eddyfi®

Surface ECA Probe Catalog

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Disclaimer

The information in this document is accurate as of its publication. Actual products may differ from those presented herein.

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Contents

We Are Eddyfi 4

Demystifying the Technology 5

The Right Surface Probe for the Job 7

Surface Probe Offering — Quick Lookup 8

Probe Numbering Nomenclature 10

Carbon Steel Welds — Sharck™ Probes 11

Complex Geometries — Flexible Probes 14

Gear Teeth — Gear Probes 19

Curved Surfaces — Semi-Flexible Probes 21

Welds and Smooth Surfaces — Padded Probes 25

Turbine Applications 28

Custom ECA Probes 29

Calibration Standards 30

Encoder 30

We Are Eddyfi

Non-destructive testing (NDT) of critical components is a vital part of integrity management and safety in such industries as nuclear and power generation, oil and gas, and aerospace. World-class engineering, nimble manufacturing, and some of the best minds in advanced eddy current testing allow Eddyfi to offer you the best performing, most reliable advanced electromagnetic hardware and software essential to you and your business. This is what we strive for, because at Eddyfi, performance matters.

With its standard line of surface probes, Eddyfi is demonstrating a genuine commitment to the NDT industry. This line of standard probes offers:

Truly democratized ECA solutions — Migrating from magnetic-particle (MT), penetrant (PT), and pencil-probe eddy current testing (ECT) is finally made simple. Gone are the headaches from choosing eddy current array (ECA) probes. The probes herein are designed to be easy to select, versatile, and used straight out of the box... all at competitive prices.

Performance — Our surface probes are also designed using the highest performance standards, the best modeling software, the most advanced materials, and cutting-edge proprietary techniques. Eddyfi's ECA probes use the most advanced topologies, surface-specific mechanical casings, real coils — no PCB-based alternatives — which deliver the best possible signal quality and response to target flaws.

Durability — All our surface ECA probes are designed for harsh environments. From our rigid probes to our flexible arrays, our probes are rugged and designed to take on the real world.

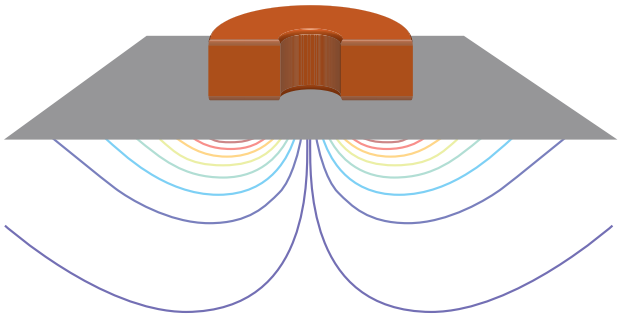
Expertise and support — Our standard surface probes are backed by the best support in the industry. We have the know-how and the knowledge of ECA technology to help you use your probes so that they truly work for you.

Eddyfi is headquartered in beautiful Québec, Canada, at the heart of the city's advanced NDT cluster. We are the most dynamic company in the field of advanced NDT equipment — we've made it our mission to push the limits of electromagnetic testing to new heights, which we achieve by designing new generations of standards and specialized probes. This is how we manage to offer complete, high-end solutions for the inspection of critical components.

If, for some reason, the standard probes herein do not fit your specific needs, Eddyfi has all the necessary capabilities to develop custom solutions to tackle the most challenging applications.

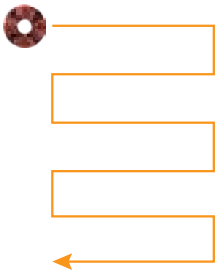
For more information, visit www.eddyfi.com or contact us at probes@eddyfi.com.

Demystifying the Technology



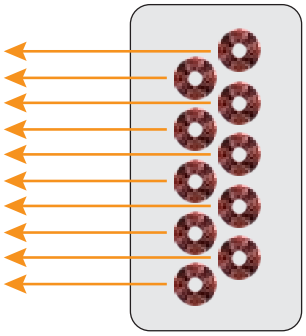
Eddy current technologies take advantage of a physical phenomenon referred to as ***electromagnetic induction***, where an alternating current flowing through a wire coil — generally copper — generates an oscillating magnetic field. When this magnetic field nears another electrically conductive material, a circular flow of electrons appears in the material, which is known as an ***eddy current***. An eddy current generates, in turn, a magnetic field that interacts with the coil and its magnetic field. Defects such as cracks in the electrically conductive materials disrupt the flow of eddy current and its magnetic field, modifying the electrical impedance of the coil, which make it possible to identify and characterize the defects.

Eddy Current Testing



Usually referred to as ECT, this is the best method for inspecting non-ferrous components, such as stainless-steel welds, for defects. ECT makes it possible to reliably detect corrosion and surface cracking, for example. Such defects cause variations in the phase and magnitude of the eddy current generated by a transmitter coil, which are monitored by a receiver coil or by measuring the variations in the current flowing through the transmitter. This is the core of standard, single-element ECT.

Eddy Current Array



Eddy current array (ECA) probes use several individual coils, grouped together in one probe. The coils are excited sequentially to eliminate interference from mutual inductance (a process referred to as ***channel multiplexing***; see below). To optimize performance, ECA probes can be flexible or shaped to match the specific geometry of the part to inspect for simplified, one-pass inspections. Data from ECA probes can be encoded and it is transmitted directly to software for graphical display (C-scan), record keeping, and reporting.

ECA probes can replace a number of traditional NDT inspection methods like magnetic particle testing (MT), liquid penetrant testing (PT), and single-element ECT (above) through shorter inspection times, better flaw detection, and complete inspection records.

Channel Multiplexing

Channel multiplexing in ECA probes is achieved when groups of coils are excited at timed intervals to eliminate interference from mutual inductance, allowing them to work together in scanning wider inspection areas than conventional ECT probes. Coils are considered multiplexed when the active time interval of one or a combination of coils expires and the active time interval of other coils starts. Channel multiplexing has several advantages:

- It minimizes crosstalk between adjacent coils
- It increases the channel resolution and coil sensitivity
- It improves the signal-to-noise ratio of the probe

Channel multiplexing is achieved with the help of a device that connects and acquires signals from several groups of coils through a single instrument input. This device is intuitively called a ***multiplexer*** (MUX) and essentially works like a high-speed switch that successively connects each signal to the instrument. Eddyfi's ***Ectane***® and ***Reddy***® test instruments are equipped with the ***SmartMUX***™ — an integrated, universal, programmable MUX — which takes care of channel multiplexing.

ECA Topologies

Topologies are the combination of how coils are organized inside a probe and their activation patterns, used in combination to create at least one eddy current channel. Eddyfi offers a variety of advanced topologies — some of the most commonly used in ECA probes are presented here. Other topologies can also be used in custom probes. See page 29 for details.

Impedance

The impedance topology is capable of detecting discontinuities oriented in any direction, especially when there is very little liftoff variation. The impedance topology can be separated into the two following modes:

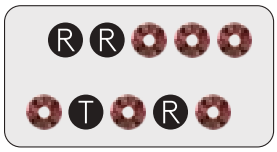
- **Absolute** — One coil is excited to generate eddy current and to sense variations in its field.
- **Differential** — Two coils are excited to generated eddy current. When the two coils are over an area free from defects, there is no differential signal between the coils, as they are both inspecting identical material. When one coil is over a defect and the other is over good material, a differential signal is generated, allowing the defect to be characterized.

The absolute and differential modes are available on all impedance probes.

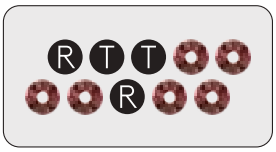
Transmit - Receive

The transmit-receive topology is generally built on two rows of coils and is directional, creating axial and/or transverse channels. Axial (or longitudinal) channels detect flaws perpendicular to the array of coils, while transverse (or circumferential) channels detect flaws parallel to the array.

- **Long, single driver** — This topology uses a relatively conventional method of generating eddy current signals: a single coil is used as the transmitter (T). The long, single-driver topology is best suited to detecting large and/or subsurface defects, and offers a better tolerance to liftoff.
- **Short, double driver** — The short, double-driver topology uses two coils excited simultaneously and acting as a single, large transmitter. This larger area offers — over the single-driver topology — a better response and sensitivity to small defects because of topology's higher resolution. It has, however, fewer channels than the short, single driver topology for the same number of coils.



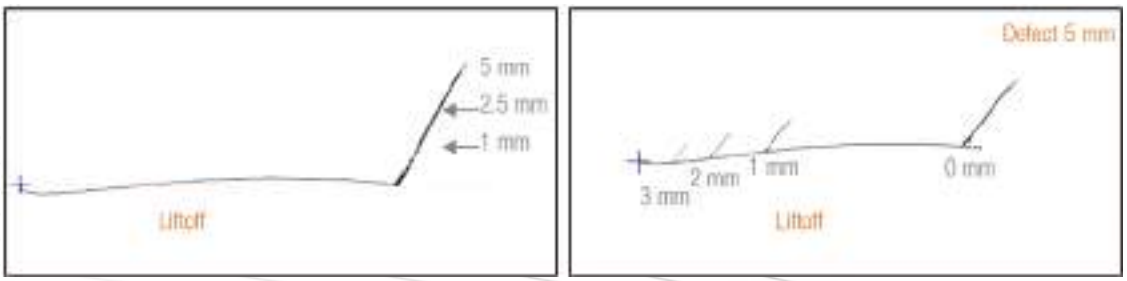
Long, single driver



Short, double driver

Tangential ECA (TECA™)

TECA incorporates tangential coils that yield a very specific eddy current signal for surface-breaking cracks in carbon steel. As illustrated, the liftoff signal is almost horizontal and crack-like indications are approximately 90° relative to the liftoff signal.



The Right Surface Probe for the Job

Custom Body and Rigid Probes

Rugged and tailored to your needs, these probes minimize liftoff for high, uniform sensitivity, making them the choice for flat surfaces. The probes are easy to handle and their design make them extremely reliable. They come in a many frequency brackets, number of coils, and (in the case of rigid probes) casing sizes (small, medium, and large). Inquire about availability.

Semi-Flexible Probes

These probes have all the great features of rigid probes, with the added ability to easily bend to perform axial scans on convex and concave geometries with height variations along a single axis (such as pipes and floor plates). Semi-flexible probes also come in several frequency brackets, number of coils, and casing sizes (small, medium, and large).

Padded Probes

These probes take it one step further—they can adapt to all types of geometry variations, in every direction, which makes them perfect for examining weld beads, transitions, and heat-affected zones. The unique and proprietary design enables detecting surface cracks in welds with minimal surface preparation. Their membrane is extra-tough to better withstand friction. Like other Eddyfi surface probes, padded probes come in a several frequency brackets, number of coils, and casing sizes (small and medium).

Flexible Probes

These probes are specifically designed to fit complex geometries, which makes them perfect for one-pass examinations of pipes, nozzles, turbine blades, wheels, and any other smooth, curved surface. They can be used in a wide range of applications that were previously challenging for ECA technology. ***I-Flex***™ probes are available in three sizes—small, medium, large—and their unique design offers three built-in topologies, making them the perfect tool for challenging applications and trials. ***T-Flex***™ probes are available in medium size only.

Sharck™ Probes

Sharck probes combine the benefits of rigid and semi-flexible probes. Their spring-loaded fingers adapt to the geometry of weld crowns, making it possible to quickly scan the weld cap, the toe area, and the heat affected zone in a single pass. This design is mostly used in combination with the patent-pending TECA™ technology to inspect carbon steel welds.

Surface Probe Offering — Quick Lookup

The table below was designed to help you quickly find the probe that you are looking for.

Geometry	Body	Far-surface corrosion	Subsurface defects (cracks, voids, porosity)	Surface-breaking defects
Carbon steel	Sharck Butt Weld			●
	Sharck Fillet Weld			●
	Sharck Pencil			●
				●
	High-Resolution Sharck			●
Complex (multipurpose probes)	I-Flex	●	●	
			●	●
		●	●	●
			●	●
		●	●	●
				●
	T-Flex			●
			●	●
Gear teeth	Gear			●
				●
				●
Curved surfaces	Semi-flexible	●	●	
		●	●	
				●
				●
				●
				●
				●
				●
Welds and smooth surfaces	Padded			●
				●
				●
				●
				●
				●

Minimum channel requirement	Coverage	Casing	Probe number	Page
64	53 mm (2.1 in)	Medium	SHARCK-BW053-G2-R-N05S or SHARCK-BW053-G2-E-N05S	page 11
32	30 mm (1.2 in)	Medium	SHARCK-FW028-G2-R-N05S or SHARCK-FW028-G2-E-N05S	page 11
32	7 mm (0.3 in)	Pencil (straight)	SHARCK-PEN-ST-N05TE or SHARCK-PEN-ST-N05TR	page 12
32	7 mm (0.3 in)	Pencil (90°)	SHARCK-PEN-RA-N05TE or SHARCK-PEN-RA-N05TR	page 12
64	71 mm (2.8 in)	Semi-flexible and conformable	SHARCK-HR-1048-071-N05SE or SHARCK-HR-1048-071-N05SR	page 13
32	128 mm (5.0 in)	Extra-large	ECA-IFC-128-005-033-N03SA	page 14
32 or 64	79 mm (3.1 in)	Large	ECA-IFG-079-250-048-N03S	page 14
32 or 64			ECA-IFG-079-050-048-N03S	page 15
32 or 64	56 mm (2.2 in)	Medium	ECA-IFG-056-250-048-N03S	page 16
32 or 64			ECA-IFG-056-050-048-N03S	page 16
32 or 64	34 mm (1.3 in)	Small	ECA-IFG-034-500-048-N03S	page 16
64	70 mm (2.8 in)	Medium	ECA-TFC-070-300-044-N03S	page 18
64	70 mm (2.8 in)		ECA-TFC-070-045-044-N03S	page 18
96	112 mm (4.4 in)	Large	GEAR-M30_42-112-N03T	page 19
64	76 mm (3.0 in)	Medium	GEAR-M20_30-076-N03T	page 19
32	50 mm (2.0 in)	Small	GEAR-M13_20-050-N03T	page 20
32	128 mm (5.0 in)	Large Minimum OD 0.9 m (36 in)	ECA-SFC-128-005-033-N03S	page 21
32	64 mm (2.5 in)	Medium Minimum OD 0.4 m (16 in)	ECA-SFC-064-005-017-N03S	page 21
64	58 mm (2.3 in)		ECA-SFC-058-250-032-N03S	page 22
64	56 mm (2.2 in)		ECA-SFD-056-250-032-N03S	page 22
128	71 mm (2.8 in)		ECA-SFC-071-500-064-N03S	page 23
128	70 mm (2.8 in)		ECA-SFD-070-500-064-N03S	page 23
64	35 mm (1.4 in)	Small Minimum OD 0.2 m (8 in)	ECA-SFC-035-500-032-N03S	page 24
64	34 mm (1.3 in)		ECA-SFD-034-500-032-N03S	page 24
64	58 mm (2.3 in)	Medium	ECA-PDC-058-250-032-N03S	page 25
64	56 mm (2.2 in)		ECA-PDD-056-250-032-N03S	page 25
96	55 mm (2.2 in)		ECA-PDC-055-500-050-N03S	page 26
96	54 mm (2.1 in)		ECA-PDD-054-500-050-N03S	page 26
64	35 mm (1.4 in)	Small	ECA-PDC-035-500-032-N03S	page 27
64	34 mm (1.3 in)		ECA-PDD-034-500-032-N03S	page 27

Probe Numbering Nomenclature

To make it easy to find out just what type of probe you are looking for or are already using, below you will find an explanation of the numbering nomenclature for most of the probes in this catalog, which conveys useful information about the probe.

Topology — Cable type — Cable exit position

ECA - SFD - 056 - 250 - 032 - N03S

ECA: Technology; SFD: Body; 056: Coverage; 250: Central frequency; 032: Coil number; N03S: Cable length

Coverage — Cable type — Cable exit position

SHARCK - BW053 - G2 - E - N05S

SHARCK: Technology; BW053: Weld type; G2: Generation; E: Compatible instrument; N05S: Cable length

Cable type — Cable exit position

GEAR - M20_30 - 076 - N03T

GEAR: Technology; M20_30: Module range; 076: Coverage; N03T: Cable length

Type

- ECA
- SHARCK
- GEAR

Body type

- RB: rigid
- SF: semi-flexible
- PD: padded
- TF: T-Flex
- IF: I-Flex

Topology type

- A: impedance
- C: long, single driver
- D: short, double driver
- G: multitopology

Application type

- BW: butt weld
- FW: fillet weld
- HR: high resolution

Compatible instrument

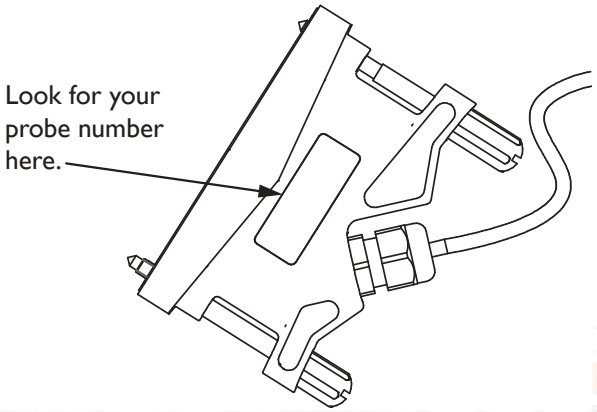
- E: Ectane
- R: Reddy

Coverage

This is the width covered by the probe's active surface, in millimeters.

Central frequency

- LXX: frequency in hertz, divided by 10 (***e.g.***, 500 Hz = L50)
- XXX: frequency in kilohertz (***e.g.***, 10 kHz = 010)
- XXM: frequency in megahertz (***e.g.***, 2 MHz = 02M)



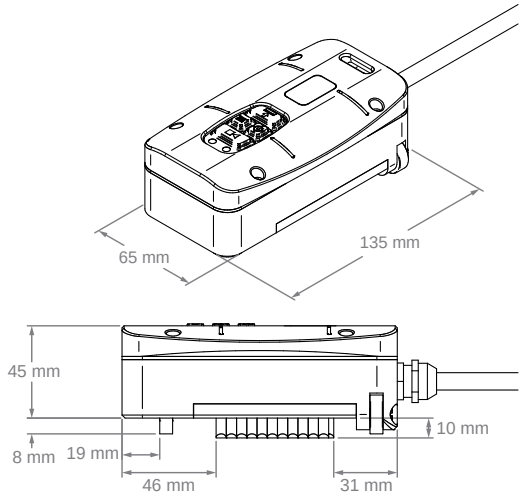
Carbon Steel — Sharck™ Probes

The patent-pending ***Sharck*** probe is a new type of ECA probe. It incorporates tangential ECA (TECA™) technology, which was specifically developed to inspect for surface-breaking cracks in carbon steel. This probe is not only capable of detecting and measuring crack position and length, but also cracks as deep as 7 mm (0.28 in). All this without removing paint or protective coatings.

SHARCK-BW053-G2-R-N05S or SHARCK-BW053-G2-E-N05S

Designed to scan the weld cap, toe area, and heat affected zone of a typical 12.7 mm (0.5 in) thick butt weld in a single pass.

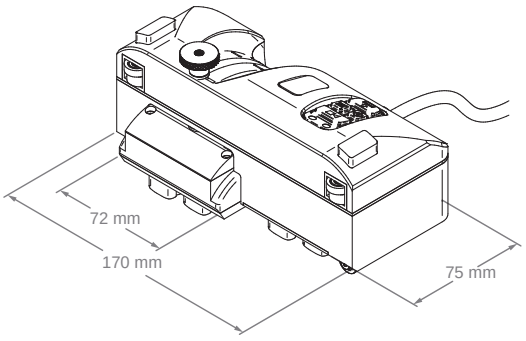
Body	***Sharck*** Butt Weld
Topology	Tangential ***Sharck***
Casing	Medium
Coverage	53 mm (2.09 in)
Fingers	22 (11 × 2 rows)
Minimum channel requirement	64
Frequency	Tuned, fixed at 20 kHz and 80 kHz
Encoder (20.53 counts/mm)	E: ***Ectane*** R: ***Reddy***
Cable	5 m (16.4 ft)
Maximum surface temperature	100 °C (212 °F)
Minimum pipe diameter for circumferential weld scan	25.4 cm (10 in)
Minimum pipe diameter for axial weld scan	40.6 cm (16 in)

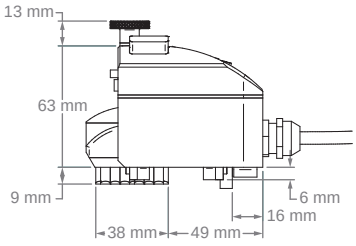


SHARCK-FW028-G2-R-N05S or SHARCK-FW028-G2-E-N05S

Designed for carbon steel fillet weld crack detection and depth sizing.

Body	***Sharck*** Fillet Weld
Topology	Tangential ***Sharck***
Casing	Medium
Coverage	28 mm (1.10 in)
Fingers	12 (6 on cap, 6 on HAZ)
Minimum channel requirement	32
Frequency	Tuned, fixed at 20 kHz and 80 kHz
Cable	5 m (16.4 ft)
Connector	E: ***Ectane*** R: ***Reddy***
Maximum surface temperature	100 °C (212 °F)
Fillet range	12.4–23.0 mm (0.50–0.91 in)
Minimum weld curvature radius	31.8 cm (15 in) concave and convex

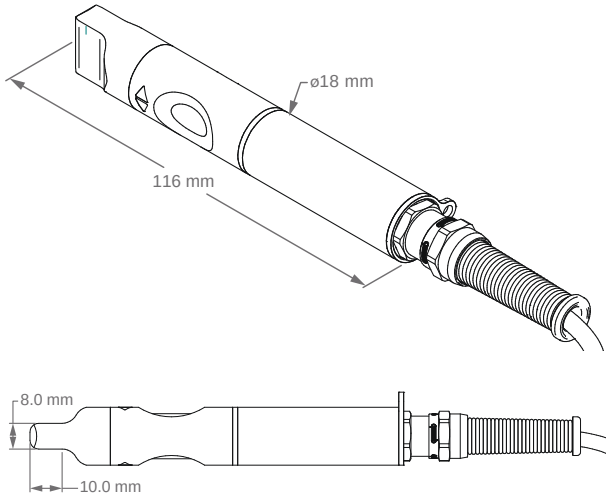




SHARCK-PEN-ST-N05TE or SHARCK-PEN-ST-N05TR

Straight ***Sharck*** pencil probe.

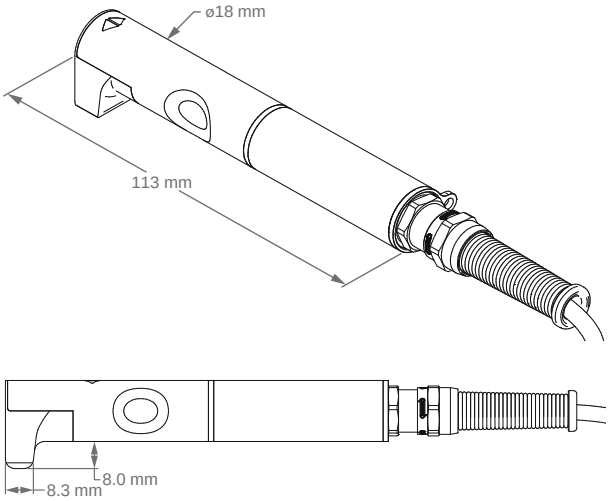
Body	***Sharck*** Pencil
Casing	Straight
Coverage	Approximately 7 mm (0.3 in) at –6 dB
Fingers	1
Minimum channel requirement	32
Frequency	Tuned, fixed at 20 kHz and 80 kHz
Cable	5 m (16.4 ft)
Connector	E: ***Ectane*** R: ***Reddy***
Maximum surface temperature	100 °C (212 °F)



SHARCK-PEN-RA-N05TE or SHARCK-PEN-RA-N05TR

90° ***Sharck*** pencil probe.

Body	***Sharck*** Pencil
Casing	Right angle
Coverage	Approximately 7 mm (0.3 in) at –6 dB
Fingers	1
Minimum channel requirement	32
Frequency	Tuned, fixed at 20 kHz and 80 kHz
Cable	Standard, 5 m (16.4 ft)
Connector	E: ***Ectane*** R: ***Reddy***
Maximum surface temperature	100 °C (212 °F)



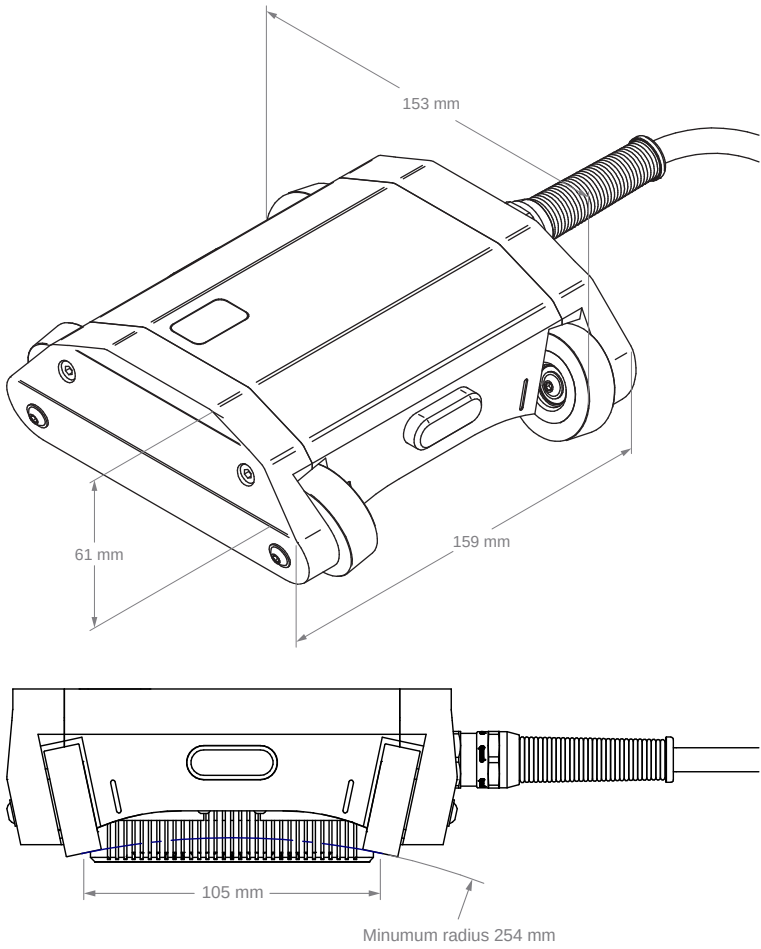
Performances

Item	Value	Note
Detectable defect range (length × depth)	2 × 0.5 mm (0.08 × 0.02 in)	Results may vary according to crack location, liftoff, etc.
Maximum measurable crack depth	7 mm (0.28 in)	Typical, with good accuracy, but can detect deeper cracks
Sizing accuracy (length, depth)	±2 mm (0.08 in), ±10–20 %	Typical when using 0.5 mm (0.02 in) scan resolution and depending on weld conditions
Scan speed	Up to 200 mm/s (7.9 in/s)	With full data recording
Liftoff tolerance	Up to 3 mm (0.12 in)	Non-conductive coatings and paints, with monitoring and auto-correction

SHARCK-HR-1048-071-N05SE or SHARCK-HR-1048-071-N05SR

The high-resolution Sharck probe, combined with a Reddy® portable instrument, is the fastest in-ditch pipeline integrity solution on the market. It enables measuring the depth of stress-corrosion cracking (SCC) thanks to TECA technology—the most advanced technology for ferrous materials, monitoring liftoff, managing permeability, and per forming live compensation.

Body	***High-resolution Sharck***
Casing	Semi-flexible and conformable
Coverage	71 mm (2.8 in)
Minimum channel requirement	64
Frequency	Tuned, fixed at 100 kHz
Encoder (20.53 counts/mm)	E: ***Ectane*** R: ***Reddy***
Cable	5 m (16.4 ft)
Compatible pipe diameters (NPS)	254–1220 mm (10–48 in)



Performances

Item	Value	Note
Detectable defect range (length × depth)	2 × 0.25 mm (0.08 × 0.01 in)	Results may vary according to crack location, liftoff, etc.
Maximum measurable crack depth	Typically 3 mm (0.120 in) with good accuracy	Can detect deeper cracks—system yields 3 mm+ (0.118 in+) results
Depth sizing accuracy	±10 %	The presence of corrosion may affect accuracy
Scan speed	Up to 600 mm/s (24 in/s)	With full data recording
Liftoff tolerance	Up to 2 mm (0.08 in)	Non-conductive coatings and paints, with monitoring and auto-correction
Materials	X52 grade steel	X56, X60, and more grades to be supported

Complex Geometries — Flexible Probes

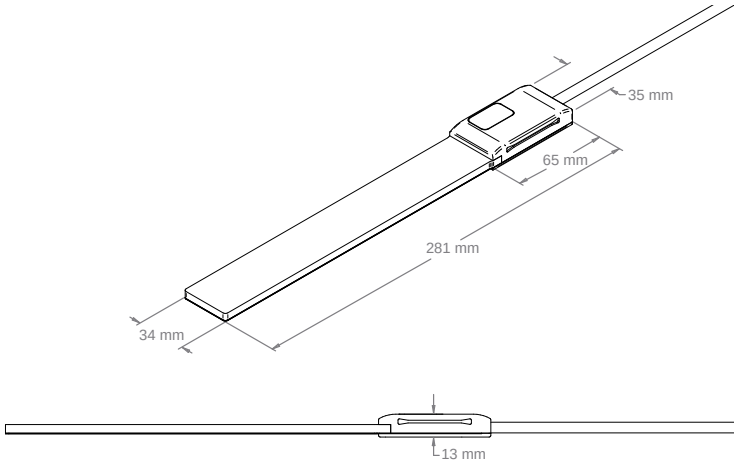
I-Flex Probes

I-Flex probes are the all-round best flexible, plug-and-play probes in the industry. The ***I-Flex*** probes are also designed with actual coils, which yield high-quality signals and better detection capabilities. ***I-Flex*** **probes are designed for surfaces with a bend radius of 20 mm (0.787 in) or more.**

ECA-IFC-128-005-033-N03SA

This extra-large I-Flex probe is specifically designed to detect far-surface corrosion and subsurface indications in non-ferromagnetic materials. The probe offers the largest possible coverage in corrosion-mapping applications.

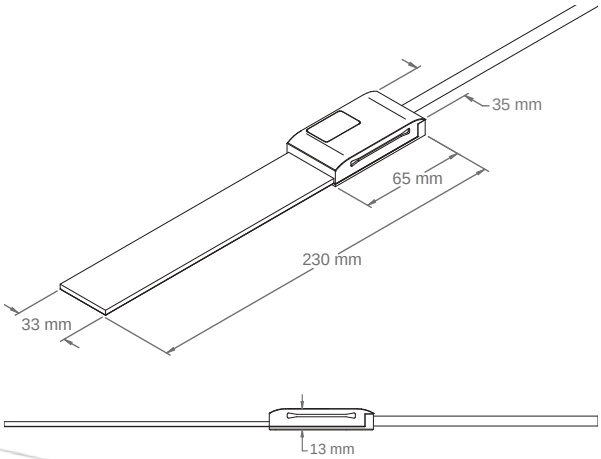
Body	I-Flex
Casing	Extra-large
Topologies	Long, single driver
Cable	3 m (9.8 ft)
Coverage	128 mm (5.04 in)
Central frequency	5 kHz
Frequency range	0.6–20 kHz
Coils (diameter × number)	6 mm × 33
Channels (according to topology)	32
Minimum channel requirement	32
Penetration (stainless steel/aluminum)	Up to 6 mm (0.236 in)



ECA-IFG-079-250-048-N03S

This large I-Flex probe is excellent for detecting subsurface indications and surface-breaking indications. The three, built-in, adaptorless topologies make this probe perfect for a broad range of challenging applications.

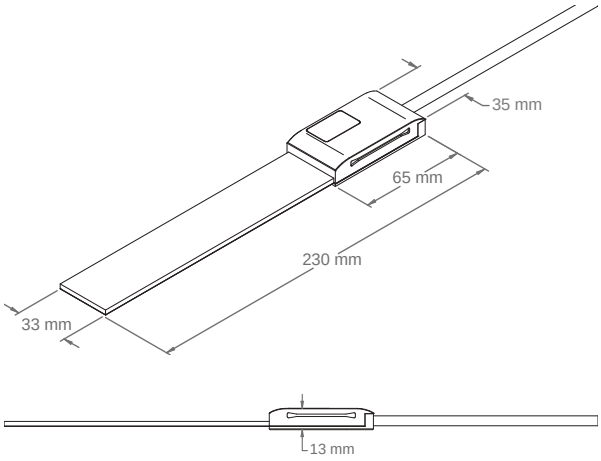
Body	I-Flex
Casing	Large
Topologies	Impedance Long, single driver Short, double driver
Cable	3 m (9.8 ft)
Coverage	79 mm (3.11 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	5 mm × 48
Channels (according to topology)	32, 59, 60
Minimum channel requirement	32 or 64
Penetration (stainless steel/aluminum)	Up to 3 mm (0.118 in)
Minimum detectable crack length	1.5 mm (0.059 in)



ECA-IFG-079-050-048-N03S

This large I-Flex probe benefits from its low frequency to reliably detect far-surface corrosion, subsurface indications, and surface-breaking indications. The three, built-in, adaptorless topologies make this probe perfect for a broad range of challenging applications.

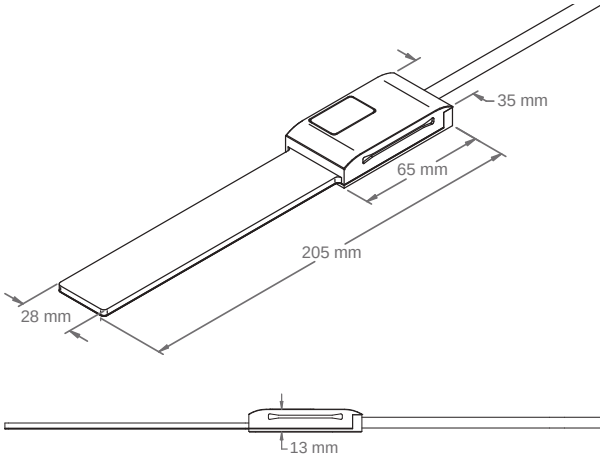
Body	I-Flex
Casing	Large
Topologies	Impedance Long, single driver Short, double driver
Cable	3 m (9.8 ft)
Coverage	79 mm (3.11 in)
Central frequency	50 kHz
Frequency range	10–150 kHz
Coils (diameter × number)	5 mm × 48
Channels (according to topology)	32, 59, 60
Minimum channel requirement	32 or 64
Penetration (stainless steel/aluminum)	Up to 4 mm (0.158 in)



ECA-IFG-056-250-048-N03S

This probe is excellent for detecting subsurface indications and surface-breaking indications. The three, built-in, adaptorless topologies make this probe perfect for a broad range of challenging applications.

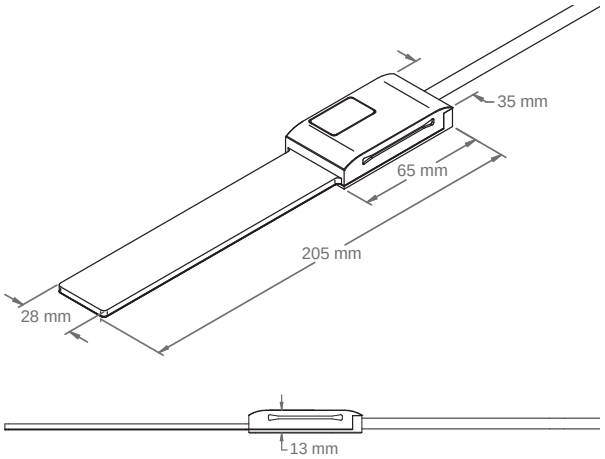
Body	I-Flex
Casing	Medium
Topologies	Impedance Long, single driver Short, double driver
Cable	3 m (9.8 ft)
Coverage	56 mm (2.21 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 48
Channels (according to topology)	32, 59, 60
Minimum channel requirement	32 or 64
Penetration (stainless steel/aluminum)	Up to 2 mm (0.079 in)
Minimum detectable crack length	1 mm (0.039 in)



ECA-IFG-056-050-048-N03S

This probe is excellent for detecting far-surface corrosion, subsurface indications, and surface-breaking indications. The three, built-in, adaptorless topologies make this probe perfect for a broad range of challenging applications.

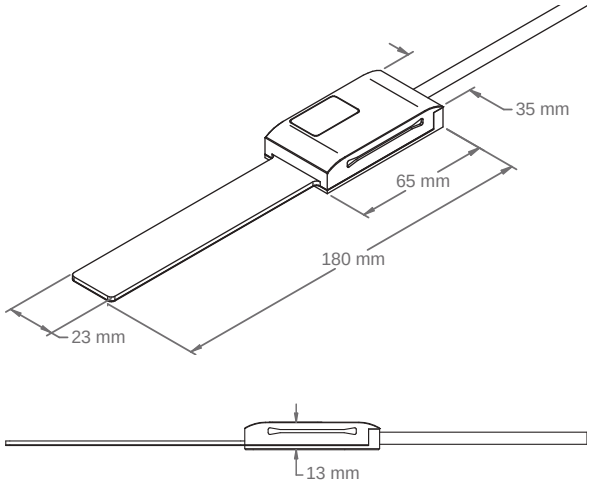
Body	I-Flex
Casing	Medium
Topologies	Impedance Long, single driver Short, double driver
Cable	3 m (9.8 ft)
Coverage	56 mm (2.21 in)
Central frequency	50 kHz
Frequency range	10–150 kHz
Coils (diameter × number)	3.5 mm × 48
Channels (according to topology)	32, 59, 60
Minimum channel requirement	32 or 64
Penetration (stainless steel/aluminum)	Up to 3 mm (0.118 in)



ECA-IFG-034-500-048-N03S

This super-high-resolution ***I-Flex*** probe is designed to detect very short, surface-breaking indications. The three, built-in, adaptorless topologies make this probe perfect for a broad range of challenging applications.

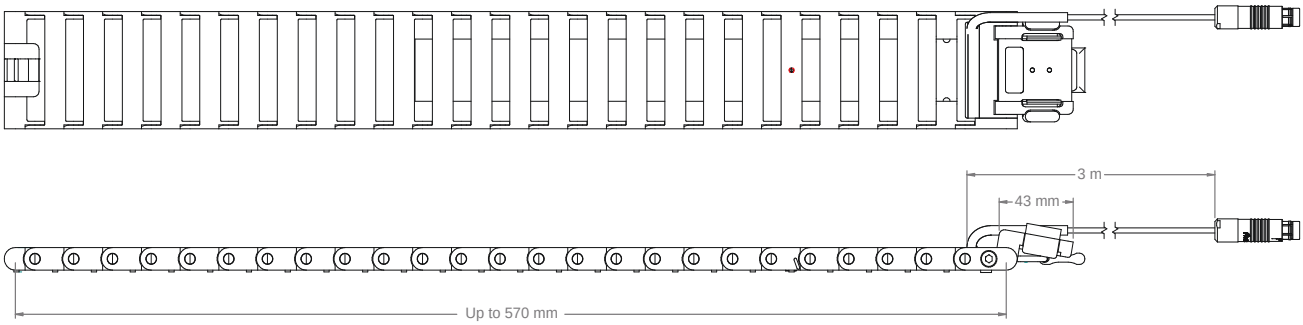
Body	I-Flex
Casing	Small
Topologies	Impedance Long, single driver Short, double driver
Cable	3 m (9.8 ft)
Coverage	34 mm (1.34 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 48
Channels (according to topology)	32, 59, 60
Minimum channel requirement	32 or 64
Minimum detectable crack length	0.5 mm (0.020 in)

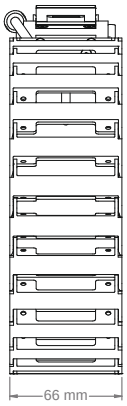


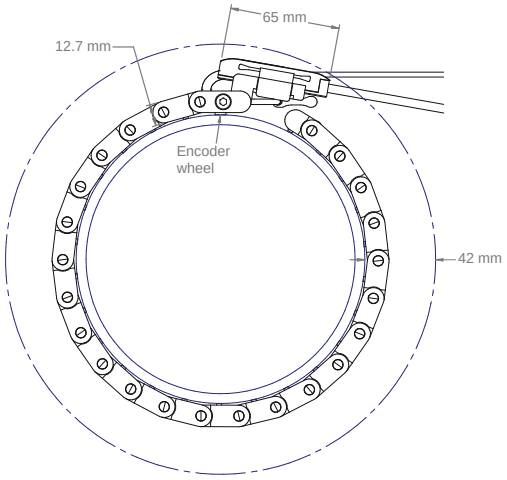
Universal I-Flex Manual Pipe Scanner

ECA-AMPS-IF-042/170-N03R/ECA-AMPS-IF-042/170-N03E

The universal I-Flex manual pipe scanner is versatile and designed to make it easier for operators to deploy the Eddyfi ***I-Flex*** probes on tubes and pipes. It is the only scanner for I-Flex probes that fits tubes and pipes with outer diameters ranging between 42–170 mm (1.25–6.00 in NPS), depending on the probe model. Thanks to its low-profile and light design, the scanner allows operators to replace several uncomfortable manual scans with one rapid axial scan, while maintaining a constant clock position. The scanner comes with an 18-pin connector (***Ectane***) or a 12-pin connector (***Reddy***) and a 3 m (9.8 ft) cable.







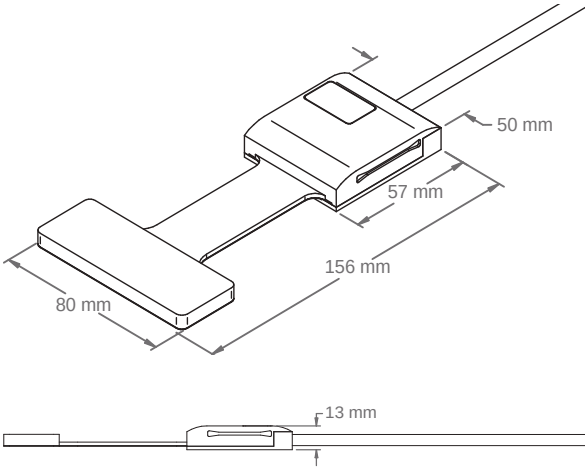
T-Flex Probes

T-Flex probes are highly flexible, plug-and-play probes. They are also designed with actual pancake coils, which yield high-quality signals and better detection capabilities, but in a T configuration, which is better suited to some types of inspection. ***T-Flex*** **probes are designed for surfaces with a bend radius of 20 mm (0.787 in) or more.**

ECA-TFC-070-300-044-N03S

This probe is designed to detect surface-breaking cracks and other surface defects on various smooth surfaces. Unleash the full potential of the probe by using transverse and axial channels (requires 128 channels), making it possible to detect defects of any orientations.

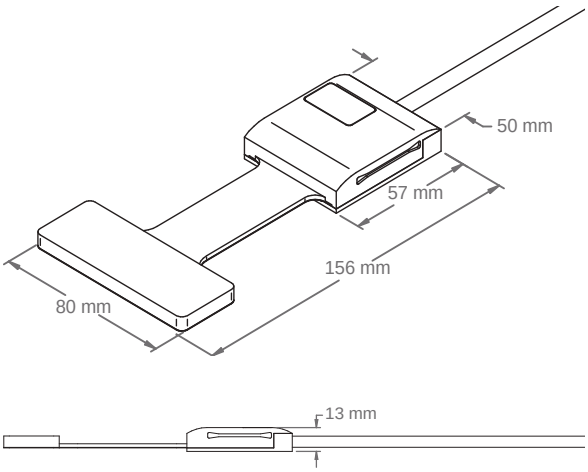
Body	T-Flex
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	70 mm (2.76 in)
Central frequency	300 kHz
Frequency range	100–600 kHz
Coils (diameter × number)	3 mm × 44
Channels	63 (83 with all trans. ch.)
Minimum channel requirement	64
Minimum detectable crack length	1.5 mm (0.059 in)



ECA-TFC-070-045-044-N03S

This low-frequency probe is designed to detect some subsurface indications and surface breaking cracks on various smooth surfaces. Unleash the full potential of the probe by using transverse and axial channels (requires 128 channels), making it possible to detect defects of any orientations.

Body	T-Flex
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	70 mm (2.76 in)
Central frequency	45 kHz
Frequency range	5–100 kHz
Coils (diameter × number)	3 mm × 44
Channels	63 (83 with all trans. ch.)
Minimum channel requirement	64
Penetration (stainless steel/aluminum)	Up to 3 mm (0.118 in)
Minimum detectable crack length	1.5 mm (0.059 in)



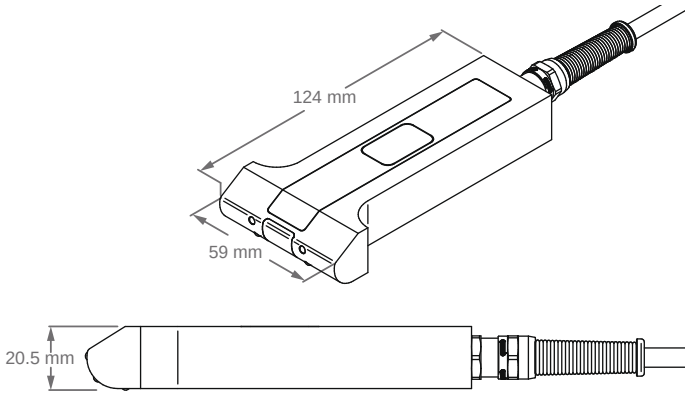
Gear Teeth — Gear Probes

Over time, gear teeth are prone to surface cracking because of the constant torque they are submitted to. Surface-breaking cracks are typically found in the addendum, dedendum, and fillet of gear teeth, although they can also occur elsewhere.

GEAR-M30_42-112-N03T

This probe is designed to inspect the cogs of large gears with a module ranging between 30 and 42. The probe is designed to detect short, surface-breaking cracks, and other surface defects in ferromagnetic materials with a high accuracy.

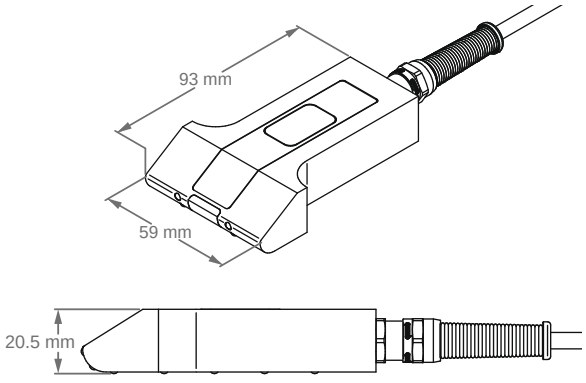
Body	Gear
Casing	Large
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	112 mm (4.4 in)
Central frequency	500 kHz
Frequency range	250 kHz–1 MHz
Coils (diameter × number)	4.5 mm × 48
Channels	91
Minimum channel requirement	96
Minimum detectable crack length	5 mm (0.197 in)



GEAR-M20_30-076-N03T

This probe is designed to inspect the cogs of large gears with a module ranging between 20 and 30. The probe is designed to detect short, surface-breaking cracks, and other surface defects in ferromagnetic materials with a high accuracy.

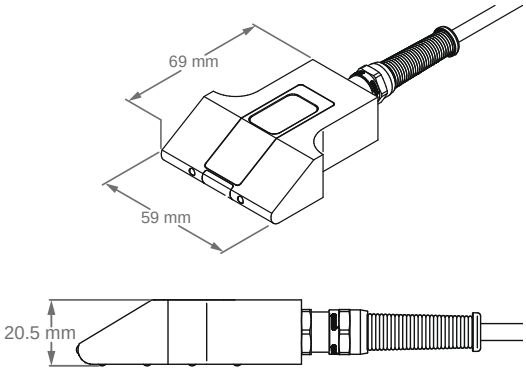
Body	Gear
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	76 mm (3.0 in)
Central frequency	500 kHz
Frequency range	250 kHz–1 MHz
Coils (diameter × number)	4.5 mm × 33
Channels	61
Minimum channel requirement	64
Minimum detectable crack length	5 mm (0.197 in)



GEAR-M13_20-050-N03T

This probe is designed to inspect the cogs of gears with a module ranging between 13 and 20. The probe is designed to detect short, surface-breaking cracks and other surface defects in ferromagnetic materials with a high accuracy.

Body	Gear
Casing	Small
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	50 mm (2.0 in)
Central frequency	500 kHz
Frequency range	250 kHz–1 MHz
Coils (diameter × number)	4.5 mm × 22
Channels	48
Minimum channel requirement	32, 64
Minimum detectable crack length	5 mm (0.197 in)



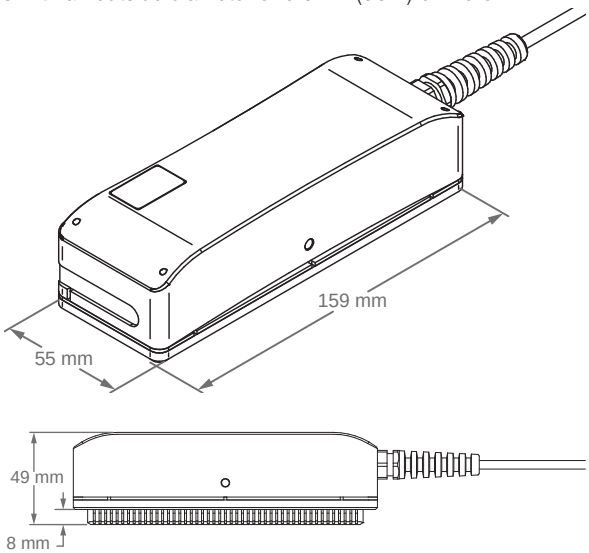
Curved Surfaces — Semi-Flexible Probes

Semi-flexible probes are designed for curved surfaces, such as pipes and pressure vessels. The sizes of their casings determine the smallest diameter that the probes can address, and is specified for each. The probes presented here are also adequate for flat surfaces.

ECA-SFC-128-005-033-N03S

This probe is specifically designed to detect far-surface corrosion and subsurface cracks in non-ferromagnetic materials. The probe offers the largest possible coverage in corrosion-mapping applications. It can be used on curved surfaces with an outside diameter of 0.91 m (36 in) or more.

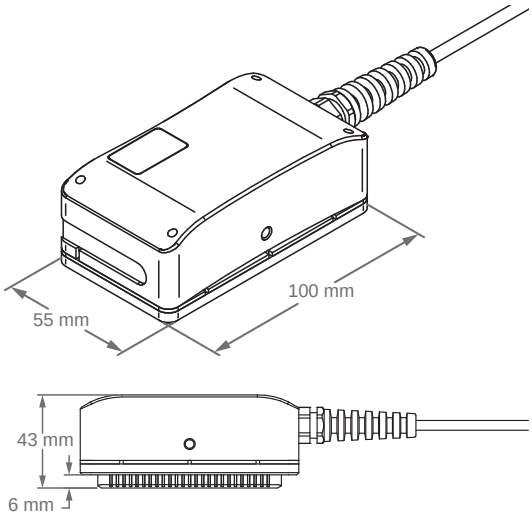
Body	Semi-flexible
Casing	Large
Topology	Single driver
Cable	3 m (9.8 ft)
Coverage	128 mm (5.04 in)
Central frequency	5 kHz
Frequency range	0.6–20 kHz
Coils	6 mm × 33
Channels	32
Minimum channel requirement	32
Penetration (Stainless steel/Aluminum)	Up to 6 mm (0.236 in)



ECA-SFC-064-005-017-N03S

This probe is specifically designed to detect far-surface corrosion and subsurface cracks in non-ferromagnetic materials. The probe offers half the coverage of the ECA-SFC-128-005-033-N03S probe (above) in corrosion-mapping applications where access is limited. It can be used on curved surfaces with an outside diameter of 0.41 m (16 in) or more.

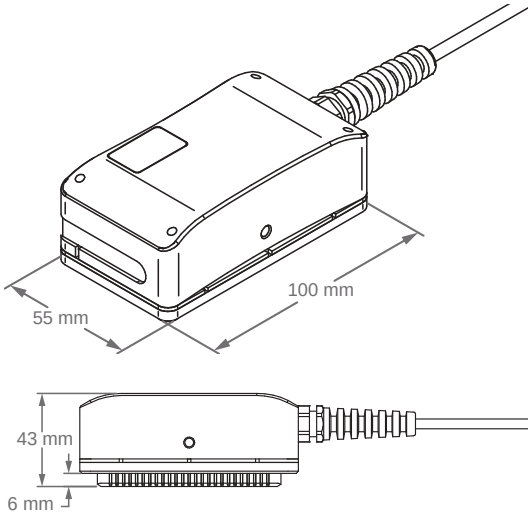
Body	Semi-flexible
Casing	Medium
Topology	Single driver
Cable	3 m (9.8 ft)
Coverage	64 mm (2.52 in)
Central frequency	5 kHz
Frequency range	0.6–20 kHz
Coils (diameter × number)	6 mm × 17
Channels	16
Minimum channel requirement	32
Penetration (Stainless steel/Aluminum)	Up to 6 mm (0.236 in)



ECA-SFC-058-250-032-N03S

This probe is designed to detect short, surface-breaking cracks and other surface defects in ferromagnetic materials with a high accuracy. It can be used on curved surfaces with an outside diameter of 0.41 m (16 in) or more.

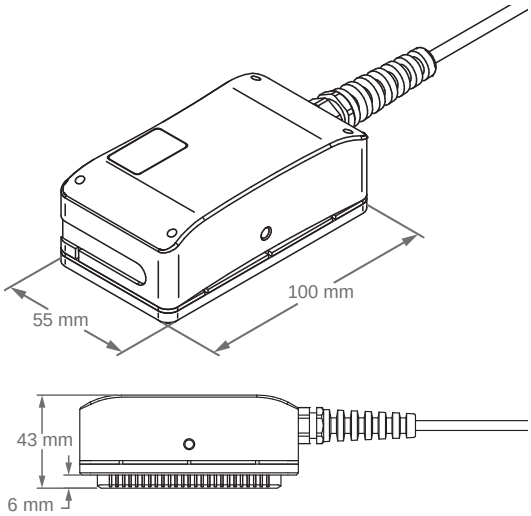
Body	Semi-flexible
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	58 mm (2.28 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 32
Channels	59
Minimum channel requirement	64
Minimum detectable crack length	1 mm (0.039 in)



ECA-SFD-056-250-032-N03S

This probe is designed to detect short, surface-breaking cracks and other surface defects in non-ferromagnetic materials with a high accuracy. It can be used on curved surfaces with an outside diameter of 0.41 m (16 in) or more.

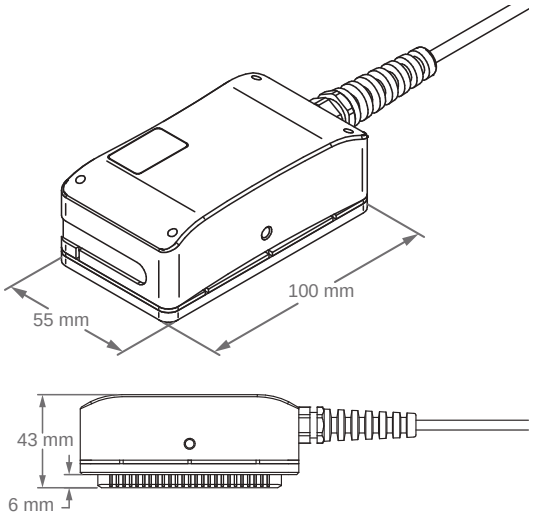
Body	Semi-flexible
Casing	Medium
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	56 mm (2.21 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 32
Channels	60
Minimum channel requirement	64
Minimum detectable crack length	1 mm (0.039 in)



ECA-SFC-071-500-064-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks in ferromagnetic materials. Note that you need 128 or 256 channels to use this probe. Consider the ECA-SFC-035-500-032-N03S as an alternative if you only have 64 channels. The probe can be used on curved surfaces with an outside diameter of 0.41 m (16 in) or more.

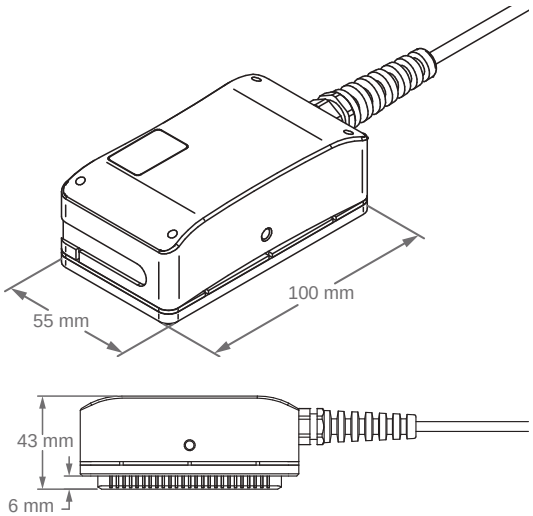
Body	Semi-flexible
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	71 mm (2.80 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 64
Channels	123
Minimum channel requirement	128
Minimum detectable crack length	0.5 mm (0.020 in)



ECA-SFD-070-500-064-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks in non-ferromagnetic materials. Note that you need 128 or 256 channels to use this probe. Consider the ECA-SFD-034-500-032-N03S as an alternative if you only have 64 channels. The probe can be used on curved surfaces with an outside diameter of 0.41 m (16 in) or more.

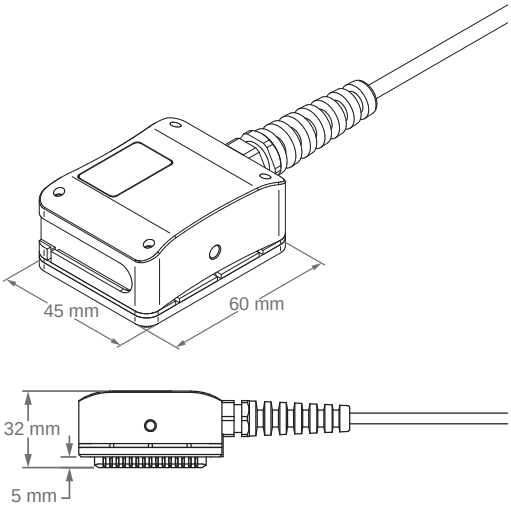
Body	Semi-flexible
Casing	Medium
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	70 mm (2.76 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 64
Channels	124
Minimum requirement	128
Minimum detectable crack length	0.5 mm (0.020 in)



ECA-SFC-035-500-032-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks in ferromagnetic materials. The probe offers approximately half the coverage of the ECA-SFC-058-250-032-N03S, but only requires 64 channels. It can be used on curved surfaces with an outside diameter of 0.2 m (8 in) or more.

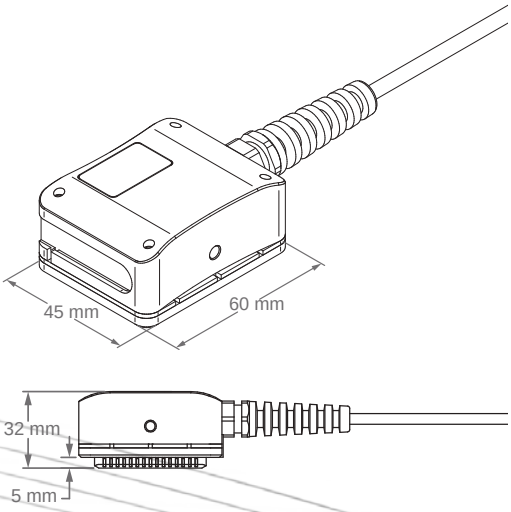
Body	Semi-flexible
Casing	Small
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	26 mm (1.02 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 16
Channels	26
Minimum channel requirement	32
Penetration (Stainless steel/Aluminum)	Up to 3 mm (0.118 in)
Minimum detectable crack length	1 mm (0.039 in)



ECA-SFD-034-500-032-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks, in non-ferromagnetic materials. The probe offers approximately half the coverage of the ECA-SFD-056-250-032-N03S, but only requires 64 channels. It can be used on curved surfaces with an outside diameter of 0.2 m (8 in) or more.

Body	Semi-flexible
Casing	Small
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	34 mm (1.34 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 32
Channels	60
Minimum channel requirement	64
Minimum detectable crack length	0.5 mm (0.020 in)



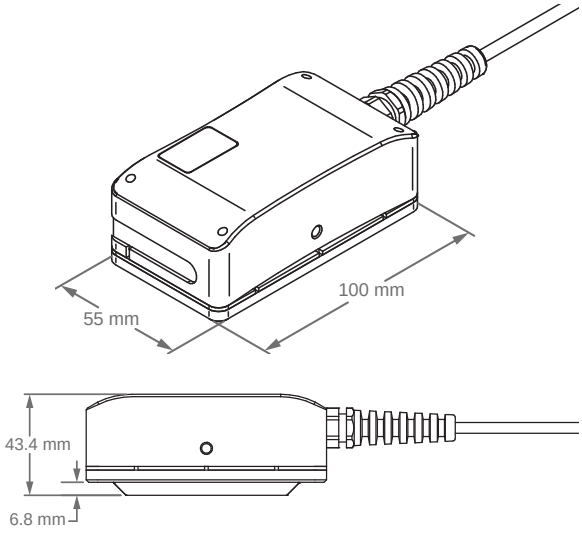
Welds and Smooth Surfaces — Padded Probes

The probes presented in this section are designed to detect welding defects in non-ferromagnetic materials. Their padded membrane is extremely resistant to the harsh friction encountered in such applications, reducing weld preparation requirements to a minimum.

ECA-PDC-058-250-032-N03S

This probe is designed to detect short, surface-breaking cracks and other surface defects in ferromagnetic materials. Its unique design enables it to adapt to weld crowns of 5 mm (0.2 in) or less.

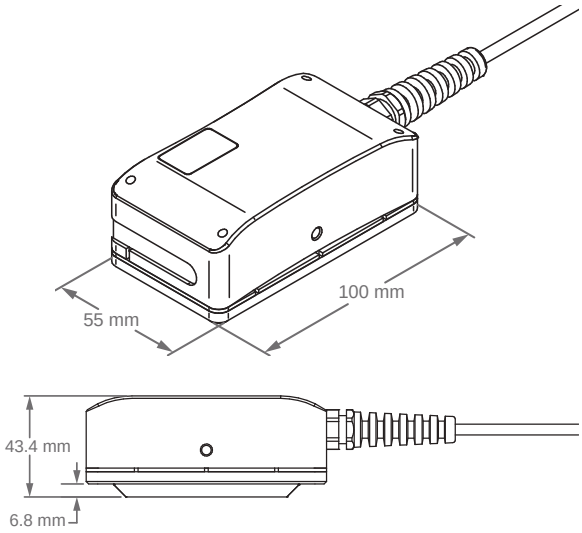
Body	Padded
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	58 mm (2.28 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 32
Channels	59
Minimum channel requirement	64
Minimum detectable crack length	1 mm (0.039 in)



ECA-PDD-056-250-032-N03S

This probe is designed to detect short, surface-breaking cracks and other surface defects in non-ferromagnetic materials. Its unique design enables it to adapt to weld crowns of 5 mm (0.2 in) or less.

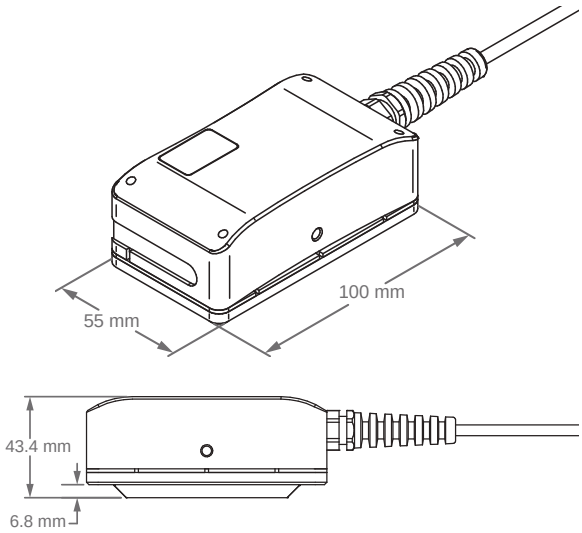
Body	Padded
Casing	Medium
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	56 mm (2.21 in)
Central frequency	250 kHz
Frequency range	50–525 kHz
Coils (diameter × number)	3.5 mm × 32
Channels	60
Minimum channel requirement	64
Minimum detectable crack length	1 mm (0.039 in)



ECA-PDC-055-500-050-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks in ferromagnetic materials. Note that you need 96, 128, or 256 channels to use this probe. Consider the ECA-PDC-035-500-032-N03S as an alternative if you only have 64 channels. The probe design enables it to adapt to weld crowns of 5 mm (0.2 in) or less.

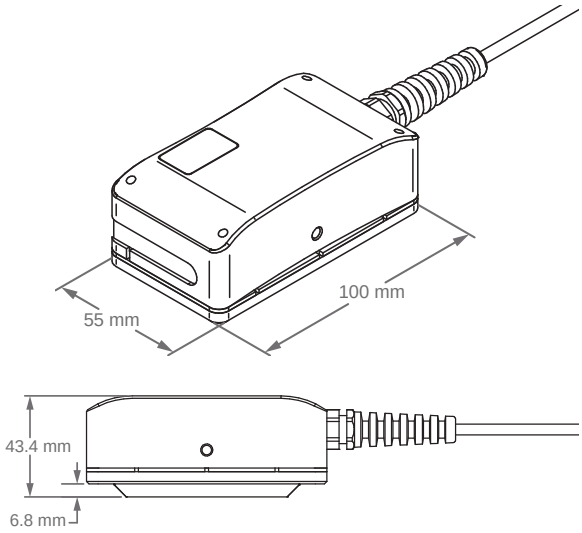
Body	Padded
Casing	Medium
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	55 mm (2.17 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 50
Channels	95
Minimum channel requirement	96
Minimum detectable crack length	0.5 mm (0.020 in)



ECA-PDD-054-500-050-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks in non-ferromagnetic materials. Note that you need 96, 128, or 256 channels to use this probe. Consider the ECA-PDD-034-500-032-N03S as an alternative if you only have 64 channels. The probe design enables it to adapt to weld crowns of 5 mm (0.2 in) or less.

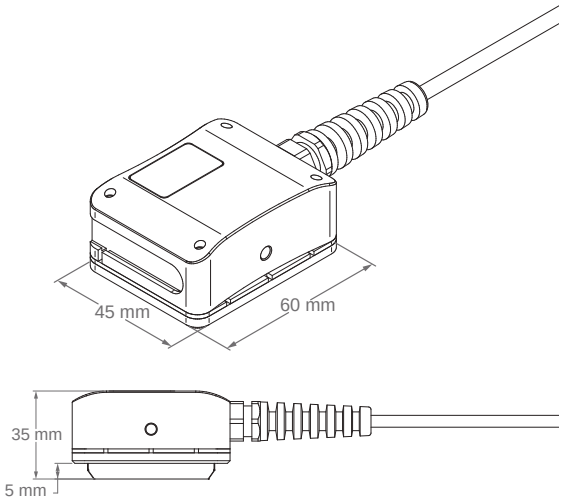
Body	Padded
Casing	Medium
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	54 mm (2.13 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 50
Channels	96
Minimum channel requirement	96
Minimum detectable crack length	0.5 mm (0.020 in)



ECA-PDC-035-500-032-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks and other surface defects in ferromagnetic materials. Its unique design enables it to adapt to weld crowns of 5 mm (0.2 in) or less.

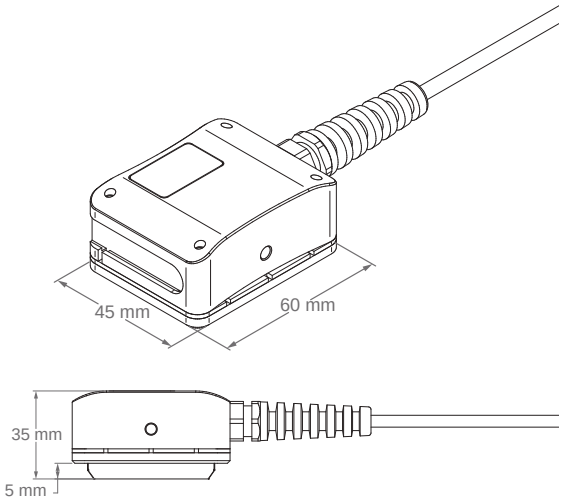
Body	Padded
Casing	Small
Topology	Long, single driver
Cable	3 m (9.8 ft)
Coverage	34 mm (1.34 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 32
Channels	59
Minimum channel requirement	64
Minimum detectable crack length	0.5 mm (0.020 in)



ECA-PDD-034-500-032-N03S

This super-high-resolution probe is designed to detect very short, surface-breaking cracks and other surface defects in welds featuring a weld crowns of 5 mm (0.2 in) or less.

Body	Padded
Casing	Small
Topology	Short, double driver
Cable	3 m (9.8 ft)
Coverage	34 mm (1.34 in)
Central frequency	500 kHz
Frequency range	100–800 kHz
Coils (diameter × number)	2 mm × 32
Channels	60
Minimum channel requirement	64
Minimum detectable crack length	0.5 mm (0.020 in)



Turbine Applications

Gas turbines are a critical asset in the power generation industry. They are big and complex, and shutting them down is often quite costly. Turbine blades, generator slots, rotor bores, bore holes, and dovetails all need to be inspected regularly, quickly, and efficiently. Each part has a highly optimized mechanical design. They each tend to have unique geometries that make it hard to inspect for defects using conventional methods. These applications involve developing custom probes to fulfill each highly specific set of requirements. Over the years, Eddyfi has gained a wealth of concrete experience developing ECA probes for these applications. By coming to us with your turbine application requirements, you're not starting from scratch. Rather, you have a great head start.

Turbine Blades

Several blades are equipped with cooling holes and gas paths, which are the source of several types of problems, such as subsurface defects and corrosion. Turbine blades also usually have very specific profiles and are sometimes coated. This presents a number of challenges for which Eddyfi has developed flexible ECA probes, trailing-edge probes, and many more.

Generator Slots

In power generators, current flows through enormous stator bars running in wedged slots along the generator's axis. After generators have been operating for a long time, the electromagnetic force may cause the stator bars to vibrate due to the existence of loose slot wedges. This can cause fretting and cracking, creating the need to inspect slot wedges regularly. They require profiled ECA probes, which Eddyfi has designed for several customers.

Rotor Bores

Many steam turbine rotors are bored to allow several shafts to be built into one another, making multiple rotation speeds possible. These bores need to be inspected for cracking, which can be difficult and time-consuming because of the length and diameter of the rotors. Eddyfi has developed a system used by many in the industry to inspect these bores with a combination of ECA and UT.

Bore Holes

Rotor bores are also engineered with holes, called bore holes. These holes can develop surface-breaking cracks, which need to be detected. Eddyfi has developed a number of probes to do this job.

Dovetails

Turbine blades are generally attached to the rotor through an ingenious system of male and female “dovetails”, which must be inspected for defects to ensure safety and maximize the life of the equipment. Dovetail inspection demands probes that are shaped to specific dovetail profiles; designed to specifically target “hot spots” or entire dovetail profile; capable of rapid, single-pass scans of regions of interest; and easy to handle — all things that Eddyfi excels at designing.

Custom ECA Probes

At Eddyfi, we make the impossible possible. We have the expertise, the engineers, and the manufacturing capabilities to take almost any set of custom surface-inspection requirements — from dimensions, number of coil rows, to topologies — and turn them into practical solutions. We have had the opportunity to demonstrate this by developing:

- Static probes
- Clamping probes
- Encircling probes
- Spring-loaded probes
- Custom-geometry probes
- Gel-filled probes
- Individually spring-loaded elements
- Expandable probes
- Partial saturation probes

Calibration Standards

These reference plates are used to calibrate your probe for a given application.

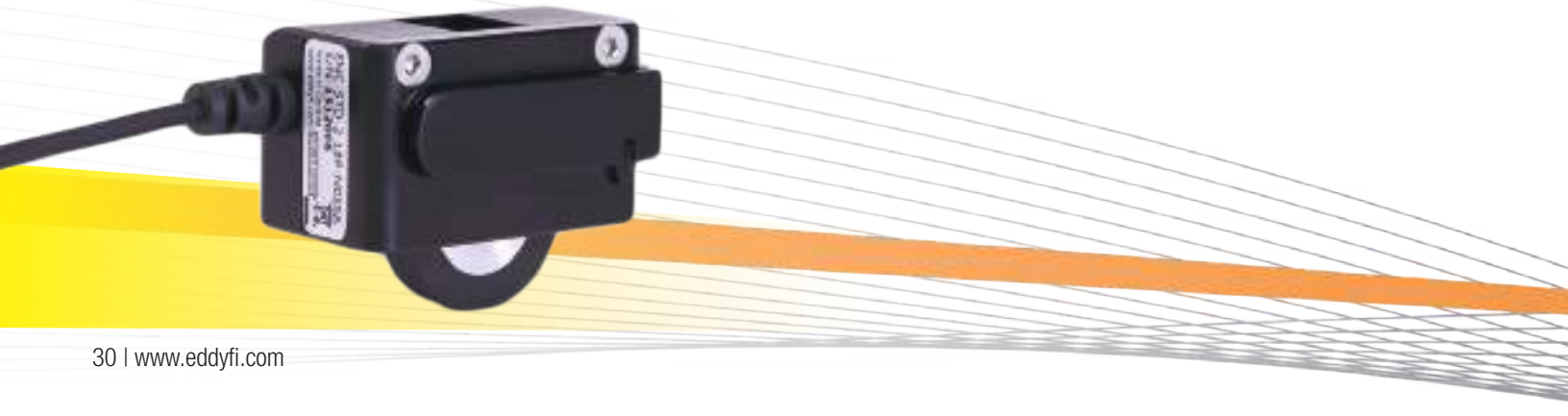
Corrosion	Grade 6061 aluminum	6.35 mm (0.250 in)	13 × FBH, Ø1.6–12.7 mm (0.063–0.500 in)	REFPL-A6061-0635-STDCOR01
Welds	Grade 316 stainless steel	6.35 mm (0.250 in)	9 × EDM notch 3 × FBH, Ø1.5 mm (0.059 in)	REFPL-SS316-0635-STDWLD01
Surface-breaking and subsurface defects	Grade 6061 aluminum	3.18 mm (0.125 in)	4 × EDM notch 6 × FBH, Ø3 mm (0.118 in)	REFPL-A6061-0318-STDCAL01
	Grade 316 stainless steel	3.18 mm (0.125 in)	4 × EDM notch 6 × FBH, Ø3 mm (0.118 in)	REFPL-SS316-0318-STDCAL01
	Grade 1018 carbon steel	3.18 mm (0.125 in)	4 × EDM notch 3× FBH, Ø3 mm (0.118 in)	REFPL-C1018-0318-STDCAL02
	Grade 6061 aluminum	3.18 mm (0.125 in)	9 × EDM notch 1 × FBH, Ø3 mm (0.118 in) 1 × FBH, Ø1.5 mm (0.059 in) 1 × FBH, Ø0.75 mm (0.030 in)	REFPL-A6061-0318-STDCAL03
	Grade 316 stainless steel	3.18 mm (0.125 in)	9 × EDM notch 1 × FBH, Ø3 mm (0.118 in) 1 × FBH, Ø1.5 mm (0.059 in) 1 × FBH, Ø0.75 mm (0.030 in)	REFPL-SS316-0318-STDCAL03
	Grade 1018 carbon steel	3.18 mm (0.125 in)	9 × EDM notch 1 × FBH, Ø3 mm (0.118 in) 1 × FBH, Ø1.5 mm (0.059 in) 1 × FBH, Ø0.75 mm (0.030 in)	REFPL-C1018-0318-STDCAL03

Encoder

ENC-STD-2-18P-N03S or ENC-STD-2-12P-N03S

High-precision, high-resolution (25.46 counts/mm) encoder for the standard surface probe series. Rugged aluminum casing, waterproof design, and easy to clean with a replaceable wheel. Equipped with an 18-pin connector compatible with ***Ectane*** or a 12-pin connector compatible with ***Reddy***, and a 3 m (9.8 ft) cable. The encoder is compatible with all the standard probes presented in this catalog, regardless of their size and type. The click-on design of the encoder also makes it extremely simple to install without any tools.

- Rugged aluminum casing
- Waterproof design
- Easy to clean
- User-replaceable wheel



Notes

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