



EVOLUTION EMS™

THE WORLD'S LEADING
**MARINE ENGINE EMISSIONS
MONITORING SYSTEM**

martek™
MARINE
Innovative Ship Solutions



Recognised supplier of choice across the industries served, with an unrivalled ability to meet the constantly developing needs of our customers operating in challenging environments.

Martek Marine has gone on to supply over 30,000 shipsets generating more than \$100million in sales.

From a staff of three, Martek now boasts a team of 60 with offices in the UK, Singapore and a service team operating on every continent.



*Martek Marine was founded in 1999
with a vision to pioneer sustainable
solutions for ship safety, performance
and crew welfare.*



THE WORLD'S LEADING MARINE ENGINE EMS

Over 20 years ago, our original emissions monitoring product was designed, developed and manufactured by our inhouse team of experts. Over the years, this hasn't changed with projects still being carried out by the Martek team, but customer expectations and requirements have - with each new sale.

We understand that no customer is the same. Each have their own needs and wants on specific designs.

Being accustomed to building multiple systems in our own production facilities means our designs can be flexible to keep up with an ever-evolving industry.

“Experience Is Everything”

- 120 marine CEMS systems installed – more than all other suppliers combined!
- 7 million engine hours application experience across 600 marine engines
- Different engines, ship types and fuels
- Pioneers - original system developed in 1995, 20 years marine EMS design experience
- Marine expertise, supplied 15,000 shipsets

7,000,000

ENGINE HOURS ACROSS 600 MARINE ENGINES

THE WORLD'S LEADING MARINE ENGINE EMS

The impact of air pollution from ships is under constant scrutiny from the world's media.

Evolution EMS™ is the world's first Type Approved (LR & DNV) on-board NOx, SOx & CO2 emissions monitoring system, providing a raft of operational advantages for ship owners, managers and operators.

The Evolution EMS™ system has been designed to be 'futureproof' against upcoming regulations allowing simple 'plug and play' analyser inputs ensuring no additional ship emissions reporting system will ever need to be purchased.

1

Unique 11-layer gas filter probe with 'blowback' arrangement. It delivers maximum filtration performance and extended maintenance interval with no consumable costs.

2

Unique 4-stage system filtration – 100micron, 10micron, 1 micron & 0.1 micron – filters the full range of particle sizes to guarantee long-term trouble-free analyser performance.

3

Long-term proven NDIR Siemens analyser technology – guaranteed accuracy, performance and reliability in the hostile marine environment.

4

Unique fail-safe protection of sample handling system – you'll be aware that this is where most makers' problems occur:

- Heated sample line multi-section temp' monitoring & alarms – 1No. Pt100 per line
- Moisture sensor alarm to protect analyser
- Sample flow monitoring & failure alarm
- Air supply monitoring & failure alarm
- SO3 filter to protect analyser – do other makers include this?

Through **20 years of expertise**, our systems have **operated for 7 million engine hours across 600 marine engines** including a range of engine, ship and fuel types.

During this time, we have put together a list of points that need to be considered when working with emission monitoring systems.

BUYERS GUIDE

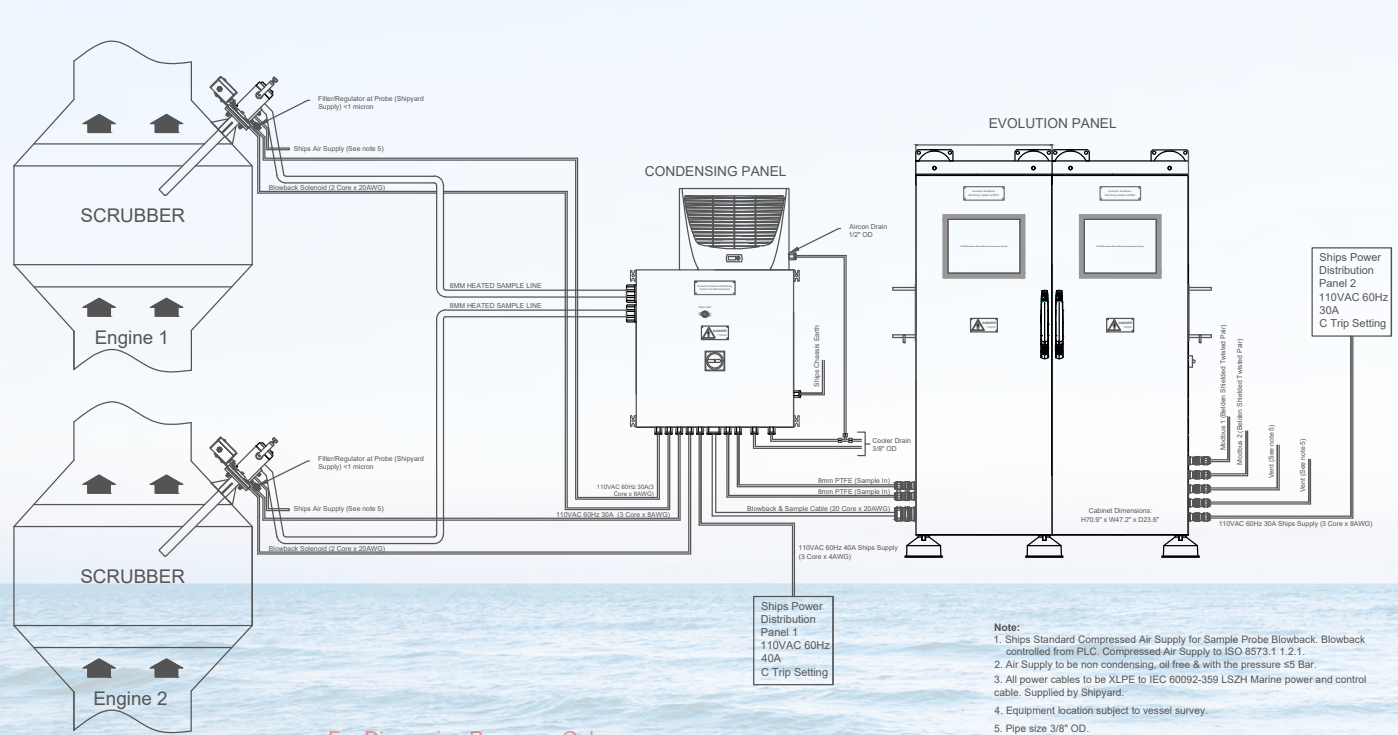
1. Analyser/control equipment must be mounted in an area with an ambient temperature less than 35°C
2. Use a proven NDIR (Non-Dispersive Infra-Red) analyser
3. In order to keep filters clean, a blow-back system on the heated sample probes should be used
4. Fit moisture sensors/membrane filters to protect the analysers in the unlikely event of moisture breakthrough
5. Scrubber gas contains high levels of moisture, in order to prevent moisture breakthrough, a high capacity cooler must be used, and should give low SO₂ knock-out
6. Mount coolers as close as environmental conditions will allow to the stacks being monitored, running “dry, cold” samples line where possible from the stacks down to analyser
7. Using heated stack probes will enable immediate monitoring as soon as the engine comes on-line



TECHNICAL DRAWINGS

CONTINUOUS SCRUBBER MONITORING SYSTEM

(SA080119D-1)



Drawing SA080119D-1 shows an Emissions Monitoring System specifically developed for scrubber monitoring. This is a continuous monitoring system whereby samples are drawn continuously from both stacks at the same time and analysed simultaneously.

Samples are cooled in a conditioning cabinet located in a suitable area adjacent to the stacks. This allows cooled conditioned sample gas to be transported down to the monitoring cabined located in a controlled environment.

Transporting cooled, dry samples means that cost effective PTFE sample tubing can be used instead of more expensive heated transport tubing.



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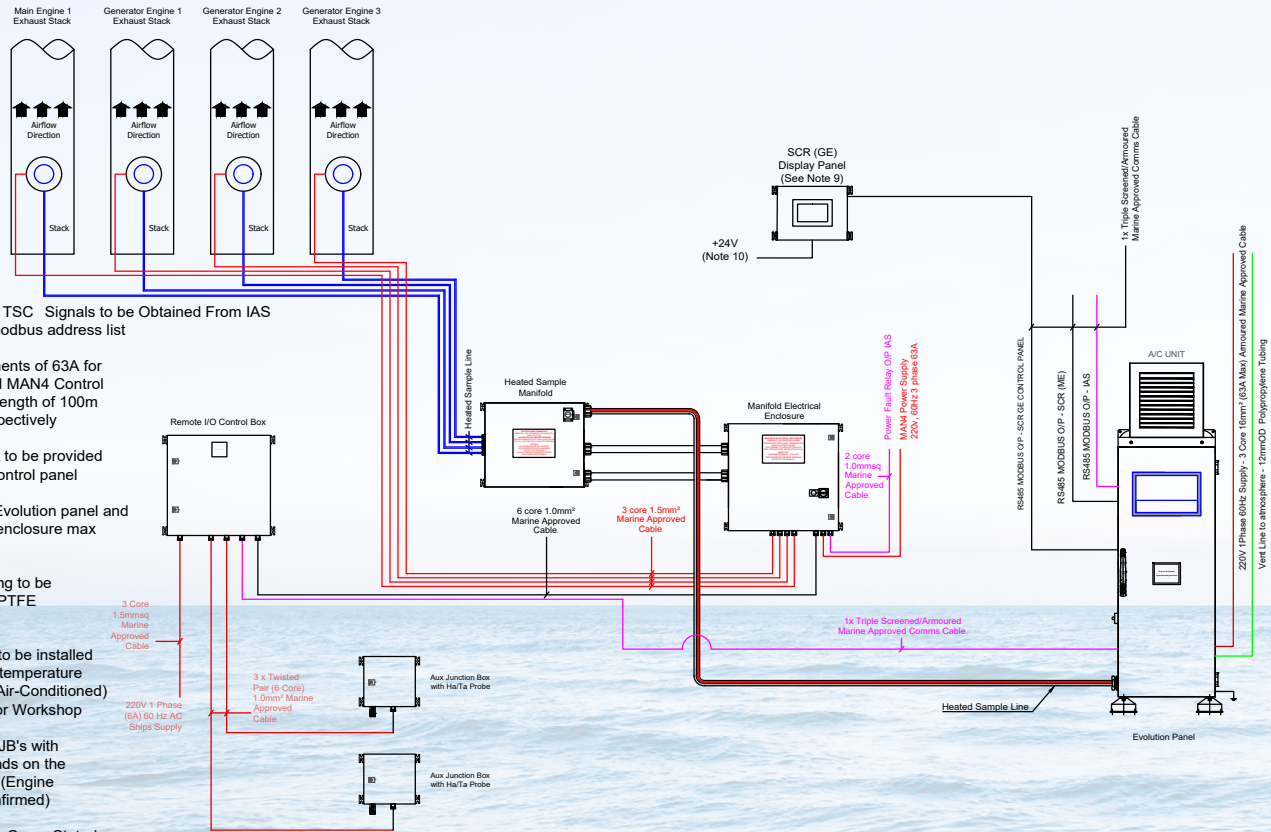
For Discussion Purposes Only					Drawn By.		Client / Vessel:		Job Number:		Drg Size:	
No.	Revision.	Date.	Name.	Notes.	J.B		Alfa Laval Nijmegen BV				A4	
					Date Drawn.				Scale:		Rev:	
					S.A		Drawing Title:		None		0	
					Date Checked.		Continuous Scrubber Monitoring System Schematic				Sheet:	
					S.A						1	
					Date Approved.				Drawing Ref:		SA080119D-1	
					08.01.19							

TECHNICAL DRAWINGS

EVOLUTION SEQUENTIAL EMS (SA080119D-2)

Notes:

- 1) Power Signals & TSC Signals to be Obtained From IAS Via Modbus, see modbus address list
- 2) Power Requirements of 63A for both EVO main and MAN4 Control is based on HSL Length of 100m for each panel respectively
- 3) Local earth point to be provided adjacent to each Control panel
- 4) Power cable to Evolution panel and manifold electrical enclosure max CSA 16mm²
- 5) Sample line tubing to be 8mm OD / 6mmID PTFE (Martek Supply)
- 6) Evolution Panel to be installed in a location with a temperature <35°C (Preferably Air-Conditioned) For example ECR or Workshop
- 7) Number of AUX JB's with Ha/Ta Probe depends on the location of engines (Engine locations to be confirmed)
- 8) Number of Cable Cores Stated are minimum requirements
- 9) GE SCR Display to show Current Values of NO(ppm), SO₂ (ppm) & CO₂ (%Vol) and currently sampled stack
- 10) 24Vdc to be supplied by Shipyard



For Discussion Purposes Only

No.	Revision.	Date.	Name.	Drawn By.	J.B	Client / Vessel:	Job Number:
				Approved By.	S.A	Alfa Laval Nijmegen BV	-
				Date Approved.	08.01.19	Drawing Title: Evolution Sequential Emissions Monitoring System Schematic	Drawing Number: SA080119D-2

Drawing SA080119D-2 shows a sequential Emissions Monitoring System specifically developed for engine compliance testing in line with MARPOL Annex VI (Regulations For The Prevention Of Air Pollution From Ships) and the NO_x Technical Code 2008.

This is a sequential monitoring system whereby samples are drawn from each stack one at a time. Stacks are automatically added to the sampling sequence as soon as the system logs an engine power greater than 50kW which indicates that an engine is running.

Additional parameters, including Ha (Absolute humidity of engine intake air) Ta (Engine intake air temperature) P (Engine power) and TSC (Engine charge air temperature) are measured or input via a Modbus link by this system so that compliance NO_x levels in g/kWh can be calculated/displayed.

CURRENT USERS OF THE **EVOLUTION** **EMISSIONS MONITORING SYSTEM**



- BELCO Technologies Corporation
- Interlake Steamship Co
- CR Ocean Engineering
- American Steamship
- Daewoo Shipbuilding & Marine Engineering Co Ltd
- Hyundai Heavy Industries Co Ltd
- KOTC
- Hyundai Samho Heavy Industries Co Ltd
- Gaslong LNG Services
- NLNG Ship Management Limited



EVOLUTION EMSTM

Become Part of the World's Leading Marine Engine EMS

Martek Marine Ltd (Head Office)
Adwick Park
Manvers
Rotherham S63 5AB
United Kingdom

Telephone: +44 (0) 1709 599 222
Email: info@martek-marine.com

Martek Marine Asia Pacific
298 Tiong Bahru Road
#05-01, Central Plaza
Singapore 168730

Telephone: +65 6331 6790
Email: apacsales@martek-marine.com

Registered in England and Wales number: 03930003

www.martek-marine.com

Martek Sustainability Statement

We are dedicated to building a sustainable and profitable business while continuing to operate responsibly with honesty, integrity and fairness.

At Martek Marine, we are committed to establishing high ethical standards of behaviour and effective corporate governance. This defines our strategic and financial objectives. Corporate responsibility remains central to delivering our strategy and achieving our success.

We are committed to conducting business in an environmentally responsible manner. We are putting in place processes to understand and address our responsibilities in respect of our operational impacts on the environment.

We aim to reduce the use of replacement parts and calibration to help overcome waste and excessive carbon emission.

Pioneering sustainable and innovative solutions for ship safety, performance and crew welfare.

