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## Vaisala WAS425AH Ultrasonic Wind Sensors Supporting the Finnish Navy

“Squadron 2000” of the Finnish Navy uses Vaisala WAS425AH Ultrasonic Wind Sensors to support its operations at sea. Ultrasonic Wind Sensors are incorporated into the ships’ navigation systems both in the fast attack craft and the hovercraft of the squadron. The harsh conditions on the northern seas set stringent requirements for wind sensors - met by the Vaisala Ultrasonic Wind Sensor.

Since 1998 the Finnish Navy has been building up “Squadron 2000”, a new squadron made up of two fast attack craft and four hovercraft. The squadron currently operates one fast attack craft and one hovercraft. Squadron 2000 relies on Vaisala WAS425AH Ultrasonic Wind Sensors for wind measurement onboard these vessels. Ultrasonics are incorporat-

ed into the ships’ navigation systems both in the fast attack craft and the hovercraft of Squadron 2000.

The harsh conditions on northern seas set high requirements for wind sensors. According to Navy officers, Vaisala Ultrasonic Wind Sensor WAS425AH is the first wind sensor that operates satisfactorily on these ships. The Vaisala WAS425AH is a solid state wind sensor that uses ultrasound to determine horizontal wind speed and direction. The measurement principle is based on transit time: the time it takes for the ultrasound to travel from one transducer to another, depending on wind speed along the ultrasonic path. The WAS425AH is heated and has thermostatically controlled heaters in the transducer heads to prevent freezing rain or snow from building up on the sensor.

### Measuring wind speed and direction is essential

In peacetime fast attack craft and

hovercraft participate in normal Navy operations, in other words they defend territorial integrity and carry out major exercises. A Vaisala MILOS Weather Station has been providing reliable weather data since 1998 for the existing fast attack craft of Squadron 2000. Its First Officer explains: “To measure wind speed and direction is vital for two reasons. Craft need the wind, relative humidity and barometric pressure data for usual navigation. The second reason, especially important for warships, is the fact that ballistic preparation is needed for artillery and missile firing. Wind, relative humidity and barometric pressure conditions are essential parameters to be considered for ballistic preparation. The more accurate the weather data, the more successful the ballistic preparation. This means that less corrections will then be needed during firing.”

At the craft, digital wind data is transferred from WAS425AH to the MILOS as an NMEA

*Staff of the fast attack craft appreciates the wind data and weather data that Vaisala equipment provides.*





Standard message. The craft's navigation system gets the weather data from MILOS and passes it on via the craft's local network to the fire control system. It is also possible to transmit weather data to other craft. In the existing hovercraft there is no weather station, and its navigation system takes care of wind data processing. As a backup measure these craft use portable wind meters.

Mainly true wind data is used in these craft. They measure true wind to be able to estimate the effect of the weather on operations. Relative wind data is also of interest as it is needed, for example, for steering in harbors.

### Extreme conditions on northern seas

The sensors installed on top of the craft are under enormous strain due to harsh conditions at sea, especially in the winter. Snow and salt water spraying on the sensor can cause, for example, corrosion, ice formation and mechanical damage. The maxi-

imum speed of the fast attack craft is 18 m/s, whereas the hovercraft reaches 25 m/s. In the fast attack craft a continuous true wind as high as 30 m/s has been measured on the Baltic Sea. Beside the weather conditions, factors such as the movement, tilting and vibrations of the craft set high demands on the wind sensors. Temperature and relative humidity variations are also vast during the year. In the winter, when the craft sails at a high velocity, the wind sensor can face temperatures lower than -30°C (-22 °F).

### Positive long-term user experiences

The crew of the fast attack craft is more than pleased with their Ultrasonic Wind Sensor and MILOS Weather Station. As the First Officer of the craft said: "Ultrasonic is the first wind sensor that withstands all the challenging conditions of the Baltic Sea all year round". So far the Ultrasonic has functioned as required for close to 5 years with-

out any maintenance. The sensor is fastened with a rigid steel bar on top of the craft. The installation and the sensor itself have been robust enough to bear the mechanical stress. Heaters in the transducer heads prevent freezing rain or snow build-up. High accuracy and reliable operation in all weather conditions are the features of Ultrasonic that the crew appreciates the most. ●

*The Vaisala WAS425 Ultrasonic Wind Sensor has no moving parts, and is resistant to contamination and corrosion. This eliminates on-demand and periodic maintenance.*

