDGES



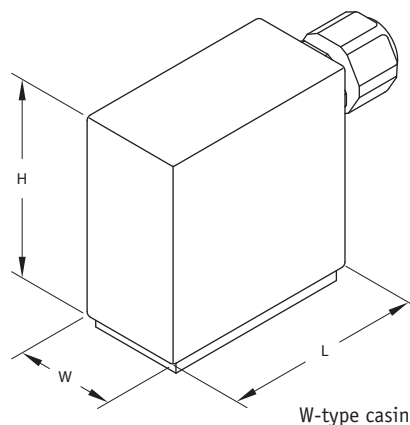
5L16-45SW1

## Advantages

- Probe and wedge in the same housing
- Probe and wedge combination represent the smallest solution to contact angle beam inspection.
- Coupling always good between probe and wedge interfaces, no need for couplant between the probe and wedge
- Assembly kept very small for an easy access in restricted areas
- Inspections of 30 to 70 degrees in steel, SW or LW
- Easy to handle
- Probes with an internal wedge can be specially ordered to fit a specific curvature radius.

## Typical Applications

- Manual weld inspection from 6.35- to 19-mm (0.25- to 0.75-in.) thick surfaces (butt joint, corner joint, tee joint), using 40 to 70 degrees simultaneously
- Manual inspection of stress corrosion cracking



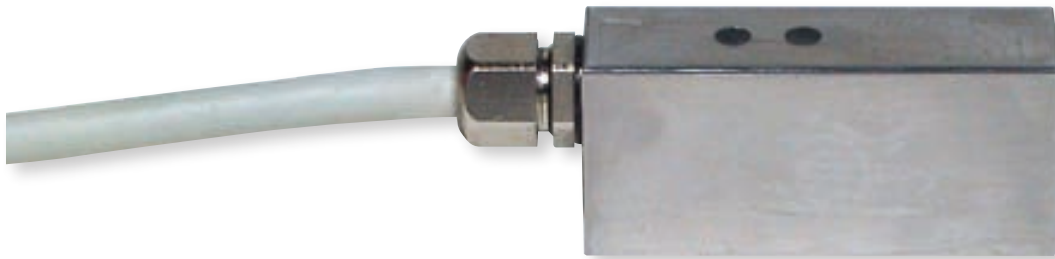
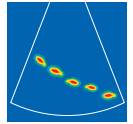
## Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch mm	Elevation (mm)	Nominal refracted beam angle in steel	External dimensions mm (in.)		
						L	W	H
2L16-45SW1	2.25	16	0.75	12 mm	45° SW	30 (1.18)	15 (0.59)	30 (1.18)
2L16-45LW1	2.25	16	0.75	12 mm	45° LW	30 (1.18)	15 (0.59)	30 (1.18)
5L16-45SW1	5.0	16	0.62	10 mm	45° SW	30 (1.18)	15 (0.59)	30 (1.18)
5L16-45LW1	5.0	16	0.62	10 mm	45° LW	30 (1.18)	15 (0.59)	30 (1.18)

These probes come standard with an OmniScan® Connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# CONTACT PROBES



2L64-C1

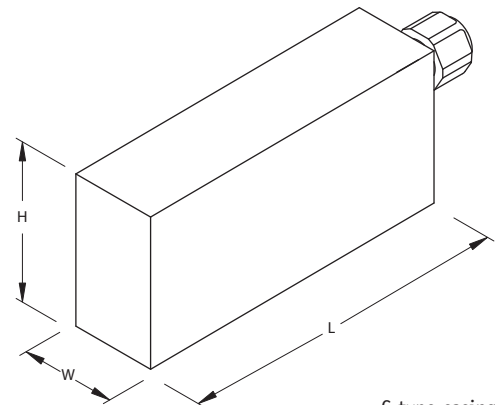
Contact probes are specially designed to be used directly in contact with the material to be inspected. Their resistant wear face is acoustically adapted to steel. They are longitudinal-wave probes and contain composite ceramic that produces high-efficiency signals.

## Advantages

- Hard active face with higher wear resistance, fracture resistance, and durability for contact inspection without wedges
- All contact probes are designed for harsh industrial use.
- Can be used for testing a wide variety of materials.

## Typical Applications

- Inspection of 6.35- to 178-mm (0.25- to 7-in.) thick steel surfaces for corrosion, pits, or blistering
- Inspection of 6.35- to 38-mm (0.25- to 1.5-in.) thick composites for delamination
- Thickness measurements



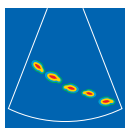
C-type casing

## Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch (mm)	Elevation (mm)	External dimensions mm (in.)		
					L	W	H
2L64-C1	2.25	64	0.75	12	54 (2.13)	15 (0.59)	25 (0.98)
5L16-C2	5.0	16	0.60	10	16 (0.63)	15 (0.59)	25 (0.98)
5L64-C3	5.0	64	0.62	10	46 (1.81)	15 (0.59)	25 (0.98)
5L64-C4	5.0	64	1.00	15	70 (2.76)	18 (0.70)	25 (0.98)

These probes come standard with an OmniScan® Connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.



# IMMERSION PROBES



10L128-I2

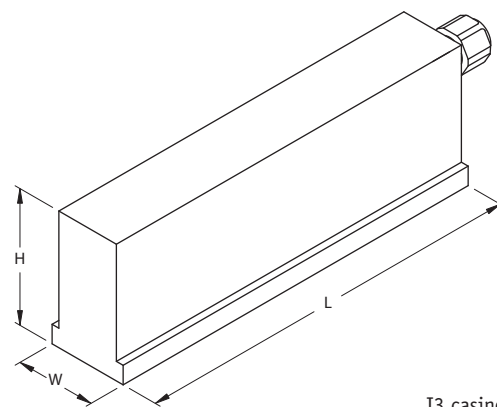
Immersion probes are designed to be used with a water-wedge or in an immersion tank when the test part is partially or wholly immersed. They are longitudinal wave probes and can be set up for refracted shear wave inspection under water.

## Advantages

- Acoustic impedance matching to water
- Designed to fit on water wedges to allow easier coupling on many surfaces and adjustable water path (when the piece to inspect cannot be immersed in a tank)
- Linear scanning allowing the coverage of 30 mm to 90 mm in one line with very high accuracy
- Corrosion-resistant stainless steel case
- Waterproof guaranteed up to 1 m (3.28 ft) under water

## Typical Applications

- Inspection of thin plates or tubing (steel, aluminum, or other)
- Composite inspection for delamination, disbonding, etc.
- Online thickness gauging
- Refracted shear wave weld inspection
- Automated scanning



I3 casing

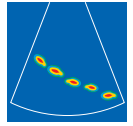
## Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch (mm)	Elevation (mm)	External dimensions mm (in.)		
					L	W	H
5L64-I1	5.0	64	0.60	10	50 (1.97)	19 (0.75)	25 (0.98)
10L64-I1	10.0	64	0.50	10	50 (1.97)	19 (0.75)	25 (0.98)
5L128-I2	5.0	128	0.60	10	83 (3.27)	21 (0.83)	35 (1.38)
10L128-I2	10.0	128	0.50	7	83 (3.27)	21 (0.83)	35 (1.38)
2L128-I3	2.25	128	0.75	12	102 (4.02)	21 (0.83)	35 (1.38)
5L128-I3	5.0	128	0.75	10	102 (4.02)	21 (0.83)	35 (1.38)

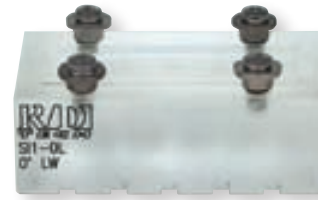
These probes come standard with an OmniScan® Connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# WEDGES FOR IMMERSION PROBES



SI2-N45S



SI1-0L

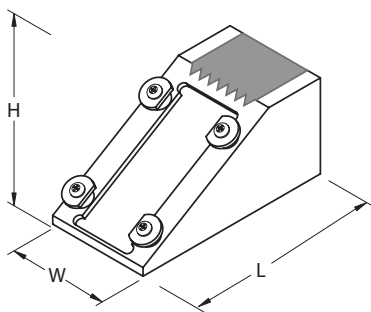
## Advantages

- New attenuating material to eliminate parasite echoes
- Stainless steel screw receptacles provide a firm anchoring of the wedge to the probe
- Many wedge options can be added to improve the quality of the inspection: irrigation, mounting holes for the wedge holder to work with any R/D Tech® scanner, and carbide pins to increase wear resistance.
- Wedge designed to perform manual or automated scans
- Wedges can be customized to create different refracted angles with all kinds of shapes.

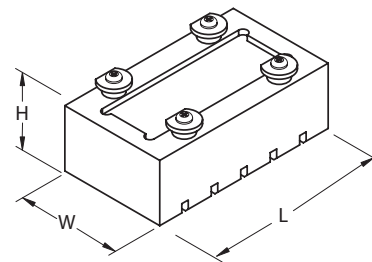
## Wedge Specifications and Dimensions

Part number	Probe type	Nominal refracted beam angle in steel	Sweep (deg.)	Probe orientation	External dimensions mm (in.)			
					L	W	W*	H
SI1-0L	I1	0° LW	N/A	N/A	62 (2.44)	35 (1.38)	35 (1.38)	22 (0.87)
SI1-N45S	I1	45° SW	30 – 70	Normal	69 (2.70)	35 (1.38)	45 (1.77)	33 (1.30)
SI2-0L	I2	0° LW	N/A	N/A	95 (3.75)	37 (1.45)	37 (1.45)	22 (0.87)
SI2-N45S	I2	45° SW	30 – 70	Normal	107 (4.01)	35 (1.38)	45 (1.77)	50 (1.97)
SI2-0L	I2	0° LW	N/A	N/A	95 (3.75)	37 (1.45)	37 (1.45)	22 (0.87)
SI2-N45S	I2	45° SW	30 – 70	Normal	107 (4.01)	35 (1.38)	45 (1.77)	50 (1.97)

\* Width for wedges with carbide pins

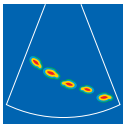


SI1-N45S P



SI1-0L P

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

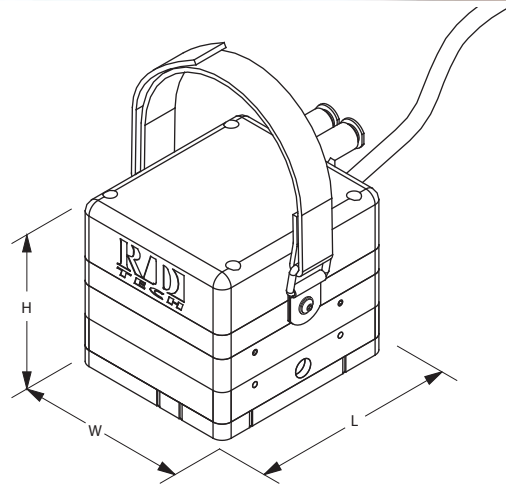


# WATER BOXES AND ENCODERS FOR IMMERSION PROBES



## Advantages

- Local immersion wedge that gives water delay lines for corrosion or composite inspection, allowing scans using a minimal quantity of couplant
- Splashproof encoder available to produce a line scan with real positioning
- Ergonomic design with a handle strap to help handling the water box on and under parts
- Off-centered probe allowing to move closer to the edges
- Adjustable pins and brushes provide a proper following of the inspected surface.
- Available in three different water heights: 10 mm, 25 mm, and 40 mm



## Water Box Specifications and Dimensions

Part number	Probe type	Nominal refracted beam	External dimensions mm (in.)				
			L	W	H	H*	H**
WBI1-XX-YY	I1	0° LW	85.0 (3.34)	74.6 (2.94)	45.7 (1.80)	60.1 (2.37)	75.1 (2.96)
WBI2-XX-YY	I2	0° LW	118.0 (4.64)	76.6 (3.02)	51.7 (2.04)	66.1 (2.60)	81.1 (3.19)
WBI3-XX-YY	I3	0° LW	130.8 (5.15)	74.6 (2.94)	58.3 (2.30)	72.6 (2.86)	87.6 (3.45)

These water box kits contain: one water box, one water path spacer (10 mm, 25 mm, and 40 mm are available as standard), filling syringe, five membranes. In part number, XX is water path spacer height, and YY is for optional encoder (see page 16 for details).

Custom water column, with heights ranging from 10 mm to 100 mm, wheel encoder, and bracket can also be ordered.

All dimensions are for the water box without the encoder.

H: Height of the water box for 10 mm (0.395 in.) water path.

H\*: Height of the water box for 25 mm (0.985 in.) water path.

H\*\*: Height of the water box for 40 mm (1.575 in.) water path.

## Encoder Specifications and Dimensions

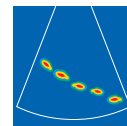
- Durable construction
- Replaceable contact surface
- Splashproof
- Sealed-ball-bearings coding wheel

Part number	Resolution	External dimensions mm (in.)	
		Diameter	Thickness
OMNI-A-WATENC	9 pulses/mm	68 (1.70)	29 (1.14)

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# SPECIAL PROBES AND WEDGES

## Small-Footprint Probe Applications Near-Wall Probe Applications



10L16-A00 with SA00-N60S wedge

5L64-NWI1

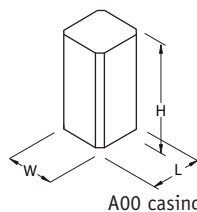
SNW1-0L

### Advantages of Small-Footprint Probes

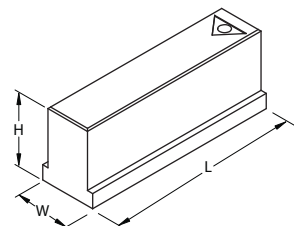
- Access to confined areas (probe has an 8 × 8 mm footprint)
- Special-design small-footprint wedge (contact surface is 11 × 17 mm)

### Advantages of Near-Wall Probes

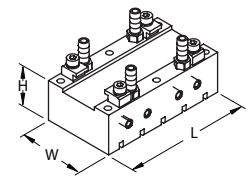
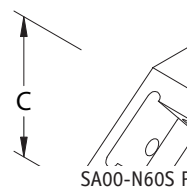
- Shortened dead zone at both ends
- Wedge can accommodate R/D Tech's MiniME encoder.
- Suitable for composite channel inspection
- Wedge is specially designed to fit probe length.
- Six Hydlar® Z wear pins for composite inspection



A00 casing  
Dimensions are without the strain relief.



NW1 casing



SNW1 IHC

### Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch (mm)	Elevation (mm)	External dimensions mm (in.)		
					L	W	H
<b>Small-footprint probes</b>							
10L16-A00	10.0	16	0.31	5	8 (0.31)	8 (0.31)	15 (0.59)
<b>Near-wall probes</b>							
5L64-NWA1	5.0	64	1.0	7	66 (2.60)	19 (0.75)	25 (0.98)
5L64-NWI1	5.0	64	1.0	7	66 (2.60)	19 (0.75)	25 (0.98)

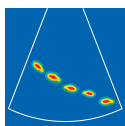
These probes come standard with an OmniScan® Connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.

### Wedge Specifications and Dimensions

Part number	Probe type	Nominal refracted beam angle in steel	Sweep (deg.)	Probe orientation	External dimensions mm (in.)			
					L	W	W*	H
SA00-N60S	A00	60° SW	45 – 70	Normal	11 (0.43)	21 (0.84)	N/A	13 (0.52)
SNW1-0L	NWA1	0° LW	N/A	Normal	66 (2.60)	N/A	36 (1.44)	22 (0.86)

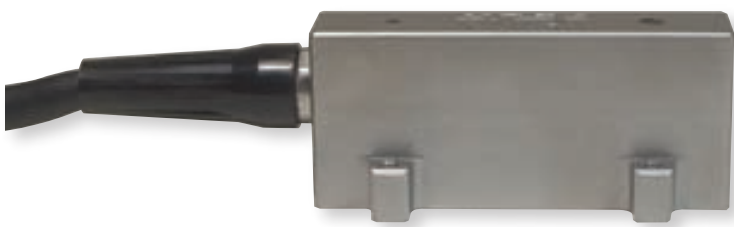
\* Width for wedges with carbide pins

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

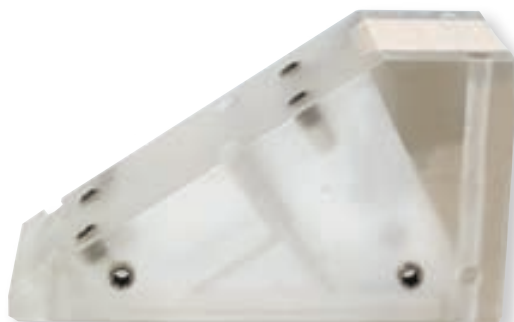


# SPECIAL PROBES AND WEDGES

## PipeWIZARD Probe Applications



7.5L60-PWZ1



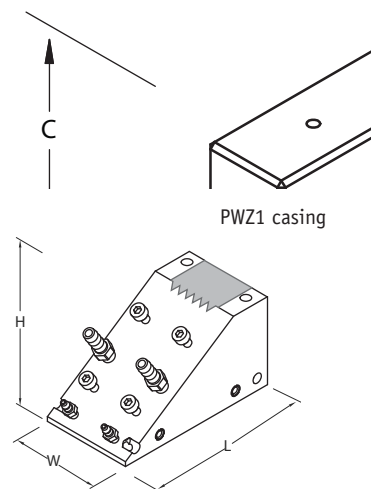
SPWZ1-N55S

### Advantages

- Low-profile housing
- Fits special PipeWIZARD® wedges designed for automated inspection of girth welds (sophisticated irrigation channels, locking carbides wear pins).
- CE-certified Hypertronics™ connector
- Shortened cable for a more streamlined system

### Typical Applications

- Automated inspection of girth welds with PipeWIZARD system
- Manual or automated inspection of 6- to 50-mm (0.25- to 2-in.) thick welds
- Detection of flaws and sizing
- Inspections of castings, forgings, pipes, tubes, and machined and structural components for cracks and welding defects



SPWZ1-N55S IHC

### Probe Specifications and Dimensions

Part number	Frequency (MHz)	Number of elements	Pitch (mm)	Elevation (mm)	External dimensions mm (in.)		
					L	W	H
5L60-PWZ1	5.0	60	1.0	10	68 (2.68)	26 (1.02)	30 (1.18)
7.5L60-PWZ1	7.50	60	1.0	10	68 (2.68)	26 (1.02)	30 (1.18)

These probes come standard with an **Hypertronics™** connector and a **0.6 m (2 ft)** cable or can be specially fitted with other connectors and cable lengths.

### Wedge Specifications and Dimensions

Probe type	Nominal refracted beam angle in steel	Sweep (deg.)	Probe orientation	External dimensions mm (in.)			
				L	W	W*	H
SPWZ1-N55S	55°	30 – 70	Normal	82 (3.23)	N/A	38 (1.50)	44 (1.73)

\* Width for wedges with carbide pins

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# Test and Documentation

An extensive database, containing records of the characterization of each probe sold, is maintained by R/D Tech. This information can be accessed for comparing probe behaviors. Please contact R/D Tech if you have any special testing requirements.

## Options

R/D Tech offers the widest range of piezocomposite ultrasonic phased-array probes. We are also able to provide you with the exact probe that will meet your needs and enable to perform your inspections with the best reliability and quality ever.

### Probes can be customized for your application:

- Number of elements: up to 1024
- Frequency from 0.5 MHz to 20 MHz
- Custom housing shape
- Custom cable: with flexible jacket, halogen-free jacket, metal conduit, etc.
- Custom connectors (Hypertronics™, Hirose™, Glenair®, Raychem™, etc.)

### Wedges can be customized with:

- Custom angle
- Custom radius of curvature
- Custom shapes: conical, double angle, roof angle, Rexolite® lens, etc.

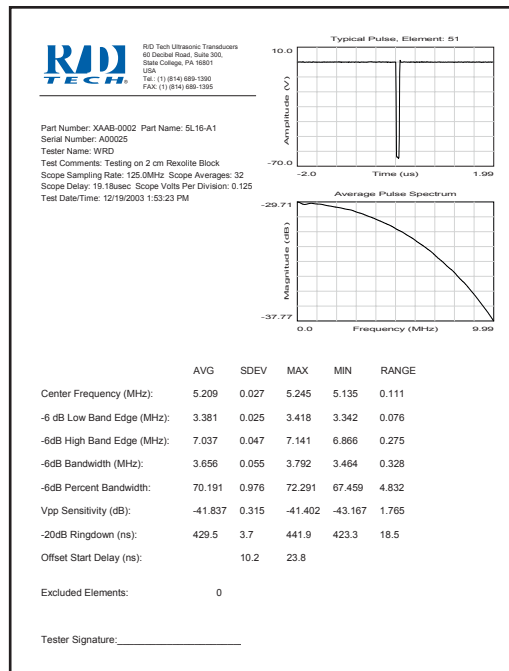
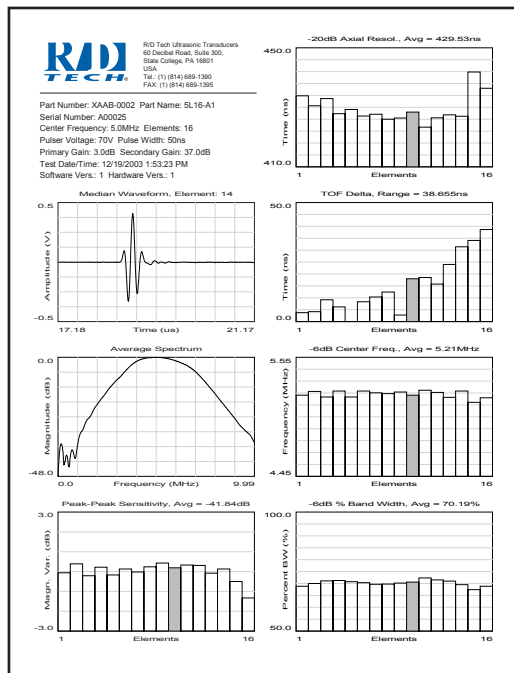
All aspects of your probe, cable, or wedge can be customized.

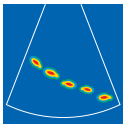
Simply call (1) (814) 689-1390 or inquire at [pa.probes@rd-tech.com](mailto:pa.probes@rd-tech.com).

## Standard Test Forms

The Standard Test Form is supplied with the purchase of every probe.

This form features measurement of the homogeneity of sensitivity for all the elements. Center frequency, bandwidth, -20 dB axial resolution, and time delay, for each element, are also reported on this form.



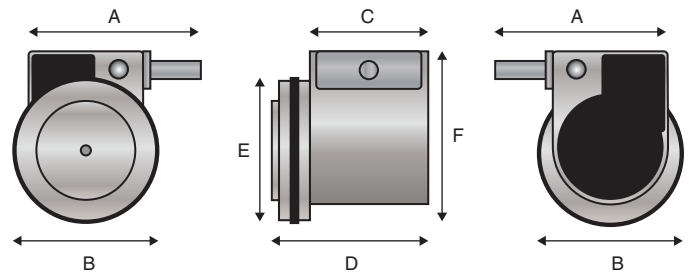


# MINI ENCODER FOR THE OMNISCAN



The miniature encoder for the OmniScan® is used for dimensioning defects in the scan axis. It can synchronize data acquisition with probe movement.

The miniature encoder is made with stainless steel. It is rugged and splashproof, and fits most R/D Tech® standard wedges with the included brackets.



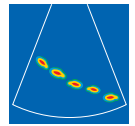
## Mini Encoder Specifications

Part number	Resolution	External dimensions mm (in.)					
		A	B	C	D	E	F
OMNI-A-ENC1	400 counts per inch (15.75 counts per mm)	22 (0.88)	19 (0.75)	15 (0.61)	20 (0.80)	19 (0.75)	22 (0.88)


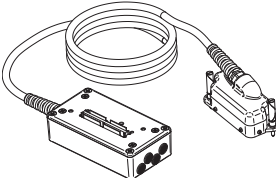
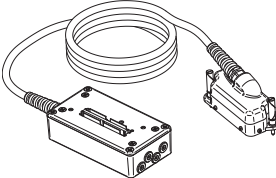
The mini encoder comes standard with a 2.5 m (8.2 ft) cable.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# ADAPTERS AND EXTENSION CABLES



## Adapters and Extensions Cables Specifications

Part number		Description
<b>Adapters</b>		
OMNI-A-ADP03		Adapter to connect Hypertronics™ PA probes on the OmniScan®
OMNI-A-ADP04		Adapter to connect PA probes with OmniScan connector on Tomoscan FOCUS™ or Tomoscan III™ PA, and other PA equipment having Hypertronics input  IMPORTANT NOTE: The OMNI-A-ADP04 adapter is not compatible with OmniScan PA beta units. A Hypertronics cable extension is required.
OMNI-A-ADP05		Y adapter with OmniScan connector to support two PA probes. Connector layout: 1 female output and 2 male inputs.
<b>Extension cable</b>		
EXT-128-10-0L		Extension cable with OmniScan connector at both ends. No LEMO® connectors are provided; 128 elements are available for phased-array use.
EXT-128-10-4L		Extension cable with OmniScan connector at both ends. Four LEMO® connectors are provided; 124 elements are available for phased-array use.

Combining OMNI-A-ADP03 with an EXT-128-10 extension cable will give you an OmniScan-Hypertronics cable.

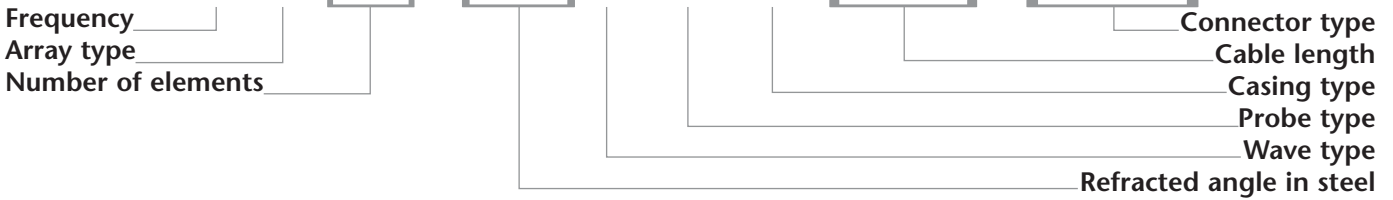
Combining OMNI-A-ADP05 with an EXT-128-10 extension cable will give you an OmniScan–2 OmniScans splitter cable.

**Note:** Dimensions listed herein are approximate and should not be used for design purposes.

# Ordering Information

## Numbering System Used to Order Phased-Array Probes

# 2L16-45SW1-2.5-OM



## Glossary Used to Order Phased-Array Probes

### Frequency

- 2 = 2.25 MHz
- 5 = 5 MHz
- 7.5 = 7.5 MHz
- 10 = 10 MHz

### Array type

- L = linear

### Number of elements

- 16 = 16 elements
- 32 = 32 elements
- 64 = 64 elements
- 128 = 128 elements

### Refracted angle in steel

- (used only with integrated wedge probes)
- 45 = 45°

### Wave type

- S = shear wave
- L = longitudinal wave
- (used only with integrated wedge probes)

### Probe type

- A = angle beam with external wedge
- W = angle beam with integrated wedge
- C = contact
- I = immersion

### Casing type

- Casing type in the same probe family

### Cable length

- 2.5 = 2.5 m

### Connector type

- OM = OmniScan® connector
- HY = Hypertronics™ connector

## Numbering System Used to Order Wedges

# SA1-N45S



## Glossary Used to Order Wedges

### Wedge type

- SA1 = wedge for angle beam probe type A1
- SA2 = wedge for angle beam probe type A2
- SI1 = wedge for angle beam probe type I1

### Probe mounting

- N = normal (parallel)
- L = lateral (perpendicular)

### Refracted angle in steel

- 0 = 0°
- 45 = 45°
- 60 = 60°

### Wave type

- S = shear wave
- L = longitudinal wave

## Numbering System Used to Order Water Boxes

# WBI3-25-E



## Glossary Used to Water Boxes

### Water box type

- WBI1 = water box for immersion transducer type I1
- WBI2 = water box for immersion transducer type I2
- WBI3 = water box for immersion transducer type I3

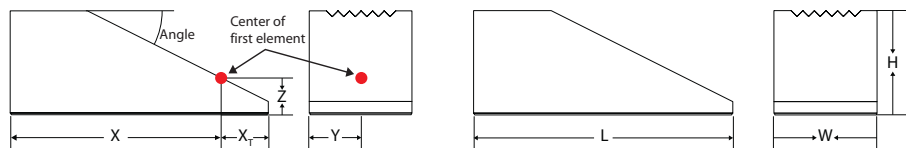
### Water column height

- 10 = 10 mm
- 25 = 25 mm
- 40 = 40 mm

### Encoder

- E = with encoder
- NE = without encoder

# First-Element Location and Wedge Dimensions



**Wedge parameters with OmniScan®**

X: primary offset

Y: secondary offset

Z: height

**Wedge parameters with TomoView™**

X<sub>T</sub>: offset from back of the wedge

Wedge	Type	Probe family	Wedge offsets				Wedge dimensions				
			X (mm)	X <sub>T</sub> (mm)	Y (mm)	Z (mm)	V (m/s)	Angle (°)	L (mm)	W (mm)	H (mm)
SA00-N60S	Plain	A00	14.2	2.8	5.5	2.3	2330	39	17.0	11.0	13.0
SA0-0L	Plain	A0	14.2	8.5	6.2	10.8	2330	0	22.7	12.4	10.8
SA0-N45S	Plain	A0	21.5	10.7	5.7	7.3	2330	31	32.2	11.3	20.2
SA0-N45L	Plain	A0	11.8	11.5	5.7	11.9	2330	16	27.7	11.3	25.3
SA0-N60S	Plain	A0	21.8	10.6	5.7	6.3	2330	39	32.4	11.3	21.5
SA1-0L	Plain	A1	20.1	8.9	15.0	20.0	2330	0	29.0	30.0	20.0
SA1-0L	IHC	A1	20.1	8.9	15.0	20.0	2330	0	29.0	30.0	20.0
SA1-N45S	Plain	A1	26.4	3.4	15.0	8.0	2330	31	29.7	30.0	17.5
SA1-N45S	IHC	A1	26.4	3.4	20.0	8.0	2330	31	29.7	40.0	17.5
SA1-N45L	Plain	A1	24.2	3.8	15.0	19.0	2330	16	28.0	30.0	24.0
SA1-N45L	IHC	A1	24.2	3.8	20.0	19.0	2330	16	28.0	40.0	24.0
SA1-N60S	Plain	A1	27.3	3.0	15.0	5.0	2330	39	30.4	30.0	16.4
SA1-N60S	IHC	A1	27.3	3.0	20.0	5.0	2330	39	30.4	40.0	16.4
SA1-N60L	Plain	A1	24.5	3.7	15.0	14.5	2330	20	28.2	30.0	20.7
SA1-N60L	IHC	A1	24.5	3.7	20.0	14.5	2330	20	28.2	40.0	20.7
SA1-L45S	Plain	A1	32.3	12.9	11.9	17.0	2330	31	45.2	34.9	26.8
SA1-L45S	IHC	A1	32.3	12.9	16.9	17.0	2330	31	45.2	45.0	26.8
SA1-L45L	Plain	A1	30.4	14.4	11.9	37.0	2330	16	44.8	34.9	42.2
SA1-L45L	IHC	A1	30.4	14.4	16.9	37.0	2330	16	44.8	45.0	42.2
SA2-0L	Plain	A2	56.1	8.9	15.0	20.0	2330	0	65.0	30.0	20.0
SA2-0L	IHC	A2	56.1	8.9	15.0	20.0	2330	0	65.0	30.0	20.0
SA2-N45S	Plain	A2	73.4	3.3	15.0	7.0	2330	31	76.7	30.0	37.5
SA2-N45S	IHC	A2	73.4	3.3	20.0	7.0	2330	31	76.7	40.0	37.5
SA2-N45L	Plain	A2	62.2	3.7	15.0	19.0	2330	16	65.9	30.0	34.0
SA2-N45L	IHC	A2	62.2	3.7	20.0	19.0	2330	16	65.9	40.0	34.0
SA2-N55S	Plain	2L64-A2	64.6	4.0	15.0	5.4	2330	36	68.6	30.0	43.0
SA2-N55S	IHC	2L62-A2	64.6	4.0	20.0	5.4	2330	36	68.6	40.0	43.0
SA2-N55S	Plain	5L64-A2	58.6	10.0	15.0	11.0	2330	36	68.6	30.0	43.0
SA2-N55S	IHC	5L64-A2	58.6	10.0	20.0	11.0	2330	36	68.6	40.0	43.0
SA2-N60S	Plain	A2	73.7	3.0	15.0	5.0	2330	39	76.7	30.0	39.1
SA2-N60S	IHC	A2	73.7	3.0	20.0	5.0	2330	39	76.7	40.0	39.1
SA2-N60L	Plain	A2	63.0	3.7	15.0	15.0	2330	20	66.7	30.0	35.5
SA2-N60L	IHC	A2	63.0	3.7	20.0	15.0	2330	20	66.7	40.0	35.5
SI1-0L	Plain	I1	50.0	12.0	17.5	20.0	2330	0	62.0	34.9	21.8
SI1-0L	IHC	I1	50.0	12.0	17.5	20.0	2330	0	62.0	34.9	21.8
SI1-N45S	Plain	I1	62.6	6.0	17.5	7.6	2330	31	68.6	34.9	33.2
SI1-N45S	IHC	I1	62.6	6.0	22.5	7.6	2330	31	68.6	45.0	33.2
SI1-0L	Plain	I1	46.8	15.2	17.5	20.0	2330	0	62.0	34.9	21.8
SI1-0L	IHC	I1	46.8	15.2	17.5	20.0	2330	0	62.0	34.9	21.8
SI1-N45S	Plain	I1	59.8	8.8	17.5	9.2	2330	31	68.6	34.9	33.2
SI1-N45S	IHC	I1	59.8	8.8	22.5	9.2	2330	31	68.6	45.0	33.2
SI2-0L	Plain	I2	85.7	9.3	18.5	20.0	2330	0	95.0	36.9	21.8
SI2-0L	IHC	I2	85.7	9.3	18.5	20.0	2330	0	95.0	36.9	21.8
SI2-N45S	Plain	I2	103.2	3.8	18.5	6.3	2330	31	107.0	36.9	50.1
SI2-N45S	IHC	I2	103.2	3.8	22.5	6.3	2330	31	107.0	45.0	50.1
SI2-0L	Plain	I2	79.3	15.7	18.5	20.0	2330	0	95.0	36.9	21.8
SI2-0L	IHC	I2	79.3	15.7	18.5	20.0	2330	0	95.0	36.9	21.8
SI2-N45S	Plain	I2	103.2	3.8	18.5	6.3	2330	31	107.0	36.9	50.1
SI2-N45S	IHC	I2	103.2	3.8	22.5	6.3	2330	31	107.0	45.0	50.1
SNW1-0L	IHC	NW1	64.5	1.5	18.3	20.0	2330	0	66.0	36.5	22.0
SNW1-0L	Plain	NW1	64.5	1.5	18.3	20.0	2330	0	66.0	36.5	22.0



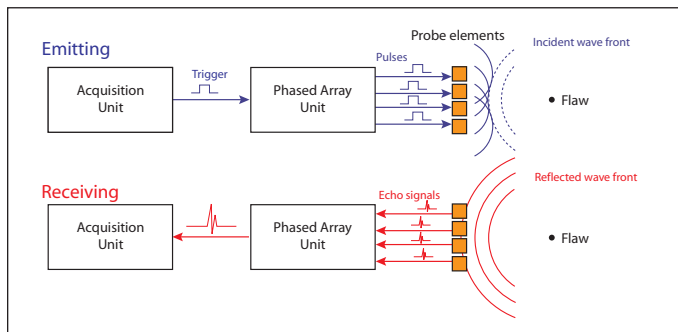
## Phased-Array Technology

Phased-array technology allows the generation of an ultrasonic beam with the possibility of setting the beam parameters such as angle, focal distance, and focal point size through software. Furthermore, this beam can be multiplexed over a large array. These capabilities open a series of new possibilities. For instance, it is possible to quickly vary the angle of the beam to scan a part without moving the probe itself. Phased arrays also allow the replacement of multiple transducers and even mechanical components. Inspecting a part with a variable-angle beam also ensures detection, regardless of the defect orientation, while optimizing signal-to-noise ratio.

All R/D Tech® phased-array systems offer the following capabilities:

### Software Control of Beam Angle, Focal Distance, and Focal Spot Size

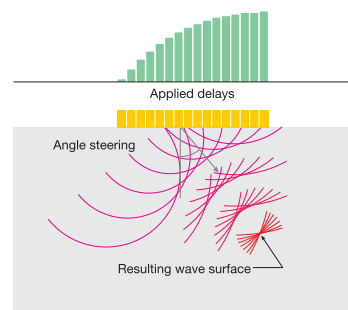
To generate a beam, the various probe elements are pulsed at slightly different times. By precisely controlling the delays between the probe elements, beams of various angles, focal distances, and focal spot sizes can be produced. The echo from the desired focal point hits the various probe elements with a computable time shift.



The signals received at each probe element are time-shifted before being summed up together. The resulting sum is an A-scan emphasizing the response from the desired focal point and attenuating various other echoes from other points in the material.

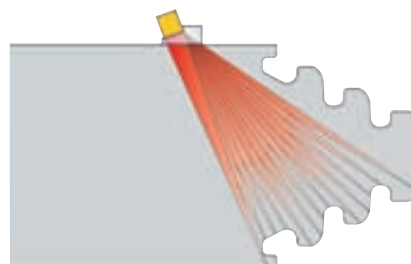
### Multiple-Angle Inspection with a Single, Small, Electronically Controlled, Multielement Probe

A conventional UT inspection would require a number of different transducers. A single phased-array probe can be made to sequentially produce the various angles and focal points required by the application.



### Inspection of Complex Shapes

The capacity to produce at will, and under computer control, various beam angles and focal lengths can be used to inspect parts with complex shapes such as turbine disc, turbine blade root, reactor nozzle, and other complex shapes.





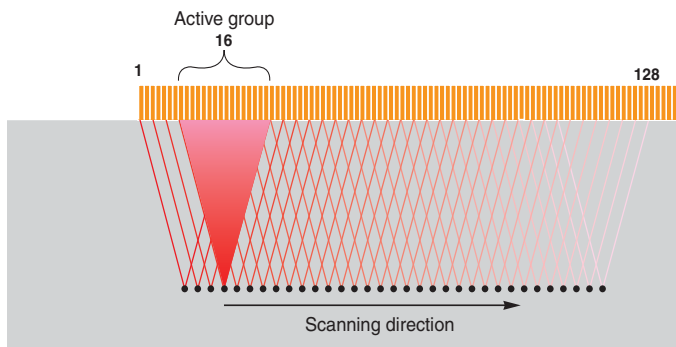
## High-Speed Scans with No Moving Parts

While phased arrays imply handling the many signals from multielement probes, it is important to note that the resulting signal is a standard RF signal (or A-scan) comparable to that of any conventional system with a fixed-angle transducer.

This signal may be evaluated, processed, filtered, and imaged as any A-scan from a conventional UT system. B-scans, C-scans, and D-scans built from the A-scan are also identical to that of a conventional system. The difference is that a multiple-angle inspection may be handled with a single transducer.

Multiplexing also allows motionless scanning. Here, a focused beam is created using a few of the many elements of a long phased-array probe. The beam is then shifted (or multiplexed) to the other elements to perform a high-speed scan of the part with no probe movement along that axis. More than one scan may be performed with various inspection angles.

The principle can be applied to flat parts using a linear phased-array probe or to tubes and rods using a circular phased-array probe.



High-speed linear scan: R/D Tech® phased-array systems can also be used to inspect flat surfaces such as steel plates. Compared to a wide, single-element transducer, sometimes called “paint brush,” phased-array technology offers a much higher sensitivity due to the use of a small focused beam.

## Phased-Array Probes

Phased-array probes are made in a variety of shapes and sizes for different applications. A few types are illustrated here: rho-theta, annular, 2D matrix, and linear.



Other types include dual linear, dual 1.5D, and internal fixed wedge angle beam probes. General-use arrays range from 1.5 MHz to 10 MHz, are less than 70 mm long, and have up to 128 elements. Nonstandard arrays are made on special request.

R/D Tech offers a wide variety of probes using piezo-composite technology for all types of inspection. This catalog shows R/D Tech’s standard phased-array probes, which are divided in four types:

- **Angle beam probes with external wedges**  
Designed to fit on a wide range of wedges.
- **Angle beam probes with internal wedges**  
Designed to be used when the size of the probe/wedge assembly is critical.
- **Contact probes**  
Designed for direct contact inspections without the use of a wedge (hard face).
- **Immersion probes**  
Designed to be used in a water box or in complete immersion.

## OmniScan Connector

- Enables probe recognition. The main probe characteristics are sent to the OmniScan® phased-array instrument for faster and error-free setups.
- No more pins to bend or break
- Splashproof casing
- Improved shielding
- Compact design
- Improved signal-to-noise ratio



# Books

## ***Introduction to Phased Array Ultrasonic Technology Applications***



This guideline is R/D Tech's first step to help fill the lack of information between conventional UT and phased-array technologies. The guideline is focused on terminology, principles, useful formulas, tables, and charts. This guideline provides an overview of phased-array ultrasonic technology, including examples of industrial applications. The guideline is an introduction to phased-array ultrasonic technology applications, not a training manual.

We hope that this phased-array ultrasonic technology guideline will help enrich your background of ultrasound terminology, familiarize you with the phased-array inspection tools, and reduce your training time for handling the new industrial ultrasonic technology of the twenty-first century.

## ***Phased Array Technical Guidelines***



This booklet contains a great deal of new information and focuses on practical hands-on examples of phased-array techniques.

With many formulas, graphs, and illustrations, this 200-page booklet is an ideal refresher for the expert as well as an excellent guide for the person who wants to know more about phased-array technology.

# Training

R/D Tech offers comprehensive ultrasound phased array training programs.

R/D Tech has developed partnerships with major training companies in an effort to offer comprehensive courses in phased-array technology and applications.

Recognizing the need for both basic and advanced training in phased-array technology, R/D Tech has enlisted the support of Lavender International (UK), Davis NDE (USA), TEST NDT (USA), and Eclipse Scientific Products (Canada).

Courses range from a two-day long "Introduction to Phased Array" program to an in-depth two-week "Level II Phased Array" course. In both cases, students experience practical training utilizing the portable OmniScan® phased array unit. To ensure maximum hands-on training, no more than two students will share a unit. Courses lead to either recognized certification or to certificates of attendance.

Courses are currently being offered at training facilities in participating companies as well as at customers' determined locations worldwide. Customized courses can also be arranged. Check the latest courses schedule at [www.rd-tech.com](http://www.rd-tech.com).

## ***R/D Tech Certified Training Partners***



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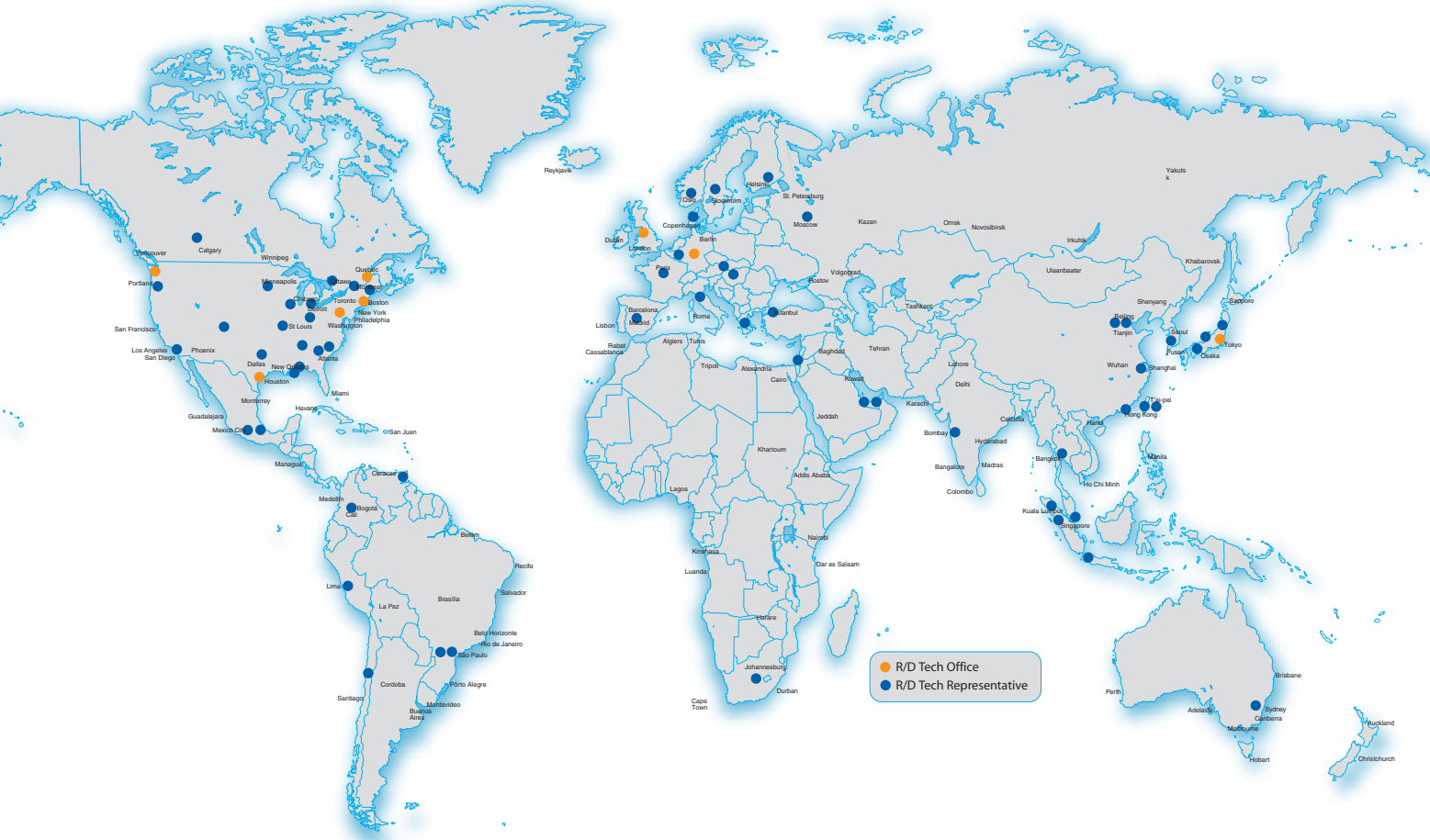
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## How to Order

Consult the ordering information outlined on page 16 and call your local sales representative for pricing or for further information.

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