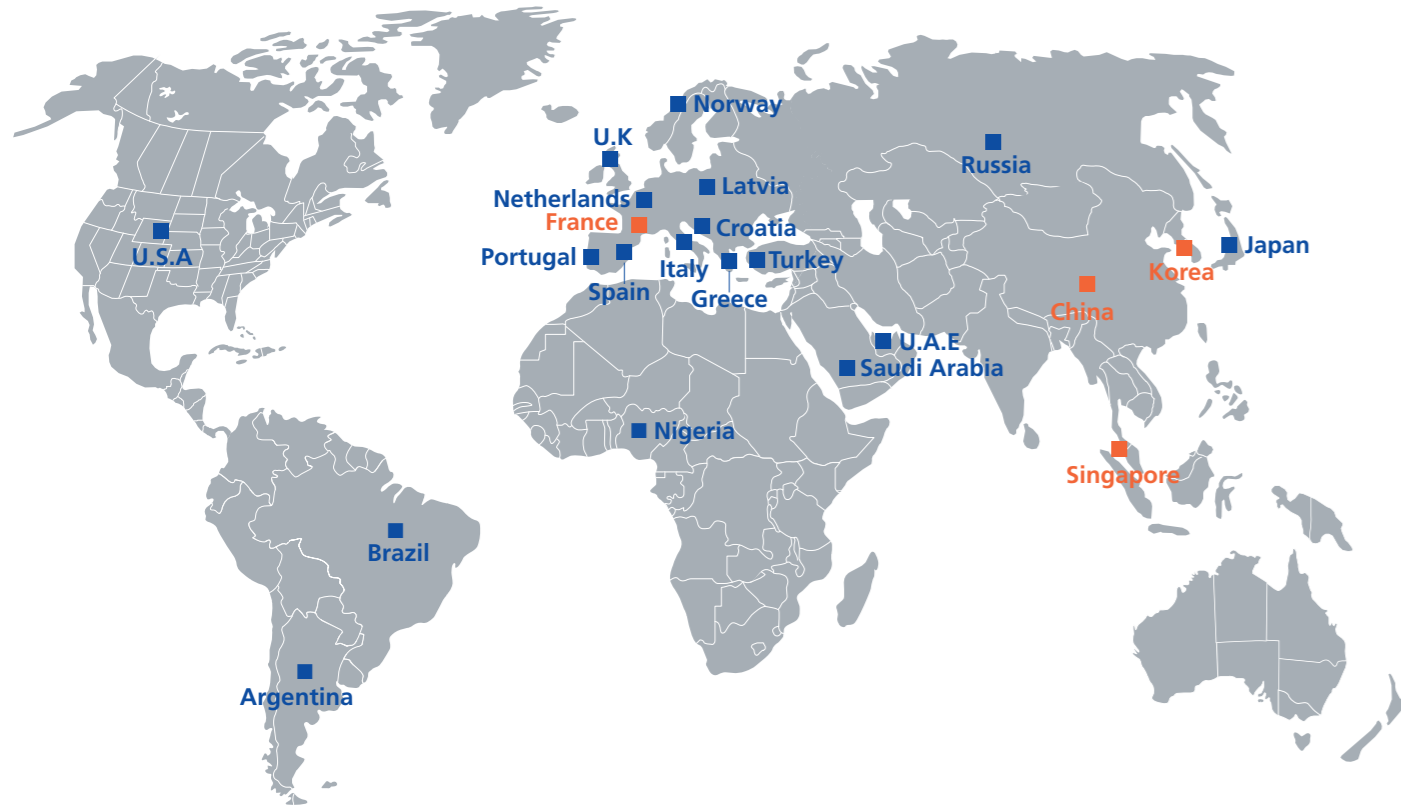


We are here for supporting you



Company Introduction – KSB Seil Co., Ltd.

1990	Establishment of Seil Seres Co., Ltd. Started local manufacturing of ODME.
1992	Started local manufacturing of VRC System under the technical license with KSB S.A.S.(Amri)
1999	Obtained ISO 9001 Certificate from DNV Succeeded in 100% localization for ODME Model SS-2000.
2001	Contracted with DSME to supply VRC System with actuators for 12 shipsets of LNG carriers.
2004	Obtained ISO 14001 Certificate from DNV.
2005	Established Shanghai branch office.
2007	Obtained OHSAS Certificate from DNV.
2011	Merged into KSB.

Delivery Reference of O.D.M.E (As of April.2015)

Type Delivery Year								TOTAL
	V.L.C.C	C.O.T	P.C	F.P.S.O	SHUTTLE	DRILL SHIP	OTHERS	
~2000	86	131	157	1	7	7	1	390
2001	8	17	23	3	1		1	53
2002	13	29	36		1			79
2003	7	31	68	1	2			109
2004	10	33	65	2	2			112
2005	6	44	93	1				144
2006	9	44	101	2				156
2007	12	30	129		2	5		178
2008	16	40	176		1	5	2	240
2009	16	45	78		2	8	1	150
2010	31	63	64	1	3	11		173
2011	19	57	39		2	3	1	121
2012	2	38	32	2	12	10	1	97
2013	2	16	42		2	7		69
2014	3	24	64		4	4		99
2015	2	32	69					103
2016	2	17	16		1			36
2017		2						
Total	244	693	1,252	13	42	60	7	2,309

KSB Seil Co., Ltd
 (Songjeong-dong), 76,
 Noksansaneopbuk-ro 313 beon-gil,
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More space for solutions.

Subject to technical modification without prior notice.

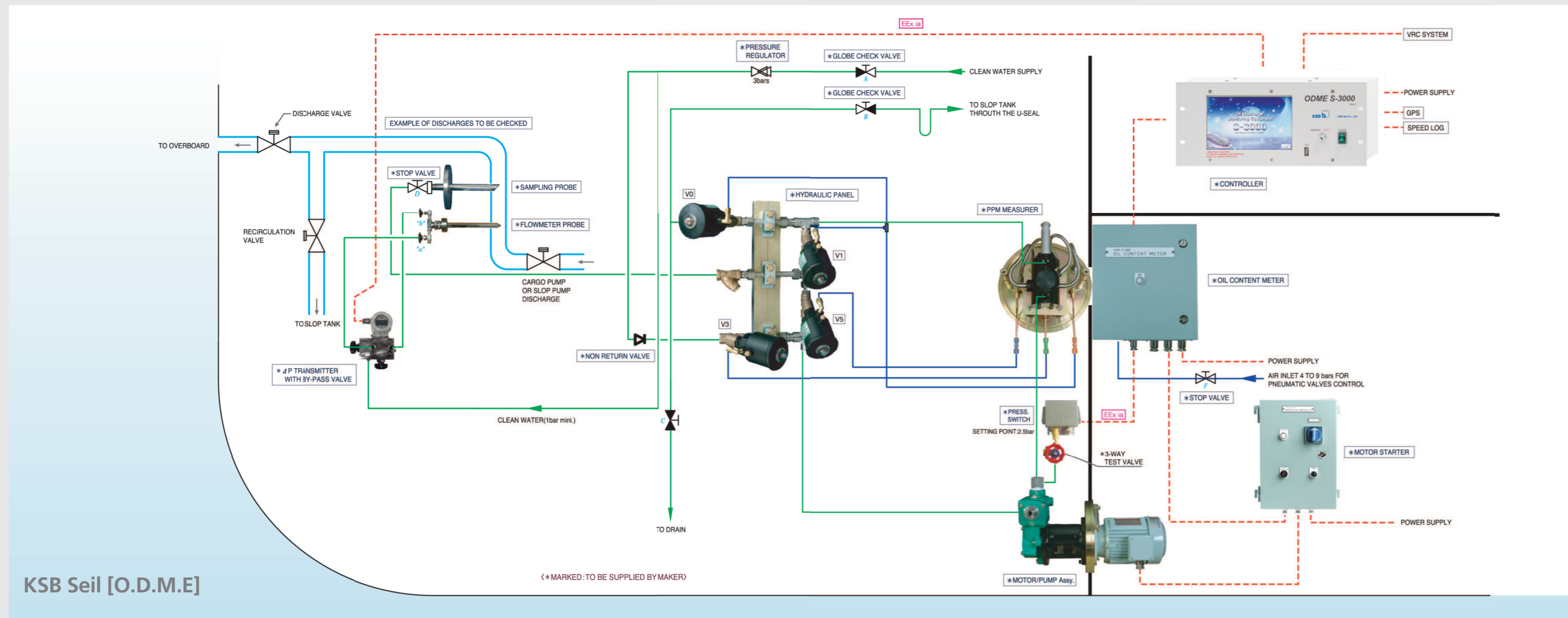
S-3000 – Oil Discharge Monitoring Equipment



8487.05_EN / 04.21 / © KSB Aktiengesellschaft 2015



IMO RES. MEPC.108(49) & MEPC.240(65) ODME S-3000



KSB Seil [O.D.M.E]

(* MARKED: TO BE SUPPLIED BY MAKER)

Company Introduction – KSB Seil Co., Ltd.

Guidelines and specifications for oil discharge monitoring and control system for above 150 gross tons tankers.

- The Oil Discharge Monitoring Equipment(ODME) S-3000 continuously samples the oil-mixture water being discharged overboard, measures the oil content and controls the discharge of the oil-mixture water and plays therefore a central role in the O.D.M.E.
- The ODME S-3000 has been tested and approved for crude oils, "black" and "white" products as per IMO Resolution MEPC.108(49). And it has also been tested and approved for the blends of petroleum oil and bio-fuels as given in IMO Resolution MEPC.108(49) & MEPC.240(65).
- The U-seal must be installed in accordance with MEPC 108(49) 6.3.10, 'Sample water returning to the slop tank should not be allowed to free-fall in to the tank. In tankers equipped with an inert gas system a U-seal of adequate height should be arranged in the piping leading to a slop tank.'

MEPC 108(49)

Features

- Can be as dirty and clean ballast, monitor control system.
- Intrinsically safe type, DP transmitter.
- Near and far infra-red detector using for Si-photodiode.
- Short response time(15sec)
- Automatic back-flushing sequence of the complete hydraulic panel.
- Automatic zeroing and calibration.
- Self-cleaning measuring cell design.
- All information displayed in 40 x 4 LCD.
- Microprocessor technology with RTC chip memories
- Y2K compliance.
- Communication between operators console and oil content meter by a current loop method.
- Insensitive to ships motion and vibration.
- Accuracy better than IMO RES. MEPC.108(49) requirements.
- Easy installation requiring little work & time.
- Flowmeter working by differential pressure.
- Log input by electrical or dry contract impulse.
- Automatic monitoring of up to multi channels(option).

Alarms

- Oil content meter failure.
- Sample pump not powered.
- No sample.
- Clean water failure.
- Flowmeter failure.
- Printer paper failure.
- Calibration failure.

MEPC 240(65)

Features

- The measuring range is 0~1000PPM
- Ship's position indication(GPS-NMEO183)
- Ship's speed(200PPNM or GPS)
- Log input by electrical or dry contract impulse.
- Easy to operate and intuitive menu design.
- All information displayed in 7" TFT LCD touch screen.
- Download log-files into a USB flash drive.
- Thermal transfer printer(option)

Alarms

- Overboard valve wrongly open.
- Oil content meter failure.
- PPM range exceeded(15PPM exceeded in clean ballast mode)
- Flowmeter and GPS signal failure.
- Flow range exceeded.
- Speed low and signal failure.
- Oil limit and L/NM exceeded.
- Sample pump no powered.
- Sample pump wrongly powered (monitor under power when it should be stopped)
- Cleaning water and calibration failure.

<p>Controller</p> <ul style="list-style-type: none"> 344 × 142.5 × 175, 2.1kg 32bit CPU S3C6410 ARM microprocessor 7" TFT LCD touch screen (800 × 480) Save log-file to USB flash drive Thermal transfer printer(option) 	<p>Oil Content Meter</p> <ul style="list-style-type: none"> 400 × 400 × 300, 24kg Scattered I.R. Light method Multi cell sensor (Si-photodiode) Protected vibration 5-way Pneumatic Solenoid w/v with manifold 	<p>Motor Starter</p> <ul style="list-style-type: none"> 250 × 300 × 180, 10 kg MCCB for maintenance. Auto/Manual key switch Overload relay 	<p>Pressure Switch</p> <ul style="list-style-type: none"> 151 × 151 × 130, 2 kg Measuring range: 0~16 bar Automatic pump shut-down Set point : 2.5 bar 	<p>Motor/Pump Assy.</p> <ul style="list-style-type: none"> 2.2 kW, D.O.L Motor Centrifugal type pump Pump suction head: Max. 8 m Class certified bulkhead penetration 	<p>PPM Measurer</p> <ul style="list-style-type: none"> 360 × 283 × 180, 30 kg 4 optical fi bers Self cleaning system Class certified bulkhead penetration plate 	<p>Hydraulic Panel</p> <ul style="list-style-type: none"> 600 × 404 × 580, 15 kg 4 pneumatic valve Sample water fi lter 4~9 bar air supply 	<p>Sampling Probe</p> <ul style="list-style-type: none"> 16K 65A for cargo system 5K 65A for ballast system 	<p>Flowmeter & Probe</p> <ul style="list-style-type: none"> 311 × 104 × 102, 9 kg fl owmeter Pitot-tube type probe Intrinsically safe type (EEx ia IIC) Below ±1% accuracy
--	--	---	---	--	--	---	--	--



MANUFACTURER'S INFORMATION
Oil Discharge Monitoring Equipment type MKIII

As the Official under-signed Manufacturers of Oil Discharge Monitoring Equipment type MKIII, SERES ENVIRONNEMENT Co. based at - 360, RUE LOUIS DE BROGLIE - BP 20087 - 13793 AIX-EN-PROVENCE - FRANCE, confirms the upcoming termination of spare parts supply for the stated below product reference:

“ODME MKIII was developed by SERES ENVIRONNEMENT since 1995 and manufactured until end of 2005. Therefore, due to its long existence, we have recently encountered some problematic situation regarding the Supply and substitution of critical spare parts”.

At the present times, a few spares references remains available in ours stock provisional, though we have came down along a potential Solution, suggesting a product upgrading, moving from the Obsolete ODME Version, to the latest ODME S3000.

This Version could be easily provided by ours referenced distributor and installer "KSB-Seil in Korea.

KSB-SEIL, due to its specific technical Skill and Biofuel certification, will be Capable installing the ODME S3000, avoiding cost effectiveness of wilding procedures, employing along a considering short delay.

We grand this Opportunity reminding the importance of considering only and uniquely originals spare Parts replacements, avoiding the insisting proposal of Counterfeit, which might drastically altered the correct Functioning of ours Equipments.

Remaining at yours attendances for all complementary informations.

Best Regards

Drawn up at Aix-en-Provence, 11st July, 2017

For and on behalf of SERES

Mr Didier SUCHET

CEO

**EC-TYPE EXAMINATION
CERTIFICATE (MODULE B)**

Certificate No:
MEDB0000086
Revision No:
1

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED), issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Authority. This Certificate is issued by DNV GL AS under the authority of the Government of Norway.

This is to certify:

That the Oil discharge monitoring and control system for an oil tanker

with type designation(s)
ODME S-3000 Version 2

Issued to
KSB Seil Co., Ltd.
Busan, Republic of Korea

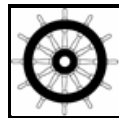
is found to comply with the requirements in the following Regulations/Standards:
Regulation **(EU) 2019/1397,**
item No. MED/2.5. Marpol 73/78 as amended, Annex I Regulation 31, IMO Res. MEPC.108(49)
as amended by IMO Res. MEPC.240(65) and IMO MEPC.1/Circ.858

Further details of the equipment and conditions for certification are given overleaf.

This Certificate is valid until **2025-05-11.**

Issued at **Høvik** on **2020-05-12**

DNV GL local station:
Gimhae Station



for **DNV GL AS**

Approval Engineer:
Erik Istad

Notified Body
No.: **0575**

Roald Vårheim
Head of Notified Body



The mark of conformity may only be affixed to the above type approved equipment and a Manufacturer's Declaration of Conformity issued when the production-surveillance module (D, E or F) of Annex B of the MED is fully complied with and controlled by a written inspection agreement with a Notified Body. The product liability rests with the manufacturer or his representative in accordance with Directive 2014/90/EU.

This certificate is valid for equipment, which is conform to the approved type. The manufacturer shall inform DNV GL AS of any changes to the approved equipment. This certificate remains valid unless suspended, withdrawn, recalled or cancelled.

Should the specified regulations or standards be amended during the validity of this certificate, the product is to be re-approved before being placed on board a vessel to which the amended regulations or standards apply.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Job Id: **344.1-001318-18**
Certificate No: **MEDB0000086**
Revision No: **1**

Product description

Intended for installation onboard oil tankers for ballast water monitoring control and alarm of contents of oil at discharge overboard.

Controller:

ODME S-3000 Version 2: Cpu: s3c6410, embedded Linux C program

Analyzer:

ODME S-3000 Version 2: Cpu: Atmega 128, Codevision C program

Application/Limitation

ODME S-3000 Version 2:

The oil content meter is tested and approved for crude oils, "black" and "white" products as per IMO Resolution MEPC.108(49), and the blends of petroleum oil and bio-fuels as given in IMO MEPC.240(65) and MEPC.1/Circ.761, to meet the requirements for testing bio-fuel blends containing 99% and 75% or more of petroleum oil.

The ODME for Energy-rich fuels is covered by this certificate as given in IMO.MEPC.1/Circ.879 and MEPC.2/Circ.24

Tested and approved blends of petroleum and bio-fuel:

- FAME 25 % and Diesel 75 %
- FAME 1 % and Diesel 99 %
- Vegetable oil 25 % and Diesel 75 %
- Vegetable oil 1 % and Diesel 99 %
- Alkanes (>60 °C) (C10-C26) 25 % and Diesel 75 %
- Alkanes (>60 °C) (C10-C26) 1 % and Diesel 99 %
- Alkanes (≤60 °C) (C10-C26) 25 % and Diesel 75 %
- Alkanes (≤60 °C) (C10-C26) 1 % and Diesel 99 %
- Ethyl alcohol 25 % and Gasoline 75 %
- Ethyl alcohol 1 % and Gasoline 99 %

Enclosure protection of electrical components in engine room and pump room to be minimum IP44.

Transmitters and other electrical components/ systems in pump room to be arranged 'intrinsically safe'.

Type Examination documentation

DWG No.:	Rev.:	Name:
Version 2:		
MK-SV-3030	0-8	Oil Content Meter Dimension Drawing
MK-SV-3030	1-2	Oil Content Meter Dimension Drawing
MK-SV-3101	1-4	Bulkhead Penetration for Motor/ Pump
MK-SV-3141	0-1	Bulkhead Penetration for ppm Measurer
MK-SV-3141	1-1	Bulkhead Penetration for ppm Measurer
MK-SV-3141	2-1	Bulkhead Penetration for ppm Measurer

Job Id: **344.1-001318-18**
Certificate No: **MEDB0000086**
Revision No: **1**

MK-SC-3130	0	Schematic Drawing for Oil Content Meter (2)
MK-SC-3140	0	Schematic Drawing for Oil Content Meter (3)
MK-SC-3150	0	Schematic Drawing for Oil Content Meter (4)
MK-SC-3160	0	Schematic Drawing for Oil Content Meter (5)
MK-SC-3170	1	Schematic Drawing for Oil Content Meter (6)
MK-SX-3050	0-2	Dimension for Name Plate
MK-SV-3010	0-11	Controller Dimension Drawing
MK-SC-3010	2	Layout for Controller Electronic Parts
MK-SC-3020	1	Schematic Drawing for Controller (1)
MK-SC-3030	2	Schematic Drawing for Controller (2)
MK-SC-3040	2	Schematic Drawing for Controller (3)
MK-SC-3050	1	Schematic Drawing for Controller (4)
MK-SC-3060	2	Schematic Drawing for Controller (5)
MK-SC-3070	2	Schematic Drawing for Controller (6)
MK-SC-3110	2	Layout for Oil Content Meter Electronic Parts
MK-SC-3120	1	Schematic Drawing for Oil Content Meter (1)

Operational Manual:

S-3000 MEPC 108(49) & MEPC 240(65), Oil Discharge Monitoring Equipment, Operation Manual

Tests carried out

Test Reports:

ODME S-3000 Version 2:

- Tested in accordance with the requirements of the specification contained in Part 1 of the Annex to the Guidelines and Specification contained in IMO Resolution MEPC.108(49), for oil content meter, witnessed and signed by Det Norske Veritas, Pusan, July 2004.
- Tested in accordance with the requirements of the specification contained in Part 2 of the Annex to the Guidelines and Specification contained in IMO Resolution MEPC.108(49), for environmental testing oil content meter and control section, witnessed and signed by Det Norske Veritas, Pusan, July 2004.
- Korea Marine Equipment Research Institute, *Environmental test for controller: Vibration test report with evidence*, dated 26.02.2015.
- Korea Marine Equipment Research Institute, *Environmental test for controller: Low temperature, high temperature, humidity report with evidence*, dated 15.09.2014.
- KSB Seil Co., Ltd., *Environmental test for controller: Fluctuation in power supply test, inclination test, report and evidence*, dated 10.11.2014, witnessed by DNV GL.
- KSB Seil Co., Ltd., *Type approval test report for bio-fuel blends*, dated 10.11.2014, witnessed by DNV GL.

Job Id: **344.1-001318-18**
Certificate No: **MEDB0000086**
Revision No: **1**

Marking of product

For traceability to this type approval, each unit is to be marked with:

- Manufacturers name or trade mark
- Type designation
- Serial No.

Mark of Conformity

The manufacturer is allowed to affix the Mark of Conformity according to Article 11 in the Council Directive 96/98/EC on Marine Equipment and shall issue a Declaration of Conformity, only when the module D or E or F of Annex B in the same directive is fully complied with.

Module D: The quality system for production and testing shall be approved by the Notified Body.

Module E: The quality system for inspection and testing shall be approved by the Notified Body.

Module F: Compliance of the products to type as described in this EC Type-Examination Certificate must be verified by the Notified Body who also shall issue a Certificate of Conformity.

This certificate is replacing previous EC Type-Examination Certificate No. MED-B-0000086

Job Id: **344.1-001318-18**
 Certificate No: **MEDB0000086**
 Revision No: **1**

APPENDIX

TEST DATA AND RESULTS OF TESTS CONDUCTED ON AN OIL CONTENT METER IN ACCORDANCE WITH PART 1 OF THE ANNEX TO THE GUIDELINES AND SPECIFICATIONS CONTAINED IN IMO RESOLUTION MEPC.108(49), as amended by Resolution MEPC.240(65).

Oil content meter submitted by KSB Seil Co., Ltd., Busan, Republic of Korea
 Test Location KSB Seil Co., Ltd., Busan, Republic of Korea
 Method of sample analysis ISO 9377-2
 Test rig according to drawing Report No.14-699-Tao11
 Samples Analysed by SGS Korea, Ulsan, Korea

Environmental testing of the electronic section of the oil content meter has been carried out in accordance with part 2 of the annex to the Guidelines and Specifications contained in IMO resolution MEPC.108(49), as amended by Resolution MEPC.240(65). The equipment functioned satisfactorily on completion of each test specified in the environmental test protocol.

		Readings (ppm)			REMARKS
		Indicated	Measured	Grab sample	
CALIBRATION AND ZERO TEST	0	0	0	0	
	15	15	15	14	
	50	51	48	55	
	100	100	96	105	
	200	200	193	192	
	400	405	384	412	
	600	602	576	595	TEST WATER TEMPERATURE 28°C
	800	802	768	787	
	1000	984	1080	1012	RE-ZERO <u>YES/NO</u> RECALIBRATE <u>YES/NO</u>

RESPONSE TESTS

NO.1 CRUDE OIL					REMARKS	
	15	14	15	13		
	100	100	96	98	RE-ZERO	<u>YES/NO</u>
90% M.F.S.V. =	900	901	864	894	TIME	<u>n.a</u>
RECORDED ZERO					RECALIBRATE	<u>YES/NO</u>
					TIME	<u>n.a</u>
					CLEAN	<u>YES/NO</u>
					TIME	<u>n.a</u>

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NO.2 CRUDE OIL				REMARKS	
	15	14	15	11	
	100	100	96	93	RE-ZERO <u>YES/NO</u>
90% M.F.S.V. =	900	907	864	910	TIME <u>n.a</u>
RECORDED ZERO					RECALIBRATE <u>YES/NO</u>
					TIME <u>n.a</u>
					CLEAN <u>YES/NO</u>
					TIME <u>n.a</u>
NO.3 CRUDE OIL				REMARKS	
	15	13	15	19	
	100	100	96	106	RE-ZERO <u>YES/NO</u>
90% M.F.S.V. =	900	901	864	930	TIME <u>n.a</u>
RECORDED ZERO					RECALIBRATE <u>YES/NO</u>
					TIME <u>n.a</u>
					CLEAN <u>YES/NO</u>
					TIME <u>n.a</u>
NO.4 CRUDE OIL				REMARKS	
	15	15	15	16	
	100	101	96	95	RE-ZERO <u>YES/NO</u>
90% M.F.S.V. =	900	902	864	879	TIME <u>n.a</u>
RECORDED ZERO					RECALIBRATE <u>YES/NO</u>
					TIME <u>n.a</u>
					CLEAN <u>YES/NO</u>
					TIME <u>n.a</u>
NO.5 CRUDE OIL				REMARKS	
	15	15	15	15	
	100	98	96	91	RE-ZERO <u>YES/NO</u>
90% M.F.S.V. =	900	901	864	886	TIME <u>n.a</u>
RECORDED ZERO					RECALIBRATE <u>YES/NO</u>
					TIME <u>n.a</u>
					CLEAN <u>YES/NO</u>
					TIME <u>n.a</u>

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					REMARKS	
MARINE RESIDUAL FUEL OIL RMG 35-ISO 8217	15	15	15	17	RE-ZERO	<u>YES/NO</u>
	100	100	96	94	TIME	n.a
	90% M.F.S.V. = 900	889	880	905	RECALIBRATE	<u>YES/NO</u>
	RECORDED ZERO				TIME	n.a
				CLEAN	<u>YES/NO</u>	
				TIME	n.a	
AUTOMOTIVE GASOLINE	15	13	15	13	RE-ZERO	<u>YES/NO</u>
	100	97	100	101	TIME	n.a
	90% M.F.S.V. = 900	877	872	913	RECALIBRATE	<u>YES/NO</u>
	RECORDED ZERO				TIME	n.a
				CLEAN	<u>YES/NO</u>	
				TIME	n.a	
KEROSENE	15	14	15	13	RE-ZERO	<u>YES/NO</u>
	100	101	100	95	TIME	n.a
	90% M.F.S.V. = 900	900	872	898	RECALIBRATE	<u>YES/NO</u>
	RECORDED ZERO				TIME	n.a
				CLEAN	<u>YES/NO</u>	
				TIME	n.a	
MARINE DISTILLATE FUEL OIL	15	15	15	15	RE-ZERO	<u>YES/NO</u>
	100	99	94	103	TIME	n.a
	90% M.F.S.V. = 900	895	876	881	RECALIBRATE	<u>YES/NO</u>
	RECORDED ZERO				TIME	n.a
				CLEAN	<u>YES/NO</u>	
				TIME	n.a	

M.F.S.V = Maximum Full Scale Value

Job Id: **344.1-001318-18**
 Certificate No: **MEDB0000086**
 Revision No: **1**

INDIVIDUAL BIOFUEL BLENDS AND CONCENTRATIONS

		Readings (ppm)			REMARKS
		Indicated	Measured	Grab sample	
CALIBRATION AND	0	0	0	0	Bio-fuel blends containing FAME 25% and Diesel 75%
ZERO TEST	15	17	15	13	
	50	55	52	54	
	100	104	103	103	
	200	204	198	194	
	400	410	406	393	
	600	634	602	623	
	800	847	810	825	
	1000	976	993	1016	
					RE-ZERO NO
					RECALIBRATE NO
* BIO-FUEL BLEND					REMARKS
75% Petroleum Oil					
75% Naphtha					
25% Tert Amyl Ethyl Ether					
	15	-	-	-	RE-ZERO YES/NO
	100	-	-	-	TIME Mins
	900	-	-	-	RECALIBRATE YES/NO
90% M.F.S.V. =	900	-	-	-	TIME Mins
RECORDED ZERO					CLEAN YES/NO
					TIME Mins
* BIO-FUEL BLEND					REMARKS
99% Petroleum Oil					
99% Naphtha					
1% Tert Amyl Ethyl Ether					
	15	-	-	-	RE-ZERO YES/NO
	100	-	-	-	TIME Mins
	900	-	-	-	RECALIBRATE YES/NO
90% M.F.S.V. =	900	-	-	-	TIME Mins
RECORDED ZERO					CLEAN YES/NO
					TIME Mins

Job Id: **344.1-001318-18**
 Certificate No: **MEDB0000086**
 Revision No: **1**

<p>BIO-FUEL BLEND 75% Petroleum Oil 75% Diesel <hr/> 25% Alkanes (C10-C26) linear and branched with a flash point >60°C <hr/> 15 20 19 18 100 98 104 98 90% M.F.S.V. = 900 898 912 865 RECORDED ZERO</p>				<p style="text-align: right;">REMARKS</p> <p>RE-ZERO YES/NO <hr/> TIME Mins <hr/> RECALIBRATE YES/NO <hr/> TIME Mins <hr/> CLEAN YES/NO <hr/> TIME 15 Mins</p>
<p>BIO-FUEL BLEND 99% Petroleum Oil 99% Diesel <hr/> 1% Alkanes (C10-C26) linear and branched with a flash point >60°C <hr/> 15 20 18 20 100 93 99 93 90% M.F.S.V. = 900 939 907 947 RECORDED ZERO</p>				<p style="text-align: right;">REMARKS</p> <p>RE-ZERO YES/NO <hr/> TIME Mins <hr/> RECALIBRATE YES/NO <hr/> TIME Mins <hr/> CLEAN YES/NO <hr/> TIME 15 Mins</p>
<p>BIO-FUEL BLEND 75% Petroleum Oil 75% Diesel <hr/> 25% Alkanes (C10-C26) linear and branched with a flash point ≤60°C <hr/> 15 20 17 17 100 105 100 101 90% M.F.S.V. = 900 894 911 932 RECORDED ZERO</p>				<p style="text-align: right;">REMARKS</p> <p>RE-ZERO YES/NO <hr/> TIME Mins <hr/> RECALIBRATE YES/NO <hr/> TIME Mins <hr/> CLEAN YES/NO <hr/> TIME 15 Mins</p>

Job Id: **344.1-001318-18**
 Certificate No: **MEDB0000086**
 Revision No: **1**

BIO-FUEL BLEND 99% Petroleum Oil 99% Diesel <hr/> 1% Alkanes (C10-C26) linear and branched with a flash point ≤60°C <hr/> <div style="text-align: right;">15 19 19 16</div> <div style="text-align: right;">100 104 97 96</div> <div style="text-align: right;">90% M.F.S.V. = 900 906 886 923</div> RECORDED ZERO				REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>
BIO-FUEL BLEND 75% Petroleum Oil 75% Gasoline <hr/> 25% Ethyl Alcohol <hr/> <div style="text-align: right;">15 11 15 15</div> <div style="text-align: right;">100 97 98 100</div> <div style="text-align: right;">90% M.F.S.V. = 900 907 911 896</div> RECORDED ZERO				REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>
BIO-FUEL BLEND 99% Petroleum Oil 99% Gasoline <hr/> 1% Ethyl Alcohol <hr/> <div style="text-align: right;">15 19 16 18</div> <div style="text-align: right;">100 107 102 105</div> <div style="text-align: right;">90% M.F.S.V. = 900 932 898 934</div> RECORDED ZERO				REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>
BIO-FUEL BLEND 75% Petroleum Oil 75% Diesel <hr/> 25% F.A.M.E. <hr/> <div style="text-align: right;">15 13 15 13</div> <div style="text-align: right;">100 100 95 103</div> <div style="text-align: right;">90% M.F.S.V. = 900 896 901 893</div> RECORDED ZERO				REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>

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BIO-FUEL BLEND 99% Petroleum Oil 99% Diesel <hr/> 1% F.A.M.E. <hr/> 15 100 90% M.F.S.V. = 900 RECORDED ZERO	14 98 910	17 95 899	14 99 912	REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>
BIO-FUEL BLEND* 75% Petroleum Oil 75% Diesel 25% Tert Amyl Ethyl Ether <hr/> 15 100 90% M.F.S.V. = 900 RECORDED ZERO	- - -	- - -	- - -	REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>Mins</u>
BIO-FUEL BLEND* 99% Petroleum Oil 99% Diesel 1% Tert Amyl Ethyl Ether <hr/> 15 100 90% M.F.S.V. = 900 RECORDED ZERO	- - -	- - -	- - -	REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>Mins</u>
BIO-FUEL BLEND 75% Petroleum Oil 75% Diesel <hr/> 25% Vegetable Oil <hr/> 15 100 90% M.F.S.V. = 900 RECORDED ZERO	20 97 889	17 100 893	21 102 889	REMARKS RE-ZERO <u>YES/NO</u> TIME <u>Mins</u> RECALIBRATE <u>YES/NO</u> TIME <u>Mins</u> CLEAN <u>YES/NO</u> TIME <u>15 Mins</u>

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BIO-FUEL BLEND					REMARKS	
99% Petroleum Oil						
99% Diesel						
1% Vegetable Oil					RE-ZERO	YES/NO
	15	16	18	18	TIME	Mins
	100	97	98	98	RECALIBRATE	YES/NO
90% M.F.S.V. =	900	864	880	881	TIME	Mins
RECORDED ZERO					CLEAN	YES/NO
					TIME	15 Mins

F.A.M.E = Fatty Acid Methyl Esters

* Crossed out Bio-Fuel blends has not been tested and are not covered by the certificate.

RESPONSE TIMES

First detectable reading			<u>7</u>	Seconds
	63	ppm	<u>15</u>	seconds... (1)
	90	ppm	<u>25</u>	Seconds
Stabilized maximum reading or 100ppm	<u>105</u>	ppm	<u>43</u>	seconds
First detectable drop			<u>7</u>	seconds
	37	ppm	<u>15</u>	seconds... (2)
	10	ppm	<u>25</u>	seconds
Stabilized minimum reading	<u>0</u>	ppm	<u>42</u>	seconds
RESPONSE TIME= $\frac{(1)+(2)}{(2)}$			<u>15</u>	seconds

OIL FOULING AND CALIBRATION SHIFT

10% oil concentration test				
First detectable response			<u>8</u>	seconds
	15	ppm	<u>8</u>	seconds
	100	ppm	<u>15</u>	seconds
Off scale on highest range			<u>25</u>	seconds
On scale on highest range			<u>8</u>	seconds
	100	ppm	<u>16</u>	seconds
	15	ppm	<u>25</u>	seconds
Minimum reading	<u>0</u>	ppm	<u>86</u>	seconds
Further cleaning required	YES/NO			
Time			--	minutes

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100% oil concentration test

First detectable response			<u>7</u>	seconds
	15	ppm	<u>7</u>	seconds
	100	ppm	<u>14</u>	seconds
Off scale on highest range			<u>25</u>	seconds
On scale on highest range			15	seconds
	100	ppm	<u>15</u>	seconds
	15	ppm	<u>25</u>	seconds
Minimum reading	<u>0</u>	ppm	<u>113</u>	seconds
Further cleaning required	YES/NO			
Time			<u>--</u>	minutes
Calibration shift	<u>0</u>	ppm		

CONTAMINANT TEST

Meter reading shift with 300 ppm non-oil contaminants mixed with water and No.2 crude oil in oil concentrations of:

- 15ppm 0 ppm
- 100ppm +1 ppm
- 300ppm +5 ppm

AIR ENTRAINMENT TEST

Meter reading shift with 1% air entrained in water and No.2 crude oil added in concentrations of:

- 15ppm 0 ppm
- 100ppm +2 ppm
- 300ppm +9 ppm

OIL PARTICLE SIZE TEST

Meter reading shift 0 ppm

TEMPERATURE TEST

Calibration test water temperature 26 °C
 Meter reading shift at 10°C 0 ppm
 Meter reading shift at 65°C +1 ppm

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SAMPLE PRESSURE OR FLOW TEST

Meter reading shift at 50°C of normal **0** ppm
Meter reading shift at 200°C of normal **0** ppm
Deviations from this test should be stated, if necessary n.a

SHUT-OFF TEST

Meter reading before shut-off **101** ppm
Meter reading after start-up
(minimum dry period 8 hours) **101** ppm
Damage to meter as follows: None

UTILITIES SUPPLY VARIATION TEST

110% voltage effects 0
90% voltage effects 0
110% air pressure effects n.a
90% air pressure effects n.a
110% hydraulic pressure effects n.a
110% hydraulic pressure effects n.a

OTHER COMMENTS

None

CALIBRATION AND ZERO DRIFT TEST

Calibration Drift **1** ppm
Zero Drift **0** ppm

SHUTDOWN AND RE-ENERGIZATION TEST

Span drift **1** ppm
Zero Drift **0** ppm
Time for warm-up and calibration **8** mins

QS - CERTIFICATE OF ASSESSMENT - EC (MODULE D)

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED), issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Authority. This Certificate is issued by DNV GL AS under the authority of the Government of Norway.

This is to certify:

That the Quality System for the products

with type designation(s) as specified in the Appendix to this Certificate

Issued to

KSB Seil Co., Ltd.
Busan, Republic of Korea

is found to comply with the applicable requirements.

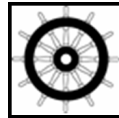
The quality system has been assessed with respect to the procedure of conformity assessment described in Annex II, Module D in the directive 2014/90/EU and regulation (EU) 2019/1397.

This Certificate is valid until **2025-05-11**.

Issued at **Høvik** on **2020-05-12**

DNV GL local station:
Gimhae Station

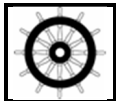
Approval Engineer:
Erik Istad



Notified Body
No.: **0575**

for **DNV GL AS**

.....
Roald Vårheim
Head of Notified Body



0575/yyyy

0575: Notified Body number undertaking quality surveillance
yyyy: The year in which the mark is affixed



The product liability rests with the manufacturer or his representative in accordance with Directive 2014/90/EU. This certificate authorizes the manufacturer in conjunction with the valid EC Type Examination (Module B) Certificate(s) of the equipment listed before to affix the Mark of Conformity (wheelmark) to the product described herein. This certificate loses its validity if the manufacturer makes any changes to the approved quality system which have not been notified to and agreed with the notified body named on this certificate. This certificate remains valid unless suspended, withdrawn, recalled or cancelled. The Manufacturer has to apply for periodical audits to verify the maintenance and application of the quality system every 12 months.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Job Id: **344.1-001318-17**
Certificate No: **MEDD000021C**

APPENDIX

Item no. MED/2.5 Oil discharge monitoring and control system for an oil tanker

Type designation	EC Type-Examination Certificate No.	Expiry date	Notified Body No.	USCG approval number
ODME S-3000 Version 2 ¹	MEDB0000086 Rev.1	2025-05-11	0575	N/A

Places of production

1.KSB Seil Co., Ltd., 76, Noksansaneopbuk-ro 313beon-gil, Gangseo-gu, Busan, Republic of Korea