

LEAFLET

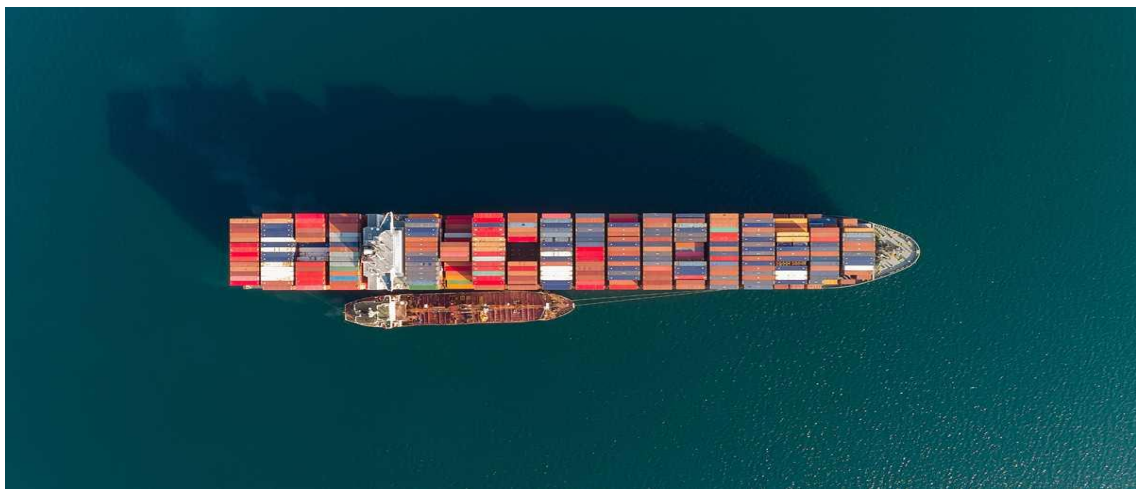
Product Name: Fuel Oil Analysis & Measurements (FOAM)
Category: Marine & Industrial Devices
Series: FOAM_01

FOAM is a smart IoT device, designed, developed and patented (at WIPO) by ENSOMATOSYS. The device applies to the refueling process of ships with the following objectives:

- Delivery - acceptance of the correct fuel quantity
- Delivery - acceptance of fuel quality per the ISO 8217: 2017 specifications or any international or national standard in force, thus eliminating or minimizing catastrophic consequences for the ship's engines and the environment
- Optimal management of the bunkering process and minimization / elimination of the economic losses

FOAM achieves the abovementioned objectives by monitoring and analyzing in real-time numerous parameters of the bunkering process. Data are transmitted

- Over 5G/4G and/or WiFi wireless radio links to a Cloud App and Data Base
- Over BLE to a Mobile App for smartphones or any other portable device in short range



A. FOAM OPERATIONAL CHARACTERISTICS

- Real-time quantity measurements and analysis
- Real-time quality measurements and analysis
- Real-time detection of fuel adulteration or improper quality
- Real-time bunkering site detection and geofencing
- Real-time wireless transmission of measurements, notifications and alarms
- Storage of measurements and event logging
- Wireless communication with Cloud App via 5G/4G LTE technologies and/or Wi-Fi
- Short range wireless communication with Mobile App via Bluetooth (BLE)
- Over the Air (OTA) Firmware updates and configuration (via 5G/4G, WiFi and BLE)
- Battery powered (portable version) or AC/DC powered (fixed installation)
- Flanges for direct connection to the bunkering pipes
- Start-stop Switch & Emergency Stop Button
- Operation LED & Alarm LED/Horn
- IP66 protection against ingress of water and dust
- Marine Type, ATEX, MID and RED approvals

B. MEASURES, ANALYZES, COMMUNICATES



Real-time measurements of the fuel quantity

- Operating and standard volume rate (m³/h)
- Operating and standard mass rate (tn/h)
- Operating and standard total volume (m³)
- Operating and standard total mass (tn)

Real-time chemical analysis of the fuel and detection of

- Category - type of fuel
- Kinematic and dynamic viscosity (cSt)
- Operating and standard density (kg/m³) and API degree
- Temperature (°C)
- Humidity (% H₂O content)
- Adulteration of fuel with air-bubbles
- Content (mg/kg) of
 - Sulfur (S)
 - Aluminum (Al)
 - Silicon (Si)
 - Calcium (Ca)
 - Vanadium (V)
 - Phosphorus (P)
 - Zinc (Zn)
 - Chlorine (Cl)

Functions performed by the Cloud App and Database

- Data storage, analysis and presentation
- Alarm indication
- Device FW update & configuration (alarm thresholds, sampling rates and schedules)
- User management

Functions performed by the Mobile App

- On-site presentation of basic bunkering data and parameters
- Alarm indication

FOAM provides real-time notifications and alarms to the Cloud and Mobile Apps, in case any of the measured parameters exceed specific limits - thresholds. Locally, the alarms are indicated with a red LED and the sound of a Horn. Moreover, FOAM detects the location of the bunkering site (WGS84 coordinates), exploiting all available Global Navigation Satellite Systems (GNSS) and provides ge-fencing notifications and alarms

C. TECHNICAL SPECIFICATIONS

Weight	<ul style="list-style-type: none"> ▪ 4-inch pipe: 90 kg ▪ 6-inch pipe: 115 kg ▪ 8-inch pipe: 145 kg
Dimensions	<ul style="list-style-type: none"> ▪ 4-inch: 90.3 × 53.9 × 56.9 cm ▪ 6-inch: 95.3 × 59.9 × 66.9 cm ▪ 8-inch: 95.3 × 63.9 × 70.9 cm
Battery	▪ VRLA, 24Ah (rechargeable)
Wireless Coms	<ul style="list-style-type: none"> ▪ WLAN 5G/4G LTE Cat.1, Cat M1, NB IoT w/ 2G (GPRS) fallback ▪ WiFi IEEE 802.11 b/g/n ▪ Bluetooth Low Energy (BLE) Version 5
Positioning	▪ GNSS (GPS, Glonass, Galileo, Beidu)

Drawings (dimensions in mm)

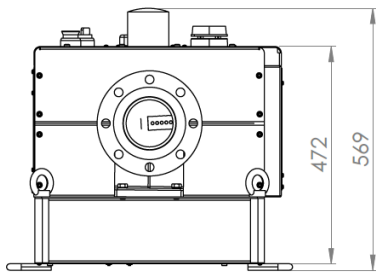


Fig. 1 Front view

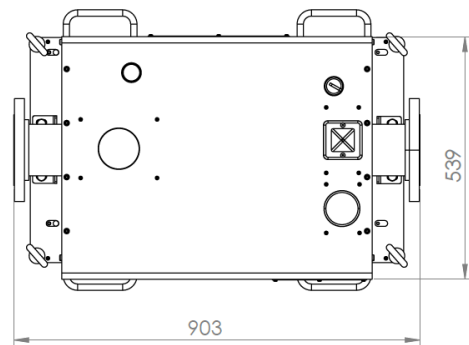


Fig. 2 Top view

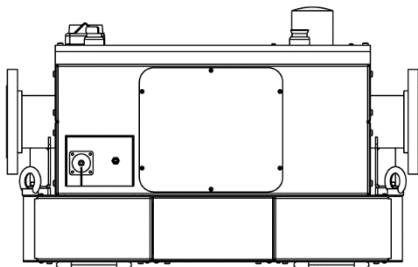


Fig. 3 Left view

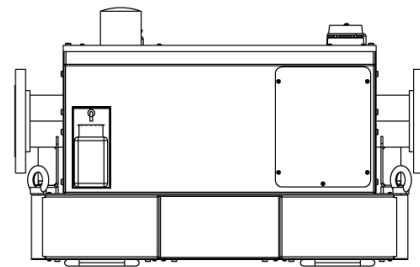


Fig. 4 Right view

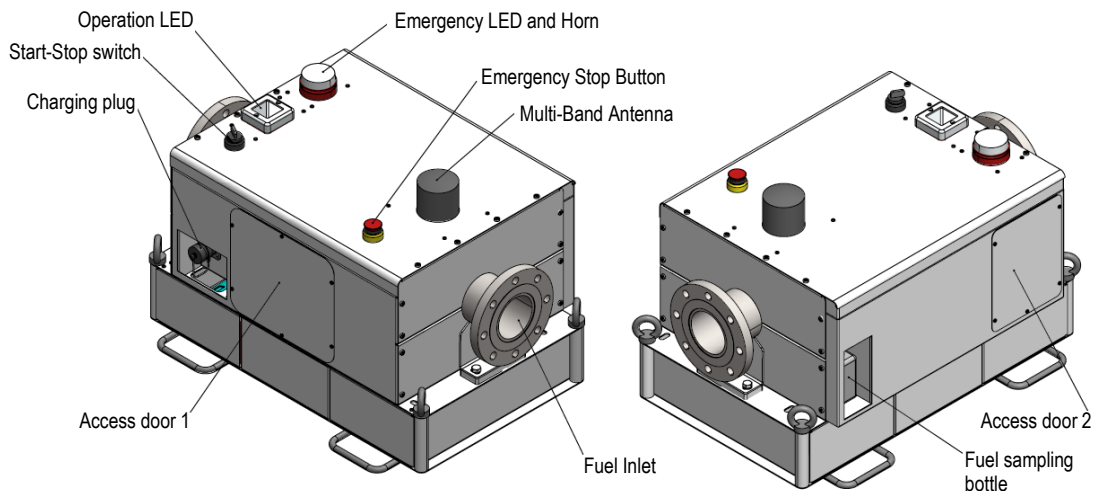


Fig. 5 Designation of Components

D. CERTIFICATIONS

Directives

ATEX 2014/34/EU
MID 2014/32/EU
RED 2014/53/EU
LVD 2014/35/EU
EMC 2014/30/EU

Performance

EN 60529 (IP66)
EN 62262 (IK10)