MULTI-CHANNEL ULTRASONIC FLAW DETECTOR
OKO-22M-UT

THE BEST INDUSTRIAL OEM SOLUTION FOR IN–LINE AND IN–SERVICE SYSTEMS
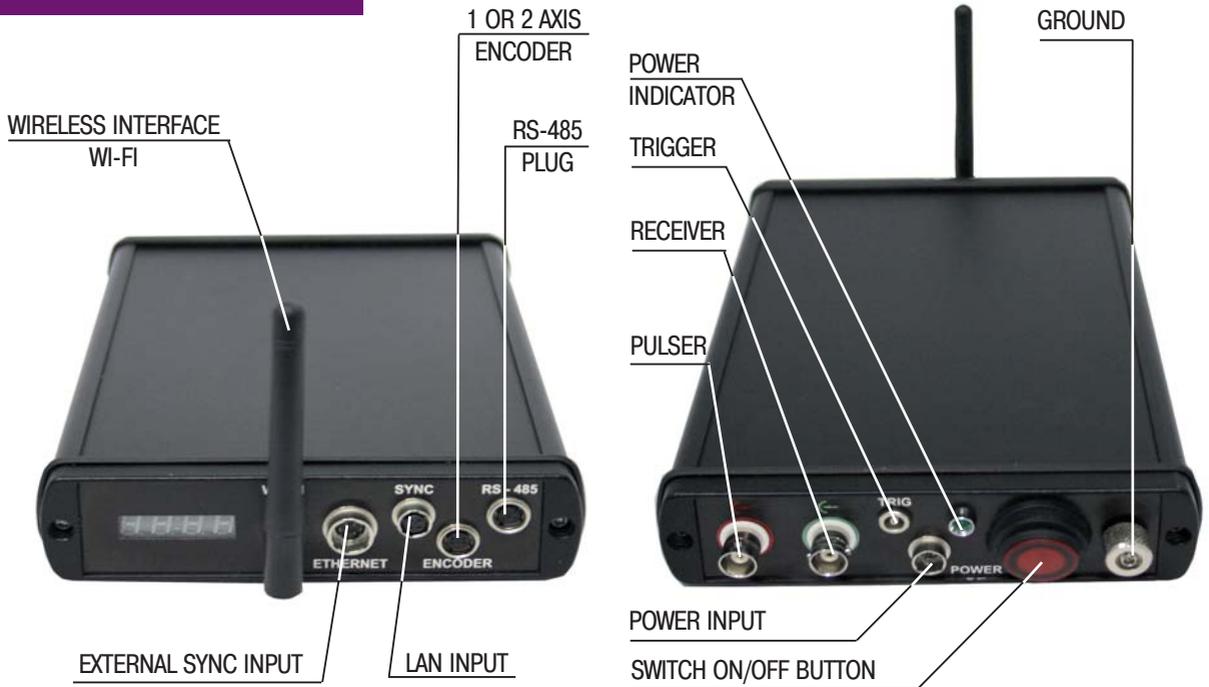

OKOndt GROUP ™

www.okondt.com

PURPOSE

The OKO-22M-UT ultrasonic flaw detector is a standalone electronic unit and is intended for application in high-performance automated multi-channel NDT Systems, transportable systems (mechanized NDT systems) in NDT labaratories or for manual testing.

Available in several flaw detector models that are different in a volume of built-in functions for results processing.

Due to the flaw detector is designed in a form of a standalone device with the connection to the PC via Ethernet port, the several UT channels can be connected to the PC via Switch unit. This allows to create UT multi-channel testing systems.
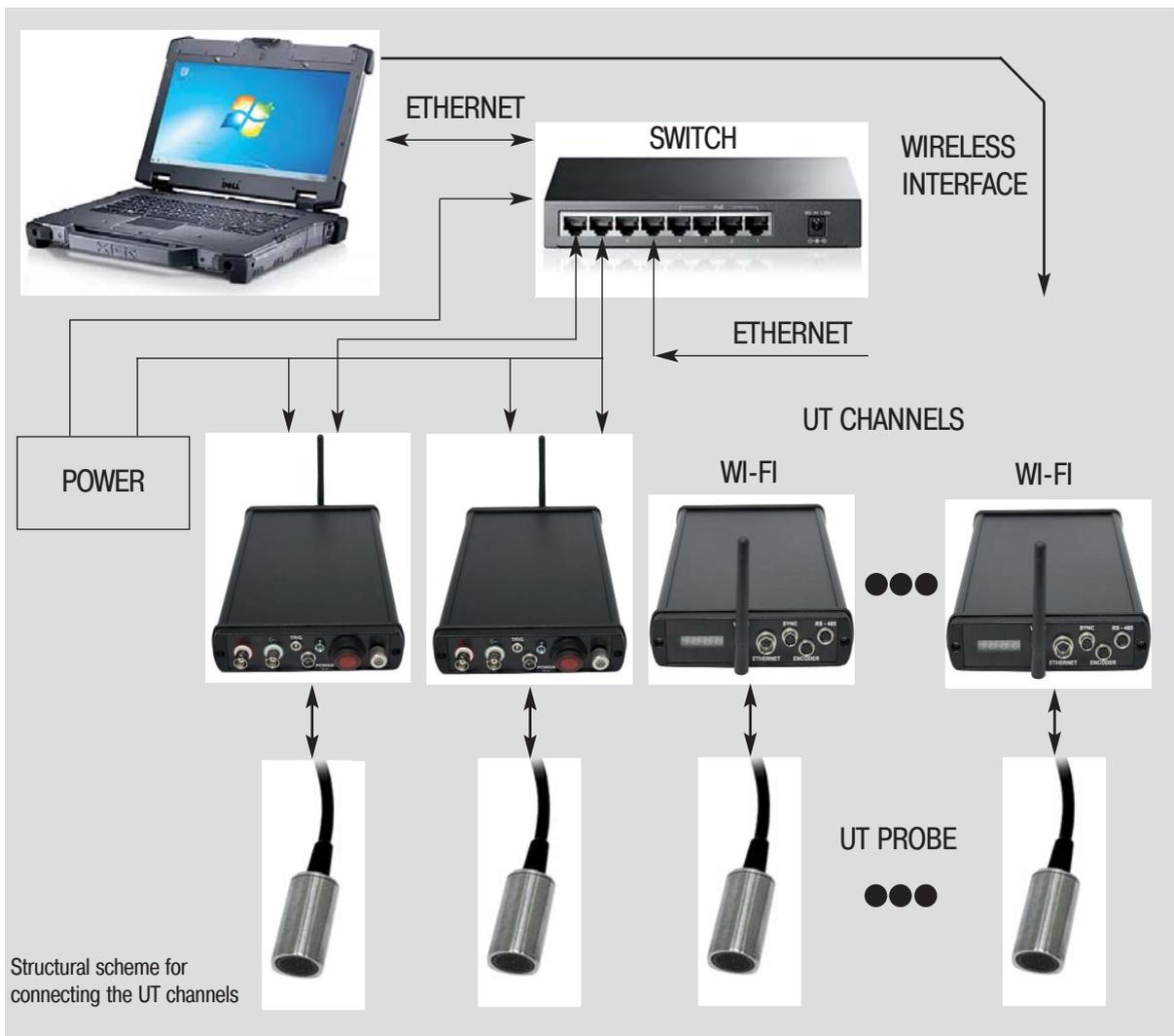
Technical capabilities of the flaw detector allow to use it both in stationary-type in-line and off-line testing systems.

OKO-22M-UT PRO

WIRELESS INTERFACE WI-FI

1 OR 2 AXIS ENCODER

RS-485 PLUG

GROUND

POWER INDICATOR

TRIGGER

RECEIVER

PULSER

EXTERNAL SYNC INPUT

LAN INPUT

POWER INPUT

SWITCH ON/OFF BUTTON

OKO-22M-UT standart

PULSER

GROUND

EXTERNAL SYNC INPUT

RECEIVER

POWER INPUT

LAN INPUT

SYNC INPUT

Structural scheme for connecting the UT channels

**APPLICATION OF ULTRASONIC TESTING TECHNIQUE IN VARIOUS INDUSTRIES:**

| Production sector, test object	Regulatory Documentation	Required number of channels	Operating frequency, MHz	Testing techniques
Metallurgy, testing the flat rolled steel	EN10160, ASTM 578/A578M-96, 4A435A, ISO 1209	60 - 100	2 - 5	Immersion or contact
Metallurgy, testing the rolled steel bars	EN 10308, EN 10228-3, ASTM E - 2375, MS-STD - 2154	3 - 20	2 - 10	Immersion or contact, testing velocity is up to 2 m/s
Engineering, testing the pipe welded joints	API 5L, API 5 CT, EN 10246-17	12	2 - 5	Immersion or contact, velocity is up to 2 m/s
Engineering, testing the pipe body, thickness gauging	API 5L, API 5CT, EN 10246, ASTM E1816-96	56	2 - 5	Immersion or contact, velocity is up to 1 m/s. Implemented resonance-frequency technique for measuring the pipe wall thickness - from 0.2 to 5.0 mm.

Small-size tubes testing by OKO-22M-UT
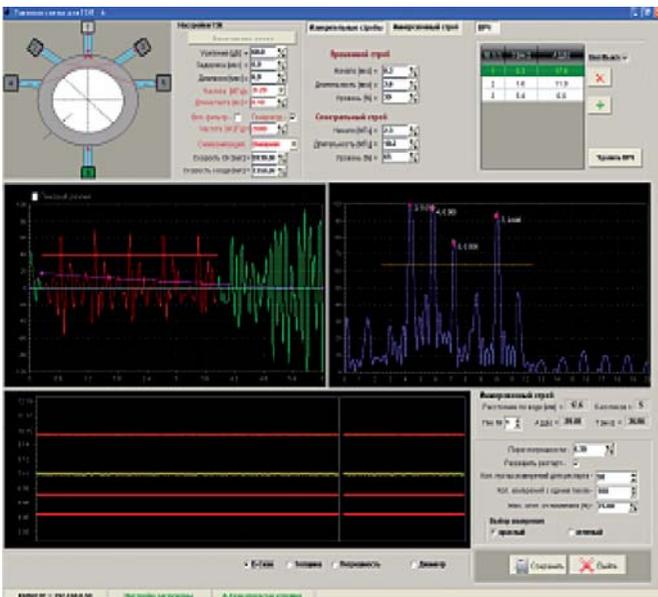
The most cost effective solution for performing high speed UT for small sized tubes with in-line immersion systems and rotary heads. OKO-22M-UT based systems could be integrated into production lines as well as a stand-alone solution for applications in laboratories. High PRF (up to10 kHz) and high digital resolution of ADC (100 MHz) provide fast data acquisition. The Software "OKO-UT Pipe" gives an opportunity to measure the thickness ot extremely thin tubes with wall thickness that starts from 0,2 mm and evaluate small cracks from 0,05 mm depth .

On-line weld profile and UT by OKO-22M-UT
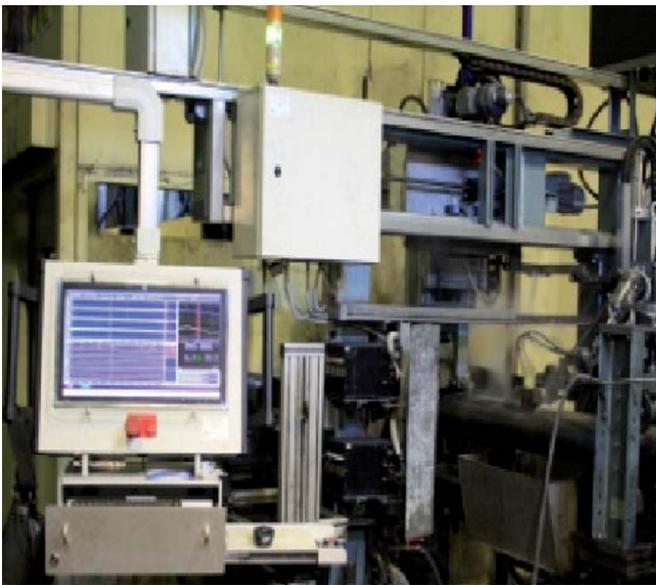
The on-line weld profile monitoring system provides the internal and external profiles of the tested weld and HAZ area along with its thickness. The material thickness and profile alarms notify the operator when the product does not meet calibration parameters. Extremely hard environment conditions are applied by IP64 OKO-22M-UT blocks. Fast Software provides high-speed tube testing with 10 channels simultaneously.

On-line weld profile and UT by OKO-22M-UT
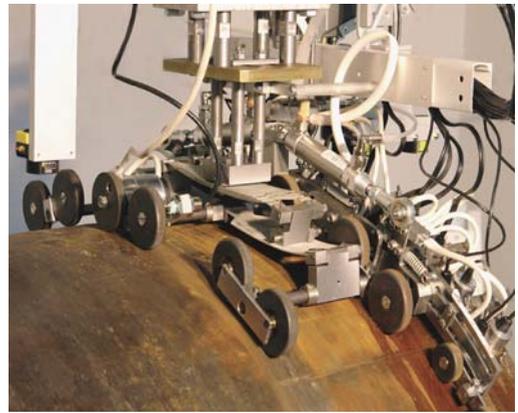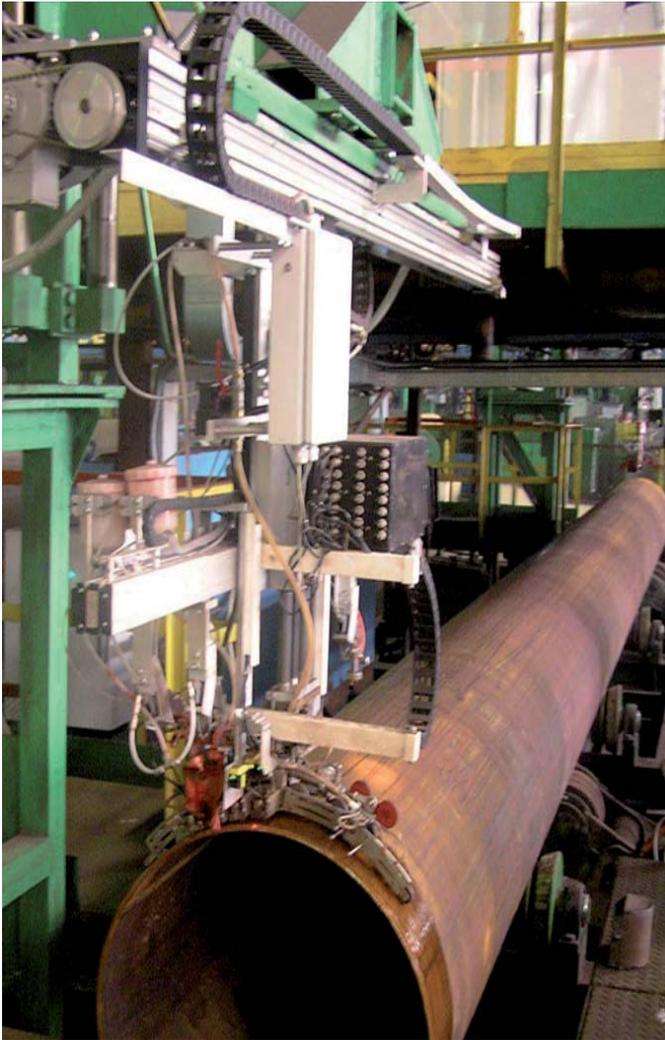
Automated Systems for ultrasonic testing of longitudinal and spiral welded joints, ends of pipes as well as pipe body can be constructed on the basis of multi-functional OKO-22M-UT boards. These solutions provide a wide range of possibilities in constructing the multichannel systems. Generally, automated UT system that meets API SPEC 5L, IPS-M-PI-190, ISO 10893, DNV-OS-F101, DEP 31.40.20.37 includes approximately 60-70 UT channels. Ultrasonic boards and computation modules of the system are joined into a local network and connected via Ethernet. Interface units (displays, keyboards and other) are integrated into the existing operator's console of the system.

Hot rolled pipes testing by OKO-22M-UT
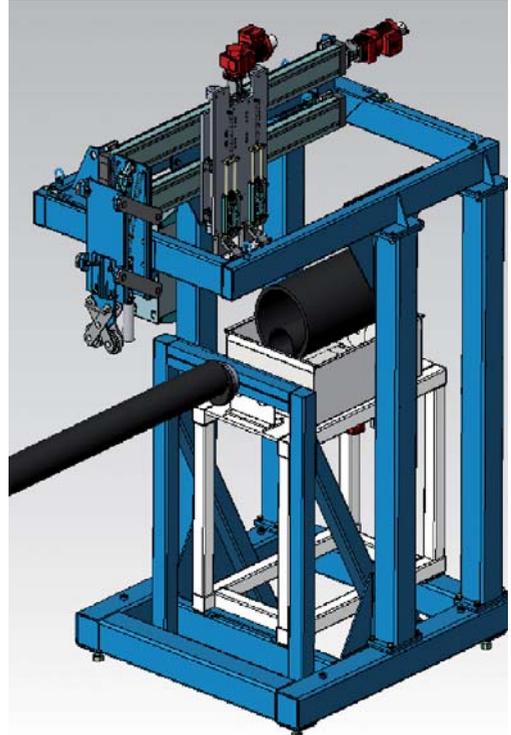
OKO-22M-UT is a high-speed waveform capturing platform and includes flexible signal gating, intended for streamlining hig-volume data acquisition tasks. This brand-new ultrasonic technique as well as OeM-ultrasonic board in connection with scan mechanics gives high in-line productivity. OKO-22M-UT guarantees an easy integration, especially in automated hot-rolling production cycles for a continuously running 100% UT inspection, including automatic registration and data storing.

METALLURGY APPLICATIONS

Axles and shafts testing by OKO-22M-UT

OKO-22M-UT is the best for immersion ultrasonic testing of axles and shafts for the presence of internal discontinuities and changes in attenuation of ultrasonic vibrations in the part material. The system applies all obligatory and additional techniques of acceptance ultrasonic testing, to every testing part, according to international standarts. Specialized Software presents such testing results: amplitude, depth, coordinates and conditional defects sizes.

Rails testing by OKO-22M-UT

Off-line high-sensitivity testing of rails is provided by conventional UT. Thanks to OKO-22M-UT board, it is possible to establish a wireless high-speed industrial communication between individual testing positions, scanning units and server station via Wi-Fi.

OKO-22M-UT represents a compact module, which can be easily installed on both mobile systems of sheets testing and special industrial cabinets of large-sized automated systems. The number of channels integrated into one system structure can amount up to 200. High performance of pulser and OKO-22M-UT board receiver allows to ensure the generation and receipt of short pulses, with the possibility to minimize the dead zones at the sheet surfaces as much as possible.

MACHINE-BUILDING APPLICATIONS

Railway Wheel pairs testing by OKO-22M-UT
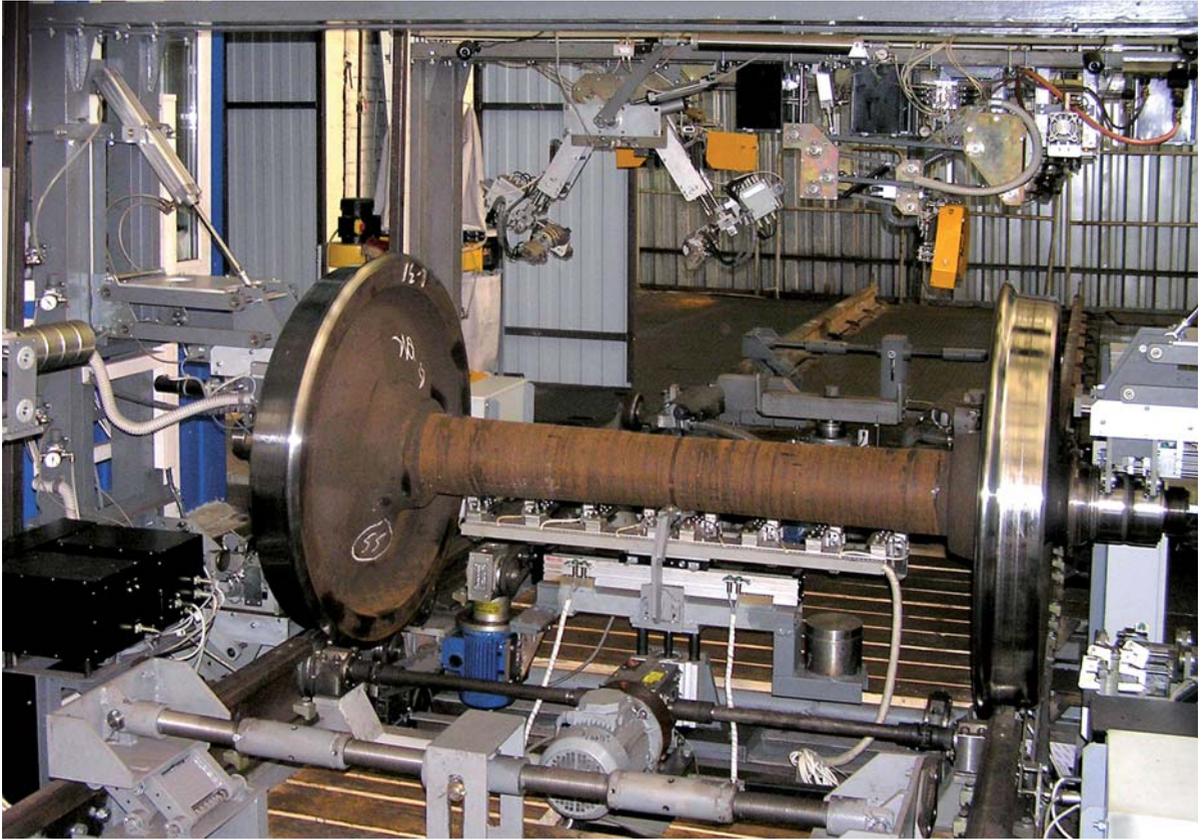
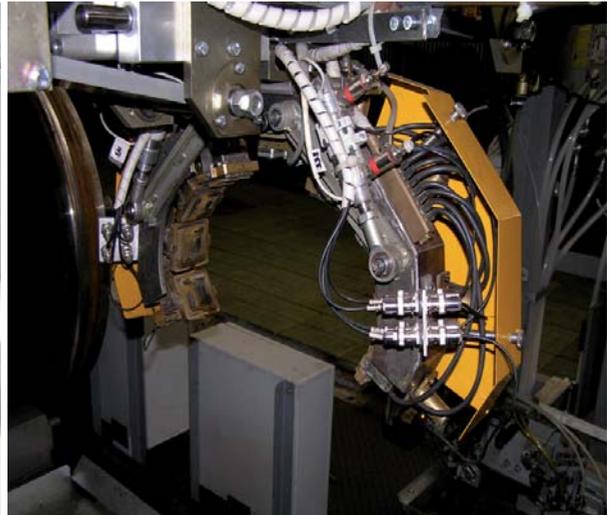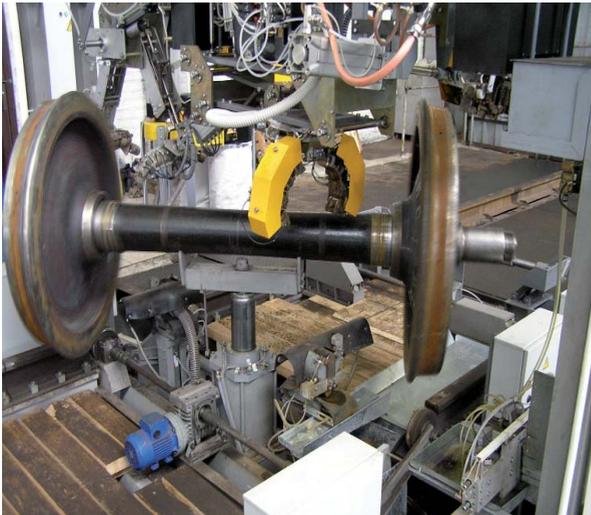Automated systems for comprehensive non-destructive testing of railway wheel pairs are constructed on the basis of OKO-22M-UT channels. They are intended for automated non-destructive testing of railway wheel pairs by ultrasonic method with the aim to detect such flaws as metal discontinuities, cracks of different orientations, surface defects.

THE OKO-22M-UT MAIN SPECIFICATIONS

Parameter	Value	OKO-22M-UT standart	OKO-22M-UT PRO, OKO-22M-UT TOFD
	PULSER		
⊳ Pulser mode	Spike pulser, Square-Wave pulser	Only spike pulser	+
⊳ Pulse Voltage (SQ mode)	120 - 300 V in steps 10 V with tolerance 10%	+	+
⊳ Pulse falling/rising time	5 ns	+	+
⊳ Pulse Width (SQ mode)	20 - 500 ns in steps 10 ns with tolerance 10%	+	+
⊳ PRF (SQ mode)	15 - 2000 Hz in steps 5 Hz, 3 automatic modes: Auto Low, Auto Med, Auto High, Manual	—	+
⊳ Pulse Voltage (spike mode)	Low (100 V), High (400 V)	+	+
⊳ Pulse energy (spike mode)	Low (30 ns), High (100 ns)	+	+
⊳ PRF (spike mode)	15 - 10000 Hz in steps 5 Hz, 3 automatic adjustment modes: Auto Low, Auto Med, Auto High, Manual	–	+
⊳ Damping	50, 62, 150, 400	—	+
	RECEIVER		
⊳ Gain	0 to 110 dB adjustable in steps of 0.2, 0.5, 1, 2 dB	+	+
⊳ Receiver input impedance	400 Ω ±5%	+	+
⊳ Receiver bandwidth	0.2 - 27 MHz (- 3 dB)	+	+
⊳ Digital filter setting	Eight digital filter sets (0.2-10 MHz; 2.0-21.5 MHz; 8.0 - 26.5 MHz; 0.5 - 4 MHz; 5 - 15 MHz; DC -10 MHz)	—	+
⊳ Rectification	Full wave, positive halfwave, negative halfwave, RF	+	+
⊳ Amplitude measurement	0-110%	+	+
⊳ Reject	0-80% FSH	+	+
⊳ Units	Millimeters, inch or microseconds	+	+
⊳ Range	1 to 6000 mm	+	+
⊳ Velocity range	1000 to 10000 m/s in steps of 1, 10, 100, 1000 m/s	+	+
⊳ Thickness measurements range	0.6 to 6000 mm	+	+
⊳ Probe angle	0^0 to 90^0 in steps 0.1, 1.0^0, 10^0	+	+
	DIGITAL SPECIFICATION		
⊳ ADC	10 - bits with the sampling rate 100 MHz	+	+
⊳ A-Scan buffer	8 KB	Raw buter	+
	GATE		
⊳ Measurement gates	– 2 fully independent three-level gates for amplitude and TOF measurement	+	+
	—Additional gate for acoustic coupling control	+	+
	—Additional gate for immersion control	+	+
	– Special-purpose gate of the Automatic gain control (AGC)	+	+
⊳ Gate Start	Variable over entire range	+	+
⊳ Gate Width	Variable over entire range	+	+
⊳ Gate Height	Variable from 2 to 100% FSH	+	+
	MEASUREMENT SPECIFICATION		
⊳ Result display	A-scan, B-scan, C-scan, D-scan, TOFD-scan	Acception	+
⊳ DAC/TCG	—Dynamic range is up to 110 dB	+	+
	—Number of points is 32	+	+
	—Building TCG curve by DAC	+	+
⊳ DGS	— Automatic building of up to 3 curves for different equivalent diameters	+	+
	— Calibration at calibration blocks and testing objects	+	+
	—Building TCG curve by DGS	+	+
	INPUTS & OUTPUTS		
⊳ Probe connector	2 BNC or 2 Lemo 1S	2 BNC	+
⊳ USB port	USB-2.0 (extra port under customer requirements)	–	+
⊳ Ethernet	+	+	+
⊳ Alarm output	+	—	+
⊳ Encoder	1 Lemo (with the option of two encoders operation)	+	+
⊳ Power input	+	+	+
⊳ Trigger	+	+	+
⊳ Wi-Fi	antenna plug in	–	+
⊳ External sync	+	+	+
⊳ Service input	RS-485	–	+