Teledyne RESON

Broadband Reference Hydrophones and Accessories
Teledyne RESON has over 40 years proven reliability in underwater acoustics. Over the years we have worked with internationally recognized laboratories and industries on the development of acoustic standard references and advanced sensor designs. The result of this work is an expansive, comprehensive line of precision reference hydrophones and projectors covering frequencies from 0.1Hz to the MHz band.

Every hydrophone leaving production is individually calibrated. Teledyne RESON provides calibrations consistent with international standards established at the National Physical Laboratory, UK. Teledyne RESON reference hydrophones are designed for precision underwater acoustic measurements, signal detection, and/or calibrated reference acoustic projection. Our hydrophones are internationally trusted for quality acoustic measuring in scientific research, navy, and environmental monitoring.

Teledyne RESON is also an OEM supplier of hydrophones for many industrial and commercial products.
Flexibility, Responsiveness & Service

Our Sales, Service, and R&D department is dedicated to providing solutions for customer needs. In addition to maintaining a product line of standard hydrophones, our experienced team of engineers also design and manufacture customer-specific sensors.

We are also flexible to discuss modification of our Commercial of the Shelf (COTS) products to better fit specific system integration requirements. Teledyne RESON is dedicated to your solutions.

Quality

The Danish headquarters, Teledyne RESON, is quality certified in accordance with ISO 9001:2008, which ensures that all Teledyne RESON products are manufactured according to the strictest quality requirements for reliable long term, continuous operation. The complete manufacturing process is monitored, from development through production and shipping.

Our Production and Calibration facility includes two large tanks where we can perform calibration measurements of our products, and a high-pressure test tank with pressure range up to 700 bar.

AT A GLANCE

• Broadband (0.1Hz to 1MHz)
• Small size
• Linear Receive Response
• Omnidirectional
• Individually calibrated
• Low self noise below SSØ
• Balanced Differential and Single-ended output
• NBR for long term deployment
• Resistance to hydrocarbons
• Modular designs

TELEDYNE RESON PROVIDES

• Quality
• Performance
• Precision
• Uniformity
• Reliability
• Durability
• Responsiveness
• Flexibility
• Options
Hydrophones

### Without Internal Preamplifiers

<table>
<thead>
<tr>
<th>Model</th>
<th>Usable Bandwidth</th>
<th>Receive Sensitivity</th>
<th>Transmit Sensitivity at Resonance</th>
<th>Depth rating</th>
<th>Size (max OD/Length in millimeters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4013</td>
<td>1 Hz to 180 kHz</td>
<td>-211 dB re. 1 V/µPa</td>
<td>135 dB re. 1 µPa/V</td>
<td>700 m</td>
<td>OD 10 mm Length 63 mm</td>
</tr>
<tr>
<td>TC4033</td>
<td>1 Hz to 160 kHz</td>
<td>-203 dB re. 1 V/µPa</td>
<td>145 dB re. 1 µPa/V</td>
<td>900 m</td>
<td>OD 25 mm Length 138 mm</td>
</tr>
<tr>
<td>TC4034</td>
<td>1 Hz to 470 kHz</td>
<td>-218 dB re. 1 V/µPa</td>
<td>145 dB re. 1 µPa/V</td>
<td>900 m</td>
<td>OD 16 mm Length 138 mm</td>
</tr>
<tr>
<td>TC4038</td>
<td>50 kHz to 800 kHz (&gt;1 MHz)</td>
<td>-228 dB re. 1 V/µPa</td>
<td>137 dB re. 1 µPa/V</td>
<td>20 m</td>
<td>OD 4 mm Length 58 mm</td>
</tr>
<tr>
<td>TC4040</td>
<td>1 Hz to 120 kHz</td>
<td>-206 dB re. 1 V/µPa</td>
<td>138 dB re. 1 µPa/V</td>
<td>400 m</td>
<td>OD 21 mm Length 120 mm</td>
</tr>
</tbody>
</table>

### With Internal Preamplifiers

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<thead>
<tr>
<th>Model</th>
<th>Usable Bandwidth</th>
<th>Receive Sensitivity</th>
<th>Transmit Sensitivity at Resonance</th>
<th>Depth rating</th>
<th>Size (max OD/Length in millimeters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4014</td>
<td>15 Hz to 480 kHz</td>
<td>-186 dB re. 1 V/µPa</td>
<td>-180 dB differential re. 1 V/µPa</td>
<td>900 m</td>
<td>OD 38 mm Length 275 mm</td>
</tr>
<tr>
<td>TC4032</td>
<td>5 Hz to 120 kHz</td>
<td>-170 dB re. 1 V/µPa</td>
<td>-164 dB differential re. 1 V/µPa</td>
<td>600 m</td>
<td>OD 38 mm Length 284 mm</td>
</tr>
<tr>
<td>TC4035</td>
<td>10 kHz to 800 kHz</td>
<td>-214 dB re. 1 V/µPa</td>
<td>-</td>
<td>300 m</td>
<td>OD 10 mm Length 169 mm</td>
</tr>
<tr>
<td>TC4037</td>
<td>1 Hz to 100 kHz</td>
<td>-193 dB re. 1 V/µPa</td>
<td>-</td>
<td>&gt;2,000 m</td>
<td>OD 36 mm Length 75 mm</td>
</tr>
<tr>
<td>TC4042</td>
<td>5 Hz to 85 kHz</td>
<td>-173 dB re. 1 V/µPa</td>
<td>-</td>
<td>1,000 m</td>
<td>OD 36 mm Length 220 mm</td>
</tr>
</tbody>
</table>
Cable for Hydrophones

Cable description for Hydrophones with integrated cables

<table>
<thead>
<tr>
<th>Cable</th>
<th>Details</th>
<th>Standard length</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4013</td>
<td>Integrated Coax cable with BNC termination</td>
<td>6m, 10m, 20m, 30m, 40m, 50m</td>
</tr>
<tr>
<td>TC4033</td>
<td>Integrated TSP DSS-2/MIL-C-915 cable with BNC termination</td>
<td>10m, 20m, 30m, 40m, 50m</td>
</tr>
<tr>
<td>TC4034</td>
<td>Integrated TSP DSS-2/MIL-C-915 cable with BNC termination</td>
<td>10m, 20m, 30m, 40m, 50m</td>
</tr>
<tr>
<td>TC4038</td>
<td>Integrated Coax cable with BNC termination</td>
<td>2m, 10m</td>
</tr>
<tr>
<td>TC4040</td>
<td>Integrated TSP DSS-2/MIL-C-915 cable with BNC termination</td>
<td>10m, 20m, 30m, 40m, 50m</td>
</tr>
</tbody>
</table>

*Longer cables and/or non-standard length on request.

The below models use TL8140, TL8142 or TL8144 cable options

<table>
<thead>
<tr>
<th>Cable</th>
<th>Cable options</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4014</td>
<td>TL8140 - PIGTAIL is supplied with wires, you will need to attached your own connector. Use the pigtail cable to access differential output.</td>
</tr>
<tr>
<td>TC4032</td>
<td>TL8144 - a female/ Female JUPITER cable to be used with EC options.</td>
</tr>
<tr>
<td>TC4042</td>
<td>TL8142 - is a male and female extension cable, to go in-between the hydrophone and male/ female JUPITER TL8144 end cable.</td>
</tr>
</tbody>
</table>
## Accessories

### EC6061 Voltage Preamplifier
- Hi-Pass filters 0.1Hz-50kHz
- Output gain 0-32dB
- 1MHz Bandwidth
- 9-18VDC
- 100M-Ω input impedance / 10Ω output impedance
- Splash proof and portable

### EC6081 Voltage Preamplifier with Band Pass Filters
- Hi-Pass filters 1Hz-250kHz
- Lo-Pass filters 1kHz-1MHz
- Output gain 0-50dB
- 1MHz Bandwidth
- 10-30VDC
- 100M-Ω input impedance / 10Ω output impedance
- Splash proof and portable

### EC6067 Condition Charge Amplifier
- Adjustable input capacitance for long cable runs
- Input resistance settings to set Hi-Pass filters
- Output gain 0-32dB
- 1MHz Bandwidth
- 12-24VDC
- 3.3Ω to 1GΩ input impedance / 20Ω output impedance
- Splash proof and portable

### EC6070 Audio Amplifier
- Audio amplifier for monitoring underwater acoustic signals
- Built-in envelope sonar detector for dolphin echo clicks
- Bandwidth up to 700kHz
- Total signal amplification up to 90dB
- Hi-Pass filtering
- Built-in landspeaker and headphone amplifiers
- Input/Output via BNC and MMI jacks

### EC6073 Input Module
- Hassel-Free Plug-and-Play system
- Provides input for 7-pin female Jupiter
- Provides input for LEMO (4 pin)
- Live level signal output via BNC
- Input for VDC to power the preamplifier
- Input for calibration tone
- Power cables included
- Splash proof and portable

### Optional Battery Packs for Teledyne RESON Preamplifiers

**EC6068**
12 VDC rechargeable power supply, to be used with EC6072 (you need both)

**EC6072**
Battery charger for EC6068, direct DC power supply to VP1000, VP2000, CCA-1000 or EC6073 input module

**EC6069**
18VDC dry-cell power supply, 2x 9V batteries
Diagram on Accessories

Hydrophones without integrated preamplifiers

<table>
<thead>
<tr>
<th>Hydrophones</th>
<th>Preamplifiers</th>
<th>DC-Supply</th>
<th>Charger</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4013</td>
<td>VP1000</td>
<td>EC6068</td>
<td>EC6072</td>
</tr>
<tr>
<td>TC4033</td>
<td>VP2000</td>
<td>EC6068</td>
<td></td>
</tr>
<tr>
<td>TC4034</td>
<td></td>
<td>EC6069</td>
<td></td>
</tr>
<tr>
<td>TC4038</td>
<td></td>
<td>VP1000</td>
<td></td>
</tr>
<tr>
<td>TC4040</td>
<td></td>
<td>VP2000</td>
<td></td>
</tr>
</tbody>
</table>

Hydrophones with integrated preamplifiers

<table>
<thead>
<tr>
<th>Hydrophones</th>
<th>Input Module</th>
<th>DC-Supply</th>
<th>Charger</th>
</tr>
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<tbody>
<tr>
<td>TC4014</td>
<td>TL8144 cable</td>
<td>EC6068</td>
<td>EC6072</td>
</tr>
<tr>
<td>TC4032</td>
<td></td>
<td>EC6068</td>
<td></td>
</tr>
<tr>
<td>TC4035</td>
<td></td>
<td>EC6073</td>
<td></td>
</tr>
<tr>
<td>TC4042</td>
<td></td>
<td>EC6069</td>
<td></td>
</tr>
</tbody>
</table>

*For use of differential output mode (where available) do not use EC6073 based setup as shown above. Use TL8140 pigtail cable and terminate as required.
Example set up

Calibrations are done with respect to a reference hydrophone. The reference hydrophone is calibrate by the reciprocity method and this is undertaken by the National Physical Laboratory (NPL) in the United Kingdom. For more details on calibrations and related uncertainties please see www.teledyne-reson.com/calibration

Teledyne RESON calibrations use pulse-gated measurement techniques are used to avoid reflections in the tank. Voltage, current, and impedance are all measured within the same gated pulse. The pulse width is limited by its wavelength and the size of the tank. We also perform a pistonphone calibration test at 250Hz. Every Hydrophone and Transducer that leaves our facility is quality checked and individually calibrated. Each unit has its own serial number and ships with its own receive, impedance and transmit (when applicable) calibration plots.
Performance

Equivalent Spectral Noise Pressure Curves for Teledyne RESON Hydrophones

Find detailed information about our hydrophones at www.teledyne-reson.com/hydrophones
Teledyne Marine
A Sea of Solutions – One Supplier

Teledyne RESON forms together with Teledyne BlueView and Teledyne Odom Hydrographic the Teledyne Marine Acoustic Imaging Group (TMAIG). TMAIG develops some of the world’s most sophisticated sonar technology.

TMAIG has manufacturing, R&D, sales and after service functions at the headquarters in Denmark as well as in Holland, Germany, UK and the USA. Furthermore it has sales offices in USA and in Shanghai and supports local sales through a network of distribution partners in more than 47 countries.

TMAIG is part of Teledyne Marine, a substantial group of companies providing products and services to the oceanographic community. Teledyne Marine is owned by Teledyne Technologies Inc., a company listed on the New York Stock Exchange (TDY).

Teledyne Marine is a group of leading-edge undersea technology companies that have been assembled by Teledyne Technologies Incorporated. Through acquisitions and collaboration, over the past 10 years Teledyne Marine has evolved into an industry powerhouse, bringing the best of the best together under a single umbrella. Each Teledyne Marine company is a leader in its respective field, with a shared commitment to providing premium products backed by unparalleled service and support.

In keeping with Teledyne’s philosophy, the member companies within the Teledyne Marine Group remain committed to their technical heritage; however, our Teledyne Marine sales staff is able to address not only brand level solution, but turn-key systems and capabilities by leveraging our full range of technology solutions. Our goal is to provide a one-stop shopping experience including 24/7 customer support world-wide.