Eddyfi Technologies
Beyond current

Technical
Specifications

CYPHER

Unlock... Everything.

You shouldn't need a PhD or 10 years of field time to run advanced inspections. Whether you're inspecting welds in oil and gas, composites in aerospace, or critical systems in nuclear power, Cypher® gives you access to industry-leading performance through an interface that just makes sense.

CYPHER IS INSPECTION POWER, UNLOCKED, SO YOUR TEAM CAN DELIVER MORE WITH LESS EFFORT

That's what makes it easily the most advanced. Cypher is the result of everything we've learned, refined into one powerful, unified instrument that's built for how inspections happen today. It's not just a merger of two legacies—it's a bold step into the future of phased array. By combining the high-performance DNA of both Gekko and TOPAZ, Cypher delivers the most advanced Phased Array Ultrasonic Testing (PAUT) and Total Focusing Method (TFM) capabilities we've ever engineered—streamlined, simplified, and accessible to every user. It delivers the high-end speed and imaging you expect, but with a workflow that reduces setup time, accelerates productivity, and bridges the gap between expertise and accessibility.

If you've worked with Eddyfi Technologies instruments before, Cypher retains what you love—Capture and UltraVision software compatibility, premium hardware, and robust reliability—now elevated by a reimagined interface and seamless integration with the Eddyfi ecosystem. And if you're new to Eddyfi, Cypher gives you a reason to rethink everything: intuitive software, automated probe recognition, real-time remote integration with the Eddyfi ecosystem. And if you're new to Eddyfi, Cypher gives you a reason to rethink everything: intuitive software, automated probe recognition, real-time remote collaboration, and the fastest possible TFM acquisition on the market.

...everything portable PAUT should be

...everything high-resolution TFM reveals

...everything TOFD sees clearly

...everything real-time enables

...everything automated workflows need

...everything you expect from a lab—onsite

...everything inspection-ready out of the box

...everything simpler, faster, smarter

...everything inspectors trust under pressure

...everything defects can't hide from

...everything your procedures demand

UNLOCK... CONFIDENCE IN EVERY INSPECTION

Cypher isn't just about what it does, it's about what it enables. Designed for inspection professionals across diverse industries, it helps teams overcome complexity, bridge expertise gaps, and gain confidence in every result.

- Complete code-compliant inspections with best-in-class PAUT and Time-of-Flight Diffraction (TOFD)
- Deliver results faster with the industry's highest portable TFM acquisition speed
- Experience a more intuitive workflow: automated probe detection, smart setup guides, and guided data capture built for productivity
- Stay focused in any environment with a rugged IP65-certified system and large 30.7cm (12.1in) touchscreen optimized for outdoor use
- Collaborate in real-time using remote diagnostics, cloud backup, and seamless integration with Eddyfi Technologies' full ecosystem of probes, scanners, and software

Figure 1: Annotated breakdown of Cypher.

UNLOCK... PERFORMANCE ACROSS EVERY INDUSTRY

Cypher adapts to the demands of diverse sectors with optimized inspection workflows, advanced imaging algorithms, and proven capability with application-specific needs.

- Oil & Gas: Portable solutions for pipeline welds, risers, and refinery equipment, supported by carbon steel and austenitic steel inspections.

Figure 2: Ready for integration: Cypher pairs with automated crawlers and robotic scanners for streamlined semi-automated inspections.

- Corrosion & High Temperature Hydrogen Attack (HTHA): Designed for severe environments with advanced imaging for corrosion mapping, HTHA, and Hydrogen Induced Cracking (HIC) assessments.
- Power Generation: Efficient in-service inspections of turbines and boilers, validated by our boiler tube and small pipe capabilities.
- Aerospace: Precision assessments of composites, fasteners, and curved surfaces with tools tailored for composite inspection.

Figure 3: Turbine inspection using Cypher, PAUT probe and wedge configuration.

- Transportation: Trusted performance for rotational components like train axles, improving safety-critical evaluations.
- Defense: Robust inspection of welds and structural materials, supporting national assets with defense-ready solutions.
- Manufacturing: Reliable evaluations for complex parts and QA processes, backed by our manufacturing-focused PAUT applications.

UNLOCK... INSIGHT OTHERS CAN'T SEE

Whether you operate in standard weld inspection or high throughput automated workflows, Cypher delivers consistent results with scalable power.

- Uniform image quality across materials, shapes, and thicknesses
- Seamless transition from manual scanning to semi-automated systems
- Performance tailored to configurations from 16:128 to 64:128

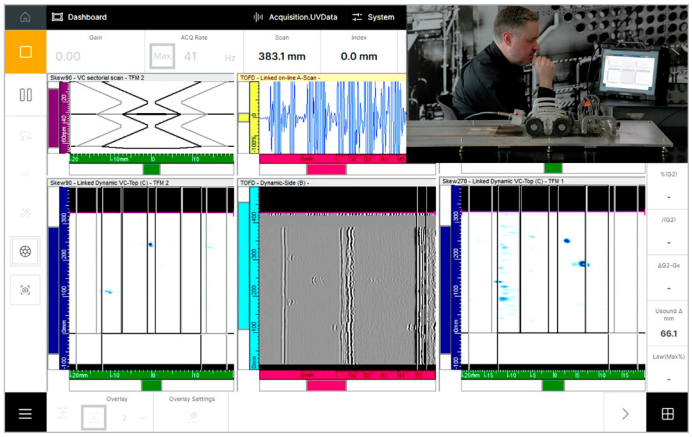

Figure 4: Cypher pairs with semi-automated and automated inspection solutions, delivering high-quality data for both corrosion mapping and weld inspection tasks, offering versatility across a range of industries.

UNLOCK... FUTURE-READY PERFORMANCE

Cypher delivers next-generation PAUT performance in a portable format—combining advanced imaging with responsive hardware and a **Beyond Current** software platform.

- TFM algorithms optimized for corrosion mapping, HTHA, and complex geometries
- Adaptive delay law generation ensures precise focusing across applications
- Fastest TFM inspection speed available on the market
- Architecture built for AI-assisted evaluation and modular feature growth

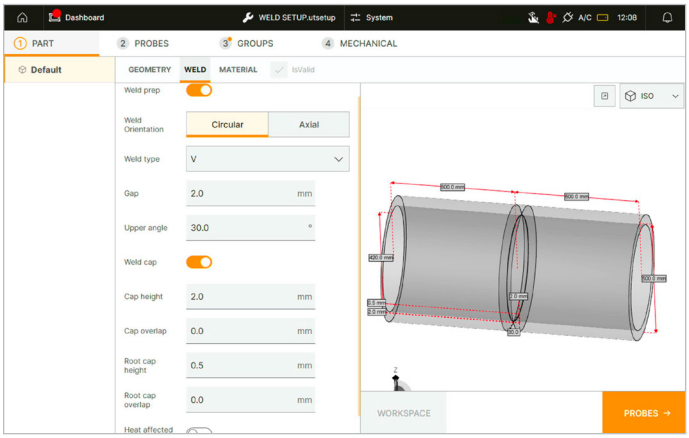

Figure 5: Cypher software streamlines inspection setup with automated probe recognition and guided workflows.

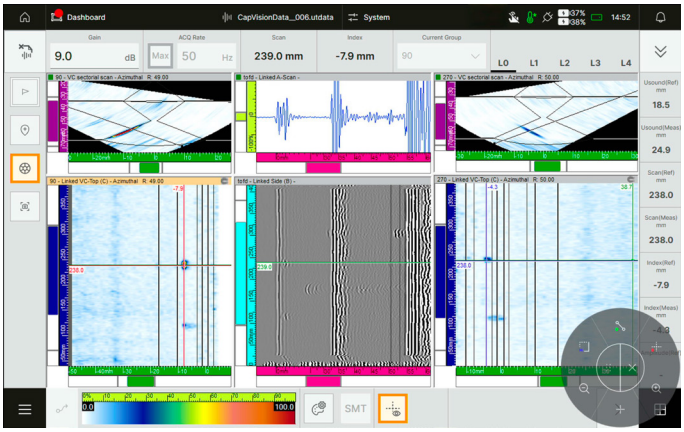

Figure 6: Unlock the fastest TFM available. Multi-group PAUT and TOFD for maximum productivity.

UNLOCK... DURABILITY WHERE IT COUNTS

Cypher adapts to the demands of diverse sectors with optimized inspection workflows, advanced imaging algorithms, and proven capability with application-specific needs.

- IP65-certified, MIL-STD-810G drop-tested, and field-ready
- Bright 30.7cm (12.1in) touchscreen designed for outdoor visibility
- Compact, rugged design with hot-swappable batteries for continuous use

Figure 7: Reliable inspections with Cypher, rain or shine.

Figure 8: Plug in. Power up. Integrated dual IPEX for instant readiness. No extras required.

UNLOCK... SUPPORT THAT GOES BEYOND THE SCAN

Cypher is backed by our Customer Success Program, our next evolution in empowering modern inspection teams. This program offers remote diagnostics, simplified calibration, real-time insights, advanced connectivity tools, and exclusive access to Eddyfi Academy courses—minimizing downtime and keeping you inspection-ready with less effort and greater confidence.

SPECIFICATIONS

INSTRUMENT

Size	343mm × 276mm × 141mm (13.5in × 10.9in × 5.6in)
Weight	6.6kg (with 1 battery)
Onboard Storage	2TB internal SSD storage
PAUT Connectors	2x PA connectors, 4x UT channels (4x P/R connectors)
Drop Test Rating	Drop-tested according to MIL-STD-810H
Display	307mm (12.1in) TFT LCD with multi-touch capacitive touch screen, 1280x800 pixels
Battery	2 hot-swappable Lithium-ion batteries, 87Wh each
Battery Life	Up to 5 hours of continuous operation depending on power consumption
External DC Supply	15VDC 90W 6A

ENVIRONMENTAL

Ingress Protection Rating	IP65 Certified [completely protected against dust and water jets from all directions (6.3mm nozzle)]
Operating Temperature	-10 to 50 °C (14 °F to 122 °F) under normal conditions
Storage Temperature	-20 °C to 60 °C (-4 °F to 140 °F) (with battery inside)
	-20 °C to 70 °C (-4 °F to 158 °F) (without battery inside)
Relative Humidity	80% non-condensing

CONNECTIVITY

Wireless	Wi-Fi® 6E and Bluetooth® 5.3 onboard
USB Ports	4x USB 3.1 ports 2x USB 2.0 ports (internal)
Encoder Inputs	3-axis currently supported (quadrature or clock/direction)
Digital Input	4+4 digital inputs, TTL (encoder + robotic connectors)
Digital Output	3+3 digital outputs, TTL (encoder + robotic connectors)

GENERAL ULTRASONIC SPECIFICATIONS

Effective Digitizing Frequency	Up to 100 MHz; User-adjustable compression factor
Maximum Pulse Repetition Rate (PRF)	Up to 40 kHz
Maximum # of A-Scan data points	Up to 65 536
A-Scan Bit Depth	16 bits
Rectification	RF, full wave, half wave+, half wave-
Video Filtering	Smoothing
Filtering	PA channel: selection of band-pass filters, high-pass filters, and averaging
	UT channel: selection of low-pass filters, band-pass filters, high-pass filters, and averaging
Scan type	Single, linear, sectorial, compound, and TFM (includes PWI, PCI, FMC)
Time-Corrected Gain (TCG)	PA: 40dB in step of min. 0.1dB
	UT: 110dB in step of min. 0.1dB
	Maximum slope of 40dB/10ns

PAUT SPECIFICATIONS

Calibration Certification	ISO 18563-1:2022 NB/T-47013:2015
Splitter	Low Noise Internal Splitter IPEX 1 = channel 1 to 128 and IPEX 2 = channel 65 to 128
Voltage	Adjustable from 20Vpp to 120Vpp
Pulse Width	Adjustable from 30ns to 1250ns; resolution of 2.55ns. (half period of bipolar pulse or duration of negative pulse)
Pulse Shape	Bipolar (Negative - Positive square pulse) Negative square pulse
Gain Range	-10dB to 120dB/0.1dB; maximum input signal 1Vp-p (full-screen height)
System Bandwidth	0.4MHz to 20MHz
Maximum Aperture	Up to 64 elements
Total Number of Elements	Up to 128 elements
Number of Focal Laws	4096 maximum total (512 maximum per group)

SPECIFICATIONS

UT

Calibration Certification	ISO22232-1
Voltage	Adjustable from 20 to 200V
Pulse Width	Adjustable from 30ns to 1250ns; resolution of 2.5ns
Pulse Shape	Negative square pulse
Gain Range	-10dB to 120dB/0.1dB; maximum input signal 2Vpp (full-screen height)
Input Impedance	≥50 in pulse-echo mode
	≥50 in pitch-catch mode
System Bandwidth	0.25MHz to 22MHz

FMC: TFM/PCI

Supported Modes	Pulse-echo: L-L and LL-LL TT, and TT-TT
	Self-tandem: TT-T and TT-TTT, LL-L and LL-LLL, LT-T, TL-T, LL-T and TL-L
	Linear Array, Matrix Array, Dual Linear Array, Dual Matrix Array
	Pulse/Echo, Pitch/Catch (TRL configuration), Pitch/Catch (Face-To-Face)
Parallel Multimode TFM	Up to 8 simultaneous groups (TFM or PCI or TOFD)
Parallel Multi-Probe TFM	Up to 8 simultaneous groups with different PA probes, including TOFD
Live Envelope Process	Yes
Maximum Aperture	128 elements extended aperture (64:128PR only)
	64 elements aperture (64:128PR)
	64 elements extended aperture (32:128PR only)
	32 elements aperture (32:128PR)
	32 elements extended aperture for 16:64PR and 16:128PR
	16 elements aperture for 16:64PR and 16:128PR
Image Resolution	Up to 1017× 1017 points (for each TFM wave set)

PWI: TFM/PCI

Supported Modes	Pulse-echo, Dual Matrix Array, Dual Linear Array
Parallel Multimode TFM	Up to 8 simultaneous groups (including PWI/TFM or PWI/PCI, and TOFD)
Parallel Multi-Probe TFM	Up to 8 simultaneous groups with different PA probes and TOFD
Live Envelope Process	Yes
Maximum Aperture	64 elements aperture (64:128PR)
	32 elements aperture (32:128PR)
	16 elements aperture for 16:64PR and 16:128PR
Image Resolution	Up to 1017× 1017 points (for each TFM wave set)