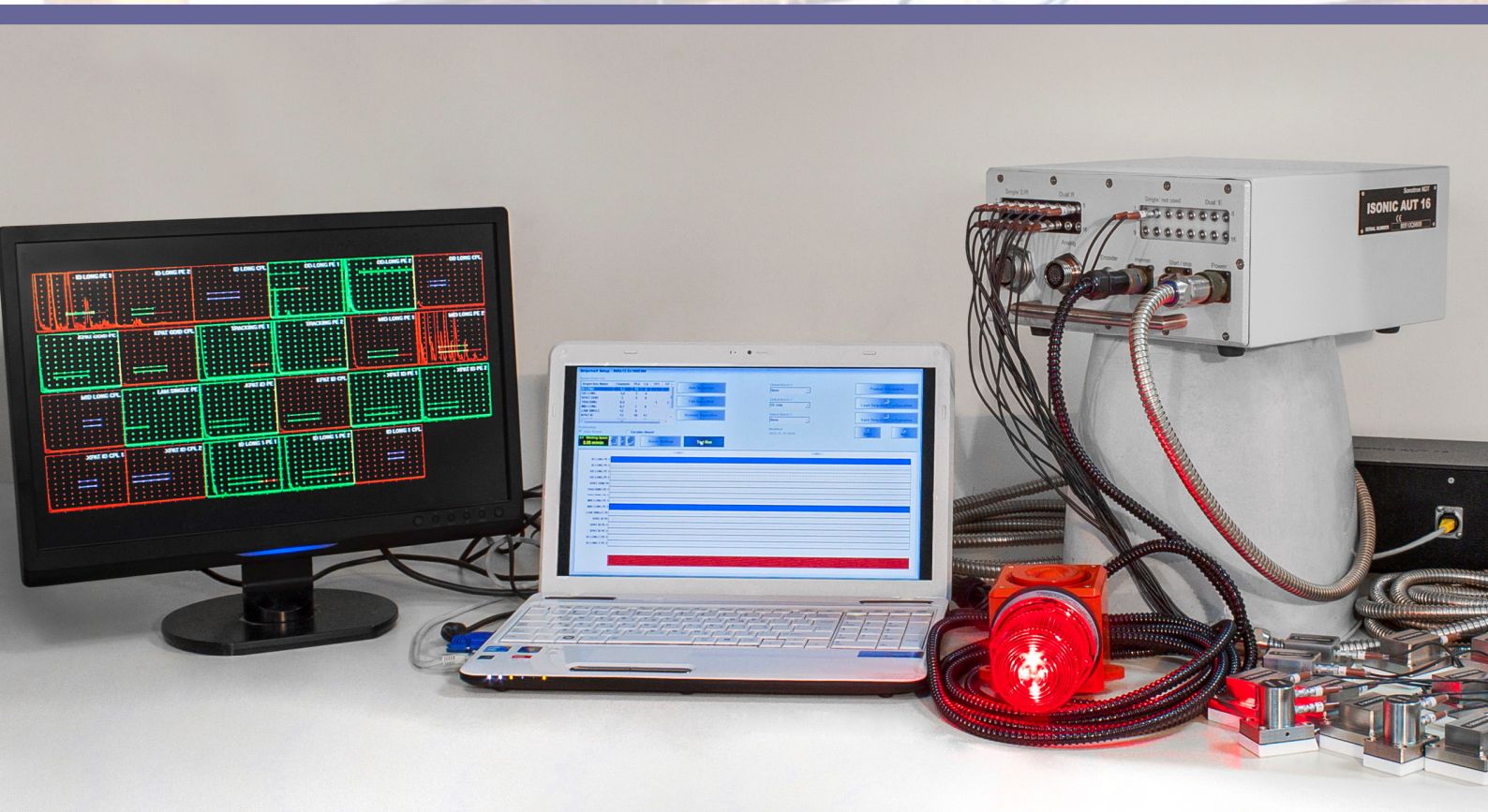
ISONIC AUT 16/32

Multi-Channel Flaw Detectors for Automatic Ultrasonic Testing – Conventional Modality



Advanced Platform / Core Component for the High Speed AUT Machines and Process Monitoring Systems

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ISONIC AUT 16 / 32 are portable multi-channel instruments designed for servicing as the core components of high-speed automatic ultrasonic testing (AUT) machines and process monitoring systems

ISONIC AUT 16 / 32 comprises 16 / 32 identical independently adjustable channels. Each channel comprising pulser, receiver, and 100 MHz sampling rate signal digitizer (A/D Converter) has 2 probe terminals to drive either single or dual element probe or probe pair. The highest scanning speed is achieved through the *parallel* pulsing, receiving, digitizing, and recording of signals by all channels in use. However in the case of cross-talking through the material is possible the instrument's channels may be toggled to work *sequentially* or organized into several groups of few channels working at parallel each (*combined* mode). The PRF of **up to 5 kHz per channel** is provided

Superior signal to noise ratio and dynamic range are achieved through firing probes with up to 400 Volt pp bi-polar square wave initial pulse. The duration and the amplitude of both positive and negative half-waves of the initial pulse are tuneable in the wide range. Further it is provided high stability of the firing amplitude selected by an operator within entire pulse width while the leading and falling edges of the bi-polar initial pulse are electronically boosted. Electronic damping circuit provides optimal amplitude / duration ratio for the received signals

Every channel is featured with 3 independent gates; beside regular functions the *Gain per Gate Adjustment* is possible for each gate – this allows implementing of pulse echo and back echo attenuation inspection techniques simultaneously, interface echo synchronizing, suppression of large geometry echoes, etc

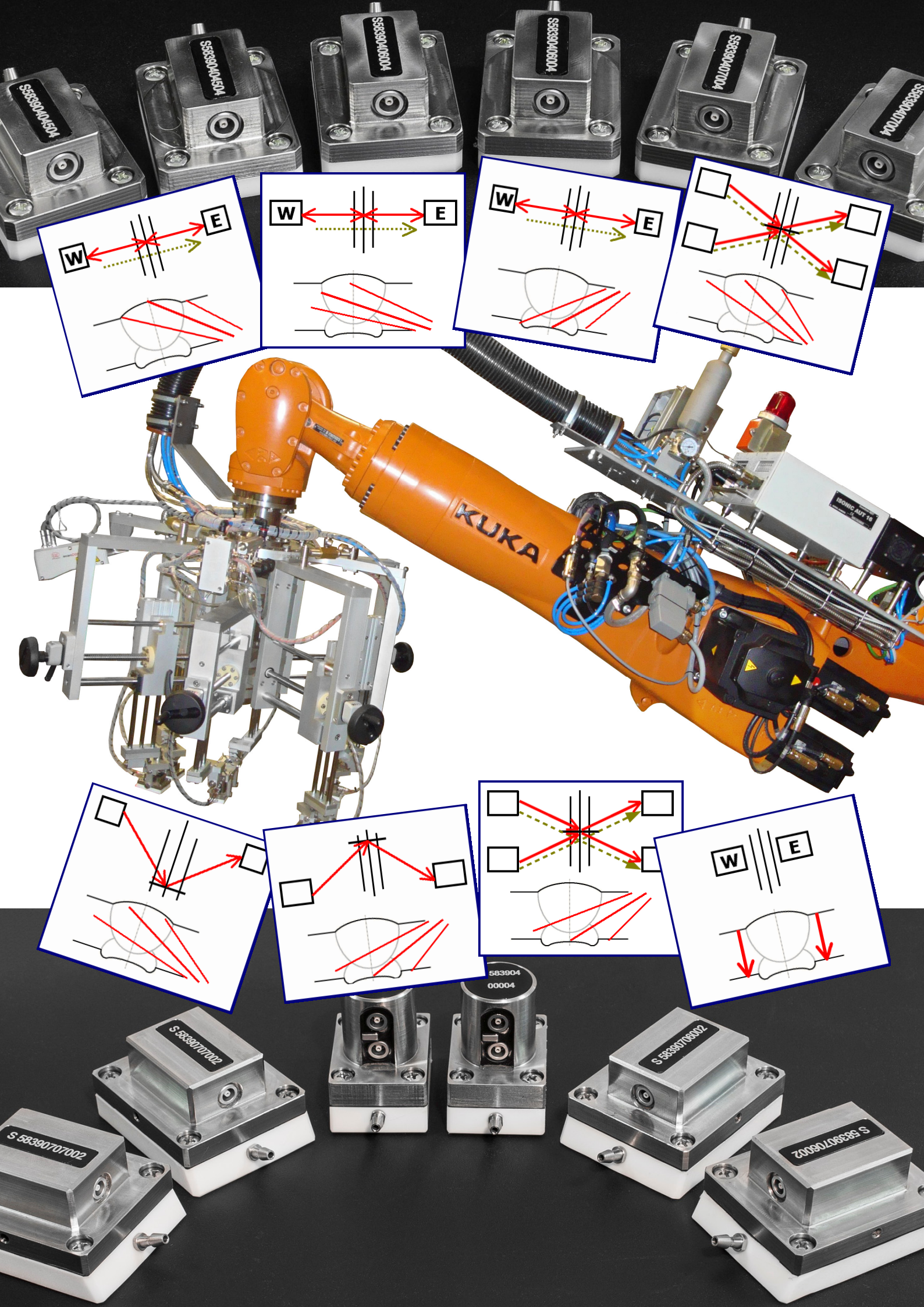
ISONIC AUT 16/32 electronics is also featured with:

- multi-axis encoder interface
- scanner motor control and powering interface
- interface for the external pedal and/or push-button "start/stop inspection" inputs
- user programmable lines for driving paint guns, audible alarm sirens, GO/NO-GO parts sorters, and the like
- user programmable proportional analogue outputs for the signal TOF / amplitude

The appropriate terminals are provided for any combination of the above external devices in accordance with the automation requirements

Scope of ultrasonic inspections performed by **ISONIC AUT 16/32** includes multi-channel thickness gauging, pulse echo, pitch-catch, and through-transmission flaw detection, TOFD, and the like. The instruments are packed into the rugged portable light weight IP 67-sealed cases, which may be either fitted into the scanner's chassis or mounted into a cabinet at the stationary inspection deck or just dropped onto the ground while in the field. A remote PC connected through LAN and appropriate inspection software package are required to control the instrument. The pre-scanning routine includes composing of multi-channel scanning strategy and automation logics followed by the calibrating of each channel involved. At the scanning stage the raw data comprising digitized ultrasonic signals and corresponding encoding information is streamed to the remote PC, which provides high-end processing, feedback to the instrument and external devices, imaging, logging, storage, etc. Fully digital control and data transfer allow practically unlimited distance between the instrument and remote PC enabling flexibility of creating control rooms or multiple monitor stations throughout the factory / hangar / weld station, etc

A variety of heavy duty probes for AUT are available along with **ISONIC AUT 16/32** instruments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ISONIC AUT 16 / 32 - Technical Data

Number of Channels:	16 - ISONIC AUT 16 32 - ISONIC AUT 32
Pulsing/Receiving (multi-channel operation):	• Parallel - all channels do fire, receive, digitize, and record signals simultaneously • Sequential – cycles of firing, receiving, digitizing, and recording signals are separated in time in a sequence loop for: ○ Each channel ○ Each group of channels working at parallel
Initial Pulse:	Bipolar Square Wave with Boosted Rising and Falling Edges, Guaranteed Shell Stability, and Active Damping
Transition:	≤7.5 ns (10-90% for rising edges / 90-10% for falling edges)
Amplitude:	Smoothly tunable (12 levels) 50 … 400 Vpp into 50 Ω
Half Wave Duration:	50…600 ns controllable in 10 ns step
Modes:	Single / Dual
Analogue Gain:	0...100 dB controllable in 0.5 dB resolution
Advanced Low Noise Design:	85 µV peak to peak input referred to 80 dB gain / 25 MHz bandwidth
Frequency Band:	0.2...25 MHz Wide Band
A/D Conversion:	100 MHz 16 bit
Digital Filter:	32-Taps FIR band pass with controllable lower and upper frequency limits
A-Scan:	• RF • Rectified (Full Wave / Negative or Positive Half Wave) • Signal's Spectrum (FFT Graph)
Reject:	0...99 % of screen height controllable in 1% resolution
Material Ultrasound Velocity:	300...20000 m/s (11.81…787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution
Time Base - Range:	0.5...7000 µs - controllable in 0.01 µs resolution
Time Base - Display Delay:	0...400 µs - controllable in 0.01 µs resolution
Probe Angle:	0...90° controllable in 1° resolution
Probe Delay:	0...70 µs controllable in 0.01µs resolution
DAC / TCG:	• Multi-curve • Slope ≤ 20 dB/µs • Available for the rectified and RF A-Scans • Theoretical – through entering dB/mm (dB/") factor • Experimental – through recording echoes from several reflectors; capacity - up to 40 points
DGS:	Standard Library for 18 probes / unlimitedly expandable
Gates:	3 Independent Gates controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5...95 % of A-Scan height controllable in 1 % resolution
Gate per Gain Adjustment:	Independently controllable for each gate in 26 dB range with 0.5 dB resolution
HW Gates and Interface Echo Gate:	Standard Options
Digital Readout:	• 27 automatic functions • Dual Ultrasound Velocity Measurement Mode for Multi-Layer Structures • Curved Surface / Thickness / Skip correction for angle beam probes • Ultrasound velocity and Probe Delay Auto-Calibration for all types of probes
Freeze A-Scan:	• Freeze All • Freeze Peak Note: signal evaluation, manipulating Gates and Gain is possible for the frozen A-Scans as for live
Scanning and Imaging - Single Channel:	• Thickness Profile B-Scan • True-To-Geometry Angle / Skip Corrected Cross-sectional B-Scan • High Resolution B-Scan • Horizontal Plane View CB-Scan • TOFD
Scanning and Imaging - Multi Channel:	• Strip Chart - strips of 4 types, namely P/E Amplitude/TOF; Map; TOFD; Coupling • Stripped C-Scan
Data storage:	100% raw data capturing
Encoder:	• Incremental TTL encoder • Single Axis - Line Scanning ○ Incremental TTL encoder ○ Time-based (built-in real time clock – 0.02 sec resolution) • Multi-axis (on request): incremental TTL encoders

Postprocessing:	Freely distributable viewers for the computer running under W'XP, W'7, W'8, W'10 providing comprehensive postprocessing according to the corresponding AUT software applications and featured with: • Recovery and play back of A-Scan sequence at various gain levels • Echo-dynamic pattern analysis • Defects sizing, outlining, pattern recognition • Defect list creation • Converting data into ASCII / MS Excel / MS Access / MS Word formats • etc
Real Time Hardware Outputs:	• 67/134 (ISONIC AUT 16/32) independent user programmable digital lines (+24V or +9V logic) for controlling: ○ Audible alarm sirens ○ Paint guns ○ GO/NO-GO parts sorters ○ etc • 16/32 (ISONIC AUT 16/32) independent user programmable analogue output lines (0…5V): ○ TOF proportional ○ Amplitude proportional
Hardware Control Inputs:	3 independent user programmable lines for the external pedal / push-button “Start/Stop Inspection” control
On-Board Computer CPU:	• Dual Core Intel Atom N2600 CPU 1.6 GHz / units manufactured after 2018-05-31 • AMD LX 800 - 500MHz / units manufactured on or before 2018-05-31
RAM:	• 2 GB / units manufactured after 2018-05-31 • 1 GB / units manufactured on or before 2018-05-31
Quasi HDD:	• SSD Card 64 GB / units manufactured after 2018-05-31 • CF Card 4 GB / units manufactured on or before 2018-05-31
Standard Ports:	• 2 x USB (optionally expandable up to 8) • Ethernet • sVGA
Controls:	• Standard USB Keyboard and Mouse connected directly to the instrument along with the sVGA screen • Remote control from an external PC over LAN (Ethernet) or internet
Operating System:	• W'7PROEmb / units manufactured after 2018-05-31 • W'XPEmb / units manufactured on or before 2018-05-31
Motors (on request):	• 3 independent outputs • DC powering: 48VDC • RS 232 control - stepped motor • Other type of motor / PC power voltage / Extra-motors - on request
Power:	• Mains - 100…240 VAC, 40…70 Hz, auto-switch • 36...72 VDC • Built-in UPS (uninterruptible power supply)
Ambient Temperature:	• -50°C ... +60°C (operation) • -50°C ... +60°C (storage)
Housing:	• Rugged aluminum case mountable on scanner • IP 67 • No air intake • No external cooling required
Dimensions of electronic box:	305X160X380 mm (12.00"x6.30"x14.96")
Weight:	7.500 kg (16.50 lbs)