



Free Flooded Ring

For low frequency active sonar



Key features

- Low frequency
- High power
- Broadband
- Essentially unlimited depth capability
- High efficiency
- High reliability
- Low maintenance
- Array operation

Overview

The Free Flooded Ring (FFR) consists of a ring of piezoelectric ceramic contained within a neoprene boot, and produces a toroidal beam pattern in the horizontal plane. It has exceptional properties for low frequency active sonar applications; very wide bandwidth ($Q \sim 1$), high source level, high efficiency and an essentially unlimited depth capability.

The Ultra FFR product family has several decades of accumulated use by navies and naval research establishments in Canada, United Kingdom, Australia, United States, the Netherlands and the Republic of Korea. The simple, rugged design of the FFR underpins its ability to withstand underwater and deck shock and results in a robust and highly reliable device that is inherently low maintenance leading to a very long in-service life. Ultra's mature FFR manufacturing process and stable supply chain have been honed over several decades. Ultra has delivered scores of FFRs of various models to its customers.

Technical Specification

Ultra Maritime offers three different commercial off-the-shelf models that are of like design but scaled for operation at different frequencies. These models can be optionally equipped with a variety of features to meet specific customer requirements. Features can include: Custom performance specifications, array performance design, mounting or mooring arrangements, towed body supply, etc.

Specification for FFR Models	
Model Number	
Model 28 Fx1000	<p>Operating Frequency Range 900 - 2000 Hz</p> <p>Apparent Bandwidth (-6 dB) 1000 Hz</p> <p>Maximum Design Drive Voltage 2500 Volts RMS</p> <p>Maximum Sound Pressure Level 222 dB//1μPa @ 1 m @ 940 Hz</p> <p>Electroacoustic Efficiency 75% @ 1.5 kHz</p> <p>Directivity Radial omni</p> <p>Directivity Axial -20 dB @ 800 Hz</p> <p>Weight (Dry / Wet) 270 kg / 207 kg</p>
Model 18Fx1800	<p>Operating Frequency Range 1500 - 4000 Hz</p> <p>Apparent Bandwidth (-6 dB) 1900 Hz</p> <p>Drive Voltage Maximum Design 2500 Volts RMS</p> <p>Maximum Sound Pressure Level 218 dB//1μPa @ 1 m @ 1550 Hz</p> <p>Electroacoustic Efficiency 75% @ 3 kHz</p> <p>Directivity Radial omni</p> <p>Directivity Axial -20 dB @ 1600 Hz</p> <p>Weight (Dry / Wet) 75 kg / 52 kg</p>
Model 08Fx4000	<p>Operating Frequency Range 3500 - 10000 Hz</p> <p>Apparent Bandwidth (-6 dB) 4000 Hz</p> <p>Maximum Design Drive Voltage 2500 Volts RMS</p> <p>Maximum Sound Pressure Level 210 dB//1μPa @ 1 m @ 4000 Hz</p> <p>Electroacoustic Efficiency 75% @ 5 kHz</p> <p>Directivity Radial omni</p> <p>Directivity Axial -18 dB @ 5500 Hz</p> <p>Weight (Dry / Wet) 6.75 kg / 3.7 kg</p>

