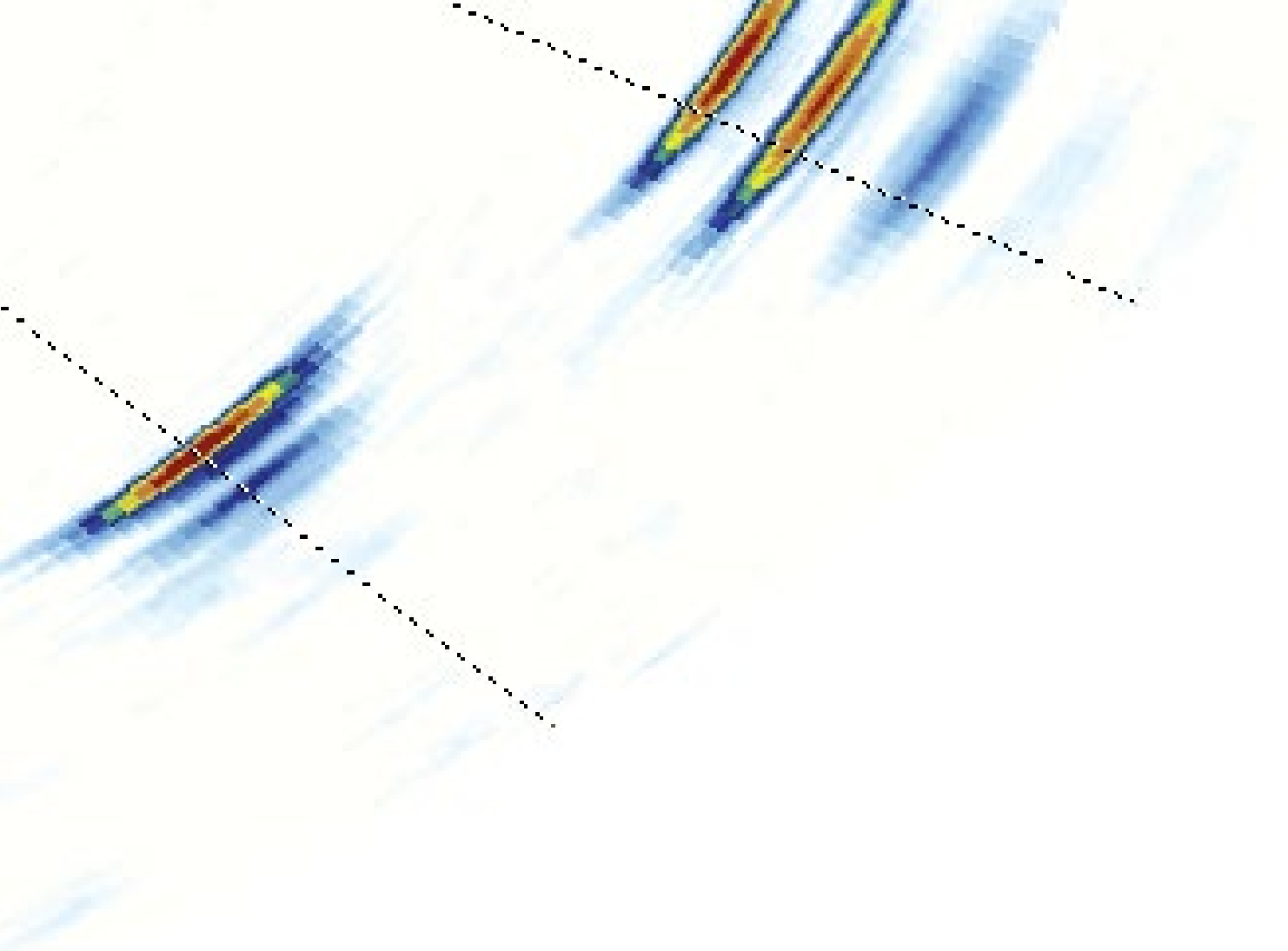


# Phased Array Probes and Wedges



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



A leader in providing solutions for customers in the industrial and life science markets, Olympus Scientific Solutions offers a comprehensive portfolio of advanced technologies including remote visual, microscopy, ultrasound, eddy current, eddy current array, and X-ray fluorescence.

Our commitment to designing quality products is directly linked to our customers' responsibility to help ensure safety, quality, and reliability by complying with the highest industry standards and regulations to help people lead safe and productive lives.

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## Phased Array Probes

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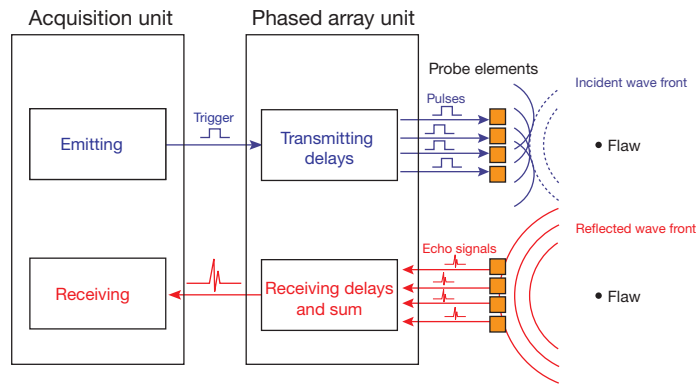
# Introduction to Phased Array Technology

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.

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

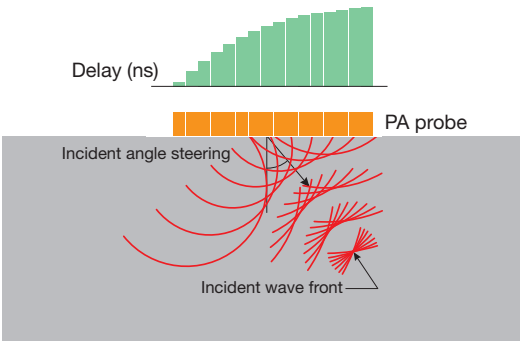
To generate a beam, the various probe elements are pulsed at slightly different times. By precisely controlling the delays between the probe elements, beams of various angles, focal distances, and focal spot sizes can be produced. The echo from the desired focal point hits the various probe elements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



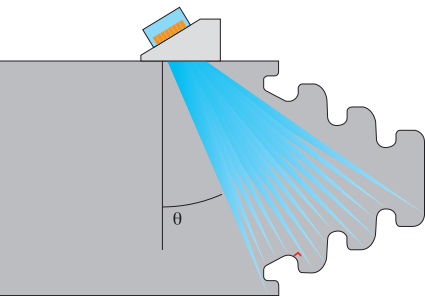
## Multiple-Angle Inspection with a Single, Small, Electronically Controlled, Multielement Probe

A conventional ultrasonic testing (UT) inspection requires a number of different transducers. A single phased array (PA) 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.



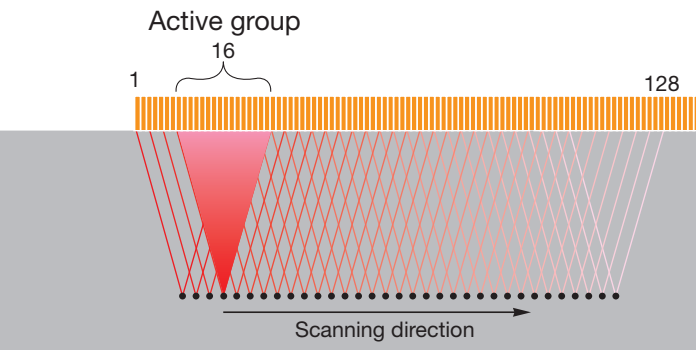
## High-Speed Scans with No Moving Parts

While phased array involves handling many signals from a multielement probe, it is important to note that the resulting signal is a standard radio frequency (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.

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



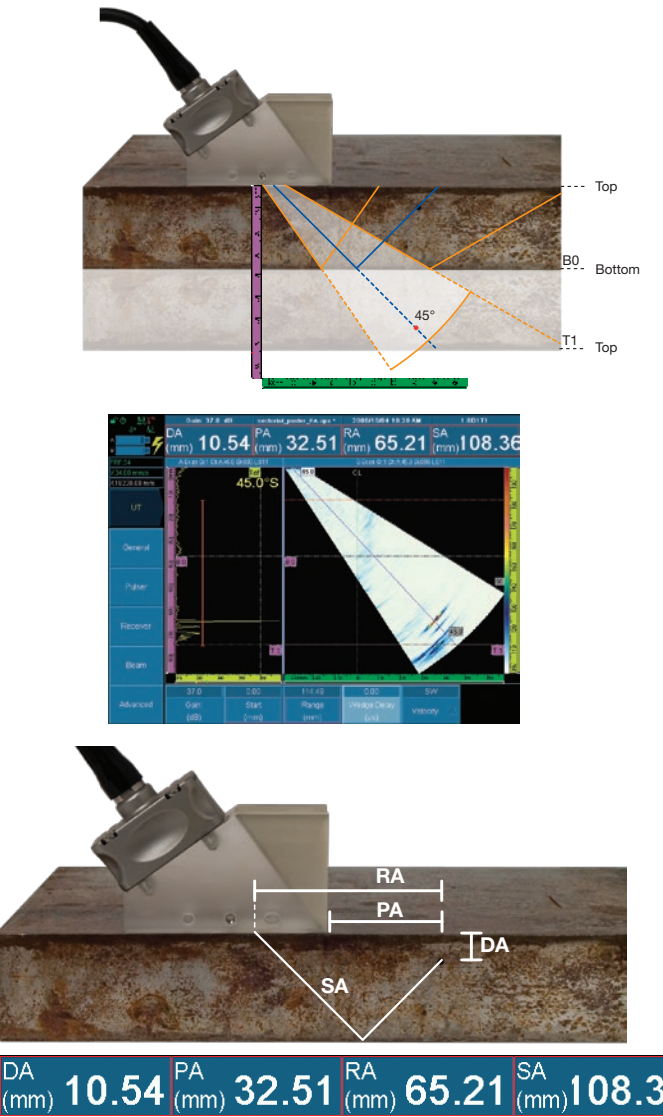
High-speed linear scan: Olympus phased array systems can also be used to inspect flat surfaces such as steel plates. Compared to a wide, single-element transducer—often referred to as a “paint brush”—phased array technology offers a much higher sensitivity due to the use of a small, focused beam.

## Defect Positioning

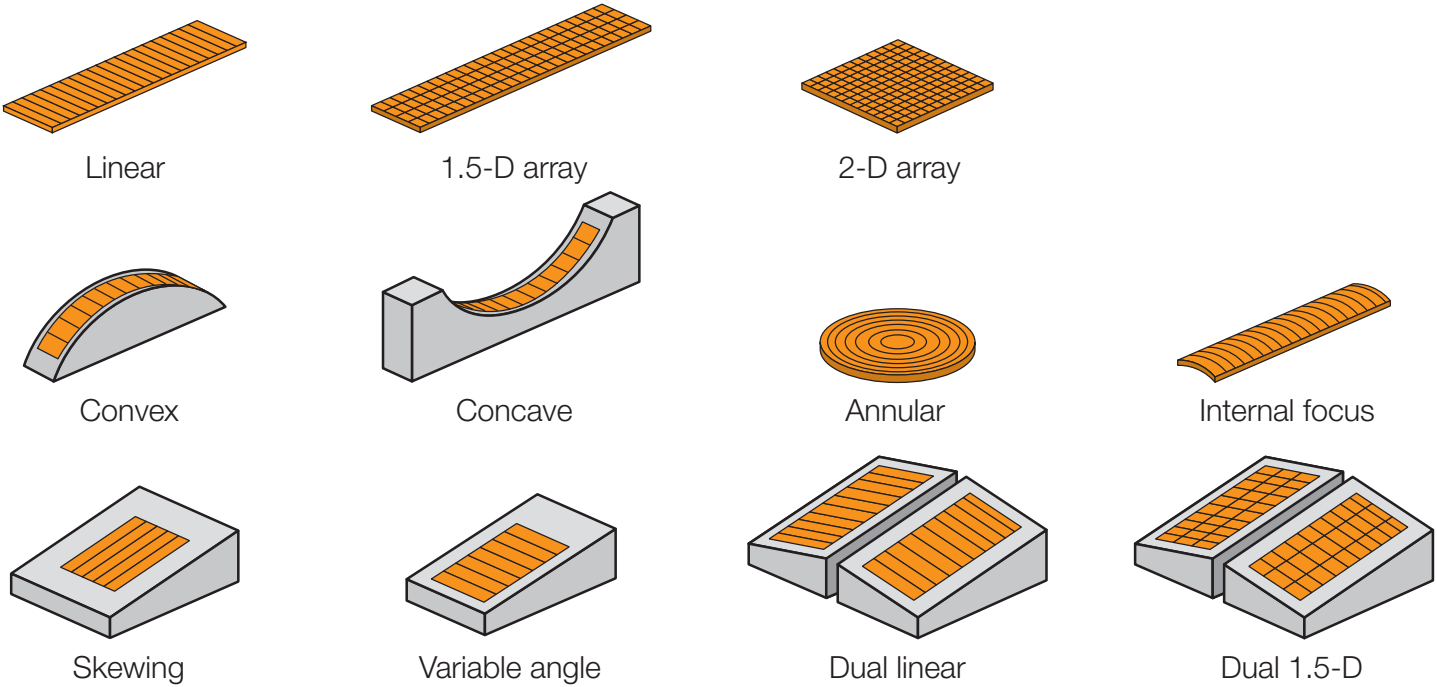
For manual inspections, real-time readings are essential to quickly position the reflected signal source with respect to the part’s geometry and/or probe location.

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



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:

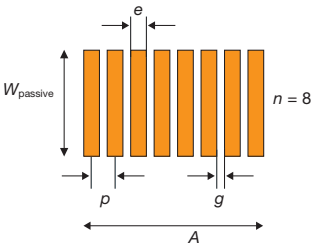
**A = n • p**

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) • p + e**

where **e** = element width—width of a single piezocomposite element (a practical value is **e < λ/2**)



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

**N = D²f / 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' • 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, curved)
  - 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/>.

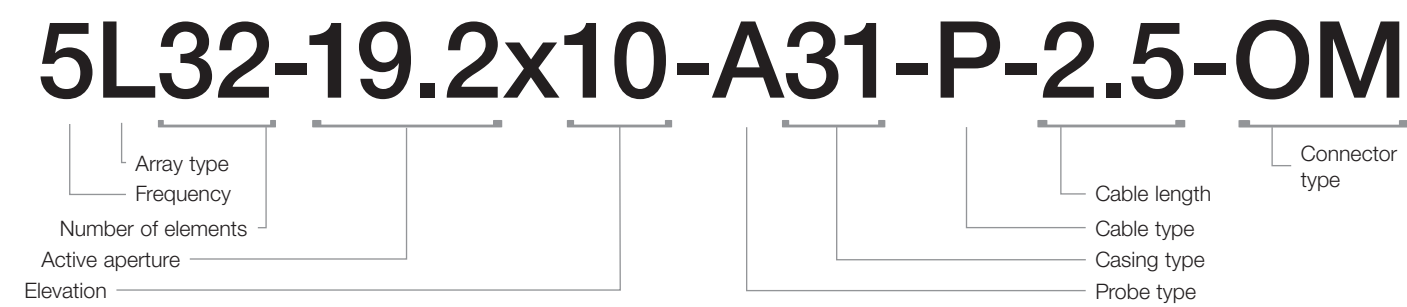
For additional information contact your local sales representative. If you do not know your local sales representative, please visit [www.olympus-ims.com](http://www.olympus-ims.com), “Contact Us” tab.

You may also contact the phased array product management group via email: [sce.pm@olympus-ossa.com](mailto: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 scanner for detection of wall-thickness reductions due to corrosion, abrasion, and erosion.                                       |
| A14         |           | ✓         | ✓    |           |                 |                  | ✓               |                         | ✓         | Compatible with the RexoFORM scanner 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.                                                  |
| A25         |           |           | ✓    |           |                 |                  |                 | ✓                       |           | Designed for small-diameter pipe weld inspection of thin, grainy materials.                                                                                    |
| A26         |           |           |      |           |                 | ✓                |                 | ✓                       |           | Designed for weld inspection of very thick, grainy 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.                                                                                                                         |
| I5          | ✓         |           |      |           |                 |                  |                 | ✓                       |           | Low-frequency, large-aperture phased array probe for inspecting thick composite materials, such as those found in wind blades.                                 |
| Rex1        |           | ✓         |      |           |                 |                  |                 | ✓                       |           | Dual Linear Array™ probe for corrosion inspection.                                                                                                             |
| Ult1        |           | ✓         |      |           |                 |                  |                 | ✓                       |           | Dual Linear Array probe for corrosion inspection on surfaces up to 150 °C.                                                                                     |
| IWP1        | ✓         |           |      |           |                 |                  |                 | ✓                       |           | Phased array probe for RollerFORM® scanner.                                                                                                                    |
| FA1         |           | ✓         |      |           |                 |                  |                 | ✓                       |           | Flexible phased array probe for the FlexoFORM™ pipe elbow scanner and SFA1 wedge series.                                                                       |
| IWP3        |           |           |      |           |                 |                  | ✓               | ✓                       |           | EdgeFORM™ bond seam scanner.                                                                                                                                   |

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

# Solution-Specific Probes

## Weld Series



A31

### Advantages

- Design optimized for weld inspection
- Leading-edge signal-to-noise ratio performance
- Wide thickness range
- Improved coupling to the part
- Acoustically matched to Rexolite

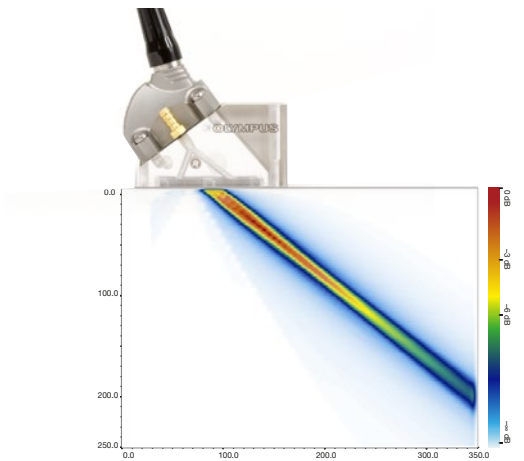
### Typical Applications

#### 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



A32



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   | Q3300530    | 10.0            | 32                 | 0.60       | 19.2                 | 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® Scanner)



### Advantages

- 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.)
- The A15 series operates with 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
- A25 dual linear array probes enable inspection of austenitic materials
- 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 and A25 Probes

##### Thin-Wall Applications

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



A15



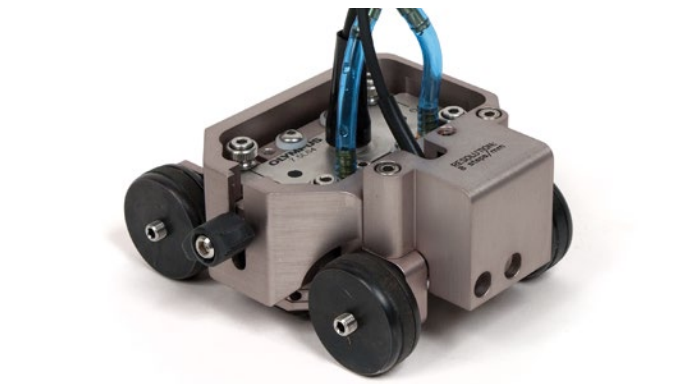
A25

### 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) |
| 5DL16-12X5-A25 | Q3301132    | 5.0             | Dual 16 (Linear)   | 0.75       | 12×5                 | 5.0            | 24 (0.94)                    | 24 (0.94) | 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.

Corrosion Mapping



HydroFORM® Scanner

Advantages

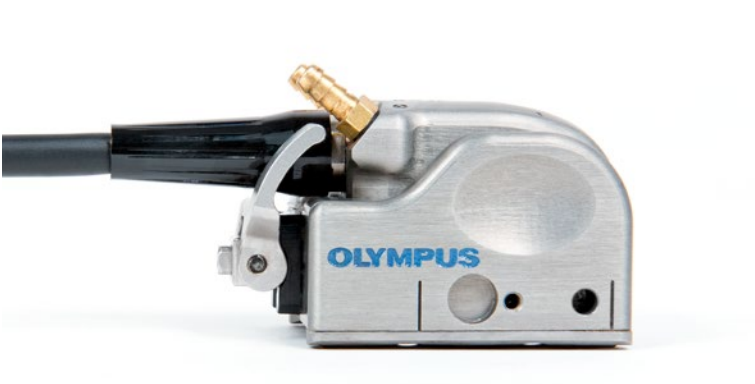
- Local immersion technique
- Coupling is optimized, enabling inspection of rough surfaces
- Large coverage
- Wedge reflection is eliminated
- Easy synchronization on front wall for OD and ID corrosion monitoring

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
- Removable contoured delay line
- Built-in irrigation
- Adjustable ring for stabilization and wear resistance
- Compared to dual UT technique, DLA offers an increased probability of detection, better imaging, larger coverage, and enhanced data point density

Typical applications

REX1 Probes

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

ULT1 Probes

- Manual inspection of small to medium areas for remaining wall or internal corrosion measurements for surface temperatures up to 150 °C (300 °F)

Probe Specifications and Dimensions

| Part Number                          | Item Number | Frequency (MHz) | Number of Elements | Pitch (mm) | Active Aperture (mm) | Elevation (mm) | Cable Length | External Dimensions mm (in.) |           |           |
|--------------------------------------|-------------|-----------------|--------------------|------------|----------------------|----------------|--------------|------------------------------|-----------|-----------|
|                                      |             |                 |                    |            |                      |                |              | L                            | W         | H         |
| 2.25L64-I4                           | U8331125    | 2.25            | 64                 | 1.0        | 64.0                 | 7.0            | 7.5          | 73 (2.87)                    | 24 (0.94) | 25 (0.98) |
| 5L64-I4                              | U8331162    | 5.0             | 64                 | 1.0        | 64.0                 | 7.0            | 7.5          | 73 (2.87)                    | 24 (0.94) | 25 (0.98) |
| 7.5L64-I4                            | U8330955    | 7.5             | 64                 | 1.0        | 64.0                 | 7.0            | 7.5          | 73 (2.87)                    | 24 (0.94) | 25 (0.98) |
| 7.5DL32-REX1-P-2.5-OM-IHC-RW         | Q3300635    | 7.5             | Dual 32            | 1.0        | 32.0                 | 5.0            | 2.5          | 66 (2.57)                    | 40 (1.58) | 38 (1.5)  |
| 7.5DL32-32X5-ULT1-H150-2.5-OM-IHC-RW | Q3300636    | 7.5             | Dual 32            | 1.0        | 32.0                 | 5.0            | 2.5          | 66 (2.57)                    | 40 (1.58) | 38 (1.5)  |
| 7.5DL32-32X5-REX1-P-7.5-OM-IHC-RW    | Q3300649    | 7.5             | Dual 32            | 1.0        | 32.0                 | 5.0            | 7.5          | 66 (2.57)                    | 40 (1.58) | 38 (1.5)  |

Austenitic, Nickel, and Other Coarse-Grained Alloys



Dual Matrix Array (DMA) Probes

Advantages

- Ability to transmit and receive longitudinal waves in granular materials
- Increased penetration in stainless steel, which includes austenitic, corrosion-resistant alloys, and dissimilar welds
- Excellent signal-to-noise ratio

Typical Applications

A17, A26, and A27 Probes

Stainless Steel Weld Applications

- Corrosion-resistant alloy (CRA)
- Stainless steel
- Austenitic material
- Clad pipes
- Dissimilar 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 (7x4 Matrix)   | 2.71       | 19x12                | 3.0            | 34 (1.34)                    | 16 (0.63)   | 25 (0.98)   |
| 2.25DL32-32X12-A26 | Q3301043    | 2.25            | Dual 32 (Linear)       | 1.0        | 32x12                | 12.00          | 48.2 (1.9)                   | 16.5 (0.65) | 26.4 (1.04) |
| 4DL32-32X12-A26    | Q3301480    | 4.0             | Dual 32 (Linear)       | 1.0        | 32x12                | 12.00          | 48.2 (1.9)                   | 16.5 (0.65) | 26.4 (1.04) |
| 4DM16X2-A27        | Q3300060    | 4.0             | Dual 32 (16x32 Matrix) | 1.0        | 16x6                 | 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.



A17



A26



A27



Wheel Probes



RollerFORM® Scanner

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) |
| EdgeFORM-7.5-32x1    | Q3300912    | 7.5             | 32                 | 1          | 32                   | 5              | 153 (6)                      | 45 (1.77) | 45 (1.77) |
| EdgeFORM-7.5-32x0.36 | Q3300914    | 7.5             | 32                 | 0.36       | 11.5                 | 5              | 153 (6)                      | 45 (1.77) | 45 (1.77) |

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



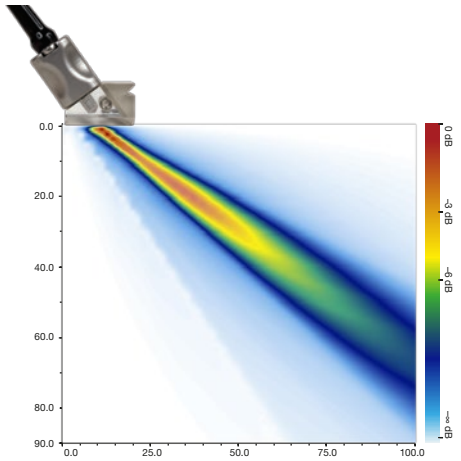
Advantages of Small-Footprint Probes

- 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



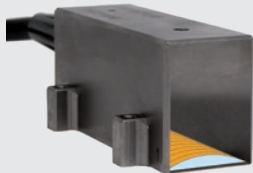
Advantages

- 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

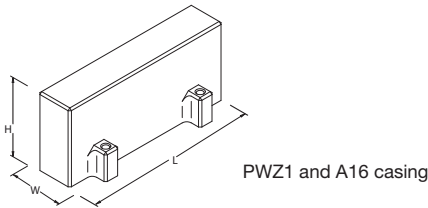
- Automated inspection of girth welds with PipeWIZARD systems (PWZ1 and A16 housing types)
- Manual or automated inspection of thick welds
- Detection of flaws and sizing
- Inspection of castings, forgings, pipes, tubes, and machined and structural components for cracks and welding defects

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.

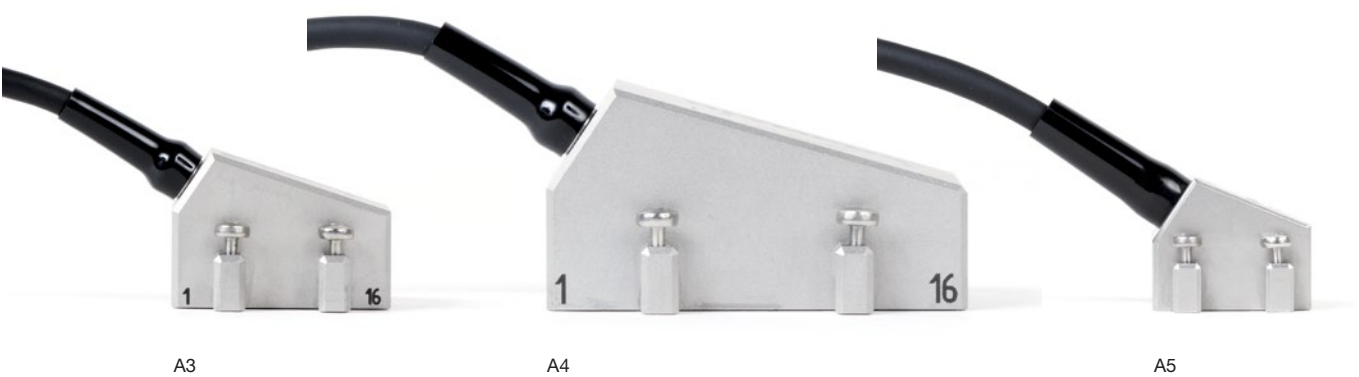


Probe Specifications and Dimensions

| 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



Advantages

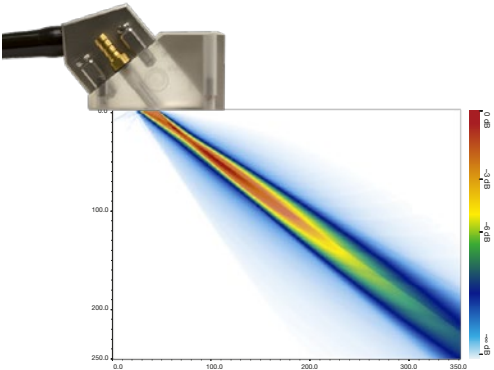
- Acoustically matched to Rexolite
- Wide selection of wedges available to suit most angle beam applications

Typical Applications

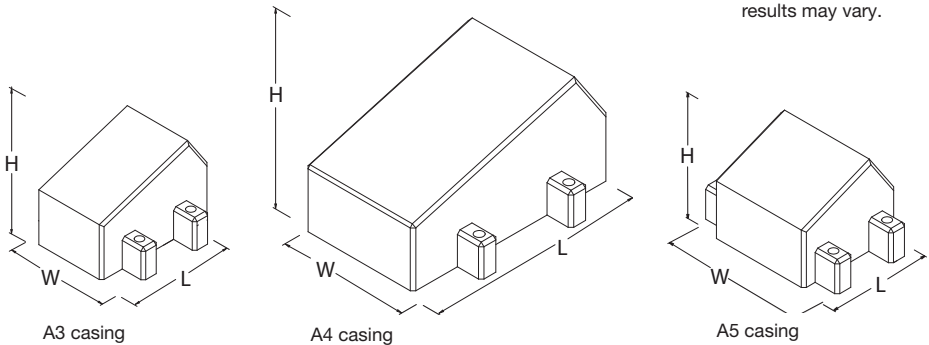
A3, A4, and A5 Probes

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



10L128-I2

Advantages

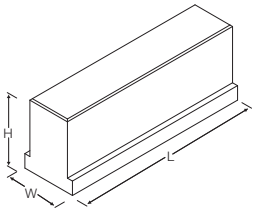
- Shortened dead zone at both ends (1.5 mm between center of first or last element and housing edge)
- Well-suited for composite channel inspections
- C-scan inspection of composites (delamination, disbonding, and porosity)

Aqualene Wedge SNW1-0L-AQ25

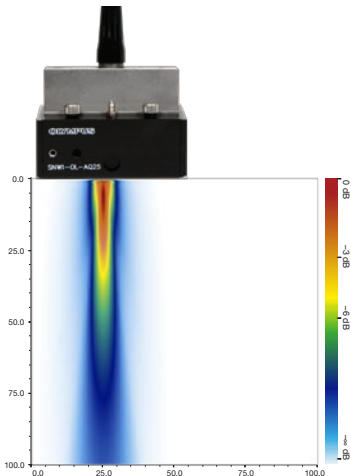


The Olympus Aqualene wedge promotes exceptional coupling, improved measurements, and enhanced near-surface resolution.

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.

Immersion Probes

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



10L128-I2



Immersed Inspection

Advantages

- Acoustic impedance matched to water
- Design enables 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) underwater

Typical Applications

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

I5 Probe for Wind Blade Inspection

Advantages

- Low-frequency 0.5 and 1 MHz phased array probes (96 mm aperture)
- Longitudinal and transverse probe holders configured for thick material inspection or excellent near-surface resolution
- Encoded inspection can be done manually or with scanner

Typical Applications

- Spar Cap and Shear Web Bonding Wind Turbine Blades Inspection
- GFRM (glass fiber-reinforced materials) or CFRM (carbon fiber-reinforced materials)

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) |
| 0.5L64-96X22-I5-P-5-OM | Q3300971    | 0.5             | 64                 | 1.5        | 96x22                | 22             | 120                          | 34        | 50        |
| 1L64-96X22-I5-P-5-OM   | Q3300970    | 1               | 64                 | 1.5        | 96x22                | 22             | 120                          | 34        | 50        |

Unless specified, 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

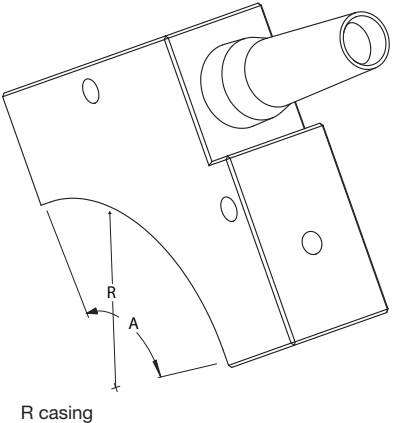


Advantages

- Acoustic impedance matched to water
- High circumferential resolution around the radius
- Corrosion-resistant stainless steel case
- Waterproof 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



Probe Specifications and Dimensions

| Part Number     | Item Number | Casing Type | Frequency (MHz) | Number of Elements | 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 and A24 Atlas Series Probes



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

Advantages

- Long use life: replaceable wear face extends the life of the probe
- Versatile: longitudinal 0° inspection sweeping +30° to -30°
- Cover a range of thicknesses: available in 2.0 and 4.0 MHz versions
- Familiar case style: standard Atlas series case with phased array technology

Typical Applications

- Bridge pins and bolts
- Forgings

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         |
| 2L8-8X9-DGS1   | U8330598    | 2.0             | 8                  | 1.0        | 8.0                  | 9.0            | 58° SW                                | Yes              | 27 (1.06)                    | 17 (0.67) | 22 (0.87) |
| 4L16-8X9-DGS1  | U8330597    | 4.0             | 16                 | 0.5        | 8.0                  | 9.0            | 58° SW                                | Yes              | 27 (1.06)                    | 17 (0.67) | 22 (0.87) |
| 2L16-16X16-A24 | Q3300915    | 2.0             | 16                 | 1.0        | 16.0                 | 16.0           | 0° Longitudinal Wave                  | No               | 25 (0.98)                    | 38 (1.50) | 18 (0.71) |
| 4L16-16X16-A24 | Q3300916    | 4.0             | 16                 | 1.0        | 16.0                 | 16.0           | 0° Longitudinal Wave                  | 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



### 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 x 22MM LG, CAPTIVE, PP  | U8779634    | Kit of (16x) SCRW-0068; M3 x 22 mm, captive Phillips pan-head screws, for A10, A11, A12, A14, A17, A26, and A27 case styles. |
| SCREW KIT, 1-64 Captive Custom        | U8779635    | Kit of (16x) SCRW-10010, 1-64, captive custom screws for A15 case style.                                                     |
| SCREW KIT, M3 X 12MM LG CAPTIVE SHCS  | U8779636    | Kit of (12x) SCRW-10096; M3 x 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 (12x) SCRW-10097; M3 x 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 (24x) SCRW-0009; M3 x 12 mm, captive Phillips pan-head screws for A1, A2, A3, A4, A5, A31, and A32 case style.        |
| SCREW KIT M3 CAPTIVE, SHCS 16 MM      | U8779672    | Kit of (16x) SCRW-0048, M3 x 16 mm captive screws for PWZ1, PWZ2, PWZ3, and PWZ4 case style.                                 |
| SCREW KIT, 1-64 X 1/8" CAPTIVE CUSTOM | Q3301131    | Q3301131 / Kit of (16x) Screw 1-64 x 1/8" Captive Custom, for A25 Case Style                                                 |

Removable Contact Wear-Face



Applications

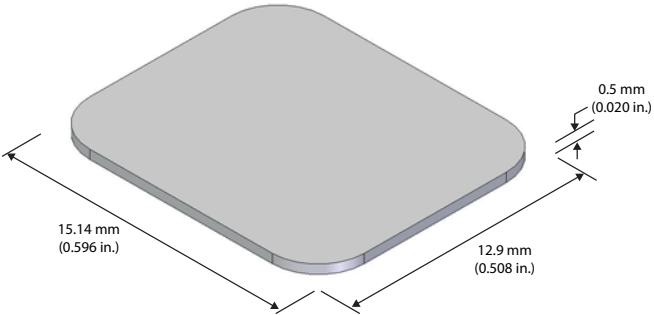
- Contact 0-degree forging and thicker material inspections

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



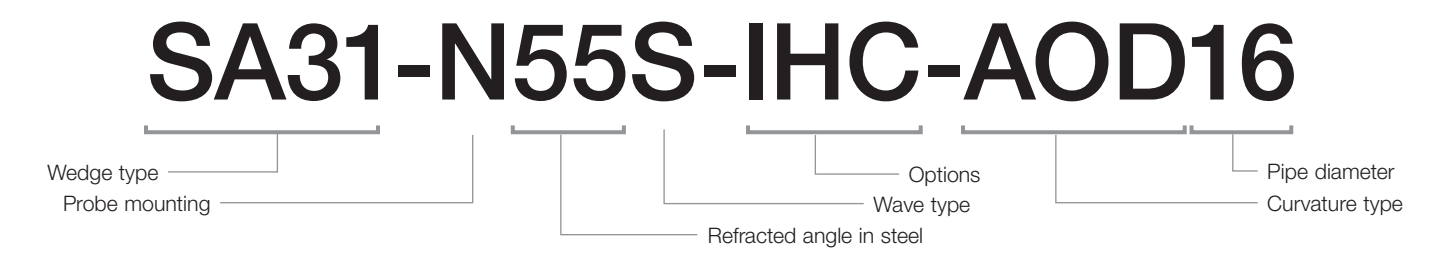
Wedges for Angle Beam Probes



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



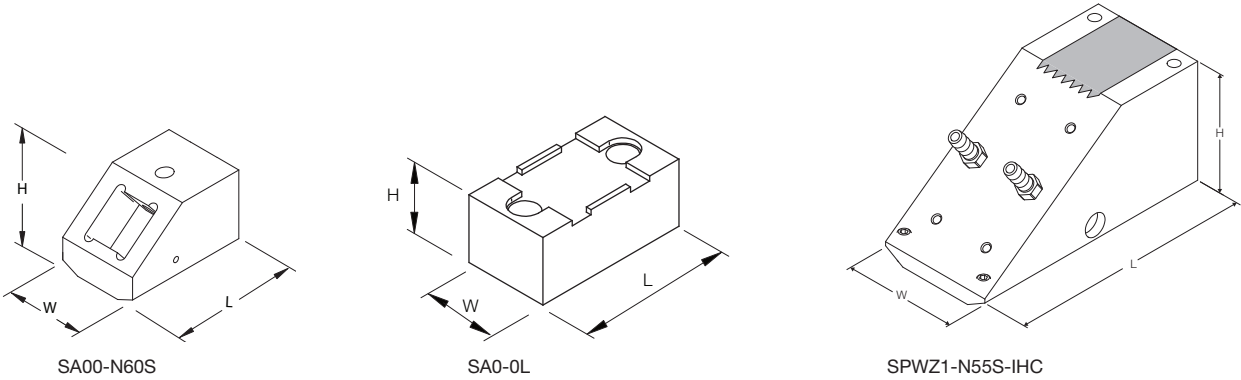
Glossary Used to Order Wedges

|                                                                                                                                                                              |                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Wedge type</b><br>SA = wedge for probe type A<br>SAWS = wedge for probe type AWS<br>SNW = wedge for near-wall probe type NW<br>SPWZ = wedge for PipeWIZARD probe type PWZ | <b>Wave type</b><br>S = shear wave<br>L = longitudinal wave                                                                                                                                          |
| <b>Probe mounting</b><br>N = Normal<br>L = Lateral (90° skew)<br>DN = Dual Normal                                                                                            | <b>Options</b><br>IHC = irrigation, scanner holes, and carbide wear pins<br>IHC-C = irrigation, scanner holes, and composite wear pins<br>IHS = irrigation, scanner holes, and stainless steel frame |
| <b>Refracted angle in steel</b><br>0 = 0°<br>55 = 55°<br>60 = 60°                                                                                                            | <b>Curvature type</b><br>AOD = axial outside diameter (circumferential scan)<br>COD = circumferential outside diameter (axial scan)                                                                  |
|                                                                                                                                                                              | <b>Pipe diameter</b><br>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                                  | 40 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                                  | 40 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                                  | 40 to 70              | Normal            | 30                    | 30 | 40  | 16 |
| SA1-N60L        | A1         | 60° LW                                  | 40 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                                  | 40 to 70              | Normal            | 79                    | 30 | 40  | 50 |
| SA2-N55S        | A2         | 55° SW                                  | 40 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                                  | 40 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                                  | 40 to 70              | Normal            | 58                    | 37 | 50  | 32 |
| SA3-N60L        | A3         | 60° LW                                  | 40 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                                  | 40 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                                  | 40 to 70              | Normal            | 86                    | 47 | 55  | 45 |
| SA4-N60L        | A4         | 60° LW                                  | 40 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                                  | 40 to 60              | Normal            | 57                    | 47 | 55  | 37 |
| SA5-N60S        | A5         | 60° SW                                  | 40 to 70              | Normal            | 46                    | 43 | 55  | 25 |
| SA5-N60L        | A5         | 60° LW                                  | 40 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                                  | 40 to 70              | Normal            | 23                    | 23 | 40  | 14 |
| SA10-N60L       | A10        | 60° LW                                  | 40 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                                  | 40 to 70              | Normal            | 41                    | 23 | 40  | 29 |
| SA11-N60L       | A11        | 60° LW                                  | 40 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                                  | 40 to 70              | Normal            | 73                    | 45 | 40  | 45 |
| SA12-N60L       | A12        | 60° LW                                  | 40 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                                  | 40 to 70              | Normal            | 96                    | 23 | 40  | 49 |
| SA15-N60S       | A15        | 60° SW                                  | 40 to 70              | Normal            | 18                    | 22 | N/A | 12 |
| SA16-N55S       | A16        | 55° SW                                  | 40 to 70              | Normal            | 85                    | 31 | 40  | 44 |
| SA31-0L         | A31        | 0° LW                                   | -30 to 30             | Normal            | 40                    | 30 | 40  | 20 |
| SA31-N55S       | A31        | 55° SW                                  | 40 to 70              | Normal            | 49                    | 30 | 40  | 32 |
| SA31-N60L       | A31        | 60° LW                                  | 40 to 70              | Normal            | 39                    | 30 | 40  | 31 |
| SA32-0L         | A32        | 0° LW                                   | -30 to 30             | Normal            | 50                    | 30 | 40  | 20 |
| SA32-N55S       | A32        | 55° SW                                  | 40 to 70              | Normal            | 62                    | 30 | 40  | 33 |
| SA32-N60L       | A32        | 60° LW                                  | 40 to 70              | Normal            | 56                    | 30 | 40  | 43 |
| SAWS1-N60S      | AWS1       | 60° SW                                  | 40 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                                  | 40 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                                  | 40 to 70              | Normal            | 65                    | 30 | 40  | 38 |
| SPWZ3-N60L      | PWZ3       | 60° LW                                  | 40 to 70              | Normal            | 64                    | 30 | 40  | 35 |

\* Width with IHC wedge option



Standard Axial Outside Diameter (AOD) Wedge Curvature Values

| External Pipe Diameter in.                                       | Curvature Range  |                  |
|------------------------------------------------------------------|------------------|------------------|
|                                                                  | Minimum mm (in.) | 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                                                            | 193.7 (7.625)    | 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.) | 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 a specific radius and angle as well as with an 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

Wedge type \_\_\_\_\_ Radius \_\_\_\_\_  
Inspection type \_\_\_\_\_ Angle of inspected part \_\_\_\_\_

## 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.    |

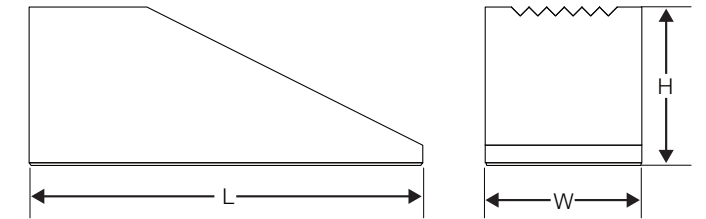
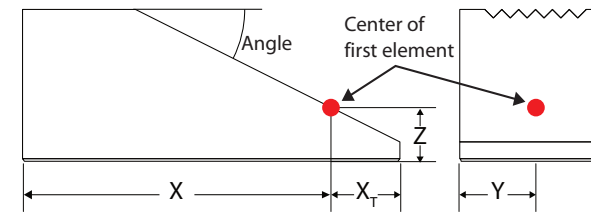
| Radius                  |
|-------------------------|
| Radius in inches        |
| ADJ = adjustable radius |

Note: Not all angles or radii are available. 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.

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

| Wedge parameters with TomoView software |                                                                                                     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------|
| X <sub>T</sub>                          | 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](http://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.



**OLYMPUS**  
Your Vision, Our Future

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Fax: 1-418-872-5431  
Web site: [www.olympus-ims.com](http://www.olympus-ims.com)

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## Wedge Specification Sheet

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

**OmniScan Wedge Parameters**


| Wedge Parameters   |               |             |          |         |            |     |
|--------------------|---------------|-------------|----------|---------|------------|-----|
| <b>Model</b>       | Serial Number |             |          |         |            |     |
| SA1-N60S-IHC       | SA1-N60S-IHC  |             |          |         |            |     |
| <b>Wedge Angle</b> | 39.00 °       | Normal      | Velocity |         |            |     |
| Prt. Offset        | 27.30 mm      | Sec. Offset | 0.00 mm  | Height  | 2330.00 mm | m/s |
|                    |               |             |          | 6.00 mm |            |     |

|        |  |             |             |                |                  |                  |             |
|--------|--|-------------|-------------|----------------|------------------|------------------|-------------|
| Close  |  | 39.00       | Normal      | 2330.00        | 27.30            | 0.00             | 5.00        |
| Browse |  | Angle (deg) | Orientation | Velocity (m/s) | Prt. Offset (mm) | Sec. Offset (mm) | Height (mm) |
| New    |  |             |             |                |                  |                  |             |
| Edit   |  |             |             |                |                  |                  |             |
| Manage |  |             |             |                |                  |                  |             |
| Save   |  |             |             |                |                  |                  |             |

**TomoView Wedge Parameters**

Wedge

SA1-N60S-IHC



Footprint Flat

Wedge angle (deg) 39,000

Roof angle (deg) 0,000

Sound velocity (m/s) 2330,00

Height at the middle of the first element (mm) 5,000

Primary axis offset of the middle of the first element (mm) 3,000

Secondary axis offset of the middle of the first element (mm) 20,000

Primary axis position of wedge reference (mm) -30,300

Secondary axis position of wedge reference (mm) -20,000

Wedge length (mm) 30,300

Wedge width (mm) 40,000


## Testing and Documentation

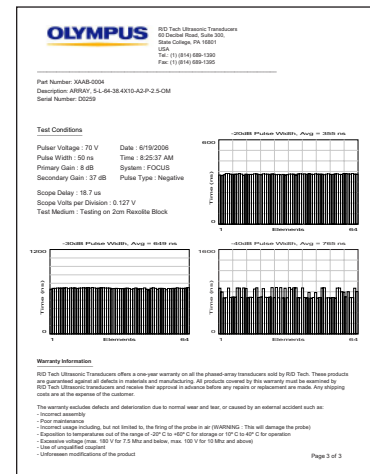
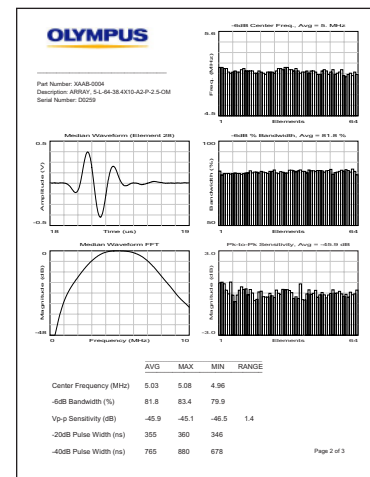
All Olympus phased array probes are rigorously tested to help ensure that they conform to the highest standards. Olympus maintains an extensive database containing characterization records for every probe sold. This information can be accessed to compare probe properties.

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:

|  | Olympus NDT Ultrasonic Transducers<br>60 Central Road, Suite 700<br>State College, PA 16801<br>USA<br>Tel: (717) 694-6999<br>Fax: (717) 694-6999 |                    |             |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------|
|                                                                                   | <hr/>                                                                                                                                            |                    |             |
|                                                                                   | <h2 style="text-align: center;">PROBE TEST DATA SHEET</h2>                                                                                       |                    |             |
|                                                                                   | Part Number: XAAB-0004<br>Description: ARRAY, 5-L-64-38-4X10-A2-P-2-5-OM<br>Serial Number: D0259                                                 |                    |             |
| <hr/> <h3>Performance Summary</h3>                                                |                                                                                                                                                  |                    |             |
| 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)                                                                                                                     |                    |             |
| Active Area: 64                                                                   | Connector Type: Omnicam                                                                                                                          |                    |             |
| Length: 38.4 cm (15.1 in)                                                         | Matching Medium: Raylosite                                                                                                                       |                    |             |
| Elevation: 10.0 cm (3.9 in)                                                       | Pitch: 0.89 mm (0.034 in)                                                                                                                        |                    |             |
| <hr/> <h3>Performance Summary</h3>                                                |                                                                                                                                                  |                    |             |
| Parameter                                                                         | Measurement                                                                                                                                      | Specification      | Conformance |
| Average Center Frequency (MHz)                                                    | 5.03 MHz                                                                                                                                         | +/- 10.0% (band)   | Pass        |
| Element -6dB Bandwidth (%)                                                        | 81.8 %                                                                                                                                           | > 60% (typical)    | Pass        |
| Overall Vop 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                                |                                                                                                                                                  |                    | [   ]       |
| <hr/>                                                                             |                                                                                                                                                  |                    |             |
| Tester Signature _____                                                            |                                                                                                                                                  | Date June 19, 2005 |             |



## 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

[illegible]

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 clear and concise manner.

Get your free poster at [www.olympus-ims.com](http://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 for both newcomers and 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.

## Warranty Information

Olympus offers a one-year warranty on all phased array transducers that we sell. 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 (-4 °F to 140 °F) for storage or 10 °C to 40 °C (50 °F to 104 °F) 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 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](http://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](http://www.olympus-ims.com).