ISONIC 2010

Smart Phased Array Ultrasonic Flaw Detector and Recorder with 1 / 2 Additional Channels for Conventional UT / TOFD



Designed and built under the drive for improved detection, productivity, and reducing of inspection cost **ISONIC 2010** resolves the well-known nowadays challenges faced by NDT and QA management such as increasing of nomenclature and complexity of inspections combined with more demanding codes, standards, and norms along with significant loss of domain expertise

ISONIC 2010 instrument carries the application based smart platform for the regular and advanced ultrasonic testing delivering

- 5 inspection modalities – PA, TOFD, CHIME, SRUT GW, conventional UT and a combination of them
- built-in image guided scan plan creator (ray tracer) for the numerous types of simple and complex geometry welds, shafts, bolts, spindles, composite profiles, and the like
- outstanding ultrasonic performance and probability of detection
- simplicity and intuitiveness of operation and data interpretation
- rapidness in the creation of the new inspection solutions and procedures
- easily expandable on-board solutions base
- reduced training time and cost
- comprehensiveness of automatically created inspection reports

The optimal suitability of **ISONIC 2010** for resolving of the huge variety of inspection tasks for all industries and processes involving ultrasonic NDT are strongly backed by the above listed features and technical particulars and specs below

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- Flaw Detection and Thickness / Corrosion Mapping
- True-To-Geometry Volume Overlay and 3D Coverage and Imaging for:
  - Butt Welds (Planar and Circumferential) with
    - Symmetrical or Asymmetrical Bevel or Unbeveled
    - Equivalent or Different Thickness of Jointed Parts
  - Longitudinal Welds
  - Fillet, Tee-, and TKY- Welds - Flat and Curved Parts
  - Corner and Nozzle Welds
  - Open Corner and Edge Welds
  - Lap Joints
  - Elbow and Transit Welds
  - Simple and Complex Geometry Solid and Hollow Shafts and Axles
  - Drill Rods, Bridge Hanger Pins, Bolts
  - Turbine Blades
  - Flat and Curved Carbon Fiber, Glass Fiber, Honeycombs Parts Including Corners and Radius Areas
  - etc
- TOFD
- CHIME (Creeping & Head Wave Inspection Technique)
- SRUT GW (Short Range Guided Wave)
- Operating 1 or 2 PA Probes Simultaneously: No External Splitter Required
- Versatile Fully Parallel PA Functionality Out of the Same Unit:

ISONIC 2010 models with two PA probe terminals
- 1 X 16:16
- 2 X 16:16
- 1 X 32:32
- 1 X 64:64
- 2 X 32:32
- 2 X 64:64
- 1 X 128:128

ISONIC 2010 models with one PA probe terminal
- 1 X 32:32
- 1 X 64:64

ISONIC 2010 EL – entry level model with one PA probe terminal
- 1 X 16:16
- 1 X 32:32
- 1 X 64:64

- Freely Adjustable Emitting and Receiving Aperture
- Testing Integrity :
  - 100% Raw Data Capturing
  - EquPAS – Equalized (Homogenized) Phased Array Ultrasonic Testing Sensitivity Over Entire Scan Plan
  - Scanning Performance Monitoring, On-Line Displaying, and Recording
  - Quantitative Scanning Integrity Report
- Live FMC/TFM
- FD B-Scan (Frequency Domain B-Scan) - Ultrasonic Spectroscopy
- Intuitive User Interface
- Automatic Finding, Sizing, Alarming, and Reporting of the Defects
- Remote Control, Observation of the Indications, Data Acquisition through LAN, Internet, Intranet, 3,4,5G
- and much more...

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Phased Array (PA) Modality:

- Fully parallel 32:32 PA electronics expandable to 64:64* or 128:128**
- 2 PA probe terminals** - *there is no external splitter required for operating 2 PA probes simultaneously*
- Ability of work with PA probes carrying up to 64* or 128** elements
- Built-In PA Probe / Wedge / Delay Line Editor
- Semiautomatic Routine for Quick Verification of Geometry (Dimensions and Angle), Velocity and Array Placement for wedges with flat and contoured contact face
- Independently adjustable emitting and receiving aperture with parallel firing, A/D conversion, and on-the-fly real time digital phasing
- Phased array pulser receiver with image guided ray tracing / scan plan designer for the numerous types of simple and complex geometry welds, shafts, bolts, spindles, composite profiles, and the like
- 8192 independently adjustable focal laws
- On-the-fly focal law editing ability
- Bi-polar square wave initial pulse: up to 300 Vpp / 100 dB analogue gain / 0.2...25 MHz bandpass / 16 bit 100 MHz ADC / 32 taps smoothly tunable digital filter
- Regular and volume overlay true-to-geometry (true-to-shape) B-Scan / Sector Scan (S-Scan) / Horizontal Plane S-Scan (CB-Scan) coverage accompanied with all-codes-compliant A-Scan based evaluation
- Multigroup coverage composed of several cross-sectional B- and S-Scans (scan plans) out of the same probe simultaneously
- Interface Echo start
- Strip Chart
- Single group and multigroup Top (C-Scan), Side, End View imaging formed through encoded / time-based line scanning, 3D-Viewer
- Single side / both sides weld coverage with use of one PA probe / pair of PA probes
- TOFD Map out of a pair of PA probes
- Top (C-Scan), Side, End View imaging formed through encoded XY- scanning, 3D-Viewer
- Scanning performance monitoring and recording along with inspection data: scanning speed, coupling monitor, and lamination checker under the wedged probe
- Equalized (homogenized) cross sectional coverage sensitivity: *TCG-independent* gain per focal law adjustment providing pure angle gain compensation (AGC) for S-Scan, etc
- DAC, TCG applied to defects imaging and evaluation in real time or at the postprocessing stage (DAC / TCG image normalization)
- Dynamic Focusing
- FMC, TFM, Back Diffraction Technique with / without and Mode Conversion
- Distinguishing and evaluation of diffracted and mode converted signals for defects sizing and pattern recognition
- Operating Linear Array (LA), Ring Array (RA), Daisy Array (DA), Matrix Array (MA), Dual Matrix Array (DMA), Dual Linear Array (DLA), and other PA probes
- FFT signal analysis - Ultrasonic Spectroscopy – for defect pattern analysis and materials structure characterization
- FD B-Scan (Frequency Domain B-Scan) for rapid material structure screening, other special tasks
- 100% raw data capturing
- Automatic finding and alarming defects / generating of editable defects list immediately upon scanning completed or at the postprocessing stage
- Advanced defects sizing and pattern recognition utilities

Conventional UT and TOFD:

- 1 or 2 channels***
- Single / dual modes of pulsing/receiving for every channel
- Bi-polar square wave initial pulse: up to 300 Vpp / 100 dB analogue gain / 0.2...25 MHz bandpass / 16 bit 100 MHz ADC / 32 taps smoothly tunable digital filter
- Regular A-Scan
- Thickness B-Scan
- True-to-Geometry flaw detection B-Scan – straight / angle beam probes
- CB-Scan
- TOFD
- Strip Chart and Stripped C-Scan
- Parallel or sequential pulsing/receiving and A/D conversion
- DAC, DGS, TCG
- FFT signal analysis - Ultrasonic Spectroscopy
- 100% raw data capturing

ISONIC 2010

General:

- *Dual Core 1.6 GHz clock 2 GB RAM 128 GB SSD W'7PROEmb on-board control computer*
- *Intuitive User Interface*
- *Single and multi-axis encoder connection*
- *Comprehensive postprocessing and data reporting toolkit*
- *Remote control and data capturing with use of a regular PC with no need in special software*
- *No intake air / no cooling IP 65 light rugged case*
- *Sealed all-functional keyboard and mouse*
- *6.5" bright touch screen*
- *Ethernet, USB, sVGA terminals*

ISONIC 2010 uniquely combines PA, single- and multi-channel conventional UT, and TOFD modalities providing 100% raw data recording and imaging. Along with the intuitive user interface, portability, lightweight, and battery operation this makes it suitable for all kinds of every-day ultrasonic inspections

PA modality is carried by the **fully parallel non-multiplexed 32:32 electronics** with independently adjustable emitting and receiving aperture, each may consist of 1...32 elements when operating one PA probe or 1...16 elements per probe in case of operating two PA probes simultaneously. 2 PA probes terminals allow operating of a pair of PA probes simultaneously with *no need in an external splitter*. 64- and 128-elements PA probes may be used with **ISONIC 2010** when connected to instrument's terminals through miniature active extenders, which expand the functionality to *fully parallel 1 X 64:64, 2 X 32:32**, 1 X 128:128**, and 2 X 64:64** (no multiplexing involved)*. The groups of PA probe elements forming emitting / receiving aperture may be fully or partially matching or totally separated allowing maximal flexibility whilst managing the incidence angles, focal distances, types of radiated and received waves including directly reflected and diffracted signals either mode converted or not

Each channel is equipped with own pulser-receiver and A/D converter. Parallel firing, A/D conversion, and "on-the-fly" digital phasing are performed for every possible composition and size of the emitting and receiving aperture so the implementing of each focal law is completed within a single pulsing/receiving cycle providing the **maximal possible speed of material coverage**

ISONIC 2010 allows using of various types PA probes: linear, rings, and daisy arrays (LA, RA, and DA), dual linear arrays (LA), matrix arrays (MA), dual matrix arrays (DMA), etc

In addition to the PA electronics **ISONIC 2010** carries 1 or 2 independent conventional channels*** for regular UT, TOFD, SRUT GW and other types of advanced inspection, imaging, and recording; each channel is capable for both single and dual modes of use

The **top level ultrasonic performance** is achieved through firing PA, TOFD, and conventional probes with bipolar square wave initial pulse with wide-range-tunable duration and amplitude (up to 300 Vpp). The high stability of the initial pulse amplitude within entire duration of the positive and negative half-waves, the extremely short boosted rising and falling edges and the automatic adaptive damping improve the signal to noise ratio and resolution allowing controlling of the analogue gain over the 0…100 dB range for each modality

ISONIC 2010 is a very powerful platform for huge number of the practical PA UT software applications available for the activation at any moment. Thanks to unique ***True-To-Geometry Volume Overlap Coverage and Real Time Imaging*** **ISONIC 2010** is suitable for high performance inspection of simple and complex geometry welds (butt, longitudinal, fillet, lap, corner, elbow, etc) with scanning from one or both sides simultaneously (when applicable), bolts, bridge hanger pins, wind turbine and other shafts, annular rings, flanges, rails and railway axles and wheels, CRFP and GRFP composite panels and profiled stuff, and the like. Precise and easy reproducible automatic ***Equalizing (Homogenizing) of the Sensitivity within Entire Cross-Section / Volume of the Material*** is provided thanks to the unique TCG-independent angle gain / gain per focal law compensation solution combined with DAC / TCG image normalization. Along with 100% raw data capturing and scanning performance monitoring, on-line displaying, and recording this provides the ***Highest Degree of Testing Integrity***

Thanks to ***True-To-Geometry Volume Overlap Coverage and Imaging*** and ***Equalizing (Homogenizing) of the Sensitivity within Entire Cross-Section / Volume of the Material*** the inspection results produced by **ISONIC 2010** are ***quickly and easy interpretable and acceptable by the UT Pros and non-Pros as well***

ISONIC 2010 is packed into the IP 65 reinforced plastic case with no intake air or any other cooling means. The medium size 640X480 6.5" bright screen provides fine resolution and visibility for all types of inspection data presentation at strong ambient light along with the optimized power consumption rate for the outdoor operation

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* - **ISONIC 2010** instruments with one PA probe terminal (part ##s SA 804908, SA 804908 EL, SA 804909)
** - **ISONIC 2010** instruments with two PA probe terminals (part ##s SA 804910, SA 804911)
*** - **ISONIC 2010** instruments may carry either one (part ##s SA 804908, SA 804908 EL, SA 804910) or two (part ##s SA 804909, SA 804911) conventional channels

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ISONIC 2010 is fully compliant with the following codes

- *ASME Code Case 2541 – Use of Manual Phased Array Ultrasonic Examination Section V*
- *ASME Code Case 2557 – Use of Manual Phased Array S-Scan Ultrasonic Examination Section V per Article 4 Section V*
- *ASME Code Case 2558 – Use of Manual Phased Array E-Scan Ultrasonic Examination Section V per Article 4 Section V*
- *ASTM 1961– 06 – Standard Practice for Mechanized Ultrasonic Testing of Girth Welds Using Zonal Discrimination with Focused Search Units*
- *ASME Section I – Rules for Construction of Power Boilers*
- *ASME Section VIII, Division 1 – Rules for Construction of Pressure Vessels*
- *ASME Section VIII, Division 2 – Rules for Construction of Pressure Vessels. Alternative Rules*
- *ASME Section VIII Article KE-3 – Examination of Welds and Acceptance Criteria*
- *ASME Code Case 2235 – Use of Ultrasonic Examination in Lieu of Radiography*
- *Non-destructive testing of welds – Ultrasonic testing – Use of automated phased array technology. - International Standard EN ISO 13588:2019*
- *Non-destructive testing of welds — Ultrasonic testing — Use of automated phased array technology for thin-walled steel components. - International Standard EN ISO 20601:2018*
- *Non-Destructive Examination of Welded Joints – Ultrasonic Examination of Welded Joints. – British and European Standard BS EN 1714:1998*
- *Non-Destructive Examination of Welds – Ultrasonic Examination – Characterization of Indications in Welds. – British and European Standard BS EN 1713:1998*
- *Non-destructive Testing — Ultrasonic Testing — Examination for Discontinuities Perpendicular to the Surface. – International Standard ISO 16826:2012*
- *Calibration and Setting-Up of the Ultrasonic Time of Flight Diffraction (TOFD) Technique for the Detection, Location and Sizing of Flaws. – British Standard BS 7706:1993*
- *WI 00121377, Welding – Use Of Time-Of-Flight Diffraction Technique (TOFD) For Testing Of Welds. – European Committee for Standardization – Document # CEN/TC 121/SC 5/WG 2 N 146, issued Feb, 12, 2003*
- *ASTM E 2373 – 04 – Standard Practice for Use of the Ultrasonic Time of Flight Diffraction (TOFD) Technique*
- *Non-destructive testing of welds - Ultrasonic testing - Use of time-of-flight diffraction technique (TOFD). - International Standard EN ISO 10863:2011*
- *Non-Destructive Testing – Ultrasonic Examination – Part 5: Characterization and Sizing of Discontinuities. – British and European Standard BS EN 583-5:2001*
- *Non-Destructive Testing – Ultrasonic Examination – Part 2: Sensitivity and Range Setting. – British and European Standard BS EN 583-2:2001*
- *AD 2000-Merkblatt HP 5/3 Anlage 1:2015-04: Zerstörungsfreie Prüfung der Schweißverbindungen - Verfahrenstechnische Mindestanforderungen für die zerstörungsfreien Prüfverfahren - Non-destructive testing of welded joints – Minimum technical procedure requirements for non-destructive testing methods (Germany)*

The zero point test and annual verification procedures of **ISONIC 2010** are fully compliant with the international standards below and the corresponding national norms

PA channels

- *ISO 18563-1. Non-destructive testing — Characterization and verification of ultrasonic phased array equipment. Part 1: Instruments*
- *ISO 18563-3. Non-destructive testing — Characterization and verification of ultrasonic phased array equipment. Part 3: Combined systems*

Conventional channels

- *EN 12668-1 / ISO 22232-1. Non-destructive testing – Characterization a verification of ultrasonic examination equipment. Part 1: Instruments*
- *EN 12668-3 / ISO 22232-3. Non-destructive testing – Characterization a verification of ultrasonic examination equipment. Part 3: Combined Equipment*



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ISONIC 2010 - Technical Data

PA Modality

Structure:	1 X 32:32 switchable* to / from 2 X 16:16 1 X 64:64** switchable* to / from 2 X 32:32** 1 X 128:128** switchable* to / from 2 X 64:64** * - the instruments configured according to part ##s 804910, 804911 ** - with use of corresponding active PA functionality extension adapters **Important:** there is no external splitter required in case of using 2 PA probes simultaneously
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 … 300 Vpp into 50 Ω
Half Wave Duration:	50…600 ns controllable in 5 ns step
Emitting aperture:	1...32/64*/128* adjustable as fully or partially matching OR mismatching with the receiving aperture * - with use of the corresponding extension terminals
Receiving Aperture:	1...32/64*/128* adjustable as fully or partially matching OR mismatching with the emitting aperture * - with use of the corresponding extension terminals
Phasing - emitting and receiving:	0…100 µs with 5 ns resolution independently controllable
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
A/D Conversion:	100 MHz 16 bit
Digital Filter:	32-Taps FIR band pass with controllable lower and upper frequency limits; non-linear acoustics technique supported
Superimposing of receiving aperture signals:	On-the-fly, no multiplexing involved
Phasing (receiving aperture):	On-the-fly 0…100 µs with 5 ns resolution
Dynamic Focusing:	Supported
FMC, TFM, Back Diffraction Technique with / without and Mode Conversion:	Supported
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

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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 Delay:	Automatically settled depending on the PA probe / wedge / delay line in use according to the desired: • Aperture(s) • Incidence Angle • Focal Point Position • etc
DAC / TCG:	• One Per Focal Law • Multi-curve • Slope ≤ 46 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
Automatic Gain Correction:	Complimentary Mechanism Independent on DAC / TCG: • AGC - Angle Gain Compensation for the sectorial scan coverage • GPSC - Gain Shot (Focal Law) Correction for other types of coverage
EquPAS - Equalized (Homogenized) PA Inspection Sensitivity:	Provided for every desired type of reference reflector: • SDH (Side Drilled Hole) • FBH (Flat Bottom Hole) • EDM Notch • etc
Gates:	• 2 Independent gates per focal law (**A** and **B**) with the **Start** / **Width** controllable over entire time base in 0.1 mm /// 0.001" resolution • **IE** gate per focal law for the standard *Interface Echo start* function controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5…95 % of A-Scan height controllable in 1 % resolution
Phased Array Probes:	• 1D Array – linear (LA), rings (RA), daisy (DA), and the like • Dual Linear Array (DLA) • Matrix Array (MA) • Dual Matrix Array (DMA)

Focal Laws:	• 8192
	• Independently adjustable gain / time base / apertures / pulsing receiving modes, etc for each focal law among the plurality of implemented within a frame composing sequence
	• On-the-fly focal law editing ability
	• Dynamic focusing:
	  ○ for any set of points distributed within entire cross-section of the material covered by linear array probe / group of probes and forming either straight, curved, zigzag, or broken line
	  ○ for any set of points distributed inside 3D space within entire cube or other volumetric polygon of the material covered by matrix array probe / group of probes

Scanning and Imaging:	• Cross-Sectional B-Scan (E-Scan) – regular and/or Volume Overlay True-To-Geometry • Cross-Sectional Sector Scan (S-Scan) – regular and/or Volume Overlay and True-To-Geometry • Multi-group image composed of several cross-sectional B- and S-Scans • Horizontal Plane S-Scan • FMC/TFM synthetic aperture images • Back-diffraction image • FD B-Scan (Frequency Domain B-Scan) • Strip Chart • TOFD Map out of a pair of PA probes • Top (C-Scan), Side, End View imaging formed through encoded / time-based line scanning, 3D-Viewer • Top (C-Scan), Side, End View imaging formed through encoded XY- scanning, 3D-Viewer • Scanning Performance Strip representing Coupling Loss and Over-Speed events • Quantitative Scanning Integrity Report
Data Storage:	100% raw data capturing
Postprocessing:	• Built-in means for the comprehensive postprocessing in the instrument • ISONIC PA Office - freely distributable postprocessing package for the computer running under W'XP, W'7, W'8, W'10

Conventional UT and TOFD

Number of Channels:	1 or 2
Pulsing/Receiving (dual channel operation):	• Parallel - both channels do fire, receive, digitize, and record signals simultaneously • Sequential – cycles of firing, receiving, digitizing, and recording signals by each channel are separated in time in a sequence loop
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 … 300 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

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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 ≤ 46 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:	2 Independent gates (**A** and **B**) with the **Start** / **Width** controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5…95 % of A-Scan height controllable in 1 % resolution
HW Gates:	Standard Option
Interface Echo:	Standard Option
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 - Dual Channel:	• Strip Chart - strips of 4 types, namely P/E Amplitude/TOF; Map; TOFD; Coupling • Stripped C-Scan
Standard length of one line scanning record:	50…20000 mm (2"…800"), automatic scrolling

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Data storage:	100% raw data capturing
Postprocessing:	• Built-in means for the comprehensive postprocessing in the instrument • ISONIC Office L - freely distributable postprocessing package for the computer running under W'XP, W'7, W'8, W'10

General

PRF:	10...5000 Hz controllable in 1 Hz resolution
On-Board Computer CPU:	• Dual Core Intel Atom N2600 CPU 1.6 GHz / units manufactured after 2017-04-30 • AMD LX 800 - 500MHz / units manufactured on or before 2017-04-30
RAM:	• 2 GB / units manufactured after 2017-04-30 • 1 GB / units manufactured on or before 2017-04-30
Quasi HDD:	• SSD Card 128 GB / units manufactured after 2017-04-30 • CF Card 4 GB / units manufactured on or before 2017-04-30
Screen:	Sun readable 6.5” touch screen 640 x 480
Controls:	• Touch screen • Front Panel Sealed Keyboard and Mouse
Standard Ports:	• 2 x USB (optionally expandable up to 8) • Ethernet • sVGA • Wi Fi (optional – through optional external USB dongle) • 3,4,5G (optional – through optional external USB dongle)
Operating System:	• W'7PROEmb / units manufactured after 2017-04-30 • W'XPEmb / units manufactured on or before 2017-04-30
Encoder Port:	• Single Axis Incremental TTL encoder – direct connection • Multi-Axis (2, 3, 4, etc) Incremental TTL Encoder – Through Miniature Scanner Mounted Optional Multi-Axis Encoder Interface Box
USB Encoder Port:	Dual Axis Incremental TTL Encoder – Through Optional Miniature Scanner Mounted Dual Axis Encoder Interface Box
Remote Control:	• From an external computer running under W'XP, W'7, W'8, W'10 through Ethernet or Wi Fi • From 3,4,5G Cell Phone • No special software required • All calibration and inspection data is stored in the control computer
Ambient Temperature:	• -30°C ... +60°C (operation) • -50°C ... +60°C (storage)

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Housing:	• Rugged aluminum case with carrying handle • IP 65 • No air intake • The cooling is not required
Dimensions:	265x156x101 mm (10.43"x6.14"x3.98") - without battery 265x156x130 mm (10.43"x6.14"x5.12") - with battery / units manufactured after 2017-04-30 265x156x139 mm (10.43"x6.14"x5.47") - with battery / units manufactured on or before 2017-04-30
Weight:	2.500 kg (5.50 lbs) – without battery 3.430 kg (7.55 lbs) – with battery



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