ECHOGRAPH 1095
Digital Ultrasonic Flaw Detector

Models
1095 BASIC
1095 DAC/TCG/AWS
1095 DGS/DAC/TCG
1095 DGS/DAC/TCG/AWS/JIS
The new ultrasonic flaw detector ECHOGRAPH 1095 features time corrected gain and backwall echo attenuation. It is the ideal instrument for manual ultrasonic testing: digital, high-contrast and comfortable in practical applications. It is reliable and sturdy and thus can be used outdoors or in rough industry environment.

The ECHOGRAPH 1095 …

- is lightweight (only 2 kg) and easy to handle
- is equipped with a very large and high-contrast TFT colour display (7” diagonal, resolution 800 x 480 pix) with automatic brightness control and a large viewing angle
- guides the user safely and self-explanatorily through the applications by means of its plain text menu
- ensures extremely simple and complete adjustment with its user guidance
- supports the operator during probe handling and instrument adjustment (DAC, TCG, AWS, DGS, JIS, …)
- offers direct access to all important key functions
- displays up to 6 measured values in large digits
- is equipped with 3 monitors to measure amplitude and time-of-flight, as well as 3 associated control lamps on the front panel for monitoring threshold values
- enables to show reference echoes and to record echo dynamics
- enables simple freezing and storing of A-scans
- allows to move all 3 monitor gates in “freeze” mode and recalculates the displayed measured values accordingly
- comes with a convenient text editor which enables the storage of each data set with an individual file name
- contains a probe data base for easy entering of probe data, even for third-party probes
- displays all functions in plain text on the screen, in addition to the 6 function keys
- permits selection of the pulse repetition frequency (PRF) from 10 Hz up to 5000 Hz: low PRF to avoid ghost echoes, and high PRF for high testing speed in case of automated testing
- saves all data, e.g. screenshots as BMP files or series of measurements as CSV files, on a removable 8 GB SD flash card
- evaluates the time-of-flight between transmitter pulse and an echo within the monitor gate
- measures the wall thickness between echoes of two monitors, either between echo peaks, edges or zero crossings
- provides 0.01 mm indication accuracy in echo-echo-mode
- allows evaluation also on curved surfaces (e.g. pipes)
- provides a VGA output for external monitors
- is delivered with a colour rubber protective holster to avoid sliding and for additional protection
- offers a separate adjustable gain in the third monitor, e.g. for individual backwall echo attenuation
- has an adjustable square pulser with a pulse width automatically adapted to the frequency of the probe when it is loaded, but which can be changed manually as well
- features digital filters for optimal adaption to the probe
- is dust-proof and provides protection against spraying water according to IP64

The ECHOGRAPH 1095 available in 4 versions:

- **ECHOGRAPH 1095 Basic**
- **ECHOGRAPH 1095 DAC/TCG/AWS**
- **ECHOGRAPH 1095 AVG/DAC/TCG**
- **ECHOGRAPH 1095 AVG/DAC/TCG/AWS/JIS**

Additional options available upon request:

- Matrix memory
- TOFD
- B-scan

### Packages and scope of supply

<table>
<thead>
<tr>
<th>order nos.</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1095.020</td>
<td>ECHOGRAPH 1095 Basic</td>
</tr>
<tr>
<td>1095.030</td>
<td>ECHOGRAPH 1095 DAC/TCG/AWS</td>
</tr>
<tr>
<td>1095.040</td>
<td>ECHOGRAPH 1095 AVG/DAC/TCG</td>
</tr>
<tr>
<td>1095.050</td>
<td>ECHOGRAPH 1095 AVG/DAC/TCG/AWS/JIS</td>
</tr>
</tbody>
</table>

**Included in delivery:**
- instrument with red protective holster,
- Li-ion rechargeable battery, mains/charging device and transport case

**Accessories for the standard package**

<table>
<thead>
<tr>
<th>description</th>
<th>order nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carry case incl. belt</td>
<td>6189.101</td>
</tr>
<tr>
<td>Replacement carrying strap</td>
<td>6189.103</td>
</tr>
<tr>
<td>USB cable</td>
<td>1657.704</td>
</tr>
<tr>
<td>eCom 95, PC software for Windows XP/7/8 Desktop</td>
<td>1995.007</td>
</tr>
<tr>
<td>Spare battery pack 7.4 V; 7.6 Ah</td>
<td>1806.551</td>
</tr>
<tr>
<td>Charger unit for external charging of a spare battery</td>
<td>1806.531</td>
</tr>
</tbody>
</table>
Operating the ECHOGRAPH 1095
The powerful ultrasonic flaw detector features 3 monitors for amplitude and time-of-flight measurement and 3 associated status lamps on the front panel for monitoring of threshold levels. The very compact instrument (54 mm case depth) provides fast digital ultrasonic electronics with a high sampling rate and pulse repetition frequencies up to 5000 Hz.

A convenient user guidance supports less-trained UT inspectors, also during probe handling and instrument adjustment: Simply activate the wizard and follow the instructions on the screen. Even difficult evaluation procedures for defect sizing (DAC/TCG, JIS, AWS and DGS) are carried out almost automatically.

**Echo evaluation DGS method (option):**
- Not restricted to special probes (DGS curve is calculated within the instrument)
- Visualisation of the reference DGS curve
- Defect size (FBH = flat bottom hole) is directly shown
- DGS with KARL DEUTSCH TR probes
- Indication of up to 6 additional threshold curves

**Echo evaluation DAC method (option):**
**Reference line method (EN 1330-4)**
- Optical and acoustical alarm when exceeding or dropping below the curve
- Indication of up to 6 threshold curves
- DAC support points can be manually added, shifted and deleted (up to 16 points)
- Calculation of time corrected gain (TCG) from the DAC curve
Extensive Functions
Application Examples

Time Corrected Gain (TCG)

- Clearly visible icon indicates the currently active evaluation method.
- Recording of the DAC curve
- For TCG evaluation the gain is adjusted depth-dependent according to the previously recorded DAC curve.

Backwall echo attenuation via separate gain in monitor 3

- Clearly visible icon indicates the currently active evaluation method.
- Gain of 28 dB inside monitor 3 and 45 dB outside

Wall thickness measurement

- Precise wall thickness measurement between zero crossings with averaging and min/max storage (e.g. for corrosion mapping)
- Current wall thickness value: |M1 - M2|
- Lowest wall thickness value: |M1 - M2| min
- Highest wall thickness value: |M1 - M2| max

Adaption to curved surfaces

- Calculation of defect depth and reduced projection distance considering the parameters of test object and probe.

Calculation of defect depth and reduced projection distance considering the parameters of test object and probe.

*¹ automatic monitor positioning
*² here: from 0.3 to 1.3 times the skip distance
*³ sound path marked in red
### ECHOGRAPH 1095

**Additional Features**

#### Technical Data

#### Screen

- **Screen type**
  - colour TFT LC display, transmissive
  - LED background illumination (with automatic adaption to the ambient light)

- **Screen size**
  152.4 mm x 91.44 mm

- **Resolution**
  800 x 480 pixel, 256 colours

- **A-scan size**
  152 mm x 76.2 mm

- **Scaling**
  generated electronically

- **Scale division**
  - coarse: 10-fold horizontal, 5-fold vertical
  - fine: 25-fold horizontal

#### A-Scan Representation and Digitizing

- **Image refresh frequency**
  60 Hz

- **A-scan representation**
  - normal display
  - filled echoes
  - frozen
  - echo dynamics curve (envelope curve)
  - zoom across monitor 1 and monitor 2
  - TOFD (on request)

- **RF representation**
  with zero crossing measurement

- **Rectification**
  full wave, positive, negative

- **Suppression**
  adjustable: 0 – 99 % screen height in 1 % steps (linear)

- **Zoom**
  monitor range (monitors 1 and 2)

#### Measuring Ranges

- **Time-base range**
  0.5 – 17760 mm steel

- **Sound velocity**
  200 – 15000 m/s in 1 m/s steps

- **Pulse shift**
  0 – 3000 mm in 0.1 mm steps

- **Linearity of time base**
  ± 0.5 % of screen width

- **Pulse repetition frequency**
  10 – 5000 Hz, for square wave pulser up to 1000 Hz (automatic optimization [Auto High, Auto Low] or manual adjustment)

- **Trigger**
  internal, external, 1st echo

#### Transmitter

- **Transmitter type**
  square wave pulser

- **Transmission voltage**
  60 – 320 V

- **Pulse width**
  30 – 5000 ns in 10 ns steps

- **Transmitter damping**
  50, 75, 220, 1000 [Ω]

#### Receiver

- **Frequency ranges**
  - LP 0.2 – 2 MHz, 2 MHz, 4 MHz, 5 MHz
  - Broadband 1.3 – 14 MHz, 10 MHz
  - HP 4.9 – 22 MHz

- **Adjustable gain**
  110 dB in 0.1/1/2/6/12 dB steps

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**Data Storage:**

All data records are stored on a removable 8 GB SD flash card. Screenshots are saved as BMP files and measurement values as CSV files. Test reports can be easily created in a comfortable way with our eCom 95 software.

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**... overview of more features of the ECHOGRAPH 1095**

- Rugged metal housing with rubber protective holster for rough environmental conditions
- Continuously adjustable stand with anti-slide coating
- Selectable screen colours for A-scan
- Antireflective protective glass
- USB interface
- Three optical indicators and an acoustical alarm output
- Energy saving mode in battery operation
- Built-in Li-ion-rechargeable battery (built-in charging processor); charging of the battery also during test if connected to the mains power supply
- Easily exchangeable battery
- Use of SD flash cards up to 32 GB
- Update resp. upgrade via SD flash card and/or via unlock code
- Specifications acc. to EN 12668-1
### Technical Data (continued)

#### Echo Evaluation, Flaw Size Determination

<table>
<thead>
<tr>
<th>Display of echo height</th>
<th>• % screen height (%SH)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• dBrel (DGS, DAC, TCG, JIS, AWS versions)</td>
</tr>
<tr>
<td></td>
<td>• dBabs</td>
</tr>
<tr>
<td></td>
<td>• indication rating acc. to AWS D1.1/1.1M</td>
</tr>
<tr>
<td></td>
<td>• region of echo height acc. to JIS Z3060-2002</td>
</tr>
<tr>
<td></td>
<td>• mmFBH (DGS option)</td>
</tr>
</tbody>
</table>

| Display of time of flight | • sound path |
|                          | • depth, projection distance and reduced projection distance |
|                          | • resolution 0.1 mm |

| Display of wall thickness / sound velocity | • wall thickness measurement: 0.01 mm resolution (optional display of sound velocity to a given wall thickness) |
|                                           | • min/max wall thickness |

#### Storage

<table>
<thead>
<tr>
<th>SD flash card</th>
<th>8 GB standard card (up to 32 GB usable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data format</td>
<td>CSV</td>
</tr>
<tr>
<td>Image format</td>
<td>BMP</td>
</tr>
</tbody>
</table>

#### Inputs and Outputs

<table>
<thead>
<tr>
<th>Probe connector</th>
<th>2 x LEMO 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB interface</td>
<td>LEMO-B, 4 pin (adapter cable with USB type A)</td>
</tr>
<tr>
<td>VGA output</td>
<td>standard VGA socket (15 pin D-Sub)</td>
</tr>
<tr>
<td>Trigger input/output</td>
<td>LEMO-1B, 10 pin: TTL level (5V), low active</td>
</tr>
</tbody>
</table>

#### Further Features

<table>
<thead>
<tr>
<th>Measuring units</th>
<th>switchable mm, inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time</td>
<td>built-in real-time clock</td>
</tr>
<tr>
<td>Languages</td>
<td>English, German, further languages on request</td>
</tr>
</tbody>
</table>

| Permissible temperatures: Operation (with batteries/ storage temperature) | -10 °C to +50 °C / -20 °C to +60 °C |

#### Power Supply

<table>
<thead>
<tr>
<th>Mains operation</th>
<th>via mains power supply (article no. 1808.503)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 100 - 240 VAC, 50 - 60 Hz</td>
</tr>
<tr>
<td></td>
<td>• output: 12 VDC, 4 A</td>
</tr>
<tr>
<td></td>
<td>• permissible operating temperature: 0 °C to +50 °C</td>
</tr>
</tbody>
</table>

| Battery operation | approx. 9.5 hrs (at factory settings) |
|                  | with built-in Li-ion rechargeable battery |

<table>
<thead>
<tr>
<th>Power saving mode</th>
<th>on / off</th>
</tr>
</thead>
</table>

| Automatic switch-off | in case of low voltage of mains or battery |

#### Dimensions and Weight

<table>
<thead>
<tr>
<th>Dimensions (H x W x D)</th>
<th>• 138 mm x 249 mm x 52 mm without protective holster</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 149 mm x 262 mm x 54 mm with protective holster</td>
</tr>
</tbody>
</table>

| Weight | • 2.0 kg (with Li-ion battery and protective holster) |

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**KARL DEUTSCH**

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