# TQ-60-X
# Advanced phased array ultrasonic flaw detector

Brochure


UT Phased Array Technology combined with TOFD solution for
Automated Ultrasonic Testing (AUT) and
Mechanical Ultrasonic Testing (MAUT) as well as manual UT inspection


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## PA + TOFD Technology

The TQ-60-X is a cutting-edge ultrasonic flaw detector that integrates phased array (PA) technology with Time-of-Flight Diffraction (TOFD).

This high-performance device is designed for simultaneous operation with two 64-channel phased array probes and various scanners, including roller scanners, PA + TOFD scanners, and more.

With an S-scan generation speed of 100 Hz, it allows scanning welds from both sides at speeds ranging from 6 to 9 meters per minute, increasing the detectability and reliability of inspection.


## Key features

- **Multiple operation modes** for various applications: PA mode, Inspection mode (2 Pas), i-Scan mode for corrosion and composite inspection, and Conventional UT mode.
- Operation with **16-, 32-**, and **64**-element phased array probes.
- **Classical PA technology** with real time focusing.
- **ACG and TCG functions** for an immediate assessment of the equivalent defect size.
- **Preset library of PA** and wedge combinations for straightforward operation.
- **Powerful yet lightweight** (2.5 kg) for optimal performance.
- **Large high contrast TFT screen** with high resolution.
- **10 hours operation** with hot-swap batteries. Enlarged data storage capabilities via USB memory makes it reliable choice for field applications.


## Various image modes for results analysis and interpretation

Different viewing modes allow comprehensive analysis directly on the flaw detector screen: S-scan, fixed -angle L-scan, LS-scan (combining classical S-scan with probe movement along the aperture), as well as A-, B-, and C-scans.

Full-screen mode provides detailed signal visualization during inspection.

The high-brightness TFT display and powerful processing performance ensure real-time signal visualization with high resolution, allowing the operator to clearly differentiate closely spaced defects.


**Weld imageing in S-can and B-scan modes,** based on the true beam path, provides accurate visualization of defect location and geometry within the inspected object.

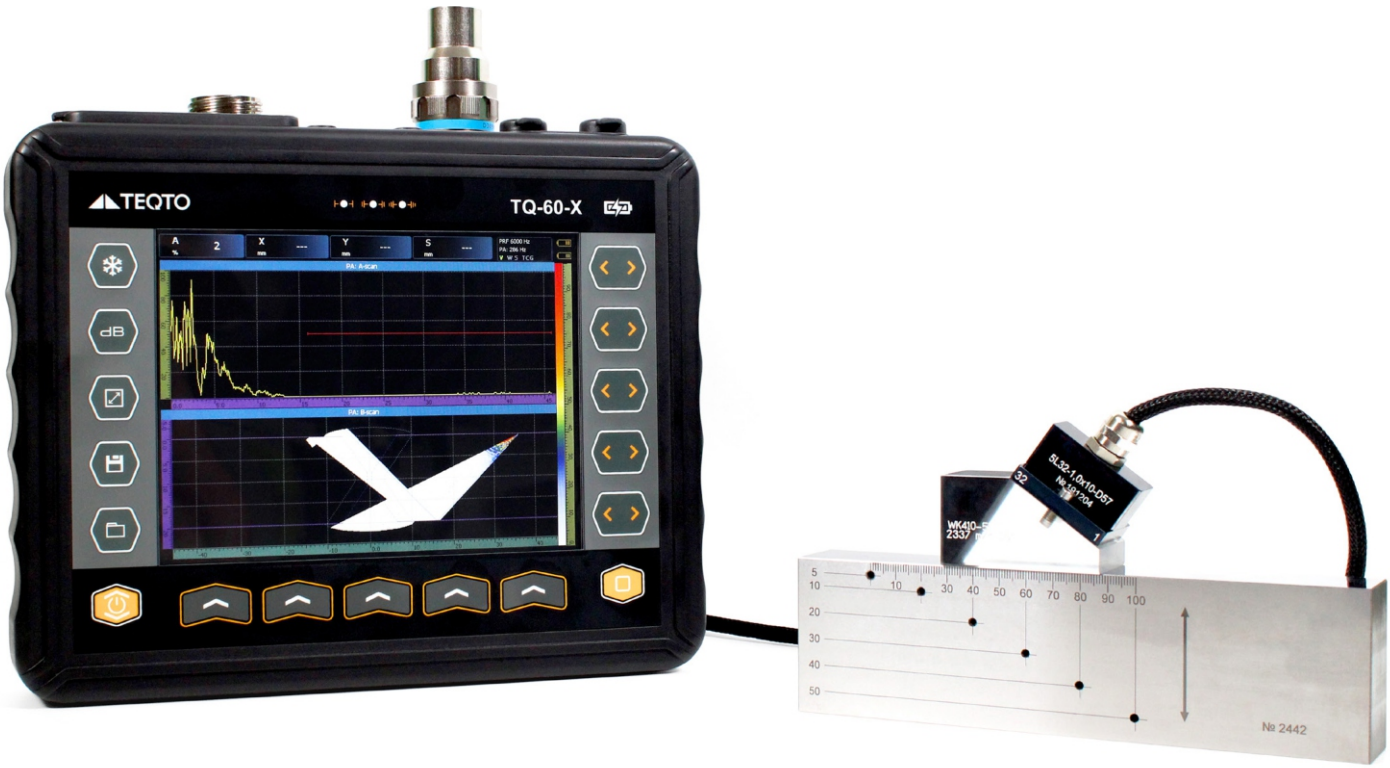
**Quick switching between operation modes** to provide more functionality and flexibility for the operator under different inspection tasks: PA flaw detector, 2PA + 2TOFD scanner, Conven - tional flaw detector, i-Scan mode.

## Advanced functionality for weld inspection

The flaw detector supports simultaneous operation with 2 × 64-element PA probes, enabling double-sided weld inspection and significantly increasing defect detectability.

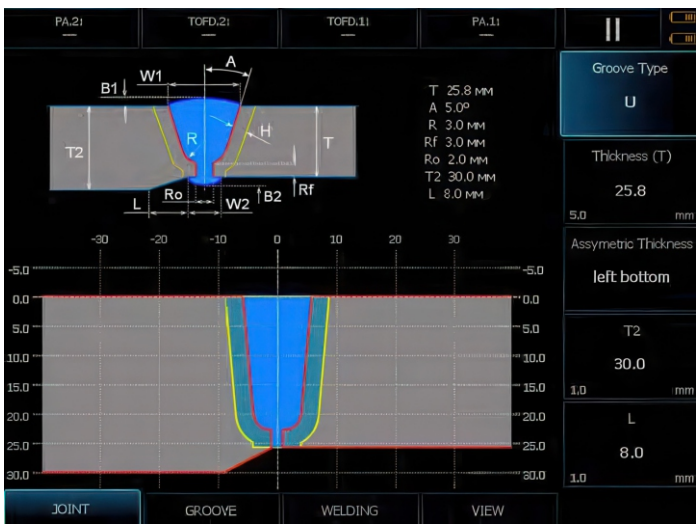
## Multigroup function for PA

Each PA can be divided into 4 groups with different focus areas, individual signal type, scan type, generator parameters etc for enlarged weld zones coverage settings, providing 4 live scans on the display. Rich options for scanning direction and focusing zones.



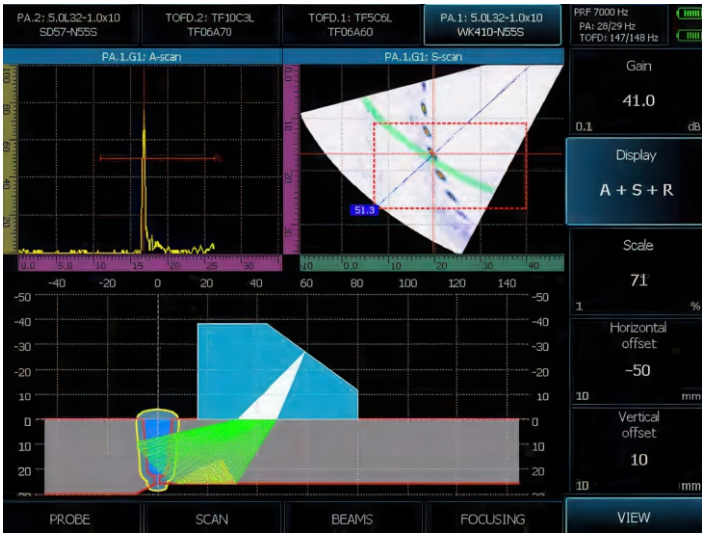

## Weld Wizard for easy and convenient analysis of inspection results

This function allows the user to configure real weld geometry within the system, taking into account weld profile, width, thickness variations, root height, heat-affected zone, cap height, and probe position during scanning.



## Scan plan Wizard

The Scan Plan Wizard provides visualization of beam paths within the inspected object. It allows configuration of penetration parameters such as element group selection, scan type, scan step, and focusing area, ensuring optimized inspection coverage and clear visualization of the inspected object.





## Easy scanner configurator

An intuitive and user-friendly scanner configurator enables quick setup of the inspection scheme. The operator can configure simultaneous operation with up to 2 x phased array probes and 2 x pairs of TOFD, at that each PA probe can be splitted up to four independent groups on each of the phased array probes (up to 8 groups of PA elements) with individual setup for each group.

## Recording and analysis features

• The flaw detector supports scan recording via encoder input or speed-based acquisition, generating a complete and detailed inspection protocol.

• The inspection results are saved for each channel enabled for the scanning.

• On-the-fly comprehensive analysis during inspection (before file saving) is possible using the functionality of the flaw detector.

• In-depth analysis of stored files can be done in fields.

## Additional features

**Angle Correction Gain and TCG functions** for an immediate and accurate assessment of the equivalent defect size.

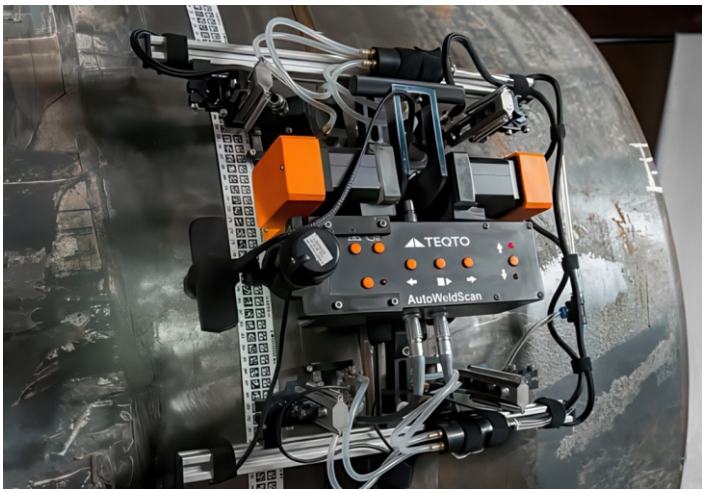
**Detailed TOFD data review** on the display of the flaw detector.

**i-Scan mode** for composite inspection and corrosion mapping.

**C-scan** ecording for linear phased array probes with direct, soft, or immersion wedges, as well as roller probes, enabling back-wall thickness mapping and composite inspection.

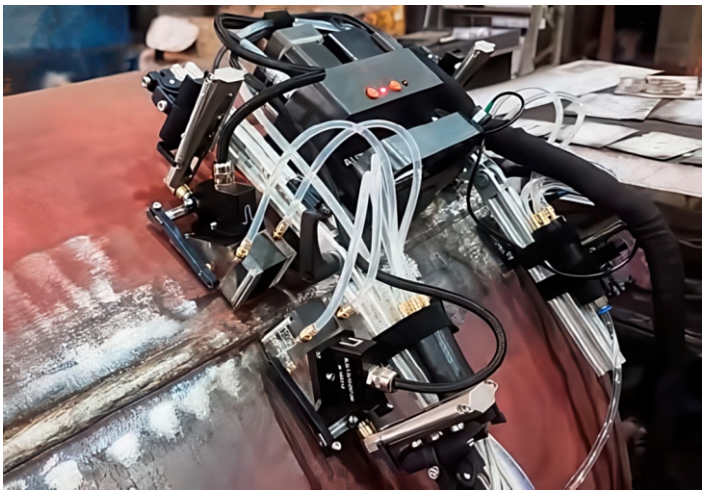
## Connectivity with automated and mechanical scanners*

### AutoWeldScan fully automated scanner for Girth weld inspection



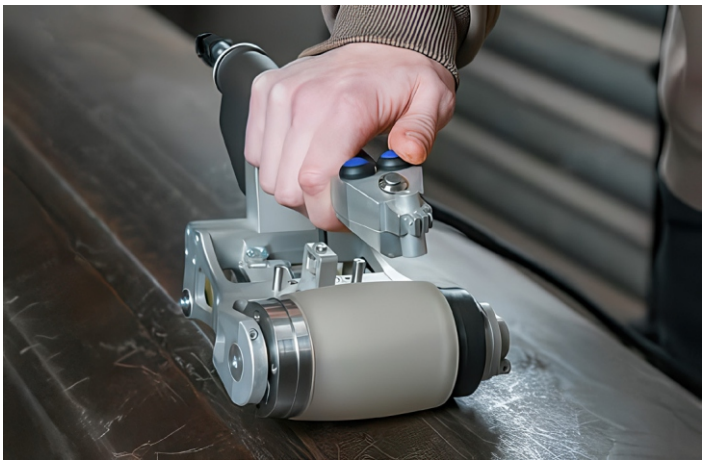

Lightweight (3.5 kg) two-motor scanner with fl oatingsemi-independent suspension allows reliable data acquisition in most difficult conditions. It compensates for surface irregularities and variations in weld edge thickness.
Allows configuration up to 2 x PAs + 2 x 2 TOFD. Remote control enables movement in four directions. Fully automated version contains intellectual system for positioning the scanner on the center of weld and movement control.

### AutoPAScan motorized scanner for AUT



The unique configuration of the scanner allows one-side inspection as well as position probes on both sides of the welds. Electronics positioned on one side of the weld ensure stable movement independent of weld construction. This design guarantees smooth operation on various surfaces, easy crossing of longitudinal welds, and convenient manual adjustment during motion.
All movement functions are controlled directly via buttons on the scanner.

### RollScan for composites inspection



Phased array rolling probe for inspection of composites and other materials with straight plane surface for the detection of lamination, porosity and thickness of the composite panels. Lasermark helps to keep the straight movement. The elastic material of the wheel Aqualen gives the high quality of ultrasonic inspection with high resolution and good SNR.

**The TQ-60-X is your ultimate solution for advanced ultrasonic testing, providing e翻cient flaw detection, comprehensive analysis, and high versatility. Elevate your inspection capabilities with thispowerful and user-friendly device.**

* The unit can be also used as an acquisition unit with the scanners of other manufacturers (when interface and encoders are specified).

# Technical specifications

### PHASED ARRAY

**Generator configuration:** 16:128 (optional 32:128)

**Excitation voltage:** ±100 V

**Excitation pulse type:** RF Pulse

**Synchronization:** position or time encoder
Gain: 0–80 dB in 0.1 dB steps

**Operating frequency range:** 500 kHz — 20 MHz

**Sampling frequency:** 100 MHz

**ADC bit depth:** 10 bits

**Data bit depth:** 16 bits

**Signal recording:** digital recording of each signal
Max A-Scan Length: up to 10,000 points

**Pulse repetition frequency:** 10 kHz

**Focusing laws:** up to 1024

**Sensitivity equalization:** 2D programmable by angle (ACG); by depth TCG (range of 60 dB, 32 points with a slope of up to 50 dB/μs)

**Focusing types:** depth, path, distance, auto
Scan Types: S-Scan, Real weld geometry (B-Scan), C-Scan, Top and side views

**Scanning modes:** S-Scan, L-Scan, Compound LS-Scan (compound S-Scan)

**Multi groups:** up to 10 groups (up to 4 on each PA channel + 2 TOFD channels)

**Cursors:** cartesian system, 2D, polar

**Measurement:** distance along the beam, coordinates in depth and position (X, Y), maximum in 2D, equivalent area

**Post-processing on PC:** analysis, 3D volume analysis, scaling, protocol output

**Connectors:** 2 x Amphenol D38999

### CONVENTIONAL UT CHANNELS

**Number of channels:** 4 channels (2 pulsers / 2 receivers)

**Sampling:** 100 MHz

**Processing:** A-Scan, B-Scan, TOFD

**Rectification FW, HW+, HW–, and RF**
**gain:** 0-110 dB in steps of 0.1, 0.5, 1, 2, and 6 dB

**Operating frequency range:** 500 kHz — 20 MHz

**Connectors:** 4 x Lemo 000

### GENERAL FEATURES

**Data storage:** standard USB card or high-speed Ethernet 10/100 Mbp**s**

**USB Ports:** 2 USB + hub with 5 additional ports
File Size: 300 MB

**Standard scanning speed:** 6–9 m/min

**Scan record length:** 5000 measurements

**Operation modes:** phased array, conventional UT, i-Scan for corrosion mapping and composite inspection

**Display:** 800 x 600 pixels, 8.5 inches, color TFT with background change function for contrast work in bright sunlight

**Battery:** dual built-in batteries with quick-swap capability; up to 12 hours of continuous operation

**External power:** 220 V AC power supply

**Operating temperature range:** –35 °C to +50 °C

**Size (H x W x D):** 280 mm x 245 mm x 100 mm

**Weight:** 2.5 kg with battery

**Operating temperature:** –50 °C to 60 °C