

# **Cabinet Cooler Vortex Size 1 Handbook**

## **ML374**

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## 1 GENERAL INSTRUCTIONS

When a Cabinet Cooler is required all potential sources of heat generation should be considered. Example: When an enclosure is in direct sunlight installing a sunshade and possibly thermal insulation would reduce the solar heating considerably.  
If a Cabinet Cooler is required, the following must be considered.

### Principle of Operation

The Cabinet Cooler (Vortex type) works by using a compressed air supply and spinning the air into a chamber at very high RPM. This splits the air into a hot and cold fraction. The hot fraction of air is exhausted outside the enclosure. The cold fraction is vented into the enclosure and ultimately must be vented out of the enclosure.

## 2 SPECIFICATION

Power Supply (as per model ordered)	110 Vac, 230 Vac 50/60Hz 24 Vdc
	AVC-0000-001      230 Vac Version AVC-0000-003      24 Vdc Version AVC-0000-009      110 Vac Version
Air Supply:	60 - 100 psi      4 - 7 barg 25scfm, 708NI/min at 100psi, 7barg Maximum of 40°C, 104°F [For version with Tamb -20°C to +40°C] Maximum of 55°C, 131°F [For version with Tamb -20°C to +55°C]
Cooling Capacity	300 W at 100psi, 7 barg
Temperature Control	Electronic +/-2°C, +/-3.6°F
Maximum Air Outlet Temperature	130°C/ 266°F
Sound Pressure Level	Maximum 88.6 dB, Average 87.5 dB at 1 meter distance, on any angle.
Weight	1.5kg, 4lbs
Hazardous Area T Class	T4 at 55°C, 131°F or at 40°C, 104°F ambient (as ordered) When housed inside IP54/NEMA 4 enclosure or better.

### 3 CERTIFICATION DATA

Cabinet Vortex Coolers are certified under ATEX Non-electrical Conformity Certificate EXVERITAS 19 ATEX 0577 X against BS EN ISO 80079-36:2016 Non-electrical equipment for explosive atmospheres - Basic methods and requirements. Vortex Coolers are suitable for use in Hazardous Areas where Equipment Group II Category 2G is required, when installed within a pressurized enclosure and the following instructions are adhered to.

#### WARNING

The device adjuster screw located beneath the air silencer (muffler) has been pinned to limit the maximum exit air temperature. Any un-authorized adjustment of the 'slotted' valve will automatically invalidate the use of this product in a hazardous area.

After assembly of the Cabinet Cooler on to an Ex p, X, Y, or Z enclosure this Cooler/muffler must be replaced onto the exhaust of the Vortex Tube which is located in the Hazardous Area, in such manner that can only be removed by the use of a tool.

It is responsibility of the user to ensure that the Cabinet Vortex Cooler is sufficiently earthed to the enclosure ensuring that any static charge created is discharged safely to the enclosure.

### 4 APPLICATION SUITABILITY

- As the Cabinet Cooler displaces air care should be given on installations where movement of dust may be an issue, (Zone 21 & 22 or Class II).
- The following materials are used in the construction of Cabinet Cooler.  
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     | • Polyamide   |
| • Mild (carbon) Steel | • Epoxy Resin |
| • Brass               | • ABS         |
| • Copper              | • PVC         |
- This equipment 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 Cabinet Cooler is not silent in operation.

## 5 INSTALLATION

### General Notes

When installing a Cabinet Cooler into a Pressurized Enclosure the following issues should be considered.

- For use in Zone 1 (Category 2) applications, the user shall ensure that the maximum regulator pressure, even under fault condition, does not exceed 7 barg.
- A second Relief Valve unit may be required to exhaust the cold fraction entering the Pressurized Enclosure. This second Relief Valve unit will need to be set at a higher lift off pressure than the Relief Valve unit supplied with the MiniPurge Control Unit. This is to ensure that the operation of the MiniPurge is not interfered with.
- The second Relief Valve unit must also be capable of exhausting the full flow rate of the cold fraction. This is typically between 20-80% of the air supply dependant on setting at time of commissioning.
- The MiniPurge must control the operation of the Cabinet Cooler by way of the purge complete signal. The MiniPurge must go through a purge cycle before the Cabinet Cooler receives either a supply of compressed air or electrical power. This will prevent the MiniPurge considering the cold fraction as the purge flow which would be incorrect. The solenoid valve will obtain its power once the purge time has elapsed.
- Cabinet Cooler assemblies supplied by Expo have a solenoid valve to control the compressed air supply. In addition a thermostatic control is included and a one way air valve fitted to the cold fraction.
- The one way air valve is to prevent the enclosure losing pressure when the Cabinet Cooler is not in operation.
- If a customer is to install a Cabinet Cooler themselves into an Expo Pressurized Enclosure that has already been certified by Expo then Expo requires;  
Documents, drawings, circuits etc, recording this addition so that we can issue an amendment to the overall certificate. This may incur additional costs.
- To install the Cabinet Cooler refer to the general assembly drawing for overall dimensions.
- Drill a hole on the top face of the enclosure, the one way valve must be vertical.  
It is possible to mount the Vortex tube in the side wall, although this is not the preferred option.
- Unscrew the hot air exhaust muffler and remove the gland.
- Fix gland into the drilled hole.
- Now insert the vortex tube through the gland and tighten the gland up to hold the Cabinet Cooler in place.
- Now replace the hot air exhaust muffler and place supplied label adjacent to the muffler on the outside of the enclosure.
- The temperature sensor can now be positioned within the enclosure. This could be on a specific device or in the top of the enclosure where the temperature will normally be at its greatest.
- The wiring and pneumatic pipe work can now be fitted.
- To avoid electric charging, steps must be taken to ensure the equipotential bonding is maintained between the cabinet vortex cooler, cabinet and earth.
- The vortex cabinet cooler control electronics and valve shall be either be placed in a safe area or protected by a suitable protection concept with the required ATEX category for area classification.
- As the maximum temperature of hot air outlet is 130°C a “Hot Surface Do Not Touch” warning label shall be attached at the vicinity of the vortex cooler.

## 6 COMMISSIONING

Always ensure that there is adequate exhaust and pressure relief provided for the enclosure. If this is not provided the enclosure will become over pressurized and may operate outside of its Test Pressure specification and possibly become a hazard.

### General Notes

Compressed air supply.

The air supply temperature should not exceed 40°C, 104°F or 55°C, 131°F, depending on the model. Solar shading or thermal insulation of air supply pipe work may be required.

Air supplies are plagued with condensed water vapour and droplets in the air lines. This condensation leads to rust and dirt in the air lines. Also, some compressors will allow oil or oil vapour to enter the air line.

It is important that the electrical equipment within the Pressurized Enclosure is not contaminated. Small orifices within the Cabinet Cooler may become clogged with rust, dirt and water droplets. A 5 micron filter will separate 99% of foreign material from the air supply, allowing virtually maintenance free operation. The use of an oil filter with an effective filtration of 0.01 micron will remove the oil droplets for an even cleaner air supply.

Keep in mind that the current line or hose might contain water, dirt or oil and should be blown out before installation. Also, pipe thread sealant or tape must be carefully applied to avoid clogging product orifices.

When the temperature of the air inside the Cabinet drops to 0°C, 32°F, the water vapour in the air will start to freeze. If this poses a problem with ice clogging the orifices of the generator inside the tube, an air dryer must be used to lower the dew point to keep out the water vapour. An air dryer rated at -19°C, 2°F will produce a dew point low enough to eliminate the water vapour freezing in the orifices of the generator.

- The installation of the electrical connections shall be inspected for correct installation before the unit is put into service.
- The Cabinet Cooler has the temperature setting, factory set to 20°C, 68°F
- If the customer wishes to change this then the adjustment resistor is shown on the drawing provided. This does not have an indexed scale.
- The Cabinet Cooler can now be operated. Once a purge cycle has been completed the Cabinet Cooler will become active. As soon as the sensor detects the set temperature has been exceeded the Solenoid Valve will open and the Cabinet Cooler will operate.
- Air will be vented from the Hot air Muffler and out of the enclosure Relief Valve.
- The Solenoid Valve will close once the set temperature has been reached.

## 7 MAINTENANCE

The Cabinet Cooler has no moving parts. Clean, compressed air moving through the tube will not cause wear on the parts and will provide the same service for an indefinite period.

Occasionally, dirt, water or oil may enter the tube from the compressed air supply and hinder the performance. When this happens, simply take the unit apart, clean the parts, and reassemble, tightly replacing the cold end cap to properly seat the generator.

The Solenoid Valve is also maintenance free and should be replaced if a fault does occur.

## 8 OPERATIONAL TESTING

This section describes the functionality test to ensure correct mechanical operation, wiring and electrical continuity.

**Warning:** Do not open enclosure when an explosive atmosphere is present. Only carry out this test in a safe environment.

### Equipment Required

As a minimum requirement the following will be required.

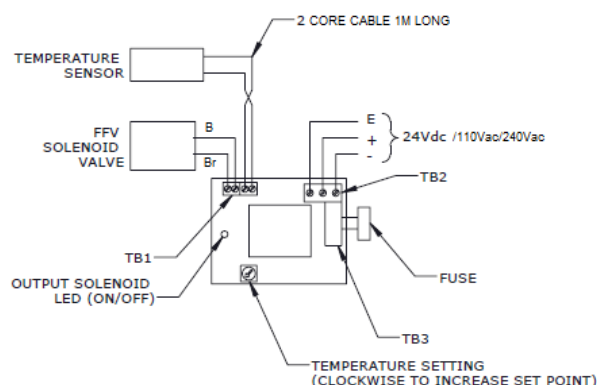
- Vortex Cooler
- 110Vac, 230Vac or 24Vdc Power Supply (dependent on model)
- 7 bar Air supply.
- Hot source, e.g. hot water (temperature above +55 °C).
- Calibrated thermometer (digital).

### Procedure

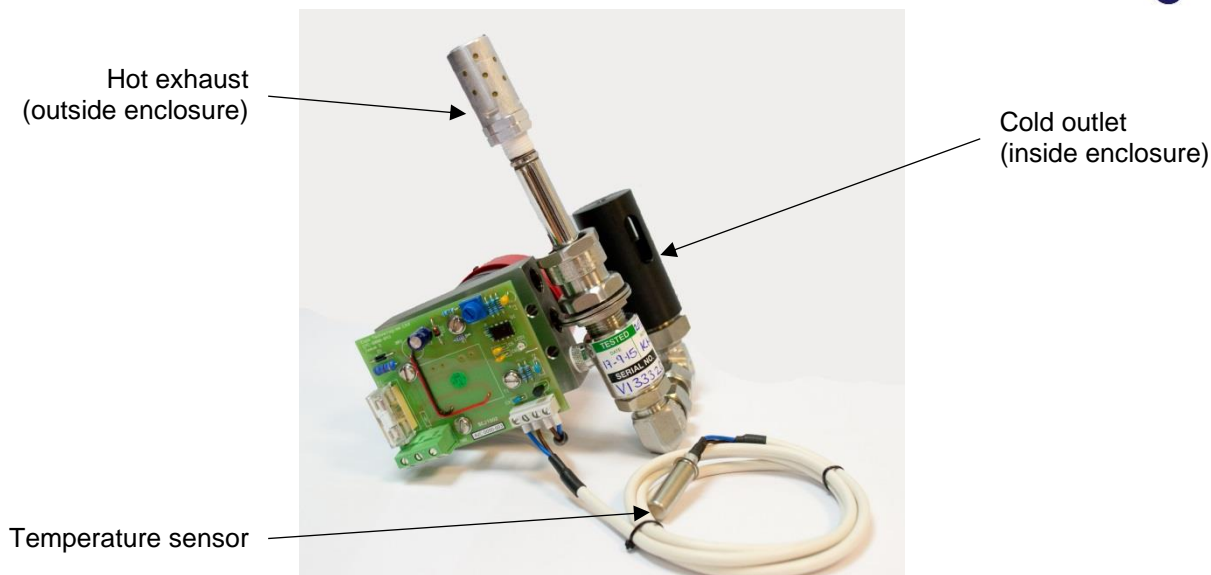
Only complete the following procedure if trained and suitably skilled in the safe use and testing of 0-250V electrical equipment and pneumatic equipment rated up to 10barg.

Ensure precautions are taken when dealing with the Heat produced by the Vortex Cooler (specifically the silencer/muffler) after testing

- Ensure that all wires are connected and terminated properly.
- Use hot water to heat the temperature sensor. It may be easier to temporarily remove the temperature sensor, if convenient, from the enclosure wall. The vortex cooler will start to run when the temperature sensor exceeds 55 °C.



- After around one minute, if a temperature differential of more than typically 10 °C can be measured at the Cold outlet, the vortex cooler can be considered working.
- Finally, remove the temperature sensor from the hot water and once given sufficient time to cool, the vortex cooler flow will stop. Replace the temperature sensor back to its original position.
- If the vortex cooler fails to start, consult Expo Technologies or your local representative.



## 9 FAULT FINDING

- The most common fault is a lack of air supply due to either low air supply pressure or poor flow rate. Poor flow is because of too small pipe work, long pipe lengths or small fittings.
- Occasionally dirty or very wet air causes ice build up within the enclosure, leading to intermittent operation and water within the enclosure.
- If the system does not work at all check the fuse has not blown.
- Ensure the temperature setting has not been tampered with.
- Ensure the air exhausts are not blocked.

## 10 DRAWINGS AND DOCUMENTS

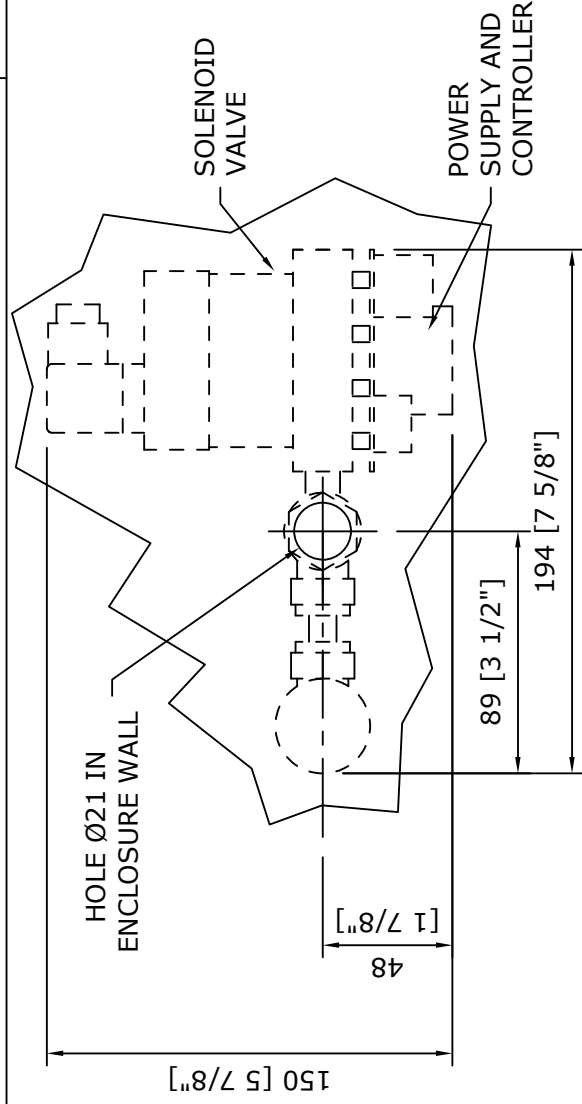
<u>TITLE</u>	<u>Drawing Number</u>
Vortex Cooler Assembly	AVC-0000-001
Vortex Cooler 24VDC	AVC-0000-003
Vortex Cooler Assembly	AVC-0000-009
ATEX Non-Electrical Conformity Certificate	EXVERITAS 19 ATEX 0577 X



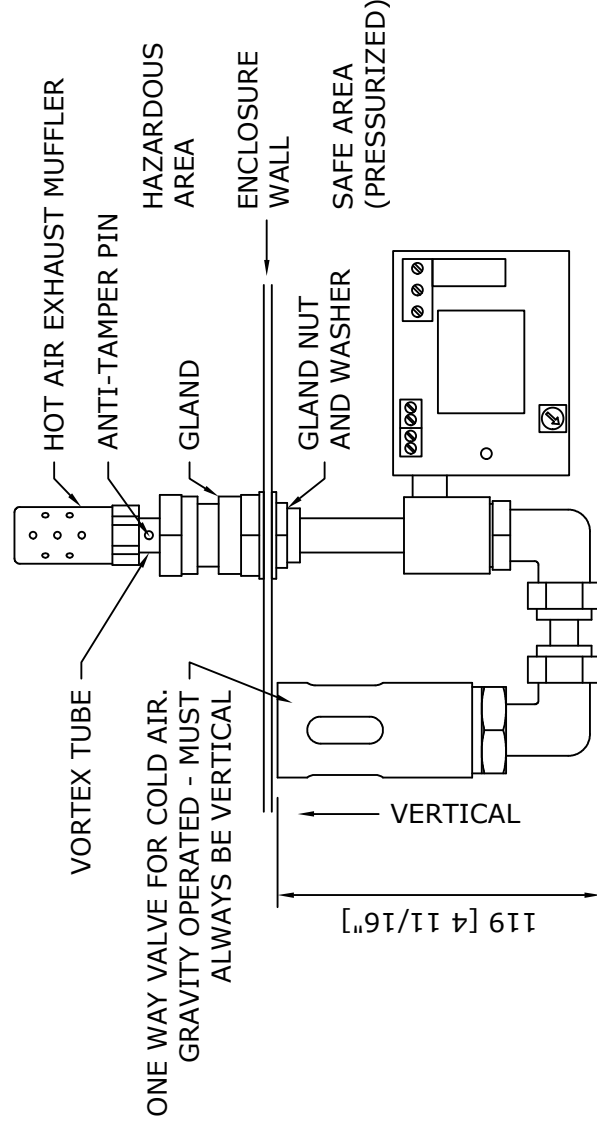
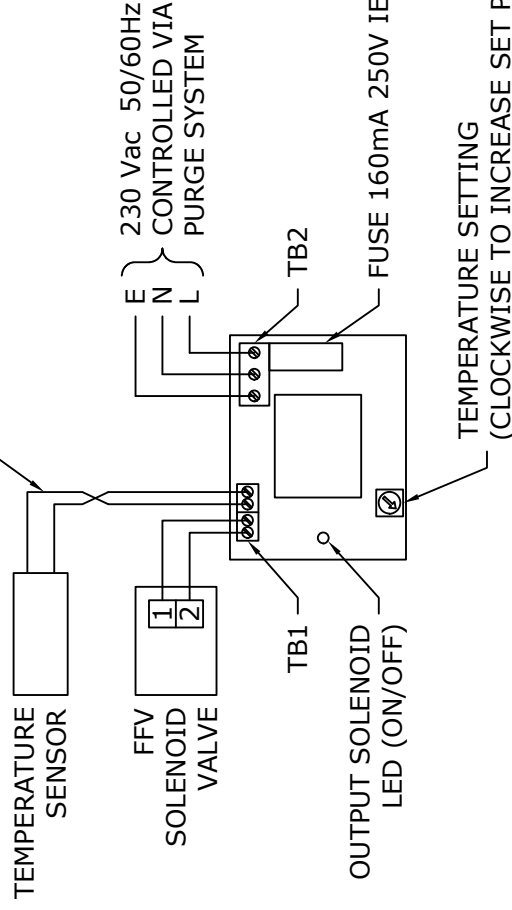
DIMENSIONS IN mm  
DO NOT SCALE

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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✓ 2 WIRES 1m LONG TWISTED.



## NOTES

SUPPLIED WITH LABEL  
MLA-ZDW0-012. THIS LABEL  
MUST BE ATTACHED ADJACENT  
TO THE CABINET COOLER ON  
THE ENTRY FACE OF THE  
PRESSURIZED ENCLOSURE

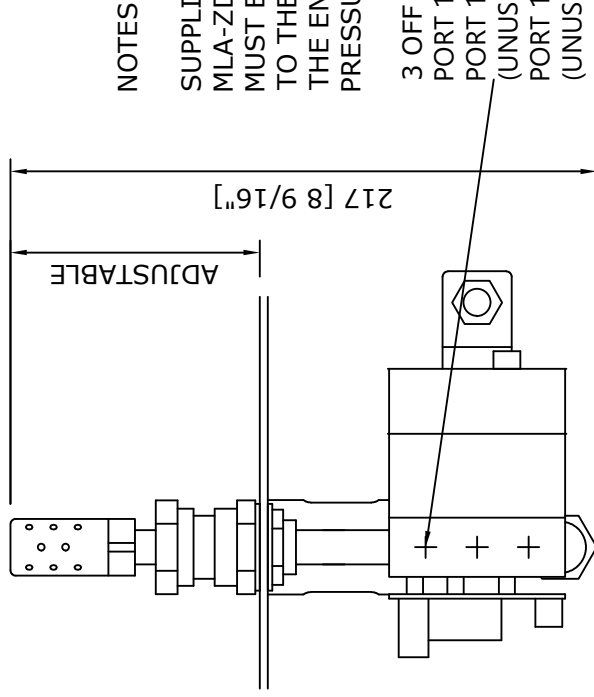
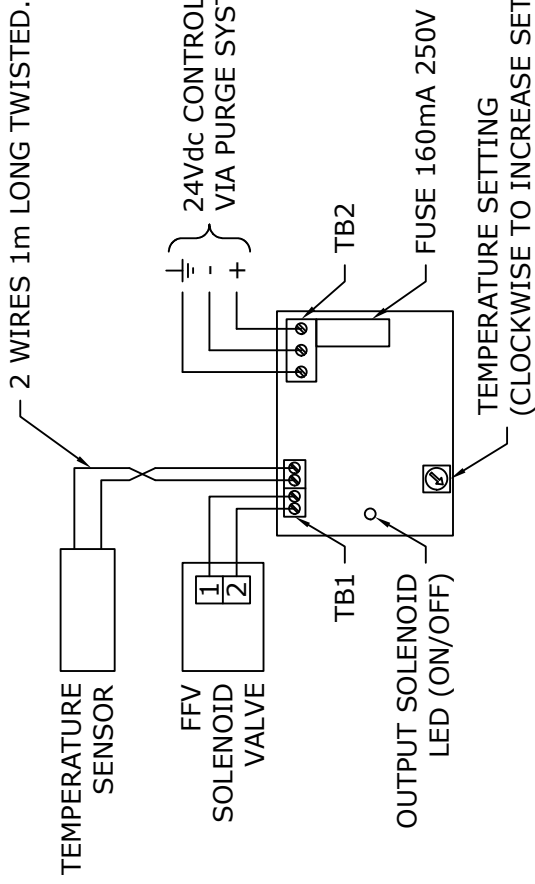
3 OFF 1/4" BSP PORTS  
PORT 1 - INLET  
PORT 12 - PLUGGED  
(UNUSED CONNECTION)  
PORT 14 - PLUGGED  
(UNUSED CONNECTION)

APPT'D		MJP	ISSUE:	1	5	6	7	MATERIAL	-	<div>Expo Technologies Limited</div> <div>SURREY TW16 5DB UNITED KINGDOM</div>	SCALE	NTS					
CHK'D		MJP	MOD. No:	DRAWN	4685	5427	DQN-12345										
DR'WN		NPB	DATE:	04/09/2001	13/05/09	14/12/11	06/12/2016	FINISH	-				TITLE	DRAWING No.	AVC-0000-001		
			APPROVED:	MJP	JPdB	JPdB	MLC										
DRAWING STATUS: CERT RELATED									JOB No:	-	CUSTOMER:	-				SHEET No.	1 OF 1
VORTEX COOLER ASSEMBLY																DRAFTING No.	AVC-0000-001



UNSPECIFIED	NO DEC PLACE $\pm 0.3$
TOLERANCES	1 DEC PLACE $\pm 0.2$ 2 DEC PLACE $\pm 0.1$
FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH	

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SUPPLIED WITH LABEL  
MLA-ZDW0-012. THIS LABEL  
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TO THE CABINET COOLER ON  
THE ENTRY FACE OF THE  
PRESSURIZED ENCLOSURE

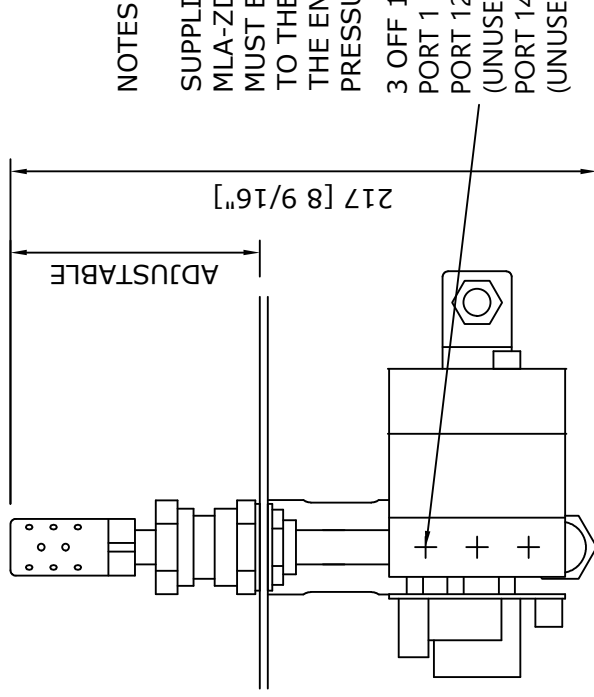
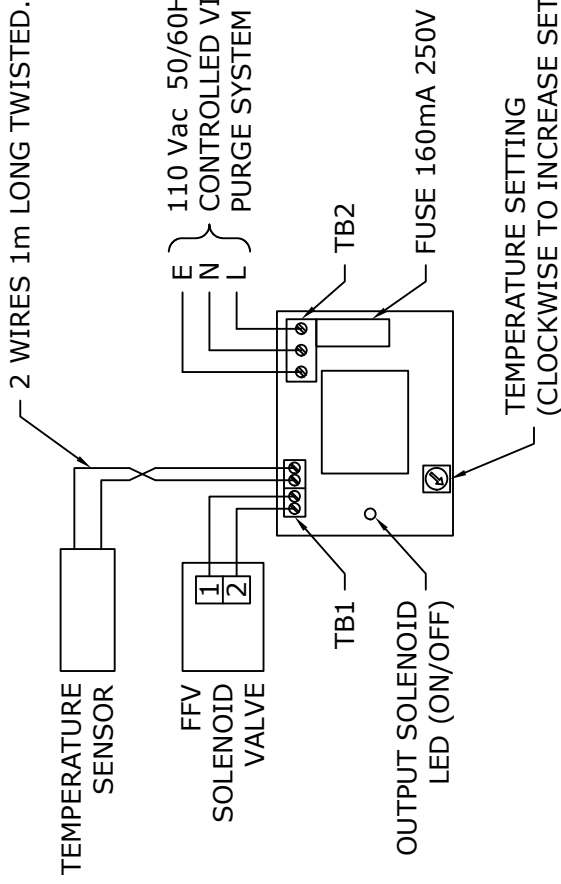
3 OFF 1/4" BSP PORTS  
PORT 1 - INLET  
PORT 12 - PLUGGED  
(UNUSED CONNECTION)  
PORT 14 - PLUGGED  
(UNUSED CONNECTION)

APP'D	JPdB	ISSUE:	1	2	3	MATERIAL	Expo Technologies Limited	SURREY, KT7 0RH UNITED KINGDOM	SCALE	NTS
CHK'D	SB	MOD. No:	DRAWN	5427	DGN-12345					
DR'WN	NRB	DATE:	19/08/2005	14/12/11	10/01/2017					
		APPROVED:	JPdB	JPdB	MLC					
DRAWING STATUS: CERT RELATED						FINISH	TITLE	VORTEX COOLER 24VDC	DRAWING No.	AVC-0000-003
							JOB No:	CUSTOMER:	SHEET No.	1 OF 1



UNSPECIFIED	1 DEC PLACE $\pm 0.2$	2 DEC PLACE $\pm 0.1$
TOLERANCES		
FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH		

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SUPPLIED WITH LABEL  
MLA-ZDW0-012. THIS LABEL  
MUST BE ATTACHED ADJACENT  
TO THE CABINET COOLER ON  
THE ENTRY FACE OF THE  
PRESSURIZED ENCLOSURE

3 OFF 1/4" BSP PORTS  
PORT 1 - INLET  
PORT 12 - PLUGGED  
(UNUSED CONNECTION)  
PORT 14 - PLUGGED  
(UNUSED CONNECTION)

[illegible]



1. ATEX Non-Electrical Conformity Certificate
2. Equipment intended for use in potentially explosive atmospheres - Directive 2014/34/EU
3. Certificate Number : ExVeritas 19 ATEX 0577 X
4. Equipment : Cabinet Vortex Coolers Types 1, 2, 3 & 4.
5. Manufacturer : Expo Technologies Limited
6. Address : Unit 2, The Summit, Hanworth Road, Sunbury on Thames, TW16 5DB
7. This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to. The examination and test results are recorded in confidential report no: EXV2164/A/1
9. Compliance has been assured by compliance with the standards, at their latest editions, listed below:  
BS EN ISO 80079-36
10. ExVeritas takes no responsibility for the validity of any information or data supplied by the manufacturer on which parts of the ATEX assessment may be based upon.
11. The marking of this equipment or protective system shall include the following:

 II 2 G Ex h IIC T4 Gb T<sub>amb</sub> -20 °C to +55 °C



No. 8613

On behalf of ExVeritas  
  
Stephen D'Henin  
Certification Manager

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12. **Schedule**

13. **Certificate Number**

ExVeritas 19 ATEX 0577 X

14. **Equipment Description**

The Expo Technologies Cabinet Vortex Cooler provides cooling for pressurized enclosures using compressed air. Cooling may be required either to remove heat generated by the contents of the enclosure and or to compensate for high ambient temperatures.

The Cabinet Vortex Coolers are of the following types:

Vortex Cooler Type	Electrical Rating	Model	Ingress Protection Rating
Type 1	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX- XXX	IP40
Type 2	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX- XXX	IP66
Type 3	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX- XXX	IP66
Type 4	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX- XXX	IP40

15. **Descriptive Documents**

15.1 **Associated Report and Certificate History:**

Report Number	Cert Issue Date	Issue	Comment
EXV2164/A/1	05.11.2019	0	Initial issue of the Prime Certificate

15.2 **Technical File number**

The technical file documents are held in Exveritas file number: TF2164

Certificate ExVeritas 19 ATEX 0577 X

Issue 0

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### 15.3 Compliance Drawings


Number	Issue	Description
SD8361	1	Type 1
SD8360	1	Type 2
SD8439	1	Type 3
SD8440	1	Type 4

### 16. Special conditions of Certification

- To avoid electrostatic charging steps must be taken to ensure the equipotential bonding is maintained between the cabinet vortex cooler, cabinet and earth.
- The cabinet vortex cooler control electronics shall either be placed in the safe area or protected by a suitable protection concept with the required ATEX Category for the area classification.
- The maximum inlet air pressure to the cabinet vortex cooler shall not exceed 7 Bar even under a fault condition.
- The maximum inlet air temperature shall not exceed + 55 °C.

### 17. Conditions of Certification

The Vortex Cooler shall include labelling with the following markings:

Manufacturer : Expo Technologies Limited  
 Manufacturer's Address : Unit 2, The Summit, Hanworth Road, Sunbury on Thames, TW16 5DB  
 Cabinet Vortex Cooler Type : Type X  
 Electrical Rating : Max Volts: XXXVac/dc (controller)  
 Coding :  II 2 G Ex h IIC T4 Gb T<sub>amb</sub> -20 °C to +55 °C  
 Serial Number : XXXX  
 Year of Manufacture : XXXX  
 Exveritas Certificate Number : ExVeritas 19 ATEX 0577 X

Notes:

- A label shall be attached on the enclosure at the vicinity of the vortex cooler showing Manufacturer, Manufacturer's address, vortex type, coding and certificate number.
- A label shall be attached to the vortex cooler showing the serial number, year of manufacture and the electrical rating.

### 17. Essential health and safety requirements

Covered by application of the standards listed in section 9 of this certificate and the assessment conducted in the test report listed in section 15.1 of this certificate.

Certificate ExVeritas 19 ATEX 0577 X

Issue 0

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