Ultrasonic Load Monitoring
Who We Are

One Company, Total Support, Complete Solutions

Over many years, Hydratight has provided world-class bolted joint solutions and continues to set international standards in joint integrity for its customers on a global scale.

Hydratight works in partnership with the world’s leading OEMs using the latest computer technology and market leading development facilities. We continue to push back the boundaries of technology to provide fast, accurate and reliable solutions to critical assembly problems.

Our people are the key to our success: qualified, competent and innovative people, working closely with our customers ensuring a total understanding of their requirements.

One Company - Meets Standards

Totally committed to safety and quality, all Hydratight products and services are designed, manufactured and carried out within a management system in accordance with ISO 9001: 2008 (Quality Management), ISO 14001: 2004 (Environmental Management) and OHSAS 18001:2007 (Occupational Health and Safety)

Our extensive bolting and machining services include:

• Torque and tension bolting equipment
• Portable machining equipment
• Product sales, rental and technical support
• Product service and training
• Special designs and alternative sizes are available upon request

Engineering Driven Safety Focused Solutions
Ultrasonic Load Monitoring

Staying at the forefront of Ultrasonics technology has resulted in Hydratight developing the BoltScope II and more recently the BoltScope Pro.

BoltScope Pro & BoltScope II ultrasonically measures the actual load in the fastener at point of loading and throughout the service life of the fastener.

Principles of Operation

The technology of the equipment is based on a well-known and reliable Pulse-Echo measuring technique.

A transducer is placed on one end of the fastener and generates a pulse which travels down the length of the fastener. The pulse is reflected off the other end and the echo returns to the transducer. The unit then measures the Time of Flight of the signal.

The initial operation is carried out with the unloaded fastener to record a reference length. Once the fastener has been tightened the operation is repeated. The difference in the Time of Flight between the unloaded and loaded state of the fastener is used to establish the resultant stress. The resultant stress can then be extrapolated to display load, elongation and strain.

Methods of Tightening

Hydratight’s BoltScope Pro & BoltScope II can be applied to all methods of fastener tightening including the following:

- Direct Manual
- Manual Torque Wrenches
- Torque Multipliers
- Hydraulic Torque Wrenches
- Hydraulic Bolt Tensioners

Applications

Hydratight’s ultrasonic products are ideally suited for any application requiring accurate fastener tension measurements. These include:

- Power Generation
  - Nuclear & steam, case and man way fasteners
  - Wind, turbine inner – outer blade bearings and gearboxes
- Petrochemical pressure vessel fasteners for pipe and heat exchangers
- Diesel and gas engines main bearings, balance weights, connection rods and cylinder heads
- Construction industry wind turbine base bolts, bridge rope ties
- Automotive cylinder head and engine fasteners
- Industrial presses, injection moulding machines and steel mills
- Aerospace landing gear and engine component fasteners
BoltScope Pro is a new addition to Hydratight’s Ultrasonic range. This bolt load monitoring device is smaller, more mobile and user friendly.

The pocket sized BoltScope Pro enhances all the existing technologies and is packaged to work on the harshest and most complex applications, producing the high levels of accuracy required to complete the joint integrity solution.

The BoltScope Pro is the first cost effective, ultrasonic monitoring device to measure bolt load, elongation, stress and percentage of strain utilizing nanosecond technology.

Loaded and un-loaded bolt readings are displayed on an easy to read screen at any time throughout the bolts active service life. The device can be configured for linear regression or vector readings to assist load measurement optimization.

BoltScope Pro has a tough aluminum body with sealed end-caps for long service in tough conditions.

BoltScope Pro includes a simple to use software suite. Joint and material data can be easily created and downloaded to BoltScope Pro. Captured data can be uploaded for offline storage, analysis and reporting.

New features include:

• Powerful auto-set facility, automatically optimizes signal detection and stability and then adjusts the display accordingly. Reducing the need for operator interrogation of reading
• Initial and secondary reading “waveforms” can be matched visually, greatly improving transducer placement repeatability
• “Target” Hi and Lo tolerance alarm function works in conjunction with the data port to control an external pump shut-off device to limit error situations
Features:

- Mobile and compact design makes it suitable for the most difficult to reach bolt locations
- Easy to navigate via user interface
- Stores up to 8,000 readings with WAVEFORMS in multiple groups
- Automatic temperature compensation
- Readings can be stored offline for joint integrity reporting
- Create up to 64 custom defined applications
- Ability to set fastener Hi and Lo tolerances with audible beeper, viewable scan bar and visual LEDs flash upon tolerance being triggered
- Measures from 1” (25mm) up to 48” (137cm) fastener lengths
- Functions in temperatures ranging from 14°F to 140°F (-10°C to 60°C)
- Operates up to 150 hours battery life
- Fixed, single and two-point zero calibration options
- Full two year warranty on parts and labor excluding batteries, transducer, temperature probes and cables

Physical Description

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>2.5“</td>
<td>63.5 mm</td>
</tr>
<tr>
<td>Height</td>
<td>6.5“</td>
<td>165 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>1.24“</td>
<td>31.5 mm</td>
</tr>
<tr>
<td>Weight including batteries</td>
<td>0.84 lbs</td>
<td>381 g</td>
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</table>

Display

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGA Greyscale Display</td>
<td>1/8 VGA</td>
</tr>
<tr>
<td>Viewing Area: (w x h)</td>
<td>1.8 x 2.4“</td>
</tr>
<tr>
<td>Pixel Density: (w x h)</td>
<td>160 x 240</td>
</tr>
<tr>
<td>EL backlit:</td>
<td>on/off/auto</td>
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</tbody>
</table>

Power Supply

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries Required</td>
<td>3 x 1.5V alkaline or 1.2V NiCad ‘AA’ batteries</td>
</tr>
<tr>
<td>Operating Time:</td>
<td>For 150 hours on alkaline and 100 hours on NiCad (charger not included)</td>
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</table>
BoltScope II

BoltScope II has set the benchmark of accuracy in fastener load monitoring over the past ten years, it is now established and recognized as the market standard.

BoltScope II is designed to verify any application that requires close load tolerances on fasteners. The instrument is particularly useful for verifying manufacturing processes or conformity of bolt tightening processes.

The BoltScope II measures bolt strain using the well proven principle of measuring the Time of Flight of an ultrasonic signal.

The BoltScope II displays the load, stress or elongation of a fastener through operator setting and pre-loaded compensation data. Built-in A-Scan wave-form displays help the user to place transducers correctly by verifying signal reception.

Material and joint data can be uploaded/downloaded to a PC directly using the Stressware software provided. Stressware allows easy measurement analysis, as well as data reports and information to be saved for periodic comparisons.

The following chart presents a typical "real world" application that clearly shows the advantages of applying ultrasonics as the method of monitoring. This form of monitoring can be applied to all methods of tightening.
**Features:**

- Powerful unit enabling the monitoring of long fasteners
- Large visual display for waveform interrogation with a four level zoom facility
- Two methods of monitoring, single echo and multi echo. Multi echoes eliminates couplant thickness
- Easy navigation soft keys for menu selection
- Stores 10,000 readings in multiple groups
- Automatic temperature compensation
- Readings can be stored offline for joint integrity reporting
- Create up to 512 custom defined applications
- Ability to set fastener Hi and Low tolerances with a large bar graph display
- Measures from 1" (25mm) up to 251" (6.4m)
- Operates from temperature ranging from 14°F to 140°F (-10°C to 60°C)
- Operates up to 40 hours battery life
- Built in ZERO CAL block enables quick and easy exchange of transducers or cables

**Physical Description**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>7.5&quot; (191 mm)</td>
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<tr>
<td>Height</td>
<td>5.5&quot; (140 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>2.2&quot; (56 mm)</td>
</tr>
<tr>
<td>Weight including batteries</td>
<td>2.5 lbs (1.14 kg)</td>
</tr>
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**Display**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic Waveform LCD:</td>
<td>High resolution 1/4 VGA</td>
</tr>
<tr>
<td>LCD Display</td>
<td></td>
</tr>
<tr>
<td>Viewing Area:</td>
<td>(w x h) 3.8 x 2.8&quot; (w x h) 96 x 71 mm</td>
</tr>
<tr>
<td>Pixel Density:</td>
<td>(w x h) 320x240</td>
</tr>
<tr>
<td>Upload Rate:</td>
<td>4Hz. Adjustable contrast and backlight</td>
</tr>
<tr>
<td>Four Level Zoom:</td>
<td>For signal enlargement</td>
</tr>
</tbody>
</table>

**Power Supply**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries Required</td>
<td>5 x ‘AA’ Alkaline or NiCad batteries</td>
</tr>
<tr>
<td>Operating Time:</td>
<td>40 hrs minimum without backlight. A.C. Power (85 to 260v)</td>
</tr>
</tbody>
</table>
Our global network means you can rely on the right people, products and services wherever you are in the world.

Email us at: solutions@hydratight.com
Or find your local representative at:
hydratight.com/contact

Material sourced from fully sustainable, managed forests using Elemental Chlorine Free fiber.