



Protective Vents

FOR SOLAR ENERGY SYSTEMS

*Improve your
product performance,
profitability and value*





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LEAD THE RAPIDLY CHANGING INDUSTRY WITH GORE AS YOUR TRUSTED PARTNER

The solar industry is changing rapidly as new technologies are developed and efficiency improves. As the technology becomes more sophisticated, the electronics become more complex. Yet your customers expect systems that last more than two decades. Understanding the challenges of these complex systems and how they are changing is the only way to ensure success. We are here to collaborate with you to engineer a venting solution that will improve the reliability of your solar energy system.

Reduce Costs

Designing a more ruggedized housing is often considered the solution for ensuring durable protection from liquids, contaminants and condensation; however, ruggedized designs increase manufacturing costs and do not address the root cause of pressure differentials — issues that increase maintenance and repair costs.

Meet Long - Life Expectancy

Installing a solar energy system requires a substantial capital investment, so your customers expect the equipment to operate reliably for as long as 20 years or more, regardless of the environment in which it is used. These systems must be protected from harsh conditions that can compromise solar cells, increase warranty claims and lead to customer dissatisfaction.

Maintain High Efficiency

Minimizing lens deflection and maintaining a clear lens are key to high efficiency. Today's technology employs smaller housings with more electronics, which in turn increases the internal temperature. Pressure differentials between warm internal temperatures and changing conditions outside can lead to water ingress, which reduces efficiency by depositing contaminants on the lens.

Improve Integration and Automation

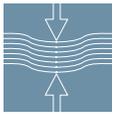
The rapid changes in technology translate to the need for flexibility and quick prototyping in system design, component integration, performance testing and equipment production. Easy installation with automated technology is essential for the fast turn-around required for success.

Gore offers a variety of designs, sizes and product forms that are easy to integrate into your solar enclosures.



DON'T LET CONTAMINATION, WATER INGRESS OR CONDENSATION COST YOU MONEY OR CUSTOMERS

REALIZE THE BENEFITS OF GORE® PROTECTIVE VENTS IN YOUR SOLAR COMPONENTS



EQUALIZE PRESSURE

GORE® Protective Vents reduce strain on seals of an IP65 (or higher) enclosure by equalizing pressure and allowing air to flow continuously through the membrane.



INTEGRATE EASILY

Available in a variety of designs and sizes, GORE® Protective Vents are engineered with a screw-in, snap-fit, or welded membrane construction that integrates easily into any housing design.



PREVENT CONTAMINATION

GORE® Protective Vents increase reliability of sensitive electronics by providing a durable barrier against contaminants such as liquid, insects, salt, sand and even dust.



EXTEND LIFETIME

GORE® Protective Vents extend product lifetime by relieving pressure and reducing condensation without requiring stronger seals, additional bolts or other ruggedized solutions.



REDUCE CONDENSATION

GORE® Protective Vents minimize condensation by allowing water vapor to diffuse through the microporous membrane — improving power output and reducing damage to internal components.



MEET INDUSTRY STANDARDS

With sophisticated laboratories throughout the world, Gore tests its venting products to meet the most rugged protocols and standards of UL, TÜV and IEC for enclosure protection.

VENTING SOLUTIONS FOR A VARIETY OF SOLAR APPLICATIONS



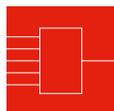
JUNCTION BOX

Water can cause corrosion and shorts to the electronics in junction boxes. By equalizing pressure inside the box, GORE® Protective Vents prevent stress on the housing seals, so water cannot enter.



CPV MODULES

The large dimensions of the CPV modules make them susceptible to pressure differentials caused by temperature changes. Installing GORE® Protective Vents in the housing equalizes pressure and increases efficiency.



STRING COMBINER BOX

Regardless of the size and volume of the string combiner box, Gore can customize a venting solution to ensure the reliability of the seals and gaskets, protecting the connectors from shorts caused by water.



TRACKING EQUIPMENT

Exposure to water and other contaminants can compromise the mechanical components of the tracking system. GORE® Protective Vents provide a barrier against liquid and other contaminants that can lead to corrosion.



MICRO / STRING INVERTER

Corrosion can quickly damage the sensitive electronics inside the micro/string inverter. GORE® Protective Vents prevent degradation by providing a durable barrier against water, oils and other liquids.



MONITORING EQUIPMENT

Condensation can compromise the performance of control components. By allowing moisture vapor to diffuse easily, GORE® Protective Vents reduce the potential for condensation inside the enclosures.



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THE CHALLENGES: INTERNAL PRESSURE BUILDUP, CONTAMINATION, WATER INGRESS AND CONDENSATION IN SOLAR ENERGY SYSTEMS

GORE® PROTECTIVE VENTS EQUALIZE PRESSURE

As the sun rises, solar cells begin generating energy, which increases their internal temperature. When external temperatures change quickly, pressure differentials can occur, sometimes as much as 200 mbar (3 psi). These pressure changes put extreme stress on the housing seals, eventually causing them to fail and allowing moisture and other contaminants to enter.

GORE® Protective Vents equalize pressure by allowing air to pass through the membrane.

GORE® PROTECTIVE VENTS PREVENT CONTAMINATION

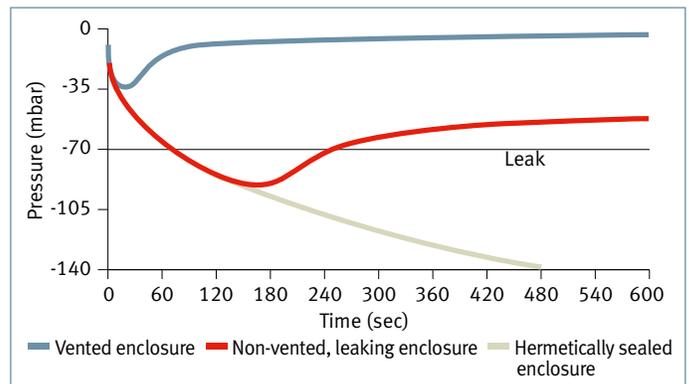
Traditionally, engineers have protected against contamination by enclosing electronics in ruggedized housings. To equalize pressure they have used tortuous paths and open holes; however, these options cannot be used with solar equipment, because the wind-driven rain, dirt and other particulates can easily enter through these openings.

GORE® Protective Vents provide a durable barrier against liquid, dust, dirt and other contaminants.

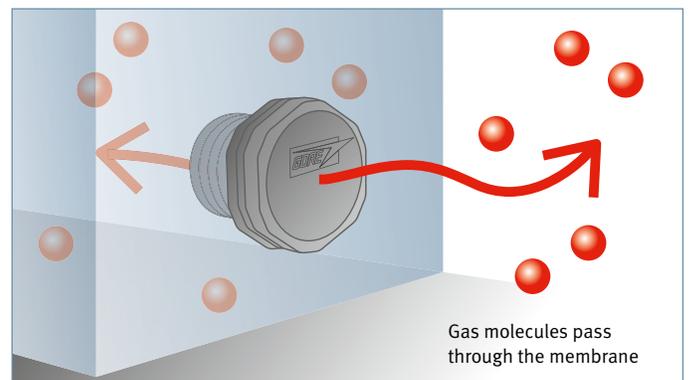
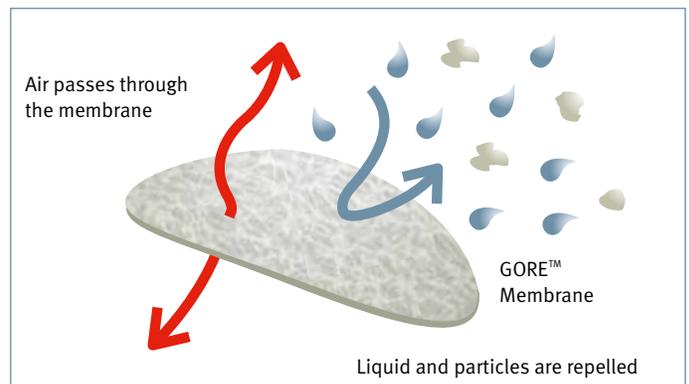
GORE® PROTECTIVE VENTS REDUCE CONDENSATION

GORE® Protective Vents prevent water ingress but allow moisture vapor to diffuse through the microporous membrane thus reducing condensation from forming on the inside of an enclosure. Third-party research has shown that condensation is more damaging than rain because it remains on the surface. Condensation leads to corrosion that degrades the lens, solar cells and housing.

GORE® Protective Vents reduce condensation because water vapor molecules can pass through the membrane.



In non-vented housings, 70 mbar (1 psi) of pressure causes seals to leak after repeated temperature cycles. Vented housings equalize pressure and prevent seals from leaking.





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TRUST THE EXPERTS AT GORE TO ENGINEER THE OPTIMAL VENTING SOLUTION FOR YOUR SOLAR APPLICATION

With proven expertise in the solar industry for more than ten years, Gore has set new standards for reliable and high-performance products. You can consider our applications engineers to be an extension of your design team from initial product concept through integration into the manufacturing process.

With the protective barrier of the GORE® Snap-in Vent, Delta Energy Systems reduced the potential of corrosion caused by liquid ingress.



GORE RESPONDS TO THE DEMANDS OF THE SOLAR INDUSTRY BY OFFERING:

- Tailored venting solutions that increase your product reliability, durability and profitability
- Global R&D and engineering teams who work with you throughout the product life-cycle
- Rigorous performance testing that improves product reliability
- Rapid sampling to shorten the product design process
- Production flexibility with multiple installation options
- Venting products that integrate easily into any enclosure

We offer you more than a venting product — we deliver a full-service solution.



Installing the GORE® XL Vent in its large CPV modules enabled Valldoreix to equalize pressure and increase efficiency.

Gore's welded VE0001SLR vents installed in Tyco Electronics junction box block water ingress that can cause corrosion and shorts.



Mencke & Tegtmeier GmbH ensured the reliability of its irradiance sensors by installing the GORE® Screw-in Vent to reduce potential condensation inside the enclosure.



Enecsys Europe GmbH selected the GORE® Snap-in Vent to reduce corrosion in its micro inverters by providing a barrier against moisture.



To maximize reliable tracking system performance, Zimm Solar GmbH installed the high-airflow GORE® Snap-in Vent to protect the mechanical components against contaminants and corrosion.

ABOUT W. L. GORE & ASSOCIATES, INC.

Gore is a technology-driven company focused on discovery and product innovation. Well known for waterproof, breathable GORE-TEX® fabric, the company's portfolio includes everything from high-performance fabrics and implantable medical devices to industrial manufacturing components and aerospace electronics. Gore products have remained at the forefront of creative solutions because they are engineered specifically for challenging applications requiring durable performance where other products fail.

For almost thirty years, Gore has delivered venting solutions for a variety of applications installed in rugged environments throughout the world — applications such as solar, lighting, security, telecommunication and other electronic systems; automotive and

heavy-duty vehicles; and chemical and agricultural packaging. Engineered with the latest materials and technology, Gore's vents are backed by years of research and testing to help extend product life and enhance reliable performance — all to ensure that these venting products can meet the challenging environments and application demands of today's technology.

Headquartered in the United States, Gore employs approximately 10,000 associates in 30 countries worldwide. In Europe, Gore started its first business operations only a few years after the Enterprise's founding in 1958.

Learn more at gore.com.



**PLEASE CONTACT GORE TO
LEARN ABOUT THE RIGHT
GORE® PROTECTIVE VENT
FOR YOUR UNIQUE
APPLICATION**

INTERNATIONAL CONTACTS

| | | | |
|-----------|-----------------|----------------|-----------------|
| Australia | 61.2.9473.6800 | Mexico | 52.81.8288.1281 |
| Benelux | 49.89.4612.2211 | Scandinavia | 46.31.706.7800 |
| China | 86.21.5172.8299 | Singapore | 65.6733.2882 |
| France | 33.1.5695.6565 | South Africa | 27.11.894.2248 |
| Germany | 49.89.4612.2211 | South America | 55.11.5502.7800 |
| India | 91.22.6768.7000 | Spain | 34.93.480.6900 |
| Italy | 39.045.6209.240 | Taiwan | 886.2.2173.7799 |
| Japan | 81.3.6746.2572 | United Kingdom | 44.1506.460123 |
| Korea | 82.2.393.3411 | USA | 1.410.392.4440 |

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W. L. GORE & ASSOCIATES, INC.

401 Airport Road • Elkton, MD 21921 USA
Phone: 1.410.392.4440 • Toll free: 1.800.637.4449
Fax: 1.410.506.8749 • Email: protectivevents@wlgore.com

gore.com/protectivevents

