

GAS ANALYSIS SAMPLING SYSTEMS

GASS™ SERIES



IMPROVE
RELIABILITY
OF ANALYSIS

PROTECT
ANALYTICAL
EQUIPMENT

REDUCE
MAINTENANCE
COSTS



PERMA PURE

GAS SAMPLE CONDITIONING

A CRUCIAL STEP
IN GAS ANALYSIS

Perma Pure's unique sample conditioning technology delivers drier, cleaner gas samples for the most accurate analyses.

Our Gas Analysis Sampling Systems also help protect expensive, sensitive analyzers by removing corrosive contaminants and particulates.

Innovative probes, lines, filters, scrubbers, dryers, and controls work together in one complete package.

If an existing model isn't exactly what you need, let us design one, customized for you...



THE WORLD
LEADER IN GAS
CONDITIONING

PERMA PURE

SINCE 1972

"My problems with gas analysis start before I even have a gas sample to analyze."

SAMPLE CONDITIONING & DELIVERY PROBLEMS FREQUENTLY INCLUDE:

- **Cold spots and condensation in long, heated lines**
- **Lines and equipment fouled by water and particulates**
- **Water-soluble analytes lost**
- **Analyzers corroded by acid mist**
- **Time-consuming, costly calibration**
- **High maintenance costs**

"What I need is an effective sampling system, so I know for sure."

When it comes to process and continuous emissions monitoring (CEMS), you need the proven reliability of Perma Pure® gas sample conditioning.

Effective water removal is the most difficult part of sample conditioning. Perma Pure's Nafion® dryers allow unparalleled removal of sample moisture without affecting the sample gases, while our filter and scrubber technology removes particulates and other contaminants that can harm expensive analytical equipment.

Perma Pure has been a world leader in gas sample conditioning since 1972. Our expertise and unique technology can solve your gas conditioning problems.

GASS™ SYSTEM COMPONENTS

Hot, Wet, Dirty Gas Inlet ▶

COLLECTION & TRANSPORT

PROBES
HEATED LINES
BLOWBACK SYSTEMS

Our customized extractive systems ensure quality sample removal.

FILTRATION

PARTICULATE FILTERS
COALESCING FILTERS
INERTIAL BYPASS FILTERS
AUTOMATIC DRAINS

These filters remove particulates and liquid contaminants including acid mists.

SPECIALTY SCRUBBERS

AMMONIA SCRUBBERS
VOC SCRUBBERS

Highly selective scrubbers remove unwanted and troublesome gases.

DRYERS

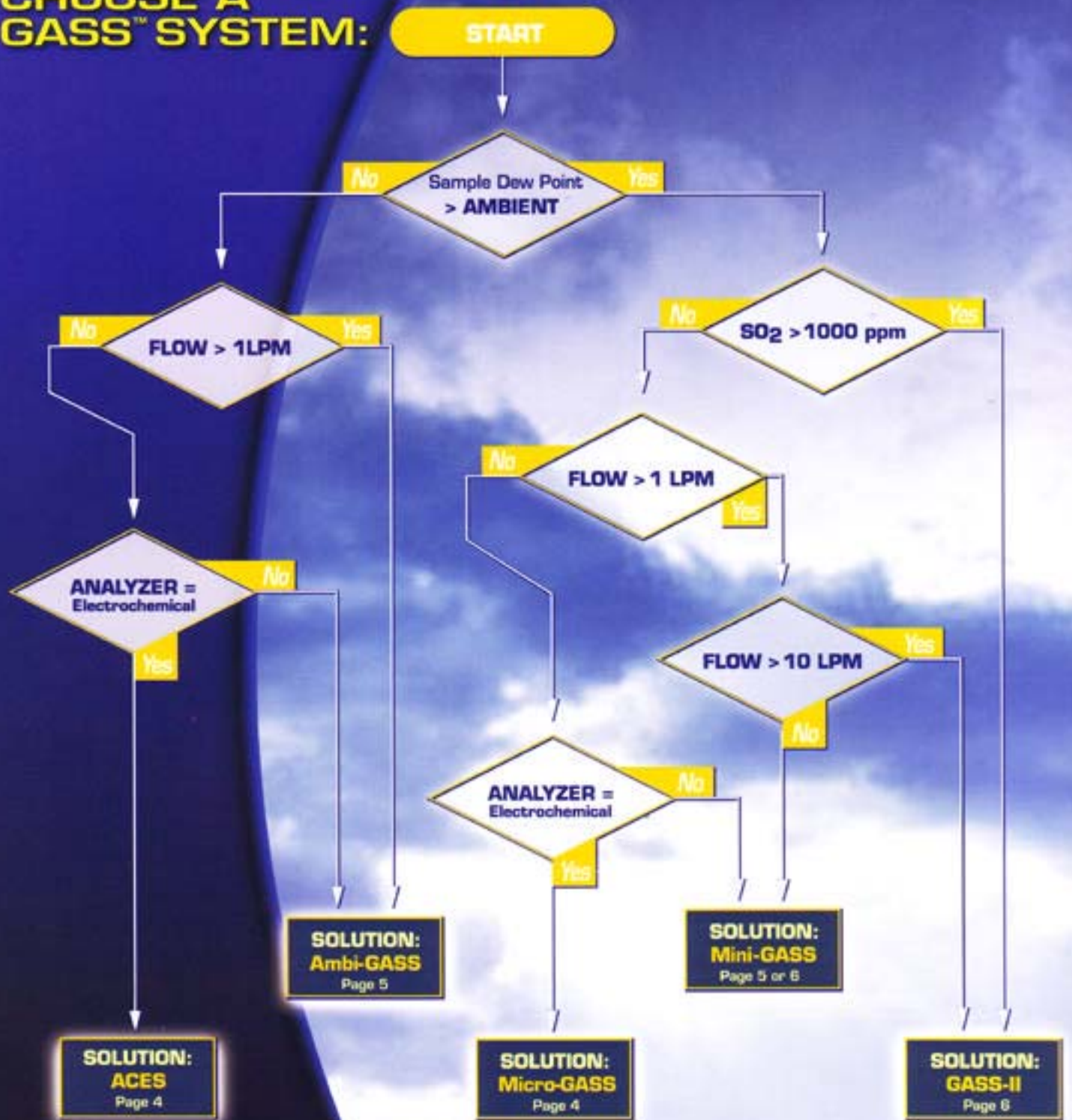
NAFION MEMBRANE DRYERS

Unique, patented, low-maintenance, corrosion-resistant water-removal technology.

▶ Cool, Dry, Clean Gas for Analysis



CHOOSE A GASS™ SYSTEM:



Use this flow chart to select the right system for your application or contact our experts to develop a customized solution.



AMBIENT SAMPLING FOR ELECTROCHEMICAL SENSORS

- Ambient sampling up to 99% R.H.
- Yields 30-70% R.H. samples
- Accepts flow rates up to 1 LPM
- Built-in pump draws sample to ECS
- 0.1 micron disposable filter

ACES™ systems prepare gas samples for analysis by electrochemical sensors (ECS) when the samples are too humid for analysis but are not condensing at ambient temperature.

ECS analyzers tolerate corrosive samples but suffer reliability problems when samples are too wet. ACES systems reduce sample humidity to the ideal range for ECS (typically 30%-70% R.H.), while also removing any particles present.

Nafion membrane dryers in ACES units provide full corrosion resistance and very high sample selectivity, so water-soluble gases are not lost from complex samples.

ACES enclosures are fully sealed and corrosion-resistant (NEMA-4X) so they can be mounted in harsh environments. ECS analyzers may be mounted on (and sometimes in) the ACES enclosure, and the built-in pump draws samples to the ECS from a remote location.

Typical applications include ambient monitoring of humid environments such as those found in water treatment plants, at landfills, or in tunnels.

For more information, request ACES brochure #115.



HEATED SAMPLING FOR ELECTROCHEMICAL SENSORS

- Conditions hot, very wet samples
- Yields 30%-70% R.H. samples
- Accepts flow rates up to 1 LPM
- Built-in pump draws sample to ECS
- 0.1 micron disposable filter

Micro-GASS™ systems prepare gas samples for analysis by electrochemical sensors (ECS) when the samples are hot and too humid for analysis, typically condensing at ambient temperature.

ECS analyzers tolerate corrosive samples but suffer reliability problems when samples are too wet. Micro-GASS systems reduce sample humidity to the ideal range for ECS (typically 30%-70% R.H.), while also removing any particles present.

Nafion dryers in Micro-GASS units provide full corrosion resistance and very high sample selectivity, so water-soluble gases are not lost from complex, very wet samples.

Micro-GASS enclosures are fully sealed and corrosion-resistant (NEMA-4X) so they can be mounted in harsh environments. ECS analyzers may be mounted on (and sometimes in) the Micro-GASS enclosure, and the built-in pump draws samples to the ECS from a remote location.

Typical applications include monitoring of boiler or burner efficiency, or of wet scrubber exhaust from semiconductor production.

For more information, request Micro-GASS brochure #113.

Ambi-GASS™



AMBIENT GAS SAMPLE CONDITIONING

- Ambient sampling up to 99% R.H.
- Yields sample dew points as low as -25°C
- Accepts flow rates up to 25 LPM
- 0.1 micron coalescing/particulate filter

Ambi-GASS™ systems prepare non-condensing, ambient-temperature gas samples for analysis.

Even when the water content of gases is not condensing, water can interfere with analyses or contribute to corrosion and maintenance problems. Ambi-GASS systems typically provide dew points from -15 to -25°C.

Nafion dryers in Ambi-GASS units provide full corrosion resistance and very high sample selectivity, so water-soluble gases are not lost from complex samples.

Ambi-GASS enclosures are fully sealed and corrosion-resistant (NEMA-4X) so they can be mounted in harsh environments. They require no electrical power and are intrinsically safe in hazardous areas.

Typical applications include ambient monitoring of humid environments such as those found at water treatment plants, at landfills, or in tunnels.

For more information, request Ambi-GASS brochure #116.

Mini-GASS™



HEATED GAS SAMPLE CONDITIONING SYSTEM

- Conditions hot, dirty, very wet samples
- Yields sample dew points as low as -25°C
- Accepts flow rates up to 10 LPM
- 0.1 micron coalescing/particulate filter

Mini-GASS™ systems prepare hot gas sample streams for high performance gas analysis. Our most popular systems, Mini-GASS units remove particles, acid mists, and water vapor from a gas stream without the loss of analytes.

Many gas analyzers suffer performance degradation and maintenance problems due to clogging and corrosion when water or water vapor reaches the equipment. Mini-GASS systems remove water to well below the condensation point, typically providing dew points as low as -25°C.

Mini-GASS units offer several options and configurations, including mounting directly on the stack so very little heated line is used. For explosive environments, a Class I, Division II version is available. An automatic drain installed on the filter will remove acid mists. A sample pump can be incorporated to make a completely self-contained system.

Mini-GASS systems are ideal for process and continuous emissions monitoring (CEMS) applications. They are designed to process highly corrosive and difficult samples including gas streams containing high levels of HCl, HF, NOx or SOx.

For more information, request Mini-GASS brochure #112.

Mini-GASS™ Probe



GAS ANALYSIS SAMPLING SYSTEM WITH INTEGRAL PROBE

- Conditions hot, dirty, very wet samples
- Yields sample dew points as low as -25°C
- Accepts flow rates up to 10 LPM
- Total extraction/conditioning system
- Custom features available

Mini-GASS Probe systems eliminate heated lines entirely by mounting the conditioning system directly on a stack probe. The sample is dried and cooled immediately after removal from the stack to minimize changes in sample composition. This system eliminates the expense of installation, operation, and maintenance of heated lines, while faster sample equilibration reduces calibration times, saving on the expense of calibration gases.

A series of filters conditions the gas stream before the sample is dried in the Perma Pure Nafion membrane dryer. The Mini-GASS Probe removes particles, acid mists, and water vapor without analyte loss due to the selectivity of the dryer.

The Mini-GASS Probe incorporates all the features of the Mini-GASS system and can be configured with the same options. The Mini-GASS Probe also offers an optional heated blowback assembly for its filter to minimize maintenance with high particle levels, and Hastelloy® probe components for additional corrosion resistance and temperature tolerance.

For more information, request Mini-GASS PROBE brochure #114.

GASS™-II



GAS ANALYSIS SAMPLING SYSTEM

- Designed for the most demanding applications
- Conditions hot, dirty, very wet samples
- Yields sample dew points as low as -25°C
- Accepts flow rates up to 25 LPM
- Suitable for high acid concentrations

GASS-II systems meet the demands of high-flowing samples or those with high acid mist levels, applications where sample drying presents the greatest challenges. GASS-II systems employ fully corrosion-resistant Nafion membrane dryers to selectively remove water directly from the vapor phase, preserving water-soluble gases for analysis.

GASS-II units use three temperature-controlled zones to condition the sample. In the first zone, GASS-II units slightly reduce the sample temperature, then filter out particles and remove acid mists. The sample is dried in the second zone, and cooled and dried further in the third zone. The result is a very low dew point and low acid content so acid mists do not form downstream. The sample can then pass through unheated lines without condensing.

GASS-II systems can be configured with many options for complete sample conditioning. High-particle applications benefit from optional bypass filters. Ammonia and VOC scrubbers are available, as are dual dryers to handle flows up to 25 LPM. The heatless dryer option eliminates the need for a separate source of instrument air. The system is completely environmentally sealed, and steam-heated or purged versions are available for explosive environments.

For more information, request GASS-II brochure #111.

GAS ANALYSIS SAMPLING SYSTEMS

GASS™ SERIES



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PERMA PURE

Brochure #110