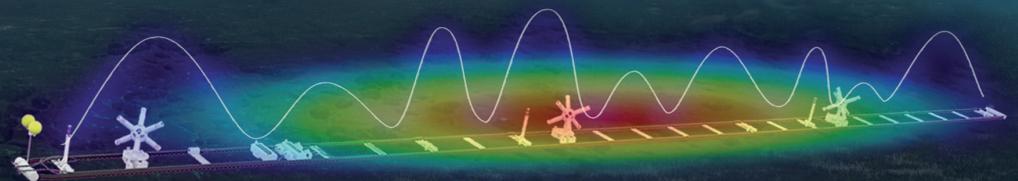


# Patria

## SIGMA & SIGMA Light

Signature Measure and Analysis Systems

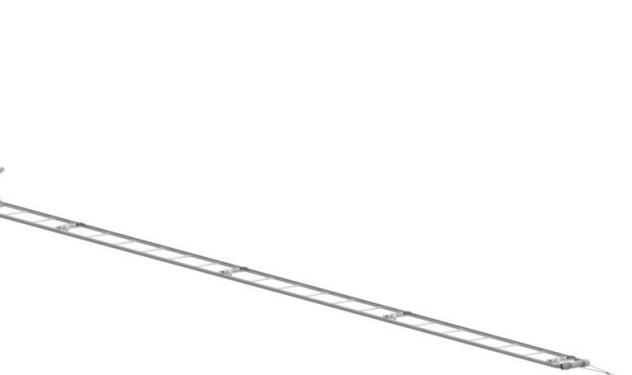


# SIGMA

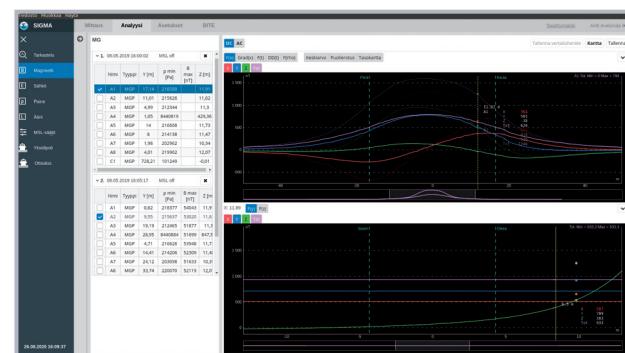
SIGMA is an advanced measurement system that captures signature of any vessel in very high detail while it passes by the system. The system contains a bottom-deployed sensor track that measures accurately magnetic, electric, pressure and acoustic signals in real-time. In addition to the time domain, the long sensor track enables extending the signature measurement also into the spatial domain. The design of the measurement track fully supports permanent installation as well as portable operations.

The system contains the sensor track, handling equipment for deploying, recovering and calibration as well as onshore measurement station. The sensor track can be connected to the measurement station with a single power/data cable. The station itself is hardened and can be extended to contain upto 3 sensor tracks.

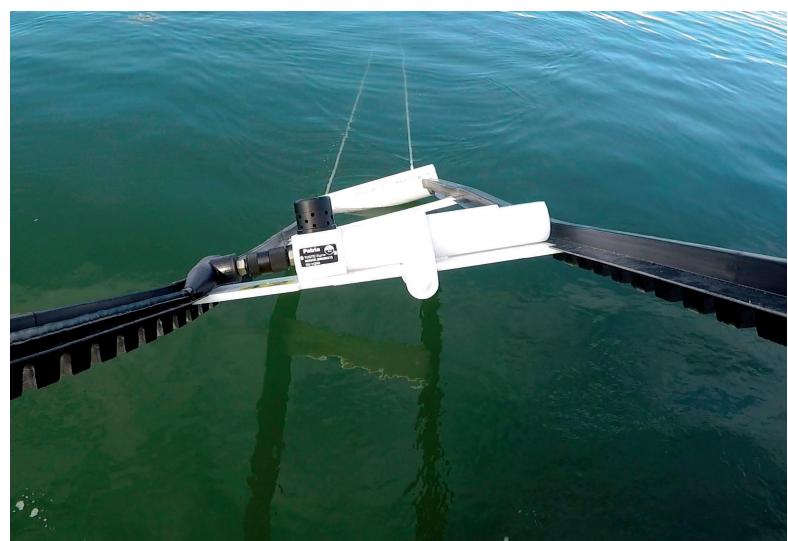
The measurement station contains applications for sensor track calibration, measurement campaign planning and execution. For that, a comprehensive set of tools and views are available for monitoring and validating the measurements as well as for analysing the measurements in the collected signature database.

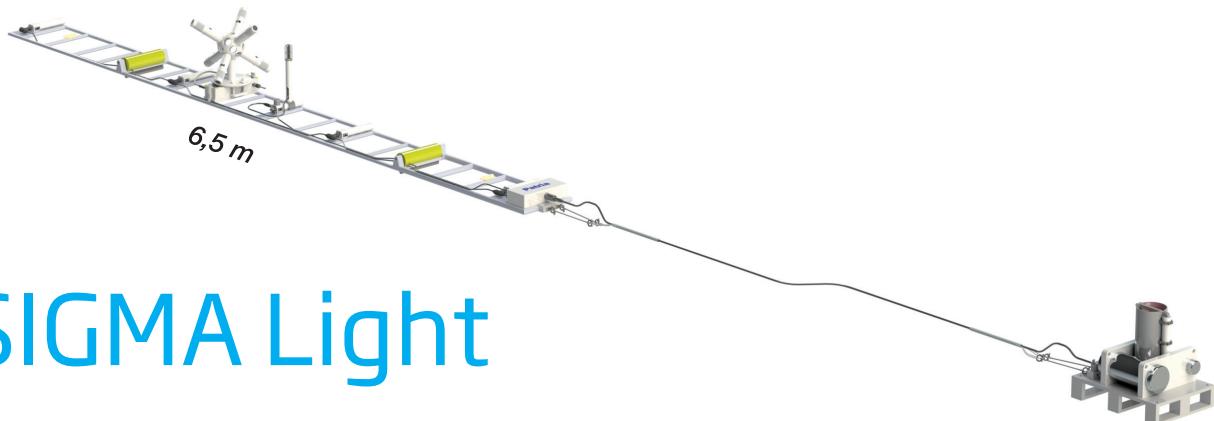


## Measurement Application



## Analysis Application





# SIGMA Light

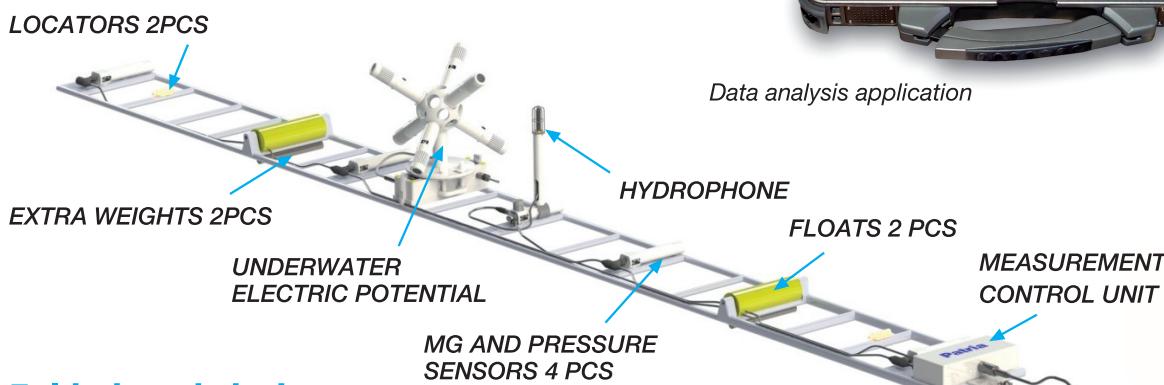
SIGMA Light is a lightweight portable measurement system that captures signature of any vessel in high detail. The system contains a bottom-deployed rigid sensor track that measures accurately magnetic, electric, pressure and acoustic signals of the vessel while it passes by the system. The design of the measurement track fits perfectly to portable operations because the track can be transported to desired location with small boat and installed in one hour.

The system contains the foldable sensor track, a battery, local data storage and recovering system. All these components locate on the sea bottom during the measurement campaign without any physical components on surface or interfaces to other systems. The recovery of the system is carried out from the boat without divers.

The system is supplied with a rugged laptop, a data analysis application and two alternative connection options. After connecting the local data storage to laptop via cable or WLAN in the buoy, the recorded data i.e. signatures can be viewed with the analysis application. The data can also be exported from laptop and stored into SIGMA measurement station.



## Deployed track at sea bottom



## Folded track during transportation



## SIGMA

### Key features

- Measures signature of underwater and surface vessels in very high detail
- Automatic adaptation to seafloor geometry
- Fixed and portable solution available
- Maximum sea cable length: 4500 m
- Comprehensive tools for signature analysis in an onshore measurement station
- Database for vessel signatures

### Sensor performance and measuring capability

- 3D Magnetic field sensors (8 pcs)
  - Measuring range:  $\pm 100\,000$  nT
  - Bandwidth: 0 - 1000 Hz
- 3D Electric field sensor (UEP/ELFE)
  - Bandwidth: 0 - 3 kHz
- Pressure sensors (8 pcs)
  - Measuring range: 0 - 6 bar
- Acoustics sensor (hydrophone)
  - Frequency range: 1 Hz - 40 kHz

### System weight and physical dimensions

- Sensor track: 41 m x 59 cm x 60 cm
- Sensor track (on the cable reel): 600 kg
- Hybrid sea cable (1500 m on the drum): 650 kg
- Instrument unit: 8,5 kg, 485 mm x 392 mm x 192 mm

### Measurement station equipment in transport condition

- Interface Unit: 27 kg
- Auxiliary Unit: 31 kg
- Interface and Auxiliary Unit 785 mm x 615 mm x 335 mm

### Power Supply

- Sensor track power supply: 150 VDC, 1 A
- Measurement station power supply: 230 V/50 Hz
- UPS device included
- Instrument unit power supply: 12 VDC

### Environmental conditions

- Information of used chemicals will be delivered according to REACH/RoHS

## SIGMA Light

### Key features

- Measures signature of underwater and surface vessels in high detail
- Lightweight and foldable structure
- Transportable with small boat and installable in one hour
- Standalone data collection
- Data analysis application in rugged laptop
- Data can be transported to SIGMA Measurement station for further analysis

### Sensor performance and measuring capability

- 3D Magnetic field sensors (4 pcs)
  - Measuring range:  $\pm 100\,000$  nT
  - Bandwidth: 0 - 1000 Hz
- 3D Electric field sensor (UEP/ELFE)
  - Bandwidth: 0 - 3 kHz
- Pressure sensors (4 pcs)
  - Measuring range: 0 - 6 bar
- Acoustics sensor (hydrophone)
  - Frequency range: 1 Hz - 40 kHz

### System weight and physical dimensions

- Folded Sensor track: 50 kg, 25 cm x 50 cm x 350 cm
- Unfolded sensor track: 20 cm x 50 cm x 650 cm
- Recovery system and battery: 25 kg
- Hybrid Sea Cable: 25 kg, 60 m

### Power Supply

- Battery pack 24V DC
- Battery endurance 4 days with non-stop recording

### Environmental conditions

- Information of used chemicals will be delivered according to REACH/RoHS