



## OLYMPUS®

Your Vision, Our Future

ULTRASONIC FLAW DETECTOR

### EPOCH 600



- Compact and Rugged
- Vivid VGA Display
- Intuitive Interface
- EN12668-1 Compliant

# EPOCH 600 Ultrasonic Flow Detector: Economical Size, Quality Performance



The EPOCH 600 Digital Ultrasonic Flow Detector combines Olympus' industry leading conventional flow detection capabilities with the efficiency of a highly portable, intuitive instrument. The EPOCH 600 flow detector's blend of efficient menus and direct access keys allows you to take advantage of the highest quality flow detection platform with exceptional ease of use.

The large, full VGA transfective display combined with our patent-pending digital high dynamic range receiver provides a stable, striking A-scan representation in any lighting condition. Available in two hardware configurations, the EPOCH 600 offers you the choice to adjust parameters with a knob or with a navigation area on the keypad. The EPOCH 600 is designed to meet the requirements of EN12668-1 and allows a full range of standard and optional flow detection features. The rugged, ergonomic design allows use in nearly any inspection environment, while the flexible PerfectSquare™ pulser and digital filtering capabilities can tackle nearly any application.

## Economy with Quality

The EPOCH 600 combines the efficiency of a basic flow detector with the quality of Olympus' most powerful fully digital ultrasonic instruments. A full range of dynamic, reliable inspection features are packaged with economy of size and ease of use. This optimal balance brings powerful flow detection features within reach of any level of inspector.

## Key Features

- Designed to meet the requirements of EN12668-1
- PerfectSquare™ tunable square wave pulser
- Digital high dynamic range receiver
- Eight digital filters for enhanced signal-to-noise ratio
- 2 kHz PRF for rapid scanning
- Knob or navigation pad adjustment configurations
- Large, full VGA sunlight readable display
- Long battery life, supporting lithium-ion or alkaline batteries
- Standard dynamic DAC/TVG and onboard DGS/AVG
- 2 GB MicroSD memory card for data transfers and storage
- USB On-The-Go (OTG) for PC communication
- Alarm and VGA outputs
- Optional analog output

# Simple and Durable Operation

The EPOCH 600 design is focused on providing a very high level of flaw detection with the simplicity of a basic instrument. The EPOCH 600 is designed to be ergonomic, intuitive, and practical for both experienced and novice ultrasonic inspectors.

## Intuitive User Interface

The EPOCH 600 user interface is based on the industry approved EPOCH 1000 Series imaging flaw detector. The EPOCH 600 combines a simple menu structure for instrument settings, calibration and software feature adjustment, with the EPOCH brand's hallmark direct-access key approach for critical inspection functions such as gain and gate adjustment, screen freeze, and file save. Supported in multiple languages, the EPOCH 600 user interface is intuitive for any level of operator.

## Portable Design for All Inspection Environments

The EPOCH 600 is designed for use in nearly any inspection environment, from bench top testing in a laboratory to extreme outdoor and hazardous conditions. Designed for IP rating in either knob (IP66) or navigation pad (IP67) configurations, and tested to very high environmental and reliability standards, the EPOCH 600 allows users in any inspection environment to feel confident in both the performance and durability of the instrument. The instrument is tested for vibration, shock, explosive atmosphere, and wide temperature ranges. And with a battery life to exceed 12 hours, the EPOCH 600 is the perfect solution for remote inspection locations.



## Vibrant Full VGA Display

The EPOCH 600 features a full VGA (640 x 480 pixels) resolution display. The horizontal design of the EPOCH 600 optimizes the A-scan size and readability on this high quality display. Built with transfective technology, this VGA display provides excellent clarity in indoor, low lighting conditions using its powerful backlight, as well as in direct sunlight by using the ambient light as a pseudo-backlight.



# Optimized Access to Powerful Features

The EPOCH 600 provides excellent quality ultrasonic performance. Based on the same digital architecture as the EPOCH XT, LTC and EPOCH 1000 Series, the EPOCH 600 provides flexible, powerful pulsing and receiving features to accommodate the needs of most flaw detection inspections.

## Pulser/Receiver

The EPOCH 600 comes standards with powerful flaw detection capabilities, such as:

- PerfectSquare™ tunable square wave pulser
- Digital high dynamic range receiver
- Eight 100% digital filter sets
- Auto or manually adjustable PRF from 10 Hz to 2000 Hz
- Pulser voltage from 100 V to 400 V
- Amplitude resolution to  $\pm 0.25\%$
- Five customizable digital measurements



EPOCH 600 Dynamic DAC/TVG Feature

## Options for Comfortable Navigation

In order to accommodate different user needs and preferences, the EPOCH 600 is available in two hardware configurations: one with an adjustment knob and the other with a navigation area on the keypad. The adjustment knob and the arrow keys on the navigation pad are responsible for parameter adjustment and value slewing.

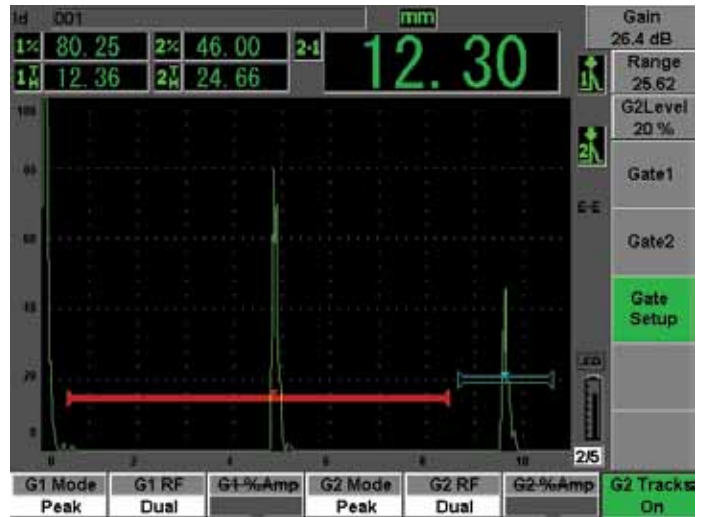
### Knob

The adjustment knob on the EPOCH 600 is used along with the CHECK and ESC keys to adjust parameter values in either coarse or fine increments. You have the ability to lock the knob to prevent accidental parameter value changes during an inspection. This configuration provides smooth value slewing for customers who prefer adjusting parameters using a knob. The knob configuration is designed to meet the requirements of IP66.



### Navigation Pad

The EPOCH 600 navigation pad is a hallmark feature of the EPOCH flaw detectors. The up and down arrows on the navigation pad are used for coarse parameter adjustment, and the left and right arrows for fine adjustment. The navigation pad also contains additional functions and frequently used parameters such as gain, save, and the CHECK and ESC keys. The navigation pad configuration is designed to meet the requirements of IP67.



EPOCH 600 Echo to Echo with Gate Tracking

## Standard Software Features

**Dynamic DAC/TVG:** Calculates signal amplitude as a percentage or decibel level compared to a DAC curve or a reference echo amplitude fixed at a time-varied gain. DAC versions include ASME, ASME 3, JIS, and Custom. Also includes several key features: dynamically adjustable DAC curves, switchable DAC and TVG views, and custom DAC warning curves.

**DGS/AVG:** This flaw sizing technique allows echo signals to be evaluated with a DGS/AVG diagram associated to a particular type of probe and material. The DGS/AVG diagram illustrates the relationships between echo height, flaw size, and distance from the transducer.

**Curved surface correction:** Corrects sound path information when using an angle beam transducer to circumferentially inspect a curved surface for either tubular or bar inspections.

# Versatility Through Optional Performance

## Optional Software Features

**AWS D1.1 and D1.5:** Provides a dynamic reflector indication rating for various AWS weld inspection applications. This allows more efficient inspections by eliminating manual calculations.

**Template Storage:** Allows on-screen comparison of a live waveform with a saved reference waveform. Saved templates can be dynamically toggled on and off with a single key press for fast waveform comparison. Gain adjustment feature allows each saved template a unique base gain for inspections requiring varying sensitivity levels. Excellent for spotweld analysis and other applications.

**API 5UE:** Allows defect sizing according to API Recommended Practice 5UE. Uses the Amplitude Distance Differential Technique (ADDT) to measure the size of potential defects during the prove-up process of OCTG pipe. The measurement process is simple and repeatable since all ADDT variables are captured from a Peak Memory envelope.

**Waveform Averaging:** This feature allows the live A-scan view to represent an average of successively acquired A-scans. Waveform averaging improves signal-to-noise ratio when static flaws are detected. Averaging in 2X, 4X, 8X, 16X, and 32X.

### Interface Gate

This optional third measurement gate enables real-time tracking of a variable interface echo in order to maintain consistent digital measurements.



EPOCH 600 Dynamic DGS/AVG Feature



EPOCH 600 Template Storage Feature



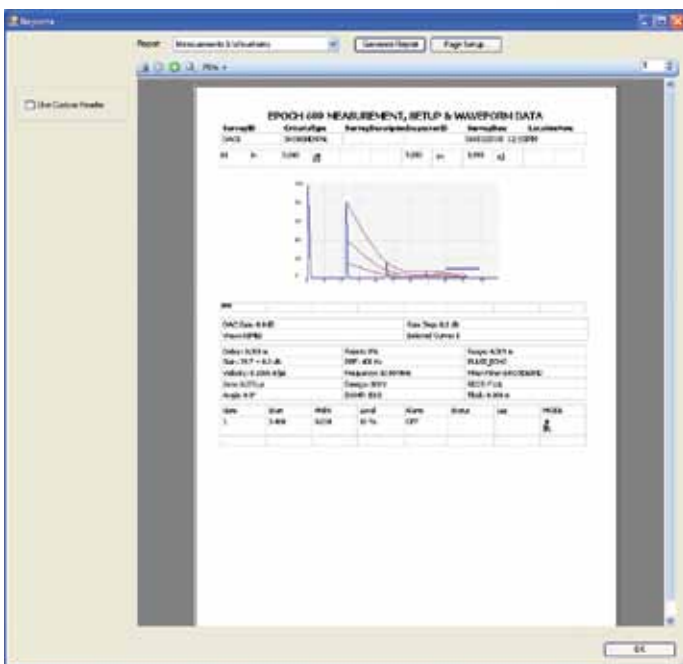
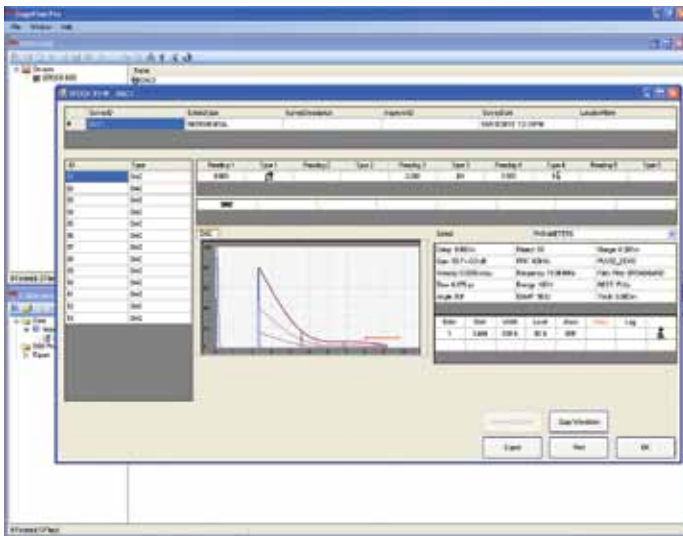
# Data Logging and PC Interfacing

## Data Management

The EPOCH 600 allows several methods of storing, archiving and reporting inspection and calibration data. The instrument features up to 50,000 points of onboard memory, augmented by an additional 2 GB of removable memory. It is also fully compatible with Olympus NDT's PC interface program, GageView™ Pro. With quick file setup functions and flexible data management, logging and reporting inspection data is simple and efficient.

## GageView™ Pro

The EPOCH 600 is fully compatible with our PC interface program, GageView™ Pro. You can download inspection data, review measurements on a PC, export measurements and calibration data to common spreadsheet programs, back up calibration and inspection data from the instrument, and perform basic operations such as instrument firmware upgrades and screen captures.



## Data Logger

The EPOCH 600 features an onboard data logger for calibration and inspection file storage. The instrument comes standard with two primary file types: calibration (CAL) and incremental (INC) files. CAL files allow you to save a virtually unlimited number of parameter setups for fast and easy recall to live settings. INC files store multiple pieces of inspection data under a single file name for downloading and reporting by inspection.

The onboard data logger can be enhanced to feature full corrosion-style data logger file types through the Expanded Datalogger software option. This option includes the following data file types: sequential, sequential with custom point, 2-D grid, 2-D grid with custom point, 3-D grid, boiler, 2-D EPRI.

## MicroSD

The EPOCH 600 utilizes 2 GB MicroSD memory cards for both onboard and removable memory. Through removable memory, you are able to store screen images in bitmap format for easy reporting, as well as exporting current or saved measurement and calibration data in .csv format. A second 2 GB MicroSD card is mounted to the PC board inside the instrument, and is responsible for all onboard data storage. In the event the instrument is damaged beyond repair, this MicroSD card can be removed at an authorized service center, allowing the operator to recover critical data from the damaged instrument.



# Portable, Rugged, and Ergonomic



## Standard Package

- EPOCH 600 Digital ultrasonic flaw detector, AC or battery operation
- Charger/AC adapter (100 VAC, 115 VAC, 230 VAC, 50 Hz or 60 Hz)
- Rechargeable lithium-ion battery
- AA battery tray
- Transport case
- Basic operation user's manual
- Quick reference card
- Comprehensive operation manual (CD)



## Physical Features – Rear

- A – USB On-The-Go port
- B – MicroSD card
- C – DC power connector
- D – VGA port
- E – RS-232/Alarm port
- F – Transducer connectors (2)
- G – Battery door
- H – Pipe stand

## Physical Features

The EPOCH 600 is a lightweight, portable flaw detector built to be rugged and flexible for nearly any inspection. Some key physical features include:

- Large, full VGA resolution transfective display for vivid clarity in any indoor lighting and direct sunlight conditions
- Rubber overmolded bumpers on all four corners for shock absorption and anti-marring considerations
- Four-point harness connection for chest straps
- “No tools” access to battery compartment and side I/O door
- Continuous position stand with right angle crook for improved stability from 0 to 180 degrees
- Gasketed side door for USB OTG connection and removable memory
- Standard internal, rechargeable lithium-ion battery
- Standard AA battery tray for extended portable use
- Lightweight, ergonomic design for increased portability and ease of use

## Instrument Inputs/Outputs

USB ports	USB On-The-Go (OTG)
RS-232 port	Yes
Video output	VGA output standard
Analog output	1 analog output (optional), Selectable 1 V/10 V Full Scale, 4 mA max
Digital output	3 alarm outputs, 5 V TTL, 10 mA

## Environmental Ratings

IP rating	Designed to meet the standards of the Ingress Protection (IP) rating number IP67 (navigation pad version) or IP66 (knob version) per IEC 60529-2004 (Degrees of Protection provided by enclosures – IP Code). The product design was confirmed to meet the IP rating by means of Olympus NDT's internal design verification test process that occurs prior to the release of the product to production.
Explosive atmosphere	Safe operation as defined by Class I, Division 2, Group D, as defined in the National Fire Protection Association Code (NFPA 70), Article 500, and tested using MIL-STD-810F, Method 511.4, Procedure I.
Shock tested	MIL-STD-810F, Method 516.5 Procedure I, 6 cycles each axis, 15g, 11 ms half sine.
Vibration tested	MIL-STD-810F, Method 514.5, Procedure I, Annex C, Figure 6, general exposure: 1 hour each axis
Operating temperature	-10 °C to 50 °C (14 °F to 122 °F)
Battery storage temperature	0 °C to 50 °C (32 °F to 122 °F)



**The EPOCH Flaw Detector Family:** The EPOCH flaw detector line features vertical and horizontal layout instruments that span the range of inspection capabilities from basic to advanced. The EPOCH 600 and EPOCH 1000 Series flaw detectors feature horizontal layout instruments for enlarged A-scan and image representation in a portable format, and provide an exceptionally high quality of digital flaw detection technology.

# EPOCH 600 Specifications\*

## General

Overall dimensions (W x H x D)	236 mm x 167 mm x 70 mm (9.3 in. x 6.57 in. x 2.76 in.)
Weight	1.68 kg (3.72 lb), including lithium-ion battery
Keypad	English, International, Japanese, Chinese
Languages	English, Spanish, French, German, Japanese, Chinese, Portuguese
Transducer connections	BNC or Number 1 LEMO
Data storage	50,000 IDs onboard, removable 2 GB MicroSD card (standard)
Battery type	Single lithium-ion rechargeable standard
Battery life	12 h to 13 h (lithium-ion), 3 h (alkaline)
Power requirements	AC Mains: 100 VAC to 120 VAC, 200 VAC to 240 VAC, 50 Hz to 60 Hz
Display type	Full VGA (640 x 480 pixels) transfective color LCD, 60 Hz update rate
Display dimensions (W x H, Diag.)	117 mm x 89 mm, 146 mm (4.62 in. x 3.49 in., 5.76 in.)

## Pulser

Pulser	Tunable Square Wave
PRF	10 Hz to 2000 Hz in 10 Hz increments
Energy settings	100 V, 200 V, 300 V or 400 V
Pulse width	Adjustable from 25 ns to 5,000 ns (0.1 MHz) with PerfectSquare™ technology
Damping	50, 100, 200, 400 Ω

## Receiver

Gain	0 to 110 dB
Maximum input signal	20 V p-p
Receiver input impedance	400 Ω ± 5%
Receiver bandwidth	0.2 MHz to 26.5 MHz at -3 dB
Digital filter settings	Eight digital filter sets standard (0.2-10 MHz, 2.0-21.5 MHz, 8.0-26.5 MHz, 0.5-4 MHz, 0.2-1.2 MHz, 1.5-8.5 MHz, 5-15 MHz, DC-10 MHz)
Rectification	Full-wave, Positive Half-wave, Negative Half-wave, RF
System linearity	Horizontal : ± 0.2% FSW
Resolution	0.25% FSH, amplifier accuracy ± 1 dB
Reject	0 to 80% FSH with Visual Warning
Amplitude measurement	0 to 110% full screen height with 0.25% resolution
Measurement rate	Equivalent to PRF in all modes

## Calibration

Automated calibration	Velocity, Zero Offset Straight Beam (First Backwall or Echo-to-Echo) Angle Beam (Soundpath or Depth)
Test modes	Pulse Echo, Dual, or Through Transmission
Units	Millimeters, inches, or microseconds
Range	3.36 mm to 13,405 mm (0.132 in. to 527 in.) @ 5,900 m/s (0.2320 in./μs)
Velocity	635 m/s to 15240 m/s (0.0250 in./μs to 0.6000 in./μs)
Zero offset	0 to 750 μs
Display delay	-59 mm to 13401 mm (-2.323 in. to 527.6 in.) @ longitudinal velocity in steel
Refracted angle	0° to 85° in 0.1° increments

## Gates

Measurement gates	2 fully independent gates for amplitude and TOF measurements
Gate start	Variable over entire displayed range
Gate width	Variable from Gate Start to end of displayed range
Gate height	Variable from 2 to 95% full screen height
Alarms	Positive and Negative Threshold, Minimum Depth (Gate 1 and Gate 2)

## Measurements

Measurement display locations	5 locations available (manual or auto selection)
Gate (1, 2)	Thickness, Soundpath, Projection, Depth, Amplitude, Time-Of-Flight, Min./Max. Depth, Min./Max. Amplitude
Echo-to-Echo	Standard Gate 2-Gate 1, Optional IF Gate Tracking
Other measurements	Overshoot (dB) value for DGS/AVG, ERS (equivalent reflector size) for DGS/AVG, AWS D1.1/D1.5 rating (D), Reject Value
DAC/TVG	Standard
DAC points	Up to 50 points, 110 dB dynamic range
Special DAC modes	Custom DAC (up to 6 curves)
Curved surface correction	Standard OD or Bar correction for Angle Beam measurements

## Software Options

### EP600-AWS (U8140147):

AWS D1.1/D1.5 Weld Rating

### EP600-TEMPLATE (U8140148):

Template Storage

### EP600-API5UE (U8140149):

API 5UE Flaw Sizing

### EP600-XDATA (U8140150):

Expanded Data Logger File Types

### EP600-AVERAGE (U8140151):

Waveform Averaging

### EP600-IG (U8140153):

Interface Gate

## Optional Accessories

**600-BAT-L (U8760056):** Rechargeable lithium-ion battery

**600-BAT-AA (U8780295):** AA battery tray

**EP4/CH (U8140055):** Chest harness

**600-TC (U8780294):** Transport case

**EPLTC-C-USB-A-6 (U8840031):** USB host cable to PC

**600-C-RS232-5 (U8780299):** RS232 communication cable

**600-C-RS232-5 (U8780299):** RS232 communication cable

**EP1000-C-9OUT-6 (U8779017):** Alarm output cable

Alarm output cable

**600-C-VGA-5 (U8780298):** VGA output cable

VGA output cable

**MICROSD-ADP-2GB (U8779307):** 2 GB MicroSD memory card

2 GB MicroSD memory card

OLYMPUS NDT INC. is ISO 9001 and 14001 certified.

**OLYMPUS**

[www.olympus-ims.com](http://www.olympus-ims.com)

[info@olympusndt.com](mailto:info@olympusndt.com)

### OLYMPUS NDT INC.

48 Woerd Avenue, Waltham, MA 02453, USA, Tel.: (1) 781-419-3900  
12569 Gulf Freeway, Houston, TX 77034, USA, Tel.: (1) 281-922-9300

### OLYMPUS NDT CANADA INC.

505, boul. du Parc-Technologique, Québec (Québec) G1P 4S9, Tel.: (1) 418-872-1155  
1109 78 Ave, Edmonton (Alberta) T6P 1L8

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