
ABB Measurement & Analytics

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ABB MEASUREMENT & ANALYTICS

CEMcaptain

Emission monitoring on your wavelength



A new breath of clean air at sea for today, tomorrow and beyond

ABB's solution for emission monitoring, CEMcaptain helps the shipping industry to lower its CO2 footprint, reduce emissions and improve engine efficiency and air quality in line with Paris Agreement goals.

In recent years, environmental protection became a crucial topic in our society. For improving air quality not only in cities but also on oceans, the emission limit targets of greenhouse gases in the shipping sector have been constantly reduced in the last few years.

There are different alternatives to comply with latest emission limits. One option for marine emissions reduction for ships is to use conventional high sulfur fuel oil and an exhaust gas cleaning system (EGCS). Nowadays, hundreds of EGCS are successfully in operation. An emission monitoring system is complementing the EGCS and is a crucial system to prove compliance to MARPOL regulations. New approaches as carbon capture systems, improving hydrodynamic performance of vessel's hulls and/or fuel efficiency will probably require more emission monitoring to reach the goals of 2030 / 2050.

Highest availability and reliable measurement results are key to avoid stress with non-compliance issues while sailing. To meet the high-performance criteria onboard calls for the right design of a continuous emission monitoring system (CEMS).

The benefits:

- The CEMcaptain is a powerful new emission monitoring system from ABB designed to help guarantee compliance to emission regulations today and in future.
- By consistently achieving 98 percent and more uptime, the CEMcaptain not only requires less maintenance effort but also eliminates the stress and workload caused by non-compliance.
- It increases onboard safety, optimizes processes and reduces ownership costs.
- You receive real-time measurement, easy transfer of diagnostic information, digital software solutions and service and support wherever you are. The modular concept of the CEMcaptain makes it possible to measure any relevant exhaust gas component, including components to measure engine efficiency.

ABB has decades of experience in monitoring emissions on land and at sea. We help make measurement easy so you can focus on your business.



The highest reliability
and most accurate
measurement in the
harshest of processes



Emission monitoring for maritime industry

We are on your wavelength

Emission monitoring for clean air on oceans brings maritime air pollution control closely in line with shore-based power plants, cement works and oil refineries, where CEMS have been used for decades. As of January 1, 2020, the low sulphur emission limits in the IMO regulations became effective worldwide.

The measurement requirement

The International Maritime Organization (IMO) set out the MARPOL Annex VI regulations aiming to control the main air pollutants emitted by vessels. These regulations focus on the control and reduction of sulphur oxides (SOx) and nitrous oxide (NOx) emissions:

- Regulation 14 for control and monitoring of SOx emitted by the combustion of heavy fuel oil (HFO) engines
- Regulation 13 for control of NOx emitted by the combustion of diesel engines

SOx control guidelines are specified in the MEPC.259 (68) and MEPC.340 (77).

They apply in all Emission Control Areas (ECAs) starting January 1, 2015 on and have started in 2020 globally. From 2023, the IMO is expected to receive three more ECA's: The Mediterranean ECA will set to come into force from May 1st 2025 while the list of ECA's might be extended to other areas.

In order to control the efficiency of exhaust gas cleaning systems (EGCS) and following MEPC.340 (77), measurement of SOx/CO₂ ratio is required.

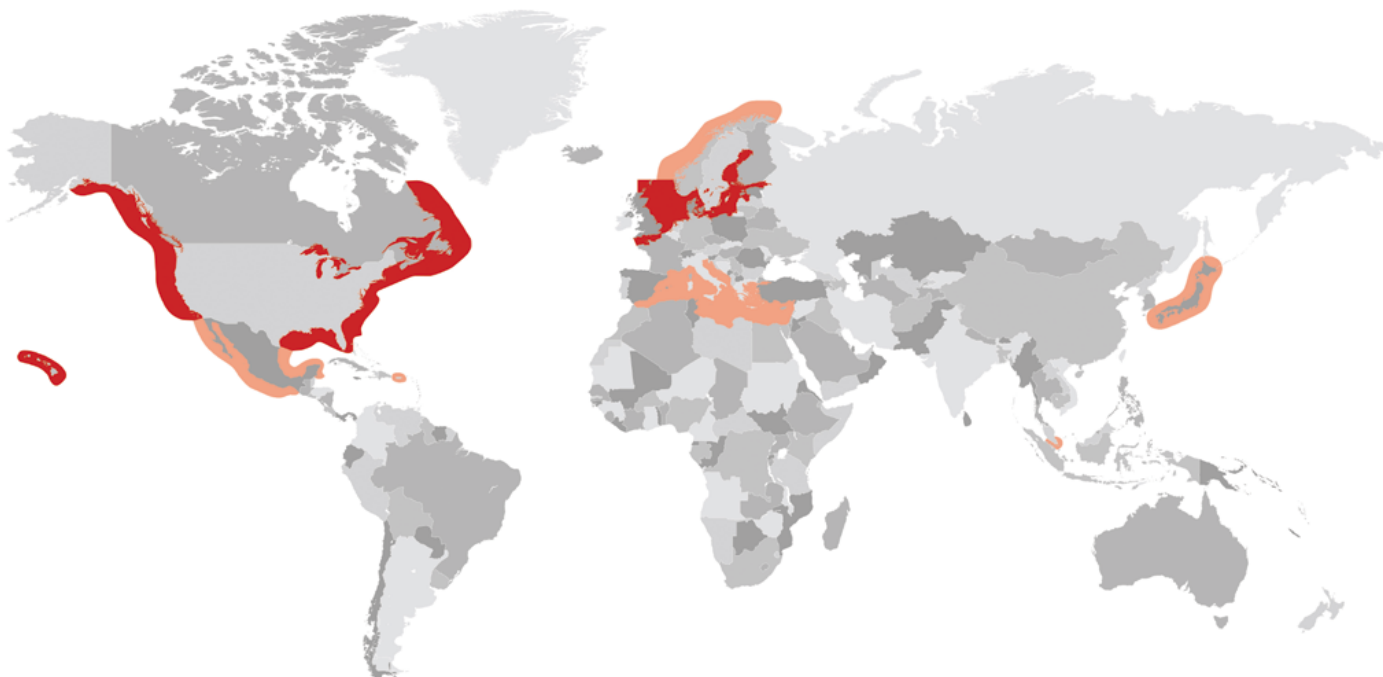
The NOx Technical Code (NTC) 2008 specifies the measurement performance of a CEMS on board of a vessel.

The currently measured gases are:

- sulphur oxides (SOx)
- carbon dioxide (CO₂)

The optional measured gases are :

- methane (CH₄)
- carbon monoxide (CO)
- oxygen (O₂)
- nitrogen oxides (NOx)



Measurement accuracy you can rely on

Compliance tested and certified

When it comes to getting the most from a CEMS it is important to select the right analyzer to prove compliance no matter what type of vessel and classification society is involved.



The ABB system design and sampling technique of CEMcaptain GAA610-M is based on a dry extractive approach which is compliant to

- MARPOL Annex VI & NOx Technical Code 2008 MEPC.177 (58)
- CO2/SO2 measurement approved according MEPC.340 (77) – Guidelines for exhaust gas cleaning systems

- NOx approved according MEPC.103(49) – Guidelines for onboard NOx verification procedure direct measurement and monitoring method
- NOx approved as equivalent measuring principle to the reference measuring principle (CLD) acc. ISO 8178-1:2006 for onboard NOx verifications procedure direct measurement and monitoring method

The following type approvals for installations onboard of ships are available:

DNV GL, Lloyds Register, ABS, KR, NK, Bureau Veritas

Other approvals on request.

Measuring emissions at sea

Powerful solution for marine industry

ABB CEMcaptain is designed with busy maritime engineers and a regularly changing crew in mind and installed onboard hundreds of ships worldwide. The CEMcaptain GAA610-M is a multi-component analyzer system continuously providing real-time data.



GAA610-M is suitable for high ambient temperatures up to 55°C and high vibration environment.



GAA610-M is protected against soot ingress with an innovative filter solution and back-purging for easy integration and alignment with scrubber operation procedure.



Continuous gas analyzer AO2000-Uras26 and Limas21

The basic version is equipped with ABB's renowned Uras26 non-dispersive IR gas analyzer and measures simultaneously and continuously SO₂ and CO₂. Two separate gas paths allow measurement of two streams with one analyzer simultaneously (optional), while an optional stream switching box makes it possible to measure four streams with one analyzer. Optional measuring components with Uras26 are methane (CH₄) and carbon monoxide (CO). Oxygen (O₂) will be added with an oxygen cell while nitrous oxides (NO_x) will be measured with the non-dispersive UV gas analyzer Limas 21.

Adjustment without test gas

No test gas is needed during operation. Regular adjustment during operation is automated by the internal gas filled cells and ambient air that enable automated adjustment of the gas analyzer.



Decrease maintenance hassle by increased system uptime

The robust design and best in class measurement technology with ABB's AO2000 - Uras26 and Limas21 ensures high reliability and stability of emission monitoring.

The automated validation and adjustment without test gas minimizes maintenance tasks and simplifies operation.

Easy communication via dynamic QR Code enables every crew member for fast fault reporting, diagnosis and repair.

Adjustment without cylinder gases saves time and cost

GAA610-M is equipped with cells filled with gas mixtures of a known concentration that enable automated adjustment of the gas analyzer. This adjustment is automated or always available at a push of a button. The gas filled calibration cell has proven its stability over decades installed in hundreds of analyzers.

Gas cylinders are only needed when commissioning the analyzer and during annual service.

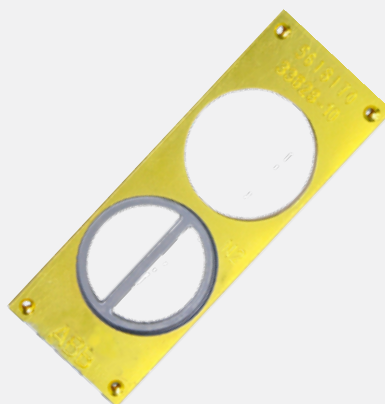


Actual system information on dynamic QR Code

A dynamic QR Code is generated by the analyzer system software in real-time, based on the latest status and health information.



ABB Ability™ Remote Assistance
with secured connectivity to ABB support.



On-site and remote digital service

With you where and when you need us

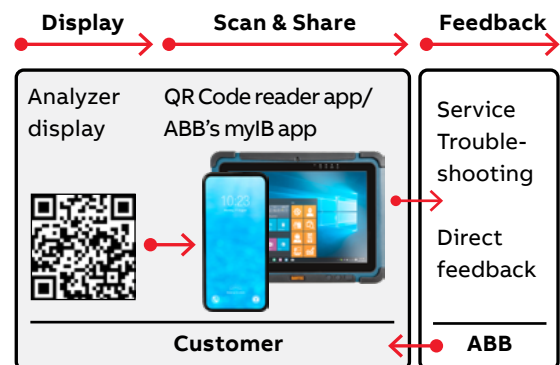


Fast fault reporting, diagnosis and repair

Fast fault reporting, diagnosis and repair help operators get closer to 100 percent uptime availability for their gas analysis instrumentation. For this purpose, CEMcaptain is digitally enabled and utilizes an innovative way of communication with any standard mobile device.

ABB's Dynamic QR Code is a unique feature to display dynamically generated QR codes on the analyzer display for easy communication. In addition to static information for system identification, it contains also dynamic information on system configuration and analyzer health status.

In combination with mobile devices, the Dynamic QR Code represents an innovative way of customer's communication. It allows for instance, improved case-specific support by ABB resulting in an increased availability of analyzer assets. It is compatible with standard QR code reader applications as well as ABB's application 'my Installed Base (myIB)'.



**Secured remote connectivity to direct ABB support**

Data privacy and data security are key topics in the digital age. The Dynamic QR code technology is completely secure because there is no permanent data transfer from a gas analyzer on the ship to our systems. Sending two photos via email is enough!

**Parts & People in every port**

- ABB is ready to deliver from two production sites in Europe (Frankfurt) and Asia (Shanghai).
- The right spare parts and a competent expert will be on hand to execute a maintenance procedure through ABB's team of 600 certified service technicians worldwide at more than 35 local service centers.
- Enable your own technicians to perform maintenance activities by attending ABB's certified training.
- Get connected with digital solutions.



Keep the air clean

with sustainable environmental operation

The combination of on-site innovations and remote digital services increase regulatory compliance and operational efficiency, making measurement easy. We help you to keep the air clean and maintain sustainable environmental management together with expert service support and innovative digital solutions.

The CEMcaptain provides measurement, analytics and digital expertise in a single package, making it easier to understand and manage emissions from operations. It provides a clear route into digital automation and you can be confident of ABB's attention to cyber security.

Installing the high-quality CEMcaptain from the outset means lower total cost of ownership. Precise calibration reduces service intervals. Good CEMS are less likely to fail. The basic requirement of CEMS is 95 percent availability, ABB CEMS consistently achieve 98% and more up-time, which means less maintenance effort, lower total cost of ownership and elimination of the stress and workload caused by non-compliance.



Thousands of experts around the world are making measurement easy for you

ABB Measurement & Analytics is a world leading manufacturer of continuous emission monitoring systems. With thousands of experts around the world and high-performance technology, ABB's team is dedicated to make measurement easy for its customers.

Unrivalled CEMS experience

ABB emission monitoring gas analyzers have evolved over decades to become best-in-class solutions. They are used in tens of thousands of industrial plants worldwide to measure and report regulated emissions to air.

- Over 60,000 systems installed worldwide
- Installed in more than 100 countries
- 70 years experience
- Over 400 systems installed on vessels

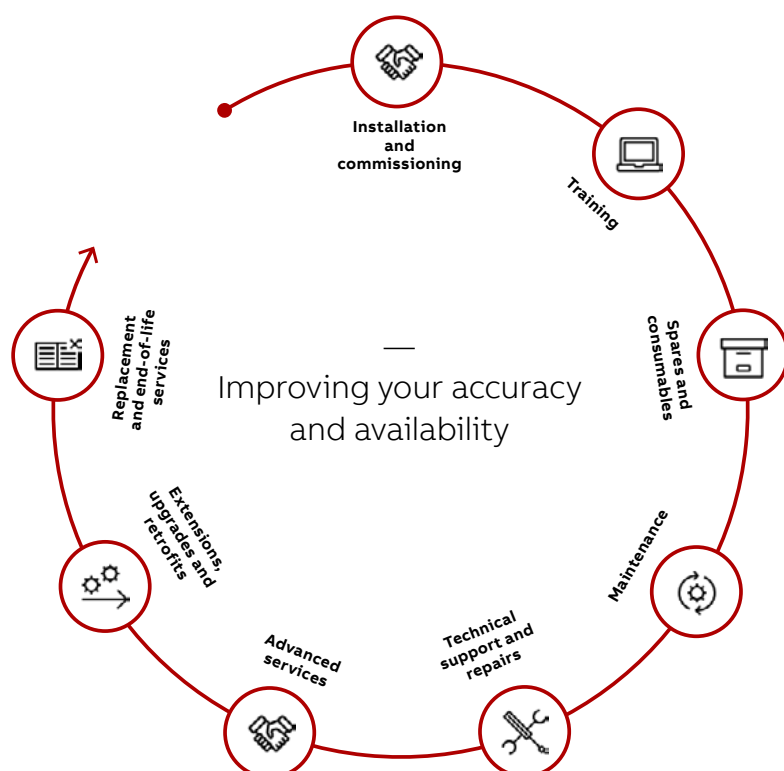
Experience in marine business

ABB Marine & Ports has established dedicated infrastructure serving the needs of the marine industry

- Collaborative Operations Centers 24/7
- Single point of contact
- unique global service support at global-marine-cems-support@abb.com

Your right partner for global business

- Global production facilities
- Global service infrastructure



When you purchase CEMcaptain, you don't just get a product. You gain access to a trusted and respected authority on process automation, operational excellence and digital technologies.

ABB has defined services for every lifecycle stage to make sure you receive the maximum possible benefit from your purchase today, tomorrow and beyond.