

# D818/ET MiniPurge<sup>®</sup>

## Manual

ML 511

**Important Note:**

**It is essential for safety that the installer and user of the Expo system follow these instructions.**

Please refer to the standard for principles and definition.

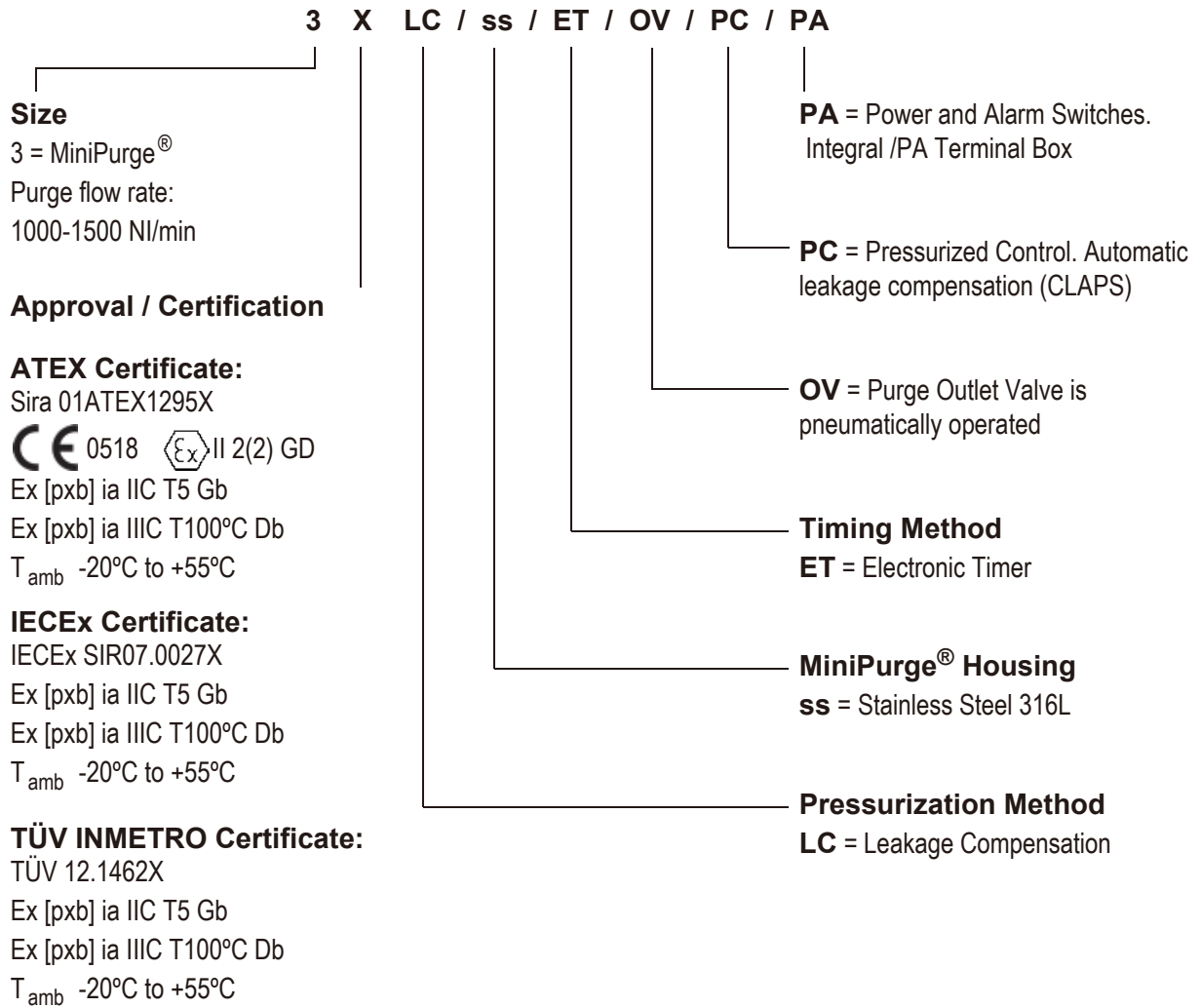
These instructions apply only to the pressurizing system. It is the responsibility of the manufacturer of the pressurized enclosure to provide instructions for the enclosure.

Expo Technologies reserves the right to replace any component, with one of the equivalent functionality.



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## Section 1: System Specification



## MiniPurge® Control Unit Data

Action on Pressure Failure:	Alarm and Trip (isolate power to pressurized enclosure), user adjustable Alarm Only.
Type of Operation:	Automatic leakage compensation using the Closed Loop Automatic Pressurization System (CLAPS System).
Leakage Compensation Capacity:	500NI/min @ 4barg inlet pressure
Leakage Compensation over capacity:	+40%(minimum) of the normal enclosure leakage
Enclosure Material:	Stainless Steel 316L.
Mounting Method	Wall mounting straps. Fixing holes as per drawing.
Temperature Limits:	-20°C to +55°C
Compressed Air Supply:	Clean, dry, oil free air or inert gas. Refer to <i>Air Supply Quality</i> section in <i>Installation of the System</i> .
Supply Pressure:	4 to 8 barg (60 to 120 psi).
Main Regulator:	Set at 4 barg, 40 µm automatic drain supply inlet filter.
Logic Regulator and Gauge:	Fitted and set to 2.3 barg (33 psi).
Process Connections:	Purge supply and outlet to pressurized enclosure 1/2" NPT female. Minimum supply line 13 mm (1/2") ID tube, inlet sized appropriately for flow rate. Reference points & signals 1/8" NPT female, minimum 6 mm pipe to be used.
Visual Indicators:	Alarm (Red ●) / Pressurized (Green ●). System Purging: 4 LEDs that flash sequentially to indicate elapsed time (black when not purging).
/PA Terminal Box:	Stainless Steel, Ex e IIC T5 Gb / Ex tb IIIC T 100°C Db IP66 Tamb : -20°C to +55°C with terminals, front access cover & lower removable gland plate. Stainless Steel, Ex e IIC T4 Gb Tamb : -20°C to +60°C with terminals, front access cover & lower removable gland plate.
Power Interlock Switch:	DPNO switch, contact ratings 250 Vac 4 Amps (AC-15) / 24VDC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.
Alarm Switch:	SPCO switch, contact ratings 250 Vac 4 Amps (AC-15) / 24VDC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.
Minimum Pressure Sensor:	Minimum: 0.5 mbarg. Maximum: 5.0 mbarg. Default Setting: 1.5 mbarg. Tolerance -0, +0.7 mbarg.
Purge Flow Sensor:	Set at 6.4 mbarg (Tolerance: -0, +10%).
CLAPS Sensor:	Minimum: 5.0 mbarg. Maximum: 15 mbarg. Default Setting: 10 mbarg. Tolerance: -0, +10%
<b>Note: there must be a 2.5 mbarg difference between the intermediate and CLAPS sensor calibration point. For example: Minimum pressure = 5 mbarg, intermediate pressure = 6.5 mbarg, CLAPS sensor = 9 mbarg.</b>	
Purge Time:	User selectable, in 1 minute intervals, up to 99 minutes (tolerance -0, +3 seconds).

Default Setting 99 minutes.

Weight: 16 kg (35lb).

### **Relief Valve Unit and Purge Outlet Valve with integral spark arrestor**

Type: RRLV52/ss/FS, Design number D779RLV.  
Bore: PPurge Outlet Valve Ø 52 mm, Relief Valve Ø 52 mm.  
Relief Valve Lift-Off Pressure: Minimum: 20 mbarg.  
Maximum: 50 mbarg.  
Default: 30 mbarg (+0, -20%).  
Flow Rate: Range: 1000 or 1500 NI/min.  
Default: 1500 NI/min.  
Material: Housing: Stainless steel 316L.  
Gasket: Silicone.  
Spark arrestor: Stainless steel mesh.  
Mounting Method: Rectangular cut-out and fixing holes as per drawing.  
Weight: 4 kg (8.8 lb).

## Section 2: Quick User Guide

### Installation



The MiniPurge<sup>®</sup> system must be installed by a competent engineer, in accordance with relevant standards, such as IEC / EN 60079-14 and any local codes or practice.

- Mount the purge system in accordance with the hook-up drawing.
- Ensure the system is installed according to the full instructions in the “*Installation of the System*” section of this manual.
- All pipings must be clean and free of dirt, condensation and debris prior to connection to the purge system or pressurized enclosure.
- It is strongly recommended that a local isolation valve is installed on the air supply upstream of the purge system.

**Note: Most faults are due to restricted air supply, inadequate supply pipe work or drop in air supply pressure during the purge process.**



### Operation of the System

Once the system is installed correctly, turn on the air supply. Refer to *Commissioning* section.



Indicator	Colour	Status
Alarm / Pressurized	Red 	Low pressure alarm (enclosure pressure too low)
Purging	Black 	Purge flow too low or not in purge mode

The purge system commences the purge cycle:


- The purge air will enter the enclosure.
- The pressurized enclosure will obtain a positive pressure.
- The Purge Outlet Valve will open within the Relief Valve Unit.
- The air will then exit the Relief Valve Unit housing via the spark arrestor.

Indicator	Colour	Status
Alarm / Pressurized	Green 	Pressurized (minimum enclosure pressure achieved)
Purging	Black 	Purge flow too low

Open the Purge Flow Restrictor Valve until the air flow reaches the required rate; the system will initiate the timed purge cycle. Start a stopwatch when the purging indicator flashes yellow

Indicator	Colour	Status
Alarm / Pressurized	Green 	Pressurized
Purging	Sequential flashing Yellow 	Purge flow rate above minimum

On completion of an uninterrupted purge cycle of the required length, the system will indicate purge complete. Stop the stopwatch when the purging indicator stops flashing.

Indicator	Colour	Status
Alarm / Pressurized	Green 	Pressurized and in leakage compensation mode

Indicator	Colour	Status
Purging	Black ●	No longer in purge mode

Check stopwatch timing to verify that the actual purge time is equal to or greater than the required purge time.

**Note: The recorded purge time must never be less than the required purge time.**

The system is now operating correctly in leakage compensation mode.

If the system has not performed as expected, check the installation thoroughly and ensure it has been carried out according to the instructions.

If an obvious problem has not been highlighted and corrected, follow the procedures in the *Fault Finding* section.

If all checks have been carried out and the system still does not perform as expected, contact your local distributor or Expo Technologies.

### Section 3: Application Suitability

MiniPurge® systems are certified for use in hazardous locations, where the hazardous location is non-mining (above ground) and the hazard is caused by flammable gasses, vapours or dust. Depending on the model the systems may be used in IECEx and ATEX Zone 1(21) and/or Zone 2(22) - Categories 2 and 3 respectively.

MiniPurge® systems may be used for hazards of any gas group. Apparatus associated with the MiniPurge® system, such as intrinsically safe signalling circuits and flameproof enclosures containing switching devices may be limited in their gas group. The certification documentation supplied with any such devices must be checked to ensure their suitability.

This system is primarily designed for use with compressed air. Where other inert compressed gasses are used (Nitrogen, for example) the user must take suitable precautions so that the build up of the inert gas does not present a hazard to health. Consult the Control of Substances Hazardous to Health (COSHH) data sheet for the gas used. Where a risk of asphyxiation exists, a warning label must be fitted to the pressurized enclosure.

The following materials are used in the construction of MiniPurge® systems. If substances that will adversely affect any of these materials are present in the surrounding environment, please consult Expo Technologies for further guidance.

Materials of Construction		
Stainless Steel	Aluminium	Acrylic
Mild (Carbon) Steel	Nylon	Silicone
Brass	Polyurethane	Neoprene
ABS	Polycarbonate	Polyester (glass filled)



## Section 4: Description and Principle of Operation

The MiniPurge<sup>®</sup> system is pneumatic in operation, with electrical interfaces.

Purge and pressurization is a method of protection used in Zone 1 (21) and/or Zone 2 (22) hazardous locations to ensure that the interior of an enclosure is free of flammable gas. Addition of a MiniPurge<sup>®</sup> system allows the electrical equipment within the enclosure to be used safely in a hazardous location.

The principle of purge and pressurization is as follows:

- Clean compressed air or inert gas is drawn from a non-hazardous location.
- The interior of the pressurized enclosure is flushed to remove any hazardous gas or dust.
- This is introduced into the pressurized enclosure to keep the internal pressure at least 0.5 mbarg above the external pressure.
- Whilst pressurized, flammable gas cannot enter the enclosure from the environment.

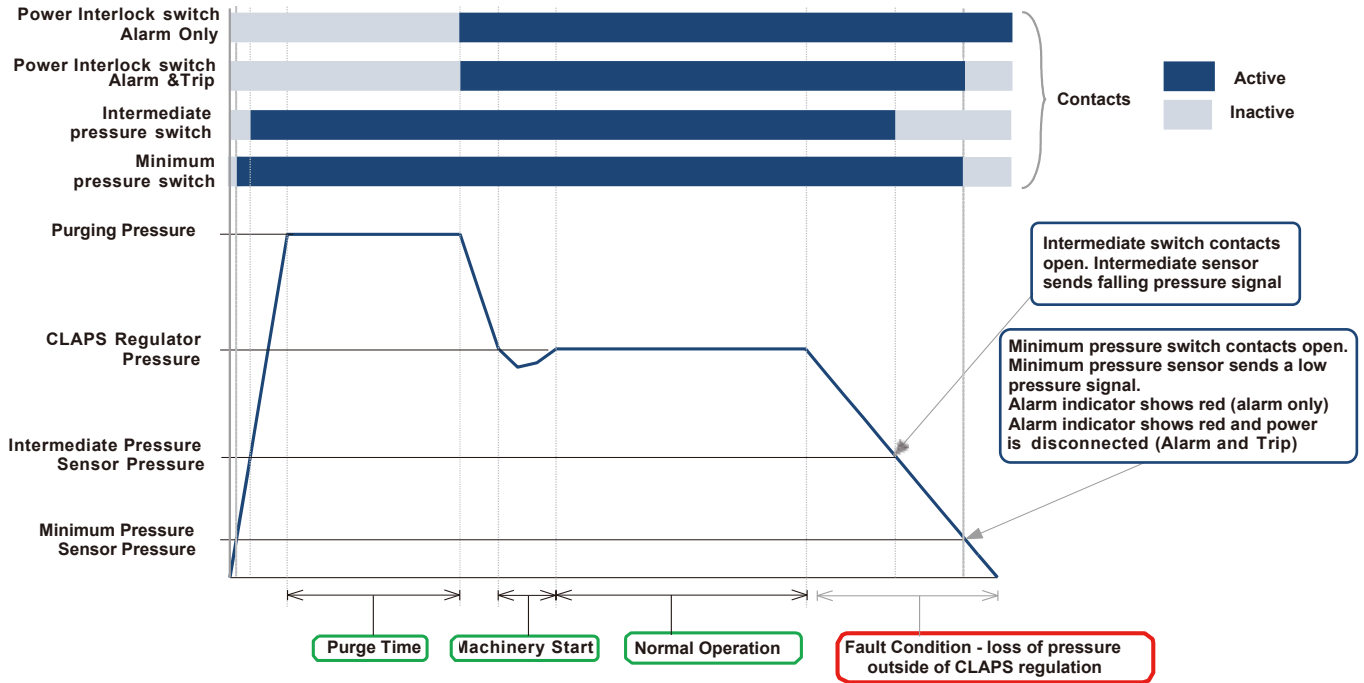
Prior to switching on the power to the electrical equipment, the enclosure must be purged to remove any flammable gas that might have entered the enclosure before pressurization. Purging is the process of removal contaminated air and replacement with air (or inert gas) known to be free from flammable gas. The duration of this purge process is normally ascertained by performing a purge test.

At the end of the purge cycle the system automatically switches to leakage compensation mode. The Purge Outlet Valve is closed and the airflow is reduced but remains high enough to compensate for the leakage of air from the enclosure whilst maintaining the minimum over pressure state.

In the event of pressure failure within the pressurized enclosure the system will raise an alarm in the form of visual indicators and a volt free contact depending on the specification of the system. The default action on loss of pressurization is alarm and automatic disconnect of power (A&T - Alarm and Trip). This can be changed by the customer to Alarm Only (IAO), please refer to section titled *Main Components*.

The MiniPurge<sup>®</sup> system incorporates a Closed Loop Automatic Pressurization System (CLAPS). This allows the system to detect a rise or fall of the enclosure's internal pressure and adjust the leakage compensation rate accordingly. Pressure variations are more likely during sudden start up of large rotating electrical machines but can also be caused by changes in running temperature. This system has been specifically designed to maintain a stable internal pressure within the enclosure.

Pressure characteristics during purge and pressurization of a pressurised enclosure using a MiniPurge<sup>®</sup> system that incorporates a CLAPS system:



## Section 5: Main Components


### Air Supply Filter / Regulator

The unit is provided with a 40 μm liquid / dust filter element as a precaution. The user of the MiniPurge® system must ensure that air supply is to the quality stated in *Air Supply Quality* paragraph found in the *Installation of the System* section. The regulator is factory set to 4 barg (60 psig) and regulates the pressure of an air supply between 4 and 8 barg (60 to 120 psig). A pressure gauge is fitted down stream of the filter; this should indicate no less than 4 barg (60 psig). During the purge cycle a pressure drop will be indicated on the gauge.

### Logic Air Supply Regulator

This device provides the system with a stable air supply pressure to the logic system and allows consistent operation. The pressure level is factory set to 2.3 barg (33 psig) and can be verified by means of the integral pressure gauge.

### Minimum Pressure Sensor

This monitors the pressure inside the pressurized enclosure. When the pressure is below the minimum required for safe operation, the pressure sensor causes the system to reset and the Alarm / Pressurized indicator turns **Red** . The sensor is factory calibrated and set to operate in falling pressure at or above the minimum specified pressure.

### Purge Flow Sensor

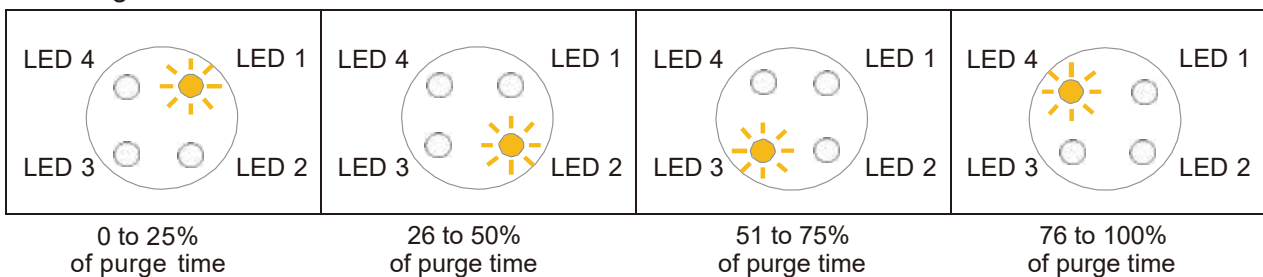
The Purge Flow Sensor monitors flow through the Purge Outlet Valve. At correct purge flow rates, above the minimum specified for purging, the sensor sends a signal that activates the purge timer. This sensor is factory calibrated to operate on falling flow rate at or above the minimum specified purge flow rate.

### Electronic Purge Timer

When both the enclosure pressure and the purge flow rate are correct, the Purge Flow Sensor activates the timer and the electronic timer starts. The timing period is selected using switches mounted on the timer module.

**Note: Setting the timer to 00 minutes will cause infinite purging; the cycle will never complete.**

During timing, the percentage of the purge cycle is indicated by four LEDs which flashes sequentially while the timer is running.



The Electronic Timer contains an intrinsically safe battery pack that needs regular replacement. See *Commissioning* section.

### Purge Complete Valve

This valve receives a signal from the purge timer that indicates the completion of the purge cycle and verifies that the pressurization signal is still present. If both conditions are satisfied a signal is sent to indicate that the purge is complete. This performs two functions: to turn on the electrical supply to the pressurized enclosure and to reduce the high purge flow rate to leakage compensation mode. It also provides a hold-on signal that maintains the leakage compensation mode with the power switch on, even when the purge timer has reset ready for the next purge cycle.

## OR Gate

This device provides the Purge Complete Valve with the hold-on function referred to previously. When either the timed-out signal or the purge complete signal is present it allows the pilot signal to be sent to the purge complete valve.

## Alarm Only Circuit (/AO)

If the pressure in the pressurized enclosure is too low the system will normally cut off electrical power to it. In certain circumstances, where local codes of practice allow, the system can be altered to provide a hold-on circuit that will maintain the electrical power supply to the pressurized enclosure while also providing a pressure failure alarm. The user must respond to the alarm and either restore the pressure to the pressurized enclosure or otherwise make the installation safe; for example, cut off the electrical supply. The decision to use the Alarm Only facility, and the allowable length of time for non-pressurized operation, is the responsibility of the user.

**Warning: It is potentially dangerous to energise the pressurized enclosure in a non-pressurized condition when it is known that there is potentially explosive gas or dust in the hazardous location.**

## Visual Indicators



Visual indicators are fitted to provide status information to the operator.

### Alarm / Pressurized Indicator

Green* 	Pressurized
Red 	Pressure Alarm (enclosure pressure low)

### System Purging Indicator

Black* 	Purge flow too low (not in purge mode)
Yellow (flashing) 	Purging (flow above minimum)

\* The Green  / Black  combination indicates normal operation of the pressurized enclosure after the initial purging cycle has been completed.

## Power Interlock Switch

This flameproof power switch is activated by the signal from the Purge Complete Valve. This activation can be used to turn on the electrical supply to the pressurized enclosure. The cable from the switch is terminated in the /PA terminal box.

## Alarm / Pressurized Switch

This flameproof switch is operated by the pressurized signal. It allows a remote electrical system status indicator to show either pressurized or a pressure failure alarm. The cable from the switch is terminated in the /PA terminal box.

## System Purging Switch (Optional)

This switch is operated by the purge flow signal that allows a remote electrical system status indicator to signal that the system is purging; sometimes referred to as purge in progress. The cable from the switch is terminated in the /PA terminal box.

## Purge Valve

This changeover valve selects between purge air flow or leakage compensation. It is sized to allow sufficient air into the enclosure during purging based on: the specified air supply pressure range, the minimum specified purging outlet flow rate +10% and the expected leakage rate from the pressurized enclosure. At the end of the

purge cycle, the purge valve closes in response to the “Purge Complete” signal; it remains in the closed position until the next purge cycle is initiated.

### **Purge Flow Restrictor**

This valve restricts the purge flow to the minimum required flow rate. The Purge Flow Restrictor must be readjusted during commissioning.

### **CLAPS Sensor**

This sensor monitors the pressure within the pressurized enclosure and sends a control signal to the CLAPS Regulator. The normal running pressure must be determined prior to system start-up so that the CLAPS Sensor may be set to the level required to control the CLAPS Regulator.

### **CLAPS Regulator**

This is the regulator that controls the leakage compensation air flow into the enclosure after the purging is complete. It either increases or decreases the air flow into the enclosure as appropriate to maintain a stable running pressure. The CLAPS Regulator must be set at the time of commissioning.

### **Relief Valve Unit**

The Relief Valve Unit allows the purge air to exit the enclosure safely via a built-in spark arrestor. This spark arrestor is designed to prevent the emission of arcs, sparks and incandescent particles produced within the pressurized enclosure.

Purge air passes through the Relief Valve Unit; the preset pressure differential across the appropriate orifice ensures that the purge flow sensor is activated once the selected purge flow has been attained.

During the purge cycle a pneumatic cylinder operates the Purge Outlet Valve that lets the air from inside the enclosure exhaust through the Relief Valve Unit. When the system changes to leakage compensation mode, the Purge Outlet Valve is closed and the enclosure sealed.

The Relief Valve Unit has an in-built relief valve. This is sized to ensure that, if the air supply pressure rises up from the specified maximum, the internal enclosure pressure will not exceed the specified maximum working pressure of the pressurized enclosure.

### **/PA Terminal Box**

The Terminal Box is increased safety (Ex e) certified and incorporates the terminal connection points for the alarm and interlock switches. All contacts provided are volt free (dry).

Cable entry methods (for example conduit or cable glands) must be certified to IECEx, ATEX or INMETRO standards. The main requirement is that IP66 (or better) ingress protection must be provided by use of seals or washers.

## Section 6: Installation of the System

The MiniPurge<sup>®</sup> is designed for use under normal industrial conditions of ambient temperature, humidity and vibration. Please consult Expo before installing this equipment in conditions that may cause stresses beyond normal industrial conditions. The MiniPurge<sup>®</sup> system must be installed by a competent person in accordance with relevant standards, such as IEC / EN 60079-14, and any local codes of practice.

The MiniPurge<sup>®</sup> control unit should be installed either directly on, or close to the pressurized enclosure. It should be installed such that the system indicators and certification labels are in view.

All parts of the system carry a common serial number. If installing more than one system, ensure that this commonality is maintained within each system installed.

### Relief Valve Unit

To achieve effective purging, the points where air enters and exits the pressurized enclosure should normally be at opposite ends of the enclosure. The RLV unit must be mounted vertically and there should be a minimum clearance of 300 mm (12") around the spark arrestor (purge outlet).

It is important that the interior and exterior of the spark arrestor is kept clean and debris is not allowed to accumulate; this might affect the calibration of the device. In particular the exterior of the spark arrestor should not be painted or blocked in any way.

### Air Supply Quality

The MiniPurge<sup>®</sup> system should be connected to a protective gas supply, which is suitable for purging and pressurization.

The supply pipe connection to the MiniPurge<sup>®</sup> must be appropriate for the maximum input flow rate for the application.

The air supply must be regulated at a pressure less than the maximum stated inlet pressure.

The air supply must be: clean, non-flammable and from a non-hazardous location. The air should be of Instrument Air Quality. Although the purge control system will operate with lower air quality, its operational life will be adversely affected. The equipment that is being protected by the MiniPurge<sup>®</sup> may also suffer because of poor air quality.

With reference to BS ISO 8573-1: 2010, Instrument Air is typically specified as:

#### *Particle Class 1*

In each cubic metre of compressed air, the particulate count should not exceed 20,000 particles in the 0.1 to 0.5 micron size range, 400 particles in the 0.5 to 1 micron size range and 10 particles in the 1 to 5 micron size range.

#### *Humidity or pressure dew point*

The dew point, at line pressure, shall be at least 10 °C below the minimum local recorded ambient temperature at the plant site. In no case, should the dew point at line pressure exceed +3 °C.

#### *Oil Class 2*

In each cubic metre of compressed air, not more than 0.1mg of oil is allowed. This is a total level for liquid oil, oil aerosol and oil vapour.

When an inert gas is being used to supply the purge system, risk of asphyxiation exists. Refer to Application Suitability section.

Before connection of the air supply to the purge system, the supply pipe work should be flushed through with instrument quality air to remove any debris that may remain in the pipes. This must be carried out for at least 10 seconds for every meter of supply pipe.

Unless a supply shut-off valve has been fitted to the MiniPurge<sup>®</sup> system, an external shut-off valve with the same, or larger, thread size as the Control Unit inlet fitting should be fitted by the installer to prevent any restriction of purge flow.

The purge air from the MiniPurge<sup>®</sup> Control Unit should be piped within the pressurized enclosure to ensure purging of potential dead air spots.

The purge system is fitted with an internal regulator factory set to 3 bar feeding the logic.

## Pipe Work

If the MiniPurge<sup>®</sup> is not connected directly to the pressurized enclosure, pipe work and fittings used to connect the Control Unit to the pressurized enclosure should be either metallic or appropriate to the environment into which the system is installed. No valve may be fitted in any signal pipe connecting the Control Unit to the pressurized enclosure. This pipe work must be fitted in accordance with local codes of practice where relevant.

## Multiple Enclosures

This system is suitable for the purge and pressurization of the primary pressurized enclosure and its associated terminal boxes.

## Provision and Installation of Alarm Devices

When the pressure inside the pressurized enclosure is above the minimum, the Minimum Pressure Sensor returns a positive (**pressurized**) signal causing the alarm indicator on the control unit to change from **red** to **green**.

When the pressure falls below the minimum permissible the positive (**pressurized**) signal is removed. This absence of signal indicates a **low pressure alarm** condition and causes the alarm indicator on the control unit to go from **green** to **red**.

There are volt free (dry) contacts available within the terminal box for remote usage.

The user must make use of this alarm facility in accordance with the local code of practice for Action on Pressure or Flow Failure. Most codes include the following recommendations:

- **Zone 1 Installations:** Alarm and Automatic Trip of Power.
- **Zone 2 Installations:** Alarm Only on pressure or flow failure with power being removed manually.

## Power Supplies and their Isolation

All power entering the pressurized enclosure should have a means of isolation. This requirement also applies to any external power sources that are connected to the equipment such as volt-free (dry) contacts within the pressurized enclosure. This is commonly achieved using the Power Interlock Switch.

## Power Interlock Switch

This switch is a Double Pole Normally Open, double-break switch: it provides two independent contacts that should be connected in series and used to isolate the power. This can be achieved using switchgear or other suitable switching device. These contacts are terminated and accessible to the user in the Ex e terminal box.

It is the responsibility of the user to ensure that the switch is only operated within appropriate technical limits.

The switch must be replaced after any short circuit that occurs within the main circuit; the switch is a piece of encapsulated equipment and as such it is not possible to check the state of the contacts. Technical modifications to the switch are not permitted.

Prior to commissioning, check that the Ex e terminal box is clean, the connections have been made properly, the cables laid correctly and all screws in the terminals are secure.



In all cases the application and isolation of power must be controlled by the MiniPurge<sup>®</sup> system using the power interlock signal.

No switches are permitted between the power switch and the MiniPurge<sup>®</sup> system other than an authorized manual override circuit.

The safe use of this switch is the responsibility of the user, all electrical installations must conform to local codes of practice.

### **Exception**

Power to apparatus that is already suitable for use in hazardous locations need not be isolated by the MiniPurge<sup>®</sup> system.



## Section 7: Commissioning

### Commissioning the System

*Note: The steps 11 and 15 to 21 represent detailed commissioning tests*

The following equipment is needed for this process:

- Continuity meter
- Gauge manometer (0 to 200 mbarg)
- Differential manometer

If, after commissioning, the system does not perform as expected, refer to the *Fault Finding* Section.

Follow the steps as outlined:

1. Check all connections and that the Relief Valve Unit is fitted correctly with an unobstructed path to the purge exhaust.
2. Close the Purge Flow Restrictor Valve.
3. Fully open external supply shut-off valve where fitted.
4. Check that the internal logic pressure gauge reads 2.3 barg / 33 psi / 230 kPag.
5. Check that the pressure gauge on main air supply reads 4 barg / 60 psi / 400 kPag.
6. Check that the Pressure Relief Valve is correctly set by disconnecting the minimum pressure sensing pipe at the bulkhead fitting on the input to the MiniPurge<sup>®</sup>. This will disable all of the pressure sensors.
  - Using a 4 mm nylon tube, connect a manometer to the bulkhead fitting from which the minimum pressure sensing pipe was removed.
  - Open the Purge Flow Restrictor Valve very slowly, until the Pressure Relief Valve opens
  - Check the opening pressure is within calibration limits.
  - This test can be carried out several times to ensure repeatability and compliance.Refer to the *Maintenance of the System* section if the Relief Valve needs recalibrating.
7. Close the Purge Flow Restrictor Valve.
8. Remove the manometer and reconnect the minimum pressure sensing pipe to the bulkhead fitting.
9. Remove red plug from the top of the Minimum Pressure Sensor and connect a gauge manometer.
10. Connect a differential manometer to the test points on the flow sensor.
11. *To check sensor calibration*
  - *The internal pressure in the pressurized enclosure must be below Relief Valve lift off pressure and above the CLAPS pressure*
  - *At this time the pressurized indicator should be **green**.*
  - *gradually open Purge Flow Restrictor Valve until purging indicator **flashes yellow**.*

**Note: For large volumes it may take a long time for the purge flow to start.**

  - *very slowly close Purge Flow Restrictor Valve until the purging indicator stops **flashing yellow**.*
  - *Take a reading from pressure gauge.*
12. To set the purge flow rate:
  - Turn on the compressed air to the MiniPurge<sup>®</sup>.
  - Gradually open the Purge Flow Restrictor Valve until the **black / yellow** indicator changes to **yellow (flashing)**.
  - The flashing yellow indicator confirms the correct flow rate.
  - The differential pressure should be greater than 6.4 mbarg.

- The relief valve is supplied with different orifice plates for the specified flow rate. This orifice plate is held in position by two M3 screws and can easily be changed by removing the large cover plate from over the outlet valve assembly and screws.

**Warning: When opening the Purge Flow Restrictor Valve, ensure the over pressure within the pressurized enclosure does not exceed the pressure relief valve setting.**

13. The purge timer will start as soon as the Purging Indicator **flashes yellow**. Check that the time delay between the indicator turning to **yellow (flashing)** and returning to **black** is not less than the minimum time required for complete purging of the pressurized enclosure. Times in excess of minimum are permitted.
14. After the purge has been completed, the Purge Valve will close and the air flow into the pressurized enclosure will be controlled by the CLAPS Regulator. The initial setting may be too high or too low.
15. *Gradually turn the CLAPS Regulator anti-clockwise to reduce enclosure pressure.*
16. *Reduce regulator until intermediate sensor causes contacts to open.*
17. *Check the manometer on the minimum pressure sensor.*
18. *Continue to reduce the CLAPS Regulator to test the minimum pressure sensor.*
19. *To check operation of Minimum Pressure Sensor, check readings on manometer as system will automatically re-purge when it reaches minimum pressure.*
20. *While the system re-purges, return the CLAPS Regulator to the initial setting.*
21. *If minimum pressure is below the set point, refer to the Recalibration section*
22. If the setting is too high, continual rising and falling of the enclosure pressure will be seen as the CLAPS Regulator automatically shuts off and reinstates the flow. The CLAPS Regulator should be adjusted to reduce the flow into the pressurized enclosure by turning the adjuster screw anti-clockwise.
23. If the initial setting is too low the CLAPS Regulator may not provide enough air flow causing a gradual decline in enclosure pressure. To increase the flow into the pressurized enclosure, adjust the CLAPS Regulator Relief Valve unit by turning the adjuster screw clockwise.
24. To test the CLAPS settings, create a leak in the system by removing a bolt or loosening a gland plate in order to create a 15mm hole. Remember to replace bolt or retighten gland plate after testing.
25. The setting of the CLAPS Sensor is factory calibrated to the normal working pressure expected in the pressurized enclosure, typically 10 mbarg. The pressure in the pressurized enclosure should be stabilized as close as possible to this figure. This can be checked by a manometer attached to the minimum pressure sensor.
26. Remove the air supply to the system, remove all test equipment and replace all plugs.

## Normal Operation

For normal operation of the system, after commissioning has been carried out it is possible to turn the air supply valve on or off to start or stop the system. After this, the purge and pressurization sequence is automatic.

## Section 8: Maintenance of the System

### General maintenance

The maintenance of the system outlined in this manual should be supplemented with any additional requirements set out in appropriate local codes of practice.

**The following checks should be carried out every 6 – 36 months dependent on environment according to IEC / EN 60079-17**

- Tests outlined in the *Detailed Commissioning* section.
- Ensure that the Relief Valve Unit is free from contamination prior to making any adjustment. To do this:
  - Remove large cover plate using a 8 mm spanner (wrench).
  - Check that the interior and all components are clean and free from contamination.
  - Replace large cover plate.
- Check the condition of the air supply filter element. Clean or replace as necessary.

### Additional maintenance checks

**The following additional checks are recommended at least every 3 years:**

Check that:

- Apparatus is suitable for use in the hazardous location.
- There are no unauthorised modifications.
- The air supply is uncontaminated.
- The interlocks and alarms function correctly.
- Approval labels are legible and undamaged.
- Adequate spares are carried.
- The action on pressure failure is correct.

### Maintenance of Electronic Timer

**This should be carried out every 3 years.**

- The intrinsically safe battery pack associated with the electronic timer should be replaced and the commissioning tests repeated.
- After the timing phase has elapsed, the battery may be hot-swapped in the hazardous location without affecting the operation of the MiniPurge<sup>®</sup> system

### Re-calibration of the Relief Valve Unit

#### Warning

**Incorrect adjustment of the Relief Valve Unit can lead to significant over pressure and result in damage to the enclosure.**

**If maximum pressure setting is reached, stop adjustment and reduce the pressure.**

To perform the following adjustments, an 8 mm spanner (wrench) and a 2.5 mm hex key will be required.

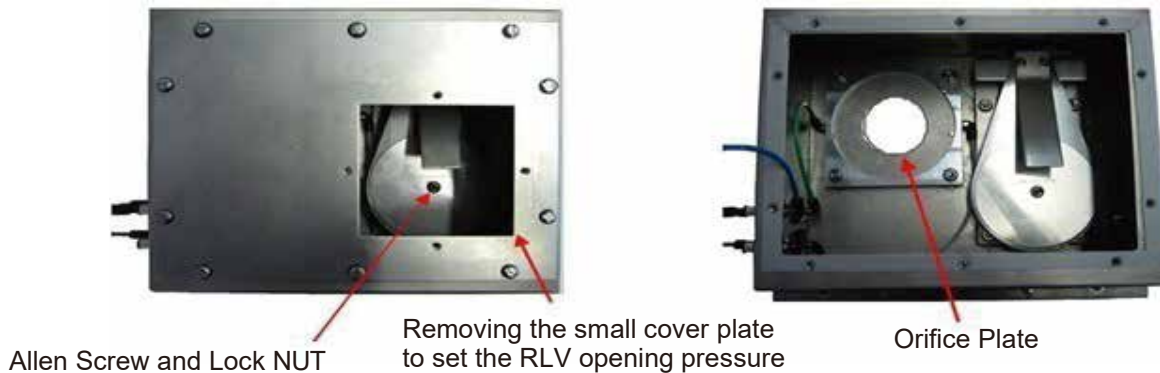
Ensure that the Relief Valve Unit is free from contamination prior to making any adjustment. To do this:

- Remove large cover plate using a 8 mm spanner (wrench).
- Check that the interior and all components are clean and free from contamination.
- Replace large cover plate

To adjust the lift off pressure of the Relief Valve:

- Attach test equipment as described in the *Commissioning* Section.

- Remove small cover plate.
- Whilst holding the central adjustment screw in position using the hex key, loosen the retaining nut.
- Adjust the hex key clockwise to increase, or anti-clockwise to reduce the lift off pressure.
- Before testing, retighten the locking nut whilst holding the adjustment screw in place.
- Carry out the commissioning tests to check the correct setting of the relief valve after adjustment.
- The adjustment is sensitive and it is recommended that a  $\frac{1}{4}$  turn (maximum) adjustments are applied between tests.



### Re-calibration of the Pressure Sensors

The brass nozzle on the sensor is sealed into position using Loctite thread sealant. If the thread has seized up, remove to a safe area and heat slightly to soften prior to making any adjustment. This prevents potential damage to the brass of the nozzle.

- Disconnect pipe work from the sensor, including pipe located below the sensor.
- Remove sensor by unscrewing anti-clockwise.
- The nozzle is located under the sensor.
- The adjustment is sensitive, turn the nozzle in  $\frac{1}{8}$  of a turn steps.
- Turn clockwise to reduce the pressure setting and anti-clockwise to increase.
- Replace sensor, screwing clockwise.
- Reconnect all pipe work.

## Section 9: Fault Finding

### General Information

If you are having problems that cannot be corrected using one of the methods described, please call Expo or your supplier for further assistance. If the system is less than 12 months old, parts under warranty should be returned to Expo for investigation. A full report of the fault and the system serial number should accompany the parts.

It is common for problems with the MiniPurge<sup>®</sup> system to be caused by contamination of the air supply with oil, water or dirt. To prevent these problems, the air supply must contain a dust filter and a water filter. This will ensure that the air is instrument quality and protect both the purge system and the equipment being purged. This filtration system is not provided by Expo and must be sourced separately.

Contamination can enter the system from a number of sources. To prevent this, it is essential that the procedures described in the *Installation* section are carried out prior to first use of the system. These procedures should also be carried out following any disconnection and re-connection of the pipe work. Failure to perform these procedures may cause damage to the system that will not be covered by the warranty.

The system has been designed for ease of fault finding and many of the components fitted are plug-in or chassis mounted. Check components by substitution only after establishing that such action is necessary.

Before carrying out the fault finding procedures, ensure that:

- Both the main air pressure to the system and for Motor Purge Systems, the regulated pressure to the logic manifold are as specified on the settings sheet.
- Air pressure does not drop below the minimum supply pressure during purging; the majority of faults reported are due to insufficient air supply during the purge cycle.

### System purges correctly but trips and auto re-purges at the end of the purge time.

This is a result of the pressure within the pressurized enclosure being below the minimum pressure sensor setting. The pressure can be checked using a manometer. The most common causes of this problem are outlined below.

Fault Location	Cause	Solution
Pressurised Enclosure	There is debris on the face of the Relief Valve disk held in place by the magnet.	<ul style="list-style-type: none"> <li>• Remove debris and ensure RLV disk is clean.</li> </ul>
	Enclosure leaking excessively.	<ul style="list-style-type: none"> <li>• Ensure all doors and covers are closed and that all conduit and cable glands are properly sealed.</li> <li>• Seal any other leaks.</li> </ul>
	Pressure sensing tube damaged.	<ul style="list-style-type: none"> <li>• Replace tubing.</li> </ul>
CLAPS Regulator	The CLAPS Regulator setting is too low.	<ul style="list-style-type: none"> <li>• Increase the setting of the CLAPS regulator to raise the pressure in the pressurised enclosure after purging.</li> <li>• To do this, turn clockwise.</li> </ul>
MiniPurge <sup>®</sup> Control Unit	the Minimum Pressure Sensor setting has drifted above the CLAPS setting	<p>The Minimum Pressure Sensor needs re-calibrating.</p> <ul style="list-style-type: none"> <li>• Refer to <i>Re-calibration of Pressure Sensors</i> in the <i>Maintenance</i> section</li> </ul>

**Relief Valve opens (continuously or intermittently)**

<b>Fault Location</b>	<b>Cause</b>	<b>Solution</b>
Pressurised Enclosure	Enclosure pressure is too high due to CLAPS Regulator being open to far.	Adjust the CLAPS Regulator.
Relief Valve Unit	Debris on the Relief Valve disk allowing air to leak from the valve.	Remove Relief Valve cover and clean the valve disk.

**System enters purging but purge indication does not occur**

<b>Fault Location</b>	<b>Cause</b>	<b>Solution</b>
Air Supply	Insufficient flow rate due to inadequate air supply pressure. Often due to pressure drop in the supply pipe.	Static pressure of 5 barg must be maintained during purge <ul style="list-style-type: none"> <li>• Check air supply pressure at the inlet to the control unit.</li> <li>• Ensure that the supply pipe bore is suitable for the flow rate</li> </ul>
Pressurized Enclosure	Excessive leakage from the pressurized enclosure.	<ul style="list-style-type: none"> <li>• Check around the enclosure while purging is taking place.</li> <li>• Total leakage at purge outlet valve should not exceed 10% of purge flow sensor setting.</li> <li>• Check for leakage down cables and conduit.</li> </ul>
Pipe Work	Tubing from Relief Valve flow sensing point not air tight.	<ul style="list-style-type: none"> <li>• Ensure fitting nuts are tightened.</li> <li>• Check for tube damage.</li> <li>• Repair as necessary.</li> </ul>
Relief Valve Unit	Relief Valve opening during purge	<ul style="list-style-type: none"> <li>• Check enclosure pressure on start up is less than Relief Valve lift off pressure.</li> </ul>
MiniPurge Control Unit	Flow sensor setting incorrect	<ul style="list-style-type: none"> <li>• Check the pressure is correct on the flow sensor.</li> </ul>

**System begins purging but cycles fail to complete**

<b>Fault Location</b>	<b>Cause</b>	<b>Solution</b>
Electronic Timer	Time set to 00	<ul style="list-style-type: none"> <li>• Reset timer to correct purge time.</li> </ul>
	The intrinsically safe battery pack is discharged	<ul style="list-style-type: none"> <li>• Replace as necessary .</li> </ul>

## Section 10: Recommended Spares List

Part Number	Description
S0015/250	Filter kit for main air supply filter/regulator
S0030/606	Purge flow sensor factory set to 6.4 mbarg
S0030/016	Minimum Pressure sensor, must be factory set to the value as stated on the Customer Test and Inspection Sheet
S0030/588	CLAPS Sensor must be factory set to the value as stated on the Customer Test and Inspection Sheet
S0015/018	Pressure gauge (Air Supply Pressure), 0 - 10 barg
S0015/135	Miniature gauge (Logic Pressure), 0-4 barg
ETM-IS31-001	IS battery pack for electronic timer module
AGE-GE00-168	Electronic Timer Assembly c/w potted Timer Switch

## Section 11: Glossary

Acronym	Definition
A&T	Alarm and Trip
AO	Alarm Only
CLAPS	Closed Loop Automatic Pressurization System
CU	Control Unit
ET	Electronic Timer
FCV	Flow Control Valve
IS	Intrinsically Safe
LC	Leakage Compensation
PA	Power and Alarm
RLV	Relief Valve Unit

## Section 12: Drawings and Diagrams

Title	Drawing Number	Number of Sheets
D818 Control Unit	XBR-7TD0-068	2
Typical Claps Hook-up Diagram	SYS-M000-007	1
P and I Diagram	XBR-7TD0-061	1
Circuit Diagram	XBR-7TD0-069	1
Ex e Terminal Box Layout	AGE-WC00-232	1
Manual Override Switch Hook-up	AGE-WC00-117	1
Size 3 MotorPurge Relief Valve	XBR-RTD0-010	1



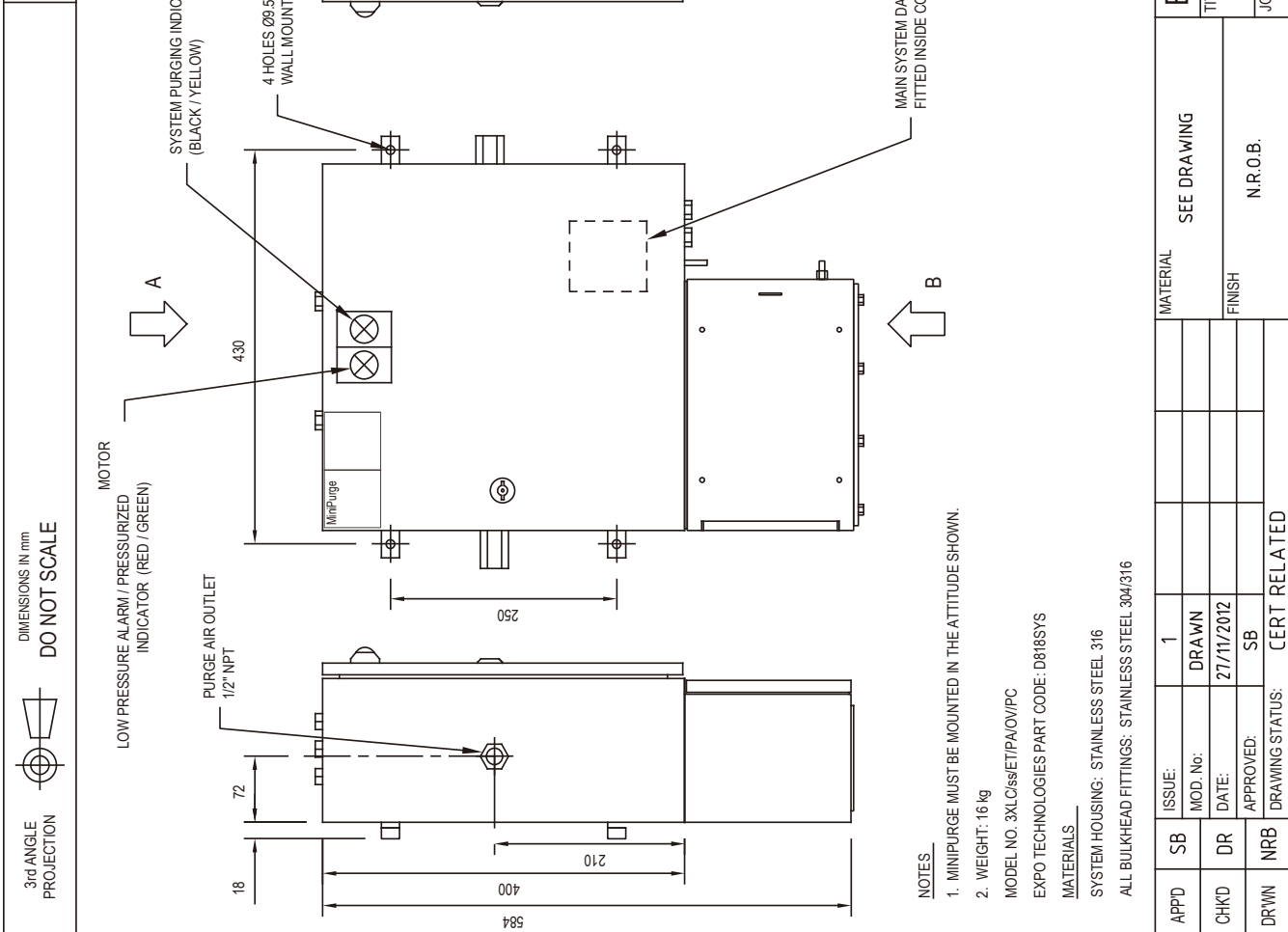
## Section 13: Certifications

Certificates can be found in the accompanying booklet (ML497) or download the certificates at [www.expoworldwide.com/downloads](http://www.expoworldwide.com/downloads).

Component	Certificate	Number
Purge System	ATEX Certificate	SIRA 01ATEX1295X
	IECEX Certificate	IECEX SIR07.0027X
	INMETRO/TÜV Certificate	TÜV 12.1462X
MIU/e Ex e Terminal Box	ATEX Certificate	Sira 99ATEX3173X
	IECEX Certificate	IECEX SIR 06.0087X
Electronic Timer	ATEX Certificate	FM 10 ATEX0003X
	IECEX Certificate	IECEX FME 10.0001X
Electronic Switches	Ex d limit switch	IECEX EPS 14.0092X
	Ex d limit switch	EPS 14 ATEX 1766 X



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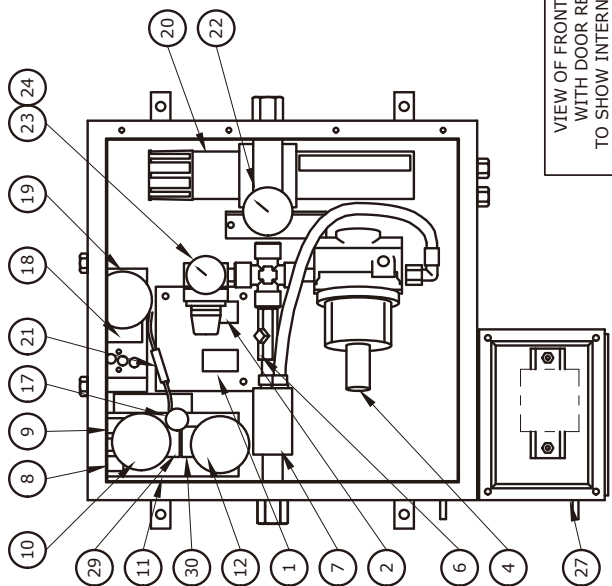
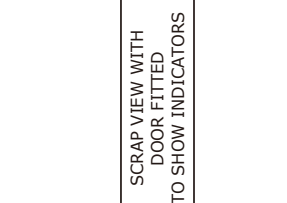
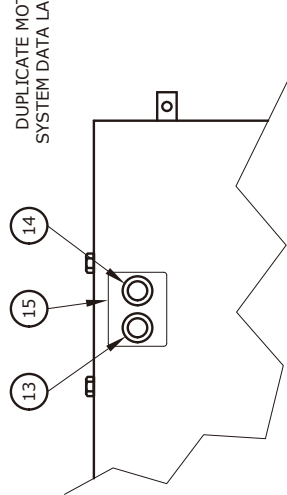
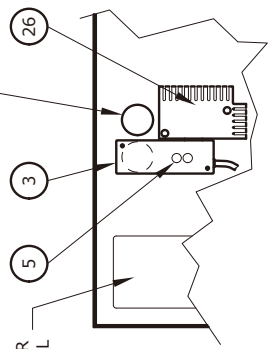
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DRWN	NRB	DATE:	27/11/2012			JOB No:		SHEET No.	1 OF 2
		APPROVED:	SB			CUSTOMER:			
		DRAWING STATUS:	CERT RELATED						

UNSPECIFIED NO DEC PLACE ±0.5  
 TOLERANCES 1 DEC PLACE ±0.2  
 2 DEC PLACE ±0.1  
 FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

3rd ANGLE PROJECTION  
 DIMENSIONS IN mm  
**DO NOT SCALE**

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REAR OF ITEM 13



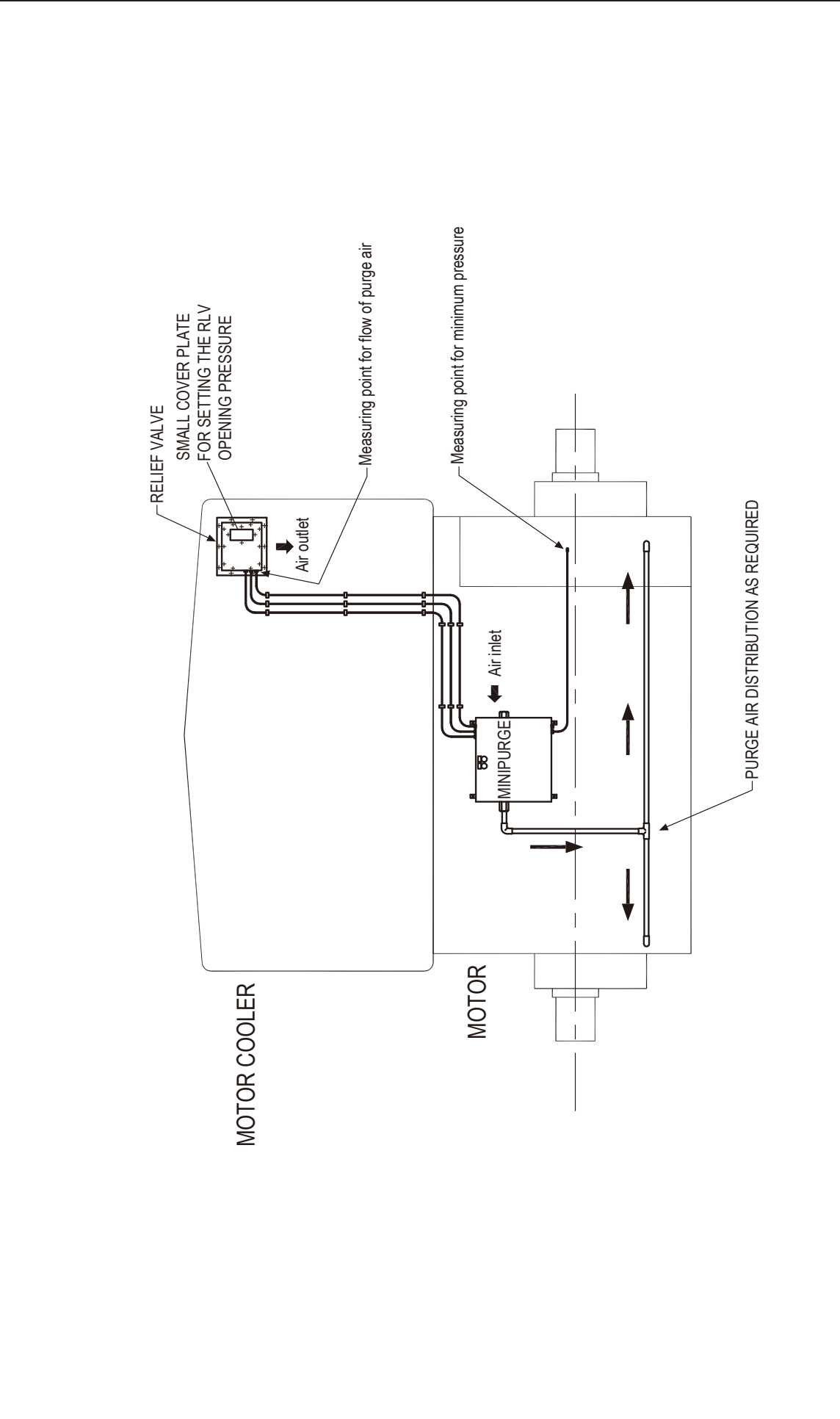
REF	DESCRIPTION
1	PURGE OUTLET OPEN SIGNAL VALVE (1)
2	PURGE COMPLETE BOOST VALVE
3	ELECTRONIC TIMER
4	LEAKAGE COMPENSATION, CLAPS VALVE
5	TIME SELECTOR SWITCHES
6	PURGE FLOW RESTRICTOR
7	PURGE VALVE
8	ALARM/PRESSURIZED SWITCH, 250V 4A, SPNO Ex d II
9	MOTOR INTERLOCK SWITCH, 250V 4A, DPNO Ex d II
10	PURGE FLOW SENSOR
11	LOGIC MANIFOLD
12	MINIMUM PRESSURE SENSOR
13	INDICATOR, ALARM/PRESSURIZED
14	INDICATOR, SYSTEM PURGING
15	MINIPURGE DOUBLE INDICATOR LABEL
17	TIMER SWITCH
18	PURGE OUTLET OPEN SIGNAL VALVE (2)
19	CLAPS SENSOR
20	MAIN AIR SUPPLY FILTER/REGULATOR
21	FLOW RESTRICTOR (CLAPS SENSOR SUPPLY)
22	GAUGE, MAIN AIR SUPPLY
23	GAUGE, LOGIC AIR SUPPLY
24	LOGIC AIR SUPPLY REGULATOR
25	-
26	I.S. BATTERY PACK
27	TERMINAL BOX, Ex e II T100°C (Tamb -20°C - 55°C) IP64
28	-
29	PURGE COMPLETE VALVE
30	TIMER VALVE

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CHKD	JPdB	MOD. No:	DRAWN	5906	5933	FINISH	D818 CONTROL UNIT		DRAWING No.	XBR-7TD0-068
DRWN	NRB	DATE:	17/01/2013	21/8/13	18/9/13				SHEET No.	2 OF 2
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		DRAWING STATUS: CERT RELATED								
		CUSTOMER:								

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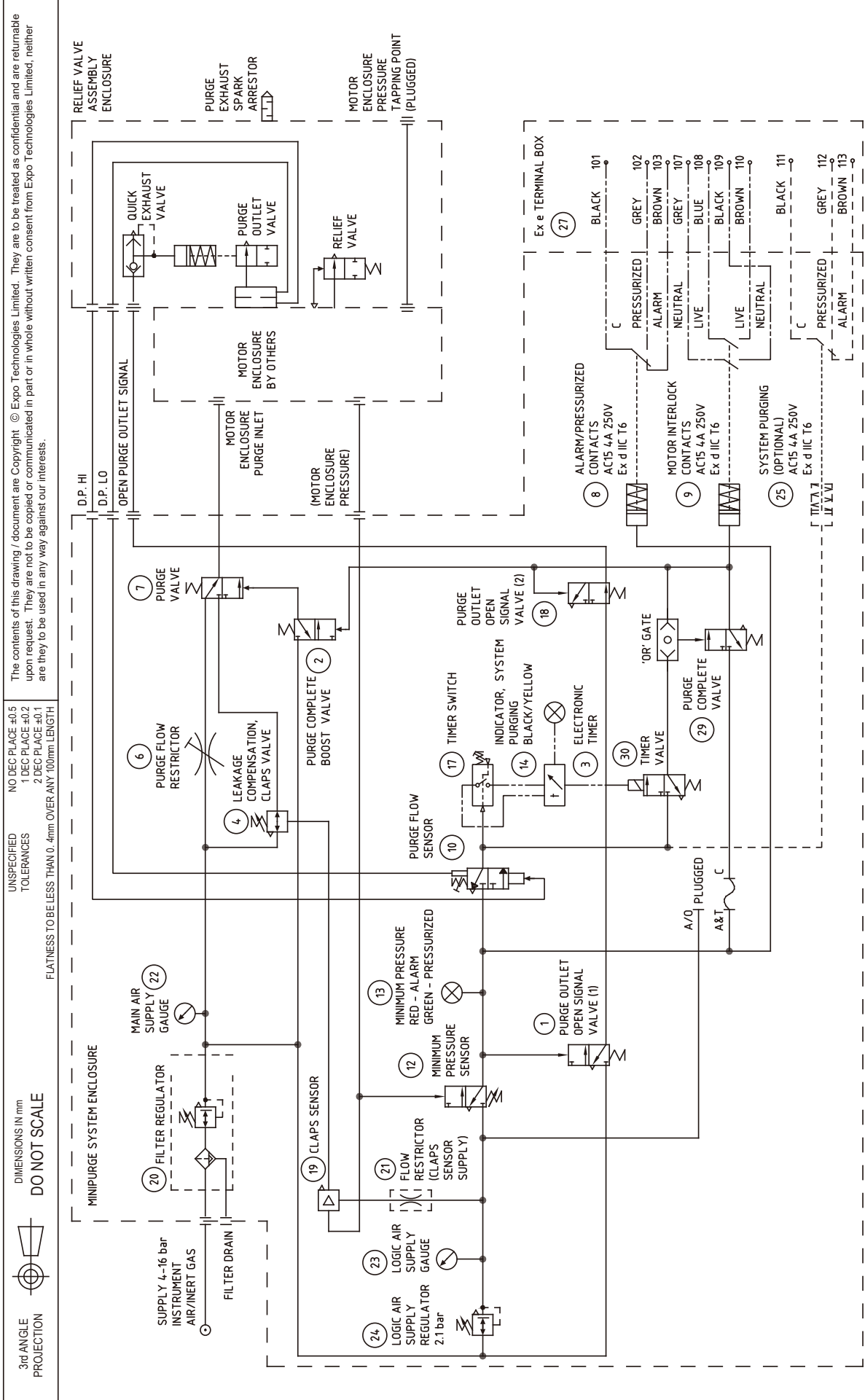
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 1 DEC PLACE ±0.2  
 2 DEC PLACE ±0.1  
 FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

3rd ANGLE PROJECTION  
 DIMENSIONS IN mm  
**DO NOT SCALE**



APPD	PAO	ISSUE:	1	2	3	4	MATERIAL	Expo Technologies Limited SURREY KT7 0RH UNITED KINGDOM		SCALE	NTS
CHKD	PAO	MOD. No:	DRAWN	3382	4763	4704	FINISH	TYPICAL CLAPS HOOK-UP DIAGRAM		DRAWING No.	SYS-M000-007
DRWN	NRB	DATE:	14/05/02	5/11/02	11/8/09	11/06/09		JOB No: CUSTOMER:		SHEET No.	1 OF 1
			APPROVED:	PAO	JPdB	JPdB	DRAWING STATUS: CERT RELATED				





APPD	SB	ISSUE:	1	2	3	4	MATERIAL	Surrey TW -16 SDB UNITED KINGDOM		SCALE	NTS
CHK'D	BRD	MOD. No:	DRAWN	5906	5981	6242	FINISH	Expo Technologies Limited		DRAWING No.	XBR-7TD0-069
DRWN	NRB	DATE:	17/01/2013	21/8/13	2/12/13	15/12/14		D818 CIRCUIT DIAGRAM		SHEET No.	1 OF 1
		APPROVED:	SB	JpDb	SM	SM		JOB No:			
		DRAWING STATUS:	CERT RELATED								
			CUSTOMER:								

3rd ANGLE PROJECTION  
 DIMENSIONS IN mm  
**DO NOT SCALE**  
 UNSPECIFIED TOLERANCES  
 FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH  
 NO DEC PLACE #0.5  
 1 DEC PLACE #0.2  
 2 DEC PLACE #0.1  
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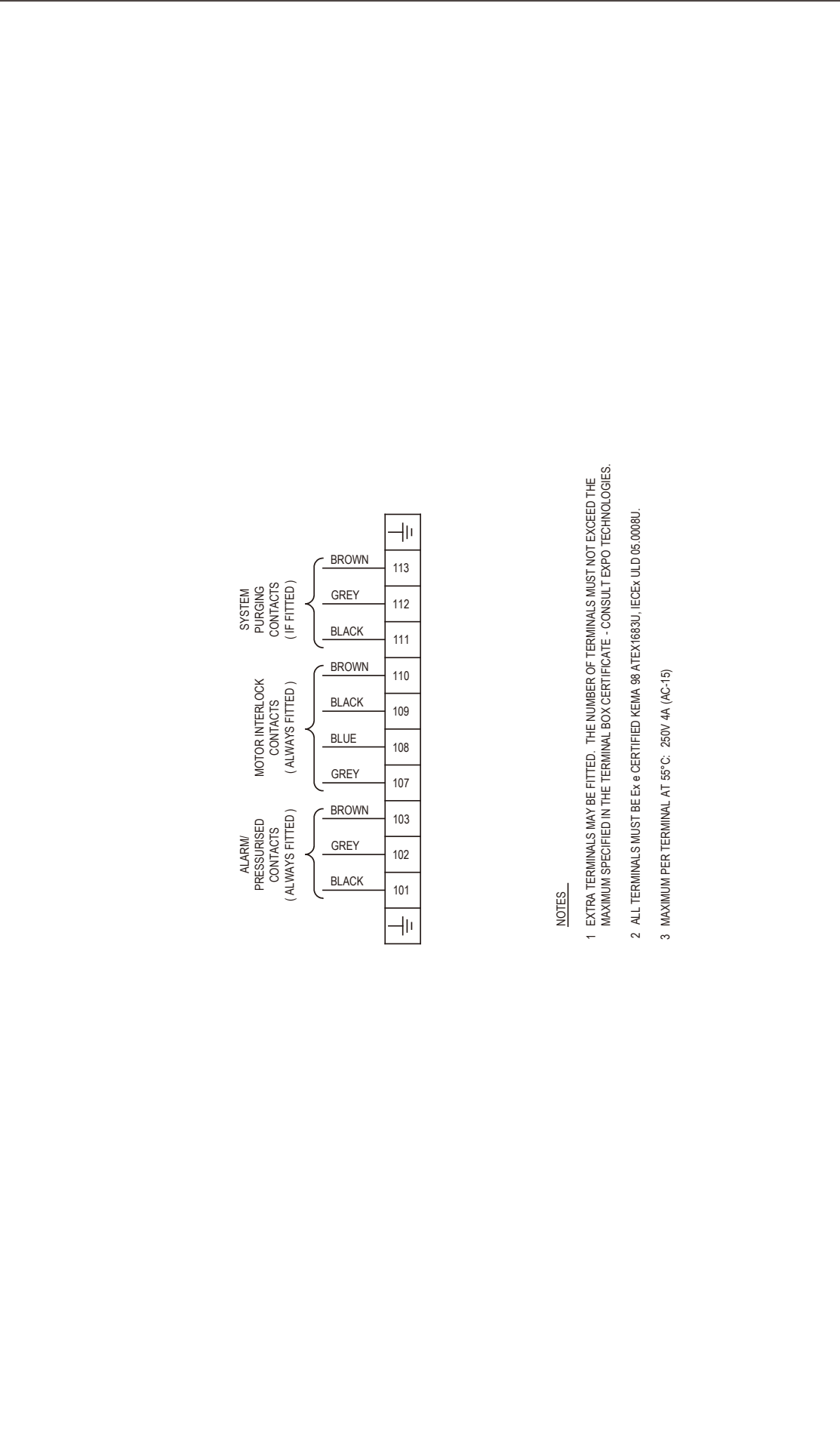
3rd ANGLE PROJECTION DIMENSIONS IN mm **DO NOT SCALE**

UNSPECIFIED TOLERANCES TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

UNSPECIFIED TOLERANCES  
 NO DECIMALS ±0.5  
 1 DECIMAL ±0.2  
 2 DECIMALS ±0.1

FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

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**NOTES**

- 1 EXTRA TERMINALS MAY BE FITTED. THE NUMBER OF TERMINALS MUST NOT EXCEED THE MAXIMUM SPECIFIED IN THE TERMINAL BOX CERTIFICATE - CONSULT EXPO TECHNOLOGIES.
- 2 ALL TERMINALS MUST BE EX e CERTIFIED KEWA 98 ATEX1683U, IECEx ULD 05-0008U.
- 3 MAXIMUM PER TERMINAL AT 55°C: 250V/4A (AC-15)

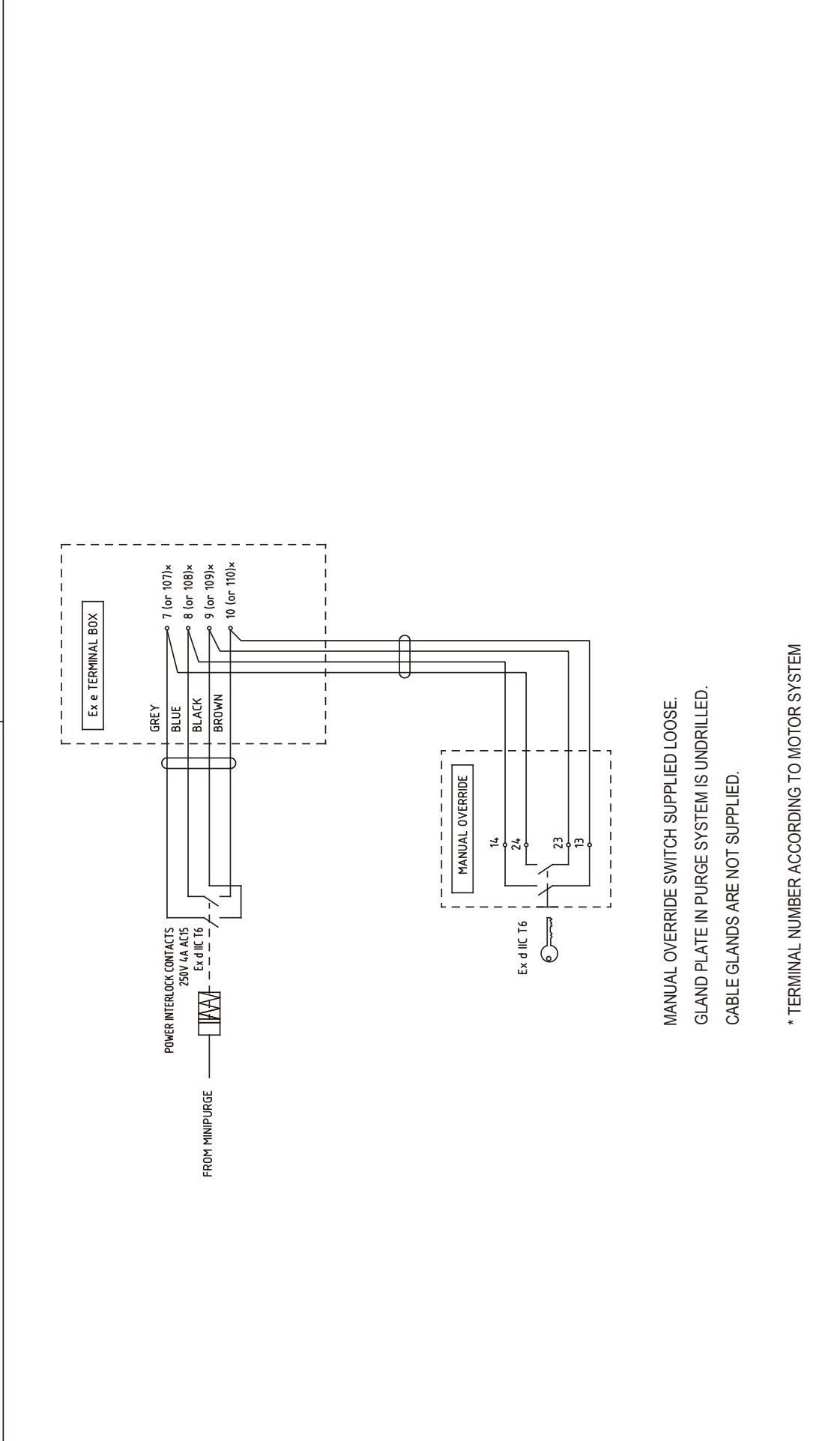
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		APPROV. ED:	SM	SM	MLC	MLC	CUSTOMER:	SHEET No.	
		DRAWING STATUS:	CERT RELATED						1 OF 1

3rd ANGLE PROJECTION

DIMENSIONS IN mm  
**DO NOT SCALE**

UNSPECIFIED TOLERANCES  
 NO DEC PLACE ±0.5  
 1 DEC PLACE ±0.2  
 2 DEC PLACE ±0.1  
 FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

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MANUAL OVERRIDE SWITCH SUPPLIED LOOSE.  
 GLAND PLATE IN PURGE SYSTEM IS UNDRILLED.  
 CABLE GLANDS ARE NOT SUPPLIED.

\* TERMINAL NUMBER ACCORDING TO MOTOR SYSTEM

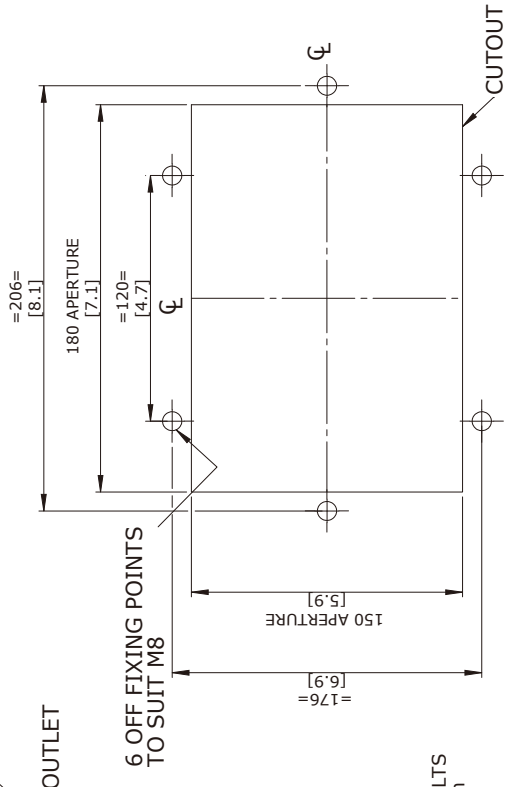
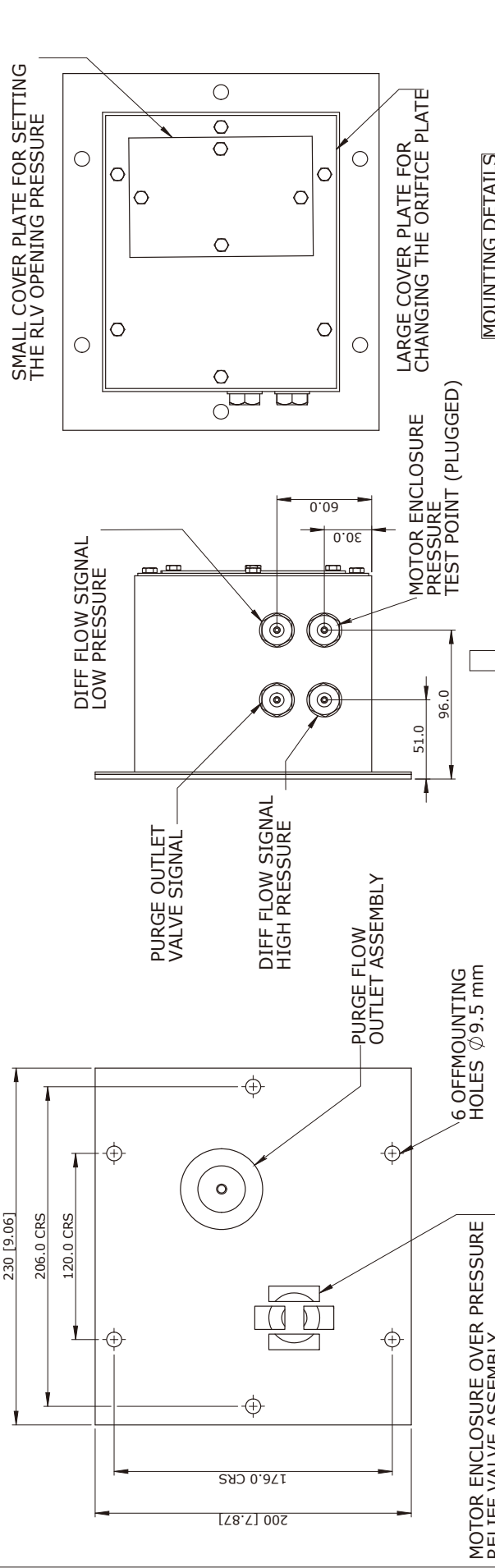
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		APPROVED:	P0	JPdB	JPdB	JPdB		MANUAL OVERRIDE SWITCH HOOK-UP				
		DRAWING STATUS:	CERT RELATED									



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UNSPECIFIED NO DEC PLACE ±0.5  
 TOLERANCES 1 DEC PLACE ±0.2  
 2 DEC PLACE ±0.1  
 FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

3rd ANGLE PROJECTION  
 DIMENSIONS IN mm  
 DO NOT SCALE



- NOTES**
1. RELIEF VALVE SUPPLIED WITH USER SELECTABLE ORIFICE PLATE TO SET THE FLOW RATE.
  2. ORIFICE PLATE IS FITTED TO PURGE FLOW OUTLET ASSEMBLY.
  3. THE RELIEF VALVE MUST BE MOUNTED IN THE ORIENTATION SHOWN.
  4. WEIGHT IS APPROXIMATELY 4 kg
  5. PART CODE: ARV-0528-107
  6. ON INSTALLATION ENSURE THAT FIXING BOLTS ARE EVENLY TIGHTENED TO A TORQUE OF 5 Nm (44 lbf/in)

REV.	MOD NUMBER	APPROVED DATE	APPROVED	DRAWN DATE:	10/07/2009	MATERIAL	STAINLESS STEEL 316L
				DRAWING STATUS:	production	FINISH	1.6 mm THICK
				APP'D	CHK'D	DR'WN	NROB
01	DRAWN	29/07/2009	JPdB	JPdB	BRD	NAH	
				TITLE	SIZE 3 MOTORPURGE RELIEF VALVE		
				JOB No:	CUSTOMER:		
				SCALE	1:5	SURREY KT7,0RH UNITED KINGDOM	
				DRAWING No.	XBR-RTD0-010		
				SHEET No.	1	OF 1	





**SCHEDULE**

**EC TYPE-EXAMINATION CERTIFICATE**

Sira 99ATEX3173X  
Issue 11

13

**DESCRIPTION OF EQUIPMENT**

The BPG range of junction boxes utilises a BPG enclosure covered by certificate number Sira 99ATEX3172U and are fitted with an arrangement of suitably certified terminals.

BPG ref.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Length	80	110	160	190	230	122	220	160	260	360	560	255	400	600	400
Width	75	75	75	75	75	120	120	160	160	160	160	250	250	250	405
Height	55	55	55	55	55	90	90	90	90	90	90	120	120	160	120

(All dimensions are in mm)

Before the Junction Box is installed, its total dissipated power for the particular application will be calculated in accordance with EN 60079-7:2003, Annex E, E.2 and will not exceed the values given in the tables below (Junction boxes of size not specified in the tables may be manufactured subject to the maximum dissipated power being based on a smaller enclosure):

BPG ref.	EPL Ga Gb Db Maximum Power Dissipation (W)															
	T6/T85°C Ta +40°C (max)	T6/T85°C Ta +55°C (max)	T6/T85°C Ta +60°C (max)	T6/T85°C Ta +65°C (max)	T5/T100°C Ta +55°C (max)	T5/T100°C Ta +90°C (max)	T4/T100°C Ta +90°C (max)									
1	8.390	2.23	1.73	1.45	8.390	8.390	8.390	8.390	8.390	8.390	8.390	8.390	8.390	8.390	8.390	8.390
2	8.551	2.00	1.70	1.45	8.551	8.551	8.551	8.551	8.551	8.551	8.551	8.551	8.551	8.551	8.551	8.551
3	8.833	2.00	1.70	1.45	8.833	8.833	8.833	8.833	8.833	8.833	8.833	8.833	8.833	8.833	8.833	8.833
4	9.012	2.07	1.80	1.29	9.012	9.012	9.012	9.012	9.012	9.012	9.012	9.012	9.012	9.012	9.012	9.012
5	9.260	2.00	1.70	1.10	9.260	9.260	9.260	9.260	9.260	9.260	9.260	9.260	9.260	9.260	9.260	9.260
6	9.378	2.00	1.70	1.45	9.378	9.378	9.378	9.378	9.378	9.378	9.378	9.378	9.378	9.378	9.378	9.378
7	10.500	2.30	1.70	1.10	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500	10.500
8	10.348	2.00	1.70	1.10	10.348	10.348	10.348	10.348	10.348	10.348	10.348	10.348	10.348	10.348	10.348	10.348
9	11.933	2.30	1.70	1.10	11.933	11.933	11.933	11.933	11.933	11.933	11.933	11.933	11.933	11.933	11.933	11.933
10	13.793	4.50	3.29	2.10	13.793	13.793	13.793	13.793	13.793	13.793	13.793	13.793	13.793	13.793	13.793	13.793
11	18.338	6.68	5.20	4.00	18.338	18.338	18.338	18.338	18.338	18.338	18.338	18.338	18.338	18.338	18.338	18.338
12	15.474	2.30	1.70	1.10	15.474	15.474	15.474	15.474	15.474	15.474	15.474	15.474	15.474	15.474	15.474	15.474
13	20.867	5.20	4.00	3.00	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867
13.5	20.867	5.20	4.00	3.00	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867	20.867
14	30.384	7.97	6.59	4.79	30.384	30.384	30.384	30.384	30.384	30.384	30.384	30.384	30.384	30.384	30.384	30.384
15	31.350	8.26	6.00	4.40	31.350	31.350	31.350	31.350	31.350	31.350	31.350	31.350	31.350	31.350	31.350	31.350

**EC TYPE-EXAMINATION CERTIFICATE**

Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

Certificate Number: Sira 99ATEX3173X Issue: 11

Equipment: BPG Range of Junction Boxes

Applicant: ABTECH Limited

Address: Sanderson Street

Lower Don Valley

Sheffield S9 2UA

UK

This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2012 EN 60079-7:2007 EN 60079-11:2012 EN 60079-26:2007 EN 60079-31:2009

The above list of documents may detail standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation, which is available on request.

If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

The marking of the equipment shall include the following:

- II 2 GD
  - Ex e IIC T6 Gb (Ta = -65°C to +#°C)
  - Ex e IIC T5 Gb (Ta = -65°C to +#°C)
  - Ex e IIC T4 Gb (Ta = -65°C to +#°C)
  - Ex Ib IIC T6 Gb (Ta = -65°C to +#°C)
  - Ex Ib IIC T5 Gb (Ta = -65°C to +#°C)
  - Ex Ib IIC T4 Gb (Ta = -65°C to +#°C)
  - Ex tb IIIC T85°C Db (Ta = -65°C to +#°C)
  - Ex tb IIIC T100°C Db (Ta = -65°C to +#°C)
- or
- II 1 GD
  - Ex Ia IIC T6 Ga (Ta = -65°C to +#°C)
  - Ex Ia IIC T5 Ga (Ta = -65°C to +#°C)
  - Ex Ia IIC T4 Ga (Ta = -65°C to +#°C)
  - Ex Ia IIIC T85°C Da (Ta = -65°C to +#°C)
  - Ex Ia IIIC T100°C Da (Ta = -65°C to +#°C)

Project Number 70004712

C Ellaby  
Deputy Certification Manager

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**SCHEDULE**

**EC TYPE-EXAMINATION CERTIFICATE**

Sira 99ATEX3173X  
Issue 11

EPL Da BPG ref.	Maximum Power Dissipation (W)			
	T <sub>6</sub> /T <sub>85</sub> °C Ta +40°C (max)	T <sub>6</sub> /T <sub>85</sub> °C Ta +55°C (max)	T <sub>6</sub> /T <sub>85</sub> °C Ta +60°C (max)	T <sub>6</sub> /T <sub>85</sub> °C Ta +65°C (max)
1	4.195	1.115	0.865	0.725
2	4.2755	1	0.85	0.725
3	4.4165	1	0.85	0.725
4	4.506	1.035	0.9	0.645
5	4.63	1	0.85	0.55
6	4.689	1	0.85	0.725
7	5.25	1.15	0.85	0.55
8	5.174	1	0.85	0.55
9	5.9665	1.15	0.85	0.55
10	6.8965	2.25	1.645	1.05
11	9.169	3.34	2.6	2
12	7.737	1.15	0.85	0.55
13	10.4335	2.6	2	1.5
13.5	10.4335	2.6	2	1.5
14	15.192	3.985	3.295	2.395
15	15.675	4.13	3	2.2

**Variation 1** - This variation introduced the following changes:

- i. The BPG range of junction boxes were permitted to have alternative power dissipation ratings that enable them to be used in an upper ambient temperature of either +40°C or +55°C or +60°C or +65°C, the associated ratings and markings were recognised.

**Variation 2** - This variation introduced the following changes:

- i. The recognition of a minor revision of the information marked on the label.

**Variation 3** - This variation introduced the following changes:

- i. When certified, intrinsically safe terminals are used, alternative marking, 'ia' and 'ib', was recognised.

**Variation 4** - This variation introduced the following changes:

- i. The BPG 13.5 junction box covered by certificate number Sira 99ATEX3172U was added to the range.

**Variation 5** - This variation introduced the following changes:

- i. The option to fit slotted trunking inside the Junction Boxes, this trunking may be sited as required. The instructions were modified to recognise additional restrictions associated with this change and a new Condition of Manufacture was introduced.
- ii. The recognition of minor drawing modifications including the introduction of a new company logo; these amendments are administrative or involve changes to the design that do not affect the aspects of the product that are relevant to explosion safety.

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Form 9400 Issue1

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**Sira Certification Service**

Rake Lane, Eccleston, Chester, CH4 9JN, Engle  
Tel: +44 (0) 1244 670900  
Fax: +44 (0) 1244 681330  
Email: [info@siracertification.com](mailto:info@siracertification.com)  
Web: [www.siracertification.com](http://www.siracertification.com)

**SCHEDULE**

**EC TYPE-EXAMINATION CERTIFICATE**

Sira 99ATEX3173X  
Issue 11

**Variation 6** - This variation introduced the following changes:

- i. Following appropriate re-assessment to demonstrate compliance with the requirements of the EN 60079 series of standards, the documents previously listed in section 9, EN 50 014:1997 (amendments A1 to A2), EN 50 019:1994, EN 50020:2002 and EN 50281-1-1:1998, were replaced by those currently listed. As part of this change, the markings in section 12 were updated accordingly and the 'ia' marking previously included as Variation 1 (dated 30 March 2005) was removed.
- ii. The Condition of Certification that defined the ambient temperature range of specific types of gaskets was removed because only silicone rubber gaskets are now used in the construction of these Junction Boxes.
- iii. It was recognised that a new procedure for selecting terminals has been adopted by the manufacturer; this allows the terminals to be chosen from an Approved Component Document, Sira 12AC087, that is issued and controlled by Sira. The relevant Condition of Certification was amended to recognise this change.
- iv. The recognition of drawing modifications required for use with other certification associated with these products.
- v. The Condition of Certification dealing with power dissipation was modified.
- vi. A Condition of Certification that requires the manufacturer to monitor the status of previously certified devices was added.

**Variation 7** - This variation introduced the following changes:

**R30711A/00**

- i. Using EN 60079-26, the junction boxes were allowed to be marked with 'Ex ia' and 'Ex Ia' concepts for EPL levels Ga and Da, as a result of this change, the maximum power dissipation table was modified and a Special Condition for Safe Use was introduced necessitating the addition of an 'X' suffix to the certificate number.
- ii. IEC 60079-0:2011 was replaced by EN 60079-0:2012 in the list of standards.

**R32242A/00**

- i. The BPG range of junction boxes were allowed to be used in an upper ambient +55°C with a temperature class/surface temperature of T5/T100°C, the associated maximum power dissipation ratings (W) and markings were recognised.

**Variation 8** - This variation introduced the following changes:

- i. To permit the replacement of the term 'ceramic' with 'the terminals shall have an insulation limiting temperature of 130°C minimum' in the Condition of Manufacture, when the junction boxes are marked for T4/100°C.

14 **DESCRIPTIVE DOCUMENTS**

14.1 **Drawings**

Refer to Certificate Annexes.

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**Sira Certification Service**

Rake Lane, Eccleston, Chester, CH4 9JN, England  
Tel: +44 (0) 1244 670900  
Fax: +44 (0) 1244 681330  
Email: [info@siracertification.com](mailto:info@siracertification.com)  
Web: [www.siracertification.com](http://www.siracertification.com)



**sira**  
CERTIFICATION

**SCHEDULE**

**EC TYPE-EXAMINATION CERTIFICATE**

Sira 99ATEX3173X  
Issue 11

**14.2 Associated Sira Reports and Certificate History**

Issue	Date	Report/File no.	Comment
0	19 January 2000	R51X6055E	The release of the prime certificate.
1	25 May 2001	R51A6746A	The introduction of Variation 1.
2	28 September 2001	53V7936	The introduction of Variation 2.
3	23 July 2002	R53A9009A	The prime certificate was re-issued to permit the following: <ul style="list-style-type: none"> <li>The incorporation of previous variations 1 and 2.</li> <li>The lower ambient temperature range was confirmed as -65°C.</li> <li>The introduction of the changes included in Sira report number R53A9009A.</li> </ul>
4	30 March 2005	R53V10438A	The introduction of Variation 3.
5	10 March 2008	R51A17881A	This Issue covers the following changes: <ul style="list-style-type: none"> <li>All previously issued certification was rationalised into a single certificate, Issue 5, Issues 0 to 4 referenced above are only intended to reflect the history of the previous certification and have not been issued as documents in this format.</li> <li>The change of the Applicant's name, first recognised 31 January 2007, was re-confirmed.</li> <li>The introduction of Variation 4.</li> </ul>
6	03 April 2012	R26585A/00	The introduction of Variation 5.
7	11 June 2012	R26585A/01	Report R26585A/01 replaced report R26585A/00.
8	24 October 2012	R25164A/00	This Issue covers the following changes: <ul style="list-style-type: none"> <li>The introduction of Variation 6.</li> <li>Because this certificate was re-issued, some Variations 1 and 2 were duplicated, this has been clarified and reflected in the certificate history, no technical changes were involved.</li> </ul>
9	07 April 2014	R30711A/00	The introduction of Variation 7.
10	08 July 2014	R32242A/00	The introduction of Variation 8.
11	30 July 2014	N/A	Issued to correct a typographical error.

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)  
 15.1 When used in an EPL ta (Da) application the power supply to the equipment is to be rated for a prospective short circuit current of not more than 10 kA.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRS)  
 The relevant EHSRS that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

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Rake Lane, Eccleston, Chester, CH4 9JN, England  
 Tel: +44 (0) 1244 670900  
 Fax: +44 (0) 1244 681330  
 Email: [info@siracertification.com](mailto:info@siracertification.com)  
 Web: [www.siracertification.com](http://www.siracertification.com)



**SCHEDULE**

**EC TYPE-EXAMINATION CERTIFICATE**

Sira 99ATEX3173X  
Issue 11

**17 CONDITIONS OF CERTIFICATION**

- 17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.
- 17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.
- 17.3 When the manufacturer has equipped the junction boxes with terminals, a routine electric strength test shall be carried out only if the components are wired. This test shall be carried out according to the following standards:  
 - industrial control equipment: EN 60947 - measurement, control and laboratory use: EN 61010
- 17.4 The terminals used in these Junction Boxes will be ATEX approved devices chosen from the Approved Component Document number Sira 12AC087 that is issued by Sira. All terminals will be installed in accordance with their certificate conditions and the relevant codes of practice/wiring regulations paying particular attention to the following:  
 • The maximum service temperature range.  
 • The minimum creepage and clearance distances shall be maintained.  
 • The rated voltages and currents may vary if cross-connection facilities are used.  
 • The reduction in rating of adjacent terminals shall be observed, where applicable.

The terminals fitted into the junction boxes shall also conform to the following requirements:

Temperature class/ Dust marking	Requirement
T6/T85°C	The terminals shall have an insulation limiting temperature of 100°C minimum
T4/T100°C	The terminals shall have an insulation limiting temperature of 130°C minimum

17.5 Suitably certified Ex e equipment such as breathing devices and blanks may be fitted to the enclosure providing the enclosure maintains compliance with BS EN 60529 code IP64 or better.

17.6 The manufacturer will take all reasonable steps to ensure that the power dissipated by the Junction Box does not exceed the maximum value stipulated in the table detailed in the Description of Equipment, in addition, the manufacturer will supply all the relevant information that will enable the user/installer to calculate the dissipated power in Watts for each Junction Box in accordance with EN 60079-7 Annex E, E2.

17.7 When the junction boxes are used for intrinsically safe applications, a 3 mm separation distance between the enclosure is required, there shall also be a minimum of 6 mm between different intrinsically safe circuits.

17.8 When trunking is fitted, it may be sited as required and the minimum creepage and clearance distances shall still be met.

17.9 The products covered by this certificate incorporate previously certified devices, it is therefore the responsibility of the manufacturer to continually monitor the status of the certification associated with these devices, and the manufacturer will inform Sira of any modifications of the devices that may impinge upon the explosion safety design of their products.

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Form 9400 Issue1

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Rake Lane, Eccleston, Chester, CH4 9JN, England  
 Tel: +44 (0) 1244 670900  
 Fax: +44 (0) 1244 681330  
 Email: [info@siracertification.com](mailto:info@siracertification.com)  
 Web: [www.siracertification.com](http://www.siracertification.com)

# sira

CERTIFICATION

## Certificate Annexe

**Certificate Number:** Sira 99ATEX3173X  
**Equipment:** BPG Range of Junction Boxes  
**Applicant:** ABTECH Limited

**Issue 0 to 2:** The drawings associated with these Issues were rationalised by those listed in Issue 3.

### Issue 3

Number	Sheet	Rev.	Date	Description
ABT 10260	1 of 1	C	25 Jun 02	External Label (BPG)
ABT 10304	1 of 1	A	16 Nov 99	BPG Manufacturing Specification

### Issue 4

Number	Sheet	Rev.	Date	Description
ABT 14842	1 of 1	-	01 Feb 05	BPG Range EEX ia Label
ABT 14845	1 of 1	-	01 Feb 05	BPG Range EEX ib Label

**Issue 5:** No new drawings were introduced.

### Issue 6

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
ABT 10260	1 of 1	D	30 Mar 12	BPG External label – Junction Boxes
ABT 10304	1 of 1	B	30 Mar 12	BPG Manufacturing specification
ABT 14842	1 of 1	B	30 Mar 12	BPG Range EEX ia Label
ABT 14845	1 of 1	B	30 Mar 12	BPG Range EEX ib Label

**Issue 7** (No new drawings were introduced.)

### Issue 8

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
ABT 10260	1 of 1	E	30 Sep 12	BPG Nameplate – Junction Box
ABT 10304	1 of 1	C	30 Sep 12	BPG Manufacturing specification
ABT 10305	1 of 1	C	30 Sep 12	BPG Range of Enclosures

### Issue 9

#### R30711A/00

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ABT10260	1 of 1	F	30 Oct 13	BPG Range Ex e Label
ABT14842	1 of 1	C	10 Oct 13	BPG Range Ex ia Label

#### R32242A/00

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
ABT26528	1 of 1	A	19 Dec 13	External ATEX Label (BPG)
ABT16689	1 of 1	C	19 Dec 13	BPG Manufacturing Spec

**Issues 10 and 11** (No new drawings were introduced.)

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**Sira Certification Service**

Rake Lane, Ecclestone, Chester, CH4 3JN, England

Tel: +44 (0) 1244 670900

Fax: +44 (0) 1244 681330

Email: [info@siracertification.com](mailto:info@siracertification.com)

Web: [www.siracertification.com](http://www.siracertification.com)

# IECEx Certificate of Conformity



Certificate No.: IECEx SIR 06.0087X  
Date of Issue: 2014-07-30  
Issue No.:  
Page 2 of 4

Manufacturer: **ABTECH Limited**  
A B Controls & Technology  
Sanderson Street  
Lower Don Valley  
Sheffield S9 2UA  
**United Kingdom**

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

**STANDARDS**  
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

<b>IEC 0079 -0 2011</b> Edition: 6.0	Explosive atmospheres - Part 0: General requirements
<b>IEC 0079 -11 2011</b> Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
<b>IEC 0079 -31 200</b> Edition: 1	Explosive atmospheres Part 31: Equipment dust ignition protection by enclosure t
<b>IEC 0079 -7 200 -07</b> Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

**TEST ASSESSMENT REPORTS**  
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report: GBSIREXTR06.010 101	GBSIREXTR12.024500	GBSIREXTR14.010700
Quality Assessment Report: GBSIRAR06.004600 GBSIRAR06.004603	GBSIRAR06.004601 GBSIRAR06.004604	GBSIRAR06.004602

# IECEx Certificate of Conformity



## INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: IECEx SIR 06.0087X Issue No.:5

Status: **Current**

Date of Issue: 2014-07-30 Page 1 of 4

Applicant: **ABTECH Limited**  
A B Controls & Technology  
Sanderson Street  
Lower Don Valley  
Sheffield S9 2UA  
**United Kingdom**

Certificate history:  
Issue No. 5 (2014-7-30)  
Issue No. 4 (2014-5-20)  
Issue No. 3 (2014-5-8)  
Issue No. 2 (2012-10-25)  
Issue No. 1 (2010-7-27)  
Issue No. 0 (2006-10-25)

**BPG Range of Junction Boxes**

Electrical Apparatus:  
Optional accessory:

Type of Protection: **Increased Safety and Dust**

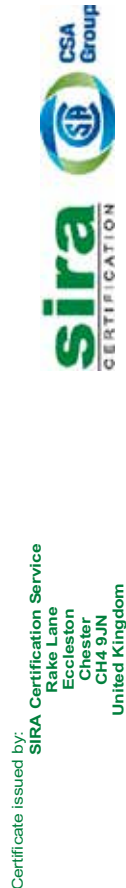
Marking: Ex e IIC T6 Gb (Ta -65°C to +#°C) or Ex ia IIC T6 Ga (Ta -65°C to +#°C)  
Ex e IIC T5 Gb (Ta -65°C to +#°C) Ex ia IIC T5 Ga (Ta -65°C to +#°C)  
Ex e IIC T4 Gb (Ta -65°C to +#°C) Ex ia IIC T4 Ga (Ta -65°C to +#°C)  
Ex ib IIC T6 Gb (Ta -65°C to +#°C) Ex ta IIC T6 Da (Ta -65°C to +#°C)  
Ex ib IIC T5 Gb (Ta -65°C to +#°C) Ex ta IIC T5 Da (Ta -65°C to +#°C)  
Ex ib IIC T4 Gb (Ta -65°C to +#°C) Ex ta IIC T4 Da (Ta -65°C to +#°C)

Approved for issue on behalf of the IECEx Certification Body: C Ellaby Deputy Certification Manager

Position: \_\_\_\_\_

Signature: (for printed version) \_\_\_\_\_  
Date: \_\_\_\_\_

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.





# IECEx Certificate of Conformity



Certificate No.: IECEx SIR 06.0087X  
Date of Issue: 2014-07-30  
Issue No.:  
Page 4 of 4

## DETAILS OF CERTIFICATE CHANGES for issues 1 and above

<b>Issue 1</b>	1	this issue introduced the following changes: To allow GBSIREXTR06.010101 to replace GBSIREXTR06.010100
<b>Issue 2</b>	1	this issue introduced the following changes: The Description was aligned with certificate no. Sira 99ATEX3173 associated with this unction Box, this included recognising the following changes assessed as part of that certificate. The BPG 13.5 enclosure was added to the range. The option to fit slotted trunking inside the enclosures, this trunking may be sited as required. The instructions were modified to recognise additional restrictions associated with this change and a new Condition of Manufacture was introduced. Following appropriate re-assessment to demonstrate compliance with the requirements of the latest standards, the documents previously used for assessment were replaced by those currently listed, the markings were updated accordingly. In addition, the enclosure was allowed to be used for intrinsically safe applications and IEC 60079-1:2012 Edition 6 was included in the list of supporting standards.
<b>Issue 3</b>	1	The Condition of Certification related to static was removed in addition to the Conditions of Manufacture were rationalised to bring them into line with Sira 99ATEX3173.
<b>Issue 4</b>	1	It was recognised that a new procedure for selecting terminals has been adopted by the manufacturer this allows the terminals to be chosen from an Approved Component Document, Sira 12AC087, that is issued and controlled by Sira.
<b>Issue 3</b>	1	this issue introduced the following change: Issued to correct the numbering of the changes in Issue 2 and to edit change 3. GBSIREXTR14.011300 was removed.
<b>Issue 4</b>	1	this issue introduced the following change: Using IEC 60079-26; the unction boxes were allowed to be marked with Ex ia and Ex ta concepts for EPL levels Ga and Da, as a result of this change, the maximum power dissipation table was modified and a Special Condition for Safe Use was introduced necessitating the addition of an X suffix to the certificate number.
<b>Issue 2</b>	1	The BPG range of unction boxes were allowed to be used in an upper ambient +55°C with a temperature class surface temperature of T5T100°C, the associated maximum power dissipation ratings (W) and markings were recognised.
<b>Issue 1</b>	1	this issue introduced the following change: Issued to correct a typographical error

# IECEx Certificate of Conformity



Certificate No.: IECEx SIR 06.0087X  
Date of Issue: 2014-07-30  
Issue No.:  
Page 3 of 4

## Schedule

### EQUIPMENT

Equipment and systems covered by this certificate are as follows:

The BPG unction Boxes comprise a polyester, BPG Enclosure, component certified as IECEx SIR 06.0086U, the fitted with terminals. Refer to certificate Annex A for a full product description.

### CONDITIONS OF CERTIFICATION ES as shown

- When used in an EPL ta (Da) application the power supply to the equipment is to be rated for a prospective short circuit current of not more than 10 kA.



With  
European  
Directives

Issued under the sole responsibility of  
**Expo Technologies Ltd**  
Unit 2, The Summit, Hanworth Road  
Sunbury on Thames TW16 5DB, UK

**This is to declare that “Purge Controllers: Sub-MiniPurge, MiniPurge, Super-MiniPurge, Super-MiniPurge 1800/3500/7000/7000X” are manufactured in conformity with the following European Directives and standards:**

Electromagnetic Compatibility Directive 2014/30/EU  
MiniPurge Systems with a /PO suffix in the type number are non-electrical and are outside the scope of the EMC Directive.  
MiniPurge Systems with suffices /PA or /IS incorporate one or more volt-free (“dry”) contacts which work in circuits specified by others. In normal operation these circuits are “benign” and no CE mark is appropriate.  
MiniPurge Systems with Electronic Timer (Option /ET) are designed to conform to the EMC Directive, in compliance with EN 61000-6-4:2007 and EN 61000-6-2:2005 (Intertek Report EM10048000).



Low Voltage Directive 2014/35/EU  
MiniPurge Systems are intended for use in potentially explosive atmospheres (Hazardous Areas) and are therefore excluded from the Low Voltage Directive.

Pressure Equipment Directive 2014/68/EU  
MiniPurge Systems are classified as not higher than category I under Article 13 of this Directive and intended for use in potentially explosive atmospheres (Hazardous Areas) and are therefore excluded from the Pressure Equipment Directive. MiniPurge Systems are covered under ATEX Directive 2014/34/EU.

ATEX Directive 2014/34/EU Equipment for explosive atmospheres  
MiniPurge Systems are designed to conform to the ATEX Directive in fulfilment of the essential health and safety requirements set out in Annex II, and in compliance with:  
EN 60079-0: 2012 + A11:2013                      EN 60079-2: 2014

MiniPurge Systems are certified by SIRA Certification Service, Hawarden Industrial Park, Hawarden CH5 3US, England, under EC Type-Examination Certificate SIRA 01ATEX1295X, in compliance with:  
EN 60079-0: 2012                      EN 60079-2: 2014

According to the model, MiniPurge Systems are rated and shall be marked as follows:

MiniPurge, Type X & Type Y models	Group II Category 2G & 2D	 Ex II 2(2) GD
MiniPurge, Type Z models	Group II Category 3G & 3D	 Ex II 2(3) GD

MiniPurge systems are manufactured under Production Quality Assurance Notification SIRA 99 ATEX M043, issued by SIRA Certification Service, Notified Body No 0518.

Signed for and on behalf of Expo Technologies Ltd.,



John Paul de Beer  
Managing Director

Date 16/08/2017  
Confidential Assessment file reference SC004