

ORCA – Frequently Asked Questions

Welcome to our FAQ page!

Here you will find the most commonly asked questions about RS-ORCA. We are constantly adding and updating new information. If you have a question that isn't answered here, please feel free to contact us, and we will be happy to help.

What information can I get from ORCA in real-time?

The RS-ORCA is more than a simple hydrophone, and more than a simple acoustic recorder. This device not only records and streams raw acoustic data, it also processes this data and makes sense of it for the user. With free TRAC software, users can easily setup their instrument parameters including enabled channels, sampling rates, channel gain, recording schedules, calibration and internal processing.

Additionally, TRAC provides a real time portal to the user's instrument. Digital multichannel acoustic data is presented as real time spectrograms, FFTs, time domain plots of particular frequency bins, third octave plots with percentiles, and live, real time audio. TRAC is a free application supplied with the purchase of all RS-ORCA passive acoustic products.

I only need one hydrophone channel, is ORCA still a good choice?

The ORCA can be used with only one channel enabled, but also gives the user flexibility to use multiple hydrophones in the future. Multiple synchronous hydrophones means that the user can do simple single channel studies, but also do more complex investigations related to source localisation, particle velocity, sampling complex acoustic environments by sampling at multiple depths, or maximize dynamic range by using different sensitivity hydrophones at the same time.

The ORCA includes one hydrophone when purchased, and our pricing is competitive with any single channel acoustic recording system in the world. By starting with a base package of the RS-ORCA with one channel, users can upgrade down the road by simply purchasing additional hydrophones when the need arises.

What Bandwidth can I capture with ORCA?

The bandwidth in an acoustic acquisition system is limited by the hydrophone bandwidth, the analogue input bandwidth and the sampling rate of the system. By default we use hydrophones that have a bandwidth exceeding 150 kHz, and an analogue bandwidth out to about 160 kHz. We use a fixed sampling rate of 768 kHz on our analogue to digital converters, so this entire bandwidth is adequately sampled. Changes in sample rates are done in the digital domain using digital filtering and decimation techniques.

Typical bandwidth is therefore out to about 150 kHz when using the 384 kHz sampling rate mode. This wide bandwidth allows the user to capture not only audible underwater noise, but sources well into the ultrasonic spectrum, including dolphin and porpoise clicks, sonar signals from vessels and a variety of commercial fish tags.

What limitations does the device have? Can, I record, stream and process all at the same time?

Users can absolutely record, stream and process high quality acoustic data all at the same time. The ORCA has been designed to give users maximum flexibility and provide many valuable use cases for a variety of end users. The ORCA was designed to be a low power acoustic recorder, but also as a broadband digital hydrophone system. This flexibility does come with some limitations in terms of what can be done simultaneously. The table below shows some common use cases.

How do hydrophones connect to ORCA? What hydrophones are supported? How does calibration work?

Hydrophones connect to the ORCA through five standard 8 pin micro-circular series wet mate female connectors. Users can choose to populate all five hydrophone channels or use just one. We supply hydrophones that can easily integrate with the ORCA, and can be directly connected to the end cap with a locking sleeve. Additionally, they can be cabled on up to 100 m of underwater cable, giving the user maximum flexibility in their deployments. Though we do recommend hydrophones supplied by RS Aqua, it is possible to interface to other hydrophones as well. The ORCA provides a nominal output voltage that can be used to power external, pre-amplified hydrophones, which is a common use case. By default hydrophone inputs are single ended, but if you wish to use balanced or differential inputs, we can accommodate you. Please contact us for technical information.

Hydrophones supplied by RS Aqua are calibrated at the factory in water and in air at low frequencies. We provide calibration data in a readable excel format, as well as in a file that can be loaded directly into your ORCA. All units supplied with hydrophones store the calibration data internally to the device from the factory. If you wish to recalibrate, or use custom hydrophones you can easily enter in calibration data using our TRAC application.

What is the self-noise floor?

The RS-ORCA offers exceptional acoustic data quality. The plot below shows the self-noise floor of the RS-ORCA using hydrophones supplied with the base ORCA package.

How much memory does the ORCA have? How long does it last on batteries?

The standard package comes with 500 GB of SSD memory, and 256 GB of SD Card memory. These memories are used in different circumstances and offer differing levels of performance and power consumption. More than 4 TB of total memory can be supplied with the ORCA on request. The base ORCA package is designed for relatively short deployments, where broadband and exceptional data quality are required. ORCA also shines in any real time scenario, where data can be recorded directly to the user's computer using our TRAC application. Adding an external, or internal extended battery pack can prolong any deployment a great deal. The ORCA accepts many types of external power sources. Processing schemes and scheduling schemes can be setup in TRAC to increase the deployment length as well. The table below represents some worst-case continuous recording scenarios.

I am interested in ambient and anthropogenic noise studies & noise mitigation, is the ORCA suitable?

The ORCA is especially useful in the characterization of ambient and anthropogenic underwater noise. This device can record and stream raw samples, while performing noise analysis processing in the form of third octaves spectrums, average SPL, peak SPL and percentiles. We are also working on a real time sound exposure level (SEL) module in an upcoming firmware/software release. This product integrates with our wireless topside buoy, TR-FLOAT, so users can seamlessly monitor underwater noise up to 7 km away from the deployed ORCA, which is ideal for noise mitigation projects.

How can I deploy ORCA?

The base ORCA package is very small and positively buoyant. The easiest way to deploy is over the side of a vessel, or simply anchored to the ocean bottom with a pickup buoy. For deep deployments an acoustic release may be required. Versions of the ORCA with larger battery packs can be easily deployed using our elliptical float collar, or rigidly mounted to a bottom platform, or inline on a mooring. RS Aqua also provides a real time topside buoy for extra power and wireless data transmission, this is an excellent solution for real time noise or marine mammal monitoring and mitigation.

What format will the data come in? How can I download data from ORCA

Raw data is recorded as standard .wav files. Processed and sensor metadata are stored in our proprietary binary formats. Downloads occur using two methods, high speed USB for extremely easy and fast downloads (~40MBytes/s), or over Ethernet. Data stored in a binary format can be converted to a standard .csv format using our included converter software. Files can be analysed in a number of different commercial software packages.

Can I integrate other sensors with ORCA?

There are two possibilities for integrating other sensors with the RS-ORCA. The user can use a spare input channel to sample analogue information from another sensor, or a digital stream can be captured from an external sensor. Care must be taken to not exceed maximum input levels when using hydrophone channels for external analogue information. At this time, the RS-ORCA does not support capturing a digital stream from an outside instrument, though this is planned for a future firmware release. Please contact us about any custom sensor integration requirements.

Does ORCA keep its own time? Can you connect a GPS for position and time logging?

Yes, the RS-ORCA keeps its own time with a real time clock. This clock gets synced to UTC or computer time every time you connect to TRAC. Our real time buoy TR-FLOAT allows for real time wireless transmission of raw acoustic data, and also provides GPS information to RS-ORCA. It is possible to synchronize RS-ORCA time to GPS time. All recorded files are time stamped with the real time clock time.

Can I use ORCA as real time digital hydrophone array for localising passive acoustic sources?

Yes. All of the hydrophones are synchronously sampled and the five elements allows for non-ambiguous array designs for localisation. The RS-ORCA can even capture data from harbour porpoise clicks in excess of 130 kHz and localize on these common events. The RS-ORCA has also been used in digital beamforming applications with small compact arrays.

Why does ORCA use five channels? Why not four like others?

RS-ORCA was originally designed for a specific use. That was to localise passive sources over a really wide acoustic bandwidth. Through research and experience we have found that five element arrays give better performance than four element arrays in beamforming and localisation applications. The fifth channel can be used in a small compact circular array as a centre element, which allows for simple beamforming, and bearing estimation at moderate frequencies. While the extra element in the middle of a tetrahedral array can give excellent non-ambiguous results for time of arrival applications at ultrasonic frequencies, like those used by harbour porpoise. Below is a plot of some cardioid beamforming results with five hydrophones directly connected to our end cap in a small circular array configuration.