



Purge &
Pressurization
Systems – Simple
solutions to
complex problems

Simplifying
Complexity.

Delivering
Safety.



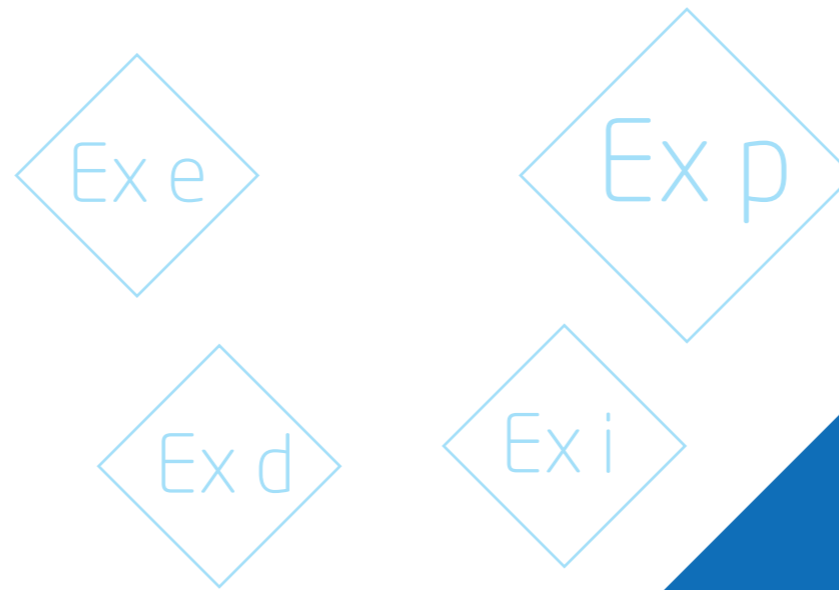
With more than 60 years' experience and deep knowledge of hazardous area standards, Expo Technologies develops and delivers simple, robust, certified solutions that improve safety and save our customers time and cost.

We work with electrical panel builders and OEMs across a wide range of industries, including oil & gas, chemical & petrochemical, pharmaceutical & biotechnology, and power generation, solving hazardous area problems by developing innovative solutions using purge and pressurization.

Our Minipurge and SmartPurge platforms are renowned for their simple installation & operation, reliability, and long life, and provide flexible platforms for challenging applications such as flammable gas analysers and robot arms.

Our purge and pressurization systems are certified and approved to national and international standards (ATEX, CCC, cFMus, cULus, EAC, IECEx, KOSHA, INMETRO, PESO) and protect more than 17,000 electrical systems and enclosures installed worldwide. Through its continued involvement with international standards committees, Expo is committed to remaining at the forefront of this important industry.

We have manufacturing centres in the UK, USA & China, and offer sales and service support through a global network of authorised channel partners.



Expo Technologies Vision

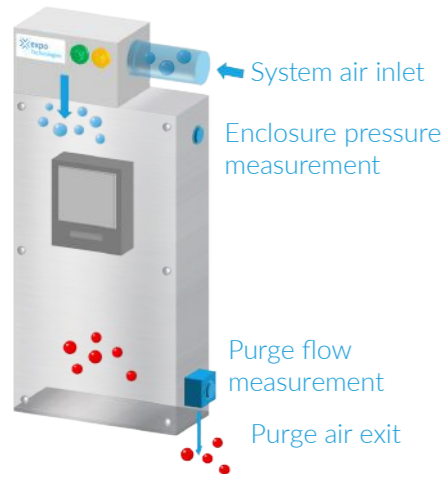
Creating a safer world through elegant design that systematically reduces complexity and risk.

Expo Technologies Mission

Our mission is to provide world-class, engineered solutions that deliver our clients' capabilities into hazardous and extreme environments. To continuously drive excellence through the development of our people and enhance our trusted position by projecting our expertise into new markets.



Electrical equipment protection in hazardous areas



Purge: The purge system supplies clean, dry instrument air to the enclosure at a high flow rate for a pre-set time, expelling any potentially flammable atmosphere remaining inside. Enclosure pressure and purge flow are monitored. The enclosure contents are not energised.



Pressurization: After purge is complete, the system supplies sufficient air to maintain a constant pressure inside the enclosure, compensating for any small leaks, preventing ingress of the outside atmosphere. Enclosure pressure is monitored. The enclosure contents can be energised.

| Containment | Prevention | Exclusion |
|--|--|--|
| Any flame or explosion is contained within the equipment and cannot ignite an explosive atmosphere outside | Elimination of sparks, limitation of electrical energy | Any potentially explosive atmosphere is prevented from coming into contact with the electrical equipment |
| Flameproof/ Explosion-proof Ex d | Increased safety Ex e Intrinsic safety Ex i | Encapsulation Ex m Pressurization Ex p |

Hazardous locations provide some of the greatest challenges to facility and electrical equipment safety. Fortunately, there are many protection concepts that can be utilized when placing electrical equipment into hazardous locations. Some of the most widely used are Explosion-Proof or Intrinsically Safe concepts which focus on containment or prevention of ignition.

However, one of the easiest to understand and use is Purge and Pressurization (Ex p) – a simple protection concept that excludes any hazardous material from the equipment installation.

Ex p offers many advantages over other protection concepts - since general-purpose electrical equipment and enclosures can be used, it makes system design, assembly, and commissioning simpler. Safety is greatly enhanced, as Ex p is an active protection method – if there is a loss of enclosure pressure an alarm or shutdown will result. This is typically not the case with other protection methods. Certification is generally faster and lower cost than other methods.



Expo's purge & pressurization systems protect thousands of electrical systems worldwide



More than 17,000 electrical systems protected by Expo purge systems



Protect very large enclosures up to 5.4 m³ under IECEx 60079-2; up to 240 cu.ft. under NFPA496.



Certified under 9 national and international schemes

Expo Technologies is a world leader in purge and pressurization systems for electrical equipment. We are a trusted partner to many leading OEMs and integrators.



Expo's purge and pressurization systems have the widest range of certification



Purge & Pressurization Systems Range

Expo offers a comprehensive range of purge and pressurization systems that allow your electrical equipment to be used in most hazardous areas, with virtually no limitations on the type of equipment that can be protected.

| | Flammable Gas or Vapour | | Ignitable Dust | | Environmental |
|---|--------------------------------------|-------------------------|--------------------------------------|---------------------------|---------------------------------|
| Hazardous area classification | Zone 1 Class I Div 1 | Zone 2 Class I Div 2 | Zone 21 Class II Div 1 | Zone 22 Class II Div 2 | Standard Industrial Environment |
| Expo purge & pressurization system type | MiniPurge Type-X MiniPurge Type-Y | MiniPurge Type-Z | DustPurge Type-X DustPurge Type-Y | DustPurge Type-Z | Pressurization only MiniEPS |
| | SmartPurge II - Gas | | SmartPurge II - Dust | | |

Flammable gas or vapour hazards

Our purge and pressurization systems can operate in two modes:

Leakage Compensation (LC) – the most commonly used mode, this method purges the enclosure with high flow for a preset time, then reduces the flow to a level sufficient to maintain overpressure, compensating for any enclosure leakage.

Continuous Flow (CF) – Once the purge is completed, the high purge flow rate is maintained into the enclosure. This is typically used when the enclosure contains a source of flammable gas, such as a gas analyser, and dilution is required as part of compliance with the certification requirements.

Dust hazards

Dust systems are required to operate in a pressurization-only mode to avoid any remaining dust mixing with the air.

Environmental Pressurization Systems

Some non-hazardous environments can still be harmful to electrical equipment if dirt, dust, or corrosive gases build up inside the enclosure. Pressurization systems are used to prevent ingress into the enclosure.

Environmental Purge System



| | |
|---------------------------------|---|
| Mini Environmental Purge System | Uncertified – for protection of electrical enclosures in unclassified areas |
| Operating modes | Pressurization only |
| Enclosure volume | Up to 7.0 m ³ (240 ft ³) |
| Temperature range | -20°C to +60°C (-4°F to 140°F) |
| Signal outputs | Low-pressure alarm |
| Air inlet | Instrument quality air, 2-7 barg |

MiniPurge



| | |
|--------------------|---|
| MiniPurge Type X | Gas: Zone 1 (Ex px) and/or Class I Division 1 Dust: Zone 21 (Ex px) and/or Class II Division 1 |
| MiniPurge Type Y | Gas: Zone 1 (Ex py) and/or Class I Division 1 Dust: Zone 21 (Ex py) and/or Class II Division 1 |
| MiniPurge Type Z | Gas: Zone 2 (Ex pz) and/or Class I Division 2 Dust: Zone 22 (Ex pz) and/or Class II Division 2 |
| Certifications | IECEX, ATEX, INMETRO, KOSHA, EAC, FM, cULus |
| Operating modes | Leakage compensation (LC) or Continuous Flow (CF) |
| Purge flow rate | Up to 900NI/min (32 ft ³ /min) depending on model |
| Enclosure volume | LC: Up to 5.4m ³ (240 ft ³) CF: Up to 1.35m ³ (60 ft ³) |
| Temperature range | -20°C to +55°C (-4°F to 131°F) |
| Purge timer | Type X – auto. 1-99 minutes Type Y & Z – manual timing |
| Signal outputs | Type X – Power interlock, low-pressure alarm Type Y & Z – low-pressure alarm |
| Connection options | Ex e junction box, IS outputs, pneumatic outputs for connection to MiniPurge Interface Unit |
| Air inlet | Instrument quality air, 4-8 barg |

SmartPurge



| | |
|-------------------|---|
| SmartPurge | Gas: Zone 1/2 (Ex px, Ex py, Ex pz) Dust: Zone 21 / 22 |
| Certifications | IECEX, ATEX, KOSHA, FM |
| Operating modes | Leakage compensation (LC) or Continuous Flow (CF) |
| Purge flow rate | Up to 540 NI/min (19 ft ³ /min) |
| Enclosure volume | LC: Up to 3.2m ³ (144 ft ³) CF: Up to 3.2m ³ (144 ft ³) |
| Temperature range | -20°C to +60°C (-4°F to 140°F) |
| Purge timer | Automatic 1-99 minutes |
| Signal outputs | Configurable alarms. Power control up to 6A 250VAC. |
| Air inlet | Instrument quality air, 2-7 barg |

Innovation case study

Custom MiniPurge for solar cell processing



Application

Expo's client is a world-leading manufacturer of wet processing equipment for silicon semiconductors and photovoltaic cells. Wet processing typically involves immersing the silicon wafers in liquid chemicals – acids, bases, or solvents – to etch or clean their surface.

Expo's brief was to develop a special purge system for a photovoltaic cell wet process tool using a flammable solvent, with two separate purging functions during the operating cycle.

Challenges

Space limitations - the process equipment had limited space available inside for the purge system, so a compact solution was a basic requirement.

Environment - the wet process used a proprietary blend of solvents that was both corrosive & flammable.

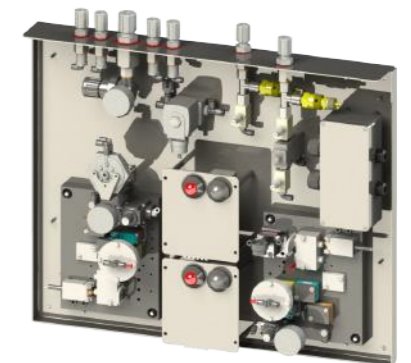
Control - the purge system was required to interface with the process tool software for activation and operating mode selection.

Solution & Outcome

A highly custom, twin parallel MiniPurge system on a special chassis, tailor-made to fit the available space. Teflon process connections to reduce the risk of corrosion in the event of any back-migration of solvent vapour.

Purge system interlocks to the process tool control system for purge mode selection and stop/start.

Purge flow measurement close to the process chambers using special Teflon orifice devices feeding back to the MiniPurge



Application

The use of robotics in industry is widespread, with new applications emerging continuously. If the robotic arm system is to be located in a hazardous area, then a certified solution is required to ensure safe operation. Due to operational requirements and constraints, many of the possible Ex protection concepts are not suitable. Ex p (Purge & Pressurization) provides a flexible and cost-effective solution.

Challenges

The customer required Ex p solutions to be developed to deal with a range of robot sizes and to avoid major design changes. The additional challenge of purging a remotely located system meant that the Purge system would require a return air line and local “enclosure”. The Expo system would then effectively purging two enclosures in series, firstly the robotic arm and then the local “enclosure” where pressure and flow would be monitored to ensure code compliance.

Solution & Outcome

Although there were physical variations between the robotic arms, a single solution was proposed that would be able to deal with multiple pressure set points and purge flow rates. Expo selected the SmartPurge system due to its wide range of certification and flexibility in flow rates.

This allowed one system to suit the full range of customer robot model sizes. The SmartPurge already had a successful track record in similar OEM applications, including flue gas analysers and offshore wireless systems.

The use of Ex p meant that only small changes were required to the standard IP 65 robot arm design. Standard stepper motors and controls could continue to be used, significantly reducing the costs of arm manufacturing. The final system was able to gain ATEX and IECEx certification.

Expo has also carried out similar projects, adapting the MiniPurge platform to deal with the specific flow rate requirements of this type of application.



Innovation case study

Customised SmartPurge for industrial robotics





Expo operates in more than 50 countries worldwide. To find out more about how Expo can help you solve your hazardous area problems, get in touch via our website www.expoworldwide.com or through your local channel partner.

Alternatively, speak to an applications engineer at one of our manufacturing centres.

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