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Приборы для вихретоковых дефектоскопов

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ

AC3 Air Conditioner Type Probe

Heavy-Duty Probes for Finned and Skip-Finned Tubing

The Zetec AC3 probe was originally designed for straight skip-finned copper tubing used in air conditioning heat exchangers. This probe uses coil configurations to test tubing with both finned and skip-finned areas, detecting multiple conditions in one pass. One coil detects pitting, wastage, cracking, denting, and bulging. The other coil is insensitive to concentric bulges, concentric wall thickness transitions, tube sheet interfaces, roll transitions, concentric inside diameter transitions, and full supports, while detecting circumferential cracks.

FEATURES & BENEFITS

▶ Effectively test finned and skip-finned tubing

Two types of coil configurations.

▶ Detect cracks dents and bulges

Two types of coil configurations.

▶ Detect circumferential flaws

Differential axial coils.

▶ Low frequency operating range

2-35 kHz.

Ideal for copper tubing.

▶ Detect circumferential flaws

Differential axial coils.

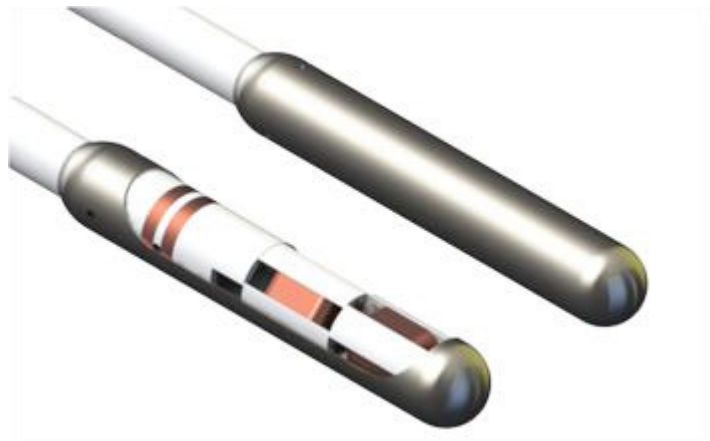
▶ Increased probe life

Enhanced housing design.

▶ Optimized signal response

Available with adjustable coil spacing design.

▶ Water resistant



Standard Configurations

Probe Diameter		Push Poly Length	Push Poly Type	Frequency Ranges		Connector
AC3	AAC3			AC3	AAC3	
0.380" (9.7mm) to 0.990" (25.1mm) in 0.010" increments	0.490" (12.5mm) to 0.990" (25.1mm) in 0.010" increments	30' (9.1m) 50' (15.2m)	3/8T (Thin wall)	LF 2kHz-35kHz MR 35kHz-50kHz	LF 2kHz-35kHz	Dual 4 pin
Custom options are available for all items						

Other Probe Head Options

- ▶ AAC3 – Adjustable coil spacing for suppression of evenly spaced tube inner diameter variations or fin responses.

General Specifications

- ▶ Shipping Dimensions (typical): 20.5" x 21" x 2.2" (52.1 mm x 53.3 mm x 5.6 mm)
- ▶ Shipping Weight: < 6 lbs. (2.7 kg)
- ▶ Operational Temperature: 40°F to 113°F (4°C to 45°C)
- ▶ Recommended Storage Temperature: 55°F to 75°F (13°C to 24°C)

Recommended Zetec Instruments and Software

- ▶ MIZ[®]-200, MIZ-85ID or MIZ-28 Instruments
- ▶ High Speed 3D Probe Pusher
- ▶ EddyNet[®]/AQ, Velocity[®] PC or UltraVision[®] ET Software

Adapters

- ▶ MIZ-27: (Qty 2) 10001860-1
- ▶ MIZ-28: (Qty 2) 10019291-1
- ▶ MIZ-200/85: (Qty 1) 009A802-00

Zetec: The largest Supplier of Eddy Current Steam Generator Probes Worldwide

For over 50 years, Zetec has manufactured more than 10,000 probe designs to meet the changing needs of the nondestructive testing (NDT) market. As a leading supplier of probes worldwide, our portfolio covers most applications and techniques. With world-class manufacturing facilities, Zetec probes deliver the best results for our customers.

2018 PRODUCT CATALOG

FERROUS TUBING PROBES



Ferrous Tubing Probe Selector Matrix

Tube Material	Tube Type	ECT	ECA	IRIS	RFT	NFT	MFL
Non-ferromagnetic	Tube	✓	✓	✓	—	—	—
	Integral finned tube	✓	✓	✓	—	—	—
Low Ferromagnetic	Tube	○	○	✓	✓	✓	
	Integral finned tube	○	○	✓	✓	✓	✓
Ferromagnetic	Tube	—	—	✓	✓	✓	✓
	Integral finned tube	—	—	○	✓	✓	✓
	Aluminum finned tube	—	—	✓	—	✓	✓

Selection of NDT test method based on detection sensitivity

Discontinuity Sought	Sensitivity Criteria	ECT	ECA	IRIS	RFT	NFT	MFL
ID Pitting	Probability of Detection	✓	✓	✓	○	○	✓
	Sizing Capability	○	✓	✓	○	—	—
OD Pitting	Probability of Detection	✓	✓	✓	○	—	○
	Sizing Capability	✓	✓	✓	○	—	—
Axial Cracking	Probability of Detection	✓	✓	—	○	○	—
	Sizing Capability	✓	✓	—	—	—	—
Circumferential Crack	Probability of Detection	○	✓	—	—	—	○
	Sizing Capability	—	✓	—	—	—	—
ID Corrosion	Probability of Detection	✓	✓	✓	✓	✓	✓
	Sizing Capability	○	✓	✓	✓	—	—
OD Corrosion	Probability of Detection	✓	✓	✓	✓	—	○
	Sizing Capability	✓	✓	✓	✓	—	—
At Tubesheet	Probability of Detection	○	✓	✓	○	—	○
	Sizing Capability	○	○	✓	—	—	—

- ✓ The test method has proven results for the specific application
- The test results obtained from the test method can be interpreted reasonably
- Test method is either not suitable for the sought application or non-reliable in terms of repeatability

Remote Field Testing (RFT) Probes

The Remote Field Testing (RFT) technique is a variation of the eddy current send/receive probe technique. The exciter coils are separated from the receiver coils by a distance equivalent to two or three times the tube OD. The receiver coils sense the flux lines that cross the tube wall twice. Remote field has an equal sensitivity to ID and OD indications, while the phase shift is directly proportional to wall loss. The remote field testing technique is used for the inspection of ferromagnetic tubing; such as carbon steel and ferritic stainless, as well as for the detection and sizing of wall thinning resulting from corrosion, erosion, wear, pitting, and baffle cuts.

Absolute and Differential Coil Detection

When using Zetec's RFT probes with the MIZ-200 or MIZ-28, RFT probes can inspect in absolute or differential coil mode. Absolute mode provides better detection of long gradual types of flaws. Differential mode is better for detection shorter or more abrupt flaws.



Frequency Selection for all RFT Probes

20 Hz to 200 Hz used for carbon steel thicker than 6mm

100 Hz to 1000 Hz used for carbon steel applications like SA214 or SA179 (most popular)

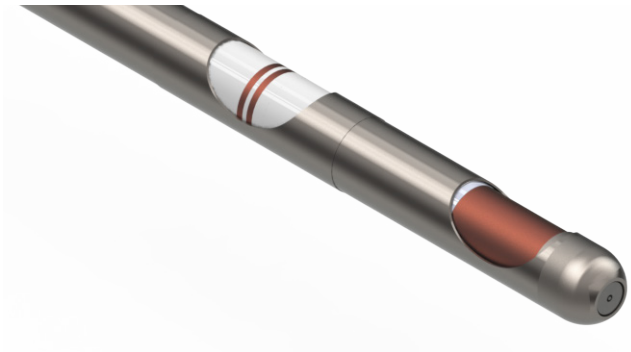
1 kHz to 10 kHz used for thin or lower permeability carbon steel like A-556

5 kHz to 30 kHz used for ferromagnetic stainless steel like SS439 (A-268) or SEA-Cure

RFT Probe Diameter Selection

Tube OD (Outer Diameter)	Recommended Rigid Probe Clearance. Tube ID – Probe OD	Recommended Flexible Probe Clearance Tube ID – Probe OD
0.5" (12.7mm)	0.06" (1.5mm)	0.1875" (4.75mm)
0.625" (15.9mm)	0.06" (1.5mm)	0.1875" (4.75mm)
0.75" (19.05mm)	0.075" (2mm)	0.1875" (4.75mm)
1" (25.4mm)	0.075" (2mm)	0.2" (5mm)
1.25" (31.75mm)	0.1" (2.5mm)	0.2" (5mm)
1.5" (38.1mm)	0.125" (3mm)	0.2" (5mm)
1.75" (44.45mm)	0.15" (4mm)	0.25" (6.35mm)
2" (50.8mm)	0.15" (4mm)	0.3" (7.6mm)
2.5" (63.5mm)	0.15" (4mm)	0.3" (7.6mm)
3" (76.2mm)	0.175" (4.4mm)	0.325" (8.26mm)
3.5" (88.9mm)	0.175" (4.4mm)	0.325" (8.26mm)
4" (101.6mm)	0.175" (4.4mm)	0.325" (8.26mm)

RFTLS Remote Field Testing Low Voltage Single Exciter



Standard Features

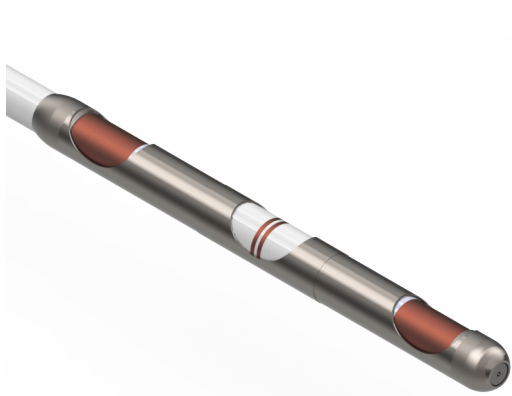
- ▶ Absolute and differential signal
- ▶ Wear resistant design

Probe Diameter 1mm Increments	Poly Length	Push Poly Black Polypropylene Poly size Probe Diameter		Frequencies	Connector
0.320" to 3.000" (8mm to 76mm)	65' (20m) 98' (30m)	Poly Diameter 5/16" (7.9mm) 21/64" (8.3mm) 3/8" (9.5mm) 1/2" (12.7mm)	Probe Diameter 8-10mm 11-12mm 13-25mm 26-76mm	20-200HZ 100-1000HZ 1-10KHZ 5-30KHZ	19 Pin Amphenol
<i>Custom options are available for all items</i>					

Supporting Instruments and Software

- MIZ-200 with EddyNet or Velocity
- MIZ-28 with adaptor 043A800-00 ZEC-ADP-MIZ-28-LV-RFT (allows for exciter coils to be individually excited)

RFTLD Remote Field Testing Low Voltage Dual Exciter



Standard Features

- ▶ Absolute and differential signal
- ▶ Wear resistant design

Probe Diameter 1mm Increments	Poly Length	Push Poly Black Polypropylene Poly size Probe Diameter		Frequencies	Connector
0.320" to 3.000" (8mm to 76mm)	65' (20m) 98' (30m)	Poly Diameter 5/16" (7.9mm) 21/64" (8.3mm) 3/8" (9.5mm) 1/2" (12.7mm)	Probe Diameter 8-10mm 11-12mm 13-25mm 26-76mm	20-200HZ 100-1000HZ 1-10KHZ 5-30KHZ	19 Pin Amphenol
<i>Custom options are available for all items</i>					

Supporting Instruments and Software

- MIZ-200 with EddyNet or Velocity
- MIZ-28 with adaptor 043A800-00 ZEC-ADP-MIZ-28-LV-RFT (allows for exciter coils to be individually excited)

High Stability X-Probe™

Faster Inspections and Complete Tube Coverage

The High Stability X-Probe allows faster inspection times and improved detection while lowering your inspection costs. It offers “one-pass” inspections to acquire both bobbin and special interest tests. The enhanced centering foot design ensures superior data is provided for a longer period of time.

FEATURES & BENEFITS

Longer Life

- ▶ **Long wear centering feet:**
Spring supported centering feet and proprietary abrasion resistant material significantly improve probe life. The probe simply centers more accurately for a longer period of time.

Lower Inspection Costs

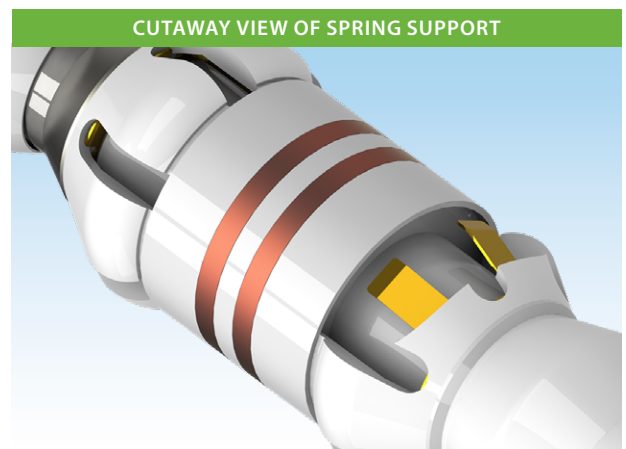
- ▶ **Inspect more tubes per probe:**
Experience a significant reduction in inspection costs realized from fewer probe changes. Estimates for the cost of a probe change exceed \$20,000. Exceed your targets by reducing:
 - ▶ Schedule
 - ▶ Rad Waste
 - ▶ Dose

Inspection-Ready

- ▶ **Proven equivalency to current array and bobbin probes:**
EPRI equivalency reports have been created for all standardized X-Probe sizes. Both the array and bobbin coils meet this equivalency and may be used for inspections of record.

Finds all Indications

- ▶ **Special interest testing quickly performed for all tubes:**
No need to go back and perform special interest testing on select tubes. The X-Probe provides all indications on the first pass at speeds 40 times faster than MRPC. The X-Probe is also great for quickly finding loose parts.



High Stability X-Probe

Standard Configurations

STEAM GENERATOR TUBE SIZES	PUSH POLY	LENGTHS	TUBE MATERIALS	CONNECTOR
7/8in (22mm) 3/4in (19mm) 11/16in (17.5mm) 5/8in (16mm)	3/8T	83ft (25m) 100ft (30.5m) 110ft (33.5m)	Inconel	36 Pin

Other options available upon request

Applications

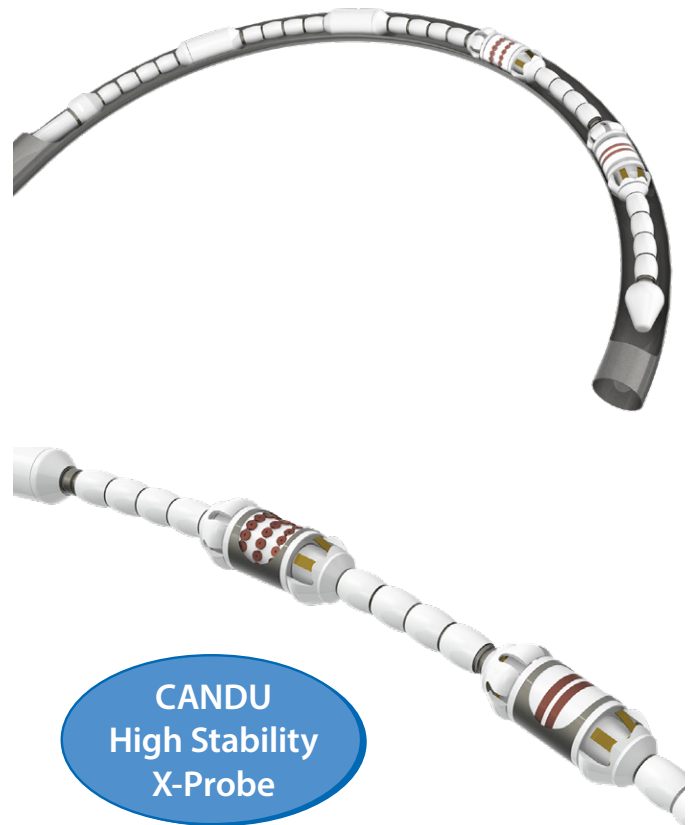
- ▶ All US style steam generators
- ▶ Some CANDU plants with Inconel 800
- ▶ French versions that have electro-magnetic coils in the bobbin

General Specifications

- ▶ Shipping Dimensions: 20.5in x 21in x 2.2in
(52.1cm x 53.3cm x 5.6cm)
- ▶ Shipping Weight: < 6 lbs (2.7 kg)
- ▶ Operational Temperature: 40°F to 113°F (4°C to 45°C)
- ▶ Recommended Storage Temperature: 55°F to 75°F
(13°C to 24°C)

Recommended Instruments and Software

- ▶ MIZ 80/81 Integrated instrument and Pusher
- ▶ MIZ 85 Instrument supporting up to 4 probes
- ▶ 10D Probe Pusher
- ▶ EddyNet PC bundle software
- ▶ RevospECT Pro Automated Analysis Software
- ▶ 66 Channel slip-ring for IOD pusher
- ▶ 36 Pin extension cable



Zetec: The Largest Supplier of Probes Worldwide

For nearly 50 years, Zetec has manufactured over 10,000 probe designs to meet the changing needs of the nondestructive testing (NDT) market. We are the leading supplier of probes worldwide covering most applications and techniques. With world-class manufacturing facilities, Zetec probes deliver the best results for our customers.

High Stability Bobbin Probe

Improve Data Quality and Inspection Costs

The new Zetec High Stability Bobbin Probe will significantly improve the economics of your steam generator tubing inspections. This innovative advancement in technology provides better quality data and bobbin probes that last considerably longer.

FEATURES & BENEFITS

Longer Life

- ▶ **Long Wear Centering Feet:**
Spring supported centering feet and proprietary abrasion resistant material significantly improve probe life. The probe simply centers more accurately for a longer period of time.

Higher Probability of Detection (POD)

- ▶ **Lower Drift Data Cable:**
The improved data cable provides much less data drift. The graph to the right compares data drift using the old and new data cables.

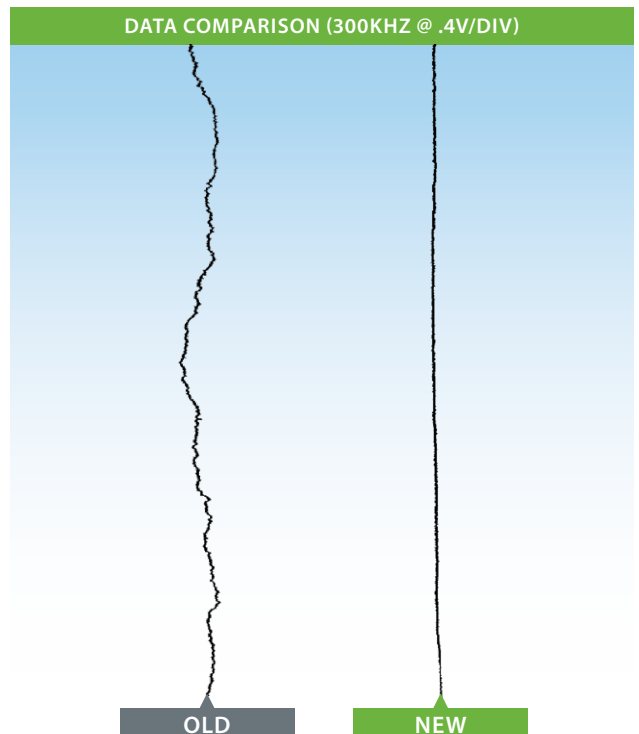
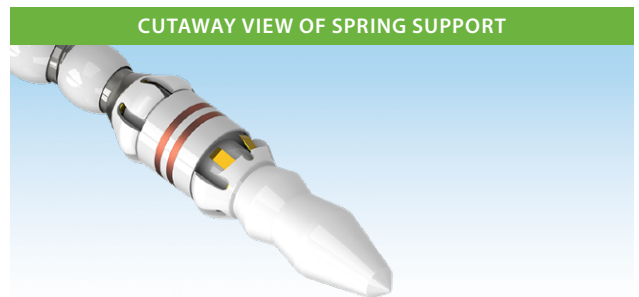
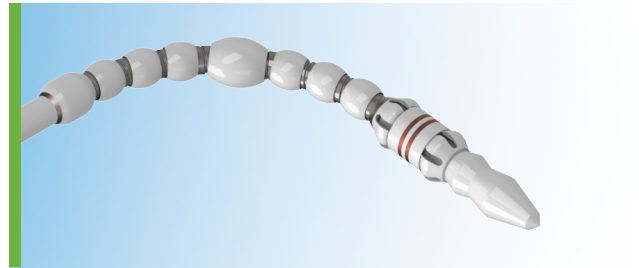
Inspection-Ready

- ▶ **Proven equivalency to current bobbin probes:**
The improved data cable was carefully designed to allow the probe to meet the EPRI equivalency for the peak center frequency. Equivalency reports can be provided to allow the probe to immediately be used as an inspection of record.

Lower Inspection Costs

Experience a significant reduction in inspection costs realized from fewer probe changes. Estimates for the cost of a probe change exceed \$20,000. Exceed your targets by reducing:

- ▶ Schedule
- ▶ Rad Waste
- ▶ Dose



High Stability Bobbin Probe

Standard Configurations

STEAM GENERATOR TUBE SIZES	PUSH POLY	LENGTHS	FREQUENCIES	TUBE MATERIALS	CONNECTORS
7/8in (22mm)	3/8T	50ft (15m)	50kHz to 800kHz	Inconel	36 Pin
3/4in (19mm)	3/8H	83ft (25m)			
11/16in (17.5mm)		100ft (30.5m)			
5/8in (16mm)		110ft (33.5m)			

Other options available upon request

Options

- ▶ M/HS replaces standard M/ULC bobbin probes
- ▶ M/HS/XP* replaces M/ULC/XP bobbin probes
- ▶ M/HS/LL replaces LLMC bobbin probes

* Center frequency equivalency is maintained by using the same data cable as the M/ULC/XP bobbin probes.

General Specifications

- ▶ Shipping Dimensions: 20.5in x 21in x 2.2in
(52.1cm x 53.3cm x 5.6cm)
- ▶ Shipping Weight: < 6 lbs (2.7 kg)
- ▶ Operational Temperature: 40°F to 113°F (4°C to 45°C)
- ▶ Recommended Storage Temperature: 55°F to 75°F (13°C to 24°C)

Recommended Zetec Instruments & Software

- ▶ MIZ 80/81 Integrated instrument and Pusher
- ▶ MIZ 85 Instrument supporting up to 4 probes
- ▶ 10D Probe Pusher
- ▶ EddyNet PC bundle software



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Surf-X™ Array Probe

Improve Inspection Quality, Safety and Speed while Reducing Total Cost

Introducing the Zetec Surf-X line of surface array probes. Featuring a unique flexible circuit design and proprietary X-Probe™ technology, Surf-X probes can lower total cost, provide excellent data quality, and significantly reduce inspection time compared with other inspection methods.

FEATURES & BENEFITS

Fast Inspections, No Chemicals

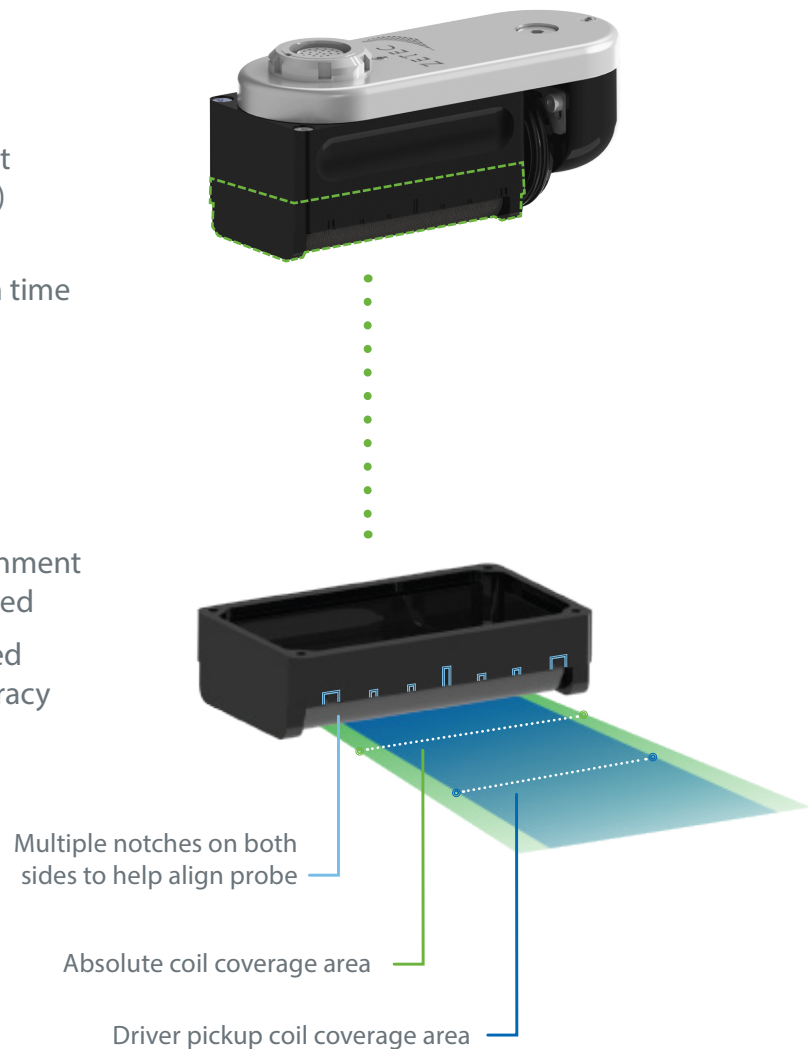
- ▶ **Chemical Testing Replacement:**
Surface array probes are a cost-effective, chemical free replacement for Liquid Penetrant Testing (PT) and Magnetic Particle Testing (MT)
- ▶ **Single Sensor Probe Replacement:**
The surface array option can reduce inspection time by up to 95% versus traditional pencil probes

Accurate, High Quality Results

- ▶ Rotatable Encoder is standard, providing easy identification of flaw locations and dimensions
- ▶ Position indicators on the probe help with alignment and ensure the entire area of interest is inspected
- ▶ Patented and proven X-Probe technology-based coil set delivers added dependability and accuracy
- ▶ Operates in absolute and multiple modes of driver pickup

Low Cost of Ownership

- ▶ Long life wear material tested to 10,000ft. on a weld
- ▶ Field-replaceable components can be swapped out in less than 5 minutes



Standard Configurations

Coverage Width	Coils	Cable Adapter Lengths	Materials	Penetration Depth	Weld Crown	Part Number
Absolute 1.7" (43.2mm) Driver Pickup 1.5" (38.1mm)	2x16 (32)	6ft (1.8m)	<ul style="list-style-type: none"> • Non-Ferrous • Ferrous (surface flaws) 	Up to 0.25" (6.3mm)	Up to 0.25" (6.3mm)	XPSC-001
<i>Other options available upon request</i>						

Applications

- ▶ Turbine blades
- ▶ Fuselage
- ▶ Welds
- ▶ Pressure vessels

General Specifications

- ▶ Shipping Dimensions: 10in. x 8in. x 6in. (25.4cm x 20.3cm x 15.2cm)
- ▶ Shipping Weight: < 2 lbs (0.9kg)
- ▶ Operational Temperature: 40°F to 113°F (4°C to 45°C)
- ▶ Recommended Storage Temperature: 55°F to 75°F (13°C to 24°C)



Recommended Instruments and Components

- ▶ MIZ®-21C Array: The Most Advanced Handheld With Surface Array Capability (PN 111A903-00)
- ▶ Cable adapter: MIZ®-21C to array probe 6ft (1.8m) (PN 111A801-00)
- ▶ Replaceable wear surface assembly (PN 126A200-00)
- ▶ Factory replaceable coil set assembly (PN 126A602-00)
- ▶ Replaceable encoder wheel (PN 126A300-00)

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