ACOUSTIC CONTROL SYSTEMS

DEVICES FOR NON-DESTRUCTIVE TESTING
OF METALS, PLASTICS AND CONCRETE
DEVELOPMENT, PRODUCTION, SALE

PRODUCT CATALOGUE

2017
1. ABOUT ACS

The scientific production company “ACS, Ltd” (“Acoustic Control Systems, Ltd”) was established in 1991. The company creates, produces and sells high technology equipment for ultrasonic nondestructive testing of various structural materials.

At the moment ACS is one of the leading producers of devices for nondestructive testing. It is respected and trusted by customers of many industries.

In January 2017 Acoustic Control Systems - ACS Group has founded a new company in Germany – ACS-Solutions GmbH.

ACS-Solutions as ACS Group member provides following services to our customers:

• Direct sales of ACS products with short-term delivering from our European stock.
• Speeding-up of guarantee service and post-guarantee maintenance of ACS products.
• Organization and carrying out of seminars for theoretical background and practical trainings for operating of ACS instruments, on request also at customer place.
• Participation in scientific conferences and thematic exhibitions on behalf of ACS Group.
• Inspection services on customer objects by different NDT methods.

2. ACTIVITY

Core areas of the company’s expertise and industry are:

• Scientific researches.
• Development and batch production of equipment for nondestructive testing of metals, plastics, concretes and composite materials:
  - ultrasonic thickness gauges, flaw detectors and tomographs;
  - electromagnetic-acoustic (EMA) thickness gauges and flaw detectors, scanning systems;
  - acoustic guided wave flaw detectors.
• Custom design and manufacturing of highly tailored devices on request.
• Products sale and service.

3. PRODUCTS

Our products have acquired a reputation of high-quality, up-to-date and competitive devices for manual testing not only in Russia but worldwide. More than 15% of our products are exported to EU, USA, Japan and other countries.

Our equipment for nondestructive testing of concrete, composites and stones has no analogues in the world.

4. STAFF

More than 25 years experience makes it possible for our experts to create products combining top technical characteristics, maximum ease and usability, great functionality and modern design.

There are three professors and two PhDs in the company along with skilled engineers and managers. Our scientists and engineers regularly publish key results of their researches and developments at scientific and special magazines.

High qualification and experience of our staff provide the quality of our products to satisfy needs of the most exacting customers.
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their technological and operational parameters without noticing the customer.
Specifications may differ from those presented on the photos.
For specifying any characteristics of the product, please call:
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Germany: +49 (0) 681-3096230 or e-mail: info@acs-international.com
ULTRASONIC THICKNESS GAUGE

A revised model of the pocket-type thickness gauge combining usability and convenience with new functional capabilities.

The thickness gauge is enclosed into a one-piece case with a removable tip having a built-in changeable wearproof single crystal transducer with operating frequency of 4 MHz.

The instrument is an unbeatable tool for express ultrasonic inspection of wall thickness of the boilers and vessels, hull plates and other objects made of ferrous and non-ferrous metals, as well as for ultrasonic thickness measurements of the small-diameter metal and plastic pipes (from 20 mm).
FEATURES
• Simple adjustment and easy to use.
• Small size and weight (can be carried in pocket).
• Four preset ultrasound velocity levels allow the user to select any one of them quickly.
• Required velocity value can be set.
• The instrument can work at temperatures from –30°C up to +50°C.
• Built-in LiPol rechargeable battery.

FUNCTIONALITY
• Single crystal transducer with a wearproof ceramic protective cover and small diameter of the working surface allows testing of corroded surfaces with the minimum radius of curvature from 10 mm.

SPECIFICATION
<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness measurement range (for steel)</td>
<td>from 0.8 to 100.0 mm</td>
</tr>
<tr>
<td>Type and frequency of the built-in transducer</td>
<td>single crystal, 4 MHz</td>
</tr>
<tr>
<td>Diameter of the working surface of the transducer</td>
<td>5 mm</td>
</tr>
<tr>
<td>Discreteness of measurements representation</td>
<td>0.1, 0.01 mm</td>
</tr>
<tr>
<td>Basic accuracy of measurements</td>
<td>± (0.005X + 0.1) mm</td>
</tr>
<tr>
<td>Measurement units</td>
<td>mm, inches</td>
</tr>
<tr>
<td>Range of ultrasonic velocity</td>
<td>from 1 000 to 9 000 m/s</td>
</tr>
<tr>
<td>Discreteness of velocity tuning</td>
<td>1 m/s</td>
</tr>
<tr>
<td>Display type</td>
<td>LCD</td>
</tr>
<tr>
<td>Power</td>
<td>built-in LiPol rechargeable battery</td>
</tr>
<tr>
<td>Period of continuous operation of the instrument at positive temperatures</td>
<td>16 hours</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>from -30 to +50°C</td>
</tr>
<tr>
<td>Overall dimensions</td>
<td>125 x 25 x 15 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>40 g</td>
</tr>
</tbody>
</table>

DELIVERY SET
• A1207 – an ultrasonic thickness gauge with a built-in rechargeable battery and a single crystal transducer
• Power adapter 220 V – USB
• USB A - Micro B cable
• Calibration sample
• Bag
FROST-RESISTANT ULTRASONIC THICKNESS GAUGE

Frost-proof ultrasonic thickness gauge for difficult weather conditions (from -30 to +50°C). The range of thickness measurement on steel is from 0.7 to 300 mm. Work with both single-crystal and double-crystal transducers.

The single-crystal wear-resistant transducer S3567 2.5A0D10CL is used to measure thickness of metals, cast iron and other materials with high ultrasound attenuation.

The double-crystal transducer D2763 10.0A0D6CL provides detection of pitting corrosion and measuring thickness thin-walled pipes of small diameter.

It is easy to master the device thanks to its high contrast display, friendly interface and high functionality.

The cover with build-in magnetic holder helps to fix the thickness gauge safely to metal surfaces for comfort work at hard-to-reach places and at heights.
**FEATURES**
- Durable body of light shockproof plastic.
- Large, informative, high contrast TFT display.
- Embedded frostproof Li-Pol accumulator.
- Automatic adaptation to transducers.
- Variable discreteness of thickness measurement (0.1/0.01 mm).
- Several operating modes.
- Indication of residual thickness of the tested object in per cent.
- Velocity calibration on material with known thickness.
- Nonvolatile memory for 50 000 measurements.
- USB connection to PC for data transmission.
- Software for saving data to PC.
- A special soft cover to protect the electronic unit from dirt, dust and water. Can be fastened on a hand.

**EXTRA FUNCTIONS**
- Sound indication.
- Vibro indication.
- Signal level indication.
- Battery level indication.
- Automatic switch off.

**OPERATION MODES**

**NORM mode**
For quick thickness measuring with the possibility to set the range of monitor and to detect the metal thickness derating.

Comfort work is provided by sound and vibro indications of violating limits of permissible results together with graphic presentation of the depth gauge scale.

There is a possibility to perform thickness measuring with indication of residual thickness of the object of inspection in per cent of value preset by defining the upper limit indicating 100% and the lower limit indicating spoilage standard.

**MEMORY mode**
For quick thickness measuring and saving results. Readings can be distributed to groups before saving, viewed on screen and edited by performing new measuring and saving new data to the same cells.

**TOLERANCE mode**
This mode is used for prompt detection of thickness departure from the agreed nominal value. It’s convenient to use this mode when regulations specify allowances.

All modes support saving results to memory.

**SPECIFICATION**

<table>
<thead>
<tr>
<th>Thickness measurement range (for steel) with transducers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3567 2.5A0D10CL</td>
</tr>
<tr>
<td>D2763 10.0A0D6CL</td>
</tr>
</tbody>
</table>

Discreteness of thickness measuring for thickness range:
- to 99.99 mm: 0.01; 0.1 mm
- from 100.0 mm: 0.1 mm

Basic measurement accuracy for thickness X, not more:
- for thickness from 0.7 to 3.0 mm: ±(0.01X+0.1) mm
- for thickness from 3.01 to 99.99 mm: ±(0.01X+0.05) mm
- for thickness from 100.0 to 300.0 mm: ±(0.01X+0.1) mm

Minimum curvature radius: 10 mm

Ultrasound velocity range: from 500 to 19 999 m/s

Display type: TFT

Power: built-in lithium accumulator

Operation time without re-charging: 9 h

Operating temperature: from -30 to +50 °C

Size of the electronic unit: 161 x 70 x 24 mm

Weight of the electronic unit: 210 g

**DELIVERY SET**
- A1208 – frostproof ultrasonic thickness gauge
- Transducer S3567 2.5A0D10CL
- Single LEMO 00 – LEMO 00 cable 1.2 m
- 220 B – USB adapter
- USB A - Micro B cable
- Soft cover
- Bag
UNIVERSAL ULTRASONIC THICKNESS GAUGE

Traditional quality, trustworthy measurements and new performance: large high contrast display, integrated extra functions and various modes of measuring, possibility to work with all double-crystal transducers at the range from 4 to 10 MHz and built in memory – everything to guarantee comfort work at any object of inspection.

The patented algorithm of automatic adaptation to the surface curvature and roughness (dynamical threshold) makes it possible to perform measuring at corroded surfaces with small radius of curvature as well as at flat smooth surfaces without any additional adjustments, which makes the process of inspection much easier and faster.

The delivery set contains the double-crystal transducer D1771 4.0A0D12CL, which has great wear resistance and provides effective measurements at most objects.

Optionally the devices can be completed with a high-temperature transducer to work at the temperature range from -20 to +250°C (to +300°C for a short application for not longer than 6 seconds).

The cover with build-in magnetic holder helps to fix the thickness gauge safely to metal surfaces for comfort work at hard-to reach places and at heights.
FEATURES
• Light shockproof body.
• Large, informative, high contrast TFT display.
• Built-in Li-Pol accumulator.
• Automatic adaptation to transducers.
• Discreteness of thickness indication 0.01 or 0.1 mm.
• Various operation modes.
• Calibration at the object of inspection.
• Indication of residual thickness of the object of inspection in per cent.
• Nonvolatile memory for 50 000 measurements.
• USB connection to PC for data transmission.
• Software for saving data to PC.
• A special soft cover to protect the electronic unit from dirt, dust and water.
  Can be fastened on a hand.

EXTRA FUNCTIONS
• Sound indication of echo-signal reception.
• Vibro indication.
• Signal level indication.
• Battery level indication.
• Automatic switch off.

OPERATION MODES

NORM mode
For quick thickness measuring with the possibility to set the range of monitor and to detect the metal thickness derating.

Sound and vibro indications when violating the limits of permissible results together with graphic presentation of the depth gauge scale provide comfort work.

There is a possibility to measure thickness with indication of residual thickness of the object of inspection in per cent of value preset by defining the upper limit indicating 100% and the lower limit indicating spoilage standart.

MEMORY mode
For quick thickness measuring and saving results. Readings can be distributed to groups before saving, viewed on screen and edited by performing new measuring and saving new data to the same cells.

All modes support saving results to memory.

SPECIFICATION

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness measurement range(for steel) with transducer D1771 4.0A0D12CL</td>
<td>from 0.7 to 300.0 mm</td>
</tr>
<tr>
<td>Discreteness of thickness measuring for thickness range:</td>
<td></td>
</tr>
<tr>
<td>to 99.99 mm</td>
<td>0.01; 0.1 mm</td>
</tr>
<tr>
<td>from 100.0 mm</td>
<td>0.1 mm</td>
</tr>
<tr>
<td>Basic measurement accuracy for thickness X, not more:</td>
<td></td>
</tr>
<tr>
<td>for thickness from 0.7 to 3.0 mm</td>
<td>±(0.01X+0.1) mm</td>
</tr>
<tr>
<td>for thickness from 3.01 to 99.99 mm</td>
<td>±(0.01X+0.05) mm</td>
</tr>
<tr>
<td>for thickness from 100.0 to 300.0 mm</td>
<td>±(0.01X+0.1) mm</td>
</tr>
<tr>
<td>Minimum curvature radius</td>
<td>10 mm</td>
</tr>
<tr>
<td>Ultrasound velocity range</td>
<td>from 500 to 19 999 m/s</td>
</tr>
<tr>
<td>Display type</td>
<td>TFT</td>
</tr>
<tr>
<td>Power</td>
<td>built-in LiPol accumulator</td>
</tr>
<tr>
<td>Operation time without re-charging</td>
<td>9 h</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>from -20 to +50 °C</td>
</tr>
<tr>
<td>Size of the electronic unit</td>
<td>161 x 70 x 24 mm</td>
</tr>
<tr>
<td>Weight of the electronic unit</td>
<td>210 g</td>
</tr>
</tbody>
</table>

DELIVERY SET
• A1209 – ultrasonic thickness gauge
• Transducer D1771 4.0A0D12CL
• Double LEMO 00 – LEMO 00 cable 1.2 m
• 220 B – USB adapter
• USB A - Micro B cable
• Soft cover
• Bag
ULTRASONIC THICKNESS GAUGE WITH A-SCAN

Innovative ultrasonic thickness gauge with enriched functionality.

The thickness gauge can operate at the mode of displaying results as digital data or at the mode with graphic imaging of the signal A-Scan.

The A-Scan feature rules out false results considerably increasing the inspection reliability. It makes possible to perform express search of foreign inclusions and laminations and to get accurate results of measuring through polymeric (polyethylene), varnish and paint and other types of insulating coating.

The thickness gauge A1210 offers a whole range of features to provide easy and effective work:
• double-crystal and single-crystal transducers;
• patented system of automatic adaptation to the surface curvature and roughness;
• patented auto correlated algorithm of measuring for pinpoint accuracy of results eliminating the influence of the single-crystal transducers’ near field zone at small thickness.

The large TFT display ensures full visual control of the inspection process with the help of color indication.

The cover with build-in magnetic holder helps to fix the thickness gauge safely to metal surfaces for comfort work at hard-to-reach places and at heights.
FEATURES

• Color high-contrast TFT display.
• A-Scan mode with an option to save images to memory.
• Metal thickness measuring through insulating coating at the A-Scan mode.
• Nonvolatile memory for 50,000 measurements including 4,000 A-Scan images.
• Automatic measuring of the ultrasonic velocity at a sample with known thickness.
• Setting the range of measurements.
• Indication of the range limits violation – with color, sound and vibro.
• Indication of residual thickness of the tested object in per cent.
• USB connection to PC for data transmission and for charging.
• Software for saving data to PC.
• A special soft cover to protect the electronic unit from dirt, dust and water. Can be fastened on a hand.

EXTRA FUNCTIONS

• Discreteness of thickness measuring 0.01 or 0.1 mm.
• Choice between mm and inches.
• Vibro indication.
• Signal level indication.
• Battery level indication.

OPERATION MODES

A-SCAN mode
Select this mode if you want signals displayed as A-Scans.

This mode rules out inaccuracy of measurements caused by duplicated readings. There are four possible ways to perform measuring: first overshoot of the gate, maximum point at the gate, between two signals and auto correlation function (ACF) in gate.

If you choose the “between two signals” way you can measure thickness of metal through polymeric (polyethylene), and varnish and paint coatings without skinning.

NORM mode
This mode is for quick thickness measuring with a possibility to set the range of monitor and to detect the metal thickness derating.

Sound and vibro indications when violating the limits of permissible results together with graphic presentation of the depth gauge scale provide comfort work.

There is a possibility to measure thickness with indication of residual thickness of the object of inspection in per cent of value preset by defining the upper limit indicating 100% and the lower limit indicating spoilage standard.

MEMORY mode
For quick thickness measuring and saving results. Readings can be distributed to groups before saving, viewed on screen and edited by performing new measuring and saving new data to the same cells.

All modes support saving results to memory.

SPECIFICATION

<table>
<thead>
<tr>
<th>Thickness measurement range (for steel) with transducers:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S3567 2.5A0D10CL</td>
<td>from 0.8 to 300.0 mm</td>
</tr>
<tr>
<td>D1771 4.0A0D12CL</td>
<td>from 0.7 to 300.0 mm</td>
</tr>
</tbody>
</table>

Discreteness of thickness measuring for thickness range:

| to 99.99 mm     | 0.01; 0.1 mm |
| from 100.0 mm   | 0.1 mm      |

Basic measurement accuracy for thickness X, not more:

| for thickness from 0.7 to 3.0 mm | ±(0.01X+0.1) mm |
| for thickness from 3.01 to 99.99 mm | ±(0.01X+0.05) mm |
| for thickness from 100.0 to 300.0 mm | ±(0.01X+0.1) mm |

Minimum curvature radius 10 mm
Ultrasound velocity range from 500 to 19,999 m/s
Display type TFT
Power built-in LiPol accumulator
Operation time without re-charging 9 h
Operating temperature from -20 to +50 °С
Size of the electronic unit 161 x 70 x 24 mm
Weight of the electronic unit 230 g

DELIVERY SET

• A1210 – ultrasonic thickness gauge with A-Scan
• Transducer S3567 2.5A0D10CL
• Transducer D1771 4.0A0D12CL
• Single LEMO 00 – LEMO 00 cable 1.2 m
• Double LEMO 00 – LEMO 00 cable 1.2 m
• 220 В – USB adapter
• USB A - Micro B cable
• Soft cover
• Bag
ELECTRO-MAGNETIC ACOUSTIC THICKNESS GAUGE

A modernized EMA thickness gauge with an innovative electro-magnetic biasing technology implemented in EMA transducers is designed to measure thickness of objects made of steel and aluminum alloys without the use of coupling liquid.

Substantial advantage of the new technology represents absence of a permanent magnet in the EMA transducers thus allowing sidestepping of strong adhesion of the transducer to the surfaces of the objects made of ferromagnetic steel; allowing scanning of the object being inspected, and preventing metal chips from sticking to the transducer’s protector, thus extending its service life.
### FEATURES
- Range of the measurable thickness values is from 0.6 to 50 mm.
- Quick access to control functions.
- Parameters of the selected transducer can be adjusted using an integrated calibration sample.
- Automatic determination of ultrasonic velocity on the object of known thickness.
- Pre-installed database of transverse velocities of the basic materials suitable for adding more velocity values.
- Non-volatile memory can store 50 000 digital measurement results and 4 000 A-Scans.
- Large informative color TFT display.
- Changeability of image orientation when the instrument is rotated by 90 degrees.
- Instrument backlighting control.
- Built-in lithium rechargeable battery (accumulator).
- Indicator of the accumulator charge level.
- Continuous work time is 9 h.
- Sound, light and vibro- indication.
- Indication discreteness of thickness measurement is 0.01 or 0.1 mm.
- Data transfer to PC via USB.
- Software to receive data from the instrument and save them into the PC.
- Special-purpose case – holder suitable for fastening of the instrument’s electronic unit for convenient operation in hard-to-reach places and for working at elevated conditions.

### FUNCTIONALITY
- An innovative technical solution frees the design of the EMA transducer from strong permanent magnets hence they are replaced with pulsed electromagnets. It excludes an effect of strong adhesion of the transducer to the ferromagnetic materials, as well as ensures safe operation of the transducer and simplifies scanning procedure, thus simplifying practical use of the thickness gauge during manual UT inspection.
- Two types of transverse wave EMA transducers – with radial and linear polarization, based on the developed pulsed electromagnet technology, are used.
- Operation with the permanent magnet transducers S7392 and S7394 by connecting a special adapter.
- Measurements can be conducted without pretreatment of the surfaces of the inspected objects and without use of coupling liquid.
- Thickness measurement of metal objects through corrosive and paint coatings of up to 1.5 mm in thickness. Instrument’s screen displays a thickness value of the metal object without considering the coating if the coating thickness is 1.5 mm and thickness value of the object being inspected is up to 15 mm.
- Scanning the object being inspected.
- Ultrasonic thickness measurement of the objects through air gap, by means of fastening of the EMA transducer in the special-purpose movable carriage.
- Small aperture of the EMA transducer (8 mm) allows to inspect of the small-diameter pipes (from 15 mm).
- Operation in the display mode representing the measurement results in the form of digital values or in the mode with graphic imaging of A-Scan of the signal.
- B-Scan mode to display a profile of the object being inspected on the instrument’s screen.

### PURPOSE
- Thickness measurement of the walls of steel pipes and steel objects, parts and nodes made of metals and alloys without the use of coupling liquid.
- Thickness measurement of the sheet products.
- Thickness measurement of the ship bottom without pretreatment of the surface.
- Evaluation of anisotropy degree of the material.
OPERATION MODES

The mode is used for thickness measurement of the object on-the-spot along with display of the previously saved resulted (groups - cells in the groups - results) on the instrument’s screen.

Representation of digital values of the measurement results for the horizontal and vertical positions of the display.

FEATURES
- Pre-selection of the group into which a result will be saved in any measurement mode. Grouping of the results simplifies further viewing and analysis of the received results.
- Correction of the saved results, by means of repeated measurements followed by recording of new data into the correctable memory cell. Any doubtful result can be overwritten.

MEMORY MODE

A-SCAN MODE

The mode is used to perform measurements with graphic imaging of the signal on the instrument’s screen in the form of A-Scan.

Representation of A-Scan of the signal for horizontal and vertical positions of the display.

FEATURES
- The mode allows elimination of measurement uncertainties caused by presence of discontinuities in material of the object being inspected. The signals shall be displayed on the screen in the form of A-Scans; measurement terms shall be set directly in the working process.
- Selection of the measurement way:
  - by the first signal excess over the gate level;
  - by maximum value of the signal in the gate;
  - between two peak signals in the strobe (it allows to conduct of ultrasonic thickness measurement of the metal through the paint coatings without removing);
  - signals combining in the gate (ACF function).
- Viewing the selected sections of the signal, current parameters and settings.
- Saving the A-Scan image together with the digital measurement result.

B-SCAN MODE

The mode is used to search for corrosion failures during scanning of the object being inspected along with representation of the graphic image of the B-Scan.

Representation of the B-Scan for horizontal and vertical positions of the display corresponding to the thickness profile of the object being inspected.

FEATURES
- Imaging of the B-Scan graphic image on the instrument’s screen when performing measurements at the rate of up to 10 frames per second.
- Setting up a moving velocity of the transducer.
- Setting up a number of measurements for a fixed distance.
- Representation of the current measurement result, as well as a minimal/maximal measurement result.
### SPECIFICATION

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of measurable thickness values with the S3850 5.0A0D8ES transducer</td>
<td>from 0.6 to 50.0 mm</td>
</tr>
<tr>
<td>Operational frequencies range</td>
<td>from 2.5 to 5.0 MHz</td>
</tr>
<tr>
<td>Main accuracy of X thickness measurement, no more than</td>
<td>±(0.01X+0.1) mm</td>
</tr>
<tr>
<td>Velocity range</td>
<td>from 1 000 to 9 999 m/s</td>
</tr>
<tr>
<td>Number of recordable results</td>
<td>50 000 measurements</td>
</tr>
<tr>
<td></td>
<td>4 000 A-Scans</td>
</tr>
<tr>
<td>Size and type of the display</td>
<td>3.5” TFT, antiglare, color</td>
</tr>
<tr>
<td>Nominal accumulator voltage</td>
<td>13.2 V</td>
</tr>
<tr>
<td>Period of continuous operation of the instrument powered by the accumulator, no less than</td>
<td>9 h</td>
</tr>
<tr>
<td>Instrument-PC communication interface</td>
<td>USB</td>
</tr>
<tr>
<td>Overall dimensions of the electronic unit</td>
<td>190 x 87 x 40 mm</td>
</tr>
<tr>
<td>Weight of the electronic unit, no more than</td>
<td>900 g</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>from -30 to +50°C</td>
</tr>
</tbody>
</table>

### DELIVERY SET

- A1270 – electronic unit of the EMA thickness gauge
- S3850 5.0A0D8ES EMA transducer with a built-in cable
- Power adapter with cable 220V-15V
- USB A- Micro B cable
- Bag
A1211 Mini

TINY ULTRASONIC FLAW DETECTOR

It is a handheld full-function ultrasonic flaw detector for ultrasonic inspection of metals, plastics and weld-joints and thickness measuring.

Thanks to its extraordinarily small size and light weight this flaw detector can be used in cramped and hard conditions. It is very convenient for business trips.

It is the lightest flaw detector – only 210 g with the battery.

Specialists of any skill level can master the device even without training owing to its intuitive interface and simple and easy-to-use menu for quick setting and selecting of working configuration parameters.

The flaw detector has a high-contrast informative TFT display with the possibility to change the image orientation if the device is turned 90 degrees.

A cover with built-in magnetic holder provides reliable fastening on metal surfaces for comfortable work in difficult-to-reach places and on heights.
**FEATURES**
- Measurement of the signal levels and defects coordinates.
- Choice of scale types: mm - depth, μs – time.
- Quick access to control functions.
- Three-level gate corresponding to the level of assessment of defects found (acceptance, reporting, examination) for correct sizing of defects across the thickness of the object of inspection.
- Display can show A-Scan and additional information: the ultrasound speed, thickness of the object of inspection, frequency signal reflection, gain.
- Indication of exceeding the reference level - color, sound, vibration.
- The battery level indicator.
- On-line control of the unit backlight.
- Discreteness of indicated measurements: 0.1 or 1 mm.
- USB connection to PC.
- Software for receiving data from the device and saving it to PC.
- Specialized soft cover to protect the electronics from dirt, dust and water, with the possibility of fastening it on a hand.

**FUNCTIONALITY**
- Possibility to change the image orientation if the device is turned 90 degrees.
- Digital TCG configuring to display information in a horizontal and vertical version of the image orientation.
- Convenient setup menu with the option to save and load configurations.
- Memory for 100 measurements for saving, viewing and deleting A-Scans.

**SPECIFICATION**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity range</td>
<td>from 1 000 to 14 999 m/s</td>
</tr>
<tr>
<td>Working frequencies</td>
<td>from 0.5 to 15.0 MHz</td>
</tr>
<tr>
<td>Gain regulation range</td>
<td>from 0 to 80 dB</td>
</tr>
<tr>
<td>Gain setting step</td>
<td>1 dB</td>
</tr>
<tr>
<td>Flaw coordinate measuring range (on steel) with a normal transducers:</td>
<td></td>
</tr>
<tr>
<td>transducer S3568 2.5A0D10CL</td>
<td>from 7 to 900 mm</td>
</tr>
<tr>
<td>transducer D1771 4.0Aod12CL</td>
<td>from 2 to 450 mm</td>
</tr>
<tr>
<td>Permissible basic flaw coordinate measuring accuracy with an normal transducers</td>
<td>± (0.03H + 1.0) mm</td>
</tr>
<tr>
<td>Flaw coordinate measuring range (on steel) with an angled transducers:</td>
<td></td>
</tr>
<tr>
<td>transducer S5182 2.5A65D12CS</td>
<td>from 2 to 200 mm</td>
</tr>
<tr>
<td>transducer S5096 5.0A70D6CS</td>
<td>from 2 to 90 mm</td>
</tr>
<tr>
<td>Permissible basic flaw coordinate measuring accuracy with an angled transducers:</td>
<td></td>
</tr>
<tr>
<td>depth H</td>
<td>± (0.03H + 1.0) mm</td>
</tr>
<tr>
<td>distance on surface L</td>
<td>± (0.03L + 1.0) mm</td>
</tr>
<tr>
<td>Display type, display resolution</td>
<td>TFT, 320 x 240</td>
</tr>
<tr>
<td>Power supply</td>
<td>Li-Pol battery</td>
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<tr>
<td>Power</td>
<td>3.7 V</td>
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<tr>
<td>Operation time from battery, not less than</td>
<td>9 h</td>
</tr>
<tr>
<td>Size</td>
<td>161 x 70 x 24 mm</td>
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<tr>
<td>Weight</td>
<td>210 g</td>
</tr>
<tr>
<td>Operation temperature</td>
<td>from -20 to +55°C</td>
</tr>
</tbody>
</table>

**DELIVERY SET**
- A1211 Mini – ultrasonic flaw detector
- Transducer S3568 2.5A0D10CL
- Transducer S5182 2.5A65D12CS
- Transducer S5096 5.0A70D6CS
- Single LEMO 00 – LEMO 00 cable 1.2 m
- 220 V – USB adapter
- USB A – Micro B cable
- Soft cover
- Bag
A1212 MASTER AND A1214 EXPERT
UNIVERSAL ULTRASONIC FLAW DETECTORS

Portable small-size general-purpose ultrasonic flaw detectors. They realize standard and special-purpose methods of ultrasonic inspection providing high efficiency and accuracy of measurements.

A1212 MASTER SPECIAL FEATURES
• All features of an up-to-date flaw detector in a compact case.
• Ideal for work at hard-to-reach places.
• Can be used in cramped and hard conditions thanks to light weight and small size. Handy for travelling.
• It weights 800 grams with the battery.
• Maximum operation time – 9 hours.
• Ergonomic case of shockproof plastic – the device can be held with one hand.
• Large high-contrast color display with high resolution (640x480 pixels) enables you to work for a long time without straining your eyes.
• Voice comments can be added to saved imaged with the help of freehand Bluetooth set.
• The electronic unit can be mounted to a special pad to have both hands free and to work with comfort at hard-to-get places and at heights.
• A special soft cover with sun hood protects the electronic unit from dirt, water and dust and also from external light and sun beams.
**A1214 EXPERT**

**APPLICATION**
- Weld joints inspection.
- Locating corrosion, cracks, internal stratifications and other flaws.
- Locating and sizing up flaws (discontinuities and inhomogeneities) in metal and plastic objects.

**A1214 EXPERT SPECIAL FEATURES**
- Classic version of an ultrasonic flaw detector offering all up-to-date functions.
- Large high-contrast color TFT display with high resolution (640 x 480) enables you to work for a long time without straining your eyes.
- User-friendly interface with shortcut keys.
- Voice comments can be added to saved images with the help of a freehand Bluetooth set.
- Operating temperature range from -30 to +55°C.
- Maximum operating time – 18 hours.
- Weight of the flaw detector with the battery – 1.8 kg.
- Quick-detachable frost-resistant accumulator.
GENERAL FEATURES

A1212 MASTER and A1214 EXPERT flaw detectors offer a range of unique features thanks to entirely digital paths:

The signal can be represented in undetected form – RF type signals (radio signal) in real time, making it possible to examine signal phases in details, to perform testing with a lot of structural noises and to distinguish signals from nearby reflectors.

Digital TCG allows to modify the signal, basing on an arbitrary function set up by 32 node points. Mode points are set up, modified and deleted at a special TCG editing mode. Setup of TCG is performed to get pulses of equal height from equal reflectors providing correct sizing of flaws through the whole thickness of the object of inspection.

DGS-diagrams for single-crystal transducers show three curves on the screen, representing the acceptance, reporting and examination levels. The equivalent area of discontinuity is evaluated automatically. With feature you avoid manual evaluations of flaw area to increase the testing efficiency significantly.

DAC-curves show three curves on the screen, representing the acceptance, reporting and examination levels. This allows you correctly estimate the validity of the detected defects, according to the current normative and methods of ultrasonic testing.

INTUITIVE USER INTERFACE OF SETTING UP AND OPERATING THE DEVICE

- Quick access to control functions.
  At any operation mode the lower part of the screen features an icon menu to access set up and functions quickly.

- Large library of configurations (100 variants).
  The device can be customized for various situations and objects in a lab, and on-site the operator can just select the right configuration from the menu. All settings are saved in the nonvolatile memory.

- Energy - independent memory for 2000 display images (A-Scans with settings of inspection).
  At the MENU mode the signal and its description is shown at the upper part of the display allowing to adjust settings of inspection on-the-fly.

- Voice comments can be added to saved imaged with the help of freehand Bluetooth set (2000 options).
  Within 20 seconds the user is able to record the necessary information about the test object with a reference to a frame of saved A-Scan.

- Semiautomatic procedure of angle correction and delay time in the wedge in case of transducer wearing.

PROCESSING RESULTS

- Results can be transferred to an external PC to be processed, documented as A-Scans with settings of inspection and archiving.
- Data are received and saved with special software – ADM 4, included in the Delivery set.
- The device can be connected to a PC through a high speed USB-port.
## SPECIFICATION

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated operating frequencies</td>
<td>from 0.5 to 15.0 MHz</td>
</tr>
<tr>
<td>Operating frequencies deviation from rated</td>
<td>± 10%</td>
</tr>
<tr>
<td>Material ultrasound velocity setting range</td>
<td>from 500 to 14 999 m/s</td>
</tr>
<tr>
<td>Gain regulation range</td>
<td>from 0 to 100 dB</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with a normal transducers:</td>
<td></td>
</tr>
<tr>
<td>S3568 2.5A0D10CL</td>
<td>from 7 to 6 000 mm</td>
</tr>
<tr>
<td>D1771 4.0A0D12CL</td>
<td>from 2 to 3 000 mm</td>
</tr>
<tr>
<td>Permissible basic flaw depth measuring accuracy (on steel) with an normal transducers</td>
<td>±(0.02H+1.00) mm</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with an angled transducers:</td>
<td></td>
</tr>
<tr>
<td>S5182 2.5A65D12CS</td>
<td>from 2 to 1 300 mm</td>
</tr>
<tr>
<td>S5096 5.0A70D6CS</td>
<td>from 2 to 500 mm</td>
</tr>
<tr>
<td>Permissible basic flaw coordinate measuring accuracy (on steel) with an angled transducers:</td>
<td></td>
</tr>
<tr>
<td>• depth H</td>
<td>±(0.03H+1.00) mm</td>
</tr>
<tr>
<td>• distance on surface L</td>
<td>±(0.03L+1.0) mm</td>
</tr>
<tr>
<td>Rated battery voltage</td>
<td>11.1 V</td>
</tr>
<tr>
<td>Operating time at normal weather conditions, not less than:</td>
<td></td>
</tr>
<tr>
<td>• A1212 MASTER</td>
<td>9 h</td>
</tr>
<tr>
<td>• A1214 EXPERT</td>
<td>18 h</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>from -30 to +55°C</td>
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<tr>
<td>Display type</td>
<td>color TFT</td>
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<tr>
<td>Display resolution</td>
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<tr>
<td>Electronic unit size:</td>
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<tr>
<td>• A1212 MASTER</td>
<td>260 x 157 x 43 mm</td>
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<tr>
<td>• A1214 EXPERT</td>
<td>260 x 166 x 80 mm</td>
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<tr>
<td>Weight with batteries:</td>
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<tr>
<td>• A1212 MASTER</td>
<td>800 g</td>
</tr>
<tr>
<td>• A1214 EXPERT</td>
<td>1.8 kg</td>
</tr>
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</table>

## DELIVERY SET

**A1212 MASTER**
- A1212 MASTER - flaw detector electronic unit
- D1771 4.0A0D12CL transducer
- S3568 2.5A0D10CL transducer
- S5182 2.5A65D12CS transducer
- S5096 5.0A70D6CS transducer
- LEMO 00 - LEMO 00 double cable 1.2 m
- LEMO 00 - LEMO 00 single cable 1.2 m
- Power adapter, cable
- USB cable
- Freehand Bluetooth
- Calibrating sample V2/25
- Soft cover
- Pad
- Travel bag

**A1214 EXPERT**
- A1214 EXPERT – flaw detector electronic unit
- Detachable frost proof Li battery
- D1771 4.0A0D12CL transducer
- S3568 2.5A0D10CL transducer
- S5182 2.5A65D12CS transducer
- S5096 5.0A70D6CS transducer
- LEMO 00 - LEMO 00 double cable 1.2 m
- LEMO 00 - LEMO 00 single cable 1.2 m
- Power adapter, cable
- USB cable
- Freehand Bluetooth
- Calibrating sample V2/25
- Soft cover
- Travel bag
A1550 IntroVisor

ULTRASONIC FLAW DETECTOR-TOMOGRAPH

The universal portable ultrasonic flaw detector-tomograph with DFA (Digitally Focused Array) visualize the internal structure of the object as real-time section imaging (B-Scan) making the results interpretation much easier than with a traditional flaw detector.

The tomograph uses various types of antenna arrays comparable by size with traditional transducers. Thanks to our special control algorithm the antenna array (AA) substitutes a whole kit of standard transducers traditionally used for testing.

A1550 IntroVisor operates basing on the principle of DFA virtual focusing to every point of the visualized section, providing high efficiency and best results for spatial resolution and sensitivity.

The A1550 IntroVisor tomograph is designed to meet the challenge of quick and efficient flaw detection at metal, plastic and composite objects with detailed documenting of the results.

To see inside metal... It’s easy now!
**ADVANTAGES**
- Real-time imaging of the object internal structure.
- Option to use various types of ultrasonic waves:
  - shear waves to inspect welds overlapping angular range used by standard methods of ultrasonic testing;
  - longitudinal waves to inspect base metal.
- Enhanced resolution and sensitivity.
- Possibility to measure discontinuity flaw size.
- High testing efficiency.
- Can operate as a tomograph (B-Scan) and as a traditional flaw detector (A-Scan).
- Weld joints scanning mode (C-Scan) with saving results to memory.

**FEATURES**
- Reconstruction of the inner structure of the object as real-time B-Scans with handy scales of distance and depth.
- Small size.
- Large color TFT display presents graphic image of the section, signals levels and coordinates.
- It is easy to master the device thanks to its user-friendly intuitive interface with shortcuts to core settings, parameters and control.
- The AA acoustic module can be replaced by hands.
- Special software helps to receive data from the device to process them, to document as tomograms and echo-signals and to activation.

**FUNCTIONS**
- Changing the scale and imaging area position in relation to the center of the antenna array.
- Five modes of visualizing discontinuity flaws depending on type.
- Two fully adjustable 2D gates.
- Run-time control of the tomogram contrast.
- Setting, saving and selection of configuration for every object.
- 2D system of spatial sensitivity adjustment to find and evaluate small flaws according to actual regulating documents and to size flaws up correctly at the whole surface of the object of inspection.
- Scanning along weld joints with the antenna array with an encoder (supply optionally) provides real-time image of the internal structure of the object as C- and D-Scans.
- Reflecting images of vertically oriented flaws.

**TYPES OF ANTENNA ARRAYS FOR THE TOMOGRAPH**
For various fields of application the A1550 tomograph uses the following arrays:
- **M9060 4.0V0R40X10CL** – 16 elements longitudinal wave array with central operation frequency of 4 MHz and scan zone of ±50°. It is used to test metal and plastic objects.
- **M9065 4.0V60R40X10CS** - 16 elements shear wave array with central operation frequency of 4 MHz and scan zone from 35° to 80°. It is used to test welding joints including austenitic. This array is distinguished by the absence of a large refracting prism.
- **M9170 4.0V60R26X10CS** - 16 elements shear wave with central operation frequency 4 MHz and sector of scanning from 35° to 80°. Used to test the weld joints. Decreased aperture (26x10 mm) is a peculiar feature of the antenna array allowing to inspect various objects in hard-to-reach locations and to minimise preparation of the near-welding surface.
- **M9171 4.0V0R26X10CL** - 16 elements longitudinal wave with central operation frequency 4 MHz and sector of scanning from -30° to +30°. Decreased aperture (26x10 mm) is a peculiar feature of the antenna array allowing to inspect various objects in hard-to-reach locations.

The antenna arrays are designed to make it possible to replace the acoustic module as its work surface is worn out.
The user can replace an out-worn acoustic module himself, so the inspection can be performed almost non-stop, increasing efficiency.
The replacement unit can be fitted to various pipe diameters expanding the range of tasks to be solved with the ultrasonic testing.
Antenna arrays can be used with an encoder (supplied optionally).
OPERATION MODES

A1550 IntroVisor has three basic operation modes and a function of setting a configuration for every particular object to be promptly selected later.

TOMOGRAPH MODE

Provides work with arrays and real-time construction of tomograms. At this mode not only tomogram (B-Scan) is displayed but all service information as well, including gates, cursors, digital indicators etc. The device realize five modes of visualizing a discontinuity flaws adaptive to its type. A mode is selected depending on the task of testing and the specificity of the object. Symbols described below help to identify each of the modes:

- for odd-shaped objects without definite thickness or for objects with rough back surface;
- for plane-parallel objects with a known thickness;
- for plane-parallel objects with a known thickness, for small-thickness objects when detecting flaws close to the surface;
- to detect vertically oriented flaws with a smooth surface mirroring the ultrasound;
- a general-purpose mode for plane-parallel objects with a known thickness and all types of discontinuity flaws.

When a flaw is detected its real or equivalent size can be estimated using one of the following methods:

- traditional (comparing to the amplitude of signal from the reference reflector);
- defectometric (measuring coordinated of the feature points of the flaw image and distance between them right on the reconstructed image).

TWO-DIMENSIONAL DGS - DIAGRAM IN TOMOGRAPH MODE

This is automatic calculation of the equivalent area of discontinuity, recounted in flat bottom hole.

This function allows operator to correctly estimate the validity of the detected defects, according to the current normative and methods of ultrasonic testing.

SCANNER MODE

Provides work with the AA and the encoder when scanning along a weld joint. C- and D-Scans are displayed in real time.

When a flaw is found its real size is evaluated with a cursor moving in three coordinated (distance, length, depth) making it easy to locate the flaw and to estimate its conventional length.

It is possible to display B-Scan while moving the vertically oriented cursor across the reconstructed image to create a clear image of the internal structure of the object of inspection.

FLAW DETECTOR MODE

At this mode the device operates as a tradition flaw detector with classic normal or angle transducers. Signals are displayed as A-Scan.

The device has all features of a modern flaw detector (built-in DGS-diagrams, TCG and DAC, multilevel digital gate, programmable form of the emission pulse, etc).

This mode provides correct evaluation of detected flaws according to actual regulations and documents.

SETUP MODE

This mode is used to set and select parameters and working configuration.

It is possible to create a number of working configurations for various objects of inspection saving them under unique names. The required configuration is selected from the list right at the object.
## Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
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<td>Size of image</td>
<td>256 x 256 pixels</td>
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<tr>
<td>Tomogram reconstruction interval</td>
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<tr>
<td>Operation frequencies</td>
<td>from 1.0 to 10.0 MHz</td>
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<tr>
<td>Velocity range</td>
<td>from 1 000 to 10 000 m/s</td>
</tr>
<tr>
<td>Attenuator range</td>
<td>from 0 to 100 dB</td>
</tr>
<tr>
<td>Attenuator interval</td>
<td>1 dB</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with a normal transducers:</td>
<td></td>
</tr>
<tr>
<td>S3568 2.5A0D10CL</td>
<td>from 7 to 7 200 mm</td>
</tr>
<tr>
<td>D1771 4.0A0D12CL</td>
<td>from 2 to 7 200 mm</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with an angled transducers:</td>
<td></td>
</tr>
<tr>
<td>S5182 2.5A65D12CS</td>
<td>from 2 to 1 600 mm</td>
</tr>
<tr>
<td>S5096 5.0A70D6CS</td>
<td>from 2 to 1 300 mm</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with a 16 elements longitudinal wave DFA:</td>
<td></td>
</tr>
<tr>
<td>M9060 4.0V0R40X10CL</td>
<td>from 7 to 300 mm</td>
</tr>
<tr>
<td>M9171 4.0V0R26X10CL</td>
<td>from 2 to 300 mm</td>
</tr>
<tr>
<td>Flaw depth measuring range (on steel) with a 16 elements shear wave DFA</td>
<td></td>
</tr>
<tr>
<td>M9065 4.0V60R40X10CS and M9170 4.0V60R26X10CS</td>
<td>from 2 to 300 mm</td>
</tr>
<tr>
<td>Display type</td>
<td>TFT</td>
</tr>
<tr>
<td>Display resolution</td>
<td>640 x 480</td>
</tr>
<tr>
<td>Power</td>
<td>Lithium accumulator</td>
</tr>
<tr>
<td>Rated power voltage</td>
<td>11.1 V</td>
</tr>
<tr>
<td>Operation time with the accumulator, not less than</td>
<td>7.5 h</td>
</tr>
<tr>
<td>Size of the electronic unit</td>
<td>260 x 166 x 80 mm</td>
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<tr>
<td>Weight of the electronic unit</td>
<td>1.8 kg</td>
</tr>
<tr>
<td>Operation temperature</td>
<td>from -10 to +55°C</td>
</tr>
</tbody>
</table>

### A1550 IntroVisor

A1550 IntroVisor is a combination of two devices: an industrial tomography and a tradition universal ultrasonic flaw detector. It is a reliable and effective equipment to resolve the most tasks of non-destructive testing.

The device is designed for operational manual testing but it can also be used as a part of automated systems.

A1550 IntroVisor can be additionally adapted or developed for special tasks of a customer.

### Delivery Set

- A1550 IntroVisor – ultrasonic flaw detector - tomograph
- M9065 4.0V60R40X10CS antenna array
- M9060 4.0V0R40X10CL antenna array
- M9170 4.0V60R26X10CS antenna array
- S3568 2.5A0D10CL transducer
- S5182 2.5A65D12CS transducer
- S5096 5.0A70D6CS transducer
- LEMO 00 - LEMO 00 single cable 1.2 m
- USB A - Mini B cable
- Detachable Lithium accumulator
- Power adaptor with cable
- Calibrating sample V2/25
- Sample UCB 114
- Soft cover
- Travel bag
UK1401 *Surfer*

**ULTRASONIC TESTER FOR CONCRETE INSPECTION**

UK1401 ultrasonic tester measures time and velocity of longitudinal ultrasonic waves in hard materials at surface scanning with a fixed base to estimate durability of materials and structural health.

The device is designed as a monoblock in ergonomic body of light shock-proof plastic.

Two built-in dry point contact transducers ensure a unique possibility of testing materials without any contact liquid. The transducers are wear-resistant and insensitive to surface condition so there is no need for time-taking and laborious process of surface preparing.

RF PATENT NO.2082163
DE 10 2006 029 435 A1
US 7,587,943 B2
APPLICATION
• Evaluation of concrete durability basing on correlation between velocity of ultrasonic waves in concrete and its mechanical parameters and physical condition.
• Search of close-to-surface flaws in concrete objects by abnormal speed decreasing or time increase in flow area.
• Estimation of anisotropy in composite materials.
• Estimation of concrete curing during building of poured-in-place concrete with sliding shuttering.
• Estimation of load-carrying ability of concrete backbones and posts.
• Evaluation of depth of outcrop cracks.
• Evaluation of material age provided that time changes its physical properties.
• Estimation of porosity and fissuring of the material.

FEATURES
• Built-in automatic gain control system (AGC).
• Sound indication of signal receiving.
• Option to save results of measurements to memory: the device is equipped with nonvolatile memory for 4 000 measurements with possibility to sort results in groups.
• Infrared connection to PC.
• User-friendly 6 button keyboard.

DELIVERY SET
• UK1401 – ultrasonic tester
• AA Alkaline, LR6, 2.8 Ah batteries (3 pcs)
• Calibration sample
• USB IrDA adapter for connection to PC
• Bag

SPECIFICATION

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning base</td>
<td>150 mm</td>
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<tr>
<td>Time measurement range</td>
<td>from 25 to 100 μs</td>
</tr>
<tr>
<td>Velocity measurement range</td>
<td>from 1 500 to 6 000 m/s</td>
</tr>
<tr>
<td>Crack deepness measurement range</td>
<td>from 10 to 50 mm</td>
</tr>
<tr>
<td>Operation frequency</td>
<td>50 kHz</td>
</tr>
<tr>
<td>Emission pulse frequency</td>
<td>from 5 to 25 kHz</td>
</tr>
<tr>
<td>Quantity of objects in memory</td>
<td>4 000</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>from -20 to +45 °C</td>
</tr>
<tr>
<td>Power</td>
<td>three AA Alkaline batteries</td>
</tr>
<tr>
<td>Operation time</td>
<td>100 h</td>
</tr>
<tr>
<td>Size</td>
<td>199 x 120 x 34 mm</td>
</tr>
<tr>
<td>Weight of electronic unit</td>
<td>350 g</td>
</tr>
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</table>
The low-frequency ultrasonic flaw detector A1220 MONOLITH resolve the task of thickness measuring and flaw detection at constructions of concrete, rocks, asphalt, etc.

The device is one of a kind as besides through-sounding it can test objects using echo-method with one-side access, so it can be used to inspect constructions in service, such as buildings, bridges, tunnels, etc.

One of the main advantages of the device is that testing is performed without using contact liquid thanks to the dry-point-contact (DPC) transducers used in antenna array. There is no need to prepare the surface which makes the inspection process easy and fast.

RF PATENT NO.2082163
DE 10 2006 029 435 A1
US 7,587,943 B2
APPLICATION
• Measuring of thickness of concrete constructions.
• Location of conclusions, cavities, voids and cracks in constructions of concrete, stone and similar materials with one-side access.
• Analysis of inner structure of coarse-grained materials.

DESCRIPTION
The flaw detector A1220 MONOLITH consists of an electronic unit with a large high-contrast TFT display and a keyboard and a 24-element matrix antenna array. The antenna array operates like a double-crystal transducer, its elements are spring-loaded so that the flaw detector could be used to rough and uneven surfaces.

FEATURES
The device provides various forms of displaying results.

A-Scan:
It is a traditional form of displaying signals. A-Scan is convenient for measuring thickness of an object, and flaw location and estimation in its selected areas.

The fully digital tract of the device provides signals display both in detected form and as a radio signal, which is particularly important for data analysis. This gives additional opportunities to interpret signals, that is to distinguish useful signals from noise, various reflectors etc.

B-Scan, C-Scan and D-Scan:
Results are displayed as longitudinal and cross-sections parallel or perpendicular to the entry surface.
B-, C- and D-Scans give a full idea of the internal structure of the object.

OPERATION MODES
A1220 MONOLITH has four basic operation modes and a service mode SETTINGS to set and select configurations of settings of inspection for every object.

ECHO MODE
Signals are represented as A-Scan in real time. The following methods of measuring are provided: first signal overshoot of the gate, maximum signal value in the gate, ACF (sum all signals at the gate). The display shows A-Scan workspace and key parameters of measuring – propagation time, depth and amplitude.

THROUGH TRANSMISSION MODE
This mode is for surface and through scanning of objects with a fixed base of measurements. Testing is performed with two transducers, separately connected to the electronic unit, placed in line or facing each other depending on the selected method of measuring. The display shows A-Scan workspace and key parameters of measuring – propagation time, sound velocity and amplitude.

MAP MODE
The MAP mode is used to create a set of cross-section images perpendicular to the surface when scanning with an antenna array along previously marked lines with constant step, i.e. a set of parallel bands limited in length. Setting a scan step vertically and horizontally it is possible to get an idea of the internal structure of the whole object.

SETTINGS MODE
At this mode a user can set and select parameters and work configuration. A number of configurations for various objects can be saved under unique named. A required configuration can be selected right at the object.
A1220 MONOLITH is multifunctional but still easy to operate thanks to its user-friendly interface and menu of icons providing quick access to basic settings and functions. Ergonomic design and light weight of the device (only 800g with a battery) make it a handy instrument for hard-to-get places. All results are saved to memory and can be sent to a PC, processed, documented and archived.

**DELIVERY SET**
- A1220 MONOLITH – ultrasonic flaw detector with a built-in battery
- Antenna array M2502 0.05A0R100X60PS
- LEMO-LEMO double cable 1.2 m
- Power adapter with a cable
- USB A –Micro B cable
- Soft cover
- Hard case

In addition the device can be completed with:

**Dry point contact (DPC) transducers for surface and through scanning:**
- **S1802 0.05A0D2PS** (transversal waves, operation frequency 50 kHz)
- **S1803 0.1A0D2PL** (longitudinal waves, operation frequency 100 kHz)

**Dry point contact antenna arrays for through scanning of objects with large thickness:**
- **M2103 0.1A0D60PL** (longitudinal waves, operation frequency 100 kHz)
- **M2102 0.05A0D60PS** (transversal waves, operation frequency 50 kHz)

**Liquid contact transducers for through scanning:**
- **S0205 0.025A0D25CL** (longitudinal waves, operation frequency 25 kHz)
- **S0206 0.05A0D25CL** (longitudinal waves, operation frequency 50 kHz)
- **S0208 0.1A0D25CL** (longitudinal waves, operation frequency 100 kHz)
## SPECIFICATION

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material velocity range</td>
<td>From 500 to 15 000 m/s</td>
</tr>
<tr>
<td>Rated operating frequencies</td>
<td>From 25 to 200 kHz</td>
</tr>
<tr>
<td>Gain regulation range</td>
<td>From 0 to 100 dB</td>
</tr>
<tr>
<td>Time frame measurement range</td>
<td>From 0 to 4 000 μs</td>
</tr>
<tr>
<td>Permissible basic time frame measurement accuracy</td>
<td>±(0.1+0.0001 Tmeasurement) μs</td>
</tr>
<tr>
<td>Flaw depth coordinate measuring range with ultrasonic velocity 2500 m/s (concrete)</td>
<td>From 50 to 2 150 mm</td>
</tr>
<tr>
<td>Permissible basic flaw depth coordinate measuring accuracy</td>
<td>±(0.1H+5.0) mm</td>
</tr>
<tr>
<td>Power</td>
<td>Built-in battery</td>
</tr>
<tr>
<td>Rated power voltage</td>
<td>11.1 V</td>
</tr>
<tr>
<td>Operation time</td>
<td>8 h</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>From -20 to +55°C</td>
</tr>
<tr>
<td>Display type</td>
<td>TFT (640 x 480)</td>
</tr>
<tr>
<td>Electronic unit size</td>
<td>260 x 157 x 43 mm</td>
</tr>
<tr>
<td>Electronic unit weight</td>
<td>800 g</td>
</tr>
<tr>
<td>Size of M2502 antenna array</td>
<td>139 x 105 x 89 mm</td>
</tr>
<tr>
<td>Weight of M2502 antenna array</td>
<td>1.1 kg</td>
</tr>
</tbody>
</table>

## SOFTWARE

Delivery kit of the instrument includes the dedicated “Planevisor” software. The software provides SAFT processing of data on the external PC.

The inspection results are represented as tomograms (B-, C-, D-Scans).

Occurrence coordinates of each reflector in the testing object can be determined.
Ultrasonic tomograph A1040 MIRA is applied for testing constructions of concrete, reinforced concrete and stone with one-side access. With it user can estimate integrity of material, locate inclusions, cavities, voids, laminations, misruns and cracks and measure thickness. Thickness of concrete objects can be up to 2.5 meters.

Results are easy to understand as they are presented in a form of cross section image (tomogram) of B-type, so structure of an object can be estimated quickly. Our special software reconstructs any tomogram from the three-dimensional data massive and creates a 3D image of the object internal structure.

A1040 MIRA is designed as a monoblock. Light and handy, it still has an embedded computer, memory, large display and control keys for comfort work. The tomograph’s antenna array consists of dry point contact transducers so there is no need for contact liquids. Tomographic data procession method (SAFT-algorithm), used for data compilation, provides clear graphic image of the internal structure of an object. The tomograph can be used for manual testing or as a part of automated systems.
**ADVANTAGES**
- Visualization of the internal structure of the tested object with one-side access.
- High productivity – it takes only a few seconds to reconstruct a tomogram.
- Easy to use.
- High accuracy of measuring and sensibility to various reflectors.
- The surface doesn’t have to be prepared for testing.
- Wear-resistant tips of transducers.

**DESCRIPTION**
The tomograph A1040 MIRA is a totally independent measuring unit for gathering and tomographic processing of data. The measuring unit contains a matrix antenna array of 48 low-frequency broad-band dry-point transversal transducers with ceramic wear-resistant tips. They are designed for long-term use with rough surfaces. Every transducer has an independent spring suspension ensuring testing on uneven surfaces. Nominal operation frequency of the array is 50 kHz.

Instrument’s interface allows working with laser beams which are projected on a surface of the testing object. Hence the operator can correctly maintain a shift step of the antenna array during a complete technical diagnostics of the testing object.

The device has an embedded computer able to process data right in the process of testing, to display them and to save. Data can be sent to a PC for advanced procession with a special software.

Inspection is conducted according to the scheme of step-by-step scanning with consolidation of data and reconstruction of volume under the whole scanned area.

**FEATURES**
- Light-weight shock-proof plastic body.
- Offline data procession without an external PC.
- Dry acoustic contact.
- Antenna array adapting to unevenness of surface.
- Automatic measuring of ultrasonic wave velocity in the object.
- 3D representation of the internal structure of the tested object as B-, C- and D-Scans of any cross-section of an object.

With the large and bright TFT display and the keyboard you can easily set up the device to an object, select necessary modes and perform testing viewing results for initial analysis.

The battery ensures up to 12 hours of nonstop work. The tomograph can be powered directly from a network.

The compact light body and the repositionable handle provide comfort application of the device at horizontal, vertical and overhead surfaces.
DATA PROCESSING AND DISPLAYING

The device uses the total focusing method implying ultrasound focusing to every dot of a half-space. As a result you have a legible image of a cross-section of an object. At the image the reflection power of every dot of the visualized volume is colour-coded.

During the work process various ways of displaying data can be chosen depending on the selected mode.

OPERATION MODES

**REVIEW MODE**
Select the REVIEW mode to view the inner structure quickly at random places. The display shows B-Scan up to 2.5 m in depth. Besides the REVIEW mode makes possible:
- Automatic measuring of wave propagation velocity
- Measuring of coordinates and image levels in the tomogram
- Thickness measuring
- Viewing of A-Scans

**MAP MODE**
The MAP mode is used to create and collect of cross-section images perpendicular to the surface when scanning with an antenna array along previously marked lines with constant step. Any B-Scan can be displayed from the accumulated 3D data array.

**SETTINGS MODE**
At this mode a user can set and select parameters and work configuration. A number configurations for various objects can be saved under unique named. A required configuration can be selected right at the object.
SOFTWARE

The device can be used with specialized software for advanced processing of data on an external PC.

The software provides reading data from the device and presenting it in a form of tomogram or in 3D form, which makes it easier to understand the internal structure of a concrete object.

For each reflector it is possible to measure its coordinates in the testing object.

DELIVERY SET

- A1040 MIRA – tomograph ultrasonic unit
- Charging unit
- USB connection cable
- Checking sample
- Travel case

SPECIFICATION

<table>
<thead>
<tr>
<th>System specification</th>
<th>Transducers specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Velocity range</strong></td>
<td><strong>Scanning device</strong></td>
</tr>
<tr>
<td>from 1 000 to 4 000 m/s</td>
<td>built-in matrix antenna array</td>
</tr>
<tr>
<td><strong>Maximum view depth in concrete</strong></td>
<td><strong>Operating frequency</strong></td>
</tr>
<tr>
<td>2500 mm</td>
<td>25 - 85 kHz</td>
</tr>
<tr>
<td><strong>Maximum view depth in reinforcement concrete</strong></td>
<td><strong>Number of transducers in the antenna array</strong></td>
</tr>
<tr>
<td>800 mm</td>
<td>48</td>
</tr>
<tr>
<td><strong>Maximum accuracy (X – thickness)</strong></td>
<td><strong>Type of transducers used in the antenna array</strong></td>
</tr>
<tr>
<td>±(0,05·X+10) mm</td>
<td>low-frequency broadband transversal with dry point contact and ceramic wear-proof tips</td>
</tr>
<tr>
<td><strong>Minimal size of a located reflector</strong></td>
<td></td>
</tr>
<tr>
<td>a sphere 20 mm in diameter at least 200 long at the depth from 50 to 400 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Display type</strong></td>
<td></td>
</tr>
<tr>
<td>5,7'' TFT, color</td>
<td></td>
</tr>
<tr>
<td><strong>Embedded memory</strong></td>
<td></td>
</tr>
<tr>
<td>flash</td>
<td></td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td></td>
</tr>
<tr>
<td>built-in battery</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td></td>
</tr>
<tr>
<td>11.2 V</td>
<td></td>
</tr>
<tr>
<td><strong>Operating time (battery)</strong></td>
<td></td>
</tr>
<tr>
<td>5 h</td>
<td></td>
</tr>
<tr>
<td><strong>PC connection</strong></td>
<td></td>
</tr>
<tr>
<td>USB</td>
<td></td>
</tr>
<tr>
<td><strong>Operation temperature range</strong></td>
<td></td>
</tr>
<tr>
<td>from -10 to +50°C</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
</tr>
<tr>
<td>4.5 kg</td>
<td></td>
</tr>
<tr>
<td><strong>Size, not more than:</strong></td>
<td></td>
</tr>
<tr>
<td>without handles</td>
<td>370 x 150 x 145 mm</td>
</tr>
<tr>
<td>with handles positioned horizontally</td>
<td>470 x 150 x 170 mm</td>
</tr>
<tr>
<td>with handles positioned vertically</td>
<td>370 x 210 x 170 mm</td>
</tr>
</tbody>
</table>

We distribute our low-frequency ultrasonic tomograph A1040 MIRA including the new 3D visualization and evaluation software INTROVIEW® via our European branch ACS-Solutions. The annual software license for the INTROVIEW® software is provided free of charge and can be extended after expiry on the cost base.

The contact information:

ACS-Solutions GmbH, Science Park 2, D-66123 Saarbrücken, Germany, Phone: +49 (0) 681-3096230, Fax: +49 (0) 681-96592280 info@acs-international.com
The use of the A2051 ScaUT Scanner System is intended to automate complex weld inspections of steel/metal structures with a varying thickness between 4 to 40 mm and with a minimum radius of curvature (to exterior face) of 300 mm.

Ultrasonic testing provides the ability to measure the thickness of the test sample or structure in addition to the ability to detect and classify internal flaws in welds such as: pores, lack of fusion and incomplete penetration, slag inclusions, cracks, cuts and internal delaminations near the weld zone, etc.

The Laser-optic method provides the ability to measure the weld edge offset, the size and the reinforcement bead profile, and external flaws next to the weld zone.

The main field application for the A2051 ScaUT system is for the inspection, industrial inspection and certification of pipelines.
MAIN MODES

WELD MODE

WELD mode is designed for a general assessment of the welded joint. In the right part of a screen there is a table indicating the characteristics and results of the inspection. In the left part of a screen is shown a cross-section of the weld, which specifies:
- The point of the beginning of scanning;
- The position of the weld with a view of its location relative to the scanner;
- The area of the acoustic contact;
- The location of the detected defects.

In the central part of the cross-section is located color indicator of the condition of the weld:
- Green (AVAILABLE) - number, size and nature of the defects found to correspond to the normative documents.
- Yellow (REPAIR) - portion of the detected defects requires local repair.
- Red (CUT) - the quantity or nature of the detected defects are not allowed to repair and required the removal of weld entirely.

EDGE MODE

EDGE mode is intended for an overall assessment of offset edge of the weld. In the right part of the screen is a table indicating the characteristics and the results of the inspection. In the left part of the screen displays a circle, on which with black the position of the right edge of the weld is fixed, and green (red) - relative offset of the left edge.

Red highlights areas in which the offset of edges exceeds the permissible value. In the central part of the circle is the color indicator of the offset of edges:
- Green (AVAILABLE) - the nature and amount of offset of edges correspond to normative documents.
- Yellow (REPAIR) - a section of the edges demands local repair.
- Red (CUT) - the offset edges is not allowed to repair, requires the removal of weld entirely.

ANALYSIS MODE

ANALYSIS mode is designed for a detailed examination of the structure of the weld, with the display of information about the nature and quantity of fixed defects and offset of edges. In the left top of the screen displays the combined image of a cross-section of the weld and edge, which provides information about the cross-section of the weld position on the location of the scanner and the edges of the weld.

In the left bottom part of the screen displays the profile of the weld with indication of the divergence of edges and the availability of undercuts in the weld.

In the right part of the screen is displayed With the tri-color-Scan and B-Scan with the ability to display the geometry edge of the weld:
- The green color is the area between the examination and reporting levels.
- Yellow is the zone between the reporting and acceptance levels.
- The red color of the area is corresponding to the acceptance level.

In the central part of the screen is a table with the main results of the monitoring (number of the defect and its size), an overall assessment of the weld and the parameters of the current B-Scan.
FEATURES

- Ultrasonic inspection is based on two multi-element antenna arrays and digital focusing aperture (DFA) algorithm, which provides the maximum possible for ultrasound sensitivity to flaws, selecting of their types, measuring equivalent cross-section area and full inspection of the whole welding line and near-weld area.

- A stable acoustic contact with low flow rate and possibility to inspection not less than 100 running meters of the weld by one full tank is provided due to automatic liquid supply from the tank through injectors under the antenna arrays.

- Apart from visual inspection, laser-optical channel, continuously measures the position of the antenna arrays relative to the axis of weld what is used for correction of a trajectory of movement.

- Transmission system is based on magnetic motor-wheel, which provides safe movement and keeps it on all circumference of the pipe and also presses antenna arrays to the surface.

- Mechanical switch of the magnetic field allows removing or setting up scanner on the surface of pipe without any problem.

- 3D inclination angle sensor and GPS / GLONASS / Galileo positioning system provide georeferencing of the collected data.

- Bluetooth headset (headphone) of the operator allows watching the process of inspection in loud areas and with the button on the headset remote controlling the movement of the scanner — flaw detector.

- Controlling all the components of device during scanning, data handling and keeping the results of measurements is made by electronic unit of scanner-flaw detector.

- Protocol of inspection with the list of detected defects, their characteristics and the results of compliance testing of weld of the regulations of rejection are displayed on integrated display.

- Lithium-ferrum-polymer battery, built in the electronic unit provides continuous work for 4 hours with a full cycle recharge in 15 minutes.

- Monoblock body of the device allows to transport and operate scanner-flaw detector by only one operator.
### SPECIFICATION

- **Sensitivity to flaws along the welding bead**: from 0.5 sq. mm
- **Measuring accuracy of geometry along the weld bead**: 0.2 mm
- **Scanning speed**: 2 m/min
- **Thickness range**: from 4 to 40 mm
- **Coupling material - tank capacity**: 0.85 L
- **Minimum radius of curvature (to exterior face)**: from 300 mm
- **Material velocity range**: from 1 000 to 9 999 m/s
- **Operation time**: 4 h
- **System dimensions**: 415 x 166 x 146 mm
- **Weight**: 10 kg
- **Operating temperature range**: from -30 to +50°C
Noncontact ultrasonic scanner-flaw detector A2075 SoNet is applicable for automatic flaws search in the metal pipe’s walls of 720 – 1420 mm in diameter and with thickness starting from 6 mm.

Mainly the instrument is used as a part of flaw detection sets. Such flaw detection sets are used for searching flaws in gas pipelines, oil pipelines and products pipe line during major repairs or during the construction process.

Scanner-flaw detector A2075 SoNet is able to successfully detect both types of flaws: stress-corrosion flaws and other surface or internal flaws of the pipe.

The inspection is conducted by an inline automatic moving of the inspecting part of a flaw detector along generatrix on the external surface of a pipe. During the inspection full circle flaw detection is held. An image of a pipe section is made right during the scanning that helps to estimate the flaws found, to plot the coordinates, to estimate their type and shape, using standard tools of nondestructive testing.
FEATURES

- Operating principle of the scanner-flaw detector is a wave guided pulse echo inspection technique excitation (sending) and receiving of ultrasonic waves in a pipe’s body is made without a contact (without using a couplant) with a help of electro-magnetic acoustic (EMA) transducers.
- Detection of a stress-corrosion and corrosion flaws in the pipe’s body. Detection of flaws in flats (sheet products) with indication of flaw’s quantity, relative dimensions and locations (coordinates).
- Wi-Fi connection between the PC and the scanner-flaw detector provides a great mobility and the possibility for the operator to conduct testing remotely.
- An image of a pipe section is made right during the scanning that helps to estimate the flaws found and helps to decide if an additional inspection with the other NDT methods is necessary.
- Continuing documentation of the results as a scanning image of the pipe.
- Efficient review of the collected scan images in the screen of the Notebook.
- Post-processing of the scan images along with recording of the location, orientation and the type of the flaws.
- Time required to set up the instrument and start inspection is just 3 minutes.
- The possibility to upload the data from intratubal inspection and attach it to the main report.
- Block structure of the instrument makes it possible to promptly replace a broken blocks on-the-site by only one operator.
- Portability – the scanner – flaw detector can be carried by 2 people and can be operated by 1 user.

ADVANTAGES

- Productivity – up to 7 meters of pipe per minute.
- High sensitivity – detection stress-corrosion flaws and corrosion from 1mm.
- Scanner flaw-detection is able to work on the pipe that has been earlier shelled from the old isolation. The scanner ensures 100% recurrence of the data.
- The scanner-flaw detector provides a high percentage of detectability of stress-corrosion flaws and delaminations comparing the result of a intratubal flaw-detection.
- High reliability – operating temperature range from -30° to +50°C.
SOFTWARE: SCAN IMAGES, REPORTS

The user gets the scan images of the pipe in real-time.

This scan image was taken from the pipe with 1 420 mm in diameter and 2 200 mm in length. In the center section of the picture an image of a “blind zone” of the transducer can be seen (1). Lower - there are the image corresponding to the stress-corrosion flaw (2). In top and bottom section of the picture image of a longitudinal joint (3, 4).

On the morrow of the pipe inspection, the operator mark out the abnormal areas. The operator prepares the report with the coordinates and location scheme of the detected flaws using the information from the abnormal areas that were marked out earlier.

The example of the report prepared with use of the gathered scan image is shown in the figure on the right. The main information about the testing object is reflected in the report. Black rectangles indicate the flawed areas which were marked out by the operator. Black horizontal line in the bottom of the figure indicates the longitudinal joint. The orientation of a black line is set by the operator during the scanning. Further, the coordinates and the dimensions of the flawed areas are listed in the table.

DELIVERY SET

• PC-Panasonic Toughbook CF-U1
• Charging unit with cable for PC
• Receiver-transmitter unit (RTU)
• Transfer platform
• Block of the electro-magnetic acoustic transducer
• Transportation packing for scanning device
• Transportation packing for RTU, PC and spare parts
• Passport (can be sent by e-mail)
• Operation manual (can be sent by e-mail)
• The standard (technique) of ultrasonic testing of a pipe’s base metal with the non-contact ultrasonic scanner-flaw detector A2075 SoNet (can be sent by e-mail)

LIST OF SPARE PARTS AND TOOLS

• Inductor of the electro-magnetic acoustic transducer (3 items)
• General-purpose tester
• Cross screwdriver
• Flat-blade screwdriver
• Set of allen keys
• Allen key for the encoder

A2075 SoNet can be supplied with the additional items:

• Charging unit with cable for accumulator unit of (RTU)
• Accumulator for PC
• Field magnet of the electro-magnetic acoustic transducer
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity</td>
<td>3 020 m/s</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>0.5 MHz</td>
</tr>
<tr>
<td>Range of the calibrated amplifier</td>
<td>from 0 to 40 dB</td>
</tr>
<tr>
<td>Limit of the acceptable basic absolute accuracy in measuring of the coordinates of the flaws along the circumference of the pipe, not more than</td>
<td>±100 mm</td>
</tr>
<tr>
<td>Limit of the acceptable basic absolute accuracy in measuring of the coordinates of the flaws towards the pipe, not more than</td>
<td>±20 mm</td>
</tr>
<tr>
<td>Maximum sensitivity of the receiver, not less than</td>
<td>20 μV</td>
</tr>
<tr>
<td>Measurement accuracy of the amplitude ratio of signals at the receiver input, not more than</td>
<td>±1 dB</td>
</tr>
<tr>
<td>Power</td>
<td>accumulator blocks</td>
</tr>
<tr>
<td>Voltage</td>
<td>12 V</td>
</tr>
<tr>
<td>Operating time (accumulator)</td>
<td>8 h</td>
</tr>
<tr>
<td>Weight</td>
<td>42 kg</td>
</tr>
<tr>
<td>Average error-free running time</td>
<td>30 000 hours</td>
</tr>
<tr>
<td>Average lifetime, not less than</td>
<td>4 years</td>
</tr>
<tr>
<td><strong>Operation conditions:</strong></td>
<td></td>
</tr>
<tr>
<td>air temperature</td>
<td>from -40 to +50°C</td>
</tr>
<tr>
<td>relative air humidity at a temperature of +35 °C, not more than</td>
<td>95%</td>
</tr>
<tr>
<td>Dimensions</td>
<td>407 x 655 x 407 mm</td>
</tr>
</tbody>
</table>
ACS Ltd. has been producing ultrasonic transducers of various types for more than 20 years. Transducers are supplied both with our devices and as separate products. Current product line includes the following main types of transducer, essentially different in construction, specifications, features and application:

- contact normal single-crystal transducers;
- contact normal double-crystal transducers;
- contact angle single-crystal transducers;
- contact high-frequency antenna arrays;
- low-frequency dry point contact transducers;
- low-frequency multi-element arrays based on dry point contact transducers;
- electromagnetic acoustic transducers.

SCHEME OF SYMBOLS OF ULTRASONIC TRANSDUCERS AND ANTENNA ARRAYS

Class:
- S – single-crystal
- D – double-crystal
- M – antenna array

Number of construction

Number of parameter part

Frequency, MHz

Directivity
- A – uncontrolled
- F – uncontrolled focused
- V – controlled

Average angle of ultrasound input into steel, degrees

Form of the active element or of the aperture
- D – round
- R – rectangle

Diameter (or length X width) of the aperture, mm

Way of interaction with a test object
- C – contact
- I – immersion
- G – gas-immersion
- P – dry point contact
- E – electromagnetic acoustic

Type of operation ultrasonic wave
- L – Longitudinal
- S – Transversal (Shear)
- R – Rayleigh
- U – two and more types of wave
### UNIVERSAL NORMAL SINGLE-CRYSTAL PIEZOELECTRIC-TRANSUCERS

<table>
<thead>
<tr>
<th>High-Frequency</th>
<th>Nominal frequency, MHz</th>
<th>1.25</th>
<th>1.8</th>
<th>2.5</th>
<th>5.0</th>
<th>6.0</th>
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</thead>
<tbody>
<tr>
<td>Piezoelectric element diameter, mm</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S3375 6.0A0D5CL</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>S3567 2.5A0D10CL</td>
<td>S3568 2.5A0D10CL</td>
<td></td>
<td></td>
<td>S3569 5.0A0D10CL</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>S3466 1.25A0D18CL</td>
<td>S3469 1.8A0D18CL</td>
<td>S3460 2.5A0D18CL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mid-Frequency</th>
<th>Nominal frequency, MHz</th>
<th>0.25</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piezoelectric element diameter, mm</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S3740 0.25A0D30CL</td>
<td>S3745 0.5A0D30CL</td>
<td>S3750 1.0A0D30CL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low-Frequency</th>
<th>Nominal frequency, kHz</th>
<th>25</th>
<th>50</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating surface diameter, mm</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S0205 0.025A0R20X20CL</td>
<td>S0206 0.05A0R20X20CL</td>
<td>S0208 0.1A0R20X20CL</td>
</tr>
</tbody>
</table>

### UNIVERSAL NORMAL DOUBLE-CRYSTAL PIEZOELECTRIC TRANSUCERS

<table>
<thead>
<tr>
<th>Operating surface diameter, mm</th>
<th>Nominal frequency, MHz</th>
<th>2.5</th>
<th>4.0</th>
<th>5.0</th>
<th>10.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D2763 10.0A0D6CL</td>
</tr>
<tr>
<td>12</td>
<td>D1761 2.5A0D12CL</td>
<td>D1771 4.0A0D12CL</td>
<td>D1762 5.0A0D12CL</td>
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</tr>
</tbody>
</table>
### UNIVERSAL ANGLE SINGLE-CRYSTAL PIEZOELECTRIC TRANSUDCERS

<table>
<thead>
<tr>
<th>Angle of input into steel</th>
<th>Nominal frequency, MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Piezoelectric element diameter, mm</td>
</tr>
<tr>
<td></td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>18</td>
</tr>
<tr>
<td>40°</td>
<td>S5266 1.25A40D18CS</td>
</tr>
<tr>
<td>45°</td>
<td>S5280 1.8A45D18CS</td>
</tr>
<tr>
<td>50°</td>
<td>S5280 1.8A50D18CS</td>
</tr>
<tr>
<td>60°</td>
<td>S5280 1.8A60D18CS</td>
</tr>
<tr>
<td>65°</td>
<td>S5280 1.8A65D18CS</td>
</tr>
<tr>
<td>70°</td>
<td>S5182 2.5A70D12CS</td>
</tr>
<tr>
<td>72°</td>
<td>S5096 5.0A72D6CS</td>
</tr>
<tr>
<td>90°</td>
<td>S5182 2.5A90D12CR</td>
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</tbody>
</table>

### LOW-FREQUENCY PIEZOELECTRIC TRANSUDCERS WITH A DRY POINT CONTACT

<table>
<thead>
<tr>
<th>Nominal frequency or nominal frequency range, kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
</tr>
<tr>
<td>S1801 0.05A0D2PS</td>
</tr>
<tr>
<td>S1802 0.05A0D2PS</td>
</tr>
<tr>
<td>S1802 0.05A0D2PU</td>
</tr>
</tbody>
</table>

* Rated frequency is relative
### LOW-FREQUENCY DRY POINT CONTACT ANTENNA ARRAYS

<table>
<thead>
<tr>
<th>Nominal frequency, kHz</th>
<th>50</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cophased</td>
<td>M2502 0.05A0R100X60PS</td>
<td>M2503 0.1A0R100X60PL</td>
</tr>
<tr>
<td></td>
<td>M2102 0.05A0D60PS</td>
<td>M2103 0.1A0D60PL</td>
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</tbody>
</table>

### HIGH FREQUENCY ANTENNA ARRAYS

<table>
<thead>
<tr>
<th>Nominal frequency 4.0 MHz</th>
<th>2.5</th>
<th>3.0</th>
<th>5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M9060 4.0V0R40X10CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M9171 4.0V0R26X10CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M9065 4.0V60R40X10CS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M9170 4.0V60R26X10CS</td>
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</tbody>
</table>

### NORMAL ELECTROMAGNETIC ACOUSTIC TRANSDUCERS

<table>
<thead>
<tr>
<th>OPERATION WAVES</th>
<th>Polarization</th>
<th>Nominal frequency, MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td>Transversal</td>
<td>radial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>linear</td>
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</tr>
<tr>
<td>Longitudinal</td>
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</table>