

VOC / NMVOC

Emission Monitoring System for VOC / NMVOC Quantification on oil tankers and gas carriers



During loading, storage and transportation of crude oil, volatile organic compounds (VOC) are emitted to the atmosphere. The non-methane fractions (NMVOC) react with nitrogen oxides, creating a toxic ground level ozone and smog layer. The NMVOC emitted to the atmosphere has environmental effects both as it is a greenhouse gas as well as being directly harmful to human health and vegetation.

Through MARPOL AnnexVI, Regulation 15, IMO has established how oil tankers and certain gas carriers are required to handle emissions of NMVOC.

There are several methods at hand for the ship owner and crew to help reducing the release of NMVOC to the atmosphere, for example by installing a recovery plant for the NMVOC.

An even simpler measure is to introduce new operational practices, such as increasing the cargo tank pressure or reducing the ship's roll and pitch on the open sea.

Whatever actions are taken, IMO directs that NMVOC emissions be reported to local ports or terminals. Our NMVOC Emission Monitoring System is specially designed to enable ships to report their emissions in accordance with IMO regulations. By continuously monitoring emissions, this will also help the crew improving their best operational practices.

Our system design is based on quantification of the gas volume through the ship's main riser before sending a sample to our analyser system for further sample treatment.

By measuring the flow, pressure, temperature and then analysing the gas composition, we will then generate the most accurate determination of NMVOC emissions possible.

Main system units are:

- Carbon steel spool piece with gas sample probes and ultrasonic flow monitoring
- Analyser system with sample treatment and a compact, field-mounted gas chromatograph in an SS316L stainless steel cabinet
- Calculation unit for data processing and communication
- Industrial computer for remote operation and maintenance.

System and analyser cabinet units

Installed in Ex Zone 1

- Spool piece with all necessary flanges and nozzles for:
 - Ultrasonic flow meter
 - Temperature and pressure transmitters
 - Sample probe for analyser system
- Heat traced sample tubing (transporting sample from spool piece to analyser cabinet)
- Dedicated automated analyser system cabinet with:
 - Sample handing system
 - Flow indicators with alarm limits
 - Compact gas chromatograph for component analysis of inert gas and VOC mixture
 - Oxygen analyser to prevent O₂ leaks into inert system
 - All necessary utility gases, carrier and calibration gas
 - Interface and signal converter

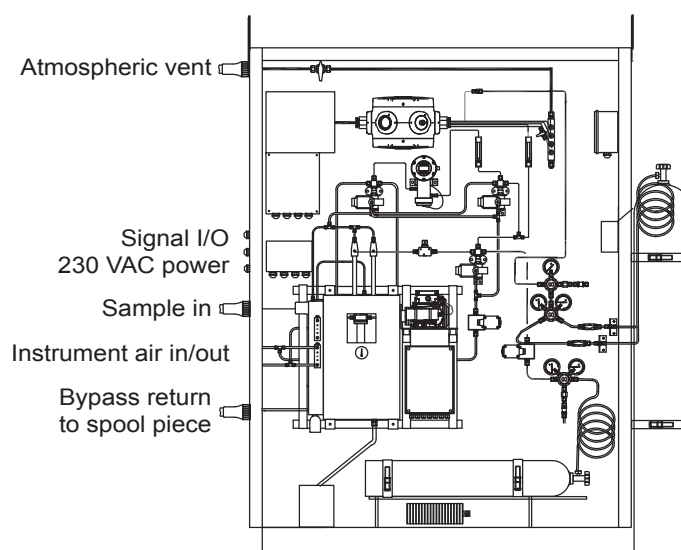
Installed in Safe Area

- Calculation unit for data processing
- Remote operator and maintenance interface unit
- System connection to ship's network (technical LAN)

Analyser cabinet installed in deck trunks according to:

- IACS E10
- IEC 60092-504

Dry instrument air and 230 VAC power to be provided by ship.



Technical specifications

Spool piece

- Material: Carbon steel
- Total length including flanges: 1500 mm
- Wall thickness: 9.5 mm
- Ship owner to specify flange standard
- Mechanical connections downstream for transmitters, gas sample and by-pass sample return, gas chromatograph flange: ½" NPTF socket
- Mounting bracket for junction box

Pressure transmitter

- Measures absolute pressure
- Measuring range: 0 to 2 barA

Flow transmitter

- Type: USM Gas flowmeter
- Measuring range: 0 to 16000 m³/h
- Transducer configuration: 180 degrees
- Communication: Modbus TCP/IP

Temperature transmitter

- Immersion depth: Close to center of spool piece (≈ ½ x diameter)
- Measuring range: 0 to 40 °C

Gas components [measuring range vol %]

- Nitrogen and oxygen [0 to 100]
- Carbon dioxide [0 to 15]
- Methane [0 to 20]
- Ethane [0 to 20]
- Propane [0 to 30]
- Isobutane [0 to 30]
- n-Butane [0 to 30]
- Isopentane [0 to 10]
- n-Pentane [0 to 10]
- Hexane+ [0 to 5] (including hydrocarbons up to C9)
- Cycle time: 2 to 3 minutes

Please note that datasheet specifications are subject to change without prior notice!