

Teledyne RESON

# Broadband Reference Hydrophones and Accessories



# Teledyne RESON Solutions

## Hydrophone product line

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.



## HYDROPHONES

### NAVAL

- Acoustic Signature Analysis
- Ship, flow, turbulence noise measurements
- Low signal-level detection
- Acoustic tracking
- Range arrays

### ACOUSTIC RESEARCH

- Underwater acoustic measurements
- Ambient measurements
- Environmental measurements
- Marine Biological Research
- Whale Audio Recording
- Dolphin echo-location Research
- Air-gun and seismic Research
- Near and far field acoustic measures

### UNDERWATER INSTRUMENTATION

- Acoustic telemetry
- Offshore structure monitoring
- Underwater positioning/navigation

# 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.



Hydrophone TC4013 net array



## 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 SS0
- 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

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

## With Internal Preamplifiers

TC4014	15 Hz to 480 kHz	-186dB -180dB differential re. 1V/μPa	-	900 m	OD 38mm Length 273mm	
TC4032	5 Hz to 120 kHz	-170dB -164dB differential re. 1V/μPa	-	600 m	OD 38mm Length 284mm	
TC4035	10 kHz to 800 kHz	-214dB re. 1V/μPa	-	300 m	OD 10mm Length 169mm	
TC4037	1 Hz to 100 kHz	-193dB re. 1V/μPa	-	>2,000 m	OD 36mm Length 75mm	
TC4042	5 Hz to 85 kHz	-173dB -167dB differential re. 1V/μPa	-	1,000 m	OD 36mm Length 220mm	

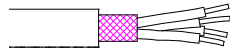
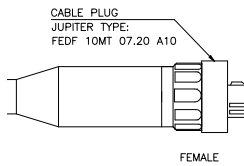
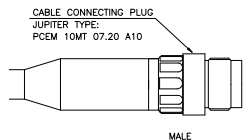
# Cable for Hydrophones

## Cable description for Hydrophones with integrated cables

Cable	Details	Standard length
TC4013	Integrated Coax cable with BNC termination	6m, 10m,20m,30m,40m,50m
TC4033	Integrated TSP DSS-2/MIL-C-915 cable with BNC termination	10m,20m,30m,40m,50m
TC4034	Integrated TSP DSS-2/MIL-C-915 cable with BNC termination	10m,20m,30m,40m,50m
TC4038	Integrated Coax cable with BNC termination	2m,10m
TC 4040	Integrated TSP DSS-2/MIL-C-915 cable with BNC termination	10m,20m,30m,40m,50m

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

## The below models use TL8140, TL8142 or TL8144 cable options

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

# Accessories

TC4013

TC4033

TC4034

TC4038

TC4040

TC4014

TC4032

TC4035

TC4042



## EC6061 Voltage Preamplifier

- Hi-Pass filters 0.1Hz-50kHz
- Output gain 0-32dB
- 1MHz Bandwidth
- 9-18VDC
- 100M- $\Omega$  input impedance / 10  $\Omega$  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- $\Omega$  input impedance / 10  $\Omega$  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
- 3.3 $\Omega$  to 1G $\Omega$  input impedance / 20  $\Omega$  output impedance
- Splash proof and portable



## 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



## 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

## 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

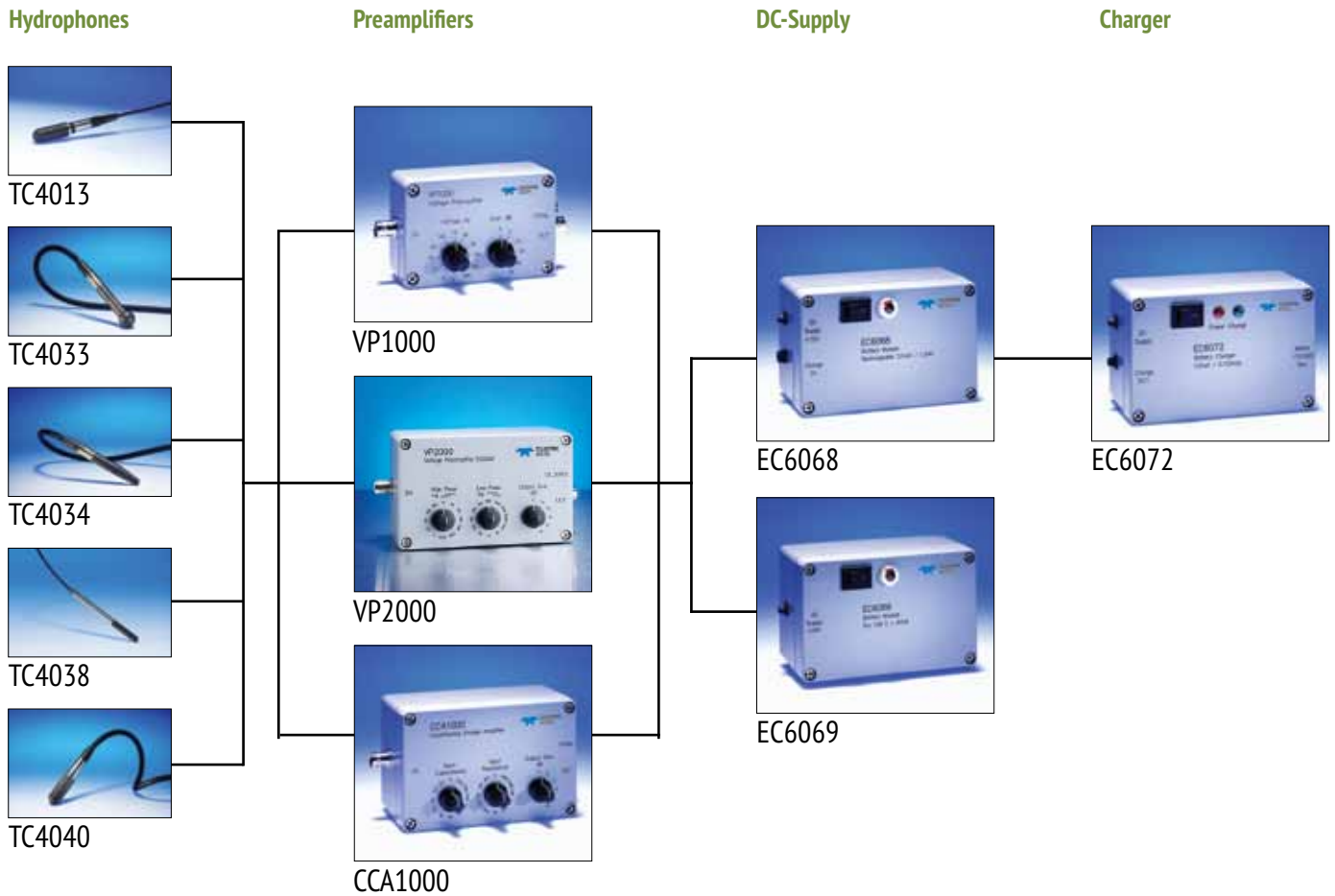


### EC6069

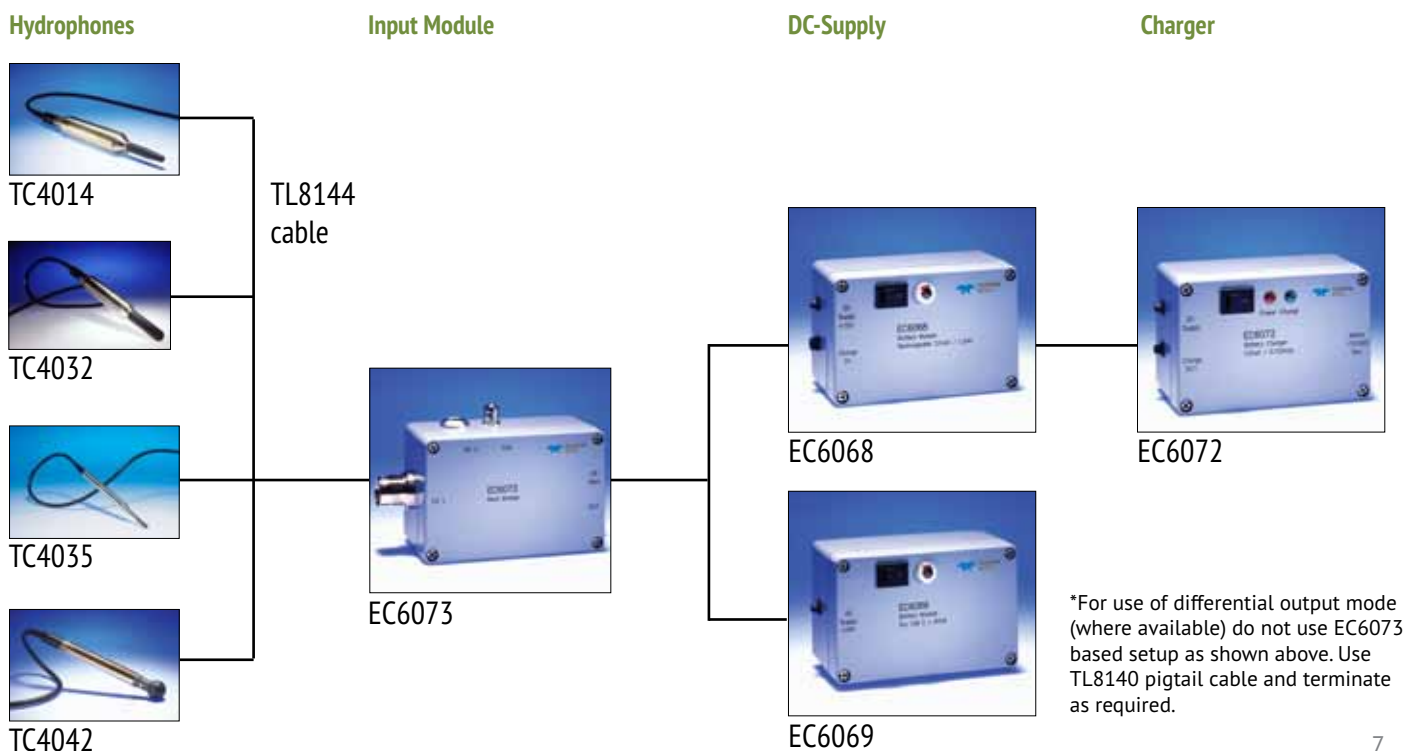
18VDC dry-cell power supply, 2x 9V batteries

# Diagram on Accessories

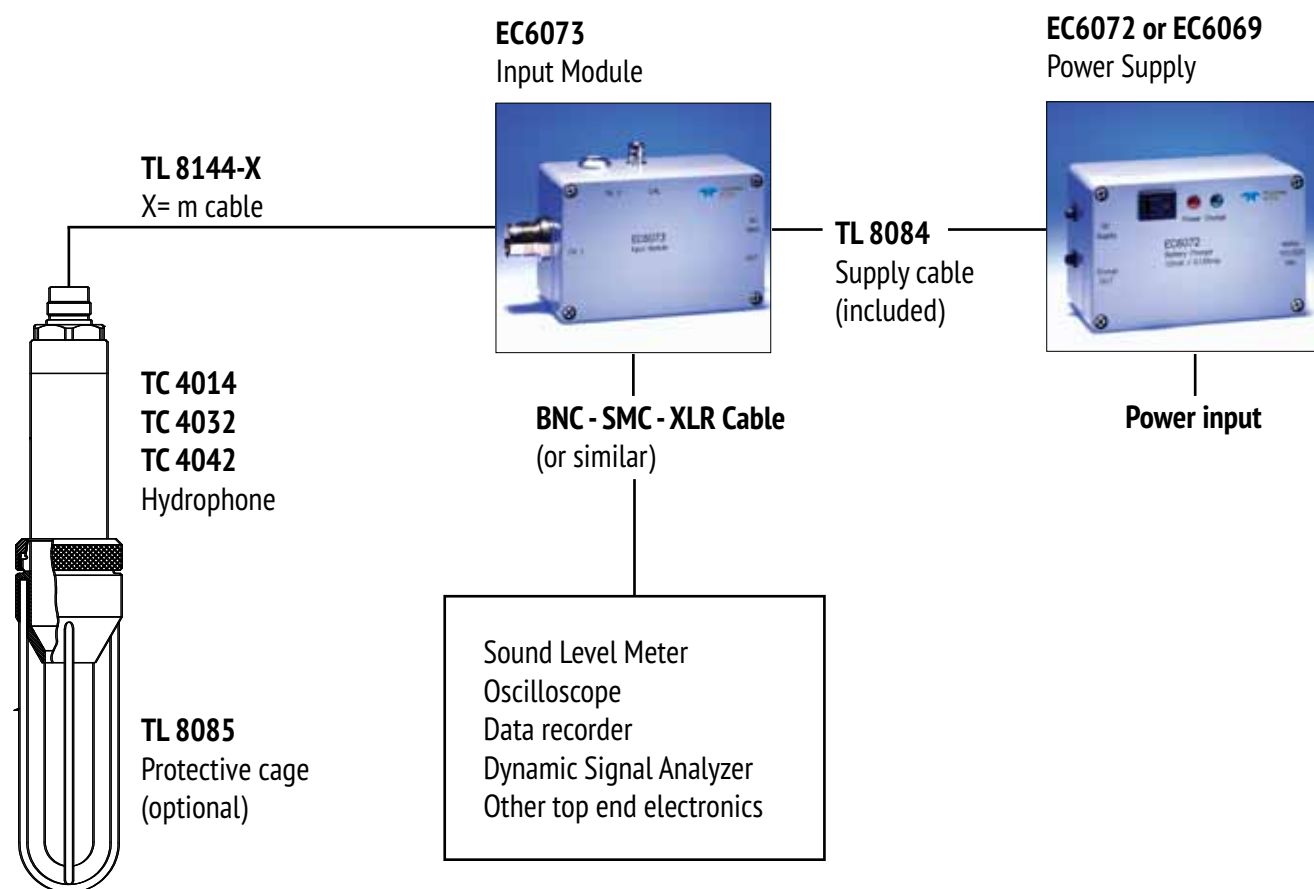
## Hydrophones without integrated preamplifiers



## Hydrophones with integrated preamplifiers



# Example set up



Teledyne RESON Calibration facility

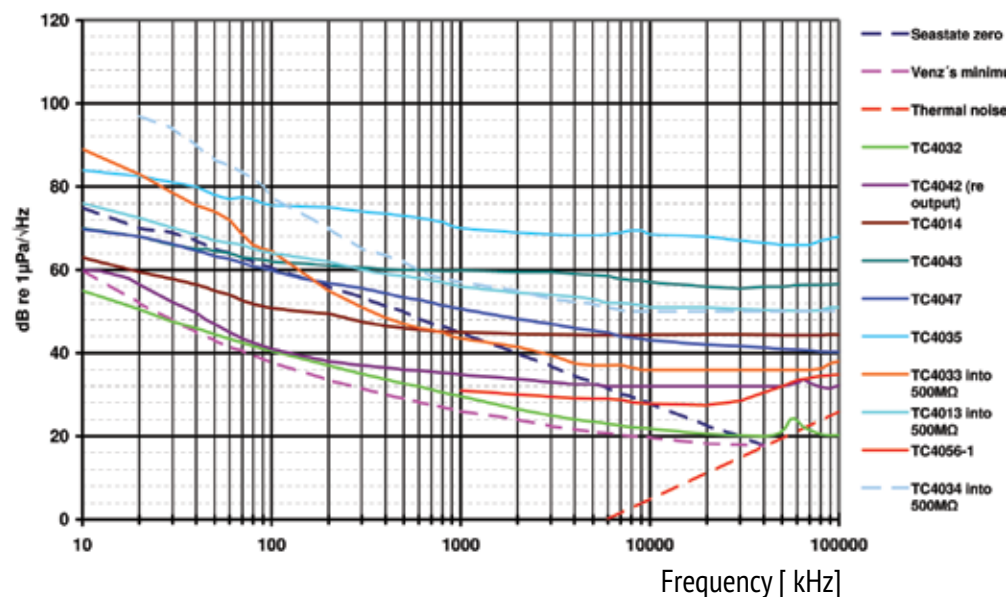
Calibrations are done with respect to a reference hydrophone. The reference hydrophone is calibrated by the reciprocity method and this is undertaken by the National Physical Laboratory (NPL) in the United Kingdom. For more details on calibrations and related uncertainties please see [www.teledyne-reson.com/calibration](http://www.teledyne-reson.com/calibration)

Teledyne RESON calibrations use pulse-gated measurement techniques 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.



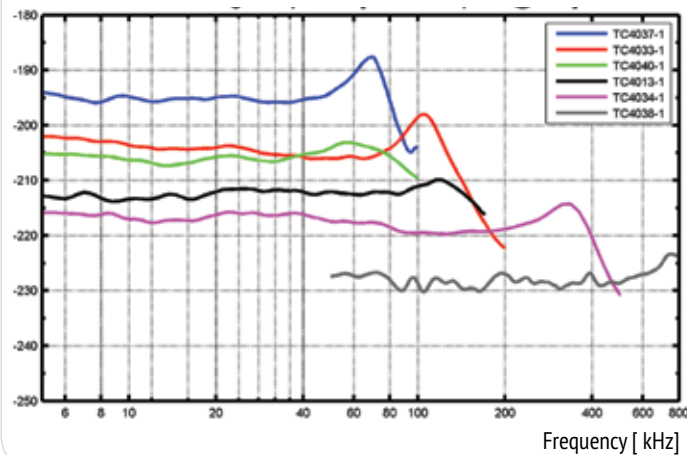
# Performance

Equivalent Spectral Noise Pressure Curves for Teledyne RESON Hydrophones

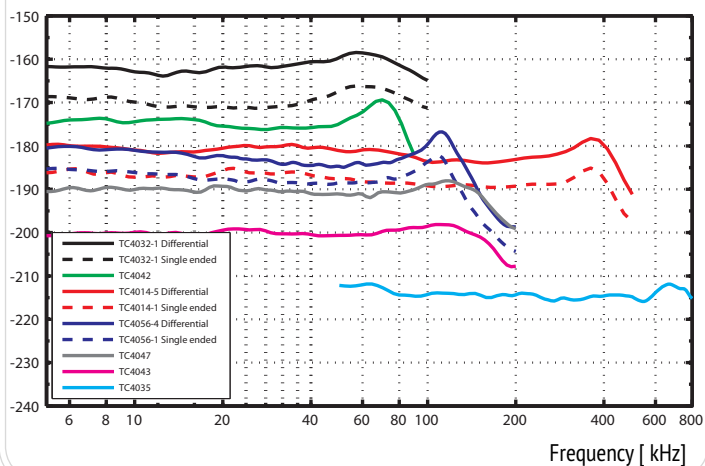


Find detailed information about our hydrophones at [www.teledyne-reson.com/hydrophones](http://www.teledyne-reson.com/hydrophones)

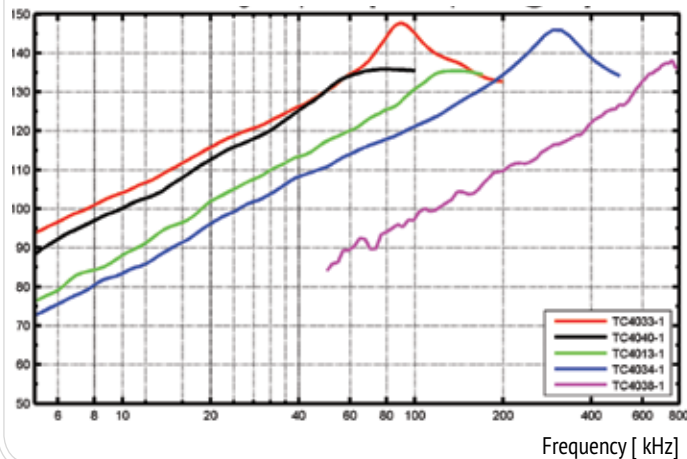
Receiving Response Teledyne RESON Hydrophone without preamplifiers [ dB re. 1V/μPa @ 1m ]



Receiving Response Teledyne RESON Hydrophone with built in preamplifiers [ dB re. 1V/μPa @ 1m ]



Transmitting Voltage Response Teledyne RESON Reference Hydrophone [ dB re. 1V/μPa @ 1m ]





# 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





[www.teledyne-reson.com/hydrophones](http://www.teledyne-reson.com/hydrophones)

For more details visit [www.teledyne-reson.com](http://www.teledyne-reson.com) or contact your local Teledyne RESON Office.

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