Fuji Electric

*Innovating Energy Technology*

ams
Advanced Marine Solutions

Exhaust gas cleaning system

# SOx Scrubber

# SaveBlue

**Save the blue sky, save the blue ocean, save the blue Earth**

## Features a compact and lightweight **cyclone design** with low pressure loss.

Regulations on emissions of sulfur oxide (SOx) and particulate matter (PM) in exhaust gas are being gradually strengthened by the International Maritime Organization (IMO).*1

Although ships need to use low sulfur fuel oil to comply with the regulations, operators have been concerned that price differences between conventional high sulfur fuel oil and low sulfur fuel oil will increase their operating costs.

With the recognition of exhaust gas cleaning systems (EGCS) by the IMO, these systems are accepted as equivalent measures for reducing emissions and they enable the continued use of high sulfur fuel oil.

*1 MARPOL 73/78 (International Convention for the Prevention of Pollution from Ships, 1973, 1978), Amended Annex VI: Prevention of Air Pollution from Ships.

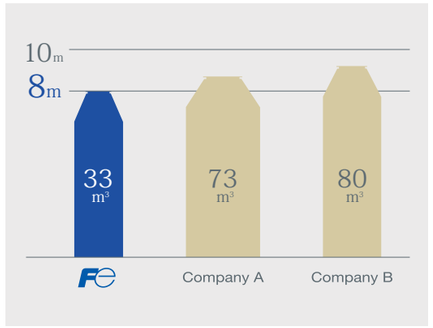
**SOx Scrubber Product Introduction Movie**

Read the QR code with the barcode reader on your smartphone or tablet.
See also from the following URL.
https://goo.gl/hoqKd4

### Compact design

The world's smallest commercial scrubber.*2
Easy to install on new ship builds as well as for retrofitting of existing ships.

*2 12 MW class, as of 2018 *According to our research




Excellent installability

### High desulfurization efficiency

The world's first SOx scrubber with a cyclone design. The highly diffused spray of wash water inside the unit increases the area and time of contact between the exhaust gas and water.

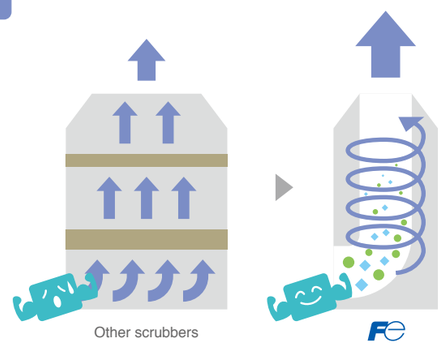
Fuji Electric has been granted a patent for the technology used for this product.
US 9770690 B2
KR 101570466 B1

PATENT PENDING Public number:
EP 2905062 A1

Compatible with all sea areas

### Low Pressure Loss

The cyclone design features a simple structure that uses only spray nozzles inside the SOx scrubber.




Induced draft fan not required



## Laser gas analyzer for ship scrubbers ($SO_2$/$CO_2$)

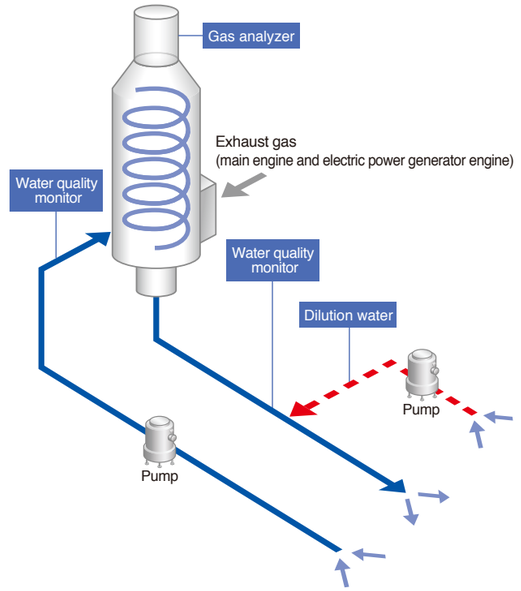
Innovative laser technology surpasses many performances of traditional infrared ray gas analysis. Its stable measurement with almost no drift allows to be free from frequent calibration and gas cylinder reservation on board. In addition, maintenance costs are less than half of those required when using conventional analyzers. This lightweight and compact unit can be installed easily without taking care of heating tube.

■Features
- ●Occupying less space gives it a major advantage with easy installability
- ●Stable performance & longer maintenance cycle

■Specifications
- ●Dimensions (W×D×H) mm : Extraction unit (400(W)×300(H)×323.4(D) mm) *Depth varies with diameters of the stack. Detection unit (330(W)×880(H)×255(D) mm) Interface box (500(W)×400(H)×166(D) mm)
- ●Weight : Extraction unit (About 18 kg) Detection unit (About 30 kg) Interface box (About 20 kg)
- ●Performance : Accuracy: ±2% of reading or 0.3% FS, whichever is greater Precision: ±1% FS or less in 2.5 times standard deviation of 10 repeat responses Drift: Less than ±2.0% FS per 6 months Calibration: whenever necessary
- ●Standard certifications : Maritime certifications and EGCS conformity assessments Class NK and DNV-GL

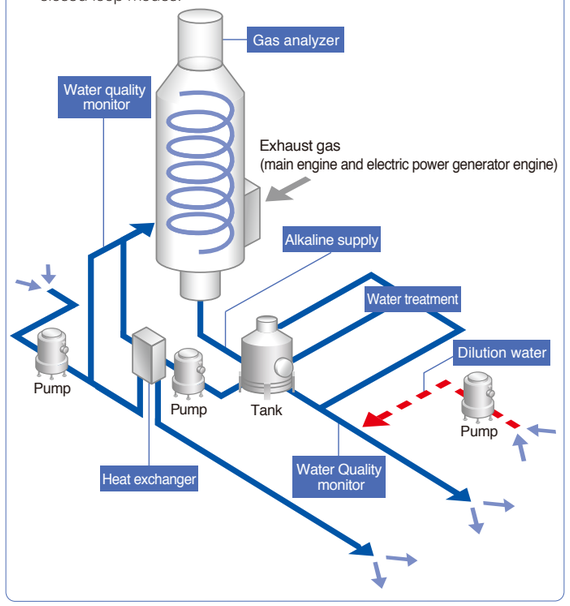
### Open-loop system

While the ship is underway on the ocean, an open-loop system is operated in which seawater is pumped in for use and can be drained back into the sea. An open-loop system uses less auxiliary equipment and helps keep the investment burden smaller.




### Hybrid system (Open-loop and closed-loop switchover)

When the ship is in a drainage-regulated area such as in coastal regions or rivers, the system is operated in closed-loop mode in which the used seawater is treated with a chemical and reused. A hybrid system can operate in either open-loop or closed-loop modes.

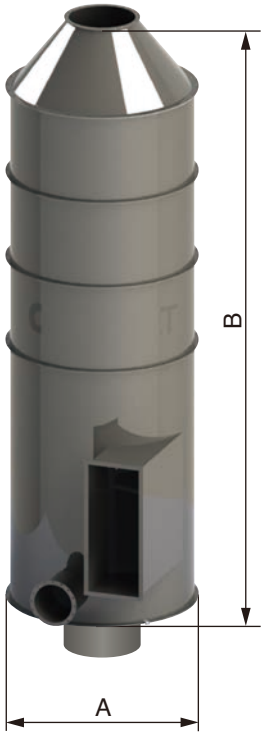



Option for US-VGP

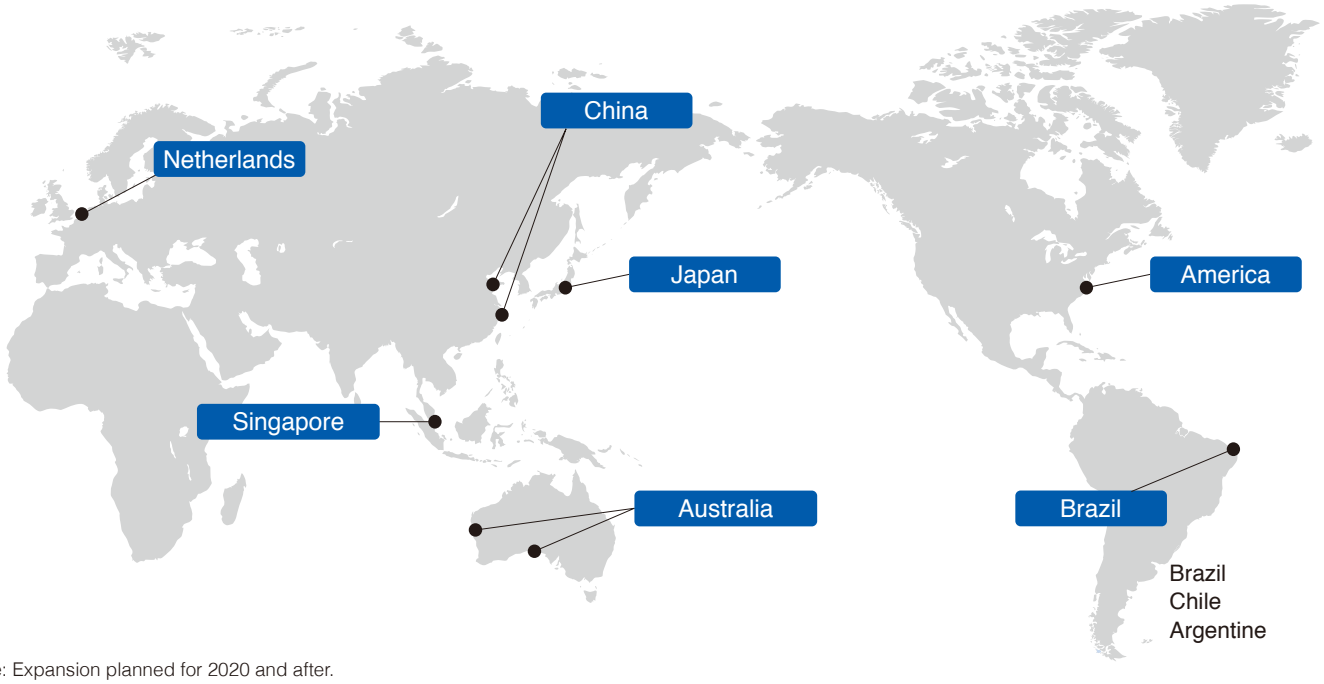
## System Design

| | | Size [$\phi$ × H] (A × B) | Dry Weight |
|---|---|---|---|
| up to 8 MW | S | 2.0 × 7.0 m | 5000 kg |
| up to 12 MW | M | 2.3 × 8.0 m | 6000 kg |
| up to 16 MW | L | 2.7 × 9.2 m | 7000 kg |
| up to 18 MW | 2L | 2.9 × 11.5 m | — |
| up to 24 MW | XL | 3.1 × 14.0 m | — |

* Sizes may change depending on design conditions.
* Multi-inlet (main engine + auxiliary engine) support is possible.




## Global Network




Note: Expansion planned for 2020 and after.

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