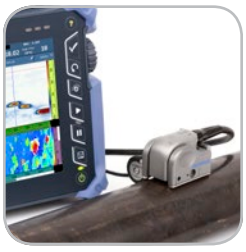
OLYMPUS®

Your Vision, Our Future

Probe Catalog

Phased Array Probes and Wedges



- Solution Specific Probes
- Angle Beam Probes
- Immersion Probes
- Integrated Wedge Probes
- Curved Array Probes
- Wedges

The Company

Olympus Corporation is an international leader in precision technology, operating in industrial, medical, academic and consumer markets, specializing in optics, electronics, and precision engineering. The company's core product line-up offers clinical, educational, and research microscopes, nondestructive testing equipment, and analytical instruments all designed with the unwavering commitment to enhancing people's lives every day and contributing to the safety, security, quality, and productivity of society.

As a subsidiary of Olympus Corporation, Olympus Scientific Solutions Americas, based in Waltham, Massachusetts, USA, is an integral part of the global Olympus network with specific responsibility for the sales and marketing of life science and industrial instrumentation in the Americas. Leading-edge testing technologies include ultrasound, ultrasound phased array, eddy current, eddy current array, microscopy, optical metrology, and X-ray fluorescence.

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Introduction to Phased Array Technology

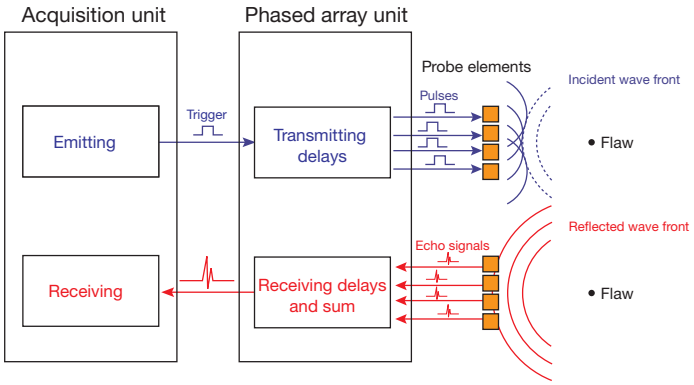
The distinguishing feature of phased array ultrasonic testing is the computer-controlled excitation (amplitude and delay) of individual elements in a multielement probe. Through software, the excitation of multiple piezocomposite elements generates a focused ultrasonic beam enabling the dynamic modification of beam parameters such as angle, focal distance, and focal spot size. To generate a beam in phase by means of constructive interference, the various active transducer elements are pulsed at slightly different times. Similarly, the echo from the desired focal point hits the various transducer elements with a computable time shift. The echoes received by each element are time-shifted before being summed together.
The resulting sum is an A-scan that emphasizes the response from the desired focal point and attenuates echoes from the other points in the test piece.

Olympus phased array systems offer the following:

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

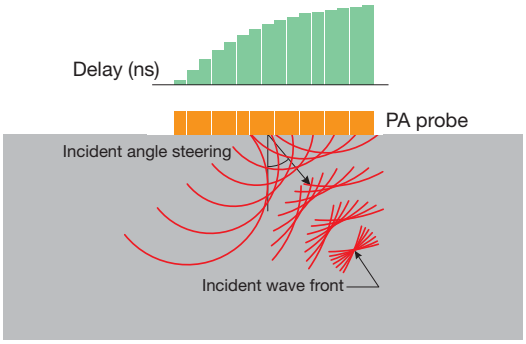
To generate a beam, the various probe elements are pulsed at slightly different times. By precisely controlling the delays between the probe elements, beams of various angles, focal distances, and focal spot sizes can be produced. The echo from the desired focal point hits the various probe elements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

The signals received at each probe element are time-shifted before being summed 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.



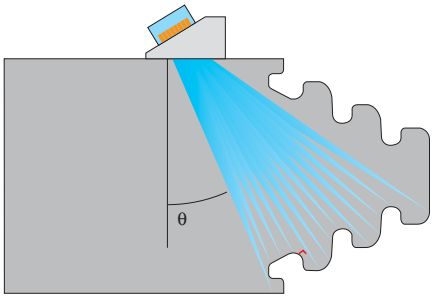
Multiple-Angle Inspection with a Single, Small, Electronically Controlled, Multielement Probe

A conventional UT inspection requires 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

Produced at will and under computer control, various beam angles and focal lengths are used to inspect parts with complex shapes such as turbine discs, turbine blade roots, reactor nozzles, and other complex shapes.



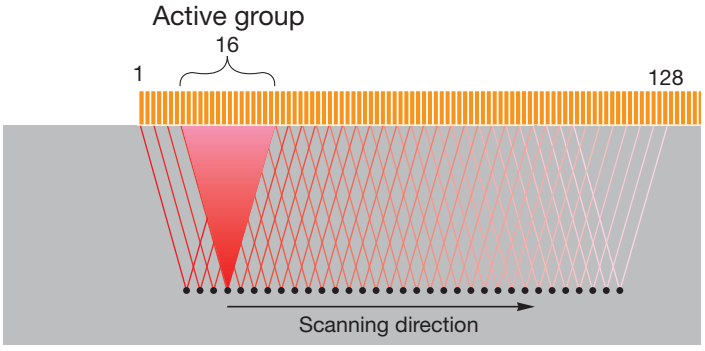
High-Speed Scans with No Moving Parts

While phased array implies handling of many signals from a multielement probe, it is important to note 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 can be evaluated, processed, filtered, and imaged just 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 can be handled with a single transducer.

Multiplexing also enables motionless scanning: 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.



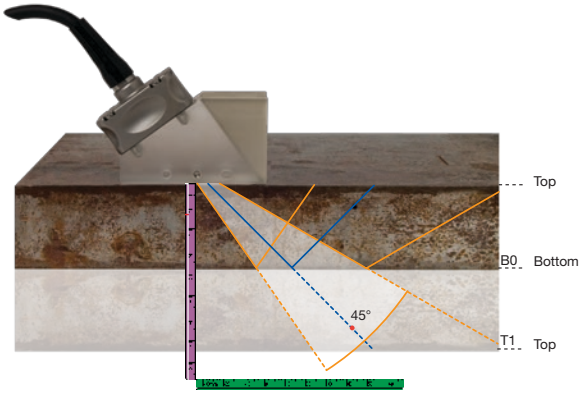
High-speed linear scan: Olympus phased array systems can also be used to inspect flat surfaces such as steel plates. Compared to a wide, single-element transducer—often referred to as a "paint brush"—phased array technology offers a much higher sensitivity due to the use of a small focused beam.

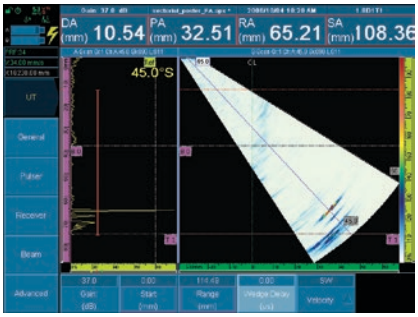
Defect Positioning

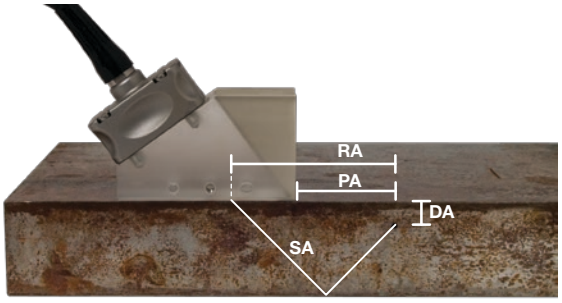
For manual inspections, real-time readings are essential to quickly position the reflected signal source with respect to the part's geometry and/or probe location.

RA, PA, DA, and SA readings enable the user to accurately position the defect in real time during an inspection.

RA: Reference point to the indication in gate A
PA: Probe front face to the indication in gate A
DA: Depth of the indication in gate A
SA: Sound path length to the indication in gate A

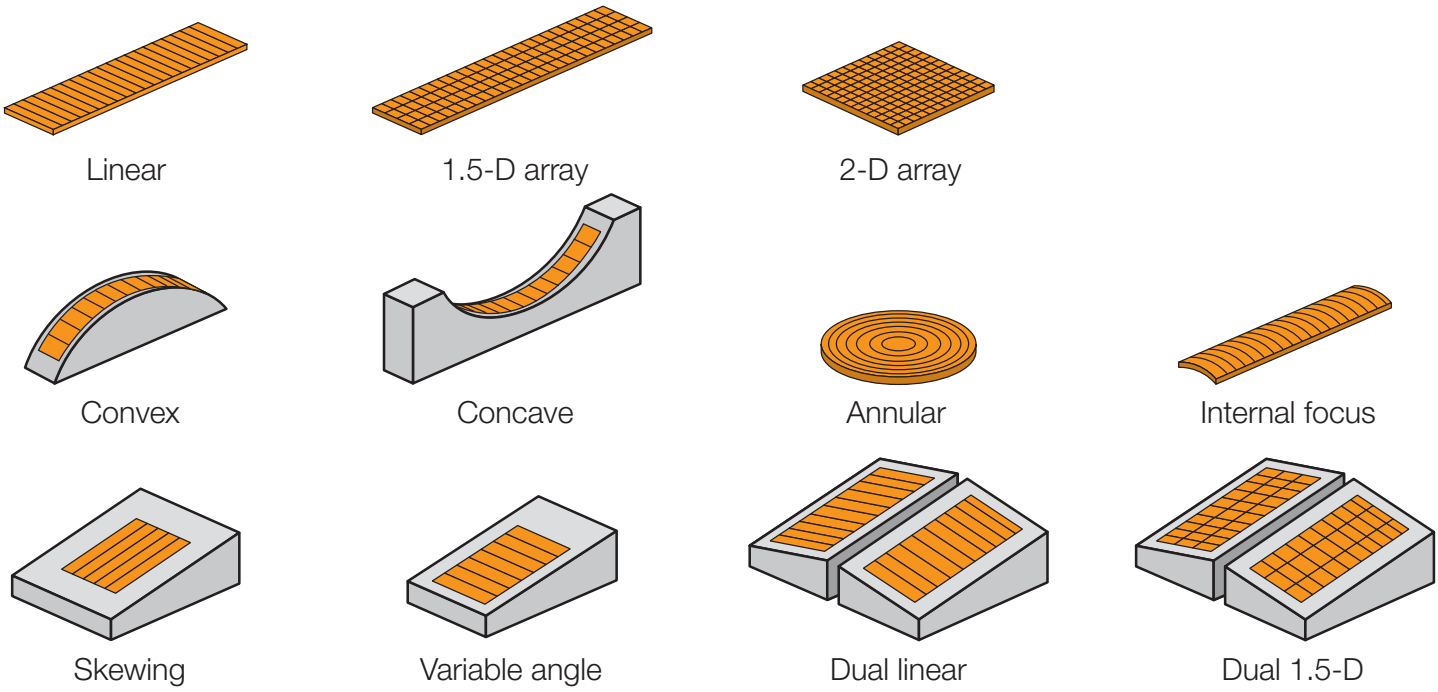






DA (mm)	PA (mm)	RA (mm)	SA (mm)
10.54	32.51	65.21	108.36

Phased Array Probes



Phased array probes are made in a variety of shapes and sizes for different applications. A few types are illustrated here.

Typical array probes have a frequency ranging from 1 MHz to 17 MHz and have between 10 and 128 elements. Olympus offers a wide variety of probes using piezocomposite technology for all types of inspections. This catalog shows Olympus standard phased array probes, which are divided into three types: angle beam probes, integrated wedge probes, and immersion probes. Other types of probes can be designed to suit the needs of your application.

Linear arrays are the most commonly used phased array probes for industrial applications. Active probe aperture is one of the critical features used to define a phased array probe.

The active aperture (A) is the total active probe length. Aperture length is calculated by the following formula:

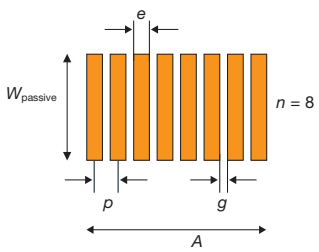
$$A = n \cdot p$$

where n = number of elements in the PA probe
p = elementary pitch—distance between the centers of two adjacent elements

A more precise way of finding the active aperture is calculated by this formula:

$$A = (n-1) \cdot p + e$$

where e = element width—width of a single piezocomposite element (a practical value is $e < \lambda/2$)



The ***near-field (N)*** value gives the maximum depth of usable focus for a given array. This value is given by the following formula:

$$N = \frac{D^2 f}{4c}$$

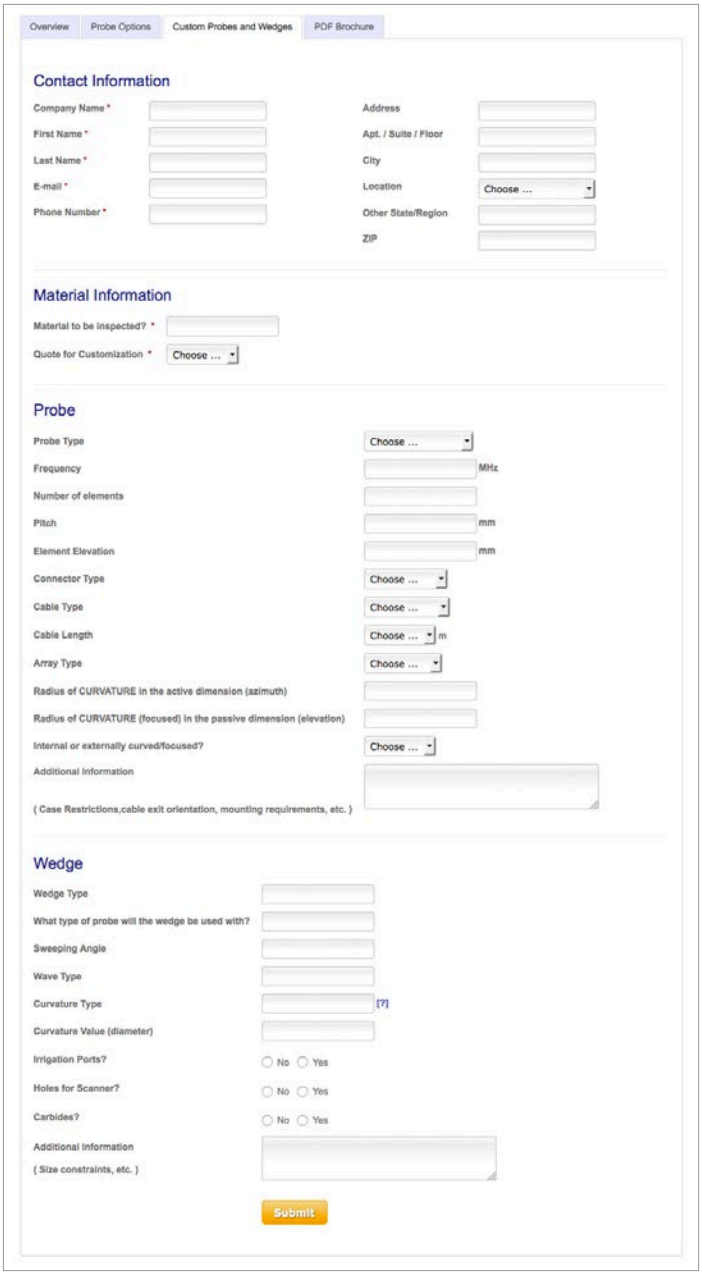
where D = element diameter
f = frequency
c = material velocity

- To calculate the near-field value in the active (primary) axis of a phased array probe: $D = n' \cdot p$, where n' is number of elements per group in the focal law.
- To calculate the near-field value in the passive (secondary) axis of a phased array probe: D = Wpassive, which is often called elevation

Custom Probes

Olympus can manufacture custom phased array probes to suit specific applications and geometries. To develop your custom probe, we will need to know:

- Application
- Comparable UT single element transducer
- Frequency
- Number of elements, pitch, and elevation
- Array shape (flat, curve)
  - Curved in active dimension
  - Curved in passive dimension (focused)
- Probe type (angle beam, immersion, integrated wedge, matrix)
- Cable jacket required
- Cable length
- Connector style
- Housing restrictions and/or size constraints



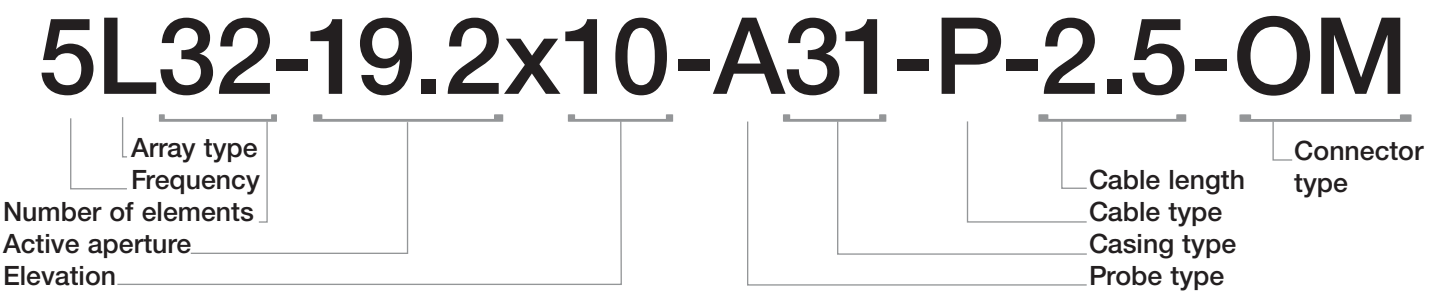
To initiate development of your custom phased array probe, please visit *https://www.olympus-ims.com/en/custom-phased-array-probe-and-wedge-design-inquiry/*.

For additional information contact your local sales representative. If you do not know your local sales representative, please visit *www.olympus-ims.com*, “Contact Us” tab.

You may also contact the phased array product management group via email: *sce.pm@olympus-ossa.com.*

Ordering Information

Numbering System Used to Order Standard Phased Array Probes



Glossary Used to Order Phased Array Probes (Typical options shown)

Frequency

1.5 = 1.5 MHz
2.25 = 2.25 MHz
3.5 = 3.5 MHz
5 = 5 MHz
7.5 = 7.5 MHz
10 = 10 MHz

Additional frequencies available upon request

Array type

L = Linear
A = Annular
M = Matrix probe (1.5D, 2D)
CV (ROC) = Convex in azimuth
CC (ROC) = Concave in azimuth
CCEV (ROC) = Elevation focused

ROC: radius of curvature (mm)

Prefix Before Array Type

D = Dual Array
T = Tri Array
Q = Quad Array

Example

DL = Dual Linear Array

Number of elements

Example: 16 = 16 elements

Active Aperture

Active aperture in mm.
Refer to page 6 for details.

Elevation

Elevation in mm

Example: 10 = 10 mm

Probe type

A = Angle beam with external wedge
NW = Near-wall
PWZ = Weld inspection angle beam
W = Angle beam with integrated wedge
I = Immersion
DGS = DGS inspection/Atlas (AVG probe)
AWS = AWS inspection

Housing Prefix

C = Contact Matching Layer

Casing type

Casing type for a given probe type

Cable type

P = PVC Sheathing
M = Metal Armor Sheathing
HF = Halogen Free Sheathing
HT150 = High Temperature Cable rated to 150 °C

Cable length

Cable length in m

2.5 = 2.5 m
5 = 5 m
7.5 = 7.5 m
10 = 10 m

Alternate cable lengths are available

Connector type

OM = OmniScan® connector
HY = Hypertronics connector
OL = OmniScan Connector with conventional UT channel on element 1 (LEMO 00 connector)

Connectors to competitor instruments or custom connectors are available upon request.

Phased Array Probes Application Matrix

Probe Model	Composite	Corrosion	Weld	Immersion	Small Footprint	Deep Penetration	General Purpose	Typical Application Use		Additional information
								Manual	Automated	
A00					✓			✓		Developed for scribe mark applications.
A0			✓		✓		✓	✓		Small access, reduced footprint.
A1			✓		✓		✓	✓	✓	
A2			✓				✓	✓	✓	
A3			✓			✓			✓	
A4			✓			✓			✓	
A5			✓			✓			✓	
A10			✓		✓		✓		✓	
A11			✓				✓		✓	
A12		✓	✓				✓		✓	Compatible with the RexoFORM for detection of wall-thickness reductions due to corrosion, abrasion, and erosion.
A14		✓	✓				✓		✓	Compatible with the RexoFORM for detection of wall-thickness reductions due to corrosion, abrasion, and erosion.
A15			✓		✓					Low-profile design. Well suited for boiler tubes, thin-walled/small pipes and applications with minimal height clearance. Compatible with the COBRA Scanner.
A17			✓							Designed for inspection of grainy materials; optimized for thicker and more attenuative austenitic materials.
A27			✓							Designed for inspection of grainy materials; optimized for thinner and less attenuative austenitic materials, as well as cladded pipes.
A31			✓						✓	Primary probe for carbon steel weld inspections ranging from 3 mm to 26 mm (0.12 in. to 1.02 in.) thickness.
A32			✓						✓	Primary probe for carbon steel weld inspections ranging from 12 mm to 60 mm (0.47 in. to 2.36 in.) thickness.
AWS			✓					✓		AWS weld inspection.
NW1	✓								✓	Designed for near-wall and close access composite applications.
NW2	✓								✓	
NW3	✓								✓	
PWZ1			✓						✓	Primary probe for carbon steel weld inspection for thickness over 50 mm (16:128).
PWZ3			✓						✓	
DGS1			✓				✓	✓		DGS applications.
I1				✓					✓	
I2				✓					✓	
I3				✓					✓	
I4		✓								HydroFORM corrosion mapping solution.
Rex1		✓						✓		Dual Linear Array probe for corrosion inspection
IWP1	✓							✓		Phased array probe for RollerFORM scanner

This table is a general application guideline. Please consult your Olympus sales representative prior to ordering.

Solution Specific Probes
Weld Series

A31

A32

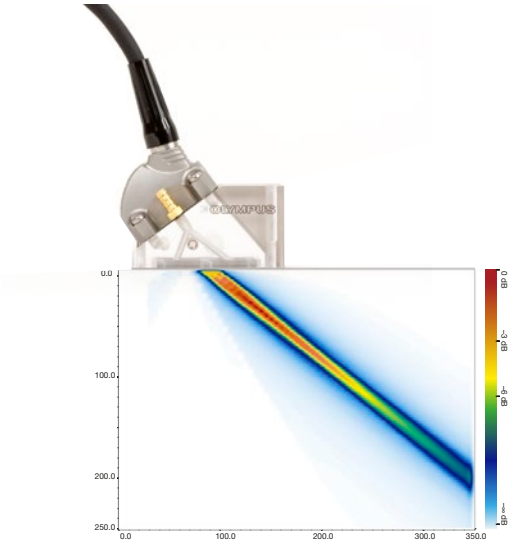
Advantages

- Design optimized for weld inspection
- Leading-edge signal-to-noise ratio performance
- Wide thickness range
- New wedge concept allows improved coupling to the part
- Acoustically matched to Rexolite

Typical Applications

A31 and A32 Probes

- Manual or automated inspection of 3 mm to 60 mm thick welds using angle beams
- Innovative wedge design available for shear or longitudinal waves



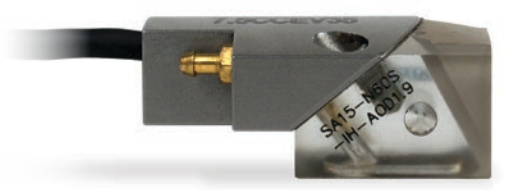
Simulation displays a 5.0 MHz A32 Weld Series probe; 32 element aperture, on a 55° shear wave wedge in carbon steel.
No steering or focusing was used.
*Beam simulations are based on theoretical models. Actual application results may vary.

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
5L32-A31	Q3300178	5.0	32	0.60	19.2	10.0	30 (1.18)	28 (1.10)	25 (0.98)
7.5L32-A31	Q3300339	7.5	32	0.60	19.2	10.0	30 (1.18)	28 (1.10)	25 (0.98)
10L32-A31	Q3300340	10.0	32	0.30	9.9	10.0	30 (1.18)	28 (1.10)	25 (0.98)
2.25L32-A32	Q3300341	2.25	32	1.0	32.0	10.0	40 (1.57)	28 (1.10)	26 (1.02)
5L32-A32	Q3300180	5.0	32	1.0	32.0	10.0	40 (1.57)	28 (1.10)	26 (1.02)
5L64-A32	Q3300179	5.0	64	0.50	32.0	10.0	40 (1.57)	28 (1.10)	26 (1.02)

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.

Small Diameter Pipe Welds (COBRA)



7.5CCEV35-A15

Advantages

- Acoustically matched to Rexolite
- Uses low-profile phased array probes with optimized elevation focusing for improved detection of small defects in thin-wall pipes
- Covers standard pipes from 21 mm to 114 mm OD (0.83 in. to 4.5 in.)
- Operates within 12 mm (0.5 in.) clearance (on all standard pipes)
- The COBRA scanner holds up to two phased array probes for complete weld coverage in one pass
- Can be configured to perform one-sided inspection for pipe-to-component evaluation
- Easy installation and manipulation from one side of a row of pipes
- Wide selection of wedges is available to suit most angle beam applications

Typical Applications

A15 Probes

Thin-wall Applications

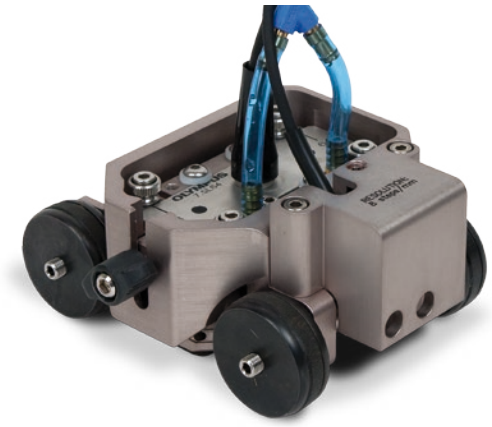
- Small diameter pipe weld inspection
- Boiler tube
- Low clearance
- Process pipes

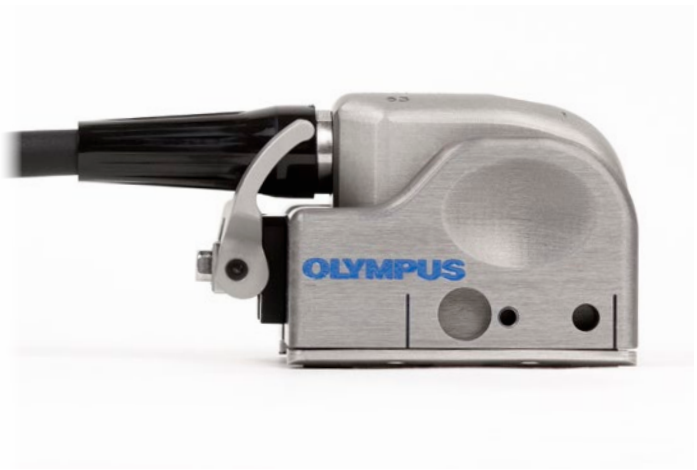
Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
7.5CCEV35-A15	U8330826	7.5	16	0.50	8.0	10.0	26 (1.02)	22 (0.87)	9.7 (0.38)
5CCEV35-A15	U8331163	5.0	16	0.50	8.0	10.0	26 (1.02)	22 (0.87)	9.7 (0.38)
10CCEV35-A15	U8331014	10.0	32	0.25	8.0	7.0	26 (1.02)	22 (0.87)	9.7 (0.38)

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.

Corrosion Mapping





HydroFORM

Advantages

- Local immersion technique
- Coupling is optimized, enabling inspection of rough surfaces
- Large coverage
- Wedge reflection is eliminated
- Easy synchronization on front wall for OD and ID corrosion monitoring

Typical Applications

I4 Probes

Corrosion Mapping Applications

- Manual or automated corrosion inspection of medium to large areas for remaining wall or internal corrosion measurements

Dual Linear Array (DLA) Corrosion Probe

Advantages

- Pitch-catch technique
- Considerable reduction of interface echo for optimum surface resolution
- Adjustable ring for stabilization and wear resistance
- Compared to dual UT technique, DLA offers increased probability of detection, better imaging, larger coverage, and enhanced data point density

Typical applications

REX 1 Probes

- Manual inspection of small to medium areas for remaining wall or internal corrosion measurements

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
2.25L64-I4*	U8331125	2.25	64	1.0	64.0	7.0	73 (2.87)	24 (0.94)	25 (0.98)
5L64-I4*	U8331162	5.0	64	1.0	64.0	7.0	73 (2.87)	24 (0.94)	25 (0.98)
7.5L64-I4*	U8330955	7.5	64	1.0	64.0	7.0	73 (2.87)	24 (0.94)	25 (0.98)
5DL32-REX1	Q3300336	5.0	Dual 32	1.0	32.0	5.0	66 (2.57)	40 (1.58)	38 (1.5)
7.5DL32-REX1	Q3300057	7.5	Dual 32	1.0	32.0	5.0	66 (2.57)	40 (1.58)	38 (1.5)

*These probes come standard with an OmniScan® connector and a 7.5 m (24.6 ft) cable or can be specially fitted with other connectors and cable lengths.
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.

Austenitic, Nickel, and Other Coarse Grain Alloys

Dual Matrix Array (DMA) Probes

Advantages

- Dual Matrix Array probes combine the benefits of focused longitudinal wave S-scans and pitch-catch longitudinal inspection strategy.
- Extend the inspection range of OmniScan and FOCUS PX instruments in coarse grained, austenitic, corrosion-resistant alloys, and dissimiar welds
- Standard Dual Matrix Array probes are designed to provide off-the-shelf inspection capabilities to cover a wider range of inspections with a superior signal-to-noise ratio.

Typical Applications

A17 and A27 Probes

- Corrosion-resistant alloy (CRA)
- Stainless steel
- Austenitic material
- Cladded pipes (A27)
- Dissimiliar welds

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
2.25DM7X4-A17	U8331715	2.25	Dual 28	2.71	19×12	3.0	34 (1.34)	16 (0.63)	25 (0.98)
4DM16X2-A27	Q3300060	4.0	Dual 16	1.0	16×6	3.0	29 (1.14)	10 (0.39)	20 (0.79)

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.

RollerFORM

Advantages

- Exceptional coupling with minimal couplant
- Easy set-up for efficient C-scan
- 25 mm (0.98 in.) water delay line enables inspection of composites up to 50 mm (1.97 in.) thick
- Up to 51.2 mm (2.03 in.) wide beam coverage
- Clear and low attenuation wheel material

Typical Applications

IWP1 Probes

Composite Applications

- Zero degree inspection of composite and other smooth-surface materials
- Can be used in accordance with existing aircraft manufacturer procedures

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
3.5L64-IWP1	Q3300030	3.5	64	0.80	51.2	6.4	144 (5.66)	22 (0.86)	22 (0.86)
5L64-IWP1	Q3300029	5.0	64	0.80	51.2	6.4	144 (5.66)	22 (0.86)	22 (0.86)

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.

Phased Array Probes

A00, A0, and A10 Small-footprint Probes

10L16-A00

10L16-A00
with SA00-N60S wedge

5L10-A0-TOP

10L32-A10

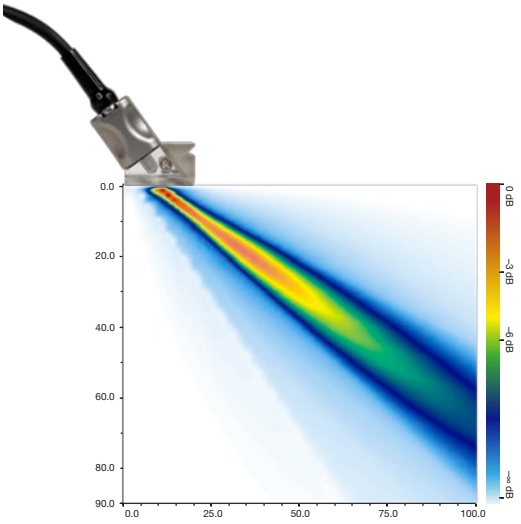
Advantages of Small-footprint Probes

- Access to confined areas
  (A00 probe has an 8 × 8 mm footprint)
- Cable can exit from either the side, back, or top
- Specially designed small-footprint wedge
- 10L16-A00 is used in aerospace scribe-line inspection

Typical Applications

A10 Probe

- Manual inspection of 6.35 mm to 38 mm
  (0.25 in. 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 weld defects



Simulation displays a 5.0 MHz A10 Weld Series probe; 16 element aperture, on a 55° shear wave wedge in carbon steel.
No steering or focusing was used.
*Beam simulations are based on theoretical models. Actual application results may vary.

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
10L16-A00	U8330145	10.0	16	0.31	5.0	5.0	8 (0.31)	8 (0.31)	23 (0.91)
5L10-A0-SIDE	U8330080	5.0	10	0.60	6.0	6.0	13 (0.51)	10 (0.39)	23 (0.91)
5L10-A0-TOP	U8330075	5.0	10	0.60	6.0	6.0	13 (0.51)	10 (0.39)	23 (0.91)
10L10-A0-SIDE	U8330110	10.0	10	0.60	6.0	6.0	13 (0.51)	10 (0.39)	23 (0.91)
10L10-A0-TOP	U8330111	10.0	10	0.60	6.0	6.0	13 (0.51)	10 (0.39)	23 (0.91)
5L16-A10	U8330595	5.0	16	0.60	9.6	10.0	23 (0.91)	16 (0.63)	20 (0.79)
10L32-A10	U8330251	10.0	32	0.31	9.9	7.0	23 (0.91)	16 (0.63)	20 (0.79)

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.

PWZ1, A14, and A16 Pipeline Probes

7.5L60-PWZ1

5L60-A14

Advantages

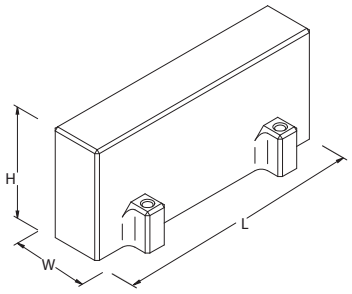
- PWZ1 and A16 fit special PipeWIZARD® wedges designed for automated inspections of girth welds (sophisticated irrigation channel and locking carbide wear pins)
- Can be ordered with CE-certified Hypertronics connector
- Suitable for manual and automated inspections
- Available laterally focused probes improve defect length sizing (7.5CCEV100-60-A16)

Typical Applications

- Automated inspection of girth welds with PipeWIZARD systems (PWZ1 and A16 housing types)
- Manual or automated inspection of thick welds
- Detection of flaws and sizing
- Inspection of castings, forgings, pipes, tubes, and machined and structural components for cracks and welding defects

Laterally Focused Arrays (CCEV)

These probes for girth weld inspection used with the PipeWIZARD system or COBRA scanner have curved elements in the passive plane, focusing the beam in the lateral direction. An integrated lens permits the use of standard wedges. These cylindrically focused probes significantly reduce oversizing and excessive repair. Their capacity to discriminate small indications is a major advantage when sizing the length of an intermittent defect using interaction rules. In addition, beam energy is better maintained in small pipe/thin wall applications.



PWZ1 and A16 casing

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
5L60-PWZ1	U8330164	5.0	60	1.0	60.0	10.0	68 (2.68)	26 (1.02)	30 (1.18)
7.5L60-PWZ1	U8330144	7.5	60	1.0	60.0	10.0	68 (2.68)	26 (1.02)	30 (1.18)
7.5L60-PWZ1*	U8330086	7.5	60	1.0	60.0	10.0	68 (2.68)	26 (1.02)	30 (1.18)
5L60-A14	U8330785	5.0	60	1.0	60.0	10.0	68 (2.68)	23 (0.91)	20 (0.79)
7.5L60-A14	U8330804	7.5	60	1.0	60.0	10.0	68 (2.68)	23 (0.91)	20 (0.79)
7.5CCEV100-60-A16	U8330958	7.5	60	1.0	60.0	18.0	68 (2.68)	29 (1.14)	30 (1.18)
7.5CCEV100-60-A16**	U8330796	7.5	60	1.0	60.0	18.0	68 (2.68)	29 (1.14)	30 (1.18)

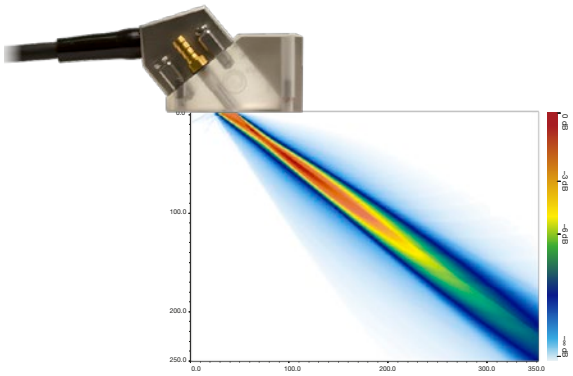
These probes come standard with an OmniScan® connector and a 2.5 m (8.2 ft) cable or can be specially fitted with other connectors and cable lengths.
* Designed for PipeWIZARD system, this probe comes with a CE Hypertronics connector and a 0.6 m (2 ft) cable.
** Designed for PipeWIZARD system, this probe comes with a CE Hypertronics connector and a 0.75 m (2.5 ft) cable.

A3, A4, and A5 Deep Penetration Probes

A3 A4 A5

Advantages

- Acoustically matched to Rexolite
- Wide selection of wedges available to suit most angle beam applications



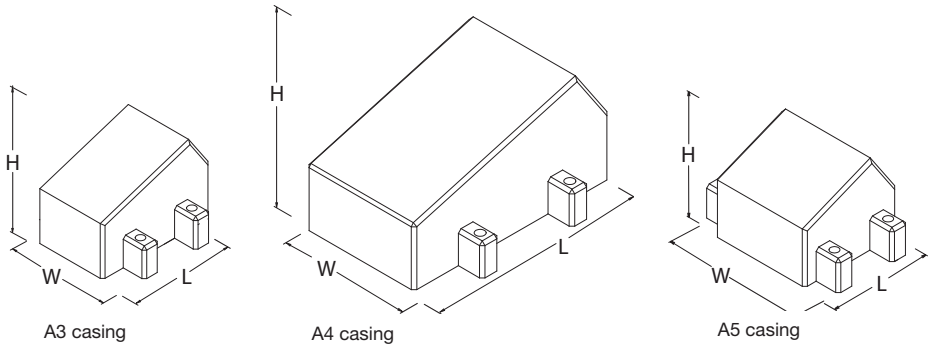
Typical Applications

A3, A4, and A5 Probes

Deep Penetration Applications

- Thick plates and welds
- Forgings
- Noisy or granular material

Simulation displays a 2.25 MHz A5 deep penetration probe; 32 element aperture, on a 55° shear wave wedge in carbon steel.
No steering or focusing was used.
*Beam simulations are based on theoretical models. Actual application results may vary.



Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External dimensions mm (in.)		
							L	W	H
3.5L16-A3	U8330094	3.5	16	1.60	25.6	16.0	36 (1.42)	36 (1.42)	25 (0.98)
5L16-A3	U8330092	5.0	16	1.20	19.2	12.0	36 (1.42)	36 (1.42)	25 (0.98)
1.5L16-A4	U8330098	1.5	16	2.80	44.8	26.0	57 (2.24)	46 (1.81)	30 (1.18)
2.25L16-A4	U8330692	2.25	16	2.00	32.0	20.0	57 (2.24)	46 (1.81)	30 (1.18)
2.25L32-A5	U8330141	2.25	32	0.75	24.0	24.0	29 (1.14)	43 (1.69)	24 (0.94)
5L32-A5	U8330139	5.0	32	0.60	19.2	20.0	29 (1.14)	43 (1.69)	24 (0.94)

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.

NW1, NW2, and NW3 Near-wall Probes

5L64-NW1

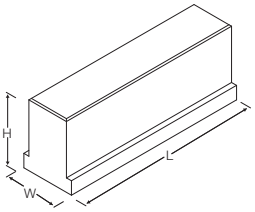
Advantages

- Shortened dead zone at both ends (1.5 mm between center of first or last element and housing edge)
- Well-suited for composite channel inspections
- C-scan inspection of composites (delamination, disbonding, and porosity)

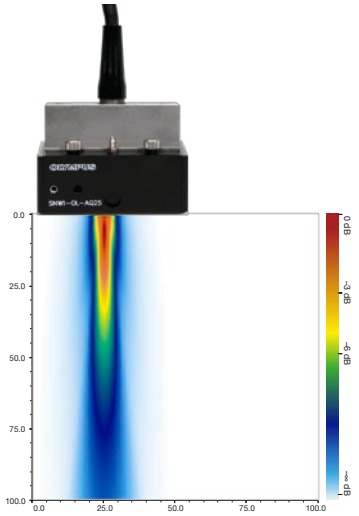
Aqualene Wedge SNW1-0L-AQ25

The Olympus Aqualene wedge promotes exceptional coupling, improved measurements, and enhanced near-surface resolution.

Aqualene wedges are available for NW1, NW2, and NW3 phased array probes. They can be ordered with an optional water recuperation system (WR option) for improved contact on irregular surfaces and minimized water loss.



NW1 casing



Simulation displays a 5 MHz NW1 Near Wall Series probe; 8 element aperture, on a 0° longitudinal wave wedge in carbon steel. No steering or focusing was used.
*Beam simulations are based on theoretical models. Actual application results may vary.

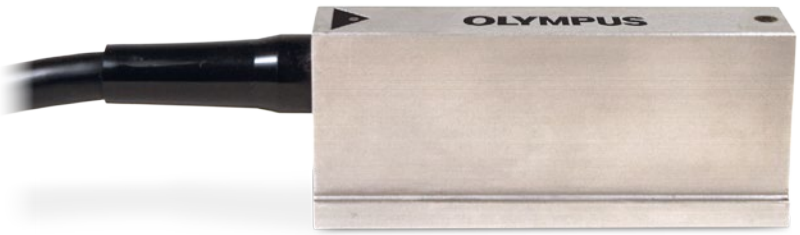
Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
3.5L64-NW1	U8330148	3.5	64	1.0	64.0	7.0	66 (2.60)	19 (0.75)	25 (0.98)
5L64-NW1	U8330134	5.0	64	1.0	64.0	7.0	66 (2.60)	19 (0.75)	25 (0.98)
3.5L24-NW2	U8330965	3.5	24	1.0	24.0	7.0	26 (1.02)	19 (0.75)	30 (1.18)
5L24-NW2	U8330155	5.0	24	1.0	24.0	7.0	26 (1.02)	19 (0.75)	30 (1.18)
3.5L128-NW3	U8330695	3.5	128	1.0	128.0	7.0	130 (5.12)	21 (0.83)	35 (1.38)
5L128-NW3	U8330647	5.0	128	1.0	128.0	7.0	130 (5.12)	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.

I1, I2, and I3 Immersion Probes

10L64-I1



10L128-I2

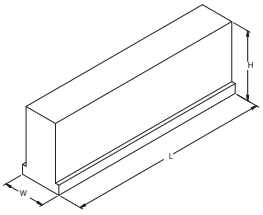
Immersion probes are designed to be used with a water wedge or in an immersion tank when the test part is partially or wholly immersed.

Advantages

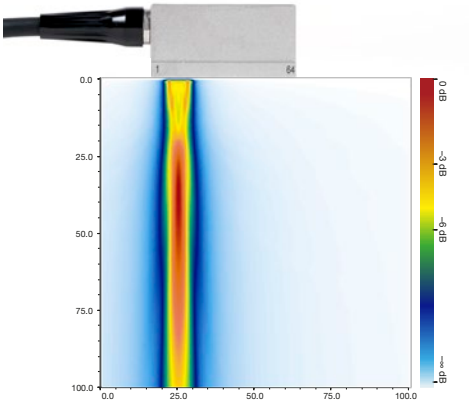
- Acoustic impedance matched to water
- Design allows fitting on water wedges for easier coupling on many surfaces and an adjustable water path (when the part to be inspected cannot be immersed in a tank)
- Linear scanning enables coverage of 30 mm to 90 mm (1.18 in. to 3.54 in.) in one line, with very high accuracy
- Corrosion-resistant stainless steel case
- Waterproof guaranteed up to 1 m (3.28 ft) under water

Typical Applications

- Inspection of thin plate or tubing (steel, aluminum, or other)
- Composite inspection for delamination, disbonding, etc.
- Inline thickness gaging
- Automated scanning



I3 casing



Simulation displays a 5 MHz I1 Immersion probe; 16 element aperture at 0° in water. No steering or focusing was used.
*Beam simulations are based on theoretical models. Actual application results may vary.

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
5L64-I1	U8330323	5.0	64	0.60	38.4	10.0	50 (1.97)	19 (0.75)	25 (0.98)
10L64-I1	U8330012	10.0	64	0.50	32.0	7.0	50 (1.97)	19 (0.75)	25 (0.98)
5L128-I2	U8330031	5.0	128	0.60	76.8	10.0	83 (3.27)	21 (0.83)	35 (1.38)
10L128-I2	U8330004	10.0	128	0.50	64.0	7.0	83 (3.27)	21 (0.83)	35 (1.38)
2.25L128-I3	U8330351	2.25	128	0.75	96.0	12.0	102 (4.02)	21 (0.83)	35 (1.38)
5L128-I3	U8330379	5.0	128	0.75	96.0	10.0	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.

R1, R4, and R5 Curved Array Probes

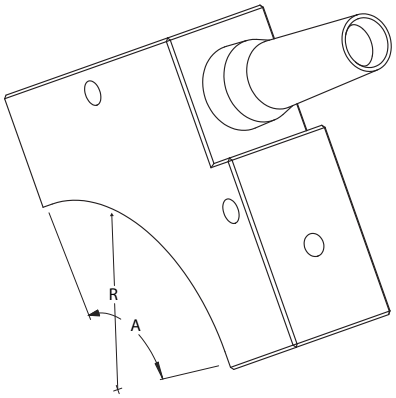
3.5CC10.2-R1 3.5CC25-R4 3.5CC50-R5

Advantages

- Acoustic impedance matched to water
- High circumferential resolution around the radius
- Corrosion-resistant stainless steel case
- Waterproof guaranteed up to 1 m (3.28 ft) underwater
- Compatible with adjustable immersion wedges (shown on page 28)

Typical Applications

- Inspection of carbon fiber reinforced polymer (CFRP) corners
- Composite inspection for delamination



R casing

Probe Specifications and Dimensions

Part Number	Item Number	Casing Type	Frequency (MHz)	Number of Element	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	Radius (mm) (R)	Angle (°) (A)	Inspection Type
3.5CC10.2-16-R1	U8330453	R1	3.5	16	1.0	16	5.0	10.2	90	ID
5CC10.2-16-R1	U8330709	R1	5.0	16	1.0	16	5.0	10.2	90	ID
3.5CC25-32-R4	U8330629	R4	3.5	32	1.32	42.3	6.0	25.0	90	ID, OD
5CC25-32-R4	U8330479	R4	5.0	32	1.32	42.3	6.0	25.0	90	ID, OD
3.5CC50-64-R5	U8330630	R5	3.5	64	1.65	105.6	6.0	50.0	121	OD
5CC50-64-R5	U8330636	R5	5.0	64	1.65	105.6	6.0	50.0	121	OD

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.

Code Compliant Probes

DGS1, SW1, and AWS1 Integrated Wedge

4L16-DGS1

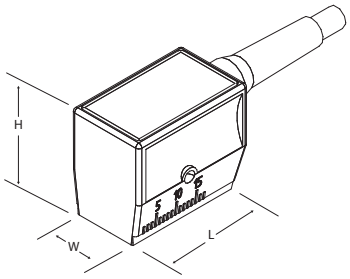
2.25L16-AWS1

Advantages

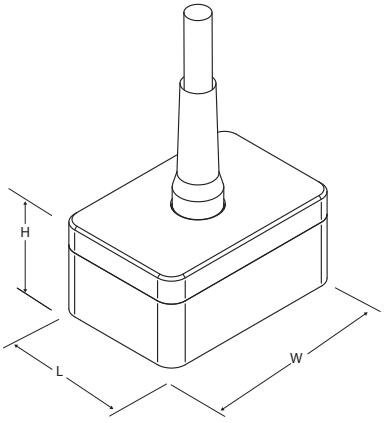
- Probe and wedge in the same housing
- Lowest-profile probe-and-wedge combination for contact angle beam inspection
- Due to probe manufacturing processes, requires no additional coupling between probe aperture and integrated wedge
- Small assembly for easy access in restricted areas
- Inspections of 30° to 70° in steel, SW or LW
- Easy to handle
- Probes with an internal wedge can be custom ordered to fit a specific radius of curvature

Typical Applications

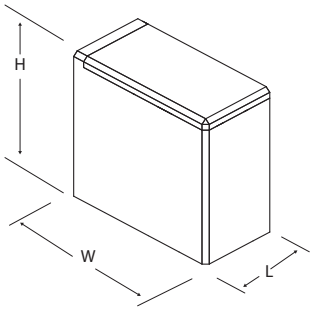
- Manual weld inspection of 6.35 mm to 19 mm (0.25 in. to 0.75 in.) thick surfaces (butt joints, corner joints, tee joints) using 40° to 70° simultaneously
- Manual inspection of stress-corrosion cracking
- AWS and DGS code compliant applications



DGS1 casing



AWS1 casing



SW1 and LW1 casings

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	Nominal Refracted Beam Angle in Steel	Integrated Wedge	External Dimensions mm (in.)		
									L	W	H
2L8-DGS1	U8330598	2.0	8	1.0	8.0	9.0	58° SW	Yes	27 (1.06)	17 (0.67)	22 (0.87)
4L16-DGS1	U8330597	4.0	16	0.5	8.0	9.0	58° SW	Yes	27 (1.06)	17 (0.67)	22 (0.87)
2.25L16-45SW1	U8330014	2.25	16	0.75	12.0	12.0	45° SW	Yes	30 (1.18)	15 (0.59)	31 (1.22)
2.25L16-45LW1	U8330495	2.25	16	0.75	12.0	12.0	45° LW	Yes	30 (1.18)	15 (0.59)	31 (1.22)
5L16-45SW1	U8330496	5.0	16	0.60	9.6	10.0	45° SW	Yes	30 (1.18)	15 (0.59)	31 (1.22)
5L16-45LW1	U8330497	5.0	16	0.60	9.6	10.0	45° LW	Yes	30 (1.18)	15 (0.59)	31 (1.22)
2.25L16-AWS1	U8330660	2.25	16	1.0	16.0	16.0	N/A	No	25 (0.98)	38 (1.50)	18 (0.71)

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.

Legacy Probes

PWZ3, A1, A2, A11, and A12 Probe Specifications and Dimensions

5L64-A2

5L64-A12

5L16-A1

5L32-A11

Probe Specifications and Dimensions

Part Number	Item Number	Frequency (MHz)	Number of Elements	Pitch (mm)	Active Aperture (mm)	Elevation (mm)	External Dimensions mm (in.)		
							L	W	H
5L32-PWZ3	U8330770	5.0	32	1.0	32.0	10.0	40 (1.57)	26 (1.02)	30 (1.18)
7.5L32-PWZ3	U8330209	7.5	32	1.0	32.0	10.0	40 (1.57)	26 (1.02)	30 (1.18)
10L32-PWZ3	U8330221	10.0	32	1.0	32.0	10.0	40 (1.57)	26 (1.02)	30 (1.18)
2.25L16-A1	U8330624	2.25	16	0.75	12.0	12.0	17 (0.67)	29 (1.14)	25 (0.98)
5L16-A1	U8330070	5.0	16	0.60	9.6	10.0	17 (0.67)	29 (1.14)	25 (0.98)
10L32-A1	U8330633	10.0	32	0.31	9.9	7.0	17 (0.67)	29 (1.14)	25 (0.98)
2.25L64-A2	U8330580	2.25	64	0.75	48.0	12.0	53 (2.09)	29 (1.14)	35 (1.38)
5L64-A2	U8330072	5.0	64	0.60	38.4	10.0	53 (2.09)	29 (1.14)	35 (1.38)
10L64-A2	U8330658	10.0	64	0.60	38.4	7.0	53 (2.09)	29 (1.14)	35 (1.38)
5L32-A11	U8330274	5.0	32	0.60	19.2	10.0	25 (0.98)	23 (0.91)	20 (0.79)
5L64-A12	U8330593	5.0	64	0.60	38.4	10.0	45 (1.77)	23 (0.91)	20 (0.79)
2.25L64-A12	U8330982	2.25	64	0.60	38.4	10.0	45 (1.77)	23 (0.91)	20 (0.79)

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.

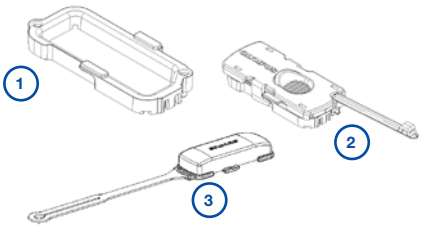
Probe Options and Spare Parts

OL OmniScan Connector

- Add a conventional UT channel (LEMO 00 connector) within the OmniScan Connector of a phased array probe
- Enables simultaneous or alternate use of phased array and pulse-echo using a single setup
- To order this option, replace OM with OL for the Instrument Connector code

Metal Armor Outer

- Offers mechanical protection against cuts, nicks, wear, and harsh environments
- Available for most standard probes and extension cables



PA Probe Connector Spare Parts

1. **Connector Base**
   P/N: PAPROBE-A-Base [U8100139]
2. **Connector Base Cover**
   P/N: PAprobe-A-basecap [U8100138]
3. **Connector Cover**
   P/N: PAprobe-A-Cover [U8100140]

Spare Screw Kits

Part Number	Item Number	Description
SCREW KIT, M3 × 22MM LG, CAPTIVE, PP	U8779634	Kit of (16×) SCRW-0068; M3 × 22 mm, captive Phillips pan-head screws, for A10, A11, A12, and A14 case styles.
SCREW KIT, 1-64 Captive Custom	U8779635	Kit of (16×) SCRW-10010, 1-64, captive custom screws for A15 case style.
SCREW KIT, M3 X 12MM LG CAPTIVE SHCS	U8779636	Kit of (12×) SCRW-10096; M3 × 12 mm, captive socket head cap screws for A1, A2, A3, A4, and A5 case style.
SCREW KIT, M3 X 22MM LG CAPTIVE SHCS	U8779637	Kit of (12×) SCRW-10097; M3 × 22 mm, captive socket head cap screws for A10, A11, and A12 case styles.
SCREW KIT, M3 X 12MM LG, CAPTIVE PP	U8779638	Kit of (24×) SCRW-0009; M3 × 12 mm, captive Phillips pan-head screws for A1, A2, A3, A4, and A5 case style.
SCREW KIT M3 CAPTIVE, SHCS 16 MM	U8779672	Kit of (16×) SCRW-0048, M3 × 16 mm captive screws for PWZ1, PWZ2, PWZ3, and PWZ4 case style.

Removable Contact Wear-face

Applications:

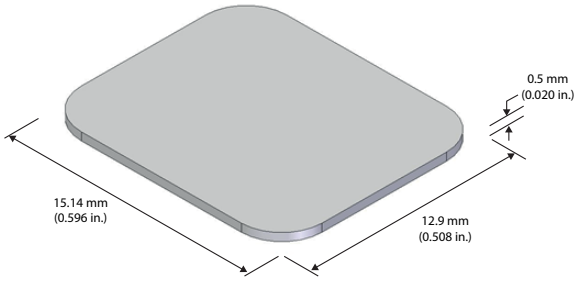
- Contact 0-degree forging and thicker material inspections

Advantages

- Use of probe in contact applications. Self-adhering for easy installation, removal, and replacement.
- Wear-face can be manufactured for any angle beam PA probe aperture size
- Use angle beam probe in contact style inspection
- Protects transducer matching layer
- Reduces probe height clearance as compared to using a 0-degree wedge
- Easy installation, removal, and replacement

Item Number	Probe Type
U8779734	A0
U8779400	A00
U8779375	A1
U8779642	A10
U8779769	A11
U8779643	A12
U8779656	A14
U8779658	A15
U8779770	A16
U8779376	A2
U8779737	A3
U8779768	A4
U8779681	A5
U8779684	AWS1
U8779650	NW1
U8779651	NW2
U8779652	NW3
U8779657	PWZ1

Wear-Faces are sold in kits of 12 pieces each



Wedges for Angle Beam Probes

SA2-0L

SA00-N60S

SA00-N55S

SA31-N55S

SA32-N55S

Advantages

- Available in standard refracted angles of 0°, 45°, 55°, and 60° in steel for angle-beam inspections from 30° to 70°, SW or LW
- Stainless steel screw receptacles provide a firm anchoring of probe to wedge
- Wedges are available with IHC options: irrigation, holes (for mounting on Olympus scanners), and carbide pins (for wear resistance)
- Wedges are designed to perform manual or automated scans (IHC)
- Custom wedges with specific refracted angles can be ordered; wedge shape and contour can also be customized

Numbering System Used to Order Wedges for Angle Beam probes

SA31-N55S-IHC-AOD16

- Wedge type
- Probe mounting
- Refracted angle in steel
- Wave type
- Options
- Curvature type
- Pipe diameter

Glossary Used to Order Wedges

Wedge type	
SA =	wedge for probe type A
SAWS =	wedge for probe type AWS
SNW =	wedge for near-wall probe type NW
SPWZ =	wedge for PipeWIZARD probe type PWZ

Probe mounting	
N =	Normal
L =	Lateral (90° skew)
DN =	Dual Normal

Refracted angle in steel	
0 =	0°
55 =	55°
60 =	60°

Wave type	
S =	shear wave
L =	longitudinal wave

Options	
IHC =	Irrigation, scanner holes, and carbide wear pins
IHC-C =	Irrigation, scanner holes, and composite wear pins
IHS =	Irrigation, scanner holes, and stainless steel frame

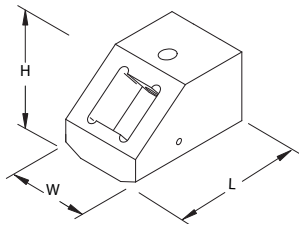
Curvature type	
AOD =	Axial outside diameter (circumferential scan)
COD =	Circumferential outside diameter (axial scan)

Pipe diameter
Measured external pipe diameter (inches)

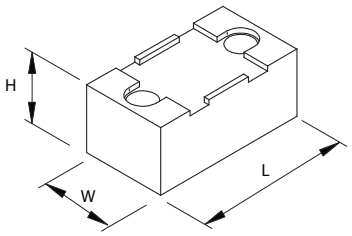
Wedge Specifications and Dimensions

Part Number	Probe Type	Nominal Refracted Beam Angle (in Steel)	Recommended Sweep (°)	Probe Orientation	Wedge Dimensions (mm)			
					L	W	W*	H
SA00-0L	A00	0° LW	–30 to 30	Normal	16	12	N/A	12
SA00-N60S	A00	60° SW	45 to 70	Normal	21	14	N/A	13
SA0-0L	A0	0° LW	–30 to 30	Normal	23	12	N/A	11
SA0-N60S	A0	60° SW	45 to 70	Normal	32	18	N/A	21
SA1-0L	A1	0° LW	–30 to 30	Normal	29	30	30	20
SA1-N60S	A1	60° SW	30 to 70	Normal	30	30	40	16
SA1-N60L	A1	60° LW	45 to 70	Normal	28	30	40	21
SA2-0L	A2	0° LW	–30 to 30	Normal	65	30	40	20
SA2-N60L	A2	60° LW	30 to 70	Normal	79	30	40	50
SA2-N55S	A2	55° SW	30 to 70	Normal	69	30	40	43
SA3-0L	A3	0° LW	–30 to 30	Normal	38	37	50	20
SA3-N45S	A3	45° SW	30 to 60	Normal	55	37	50	30
SA3-N45L	A3	45° LW	30 to 60	Normal	55	37	50	49
SA3-N60S	A3	60° SW	45 to 70	Normal	58	37	50	32
SA3-N60L	A3	60° LW	45 to 70	Normal	53	37	50	40
SA4-0L	A4	0° LW	–30 to 30	Normal	59	47	55	20
SA4-N45S	A4	45° SW	30 to 60	Normal	90	47	55	51
SA4-N45L	A4	45° LW	30 to 60	Normal	88	47	55	85
SA4-N60S	A4	60° SW	45 to 70	Normal	86	47	55	45
SA4-N60L	A4	60° LW	45 to 70	Normal	83	47	55	68
SA5-0L	A5	0° LW	–30 to 30	Normal	38	45	55	20
SA5-N45S	A5	45° SW	30 to 60	Normal	57	47	55	37
SA5-N60S	A5	60° SW	45 to 70	Normal	46	43	55	25
SA5-N60L	A5	60° LW	45 to 70	Normal	39	50	55	41
SA10-0L	A10	0° LW	–30 to 30	Normal	25	23	40	20
SA10-N55S	A10	55° SW	30 to 70	Normal	23	23	40	14
SA10-N60L	A10	60° LW	30 to 70	Normal	26	23	40	30
SA11-0L	A11	0° LW	–30 to 30	Normal	35	23	40	23
SA11-N55S	A11	55° SW	30 to 70	Normal	41	23	40	29
SA11-N60L	A11	60° LW	30 to 70	Normal	43	23	40	53
SA12-0L	A12	0° LW	–30 to 30	Normal	58	23	40	20
SA12-N55S	A12	55° SW	30 to 70	Normal	73	45	40	45
SA12-N60L	A12	60° LW	30 to 70	Normal	61	23	40	53
SA14-0L	A14	0° LW	–30 to 30	Normal	80	23	40	20
SA14-N55S	A14	55° SW	30 to 70	Normal	96	23	40	49
SA15-N60S	A15	60° SW	35 to 70	Normal	18	22	N/A	12
SA16-N55S	A16	55° SW	30 to 70	Normal	85	31	40	44
SA31-0L	A31	0° LW	35 to 70	Normal	40	30	40	20
SA31-N55S	A31	55° SW	35 to 70	Normal	49	30	40	32
SA31-N60L	A31	60° LW	35 to 70	Normal	39	30	40	31
SA32-0L	A32	0° LW	35 to 70	Normal	50	30	40	20
SA32-N55S	A32	55° SW	35 to 70	Normal	62	30	40	33
SA32-N60L	A32	60° LW	35 to 70	Normal	56	30	40	43
SAWS1-N60S	AWS1	60° SW	45 to 70	Normal	45	38	N/A	32
SAWS1-0L	AWS1	0° LW	-30 to 30	Normal	38	38	N/A	40
SNW1-0L	NW1	0° LW	N/A	Normal	66	32	32	22
SNW1-0L-AQ25	NW1	0° LW	N/A	Normal	71	40	40	37
SNW1-0L-AQ25-WR	NW1	0° LW	N/A	Normal	93	40	40	39
SNW1-0L-IHC-C	NW1	0° LW	N/A	Normal	66	32	32	22
SNW2-0L	NW2	0° LW	N/A	Normal	26	32	32	22
SNW2-0L-AQ25	NW1	0° LW	N/A	Normal	31	40	40	37
SNW2-0L-AQ25-WR	NW1	0° LW	N/A	Normal	53	40	40	39
SNW3-0L	NW3	0° LW	N/A	Normal	130	32	32	22
SNW3-0L-AQ25	NW1	0° LW	N/A	Normal	135	40	40	37
SNW3-0L-AQ25-WR	NW1	0° LW	N/A	Normal	157	40	40	39
SPWZ1-0L	PWZ1	0° LW	-30 to 30	Normal	75	30	40	20
SPWZ1-N55S	PWZ1	55° SW	30 to 70	Normal	87	30	40	45
SPWZ3-0L	PWZ3	0° LW	-30 to 30	Normal	40	30	40	20
SPWZ3-N55S	PWZ3	55° SW	30 to 70	Normal	65	30	40	38
SPWZ3-N60L	PWZ3	60° LW	45 to 70	Normal	64	30	40	35

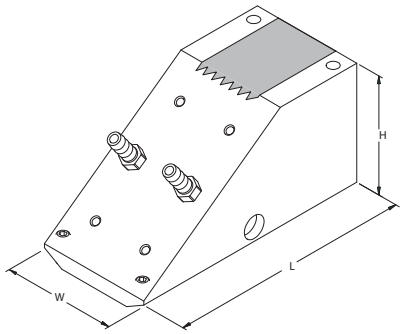
* Width with IHC wedge option



SA00-N60S



SA0-0L



SPWZ1-N55S-IHC

Standard AOD Wedge Curvature Values

External Pipe Diameter in.	Curvature Range Minimum mm (in.)		Curvature Range Maximum mm (in.)	
WEDGE TYPE: SA1, SA2, SA3, SA4, SA5, SPWZ1, SPWZ3, SI1, SI2, SI3				
2	45.7	(1.8)	50.8	(2)
2.25	50.8	(2)	57.1	(2.25)
2.5	57.1	(2.25)	63.5	(2.5)
3	63.5	(2.5)	76.2	(3)
3.25	76.2	(3)	82.5	(3.25)
3.5	82.5	(3.25)	88.9	(3.5)
4	88.9	(3.5)	101.6	(4)
4.5	101.6	(4)	114.3	(4.5)
5	114.3	(4.5)	127.0	(5)
6	127.0	(5)	152.4	(6)
7	152.4	(6)	177.8	(7)
8	177.8	(7)	203.2	(8)
10	203.2	(8)	254.0	(10)
12	254.0	(10)	304.8	(12)
16	304.8	(12)	406.4	(16)
22	406.4	(16)	555.8	(22)
30	558.8	(22)	762.0	(30)
Flat	762.0	(30)	up to flat	
WEDGE TYPE: SA10*, SA11*, SA12*, SA14*, SA31, SA32				
2.375	50.8	(2)	60.3	(2.375)
2.875	60.3	(2.375)	73.0	(2.875)
3.5	73.0	(2.875)	88.9	(3.5)
4	88.9	(3.5)	101.6	(4)
4.5	101.6	(4)	114.3	(4.5)
5.563	114.3	(4.5)	141.3	(5.563)
6.625	141.3	(5.563)	168.3	(6.625)
8.625	168.3	(6.625)	219.0	(8.625)
10.75	219.0	(8.625)	273.0	(10.75)
12.75	273.0	(10.75)	323.8	(12.75)
16	323.8	(12.75)	406.4	(16)
24	406.4	(16)	609.6	(24)
Flat	609.6	(24)	up to flat	

External Pipe Diameter in.	Curvature Range Minimum mm (in.)		Curvature Range Maximum mm (in.)	
WEDGE TYPE: ST AND SPE				
2	44.4	(1.75)	50.8	(2)
2.25	50.8	(2)	51.7	(2.25)
2.5	57.1	(2.25)	63.5	(2.5)
3	63.5	(2.5)	76.2	(3)
3.5	76.2	(3)	88.9	(3.5)
4	88.9	(3.5)	101.6	(4)
5	101.6	(4)	127.0	(5)
6	127.0	(5)	152.4	(6)
8	152.4	(6)	203.2	(8)
12	203.2	(8)	304.8	(12)
16	304.8	(12)	406.4	(16)
22	406.4	(16)	558.8	(22)
Flat	555.8	(22)	up to flat	

* Below 4 in., IHC are integrated in the Rexolite and wedges are not compatible with IHC rings. Flat wedge can be used for pipes greater than 12.75 in. OD.

Immersion Corner Wedges for Curved Array Probes

SR1-I81-ADJ

SR4-IE90-ADJ

Advantages

Immersion Inspection of Composite Radii

- Available in specific radius and angle as well as with adjustable radius to fit on various components to be inspected
- Wedges are designed to perform manual scans
- Designed to be used with the Mini-Wheel encoder

Numbering System Used to Order Wedges for Curved Array Probes

SR1-I90-0.125

- SR1 — Wedge type
- I — Inspection type
- 90 — Angle of inspected part
- 0.125 — Radius

Glossary Used to Order Wedges

Wedge type	
SR1 =	wedge for curved probe type R1
SR4 =	wedge for curved probe type R4
SR5 =	wedge for curved probe type R5

Inspection type	
I =	internal
E =	external

Angle of inspected part (°)	
81 =	81°
90 =	90°
98 =	98°

Custom angles available.

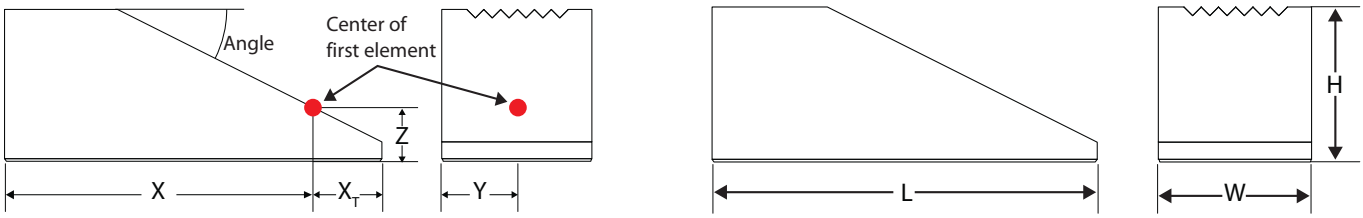
Radius	
	Radius in in.
ADJ =	adjustable radius

Note: Not all angles or radii are available. Please consult your Olympus representative to discuss your specific application.
Please consult your Olympus representative to discuss your specific application.

Wedge Specifications and Dimensions

Part Number	Item Number	Probe Type	Angle of the Inspected Part (°)	Radius Range mm (in.)		Inspection Type
SR1-I81-ADJ	U8720659	R1	81	4 to 14	(0.16 to 0.55)	ID
SR1-I90-ADJ	U8720638	R1	90	3 to 14	(0.12 to 0.55)	ID
SR1-I98-ADJ	U8720660	R1	98	3 to 13	(0.12 to 0.51)	ID
SR4-IE90-ADJ	U8720608	R4	90	3 to 20	(0.12 to 0.79)	OD/ID

Wedge Offset Parameters



A Wedge Specification Sheet is provided with every wedge. This sheet presents the wedge offset parameters of a phased array probe's first element for both OmniScan® and TomoView™ software. It is important to note that the values given are only applicable for the wedge and probe combinations listed.

Note that if the word "reverse" appears on the header of the Wedge Specification Sheet, it means that the probe is mounted backwards on the wedge.

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Your Vision, Our Future

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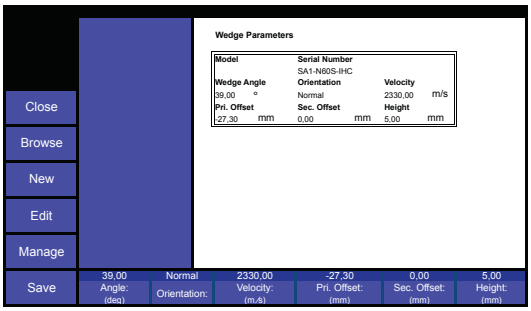
Fax: 1-418-872-5431
Web site: www.olympus-ims.com

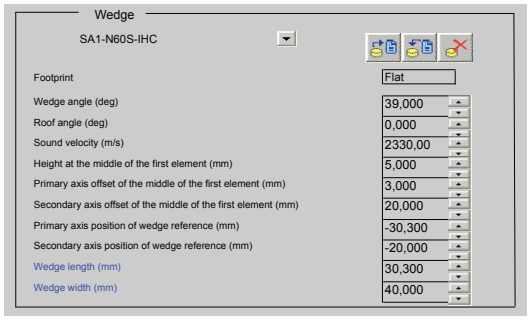
Wedge Specification Sheet

Wedge: ***SA1-N60S-IHC***
Probe: ***2L16-A1,5L16-A1 AND 10L32-A1***

OmniScan Wedge Parameters



TomoView Wedge Parameters



Wedge parameters with OmniScan	
X	Primary offset
Y	Secondary offset (0 when probe is centered)
Z	Height

Wedge parameters with TomoView	
X_T	Primary axis offset of the middle of the first element (mm)
Y	Secondary axis offset of the middle of the first element (mm) (measured from the side of the wedge)
Z	Height at the middle of the first element (mm)

How to Find the Wedge Parameters

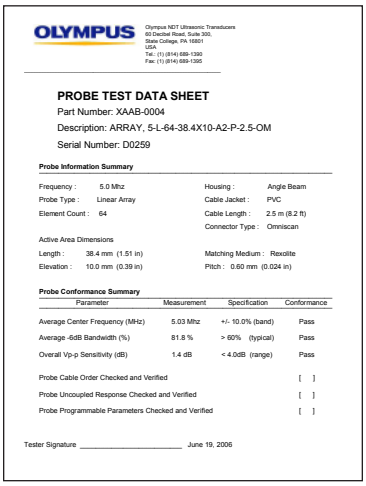
1. Find the appropriate wedge in either the OmniScan or TomoView Wedge Database. Parameters are automatically set once the wedge model is chosen.
2. If the wedge is not already in the database, you may download the latest database update from the Service & Support section of www.olympus-ims.com.
3. Enter the parameters manually using the values provided on the Wedge Specification Sheet accompanying the wedge.
4. Call your local sales representative.

Testing and Documentation

All Olympus phased array probes are rigorously tested to ensure conformance to the highest standards. Olympus maintains an extensive database containing characterization records for every probe sold. This information can be accessed to compare probe properties.
If you have special testing requirements, please contact Olympus.

Standard Test Form

A Probe Test Data Sheet is supplied with the purchase of every probe. This form presents the following information:



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Olympus NDT Ultrasonic Transducers
60 Decibel Road, Suite 300,
State College, PA 16801
USA
Tel.: (1) (814) 689-1390
Fax: (1) (814) 689-1395

PROBE TEST DATA SHEET

Part Number: XAAB-0004
Description: ARRAY, 5-L-64-38.4X10-A2-P-2.5-OM
Serial Number: D0259

Probe Information Summary

Frequency :	5.0 Mhz	Housing :	Angle Beam
Probe Type :	Linear Array	Cable Jacket :	PVC
Element Count :	64	Cable Length :	2.5 m (8.2 ft)
		Connector Type :	Omniscan

Active Area Dimensions

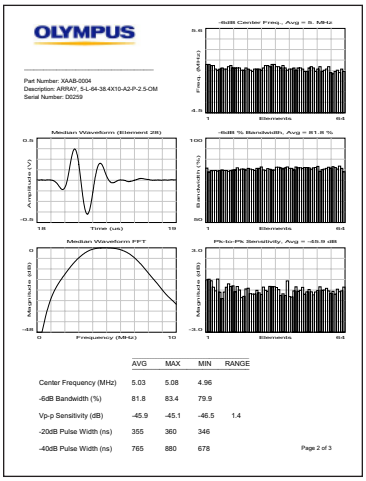
Length :	38.4 mm (1.51 in)	Matching Medium :	Rexolite
Elevation :	10.0 mm (0.39 in)	Pitch :	0.60 mm (0.024 in)

Probe Conformance Summary

Parameter	Measurement	Specification	Conformance
Average Center Frequency (MHz)	5.03 Mhz	+/- 10.0% (band)	Pass
Average -6dB Bandwidth (%)	81.8 %	> 60% (typical)	Pass
Overall Vp-p Sensitivity (dB)	1.4 dB	< 4.0dB (range)	Pass

Probe Cable Order Checked and Verified [ ]
Probe Uncoupled Response Checked and Verified [ ]
Probe Programmable Parameters Checked and Verified [ ]

Tester Signature _____ June 19, 2006



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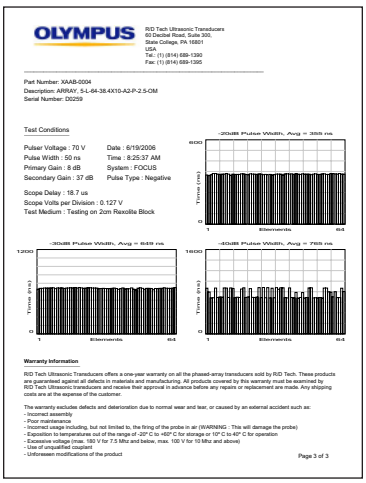
Part Number: XAAB-0004
Description: ARRAY, 5-L-64-38.4X10-A2-P-2.5-OM
Serial Number: D0259

-6dB Center Freq., Avg = 5. MHz
Median Waveform (Element 28)
-6dB % Bandwidth, Avg = 81.8 %
Median Waveform FFT
Pk-to-Pk Sensitivity, Avg = -45.9 dB

	AVG	MAX	MIN	RANGE
Center Frequency (MHz)	5.03	5.08	4.96	
-6dB Bandwidth (%)	81.8	83.4	79.9	
Vp-p Sensitivity (dB)	-45.9	-45.1	-46.5	1.4
-20dB Pulse Width (ns)	355	360	346	
-40dB Pulse Width (ns)	765	880	678	

Page 2 of 3



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RD Tech Ultrasonic Transducers
60 Decibel Road, Suite 300,
State College, PA 16801
USA
Tel.: (1) (814) 689-1390
Fax: (1) (814) 689-1395

Part Number: XAAB-0004
Description: ARRAY, 5-L-64-38.4X10-A2-P-2.5-OM
Serial Number: D0259

Test Conditions

Pulser Voltage : 70 V	Date : 6/19/2006
Pulse Width : 50 ns	Time : 8:25:37 AM
Primary Gain : 8 dB	System : FOCUS
Secondary Gain : 37 dB	Pulse Type : Negative

Scope Delay : 18.7 us
Scope Volts per Division : 0.127 V
Test Medium : Testing on 2cm Rexolite Block

-20dB Pulse Width, Avg = 355 ns
-30dB Pulse Width, Avg = 669 ns
-40dB Pulse Width, Avg = 765 ns

Warranty Information

RD Tech Ultrasonic Transducers offers a one-year warranty on all the phased-array transducers sold by RD Tech. These products are guaranteed against all defects in materials and manufacturing. All products covered by this warranty must be examined by RD Tech Ultrasonic transducers 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 including, but not limited to, the firing of the probe in air (WARNING - This will damage the probe)
- Exposition to temperatures out of the range of -20° C to +60° C for storage or 10° C to 40° 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 coupliant
- Unforeseen modifications of the product

Page 3 of 3

Median Waveform

The median waveform graph displays a median pulse-echo response (typical) from the test target. Half of the return pulses from the probe elements will have a peak-to-peak voltage greater than (or equal to) this median element, and the other half will have a smaller value. Return pulse duration is shown on the horizontal axis (in microseconds) and amplitude is shown on the vertical axis (in V). The number of the median element is shown above the graph (in parentheses).

Median Waveform FFT

The median waveform FFT graph shows the calculated spectrum for the median waveform (see above) over a range of zero MHz to twice the probe's nominal frequency.

–6 dB Center Frequency

The –6 dB center frequency bar graph displays a calculated center-frequency value for each of the probe's elements. This value is calculated by using the halfway point (in frequency) of an imaginary line intersecting a given element's spectrum (FFT) data at the –6 db level. The average value of all the probe's elements is displayed at the top of the graph.

–6 dB Percent Bandwidth

The –6 dB percent bandwidth bar graph displays a calculated percent bandwidth value for each of the probe's elements. This value is determined by using the length (in frequency) of an imaginary line intersecting a given element's spectrum (FFT) data at the –6 db level and calculated as a percentage of the center frequency. The average value of all the probe's elements is displayed at the top of the graph.

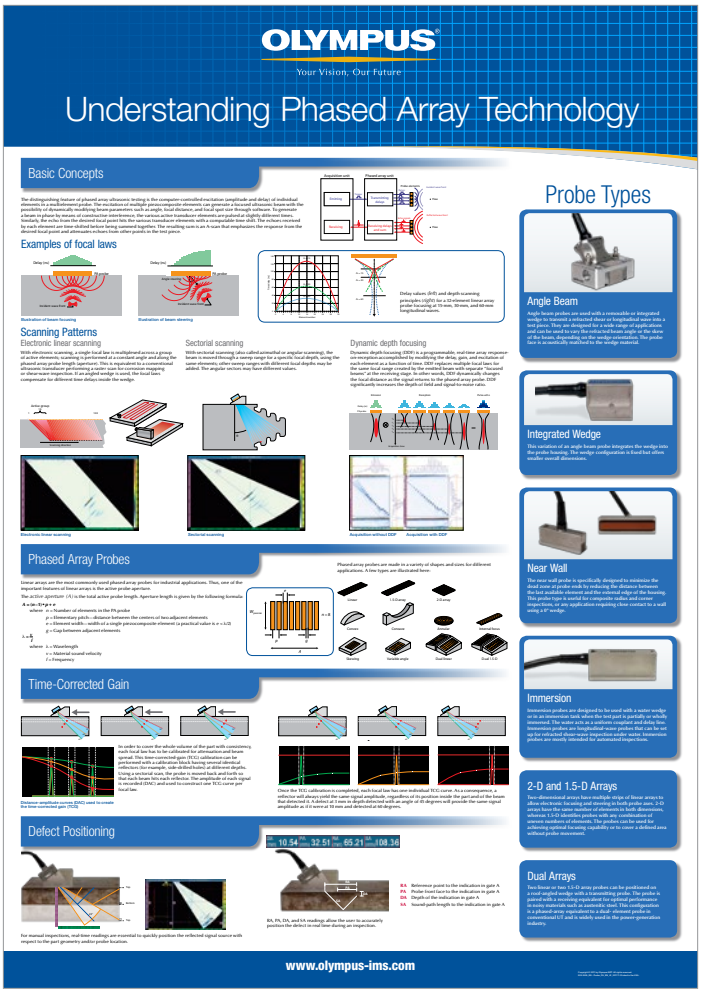
Peak-to-Peak Sensitivity

The peak-to-peak sensitivity bar graph displays a value for each of the probe's elements, representing the sensitivity of the probe. This value is calculated by using the magnitude of the excitation (test) pulse sent to each element and the peak-to-peak voltage measurement of that element's pulse-echo return (from the test target). The reported value is –20 multiplied by the log of the ratio of these two magnitudes. The average value of all the probe's elements is displayed at the top of the graph.

Pulse Width

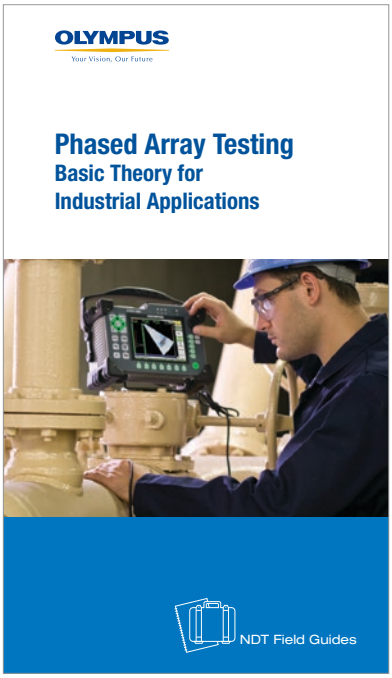
The various pulse-width bar graphs display values representing the axial resolution of the elements' pulse-echo returns at various levels, such as –20 dB, –30 dB and –40 dB. These values are calculated by measuring the return pulse's width (in nanoseconds) at the desired level. Axial resolution is an important measure of the ability to distinguish individual pulse returns from one another during normal transducer operation. The average value of all the probe's elements is displayed at the top of the graph.

Support and Resources



To support the growing NDT community, Olympus has published the “Understanding Phased Array Technology” poster. This poster has been designed by field experts to present phased array inspection technology in a concise and clearly illustrated manner.

Get your free poster at www.olympus-ims.com.



Olympus has introduced the Phased Array Testing field guide as a convenient resource for customers and anyone else interested in phased array technology.
It is designed to be an easy-to-follow introduction to ultrasonic phased array testing, both for newcomers and for more experienced users who wish to review basic principles. This guide begins by explaining what phased array testing is and how it works, outlines some considerations for selecting probes and instruments, and concludes with further reference information and a glossary.

This free field guide can be downloaded from the Olympus website, PDF Library.

Warranty Information

Olympus offers a one-year warranty on all phased array transducers sold by Olympus. These products are guaranteed against all defects in materials and manufacturing. All products covered by this warranty must be examined by Olympus and receive approval in advance before any repairs or replacements 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 probe assembly by user
- Poor maintenance
- Incorrect usage including, but not limited to, the firing of the probe in air (WARNING: This will damage the probe)
- Exposure to temperatures out of the range of -20 °C to 60 °C for storage or 10 °C to 40 °C for operation
- Excessive voltage (max. 180 V for 7.5 MHz and below, max. 115 V for 10 MHz and above)
- Use of unqualified couplant
- Unforeseen modifications of the product
- Use beyond 1 m (3.28 ft) depth in water

Warranty may vary depending on your location. Contact your local distributor

Training

In an effort to offer comprehensive courses in phased array technology and applications, Olympus has worked in partnership with major training companies to develop its unique Training Academy. Courses range from a two-day “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 OmniScan® portable phased array flaw detector. Courses lead either to recognized certification or to certificates of attendance.

Courses are currently being offered at the training facilities of participating companies as well as at customer-determined locations worldwide. Customized courses can also be arranged. Check the latest course schedule at www.olympus-ims.com.

How to Order

For pricing or for further information, consult the ordering information outlined on page 8 and call your local sales representative.

To locate the nearest Olympus office, please visit **www.olympus-ims.com.**

www.olympus-ims.com

OLYMPUS SCIENTIFIC SOLUTIONS AMERICAS CORP.
is certified to ISO 9001, ISO 14001, and OHSAS 18001.

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For enquiries - contact
www.olympus-ims.com/contact-us

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