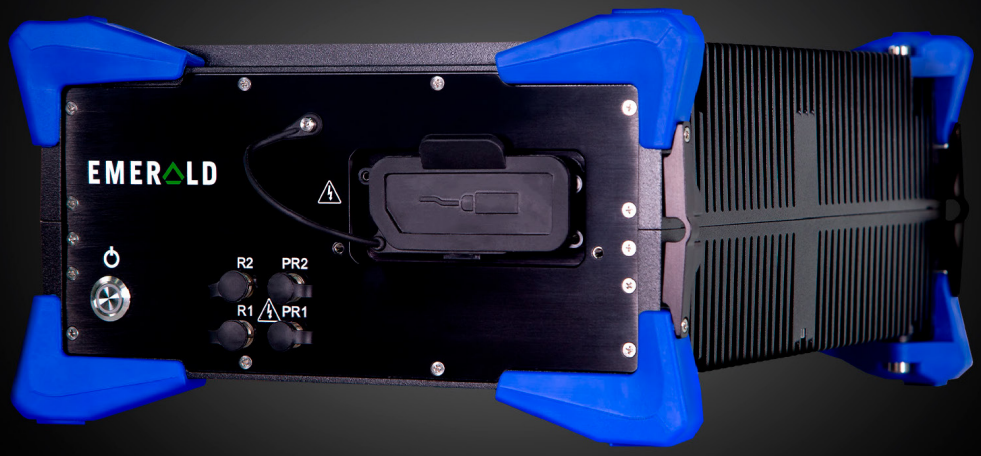
Eddyfi Technologies
Beyond current



Technical Specifications

EMERALD

Compact, industrial phased array UT & TFM system

Emerald is a compact, phased array ultrasonic system that offers extreme performance. It is designed to handle the most challenging inspection conditions found in oil & gas, power generation, in-service railway, manufacturing, heavy industry, and aerospace.

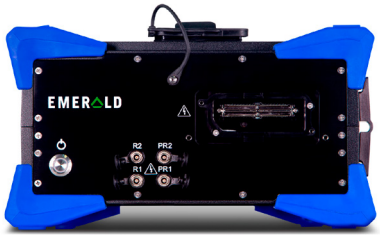
With real-time multi-TFM processing onboard and offline, combined with full matrix capture (FMC) and plane wave imaging (PWI) data acquisition features, the Emerald phased array system can produce faster and more detailed inspection results than ever before.

UNLEASH THE POWER OF PHASED ARRAY

Designed with industry leading phased array ultrasound testing (PAUT), total focusing method (TFM) imaging capabilities and time-of-flight-diffraction (TOFD), Emerald delivers fast performance and intelligent results. Featuring exceptional signal quality, it can achieve high amplification without signal distortion.

BENEFITS

- Full matrix capture (FMC) up to 128 elements
- Real-time high-speed multi-TFM onboard processing
- 64 channel code compliant PAUT
- Parallel firing and processing PA channels
- Time-of-flight-diffraction
- Multi-channel raw FMC encoded data saving
- High dynamic analog signal amplification range



INTEGRATION AND SCALABILITY

Emerald's I/O management is designed to simplify its integration in multi-instrument configurations. Encoder and critical I/O signals can be daisy chained between the instruments to simplify cabling requirements (no need for encoder splitters). Each Emerald unit can support up to three encoders, 12 inputs and nine output signals.

While each instrument can fire two parallel apertures with up to 32 elements on any number of PAUT probes, one UltraVision session can connect multiple Emerald units simultaneously making the perfect solution for complex, multi-probe high speed inspections.

POWERED BY ULTRAVISION® SOFTWARE

UltraVision is a complete PAUT and FMC/TFM inspection package that manages the entire inspection process including probe design (acoustic beam simulation), inspection technique development and validation, high-speed data acquisition, advanced data analysis and comprehensive reporting.

When working with FMC and PWI data, UltraVision offers the most complete set of reconstruction algorithms. Emerald enables access to an UltraVision advanced license when connected to a computer with UltraVision.

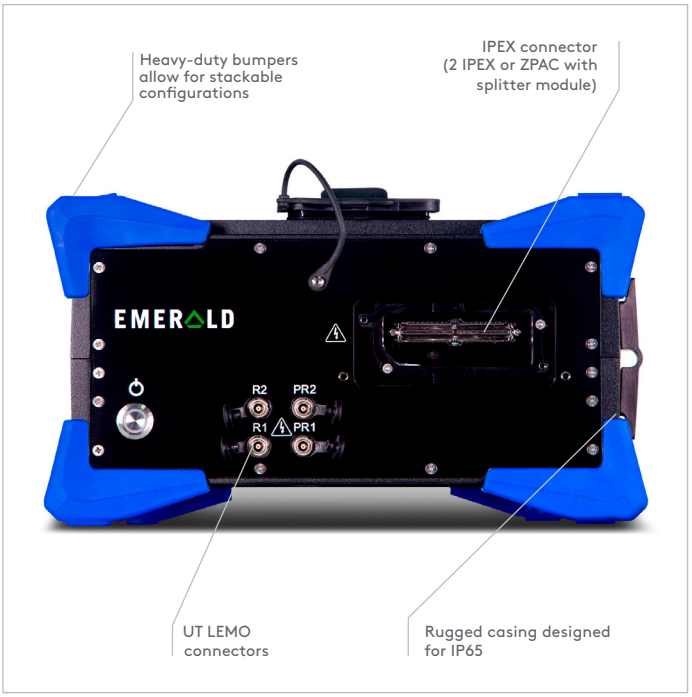


Figure 1: Annotated breakdown of the Emerald.

EXPERIENCE THE EMERALD DIFFERENCE FOR AN INSPECTION ADVANTAGE

- **Multiple firing modes for more detail:** FMC or PWI can be used to acquire data.
- **Onboard real-time, multi-TFM processing for faster results:** With an onboard processing capability of up to 1M+ points per TFM frame and up to eight simultaneous TFM reconstructions, Emerald offers the most versatile and powerful TFM imaging capability in its class. Onboard processing delivers faster and more efficient TFM reconstruction. Save data on an external device for later offline reconstruction.
- **Advanced focusing techniques:** Sectorial total focusing (STF) combines the advantages of the industry accepted sectorial view presentation with the focusing capabilities of TFM. Live FMC or PWI data is reconstructed generating sectorial sweep with all angles focused in each point along the sound path. The summed A-scan signals are available for each angle, similar to PAUT.
- **Superior signal quality:** With double stage analog amplification circuits and 16-bit resolution digitizing, Emerald can deliver high amplification without signal distortion.
- **Bipolar pulsers:** Penetrate through thick components; bipolar pulsers can deliver up to 40% more acoustic energy for the same gain settings.
- **Multi-channel raw FMC encoded data saving:** Data recording up to 128-element apertures and two 64 element DMA (dual matrix array) probes.
- **Two dedicated UT channels:** Up to eight additional conventional channels or four TOFD pairs with the probe splitter module.
- **Compact, rugged & scalable:** With an IP65 designed enclosure, Emerald can work in almost any industrial environment without external protection. Multiple instruments connected in parallel to the same UltraVision session offer almost limitless capability for complex inspection configurations.
- **Fast, industrial-grade data throughput:** Emerald uses a high-speed five Gigabit per second ethernet link for data transfer with cables up to 100m (300ft) long.

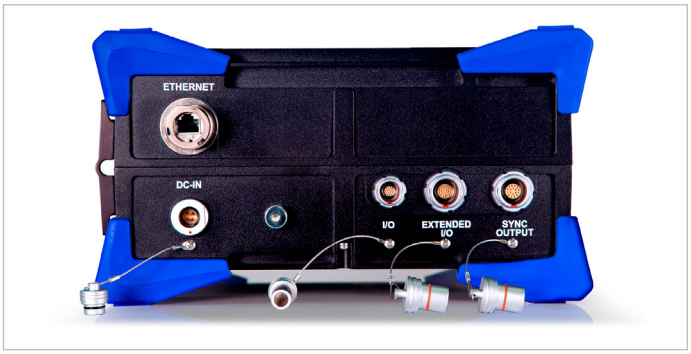


Figure 2: Emerald viewed from the back.

SPECIFICATIONS

INSTRUMENT

Dimensions (W × H × D)	294 × 162 × 373mm (11.5 × 6.4 × 14.7in)
Air intake	No
Voltage	100 to 240 VAC
Frequency	50 or 60 Hz
Instrument calibration	Compliant with ISO 18563-1/ISO 22232-1

ENVIRONMENTAL

IP rating	Designed for IP65
Operating temperature	-10°C to 45°C (14°F to 113°F)
Storage temperature range	-40°C to 70°C (-40°F to 158°F)

PULSERS

Channel configuration	64/128 PR
Maximum applied voltage (50 Ω load)	PA: 150Vpp (Bipolar) / 75V (Unipolar) UT: 200V
Maximum PRF	≤ 30 kHz
Max focal laws	2048

ACQUISITION

Acquisition	A-Scan/Peak/Conditional data recording
Acquisition triggered on	Free running, encoder position, external signal
Digitizing range	800%
Max data file size	Limited by hard drive

FMC/TFM

Maximum number of reconstruction channels	128
Firing modes	FMC, PWI, Sparse
TFM frame size (onboard)	1M points
TFM frame size (offline)	Unlimited
Simultaneous FMC channels	2
Maximum simultaneous TFM frames (onboard)	2 (up to 1M points per frame) 8 (up to 256k points per frame)

INSTRUMENT

PA connector	1x IPEX type (2x IPEX or 2x ZPAC with splitter module)
UT connectors	4 x LEMO 00 (8 additional LEMO 00 with splitter module)
Data connectivity	Ethernet 5 GBit/second
Encoder interfaces	3 quadrature-type
I/O capability	12 inputs, 9 outputs
Automated probe detection	Yes (with Zetec probe ID chip)
Automated scanner detection	Yes (with Zetec probe ID chip)
I/O and encoder daisy chaining for multi-instrument configurations	

RECEIVERS

Gain	Up to 124 dB (0.1 dB step), 76 dB Analog/ 48 dB Digital
Input impedance	50 Ω
Bandwidth (-3 dB)	PA: 0.5 to 18 MHz, UT: 0.5 to 22.5 MHz
Data compression	1, 2, 4, 8, 16
Amplitude resolution	14-bit elementary A-Scan, 16-bit PA
Max number of samples	16k
Max A-scan range	65k samples
Measurement gates	6 + 1 synchronization gate (peak, crossing, auto-crossing, homing)
Parallel PA channels processing	Up to 2 channels
Rectification	Digital
Filtering	Analog/Digital (FIR)
Digitizing frequency	100 MHz
TCG dynamic range	40 dB

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