

# MiniPurge® Type X LC / ET Size 3 & 4 Manual ML465

**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: Specification Sheet - MiniPurge® Type X Systems

**Model No. (Example): 07 3 X LC / ss / ET / PO / WM**

(Note: Not all codes are applicable)

### Purge System Type

**07** = MiniPurge

### Size

**3** = MiniPurge  
Purge flow rate:  
900 NI/min, 32 scfm

**4** = MiniPurge  
Purge flow rate:  
1800 NI/min, 64 scfm

### Approval / Certification

ATEX (Europe)  
EN60079-0, EN60079-2, EN60079-11

**Sira 01ATEX1295X**

**C** **CE** 2813  II 2 (2) G D

Ex [pxb] ia IIC T5 Gb

Ex [pxb] ia IIIC T100°C Db

Tamb -20°C +55°C

IECEx (International)  
EN60079-0, EN60079-2, EN60079-11

**IECEx SIR 07.0027X**

Ex [pxb] ia IIC T5 Gb

Ex [pxb] ia IIIC T100°C Db

Tamb -20°C +55°C

INMETRO (Brazil)

**TÜV 12.1462X**

Ex [pxb] ia IIC T5 Gb

Ex [pxb] ia IIIC T100°C Db

-20°C ≤ Ta ≤ +55°C

CCC (China)

**CNEX 2020312304000830**

Ex [px] ia IIC T5 Gb

Ex [pD] iaD 21 IP54 T100°C Db

Tamb -20°C +55°C

EAC (Eurasian Economic Union)  
TR CU 012/2011

**RU C-GB.AX58.B.00906/20**

1Ex [px] ia IIC T5 Gb

Ex [px] ia IIIC T100°C Db

-20°C ≤ Tamb ≤ +55°C

For detailed limitations and special conditions of use, please refer to the full certificate as attached to this Manual or available from [www.expoworldwide.com](http://www.expoworldwide.com)

### Options as Required

**AO** = Alarm Only

**MO** = Manual Override

**MK** = MIU Mounting Kit (PO systems only)

**WM** = Wall Mounting Bars

### Power & Alarm (Signals)

**PO** = Pneumatic Output Signal

**PA** = Power and Alarm Terminal Switches Integral /PA Box

**IS** = Intrinsically Safe Power and Alarm Terminal

### Timing Method

**ET** = Electronic Timer

### MiniPurge® Housing

**ss** = 316L Stainless Steel (NROB finish)  
Neoprene "Top" Mount Gasket

### Pressurization Method

**LC** = Leakage Compensation

## MiniPurge® Control Unit Data

<b>Supply Pressure:</b>	Must be regulated at inlet Minimum 60 psi / 0.4 MPa / 4 bar Maximum 115 psi / 0.8 MPa / 8 bar		
Air Quality:	Compressed air / Nitrogen to instrument quality		
Ambient Temperature:	-20°C to + 55°C		
Leakage Compensation:	Variable up to 28.3 scfm / 800 NI/min to compensate for leakage of enclosure		
Bulkhead Pipe Fittings:	<b>Size 3XLC</b>		<b>Size 4XLC</b>
	Air Supply: 1/2" NPT		3/4" NPT
	Output: 1/2" NPT		3/4" NPT
	Signal: 1/8" NPT		
Visual Indicators:	LC:		
	Alarm (Red ●) / Pressurized (Green ●)		
	Purge Inactive (Black ●) / Purge in Progress (Yellow ●)		

### /PA Terminal Box:

	Stainless Steel, Ex e IIC T5 Gb / Ex tb IIIC T100°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) / 24V DC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.		
Alarm Switch	SPCO switch, contact ratings 250 Vac 4 Amps (AC-15) / 24V DC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.		
Intermediate Switch:	SPCO switch, contact ratings 250 Vac 4 Amps (AC-15) / 24V DC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.		
System Purging Switch (Optional):	SPCO switch, contact ratings 250 Vac 4 Amps (AC-15) / 24V DC 4A, Ex d IIC T6 Gb / Ex tb IIIC T80°C Db.		

### /IS Terminal Box:

	Stainless steel, for intrinsically safe circuits only, c/w blue terminals, front access cover and lower removable gland plate.		
Power Interlock Switch:	Volt Free contacts for the connection of Intrinsically Safe Circuits.		
Alarm Switch	Volt Free contacts for the connection of Intrinsically Safe Circuits.		
Intermediate Switch:	Volt Free contacts for the connection of Intrinsically Safe Circuits.		
System Purging Switch (Optional):	Volt Free contacts for the connection of Intrinsically Safe Circuits.		

### /PO Terminal Box

Power Interlock Switch:	2.3 barg outlet via 1/2" NPT Female connection.		
Alarm / Pressurized Signal:	2.3 barg outlet via 1/2" NPT Female connection.		
Purge Time:	User selectable, in 1 minute intervals up to 99 minutes (tolerance -0+3 seconds)		
Flow & Pressure Sensors:	LC:	"Low Pressure Sensor"	0.2" WC / 50 Pa (0.5 mbar)
		"Flow Sensor"	1.13" WC / 280 Pa / (2.8 mbar)
Action on "Loss of Pressure":	Alarm & Trip (default) OR Alarm Only User selectable on unit (A&T OR AO)		

## Relief Valve Unit and Purge Outlet Valve with Integral spark arrestor

System:	<b>Size 3XLC</b>	<b>Size 4XLC</b>
Type:	RLV52/FS/ss	RLV75/FS/ss
Opening Pressure:	4" WC / 1 kPa (10 mbar)	4" WC / 1 kPa (10 mbar)
Purge Flow rate:	32 scfm / 900 NI/min	64 scfm / 1800 NI/min
Material	Housing: 316L Stainless Steel	
	Gasket: Neoprene	

## Section 2: Specific Conditions of Use (ATEX and IECEx Certificates)

When using the AO, AS and DT options, the recommendations for the additional requirements of Ex p apparatus contained within IEC EN 60079-14 shall be applied.

The installer/user shall ensure that the MiniPurge Control Unit is installed in accordance with the equipment certificate that covers the combination of the pressurised enclosure(s) and MiniPurge Control Unit.

The values of the safety parameters shall be set in accordance with the equipment certificate that covers the combination of the pressurised enclosure(s) and MiniPurge Control Unit.

This MiniPurge Control Unit shall be incorporated into equipment and the appropriate Conformity Assessment Procedures applied to the combination (as defined by Directive 2014/34/EU - ATEX). This certificate does not cover the combination.

## Section 3: Application Suitability

MiniPurge® Systems are certified for use in Hazardous Areas, where the Hazardous Area is non-mining (i.e., above ground) and the hazard is caused by flammable gasses, vapours, or dust. Depending on the model, the systems may be used in IECEx, ATEX Zone 1(21) - Category 2 and NEC 500 Class I, Div 1.

MiniPurge® systems may be used for hazards of any gas group. However, 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 designed for use primarily 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 for further guidance.

Materials of construction:

• Stainless Steel	• Aluminium	• Acrylic	• Polycarbonate
• Mild (carbon) Steel	• Nylon	• Silicone Rubber	• ABS
• Brass	• Polyurethane	• Neoprene	• Glass Filled Polyester

## Section 4: Description and Principle of Operation

The MiniPurge® 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® 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 (/AO), please refer to section titled Main Components.

## Section 5: Main Components

The MiniPurge® system comprises several component units. The units required depend on the type of system selected. These are summarised in Table 1.

All Expo Technologies MiniPurge® pressurization systems provide:

- a) a method of pressurizing a Pressurized Enclosure (PE) while at the same time compensating for any leakage, together with
- b) a method of purging the enclosure, before power is applied, to remove any flammable gas that may have entered the enclosure while it was not pressurized,
- c) visual indication of the MiniPurge® system status, and
- d) an output to provide remote indication or control.

### 5.1 Control Unit (CU)

The Control Unit (CU) is the heart of the system. It contains a pneumatic logic circuit specially designed and built to control the functions required for purge and pressurization. For all systems this includes air filtration, pressure and purge flow measurement, electronic purge timing, and local visual indication of Pressurized/Alarm and flow sensed. It also provides the outputs for power and remote alarm control corresponding to the output type selected.

## 5.2 Relief Valve (RLV)

The Relief Valve unit is fitted to the PE to provide a means of limiting the maximum pressure experienced by the PE during operation. The RLV model number has a suffix giving the diameter of the valve aperture in millimetres e.g., RLV75 (= 75mm bore). The RLV also incorporates a Spark Arrestor to prevent sparks being ejected from the PE into the classified area. In Leakage Compensation systems, the RLV is combined with the flow measurement mechanism.



Figure 1. LC Relief Valve

## 5.3 The Methods of Pressurizing

### a) LC - Leakage Compensation

Initially a high flow of protective gas is passed through the enclosure. This flow is verified and performs the purging phase of the operation. When the purging phase is completed - i.e., the purge time has elapsed - the flow of protective gas is provided via an adjustable valve so that it just compensates for any leakage from the PE in addition to maintaining its pressurization.

If leakage is less than 5 l/min then the LCV will be awkward to set. You will find that the RLV spring will cycle open and closed. If this happens contact our service department for advice.

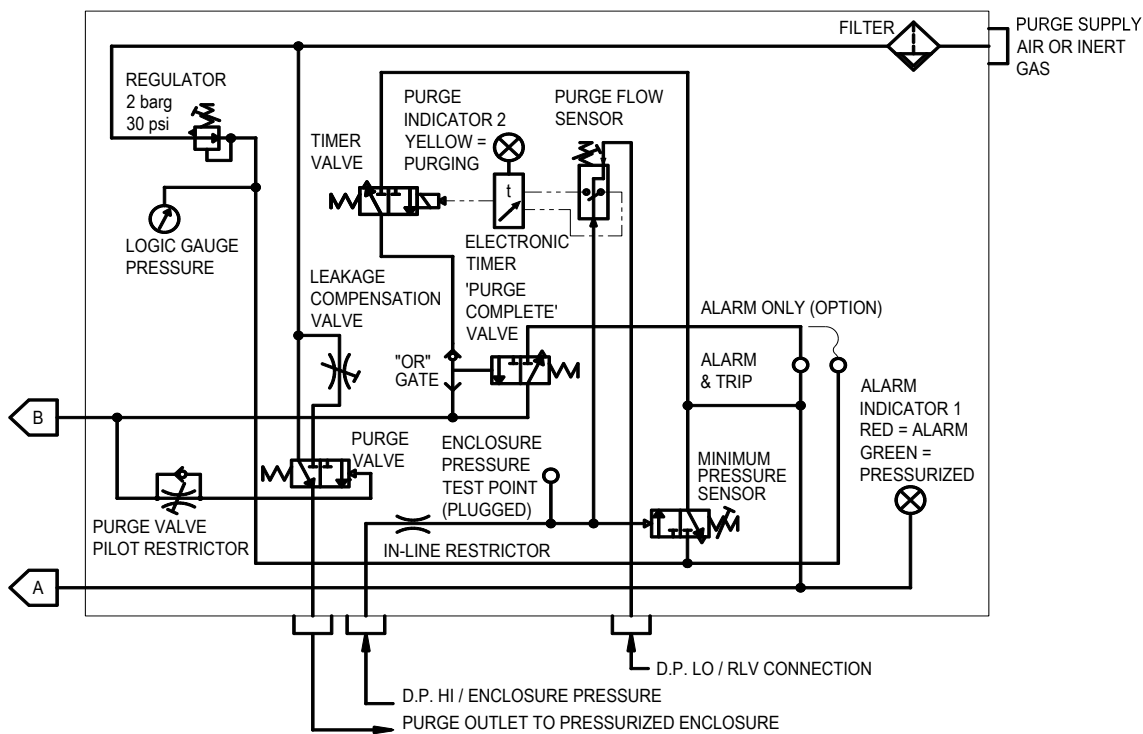


Figure 2. Leakage Compensation Circuit Diagram

## 5.4 Type of Output

The functions of the outputs are power control and alarm/pressurized indication. Power control provides a signal to switch the power to the PE. Alarm output provides a passive signal to indicate remotely when the enclosure is not pressurized and an active signal when pressurized.



## a) PO- Pneumatic Output

The power control and pressurized outputs are pneumatic signals, which may be used to operate other devices to provide power switching or alarm indication. The lack of any output signal indicates incomplete purge and alarm. In many instances these outputs may be connected to the Expo range of MiniPurge® Interface Unit s (MIU).



Figure 3. Typical MiniPurge Interface Unit type (MIU/dA)

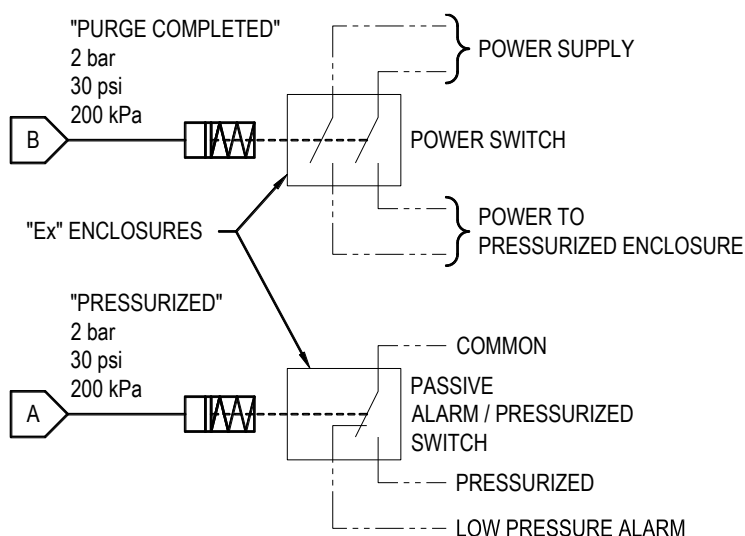


Figure 4. Pneumatic Output Option

## b) IS - Intrinsically Safe Output

The power control and alarm outputs are volt free contacts which form part of an Intrinsically Safe (IS) circuit which then provides power control or alarm outputs in a safe (unclassified) area. These contacts must only be connected to IS circuits as the switch contacts are in the hazardous area. In many instances these outputs may be connected to the Expo range of MiniPurge® Interface Units (MIU).

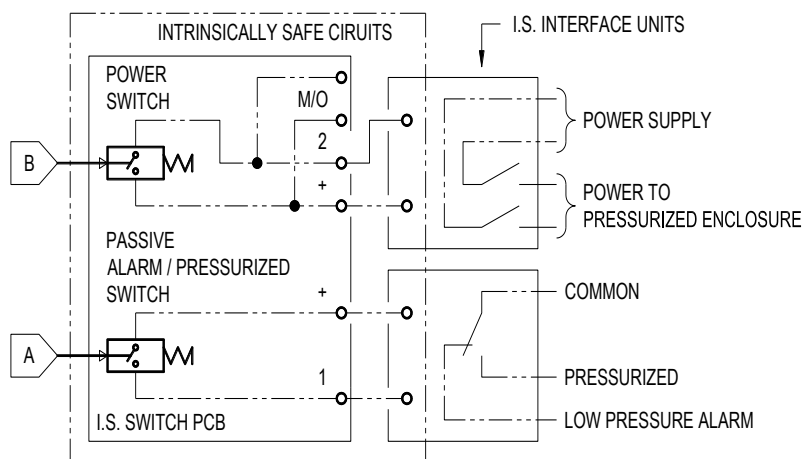


Figure 5. Intrinsically Safe (IS) Option

## c) PA - Power and Alarm

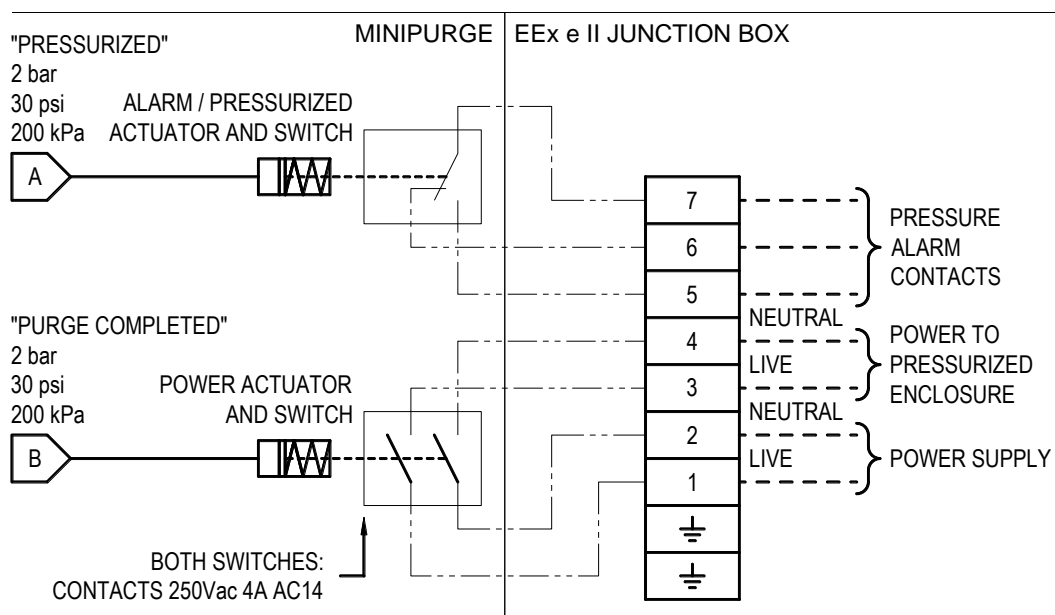


Figure 6. Ex de Power and Alarm (PA) Option

The terminal box is Increased Safety (Ex e) certified and incorporates the terminal connection points for the alarm and interlock circuits. 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

This MiniPurge® 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® system shall be installed in accordance with relevant standards, such as IEC / EN 60079-14, NEC 500, NFPA 496 and any local codes of practice that are in force.

There are up to three components for the MiniPurge® system, dependent upon the system type:

System type	Control Unit (CU)	Relief Valve (RLV)
Leakage Compensation	YES	YES

Table 1 System Components

### 6.1 Control Unit (CU)

The MiniPurge® system should be installed either directly on or close to the PE. See mounting details. Generally, the most convenient arrangement is to install the CU on the top of the PE. Must be mounted vertically as shown in MiniPurge® Configuration XBR-7TD0-003. The CU can be mounted on the side of the PE using the rear mounting fixings. The piped connections to the PE should be made using metallic tube through suitable bulkhead connections. The CU can be remote mounted using the wall mounting bars (/WM option) and should be installed as close as possible to the PE. It should be installed so that the system indicators and certification labels may be readily observed.

### 6.2 Relief Valve (RLV)

To achieve efficient purging the points where air enters and exits the PE should normally be at opposite ends of the PE. These items must be mounted vertically. The RLV is recommended on the side of the enclosure at the bottom, when the CU is top mounted on the enclosure, thus achieving top to bottom purging. The purge air may be piped within the PE to ensure purging of potential dead air spots.

It is important that the interior and exterior of the Spark Arrestor is kept clean and debris is not allowed to accumulate which might affect the calibration of the device. The exterior of the Spark Arrestor should not be painted or blocked off in any way.

### 6.3 Connections to Protective Gas Supply

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

The supply pipe connection to the MiniPurge® 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® 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® 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® 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.

### **6.4 Purge Air from CU to PE**

When the CU is mounted directly on the top of the PE, no connection will normally be necessary, as the purge air will discharge into the PE directly. When the CU is not mounted on the top, or where internal air distribution is necessary a connection should be made from the purge air outlet on the CU (normally 1/2" NPT Female for size 3, and 3/4" NPT female for size 4 MiniPurge®), via pipe pressure rated at least to the supply pressure, to the PE. This should be kept as short as possible and should be adequately sized to ensure that the full purge flow can be delivered.

### **6.5 CU to Enclosure Pressure Monitor**

When the CU is mount directly on top of the PE, no connection will normally be necessary, as the enclosure pressure monitor point will sense directly inside the PE. Only if the CU is not directly mounted or if there are fans, which may create localised low-pressure areas within the PE, it is necessary to pipe this connection. The connection is made to the enclosure pressure sensor fitting (normally 1/8" NPT Female) on the CU. There is virtually no flow in this circuit, so small bore tube may be used. Expo recommends 4mm O/D nylon tube. Make sure that all connections are free of leaks.

### **6.6 CU to Flow Sensor**

In Leakage Compensation (**LC**) systems a dedicated Purge Flow Sensor measures the differential pressure between the "DP HI (High) / Enclosure Pressure" and the pressure in the monitoring device at the back of the RLV "DP LO (Low) RLV Connection". This connection requires a 6mm pipe to connect the CU to the RLV75.

## 6.7 Power Supplies and their Isolation

All power entering the PE shall be provided with a means of isolation. This requirement also applies to any external power sources, which are connected to equipment such as "volt-free" or "dry" contacts within the PE. Printer signal, network cards, etc need isolation.

**Exception:** Power to other apparatus that is already suitable for the hazardous area need not to be isolated by the MiniPurge® system.

In all cases the application and the isolation of the power must be controlled by the MiniPurge® system. Refer to Specification Sheet for output options available.

## 6.8 Adjustments and Settings

### Purge Time

If no specific purge test has been performed on the PE, the volume of the PE must be determined by the manufacturer or user and the necessary purging time calculated based on the purge flow rate specified by the "standard" being used. It is the user's responsibility to verify or enter this data on the PE and/or MiniPurge® system nameplate. Ask Expo if in doubt. The IEC / EN 60079-2 permits 5 free volume changes and an example of the calculations is as follows:

If the PE external dimensions indicate an internal free volume of 2000 Litres then,  

$$\frac{2000 \text{ litres enclosure volume} \times 5 \text{ volume changes}}{900 \text{ litres/minute purge flow rate}} = 12 \text{ minutes purge time}$$

If the PE is a motor, experience of purge testing shows that it is prudent to multiply the motor internal "free" volume by ten to get the purging volume.

$$\frac{2000 \text{ litres enclosure volume} \times 10 \text{ volume changes}}{900 \text{ litres/minute purge flow rate}} = 23 \text{ minutes purge time}$$

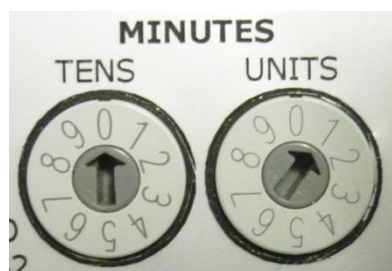
The following applies for NFPA 496 standards where 4 complete volume changes are permitted for enclosures except when the PE contains a motor when 10 volume changes are required.

If the PE external dimensions indicate a total volume of 90 cubic foot, then,  

$$\frac{90 \text{ cubic foot enclosure volume} \times 4 \text{ volume changes}}{32 \text{ cubic foot/minute purge flow rate, (see above)}} = 12 \text{ minutes purge time}$$

If the same PE contains a motor, then,  

$$\frac{90 \text{ cubic foot enclosure volume} \times 10 \text{ volume changes}}{32 \text{ cubic foot/minute purge flow rate, (see above)}} = 29 \text{ minutes purge time}$$



The standard MiniPurge® units have an adjustable electronic timer system as shown in *Figure 7. MiniPurge® Time Selector Switches*. The purge time is set by adjusting the Time Selector Switches so that the time equals or exceeds the required purge time. **If the time is set to '00', the purge time will be indefinite.**

Figure 7. MiniPurge® Time Selector Switches

## **Action on Loss of Pressurization**

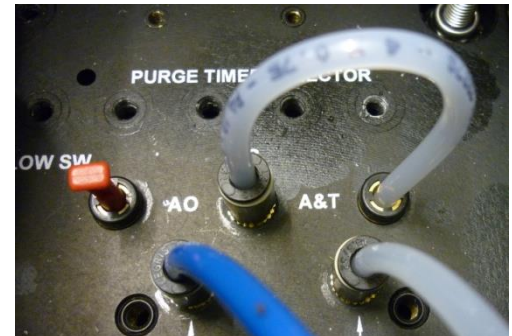
The action on loss of pressurization is the responsibility of the user.

The action on loss of pressurization can be set to ALARMS ONLY (AO), or ALARM AND AUTOMATIC DISCONNECT OF POWER (A&T).

## **Leakage Compensation**

The action on loss of pressurization is set by moving the jumper tube (see Figure 8 Action on Loss of Pressurization Jumper Tube). The standard setting is Alarm and Trip where the link is from C to A&T, with a plug in AO. Changing to Alarm Only (AO) is user adjustable by moving the link from C to AO, and plugging A&T.

Figure 8. Action on loss of pressurization jumper tube



### **Zone 1 Installations:**

Alarm and automatic disconnect of power.

Exception: If the equipment inside the PE is suitable for use in Zone 2, the power trip may be performed manually, (no automatic power trip), if the pressure or flow failure persists for an unacceptable time.

### **Zone 2 Installations:**

Where automatic is preferred, Alarm Only on pressure failure with power being removed manually by turning off the air supply to the MiniPurge® system if the failure persists for an unacceptable time.

### **Class I Division 1 Installations:**

Alarm and Automatic Trip of Power. Note: NFPA 496 states power to the circuits shall be permitted to be continued for a short period if immediate loss of power would result in a more hazardous condition and if both audible and visual alarms are provided at a constantly attended location.

### **Class I Division 2 Installations:**

Where automatic timing is preferred, Alarm Only on pressure or flow failure with power being removed manually by turning off the air supply to the MiniPurge® system if the failure persists for an unacceptable time.

## **6.9 Internal Gas Release**

If the PE contains an internal source of release of flammable gas or vapour, the procedures for assessment of the release as given in NFPA 496 or IEC / EN 60079-2 should be used. Expo is pleased to aid or consultancy and advice on such matters.

The user must verify that the specifications of the Expo system e.g., pressure, type of protective gas are correct for the specific application.

## **6.10 Multiple Enclosures**

More than one PE can be protected by a single system. Where PEs are connected and purged in "series" e.g., "Daisy Chained", the RLV should be fitted on the last enclosure with the Purge Inlet connected to the first enclosure. The bore and length of the pipe or conduit used to interconnect the enclosures is critical and will determine the maximum pressure experienced by the first enclosure in the series. Advice on sizing can be obtained from the Expo sales office but in general terms when using RLV75, the pipe bore size should not be less than 75mm (2").

A common fault of installing small bore pipe leads to over pressurizing of all but the last enclosure.

PEs should not be connected in parallel.



## Section 7: Commissioning

Start by check that the system has been installed in accordance with this manual.

Disconnect the supply pipe from the inlet to the MiniPurge® system and blow it through for at least 10 seconds per meter (3ft) of length to remove any debris or condensation.

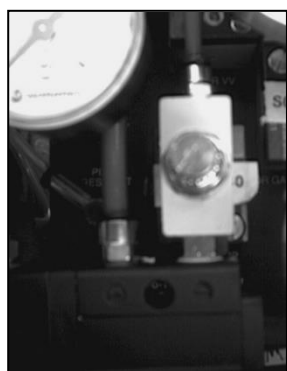
Connect a temporary pressure gauge or water manometer to the PE or MiniPurge® system pressure test point (Remove the red plug on the low pressure sensor and connect 4mm OD nylon tube).



Figure 9. PE or MiniPurge® system pressure test point

Unless a supply shut-off valve has been specially fitted inside the MiniPurge® system, it may be advisable to install an external shutoff valve with the same, or larger, thread size as the MiniPurge® CU inlet fitting upstream of the connection.

### 7.1 Leakage Compensation Systems (LC)



- Open the Leakage Compensation Valve (LCV) fully, turn anti-clockwise. Clockwise will reduce the flow and anti-clockwise will increase the airflow.
- Open the supply regulator SLOWLY and allow the PE pressure to rise until the RLV opens.
- Check that the RLV opens at or below the figure specified in the documentation.  
RLV tolerance of +0, -20% of default setting.
- Repeat the test several times.

Figure 10. Leakage Compensation Valve

- Open the supply regulator to between 4 and 8 barg / 60 and 115 psi / 400 and 800 kPa and the purging flow will start.
- Check that the internal logic gauge reads 2 bar / 30 psi / 200 kPa

At this time, the "alarm/pressurized" indicator should be green, and the "purging" indicator should be yellow. If the yellow indicator remains black, the flow through the RLV is below the minimum for which the flow sensor has been calibrated.

Check the air supply pressure at **the inlet to the Control Unit while purging is taking place**. It must be above the minimum specified.

The electronic purge timer will start as soon as the "purging" indicator starts flashing yellow. Check that the time delay between the "purging" indicator flashing yellow and the application of power to the PE is not less than the minimum time required purging the PE. Times more than the minimum are permitted. If the time is too short it must be increased accordingly.

After the power has been applied via the CU, the purging valve will close and the air flow into the enclosure will be controlled by the LCV. The initial setting of fully open will normally be too high. It should now be adjusted to set the PE pressure and leakage. There are three possible situations:

Air continues to come out through the RLV Spark Arrestor after power has been applied in considerable quantity. The LCV is much too far open, and the air flow is holding the RLV open continuously.

Close the LCV slowly. The PE pressure will start to fall as the flow decreases but eventually the RLV will close, and the enclosure pressure rise again. At this point the RLV may start to open intermittently as the PE pressure rises to the point where it exceeds the RLV opening pressure. When the RLV opens the pressure will fall quickly to the point where the RLV re-closes and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV.

If the RLV is opening intermittently the LCV is slightly too far open. When the RLV opens the enclosure, pressure falls quickly to the point where the RLV re-closes and the enclosure pressure starts to rise again. This is entirely normal for this type of RLV and shows that it is working correctly.

Continue then to close the LCV until the cycling stops and the enclosure pressure starts to fall. Carefully adjust the LCV until the PE pressure is approximately 50% of the RLV opening pressure and stable. This pressure may be around 5 mbarg / 2" WC / 500 Pa and will be the "normal working pressure".

We recommend that the setting of the minimum pressure sensor be checked at this time. Note the position of the LCV knob. (A pencil mark placed on the knob at "12 O'clock" can be used). Slowly lower the PE pressure by closing the LCV further, counting the number of turns from the "normal working pressure" position. Note the pressure at which the "alarm/pressurized" indicator turns from green to red and check that it is not lower than the figure given in the documentation. Check also the "alarm" electrical contacts. As soon as the "alarm/pressurized" indicator turns red, the system will start to re-purge. If Alarm and Trip function is selected the enclosure power will be switched off.

While it is re-purging return the LCV to its "normal working pressure" position so that, at the end of purging, the enclosure pressure should immediately settle down at the correct "normal" pressure.

If, at the end of purging, the PE pressure falls below the minimum pressure sensor setting and the LCV is fully open, the system will start to purge again. This is indicative of excessive leakage from the enclosure. In this case, check the enclosure for leakage, and reduce or eliminate the leaks. This time, at the end of purging, the enclosure should stay pressurized and the RLV action is as in a) or b) above. Proceed as described above.

## 7.2 Normal operation

Turn the air supply on or off to start or stop the system. After this the pressurizing and purging sequence is entirely automatic



## Section 8: Maintenance of the System

The maintenance recommended for the system consists of the following items, supplemented by any additional local requirements imposed by the local Code of Practice. Expo recommends that the commissioning tests be repeated at least every six months.

In addition, the following checks are also recommended at that time:

- Check the RLV and all Spark Arrestors. Remove all debris & corrosion or replace with a spare.
- Check the condition of the air supply filter element. Clean or replace it, as necessary.

At least every two years check the following additional items:

- Apparatus is suitable for the Hazardous Location
- There are no unauthorised modifications
- The air supply must be to the correct quality, refer to section Air Quality
- The interlocks and alarms function correctly
- Approval labels are legible and undamaged
- Adequate spares are carried
- The action on pressure failure is correct

The Intrinsically Safe Battery Pack should be changed at least every three years, and the commissioning tests repeated. After the timing phase has elapsed, the battery may be 'hot-swapped' in a hazardous environment without effecting the operation of the MiniPurge® Ex px system.

### Recommended spares

ETM-IS31-001 Intrinsically Safe Battery Pack

### Pressure sensor calibration

If it is decided that the minimum pressure / purge flow sensor needs recalibrating it must be returned to Expo for this service.

### Filter cleaning

If the filter element needs cleaning the filter bowl can be unscrewed and removed. The filter element also unscrews and can then be cleaned in soapy water or replaced. Do not use solvents on any part of the filter assembly.

## Section 9: Fault Finding

If the system does not behave in the manner described above, there is a fault. Some of the more likely faults are dealt with below. If a cure cannot be effected by following the procedure shown below, please call Expo (24 hour answering) or your supplier for further assistance.

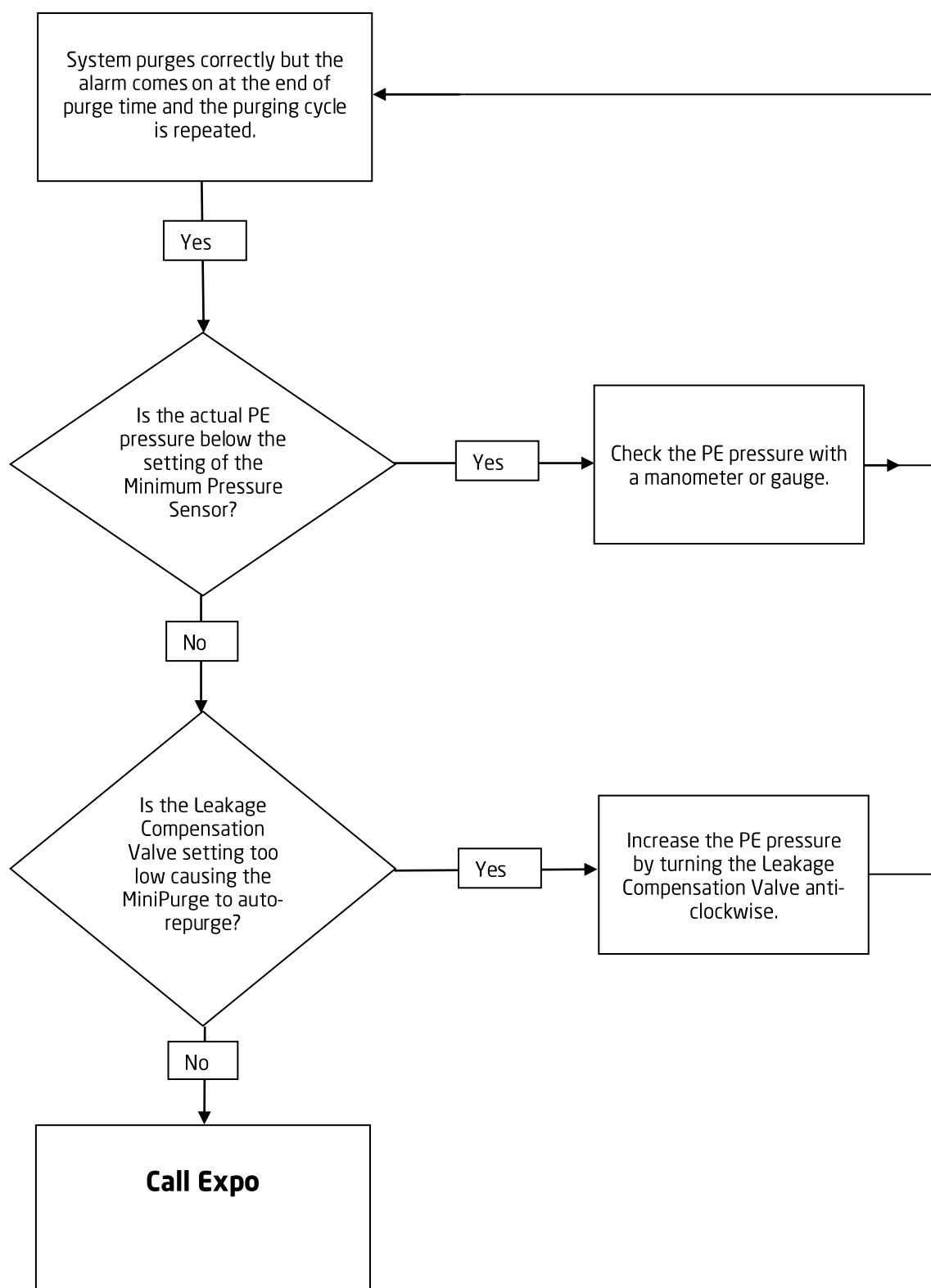
The system has been designed for ease of fault finding and the many of the components fitted are plug-in or manifold mounted. Check components by substitution only after establishing that such action is necessary. If the system is less than 12 months old, parts under warranty should be returned to Expo for investigation, with a full report of the fault and the system serial number.

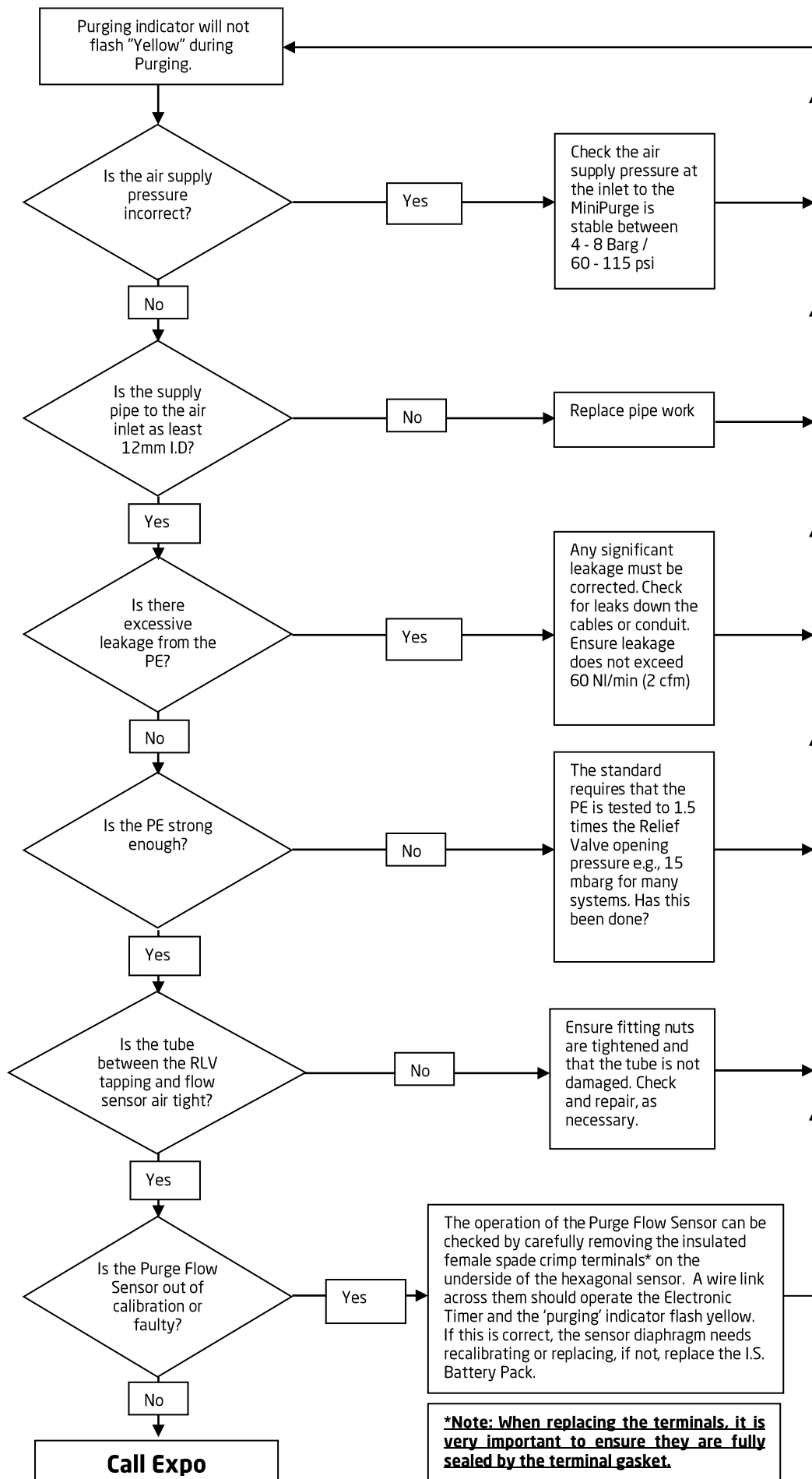
As with any pneumatic system the greatest enemies are water, oil, and dirt in the air supply. For this reason, the air system must always incorporate a dust and water filter. This can be part of the Expo system or can be provided by others. However, dirt can enter from other sources and it is vital therefore that the procedures described be carried out before using the system for the first time or following any disconnection of the pipe-work. Failure to perform this work may cause damage that will not be covered under warranty.

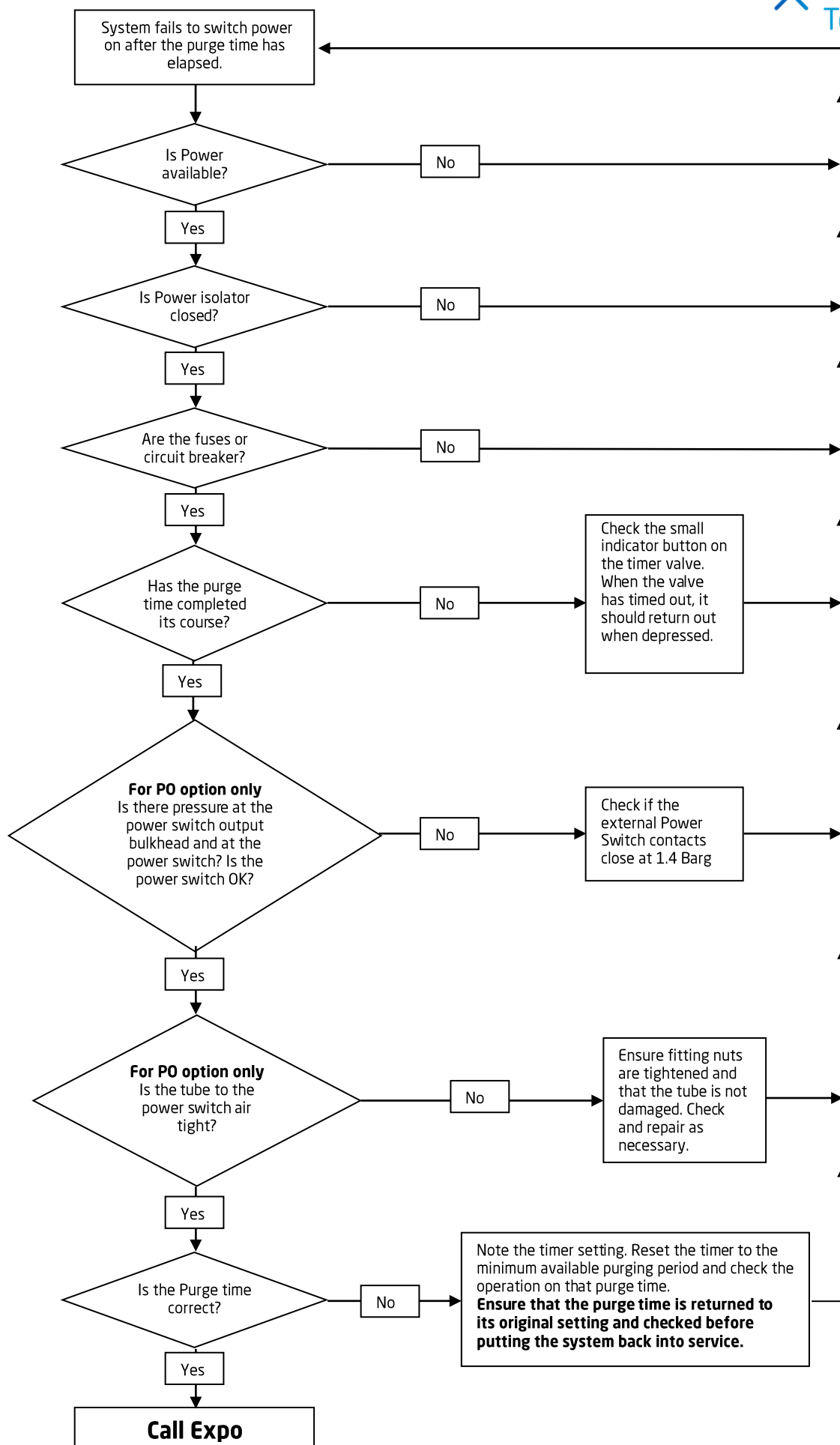
Before making the following checks verify that both the main air supply pressure to the purge system & the regulated pressure to the logic are as specified on the system specification sheet.

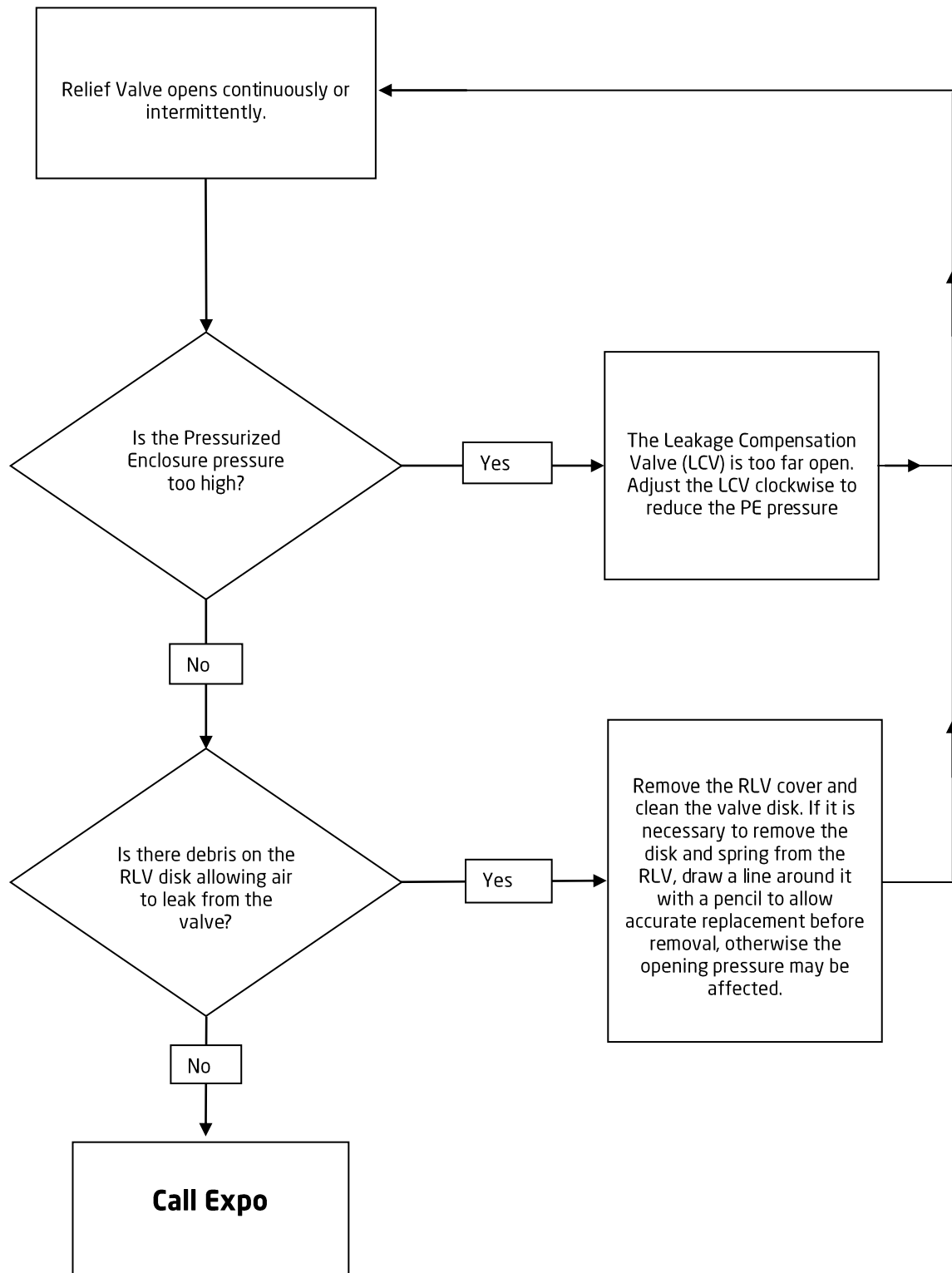
Flow charts for faulting have been provided for LC option.

## Fault Finding (LC)









## Section 10: Glossary

Acronym	Description
A&T	Alarm and Trip
AO	Alarm Only
CF	Continuous Flow
CU	Control Unit
FCV	Flow Control Valve
FM	Factory Mutual
IS	Intrinsically Safe
LC	Leakage Compensation
LCV	Leakage Compensation Valve
MIU	MiniPurge® Interface Unit
PA	Ex d Power and Alarm Switch Wired to Ex e terminal box
PE	Pressurized Enclosure
PO	Pneumatic Output
RLV	Relief Valve
SAU	Spark Arrestor Unit

## Section 11: Drawings and Diagrams

Title	Drawing Number	Number of Sheets
MINI PURGE SIZE 3X	XBR-7000-004	3
MINI PURGE SIZE 4X	XBR-7000-005	3
MINIPURGE CIRCUITS	XBR-7TD0-026	3
MINIPURGE CUTOUTS	XSD-7TD0-002	3
RELIEF VALVE DIMENSIONS	XSD-RTD0-003	2
RLV52 HIGH FLOW WITH ORIFICE BLOCK	XBR-RTD0-013	1
RELIEF VALVE TYPE RLV75	XBR-RTD0-014	1

## Section 12: Certification

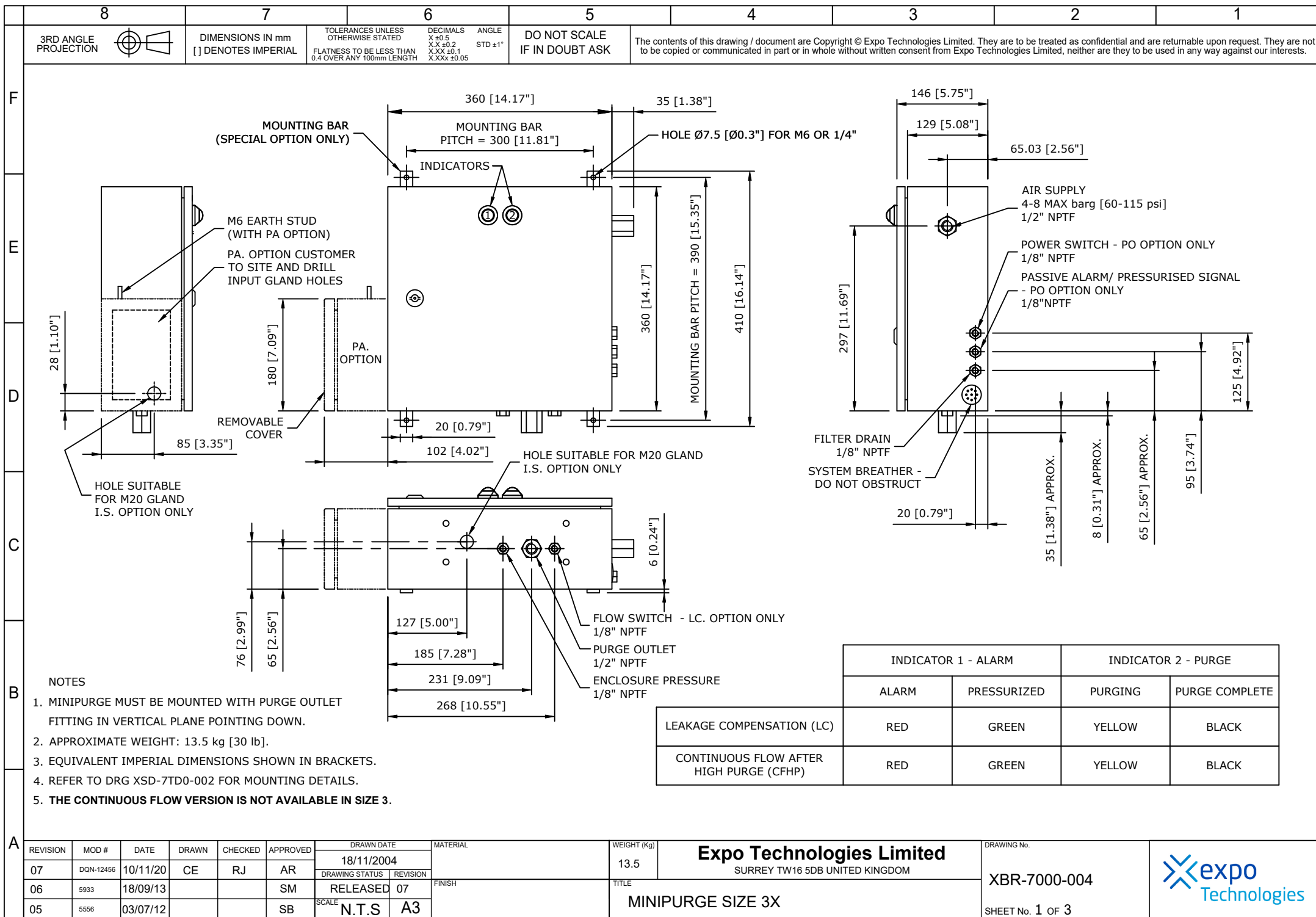
Certificates can be found in the accompanying booklet (ML499) or download the certificates at [www.expoworldwide.com](http://www.expoworldwide.com)

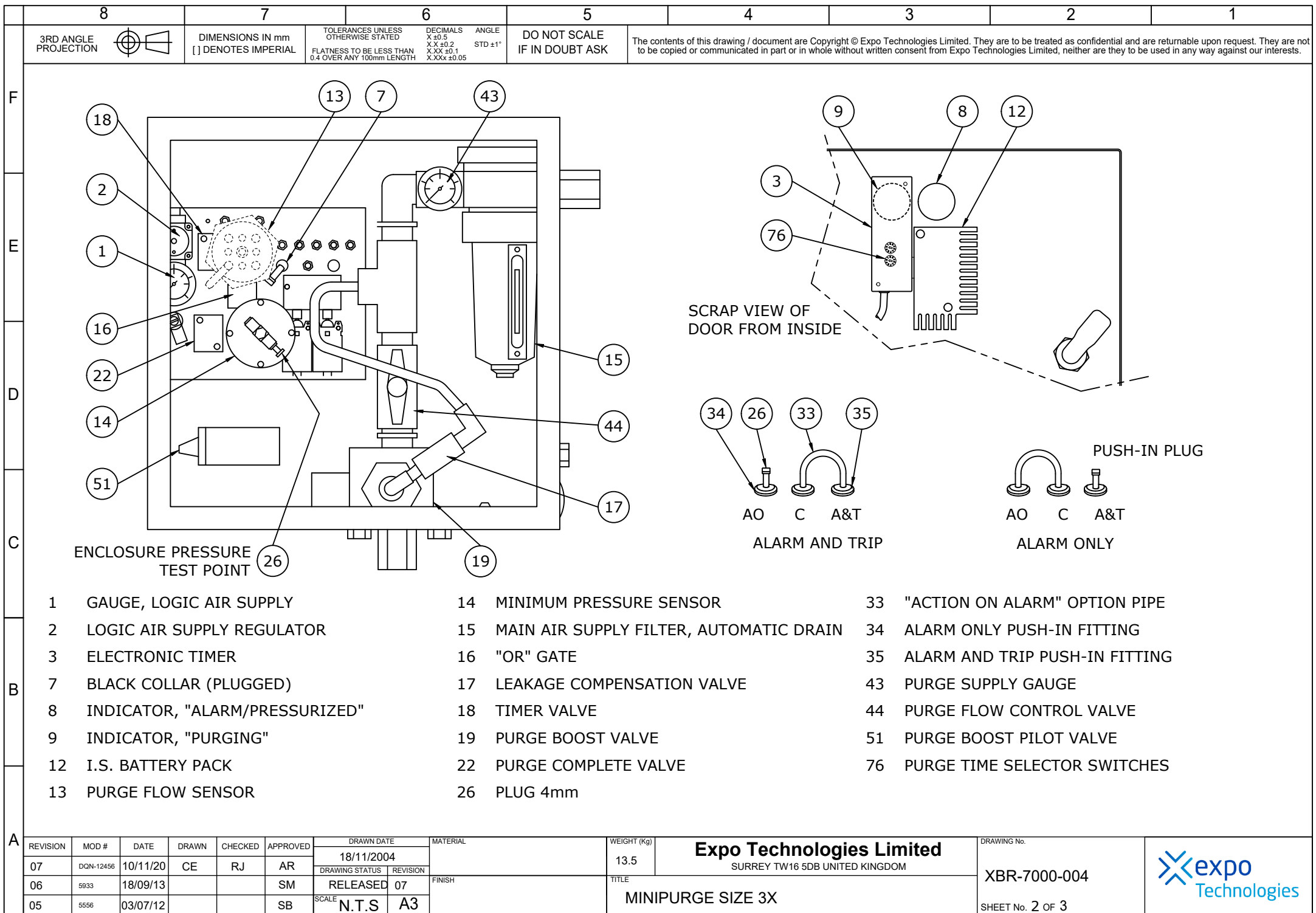
System	Certificate	Certificate Number
MiniPurge®	IECEX Certificate	IECEX SIR 07.0027X
	ATEX Certificate	01ATEX1295X
	INMETRO/TÜV	TÜV 12.1462X
	FM Certificate	1X8A4.AE
Electronic Timer	IECEX Certificate	FME 10.0001X
	ATEX Certificate	10 ATEX0003X
For PA Option Only	Certificate	Certificate Number
Ex e junction box	IECEX Certificate	IECEX EXV 19.0057X
	ATEX Certificate	ExVeritas 19 ATEX0542X
	INMETRO/TÜV	TÜV 12.1463
Ex d switches	IECEX Certificate	IECEX EPS 14.0092X
	ATEX Certificate	EPS 14 ATEX 1 766 X

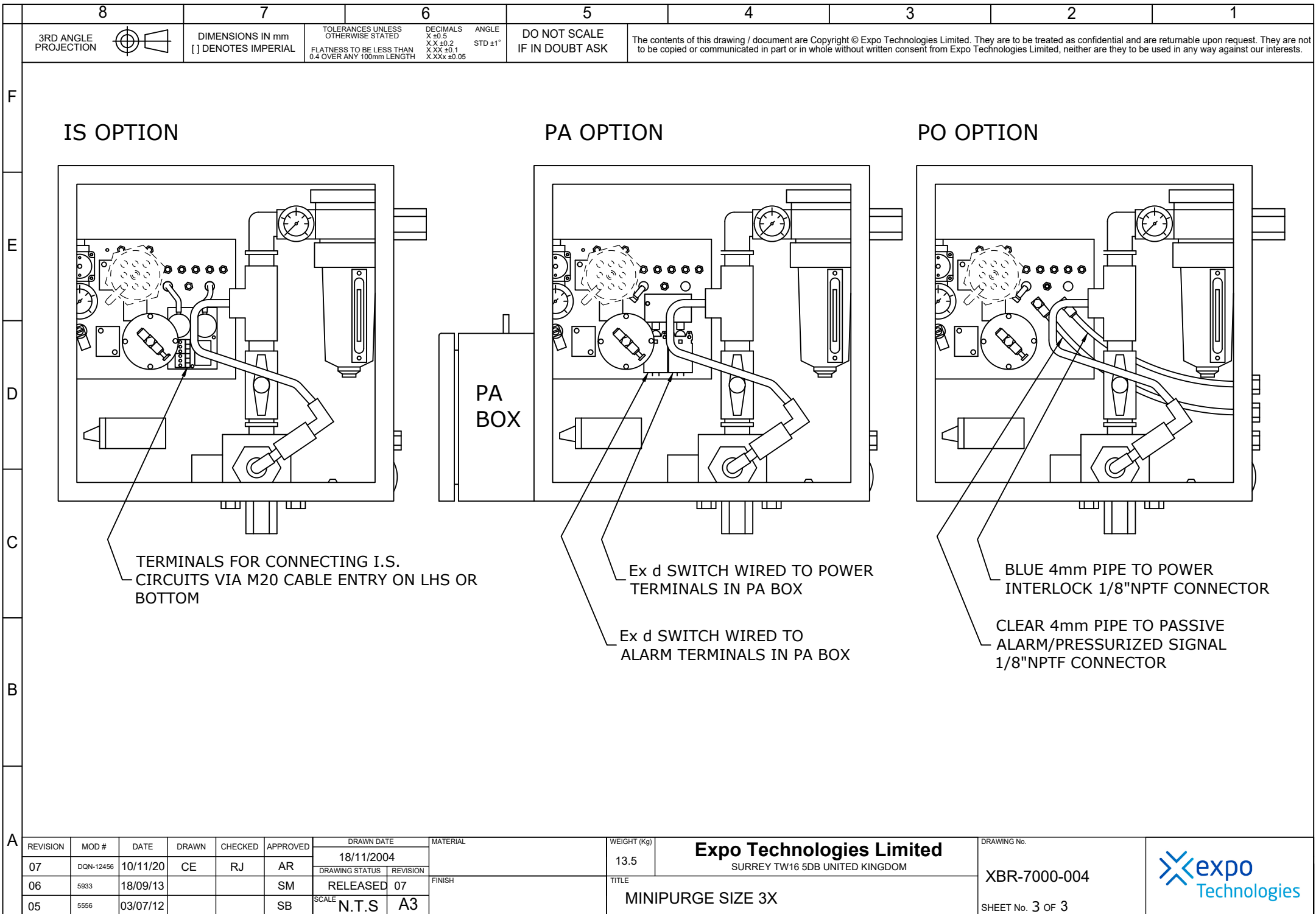
MiniPurge Interface Unit MIU/e User Instruction Manual

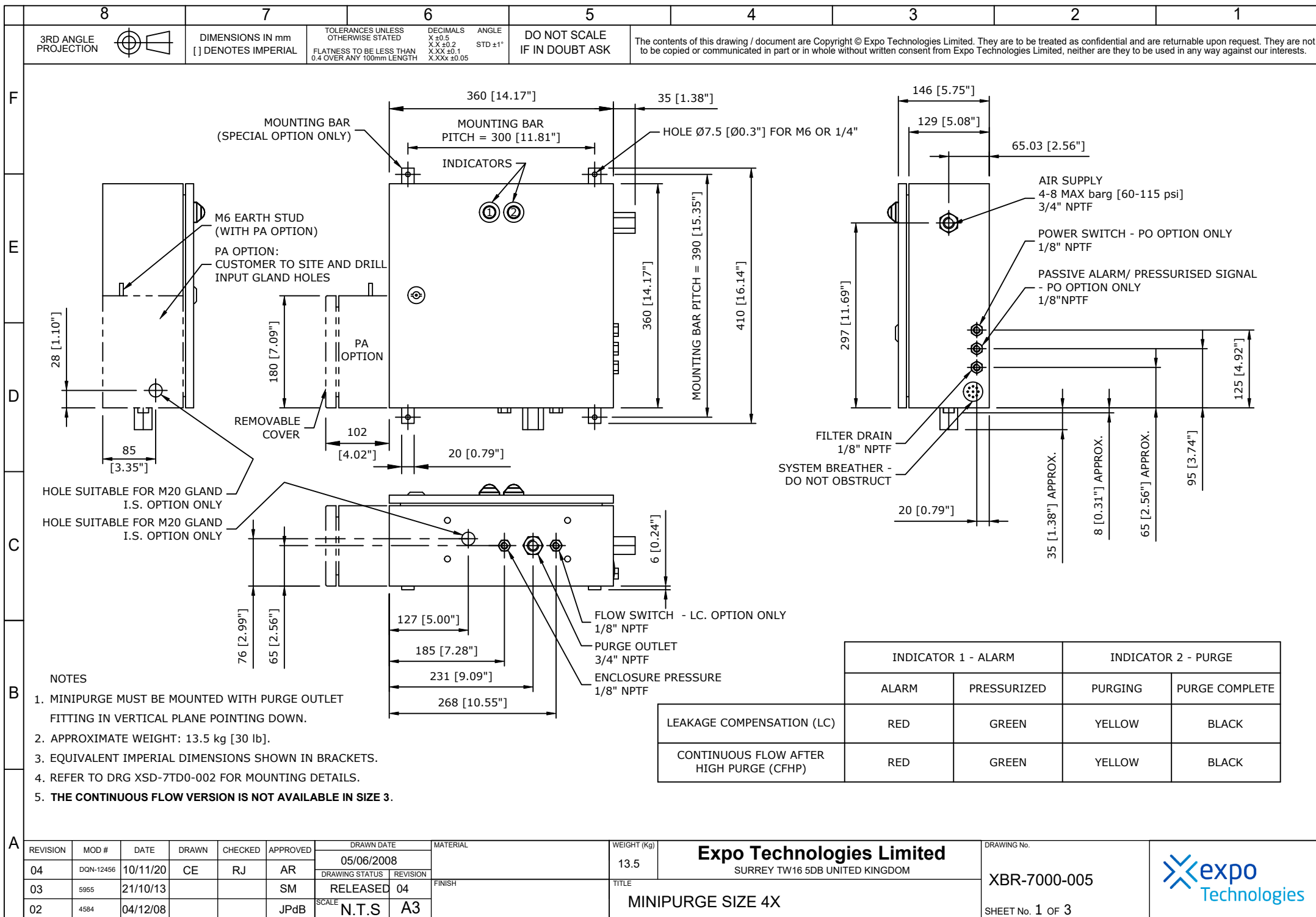
EU-Declaration of Conformity SC004

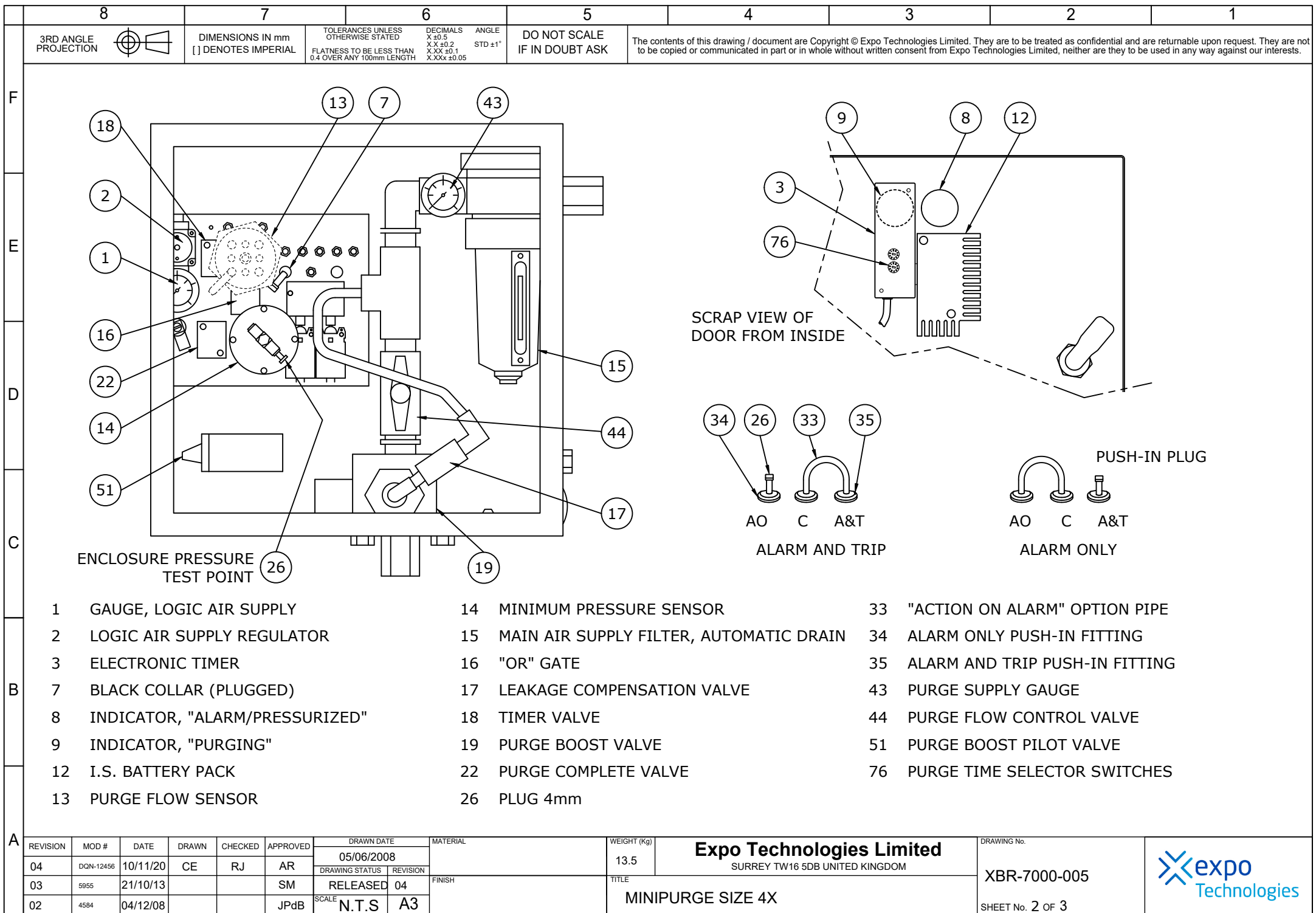


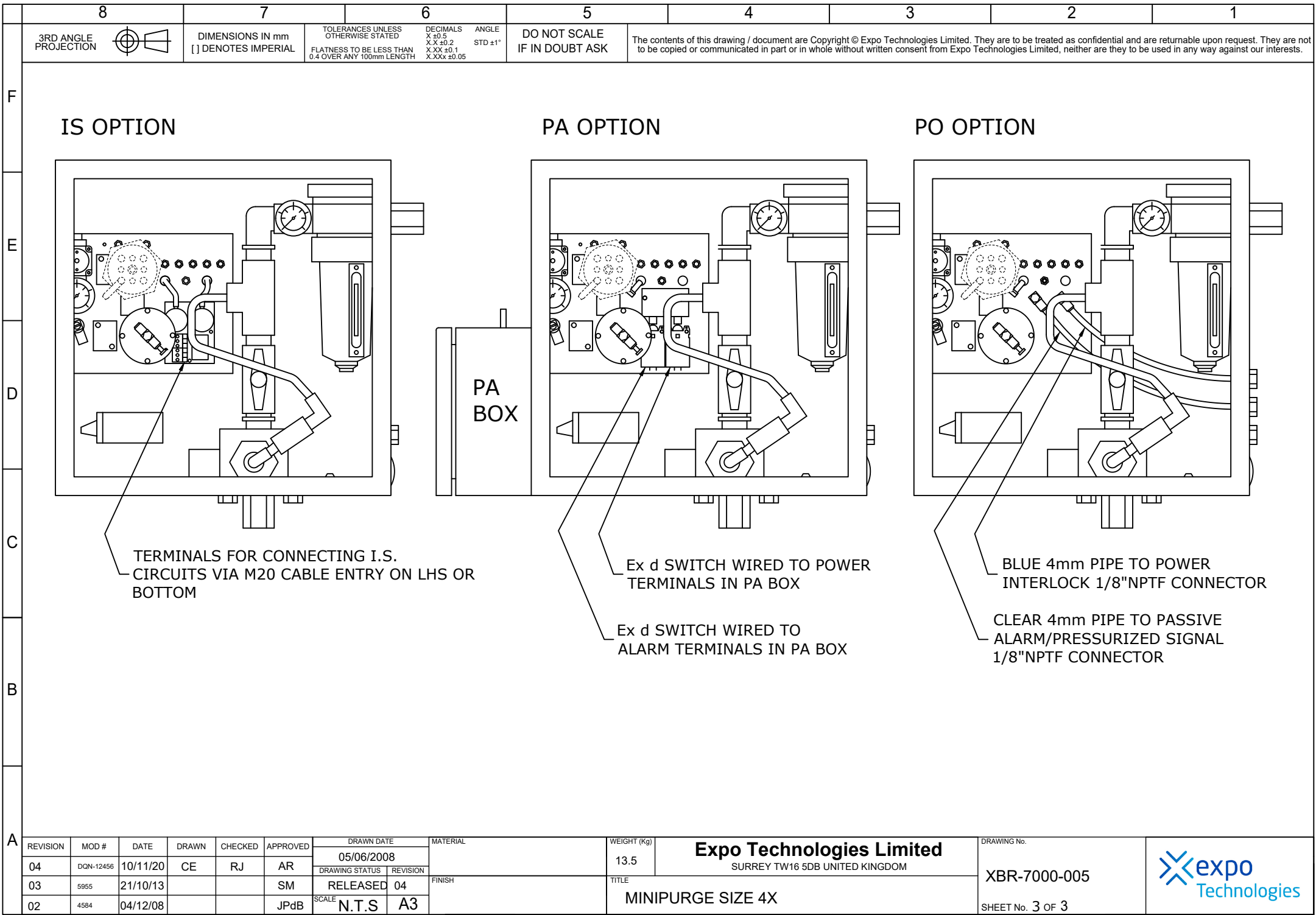


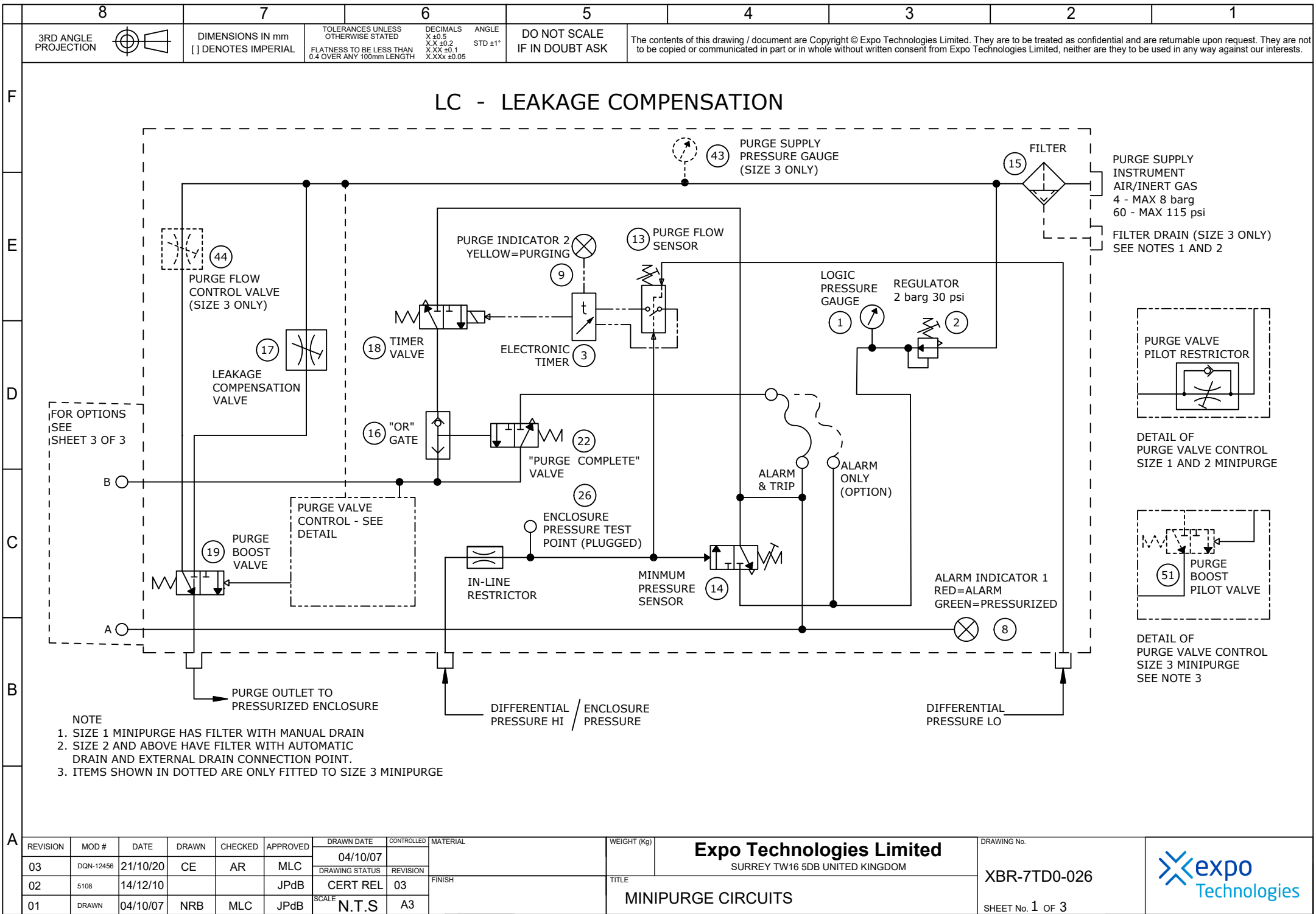






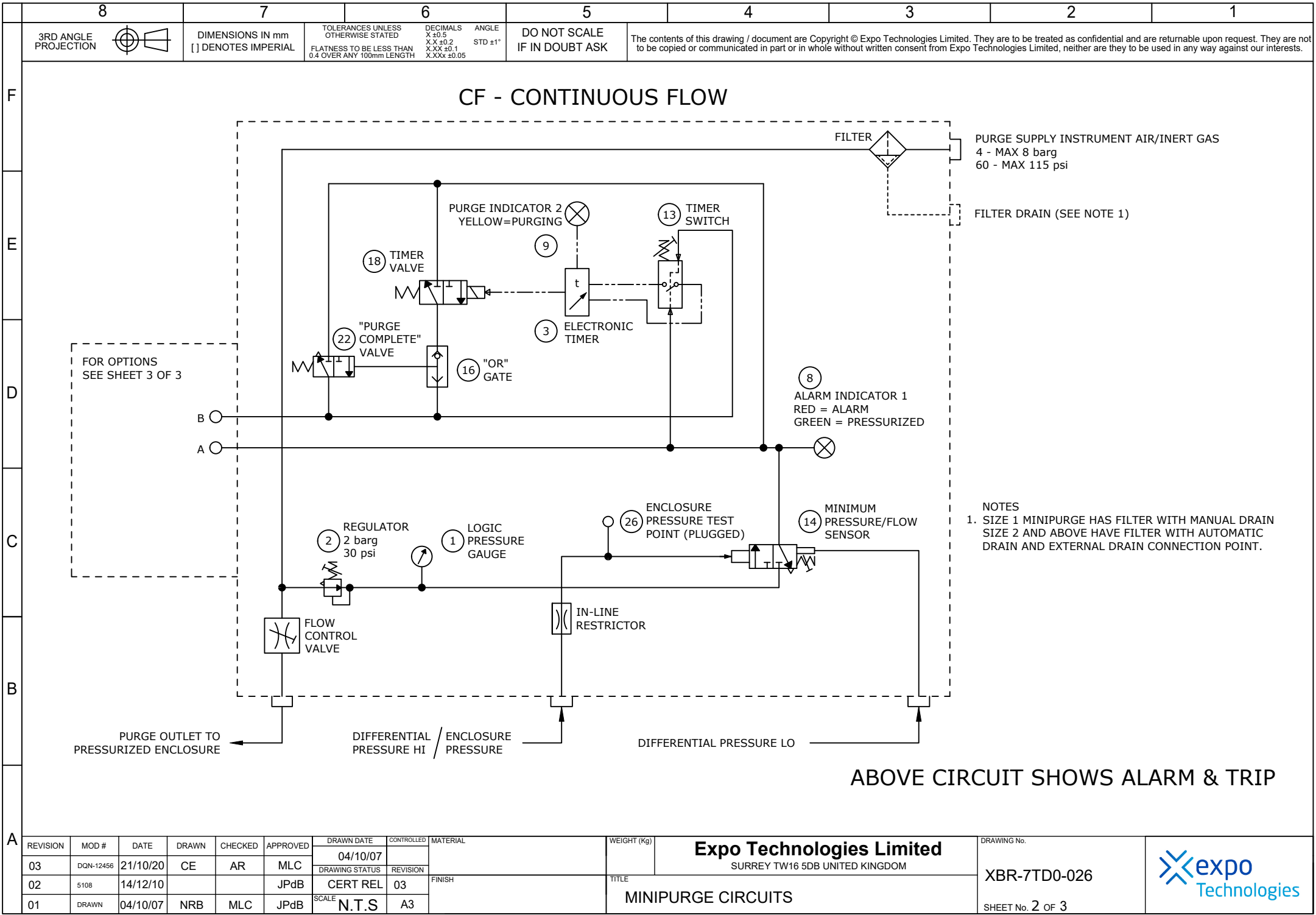






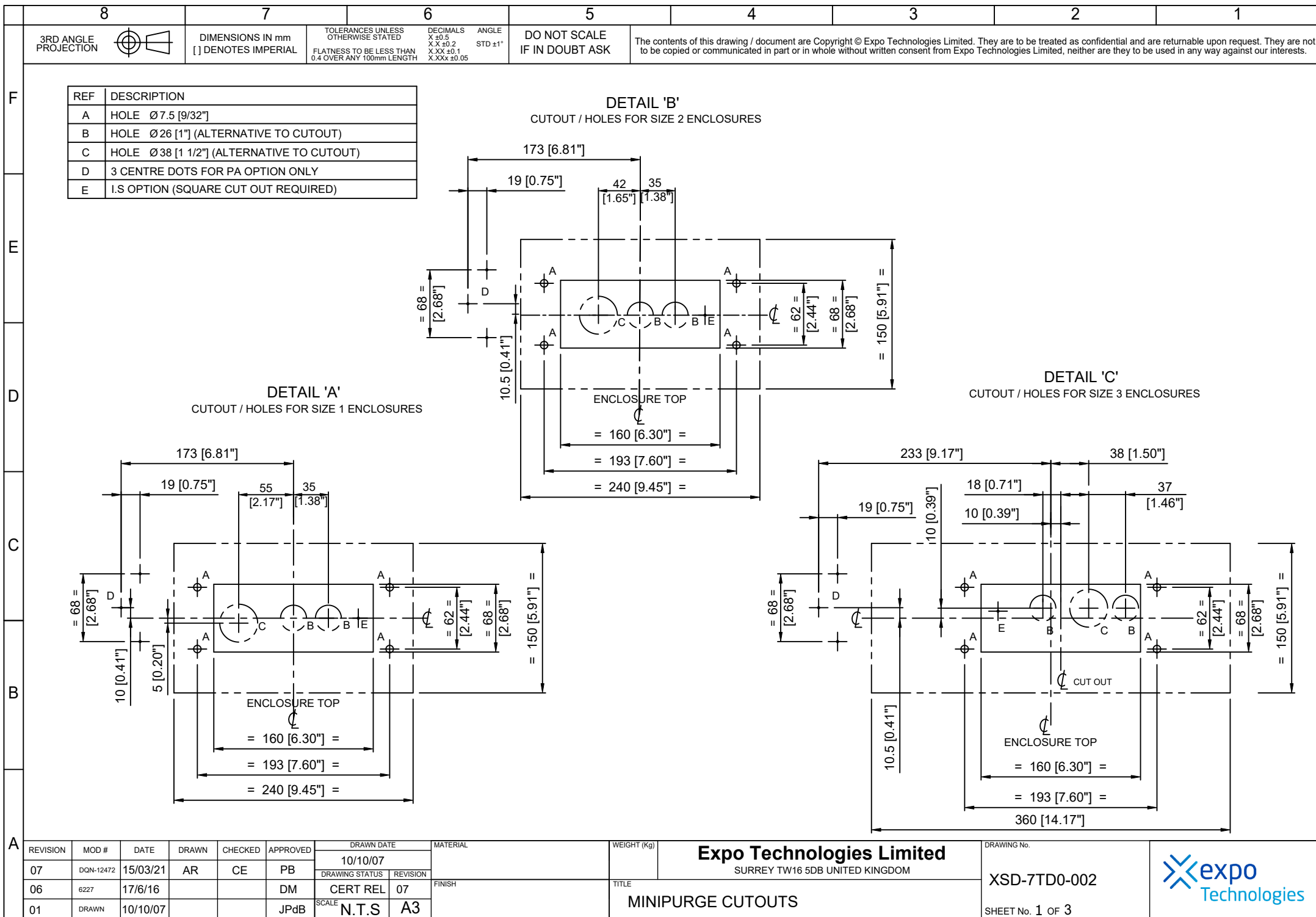
MINIPURGE CIRCUITS

SHEET No. 1 OF 3

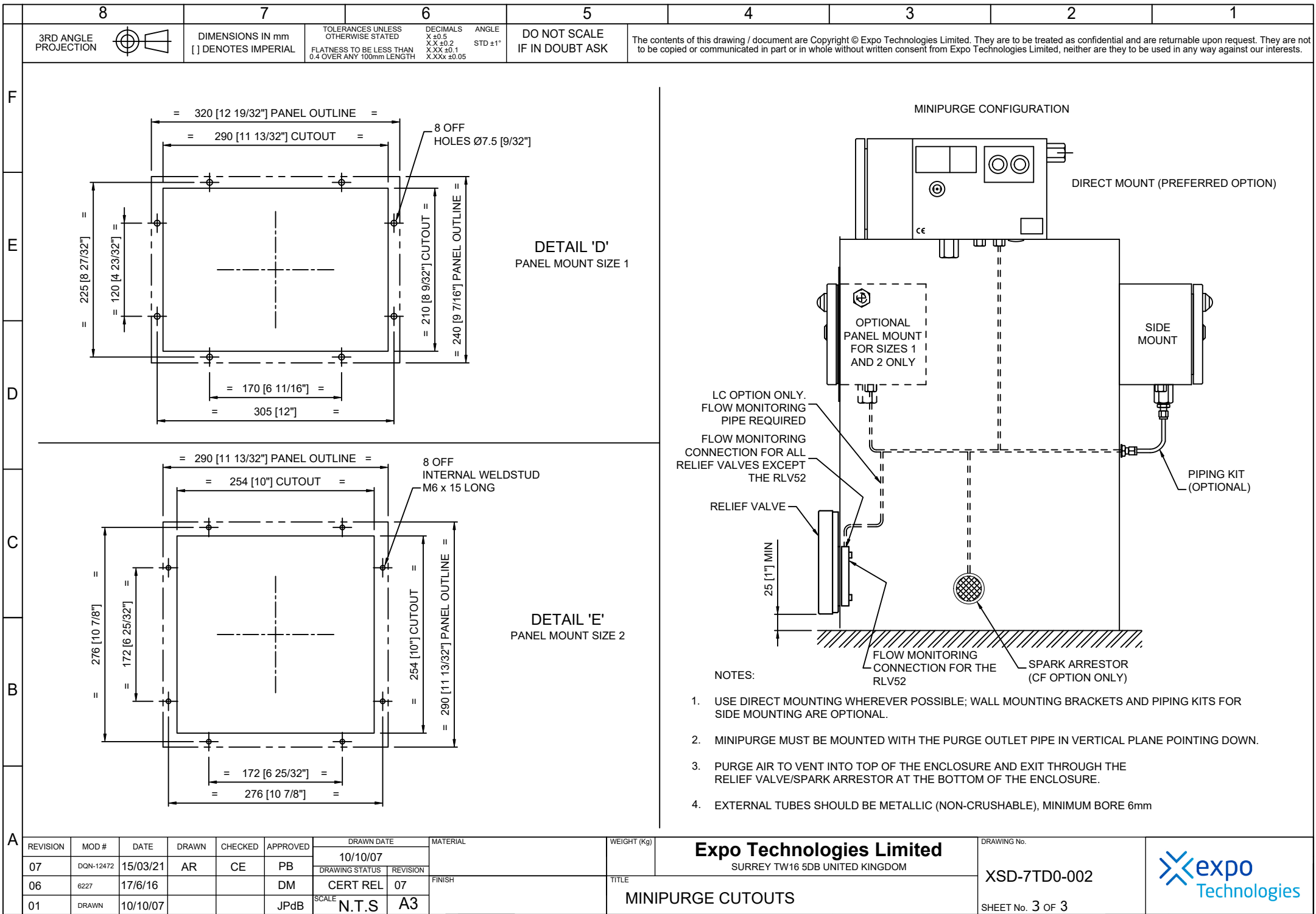




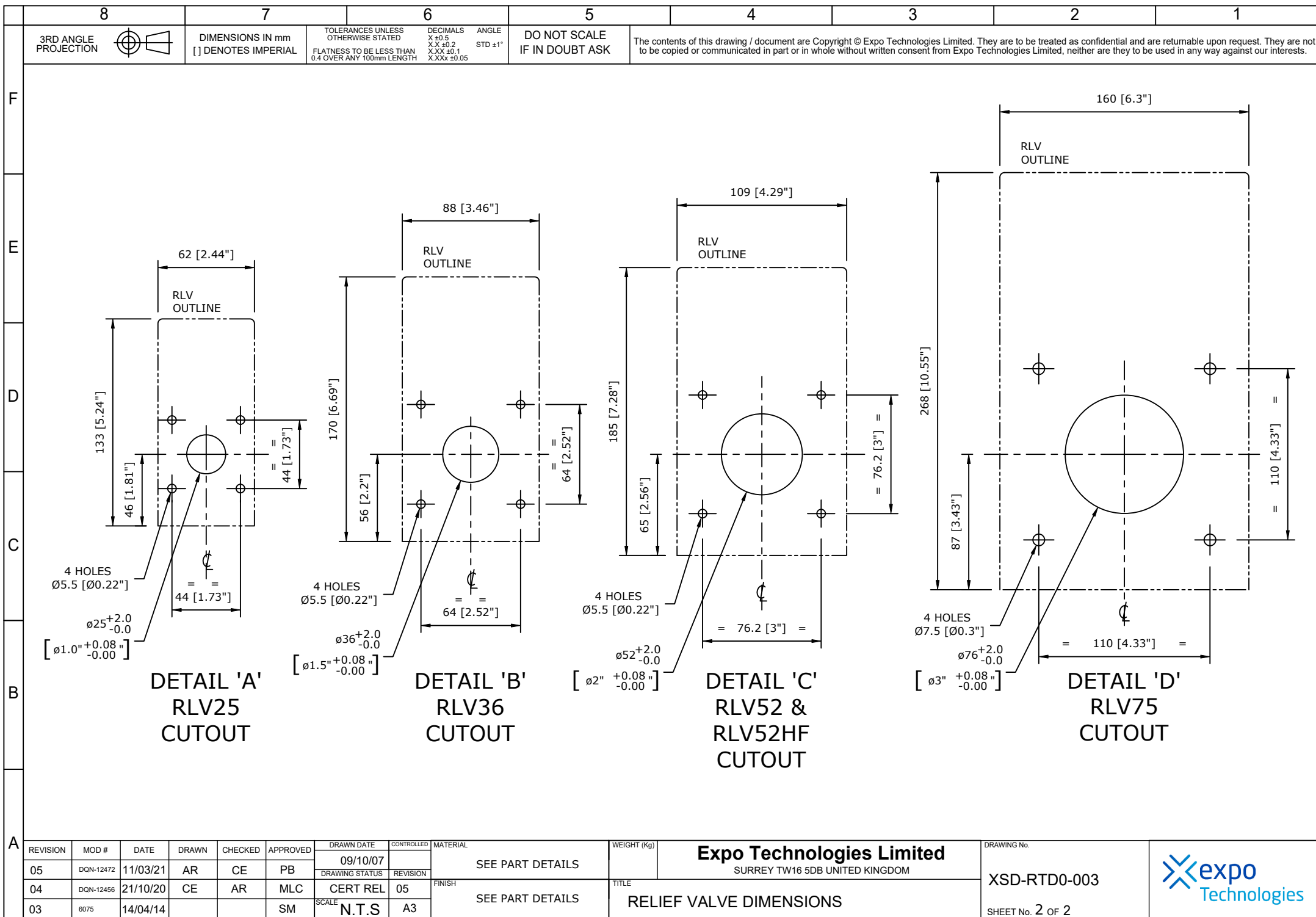




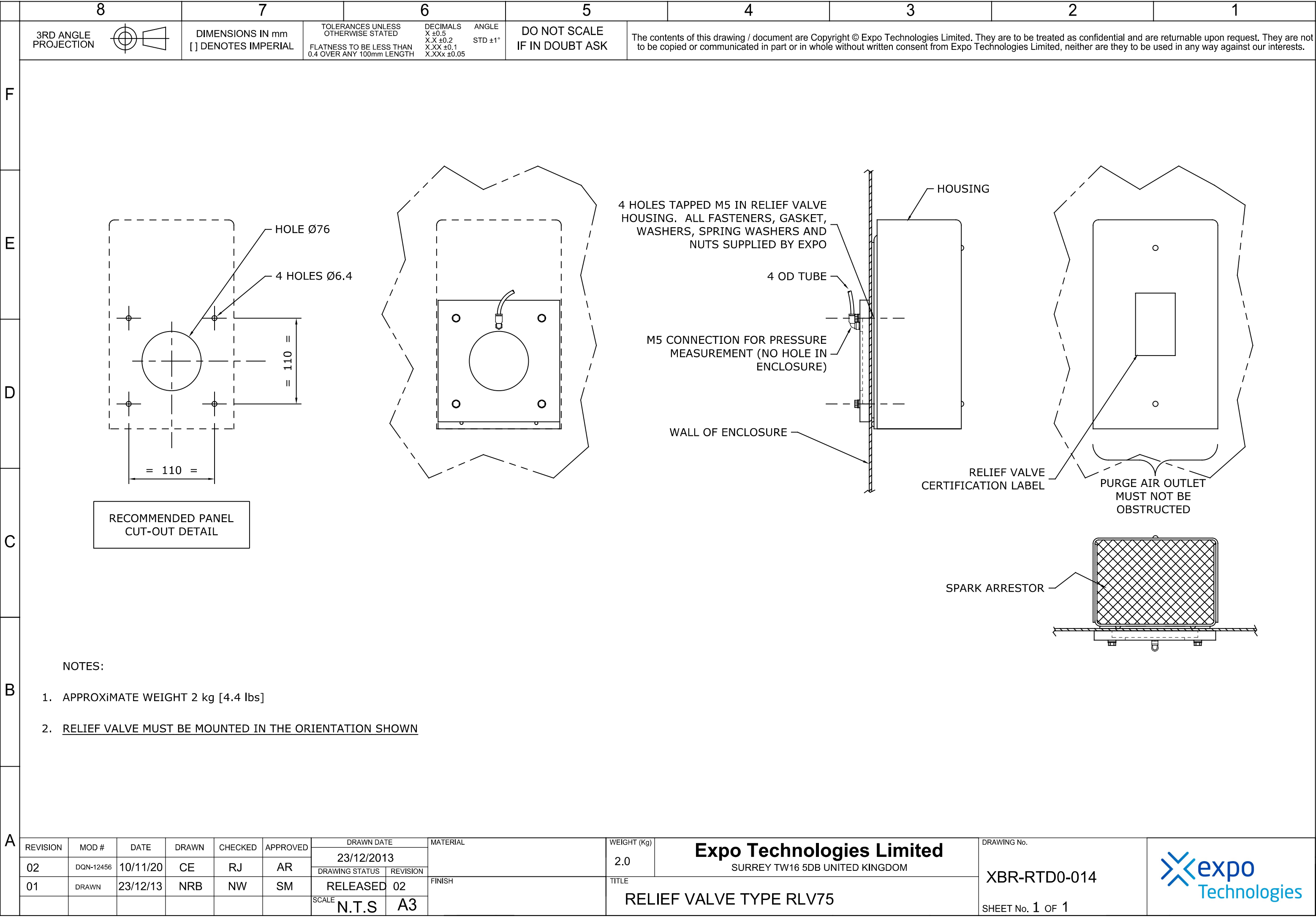














# MiniPurge Interface Unit MIU/e User Instruction Manual

Manufacturer: **Expo Technologies Ltd**, Unit 2 The Summit, Sunbury on Thames. UK.

Model Type & Rating:

MIU/e1	MIU/e2	MIU/e1/MO
400V / 7A	400V / 7A	400 V / 2A

Certificates:

Hazardous Area Marking Code:

IECEx EXV 19.0057X	ExVeritas 19 ATEX 0542X	TUV 12.1463
Ex eb IIC T5 Gb Ex tb IIIC T100°C Db Tamb -20°C to +55°C	Ex II 2 G Ex eb IIC T5 Gb Ex II 2 D Ex tb IIIC T100°C Db Tamb -20°C to +55°C	Ex e IIC T5 Gb Ex tb IIIC T100° Db IP66 Tamb -20°C to +55°C
Ex eb IIC T4 Gb Tamb -20°C to +60°C	Ex II 2 G Ex eb IIC T4 Gb Tamb -20°C to +60°C	Ex e IIC T4 Gb Tamb -20°C to +60°C

## APPLICATION SUITABILITY

The MiniPurge Interface Units – MIU/e are certified for use in Hazardous Areas where the Hazardous Area is non-mining (i.e. above ground) and the hazard is caused by flammable gasses or vapours.

The systems may be used in ATEX/IECEx Gas Zones 1 & 2, Gas Groups IIA, IIB & IIC and in Dust Zones 21 & 22, Dust Groups IIIA, IIIB & IIIC.

The following materials are used in the construction of MIU/e: Stainless Steel, Steel, Brass, Copper, Polyamide, Silicone. If substances that will adversely affect any of these materials are present in the surrounding environment, please consult Expo Technologies for further guidance. This equipment is designed for use under normal industrial conditions of ambient temperature, humidity and vibration. Please consult Expo Technologies before installing this equipment in conditions that may cause stresses beyond normal industrial conditions.

**WARNING - Only install, commission, inspect, maintain or fault find when safe to do so.**

## INSTALLATION

The MIU/e shall be installed in accordance with relevant standards, such as IEC 60079-14 and any local codes of practice that are in force.

The MIU/e shall be connected to the Purge and Pressurization system in accordance with the instructions given in the handbook supplied with the pressurization system.

The external earth connection of the MIU/e shall be connected to earth using minimum 4mm<sup>2</sup> conductor.

## SELECTION OF CABLE, CABLE GLANDS AND CONDUCTORS IN CONDUIT

Cable glands or other cable entry devices shall be appropriately certified and suitable for the cable and the conditions of use and be installed in accordance with the manufacturer's instructions.

When the MIU/e application requires the hazardous area marking code:

Ex eb IIC T5 Gb, Tamb -20°C to +55°C there is no further guidance for the selection of cable and cable glands or conductors in conduit.

When the MIU/e application requires the hazardous area marking code:

Ex eb IIC T4 Gb, Tamb -20°C to +60°C the user shall select cable and cable glands or conductors in conduit that have a higher temperature rating than 83.2°C.

## TERMINALS

MIU/e may be fitted with a combination of:

WDU2.5 terminals certified to DEMKO 14 ATEX 1338U & IECEx ULD 14.0005U.

SAK2.5 terminals certified to KEMA 97 ATEX 1798U & IECEx KEM06.0014U.

WPE2.5 Earth terminals certified to DEMKO 14 ATEX 1338U & IECEx ULD 14.0005U.

For all type of terminals: Tightening torque range: 0.4 to 0.8 Nm (WDU & WPE) & 0.4 to 0.6 Nm (SAK).

Conductor cross section maximum 2.5 mm<sup>2</sup>, minimum 1.5 mm<sup>2</sup>.

Type of connection is screwed - Solid copper conductors to be used.

Stripping length shall be 10 mm.

Only one conductor is allowed at each side of a terminal. Multiple conductors shall be crimped together before screwed into the terminal.

Maximum number of terminals: For Model MIU/e1 – Up to 18 current carrying terminals.

For Model MIU/e2 – Up to 33 current carrying terminals.

For Model MIU/e1/MO – Up to 13 current carrying terminals.

## COMMISSIONING

The installation of the cable glands, electrical and earth connections shall be inspected for correct installation before the unit is put into service. The lid shall be correctly fitted.

## MAINTENANCE

The condition of enclosure and associated cable glands shall be inspected for damage every six months. The terminals shall be inspected for tightness and gaskets inspected for damage.

## FAULT FINDING

When wiring or signal fault occurs, check each terminated wire, terminals for tightness and gaskets for damage.

External faults such as broken switches within the Control Unit may also require investigation.



## EU-Declaration of Conformity

With European Directives

**This is to declare that the MiniPurge Purge Controller  
is 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 and /ES) 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) and 61000-6-4:2007 + A1:2011 and EN 61000-6-2:2005 (Intertek Report 102569070LHD-001) respectively.

### 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 CSA Group Netherlands B.V., Utrechtseweg 310, 6812 AR, Arnhem, Netherlands, under EC Type-Examination Certificate SIRA 01ATEX1295X, in compliance with:

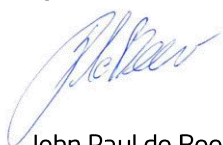
EN 60079-0: 2012 + A11:2013      EN 60079-2: 2014

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

MiniPurge systems are manufactured under Production Quality Assurance Notification SIRA 99 ATEX M043, issued by CSA Group Netherlands B.V. (CSA), Notified Body No 2813.

Signed for and on behalf of Expo Technologies Ltd.,



John Paul de Beer  
Managing Director

Date 12/11/2019

Confidential Assessment file reference SC004

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