



Readi-GASS™

Nafion™-Based In-Situ Sample Gas Conditioning System

For CEMS and Process Analysis

Making Analysis Possible



Improve Accuracy

Protect Analyzers

Reduce Maintenance

Serving a Wide Range of Applications

Perma Pure's sample conditioning solutions are an enabling technology for CEMS and monitoring.

POWER GENERATION • PETROCHEMICAL • REFINERIES • INCINERATION • INDUSTRIAL

Perma Pure's Nafion™-based products are used by leading continuous emissions monitoring systems suppliers, industries and governments. We are proud to partner with our broad and diverse customer base to meet the latest SO_x and NO_x requirements, making the world healthier and cleaner. Our commitment to protect life starts with a focus on quality and partnership with our customers to meet the challenges of demanding applications while making the world safer and healthier.

Nafion™-Based Gas Sample Conditioning Systems

Perma Pure is the exclusive manufacturer of Nafion™ tubing, a highly-selective permeation membrane. While traditional coolers will reduce unwanted moisture from many sample gas streams, certain applications require the membrane drying power of Nafion™ to properly remove enough water vapor without dissolving water soluble acid gases.

Our Nafion™-based solutions take advantage of the material's unique properties that allow the removal of water vapor without dissolving water soluble acid gases. Removal of moisture improves accuracy of measurements by eliminating interference. It also reduces maintenance expenses by protecting the analyzer and other components, as well as eliminating or lowering the temperature of the heated line.

Nafion™ Membrane Drying Technology

The Ultimate Water Vapor Removal Solution!

Corrosion Resistant

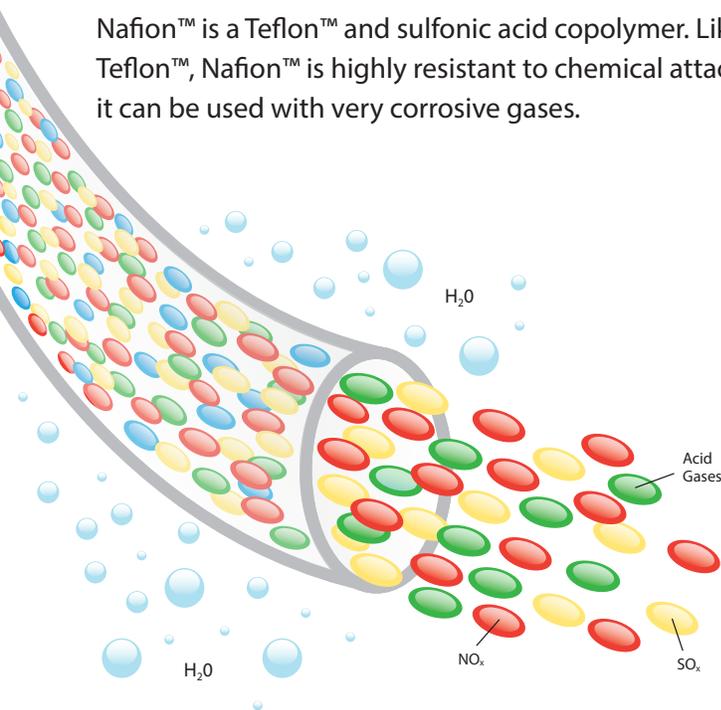
Nafion™ is a Teflon™ and sulfonic acid copolymer. Like Teflon™, Nafion™ is highly resistant to chemical attack, so it can be used with very corrosive gases.

Fast & Selective

Unlike microporous membrane permeation, a relatively slow diffusion process, Nafion™ absorbs and transfers water in "a fraction of a second" at a molecular level. Because this is a specific chemical reaction with water (not size based) other constituents are usually unaffected.

Simple

When water vapor absorbs onto the tubing from the vapor phase, there is no net change of free energy, and no external energy is required to drive the reaction. The driving force is simply the difference in water concentration on opposite sides of the tubing wall. There are no moving parts and no routine maintenance is required. The process is continuous and self-regenerating.



Introducing Readi-GASS™

A Nafion™-Based Solution Optimized for Challenging Environments

The Readi-GASS™ system is designed to remove moisture, particulate, and coalescing liquid from the sample gas while retaining the water soluble acid gases such as SO₂ and NO_x. By utilizing the Nafion™ dryer, Readi-GASS™ can provide low level measurement of SO₂, such as after the FGD at coal-based thermal power plants. The extremely robust design of Readi-GASS™ helps it deliver exceptionally accurate results, even with dirty and moist compressed air. Plus, it even compensates for temporary failure of the heated probe and sample line.

Features of Readi-GASS™ system include:

- Nafion™ drying technology
- Preserves water-soluble acid analytes
- Can handle 20% of moisture v/v at 5 lpm of sample gas flow
- Suitable for ambient temperatures up to 50°C
- Eliminates the need for a high-temperature heated sample line and condensing cooler
- Alarm for low temp, pressure, power failure
- Suited for both high and low levels of SO₂ and NO_x
- Achieves low sample dew points < 4°C
- Easy installation and low maintenance



Principal 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 can be controlled at 80°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 Perma Pure PD series dryer is used to dry the incoming atmospheric air that is used to purge itself and the sample gas dryer thereby avoiding the requirement for instrument air.

Readi-GASS™ Solves Common CEMS Challenges

- Unique Nafion™-based technology eliminates condensed water issues
- 0.1 um FF-250 coalescing particulate filter eliminates acid mist and particulate matter issues
- Dual filtration scheme protects the system from occasional failure of the heated line and heated probe
- Unique Nafion™ dryers retains SO₂/NO_x to overcome soluble gas loss in the condensed water
- In-situ installation overcomes the challenges associated with long heated lines

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	NEMA 4, 4X / C UL & UL Listed / File #E65324 and IP65 Rated
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	60-100 psig / 6.75 scfm, 4-7 bar / 190 slpm
Drain / Exhaust Requirement	.25 scfm / 7 slpm Air with Entrained Acidic Mist

Environmental

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

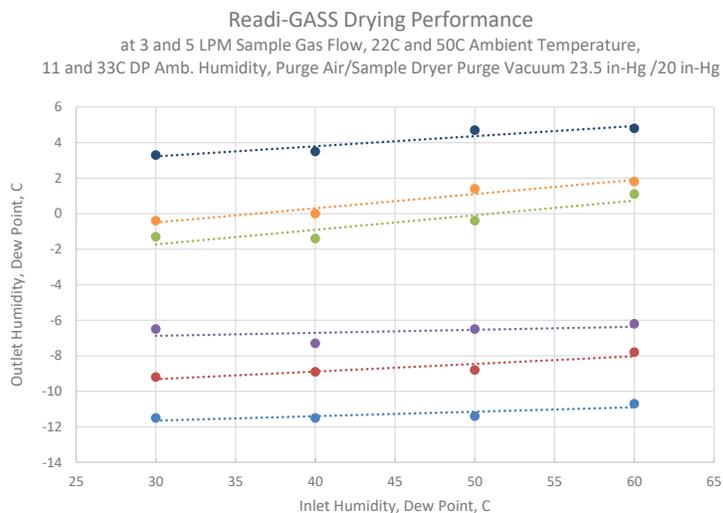
Control and Electrical

Temperature Control	PID Type with Low Temperature Alarm
Heater Type	(1) Cartridge Style, 1/8" x 1.25", 35 Watts each (2) Silicone Pad Style, 40 Watts each
System Electrical Power	220 VAC, 1 A, 50/60 Hz, Screw Terminal Connection
Alarm Output	SPDT Relay, 3 A, 250 VAC (De-Energized in Alarm State) Signals Low Compressed Air Pressure and Low Temperature Screw Terminal Connection

Materials

System Enclosure	Fiberglass Reinforced Polyester
Insulation	Rubber Foam
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



Flow, @ Amb. Temp., Amb. Humidity

- 5 LPM @ 50C, 33C DP
- 3 LPM @ 50C, 33C DP
- 5 LPM @ 50C, 11C DP
- 3 LPM @ 50C, 11C DP
- 5 LPM @ 22C, 11C DP
- 3 LPM @ 22C, 11C DP

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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