

# VAF

INSTRUMENTS



## Oilcon<sup>®</sup> Mark 6

Oil Discharge Monitoring & Control Systems

639

Product Bulletin

WWW.VAF.NL

TO BE  
REALLY  
SURE

# Introduction

For the continuous on-line monitoring of discharge water during de-ballasting operations, VAF Instruments is one of world's main suppliers. The Oilcon<sup>®</sup> Mark 6 oil discharge monitoring & control systems are more reliable and more accurate than any other monitoring & control system. It is suitable for all ballast and slop water discharges.

**Unprecedented accuracy, reliability and cost efficiency**  
Undesirable as it is that a ship has to stay in port because of problems reliability is our highest priority. The system is based on the unique multiple scattering principle for which VAF Instruments has obtained world-wide patents. This technique resulted in unprecedented levels of accuracy, reliability and cost efficiency of installation and ownership.

**Meeting every quality standard**  
The Oilcon<sup>®</sup> Mark 6 Oil Discharge Monitoring & Control Systems apply to the highest quality standards. The system fully complies with MARPOL requirements and is standard equipped with a panel mount Main Control Unit. The system is equipped with a comprehensive range of alarms and controls. All this and more from a fully ISO 9001 certified company.

**Contributing to a cleaner environment**  
VAF Instruments makes every effort to prevent marine pollution. Because no additional chemicals or solvents are needed for operation no environmental pollution takes place. No hot water flushing is required, which means minimal fresh water consumption.

**First class service and installation**  
We provide not only the hardware, but also engineering assistance, installation and tuning on board or on site. VAF instruments has experience with hundreds of installations, in all kinds of environments and with all types of applications.

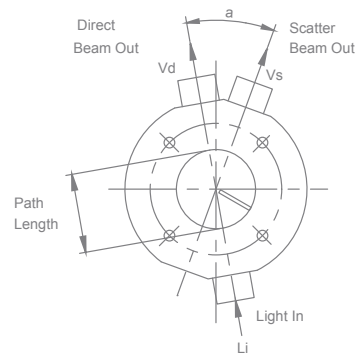
Consult VAF Instruments for further information.

Oilcon<sup>®</sup> Mark 6 is a registered trade mark of VAF Instruments B. V.

# Principle of operation

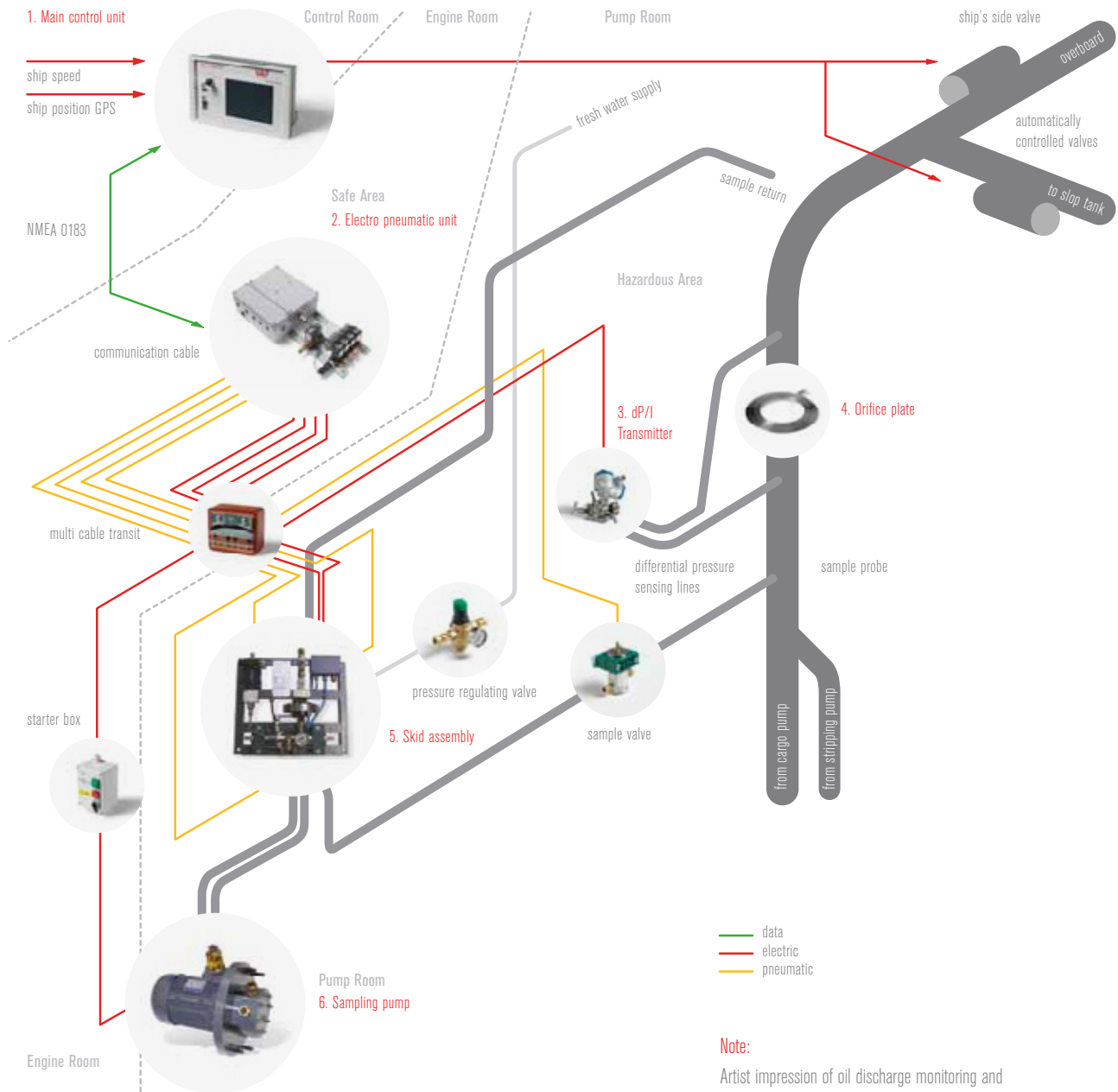
The measurement technique used in the Oilcon<sup>®</sup> Oil Discharge Monitor is based on scattered light. In accordance with IMO Resolution MEPC.108(49), the Mark 6 Oilcon<sup>®</sup> is able to discriminate between oil and other contaminants such as mud, rust or entrained air. A sample of discharge water passes through a detector cell while light enters and leaves the measurement area of the cell. The sample flow is at right angles to the optical path. When no particles or oil droplets are present in the water, light can pass straight through the cell (Direct beam). When oil is present in the form of a homogeneous mixture, light is scattered at different angles (Scatter beam). The intensity of scattered light at a specific angle depends on the density of oil droplets and upon their particle size relative to the wavelength of radiation. The intensity of light of the direct beam decreases logarithmically with increasing oil concentration, while the scatter beam increases lineary but passes through a maximum before decreasing logarithmically.

The light source used in the Oilcon<sup>®</sup> Oil Discharge Monitor is a near infra red diode which is operated in the pulsed mode so that the average power dissipation is low, although the intensity is high. The light signal is processed and transmitted along a communication cable from the detector cell to the EPU, where the detection signals are used to compute the oil levels present in the sample passing through the detector cell. Automatic sequential control of forward and backward flushing at start up and shut down of the monitor prevents erroneous readings and keeps the sampling lines clean. This also ensures reliable start up, minimises system deterioration and ensures that the pipework is left in clean condition prior to the next use of the monitor. At the end of the start up flushing cycle a system zero check is performed, this automatic zero setting compensates for any small deposits on the cell windows. The window wash pump cleans the cell windows at regular intervals during operation.



Light Scatter In Measurement Cell

# Typical system arrangement



**Note:**

Artist impression of oil discharge monitoring and control systems only (not for installation purpose).  
 Scope of supply can vary depending upon requirement.

## Features & benefits

Installers requirements	Features	Benefits
Ease of installation	Only two bulk head penetrations Only one engine room / control room data cable Mounting position of components is readily adaptable	Low cost of installation
Technical assistance	Fully trained factory personnel to assist with every inquiry	Immediately available authoritative information
Local support	Factory trained agents on a world-wide basis	Lower incurred costs

Users requirements	Features	Benefits
Accurate in-line measurement	Continuous on-line sampling system	Direct response if pollution limits are exceeded
Reliable operation	Solids rejection algorithm	Minimises false readings due to solids in the liquid
Easy operation	Automatic system operation	No special operator attention required
Intuitive control	Interaction between user and system	No special operating / operator training needed Low operating costs
No environmental pollution	No additional chemicals or solvents required for operation	Low operating costs No environmental pollution
Minimal maintenance and operating cost	Dependable and robust instrumentation	Low operating costs Comparatively minimal fresh water consumption
Dirty / segregated / clean ballast capability	Included as standard in software and hardware	Going the extra mile to prevent marine pollution

# Technical specification

## Technical specification

Range	0 - 1000 ppm
Accuracy	In accordance with IMO Resolution MEPC. 108(49), the system response is within the accuracy specified
Response time	Less than 8 seconds
Sample flow rate	Between 450 and 550 l/h
Zero noise and drift	Less than 2 ppm and nil when changing from fresh water to sea water
Response to oils	In accordance with IMO specifications
Sensitivity to solids	In accordance with IMO Resolution MEPC. 108(49) accuracy limits
Fouling	Clears in less than one minute after IMO fouling test
Water temperature range	5°C - 65°C
Maximum ambience temperature	55°C
Alarm setting	Adjustable over full range
Alarm outputs	NO/NC contact (2A at 220 VAC max)
Electrical supplies	115/230 VAC 1 phase 50/60 Hz 380/460 VAC 3 phase 50/60 Hz 24 VDC
Air supply	4 - 7 bar, dry clean air
Sample points	Optional up to 6 samples points
Valve control	Dirty ballast relays on MCU
Ex proof classification	II (1) G [Ex ia] IIB (interface) and II 1 G Ex ia IIB T4 (detector cell)

### 1. Main Control Unit

The Main Control Unit (MCU) is the central part of the ODME system and is designed for mounting in the cargo control console to which following signals are connected:

- ships speed in knots, ships GPS through NMEA0183, overboard valve position;
- oil content of ballast water in ppm from EPU (2);
- rate of discharge of ballast water in tonnes per hour from EPU (2).

The MCU processes these inputs and records and displays all the necessary information:

- time and date (UTC/GMT);
- position (GPS), longitude and latitude;
- auto/manual mode;
- status of operational mode;
- instantaneous rate of discharge of oil;
- rate of discharge;
- ships speed;
- total quantity of oil discharged;
- status of discharge;
- sampling point selected;
- type of oil.

The data is displayed on a LCD display and is also stored onto the internal memory at 10 min. intervals (selectable). The MCU is operated through a touch screen. The MCU also displays a number of pages with information according to the operator's instructions. The various pages are designed to help the operator to control the ODME system and to give a wide range of information.

### 2. Electro Pneumatic Unit

The Electro Pneumatic Unit (EPU) contains the control electronics and the solenoid valves to switch the pneumatic signals. It also contains the zener barriers for the input signals from the flowmeter, flowswitch and measurement cell. The EPU is designed for mounting in the engine room opposite the skid on the engine room/pumproom bulkhead, or in another suitable location.

### 3. / 4. Flow Meter System

The flow metering system comprises of an orifice plate flow meter and an intrinsically safe dP/I transmitter. The flow of water passing through the orifice causes a pressure difference across the plate. This differential pressure is converted into a mA signal and transmitted to the EPU by the dP/I transmitter. The manifold valve block fitted to the differential pressure transmitter, has three shut-off valves. The two outer valves are for blocking off the pressure sensing lines from the sensor. The center valve serves as equalizing valve to balance the pressure at both sides of the transmitter.

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# Technical specification

## 5. Skid assembly

The skid assembly contains the necessary items to handle the sampled ballast water to measure the oil content. In the skid assembly a pneumatically operated shuttle valve and window wash pump are installed.

The shuttle valve selects between fresh water forward or backward flush and sample. The window wash pump provides a pressure boost to the window flushing water. Also contained in the skid assembly is the intrinsically safe detector cell which contains the revolutionary electronic optical sensing system used to determine oil content. The skid assembly is normally mounted in the pumproom opposite the EPU on the engine room side of the bulkhead.

## 6. Pump/motor assembly

The pump/motor assembly comprises a high shear vortex pump, a certified gas tight bulkhead seal and a motor. The pump provides a degree of sample water conditioning as the shearing effect tends to produce droplets of oil of roughly similar size. The motor is suitable for 380 V or 440 V at 50 Hz or 60 Hz, runs at 2850 rpm or 3460 rpm respectively and is constructed to IP55 and isolation Class F, IEC 34-1.



# Dimensions & weights

Details of main components of Mark 6 Oilcon® oil discharge monitoring and control system:

## Main control unit

Weight: 1,5 kg

Dimensions (W x H x D): 257 x 157 x 126 mm



Main control unit



Electro pneumatic unit

## Electro pneumatic unit

Weight: 9,5 kg

Dimensions (W x H x D): 500 x 263 x 114 mm

## Motor starter box

Weight: 1 kg

Dimensions (W x H x D): 126 x 176 x 100 mm



Motor starter box

## Electronic differential pressure transmitter

Weight: 8 kg

Dimensions (W x H x D): 225 x 195 x 194 mm



Electronic differential pressure transmitter

## Orifice plate

Thickness: 6 mm

Material: Stainless Steel

Diameter and bore: Specific to each installation



Orifice plate

## Skid assembly

Weight: 20 kg

Dimensions (W x H x D): 500 x 420 x 177 mm

Air Connections: 6 mm & 10 mm tube

Water connections: 15 mm OD Tube



Skid assembly

## Sampling pump

Weight: 30 kg

Length overall: 348 mm

Cut out diameter: 290 mm

Connections: 15 mm OD tube



Sampling pump

### Quotation & ordering information

Please specify type of ship:

Newbuilding  Retrofit

1. Supply voltage:

2. Minimum / maximum flowrate overboard line:

3. Diameter overboard line:

**Mark 6 according resolution MEPC. 108 (49)** Summary of implementation requirements for oil discharge and control systems for oil tankers

**Feature:** Category type:  $\geq$  150 gross tonnage

**Input information (automatic receipt):** Ships position (GPS) Ship speed

Overboard discharge position Oil content [ppm]

Flowrate discharge Time and date

**Output information (recorded):** Time and date (UTC) Ships position (GPS)

Auto / manual mode Status of operation mode

Ships speed Instantaneous oil content [ppm]

Type of oil Flowrate of discharge [m<sup>3</sup>/h]

Sample point selected Status of discharge

Total quantity oil discharged [t] Instantaneous rate of discharge of oil [l/Nm]

Name:

Place and date:

For further information see relevant Product Bulletins  
or [www.vaf.nl](http://www.vaf.nl)

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