



### ULTRASONIC FLAW DETECTOR

The Panametrics-NDT™ EPOCH 4PLUS is an advanced digital ultrasonic flaw detector featuring a multi-color LCD and a host of new features to meet challenging inspection requirements. It combines powerful flaw detection and measurement capabilities, extensive data storage, and the ability to transfer detailed inspection data to the PC via its high-speed USB port.

The EPOCH 4PLUS incorporates all of the advanced signal processing features of the industry proven EPOCH 4, including a 25MHz RF bandwidth to permit testing of thin materials, narrowband filters to improve signal-to-noise in high gain applications, a negative spike pulser for applications requiring higher frequencies, and a selectable square wave pulser to optimize penetration on thick or highly attenuating materials.

EPOCH 4PLUS features include a USB communications port, Echo-Echo in RF mode, Interface Gate in RF mode, Automatic or Manual Polarity Detection in RF mode, EMAT transducer optimization capability, and Backwall Echo Attenuator. In addition, the Memory/Datalogger has an improved storage capacity with a combination of 6,400 waveforms/calibrations and 128,000 thickness readings. An External Trigger In/Out feature permits pulser input from a synchronized external device, allowing a high degree of positional accuracy.

### FEATURES

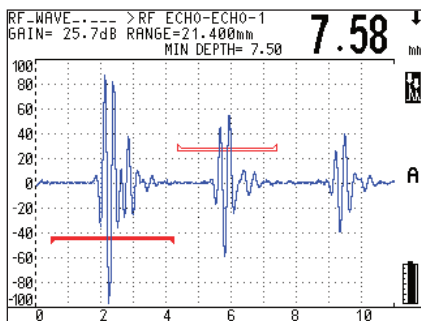
- Customizable narrowband filtering
- Selectable, tunable square wave or negative spike excitation pulser
- Light, ergonomically designed
- Fast, minimum 60Hz electronics update rate
- Large, multi-color LCD with full/split screen views
- Dynamic Waveform Color Variation changes waveform color based on flaw or minimum depth alarm conditions
- Display Freeze holds waveform and soundpath data
- Automated transducer calibration
- Soundpath data viewable in inches, millimeters, or microseconds
- Peak Hold and Peak Memory
- Alarms, threshold positive/negative, or minimum depth
- Dual Gate with Echo-Echo measurements
- Echo-Echo in RF mode
- Interface Gate in RF mode
- Automatic or Manual Polarity Detection in RF mode
- EMAT transducer optimization capability
- External Trigger In/Out
- Expanded capability High PRF, Curved Surface Correction, and AWS Weld Classification software
- Security Key enables remote upgrade of software options

## A MULTI-COLOR LCD WITH A WAVEFORM THAT DYNAMICALLY CHANGES COLOR

The EPOCH 4PLUS's color display provides high contrast viewing of the waveform from bright, direct sunlight to complete darkness. Its Dynamic Waveform Color Variation changes the color of the waveform based on user-selected alarm conditions. For example, the waveform can change color real-time when an echo breaks a flaw gate threshold or when a user-defined minimum depth value is reached indicating out-of-specification conditions.

## INTERNATIONAL VERSATILITY

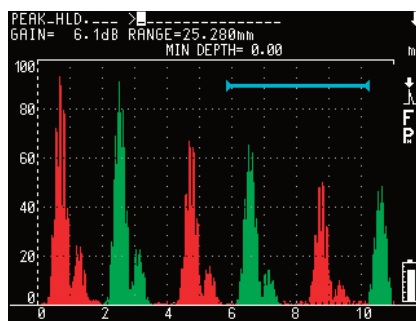
The EPOCH 4PLUS's keypad is available in English or International Symbols. Display languages are keypad selectable in French, German, Spanish, Italian, Russian, Japanese, English, and custom user-defined languages.



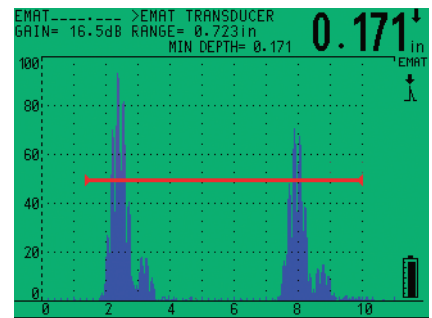
RF Echo-Echo thickness measurement with user-defined polarity detection

## SOPHISTICATED ALPHANUMERIC DATALOGGER

The EPOCH 4PLUS's sophisticated datalogger is designed for ease of use while providing a wide range of features for many flaw detection and thickness gaging applications. The unit saves and recalls inspection data sets in any combination of 6,400 waveforms/calibrations and 128,000 thickness readings. All saved data can be organized in alphanumeric file names and identifier (ID) numbers that can be scrolled and reviewed on-screen. A Memo feature permits entry of additional inspection data and the Edit feature can be used to add, delete, or clear file names and ID numbers.



Peak Hold feature



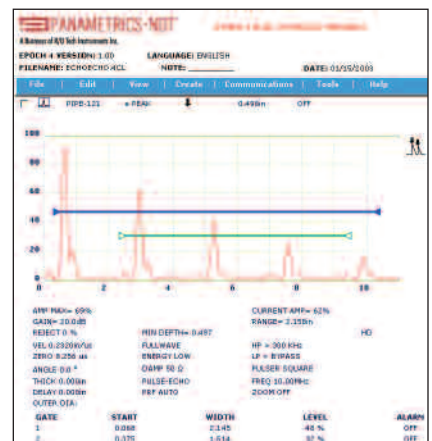
EMAT transducer optimization

## EXTENSIVE DOCUMENTATION AND HIGH-SPEED TRANSFER CAPABILITIES

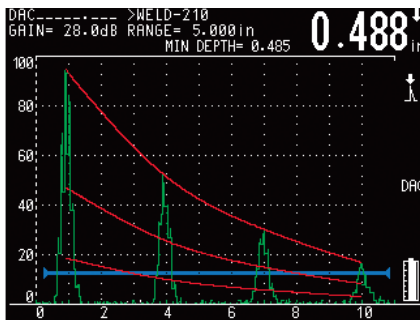
The optional Interface Program helps manage and format stored inspection data for high-speed transfer to the PC. Data can be printed or easily copied and pasted into word processing files and spreadsheets for further reporting needs. The Interface Program also allows the creation of a customized database of identifier (ID) strings that can be uploaded to the EPOCH 4PLUS. New features include live screen capture mode, color selection palette, database backup/restore, and multi-view windows. The Interface Program is fully compatible with the EPOCH 4, 4B, and 4PLUS.

## OUTPUTS

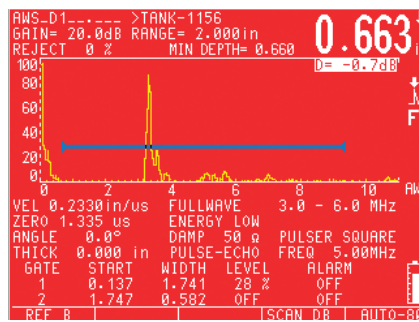
- USB communication with PC
- High-speed parallel port
- VGA output for large viewing on a monitor
- Analog port for direct output of amplitude or thickness measurement



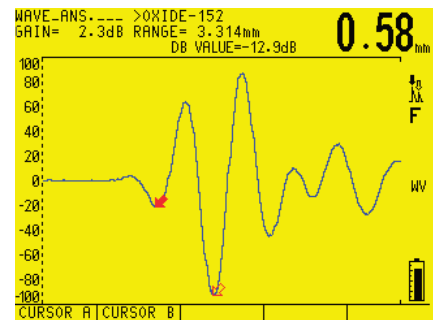
EPOCH 4/4B/4Plus Interface Program



DAC (Distance Amplitude Correction)



AWS weld classification



Wave Analysis

## SOFTWARE OPTIONS

### DAC (Distance Amplitude Correction)

Calculates signal amplitude as a percentage or dB difference of the DAC curve level (ASME, ASME-3, or JIS). Same size reflectors peak along the curve independent of their location. An alarm can be activated when a gated signal breaks the curve. (PN: EP4P/DAC)

### CSC (Curved Surface Correction)

Corrects sound path information when using an angle beam transducer to inspect circumferentially around a curved surface. (PN: EP4P/CSC)

### Spotweld Overlay

The Weld Overlay feature allows on-screen comparison of the live waveform with a stored reference waveform. The Stamping feature permits stored weld data to be stamped "good", "undersized", "stick", or two other operator defined conditions. (PN: EP4P/SPOTWELD)

### TVG (Time Varied Gain)

TVG with 40dB dynamic range corrects for distance/amplitude variations due to material attenuation and beam spreading. Reference echoes are brought to a standard full screen level of 80%. (PN: EP4P/TVG)

### Floating Gate

Automatically varies Gate Level by -6dB or -12dB of the gated backwall echo. Results in consistency of edge-depth measurements by making readings at the same relative amplitude. (PN: EP4P/FG)

### Interface Gate

Powerful tool for immersion applications where the water path distance between the transducer and front surface of the part is continually changing. Maintains the Interface Echo (between the water and the front surface of the part) on the left side of the display. (PN: EP4P/IG)

### AWS D1.1 & D1.5

Provides a dynamic reflector "indication rating" for various AWS weld inspection applications. This allows for a more efficient inspection by eliminating manual calculations. (PN: EP4P/AWS)

### Wave Analysis

Selects particular points along an RF waveform to obtain a timing/thickness measurement and also a dB difference between the two points. Applications include measuring the scale/oxide build-up on the boiler tubes. (PN: EP4P/WAVE)

### DGS/AVG

Flaw sizing technique that permits echo signals to be evaluated using DGS/AVG diagram associated with a particular type of probe and material. The DGS/AVG diagram shows the relationship between echo height, flaw size, and distance from the transducer. (PN: EP4P/DGS/AVG)

### High PRF (1,000Hz)

Increases the PRF rate to 1kHz and is useful for higher scanning speed inspections. (PN: EP4P/HPRF)

### Low PRF (30Hz)

Reduces or eliminates "wrap-around" noise by setting the PRF to a fixed 30Hz. This feature is often necessary when inspecting materials that are highly attenuating or have long sound paths. (PN: EP4P/LPRF)

### Backwall Echo Attenuator (BEA)

Attenuates the backwall echo of an inspected part to avoid screen saturation and allow detailed flaw echo examination. (PN: EP4P/BEA)

### Auto-Freeze

Provides the ability to automatically freeze the A-Scan waveform when a gate alarm has been triggered. (PN: EP4P/AUTOFREEZE)



# EPOCH 4PLUS SPECIFICATIONS\*

**Display:** Color LCD screen, 320 pixels (W) X 240 pixels (H)

**Display Characteristics:** High resolution screen with user-defined color selections and brightness adjustment. Includes dynamic waveform color variation

**Display Update Rate:** Minimum 60Hz

**Sensitivity:** 110dB Max and Reference level sensitivity feature with 6dB or 0.1dB selectable resolution

**Auto Transducer Calibration:** Automated calibration of transducer Zero Offset and/or Velocity

**Reject:** 0% to 80% of full scale in 1% increments

**Units:** English, Metric, or Microseconds

**Material Velocity:** 0.025 to 0.6000 in/ $\mu$ sec (635 to 15240 m/S)

**Range:** Standard 0.038 inch to 400 inch (1mm to 10,000mm)

**Refracted Angle:** Fixed settings of 0°, 30°, 45°, 60°, 70°, or variable from 10° to 85° in 0.1° resolution

**Peak Memory:** Simultaneous display of live A-Scan at 60Hz update rate and peak envelope of A-Scan display

**Peak Hold:** Freezes Peak Memory echo envelope for waveform comparison with live A-Scan

**Pulsar Type, User Selectable:** Tunable square wave, negative spike excitation

**Pulsar Energy:** Low(100V), Medium(200V), High(300V), and Max(400V)

**Damping:** 50, 63, 150, and 400 Ohms

**Rectification:** Full Wave, Half Wave Positive or Negative, and rectified RF settings

**Analog Bandwidth:** 0.05MHz to 25MHz at -3dB

**Filters:** Broadband, Narrowband, or Custom Selectable Low and High Pass Filters

**Test Modes:** Pulse Echo, Dual, or Through Transmission

**Alarms:** Selectable threshold positive/negative or minimum depth modes

**Operating Temperature:** 0°C to 50°C (32°F to 122°F)

**Storage Temperature:** -40°C to 70°C (-40°F to 158°F)

**Power Requirements:** AC Mains: 100-120 VAC, 200-240 VAC, 50-60Hz

**Battery:** Internal Rechargeable NiMH battery pack rated at 12V at 4000mAH

**Battery Operating Time:** 5-7 hours depending on display brightness. 2 hours typical recharge time

**Transducer Cable Connectors:** Fits BNC or Number 1 Lemo®

**Keypad:** English or International symbols

**Languages:** Available in keypad selectable languages: English, French, German, Spanish, Italian, Russian, Japanese, and user-defined custom language

**USB Communications Port:** Hi-speed interfacing with PC

**High Speed Parallel Port:** Allows rapid communication to external devices

**Analog Output:** Keypad selectable voltage output of depth or amplitude data

**VGA Output Port:** Connects to standard VGA monitor or A/V projector

**Dimensions:** 11.15"H x 6.55"W x 2.6"T

**Weight:** 5.7lbs. (2.6 Kg) with battery

**PC Requirements:** PC running minimum Microsoft® Windows® XP®, Microsoft Windows 2000®, Microsoft Windows NT® 4.0, or Microsoft Windows 98®. Microsoft® Internet Explorer 6.0

**Warranty:** One year warranty, battery not included. Optional second year warranty available

## ORDERING INFORMATION

EPOCH 4PLUS, Advanced, Microprocessor-Based Ultrasonic Flaw Detector. Includes:

EP4/MCA Mini Charger Adapter

EP4/BAT Nickel Metal Hydride Rechargeable Battery

EP4P/CAL-NIST NIST Calibration Certificate

EP4P/MAN Instruction Manual

EP4/TC Transport Case

EP4/PS Stainless Steel Pipe Stand

EP4/HS Hand Strap

## OPTIONAL ACCESSORIES

EP4/SC Shipping hard shell case

EP4/BAT-AA Alkaline battery pack

EP4/EC External stand-alone charger

EP4/RPC Rubber protective carrying case with chest harness and sun shade

EP4/DP-E Display Protectors

EP4/ALRM External Alarm

EP4/C-15VGA-6 VGA cable

EP4/C-25PRL-6 Parallel port cable

EP4P/C-USB-6 USB cable

EP4P/IP-KIT-USB Interface Program including USB cable, fully compatible with EPOCH 4PLUS, EPOCH 4, and EPOCH 4B



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