



# Oilcon<sup>®</sup> Mark 6M

Oil Discharge Monitoring & Control Systems

639

Product Bulletin

# 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® 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 which VAF Instruments has developed and improved during decades of experience. This technique resulted in unprecedented levels of accuracy, reliability and cost efficiency of installation and ownership.

## Meeting every quality standard

The Oilcon® 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.

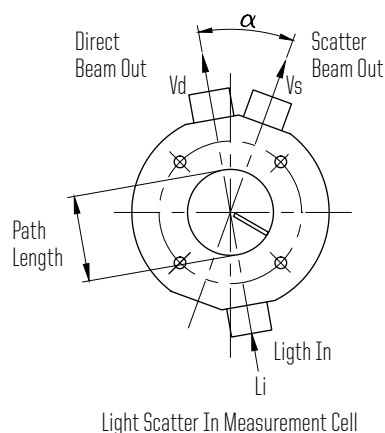
Consult VAF Instruments for further information.

Oilcon® Mark 6 is a registered trade mark of VAF Instruments

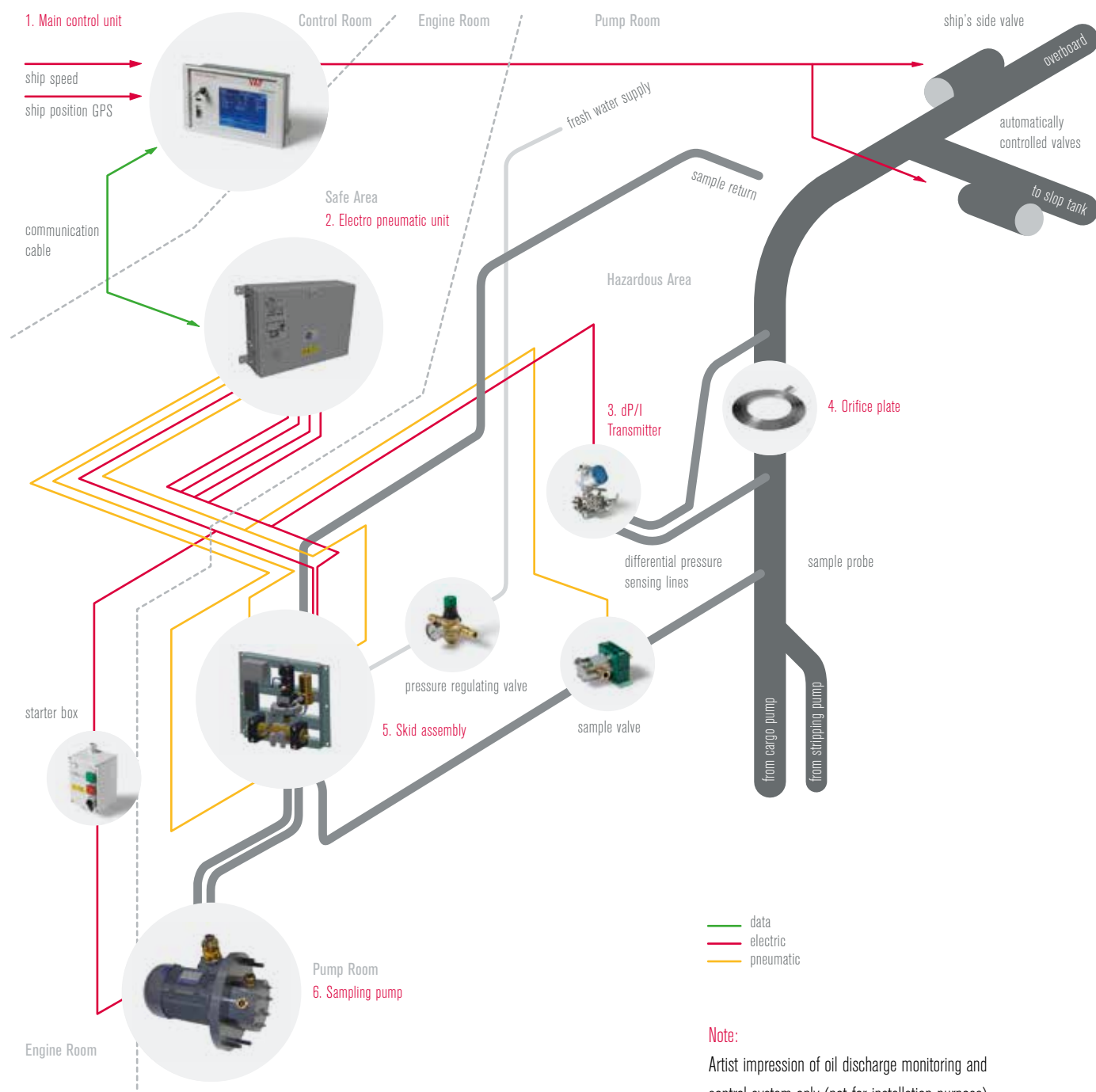
# Principle of operation

The measurement technique used in the Oilcon® Oil Discharge Monitor is based on scattered light. In accordance with IMO Resolutions MEPC.108(49) and MEPC.240(65), the Mark 6 Oilcon® 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® 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.



# Typical system arrangement



## Features & benefits

| Installers requirements | Features                                                                                                                                  | Benefits                                        |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Ease of installation    | Only two bulk head penetrations<br>Only one engine room / control room data cable<br>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<br>Low operating costs |
| No environmental pollution                    | No additional chemicals or solvents required for operation | Low operating costs<br>No environmental pollution                      |
| Minimal maintenance and operating cost        | Dependable and robust instrumentation                      | Low operating costs<br>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

|                                     |                                                                                                                         |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Range</b>                        | 0 - 1000 ppm                                                                                                            |
| <b>Accuracy</b>                     | In accordance with IMO Resolutions MEPC. 108(49) and MEPC.240(65), the system response is within the accuracy specified |
| <b>Response time</b>                | Less than 8 seconds                                                                                                     |
| <b>Sample flow rate</b>             | Between 450 and 550 l/h                                                                                                 |
| <b>Zero noise and drift</b>         | Less than 2 ppm and nil when changing from fresh water to sea water                                                     |
| <b>Response to oils</b>             | In accordance with IMO specifications MEPC. 108(49) and MEPC.240(65)                                                    |
| <b>Sensitivity to solids</b>        | In accordance with IMO Resolutions MEPC. 108(49) and MEPC.240(65) accuracy limits                                       |
| <b>Fouling</b>                      | Clears in less than one minute after IMO fouling test                                                                   |
| <b>Water temperature range</b>      | 5°C - 65°C                                                                                                              |
| <b>Maximum ambience temperature</b> | 55°C                                                                                                                    |
| <b>Alarm setting</b>                | Adjustable over full range                                                                                              |
| <b>Alarm outputs</b>                | NO/NC contact (2A at 220 VAC max)                                                                                       |
| <b>Electrical supplies</b>          | 15/230 VAC 1 phase 50/60 Hz<br>380/460 VAC 3 phase 50/60 Hz<br>24 VDC                                                   |
| <b>Air supply</b>                   | 4 - 7 bar, dry clean air                                                                                                |
| <b>Sample points</b>                | Optional up to 6 samples points                                                                                         |
| <b>Valve control</b>                | Dirty ballast relays on MCU                                                                                             |
| <b>Ex proof classification</b>      | 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: ship speed in knots, 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);                | - instantaneous rate of discharge of oil; | - status of discharge;     |
| - position (GPS), longitude and latitude; | - rate of discharge;                      | - sampling point selected; |
| - auto/manual mode;                       | - ship speed;                             | - type of oil.             |
| - status of operational mode;             | - total quantity of oil discharged;       |                            |

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. Flowmeter System

The flow metering system comprises of an orifice plate Flowmeter 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.

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## 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



#### Orifice plate

Thickness: 6 mm  
Material: Stainless Steel  
Diameter and bore: Specific to each installation



#### Electro pneumatic unit

Weight: 9 kg  
Dimensions (W x H x D): 460 x 328 x 136 mm



#### 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



#### Motor starter box

Weight: 1 kg  
Dimensions (W x H x D): 126 x 176 x 100 mm



#### Sampling pump

Weight: 30 kg  
Length overall: 348 mm  
Cut out diameter: 290 mm  
Connections: 15 mm OD tube



#### Electronic differential pressure transmitter

Weight: 8 kg  
Dimensions (W x H x D): 225 x 195 x 194 mm



# Quotation and ordering information

Please specify type of ship:

☐ Newbuilding

☐ Retrofit

1. **Supply voltage:**

2. **Minimum / maximum flowrate overboard line:**

3. **Diameter overboard line:**

4. **Flange type DIN, JIS or ANSI class:**

Mark 6 according resolutions MEPC.108 (49) and MEPC.240(65) Summary of implementation requirements for oil discharge and control systems for oil tankers

|                                               |                                         |                                               |
|-----------------------------------------------|-----------------------------------------|-----------------------------------------------|
| <b>Feature:</b>                               | Category type: $\geq 150$ gross tonnage |                                               |
| <b>Input information</b> (automatic receipt): | Ship's position (GPS)                   | Ship speed                                    |
|                                               | Overboard discharge position            | Oil content (ppm)                             |
|                                               | Flowrate discharge                      | Time and date                                 |
| <b>Output information</b> (recorded):         | Time and date (UTC)                     | Ship's position (GPS)                         |
|                                               | Auto / manual mode                      | Status of operation mode                      |
|                                               | Ship 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 [l]       | Instantaneous rate of discharge of oil [l/Nm] |

Name:

Place and date:

Please fill out this form and send it to [sales@vaf.nl](mailto:sales@vaf.nl). We will reply with a quotation and ordering information for the requested product or solution a.s.a.p.

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



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