

Marine-GASS™ Sampling System

Perma Pure's Marine-GASS™ Nafion™ based Sample Conditioning Systems is the smart solution for Marine CEMS. Designed specifically to handle harsh shipboard applications, the system ensures long term reliability of SO₂ measurements according to MEPC 184(59). Because the level of SO₂ is so low coming out of the scrubber, a peltier based cooler is unable to condition the sample effectively - only Perma Pure's Nafion™ gas dryers can preserve the SO₂ by removing the sample moisture in the vapor phase. Not all sample conditioning systems using Nafion™ Permeation Dryers are alike - choose the system from the company that knows how to optimize their performance in the toughest applications.

Main Advantages

- Optimized Nafion™ Management System guarantees long uninterrupted service life on ships
- Elimination of Cooler Catastrophic Failure Mode protects analyzers from water damage
- Unique Purge Gas Management assures reliable performance with poor compressed air quality

Environmental Ratings

- Type 4, 4x (IP 66) Fiberglass Enclosure
- Designed and tested to pass all Marine certification

Principle of Operation

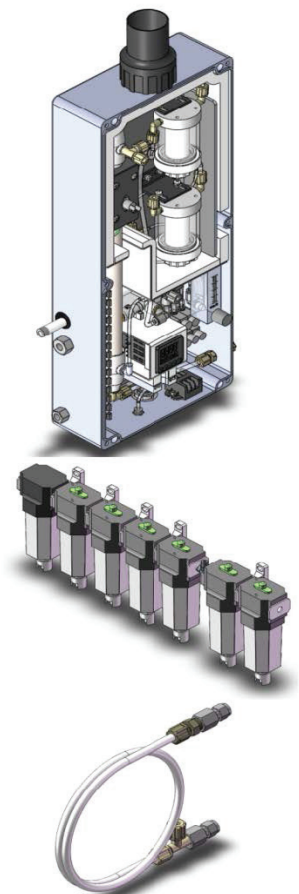
The system contains two temperature-controlled zones mounted in an environmentally sealed, NEMA-4X housing.

First Zone: High-Temperature Area

The sample passes through a two-stage filtration process to remove particles as small as 0.1 micron. Acid mists, if present, are coalesced and then removed by an auto drain. The sample then passes through a Nafion™ dryer, which removes the moisture in the vapor phase. The initial portion of the dryer is heated above the sample dew point to prevent condensation and make drying more efficient. The high temperature zone is controlled at 70°C.

Second Zone: Ambient-Temperature Area

In the second zone, the sample passes through the remainder of the dryer, further reducing the dew point to as low as 0°C. A second Nafion™ dryer is used to dry the incoming compressed air that is used to purge itself and the sample gas dryer thereby avoiding the requirement for instrument air.



Specifications

Physical

| | |
|--|--|
| System Mount Connection | Wall Mounted |
| Enclosure Nominal Dimensions (H x W x D) | 24" x 10" x 5" 600 mm x 250 mm x 120 mm |
| Enclosure Ratings | IP 66 to DIN EN 60529, Type 4, 4x, EAC cULus, Lloyd's Register, Germanischer Lloyd |
| Sample Gas Tubing Connections | 1/4" Tube Compression, Kynar® (PVDF) |
| Umbilical Line Seal | Heat Shrink Style, 5" Length, 2" Min Expanded I.D. Nose |
| Weight | 29 lbs. / 13.2 Kg |

Utility Requirements

| | |
|----------------------------|--------------------|
| Compressed Air Requirement | 5-7 bar / 120 slpm |
|----------------------------|--------------------|

Environmental

| | |
|-------------------|-----------|
| Temperature Range | 0-50°C |
| Humidity Range | 0-100% RH |

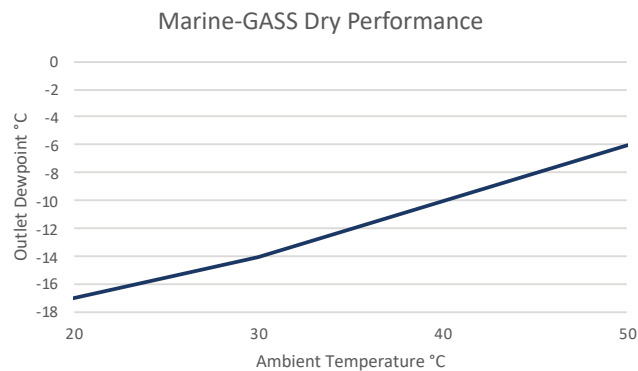
Control and Electrical

| | |
|-------------------------|---|
| Temperature Control | PID Type |
| Heater Type | (1) Cartridge Style, 8mm OD, 30w (2) Silicone Pad Style, 50 Watts each |
| System Electrical Power | 220 VAC, 1 A, 50 Hz, 130w |
| Alarm Output | SPDT Relay, 3 A, 250 VAC (De-Energized in Alarm State) Screw Terminal Connection |

Materials

| | |
|---|--|
| System Enclosure | Fiberglass Reinforced Polyester |
| Insulation | Rubber Foam And fiber Glass |
| O-Ring Seals | Viton™ |
| Filter Housing | Kynar® (PVDF) / Glass |
| Sample Gas Filter Coalescing Element, Upper Filter | Glass Fiber, 0.1 um, 95% Efficiency, Coalescing |
| Sample Gas Filter Particulate Element, Lower Filter | Glass Fiber, 0.1 um, 75% Efficiency, Particulate |
| Sample Gas Path Fittings | Kynar® |

Performance



Sample gas inlet: 2 L/min
Dew point: 40°C

Complete Family of Sample Gas Conditioning Solutions

Filters, Scrubbers & More

- Particulate/Coalescing Filters
- Inertial Bypass Filters
- Ammonia Scrubbers
- Acid Scrubbers
- Heatless Air Dryer

Coolers

- Digital Thermo-Electric Coolers
- SO₃ Aerosol Removal Coolers
- eCool™
- Complete Sample Conditioners
- Heated Filter Probes
- Flow Control Drawer
- Portable Products for Stack Testers
- SDS Supplemental Drying System (Nafion™-Based)

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