Directions For Use
Calibration Gas Generator

CG15L
TOC1500HP

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Document Change History

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1	Document Created	HD	15/04/03
5	USA Technical support number updated	FAD	17/11/04
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8	Declarations Added	LC	11/04/19

Contents

Warranties and Liabilities

1) The Company warrants that it has title to the Goods.

2) Subject to the provisions of this clause the Company warrants that the Goods shall comply in all material respects with any specification referred to in the Order Confirmation (as the same may be amended) and shall, subject thereto, be free from defects in material and workmanship for the lesser of a period of twelve months from the date of delivery or thirteen months from the date of dispatch from the factory.

3) Save as provided in this clause and except where the Goods are sold to a person dealing as a consumer (within the meaning of the Unfair Contract Terms Act 1977) all warranties, conditions or other terms implied by statute or common law are hereby expressly excluded save to the extent they may not be lawfully excluded. When the Goods are sold to a consumer within the meaning of the Unfair Contract Terms Act 1977 their statutory rights are not affected by the provisions of this clause.

4) In the event of the Customer making a claim in respect of any defect in terms of clause 2 hereof the Customer must:-

   4.1) Reasonably satisfy the Company that the Goods have been properly installed, commissioned, stored, serviced and used and without prejudice to the generality of the foregoing that any defect is not the direct or indirect result of lack of repair and/or servicing, incorrect repair and/or servicing, use of wrong materials and/or incorrect spare parts; and
   4.2) Allow the company to inspect the Goods and/or any installation and any relevant packaging as and when reasonably required by the Company.

5) Subject to the Company being notified of any defect as is referred to in sub-clause 2 hereof within a reasonable time of it becoming apparent and subject always to the terms of sub-clause 4 hereof, the Company shall, in its option, replace or repair the defective Goods or refund a proportionate part of the Price. The Company shall have no further liability to the Customer (save as mentioned in sub-clause 6 hereof).

6) The Company shall be liable to indemnify the Customer in respect of any claim for death or personal injury to any person in so far as such is attributable to the negligence or breach of duty of the Company or any failure by the Company to comply with the provisions of sub-clause 2 hereof.

7) Save as provided in sub-clause 2 hereof the Company shall not be liable in respect of any claim by the Customer for costs, damages, loss or expenses (whether direct, indirect, consequential or otherwise) or indemnity in any respect howsoever arising including, but not by way of limitation, liability arising in negligence (other than pursuant to clause 6 above) that may be suffered by the Customer or any third party.

SAFETY NOTICE TO USERS

These instructions must be read thoroughly and understood before installation and operation of your Peak Nitrogen Generator. Use of the Generator in a manner not specified by Peak Scientific Inst. MAY impair the SAFETY provided by the equipment.

When handling, operating or carrying out any maintenance, personnel must employ safe engineering practices and observe all relevant local health and safety requirements and regulations. The attention of UK users is drawn to the Health and Safety at Work Act 1974, and the Institute of Electrical Engineers regulations.

1 Introduction

The Peak Scientific Instruments range of Calibration Gas Generators is designed to produce a constant flow of dry air of calibration standard with impurities reduced to better than the following levels:-

Contaminant	Concentration
CO	<1.0 ppm
CO_2	<1.0 ppm
SOX	<0.1 ppm
THC	<0.1 ppm
O_2	=18 - 20%
H_2O	<1.5 ppm

2 Unpacking and Installation

Although Peak Scientific take every precaution with safe transit and packaging, it is advisable to fully inspect the unit for any sign of transit damage.

ANY DAMAGE SHOULD BE REPORTED IMMEDIATELY TO THE CARRIER AND PEAK SCIENTIFIC OR THE DISTRIBUTOR FROM WHERE THE UNIT WAS PURCHASED.

After unpacking and a visual inspection, the unit should be placed in a ventilated area away from direct sunlight. Care should be taken not to obstruct the ventilation holes on the sides of the unit not the fan outlet on the top.

The generator should be placed on a steady and level base.

3 Electrical Connection

Important Electrical Notice

This unit is classified as SAFETY CLASS 1 equipment. THIS UNIT MUST BE EARTHED. Before connecting the unit to the mains supply, please check the information on the serial plate. The mains supply must be of the stated AC voltage and frequency.

EARTH/GROUND (E):-	**Green & Yellow**	**or**	**Green**
LIVE (L):-	**Brown**		**Black**
Neutral (N):-	**Blue**		**White**

Fuse

The generator protection fuse in the pull out drawer of the mains inlet IEC euroconnector located on the bottom right hand side of the cabinet adjacent to the off/on switch. The fuse is rated at 10 AMP. A spare fuse is also provided in the drawer.

Connect the generator to a single phase supply using the power cord provided.

4 Air Connection

The inlet and outlet connections are 1/4" BSP female.

The minimum required air conditions are as follows:-

	TOC1500HP	CG15L
Pressure	100 psig (6.8 Barg)	120 psig (8.27 Barg)
Inlet Flow	9.5 Litres/min	28 Litres/min

The inlet air should be oil free and pre-filtered to remove bulk moisture. Although not essential, an air drier up-stream of the generator will ensure a long and trouble free life.

Note:- The platinum catalyst within the Zero Air Catalytic Chamber will become poisoned if it comes into contact with any halogenated hydrocarbons, silicone sprays, silicone greases, phosphorous compounds, lead components, high sulphur vapours or other catalyst poisons.

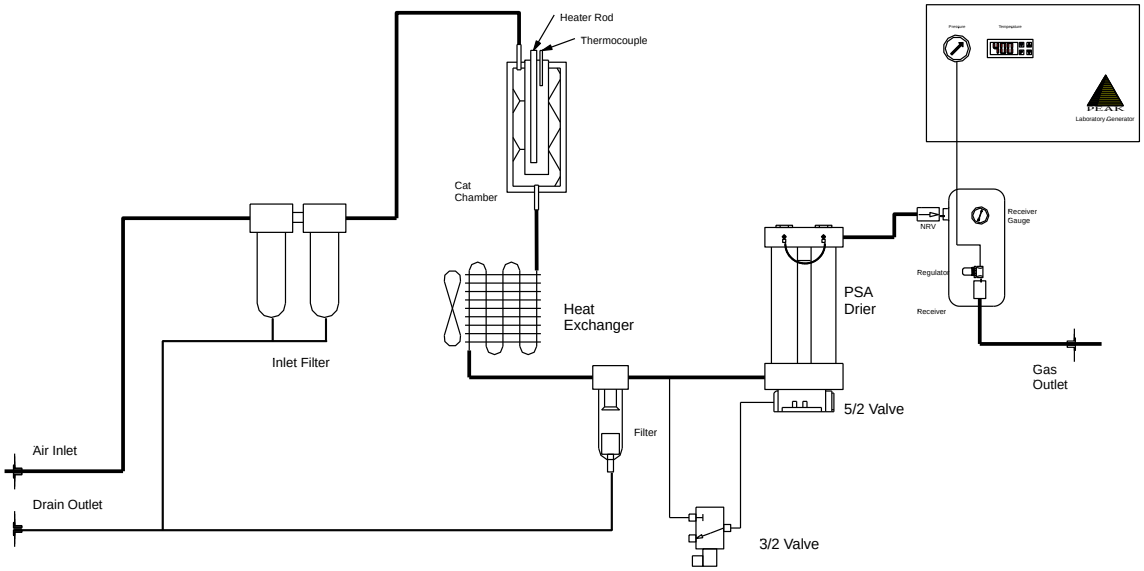
The air supply should be connected to the generator inlet on the left side of the cabinet. The user's application should be connected to the outlet on the right side of the cabinet. To avoid leakage/impurity ingress, use PTFE tape on all fittings.

Slowly, turn on the air supply until the desired pressure is attained. Output pressure and flows are factory set at 80 psi and 1.5 l/min (TOC1500HP) or 15l/min (CG15L).

5 Principle of Operation

The CG15L calibration gas generator works on the basis of two fundamental processes as illustrated in the following pneumatic diagram.

Note: - This diagram is only to illustrate the principles involved. For an actual pneumatic diagram please refer to the drawings at the end of this document.



CGxxL Pneumatic Diagram

The first process utilizes a 'Zero Air' catalytic combustion chamber. This works on the principle of catalytic oxidation where hydrocarbons from the incoming compressed air supply are *cracked* to carbon dioxide and water. The hydrocarbon level in the form of methane is reduced to <0.1ppm For this process to work the catalyst requires to be heated to approximately 400 degrees celsius.

After the catalytic chamber the air passes through a simple cooling coil to a filter which removes bulk moisture and any further particulate down to a level of 5 micron. The filter incorporates an auto-drain mechanism which will release any accumulated water from the filter bowl when the level is sufficiently high. The water passes out through a drain bulkhead at the bottom of the side of the cabinet.

Because water and also carbon dioxide are created in the Catalytic Process there is a necessity to effectively remove them both.

Moisture / CO_2 Removal:-

The second process utilizes a 'Pressure Swing Adsorption' (PSA) method to further treat the air. This is where contaminant gases and moisture can be selectively adsorbed from compressed air into a porous crystalline sieve material. The adsorption process is aided by the electrostatic interaction between the adsorbent sieve material and the gaseous adsorbate. The Peak Scientific Instruments Ltd. PSA dryer system utilizes the 'Skarstrom' process where there are two columns of adsorbent used alternatively and described as follows:-

The un-treated air is passed via a '5 port-2 position' (5/2) pneumatic control valve into one of the sieve columns where moisture, CO_2 and other non methane hydrocarbons are removed. Some of the purified gas is back-purged down the other column to atmosphere which creates a regeneration effect. A simple timer eventually causes the 5/2 valve to change columns and the other regenerated sieve column now generates the purified gas. Again some purified gas is back purged down the other column to atmosphere to cause a regeneration effect. This process repeats itself approximately every 2 minutes indefinitely.

During this process CO_2 is reduced to a level of <1ppm and water moisture is removed to a level of -75^{o} Celsius Pressure Dew Point (1.4ppm @ ATP or 0.14ppm @ 100 PSI approx.).

6 Commissioning

This should be undertaken by a technically competent person

With the generator installed as described earlier remove the lower front cover. Check that all internal components are securely located and have not moved during transit.

Open the air supply and turn the unit ON.

Check that the cooling fan is operating and exhausting air out of the generator. Check that the red LED display on the Upper Front Panel is lit.

After a maximum of 2 minutes the timer valve should operate to change over the columns on the PSA drier unit. This is accompanied by an audible rush of exhaust air from the Exhaust Silencer.

The reading on the Digital Display should begin to increase towards its set point of 400°C. After a maximum time of 40 minutes the Catalytic Chamber should have reached temperature. When this happens the display will remain steady on 400°C. The heater is controlled by a PID controller which accurately matches heater output to demand.

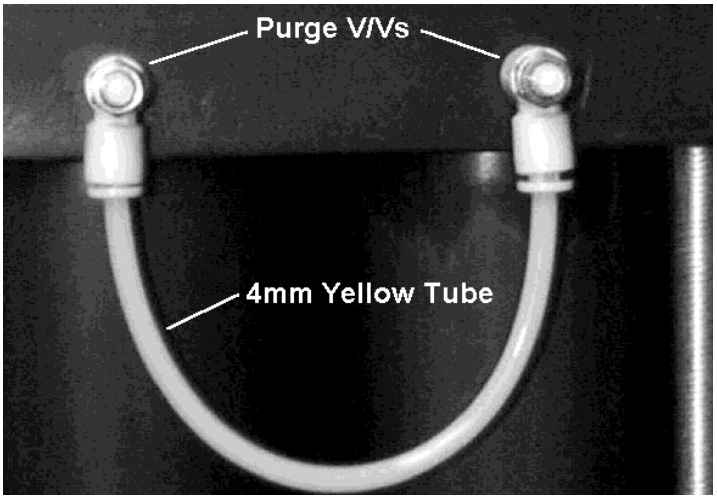
Do not touch any part of the Catalytic Chamber or Copper Lines as they will be VERY hot.

Purge Setting

The PSA Purge has been set in the factory and should not require adjustment. The purge can be checked by connecting a simple *Rotameter* type flow meter to the outlet of the drier purge valves in turn. The connection is for 4mm plastic hose. The purge should be set at 100 psig input.

Specification	TOC1500HP	CG15L
Output Flow	1.5 l/min	15.0 l/min
Purge Flow	8 l/min	12.0 l/min

A reduced purge rate will result in higher levels of contaminate gases over a period of time.



7 Routine Maintenance

WARNING: Servicing and/or repair of the generator should only be undertaken by a TECHNICALLY COMPETENT PERSON with the generator safely isolated.

Due to the simplicity of the design and the small number of moving parts the CG15L Gas Generator will have a long and trouble free life. However as with all scientific and technical equipment it should be regularly inspected by a competent person and the following points noted.

Filters/Separator/Silencers Every 12 months

Service kits are available for all routine maintenance; please contact the factory for further details.

FAILURE TO FOLLOW THE PRESCRIBED MAINTENACE PLAN WILL INVALIDATE THE PRODUCT WARRANTY.

Inlet Filter / Separator Elements

These should be changed at intervals as indicated below. In addition filter bowls should be cleaned and the operation of the auto-drains should be checked.

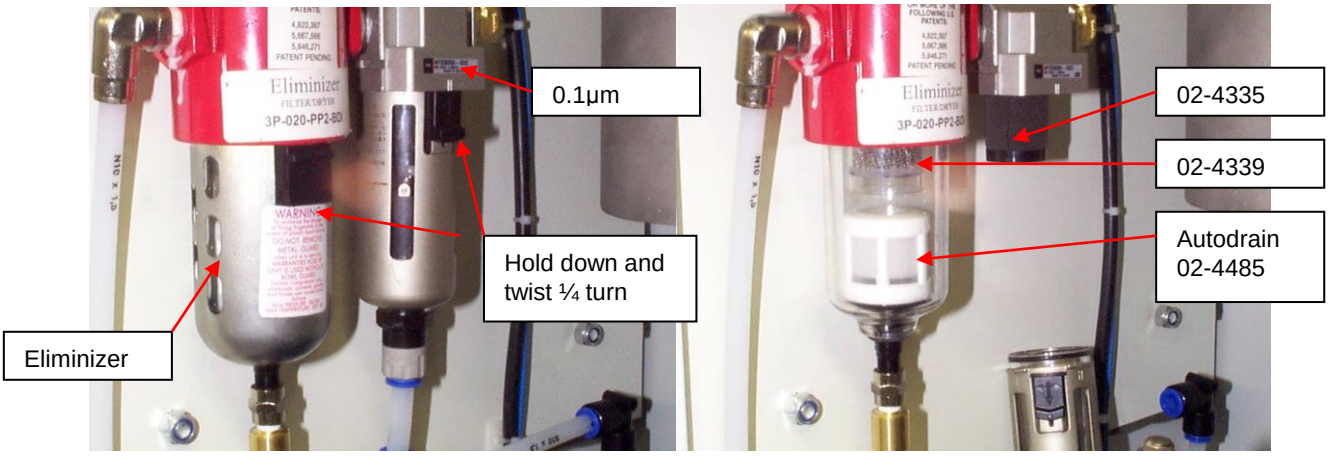
The Generator MUST be de-pressurised prior to attempting to remove ANY filter bowl. Failure to do this may cause injury.

Eliminizer & Coalescing Filter Elements

These elements should be changed at 12-month intervals. Part Numbers 02-4339 & 02-4335.

Disconnect the drain fittings from the bottom of the bowls.

Turn the bowl ¼ turn counter clockwise to release. The element then un-screws. Re-assembly is the reverse procedure.



Dryer Filter & Silencer Elements

These elements should be changed at 12-month intervals. Part Numbers 02-4335, 02-4339 & 02-1033.

The Generator MUST be de-pressurised prior to attempting to remove ANY filter bowl. Failure to do this may cause injury.

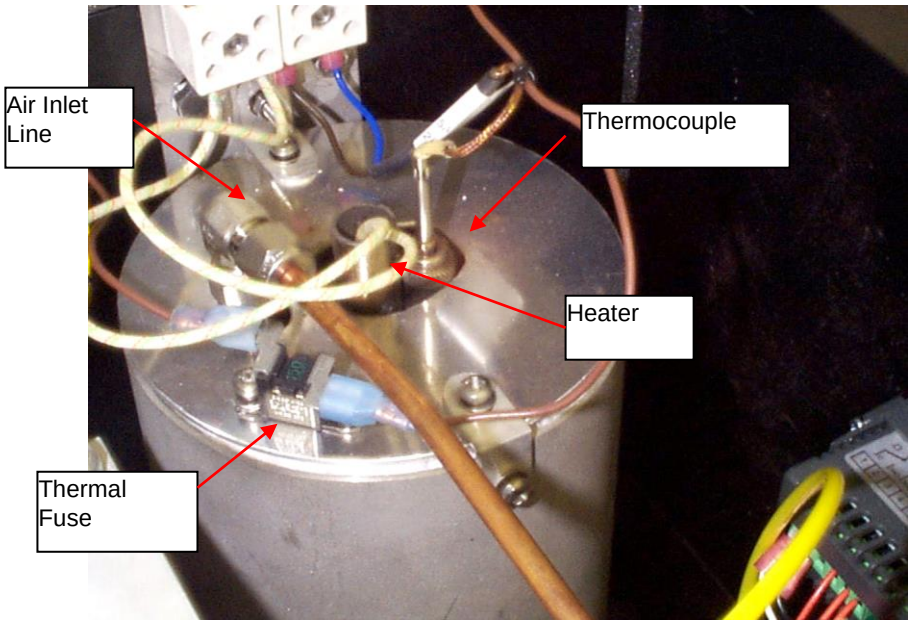
Disconnect the drain fittings from the bottom of the bowl.

Turn the bowl ¼ turn counter clockwise to release. The element then un-screws. Re-assembly is the reverse procedure. The Exhaust Silencers are removed by unscrewing.

Catalytic Chamber

The Catalytic Chamber is heated to 400ºC and will cause severe burns if touched. If for any reason the chamber or its associated parts need to be examined the generator must be switched off and allowed to cool. THIS COULD TAKE UP TO 10 HOURS.

The Catalytic Chamber takes the form of cylindrical chamber with a heated central core. The annular space is specifically designed to allow the required contact time with the catalyst to ensure complete oxidization. The complete chamber is contained within an insulated enclosure as shown below.



Heater

Regardless of the supply voltage the heater is rated at 110 Vac. This minimizes the volt-drop across the conductors and prolongs the life of the element. The Heater is contained within a stainless steel sleeve to facilitate removal should replacement be required.

Thermocouple

The thermocouple is “K” type spring-loaded bayonet fitting to ensure good contact with the chamber core.

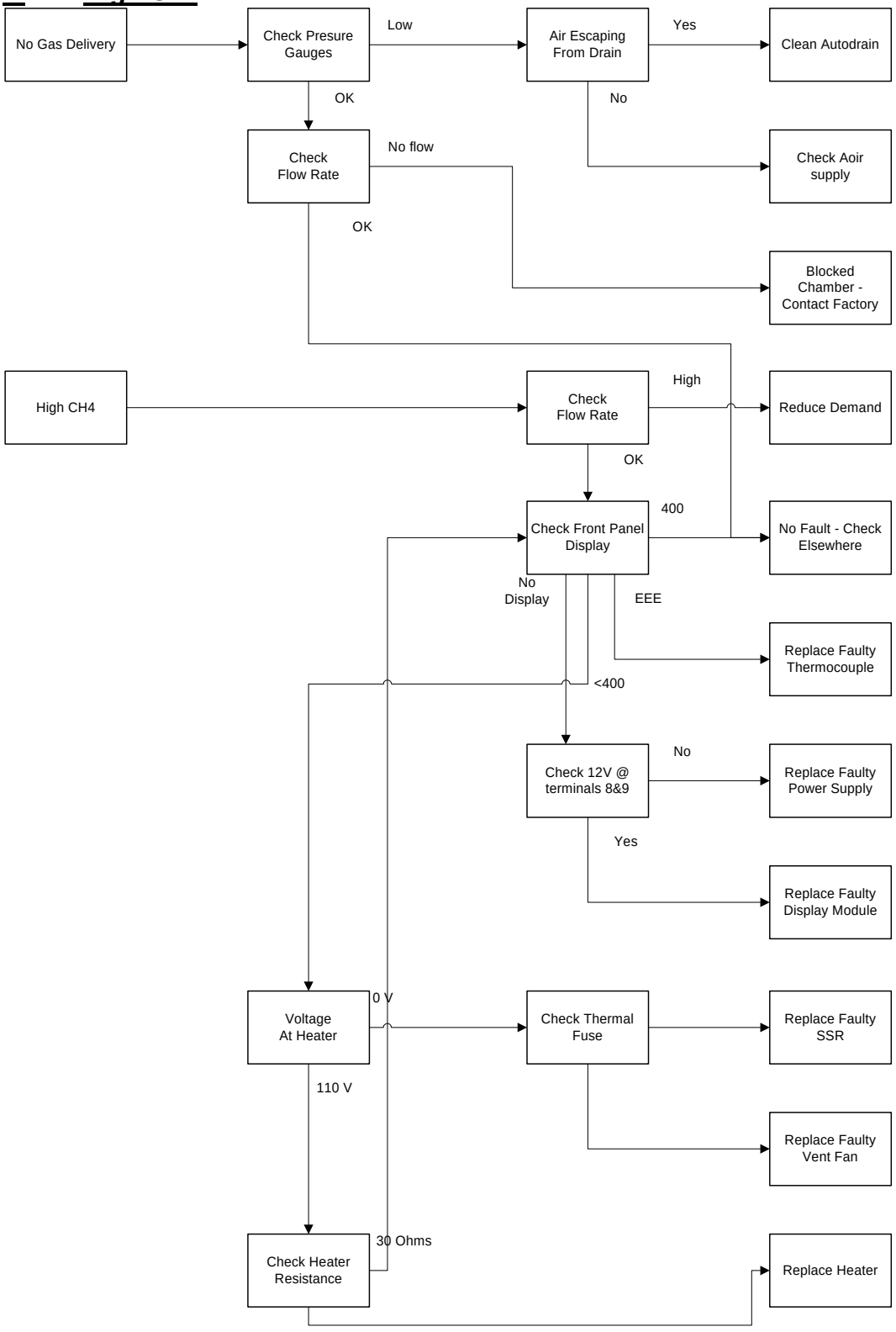
Thermal Fuse

The thermal fuse is provided as a safety feature to cut supply to the heater thus preventing chamber overheating in the event of a control or ventilation failure. It is a fail-safe device and if blown requires replacing.

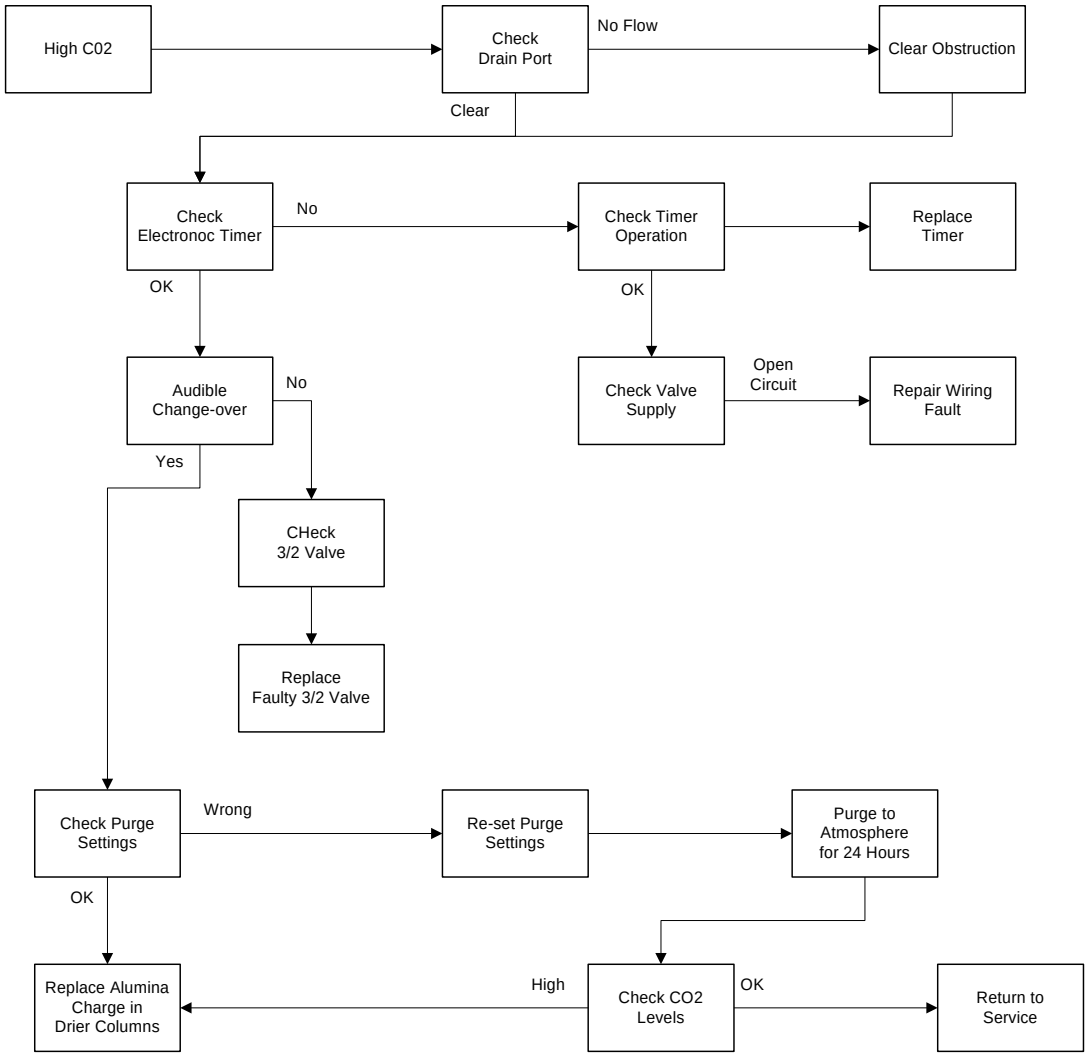
Note: - The thermal fuse will not blow under normal operation. A blown thermal fuse indicates that a fault exists which MUST be rectified before attempting to replace the thermal fuse. Refer to the trouble shooting chart on page 13 for guidance.

8 Troubleshooting

1. High CH_4



2. High CO_2


High C02
Check Drain Port
No Flow
Clear Obstruction
Clear
Check Electronoc Timer
No
Check Timer Operation
Replace Timer
OK
OK
Audible Change-over
No
Check Valve Supply
Open Circuit
Repair Wiring Fault
Yes
CHeck 3/2 Valve
Replace Faulty 3/2 Valve
Check Purge Settings
Wrong
Re-set Purge Settings
Purge to Atmosphere for 24 Hours
OK
Replace Alumina Charge in Drier Columns
High
Check CO2 Levels
OK
Return to Service

9 Technical Specifications

General Details

Minimum Operating Ambient Temperature		5 ^{o}C (41 ^{o}F)
Maximum Operating Ambient Temperature		45 ^{o}C (113 ^{o}F)
Inlet Conditions (Free of oil and bulk moisture)		
Minimum Air Inlet Pressure		6.8 Barg (100 PSI)
Maximum Air Inlet Pressure		8.6 Barg (125 PSI)
Minimum Air Inlet Flow Rate (TOC1500HP)		9.5 Litres/min (ATP)
Minimum Air Inlet Flow Rate (CG15L)		28.0 Litres/min (ATP)
Outlet Gas		
Maximum Pressure Drop (Outlet-Inlet) δP		0.7 Bar (10 PSI)
Maximum Gas Outlet Pressure		Max Inlet-δP
Pressure Dewpoint		-75^{o}C (-103^{o}F) (1.4ppm @ ATP)
Start up time for dewpoint		8 hrs
Particles		0.01um
Hydrocarbon concentration (as methane)		<0.1ppm
Start up time for hydrocarbon concentration		45 minutes
CO level		<1.0ppm
CO_2 level		<1.0ppm
SOX		<0.1ppm
Electrical Requirements		
@115V ac (50/60Hz)		5.2 Amps
@230V ac (50/60Hz)		2.6 Amps
Electrical Connection		IEC-Euroconnector
General		
Dimensions W x D x H	cm (inches)	43 x 41 x 62 (20” x 17” x 16”)
Shipping Weight	Kg (lbs)	64 (136)

Serviceable Parts List

Item	TOC1500HP (110V 60Hz)	TOC1500HP (230V 50HZ)	CG15L (110V 60HZ)	CG15L (230V 50Hz)
Fuse (10A)	00-1208	00-1208	00-1208	00-1208
Transformer	n/a	04-4356	n/a	04-4356
Element Eliminizer	02-4339	02-4339	02-4339	02-4339
Element AFD3000	02-4335	02-4335	02-4335	02-4335
Heater Element	04-1053	04-1053	04-1059	04-1059
Thermocouple	04-1051	04-1051	04-1051	04-1051
Temperature Controller	04-4459	04-4459	04-4459	04-4459
Thermal Fuse	00-1207	00-1207	00-1207	00-1207
Cooling Fan	04-1022	04-1021	04-1022	04-1021
Exhaust Silencer	02-1033	02-1033	02-1033	02-1033
Timer	04-1019	04-1019	04-1019	04-1019
3/2 Valve	02-4384	02-4334	02-4384	02-4334
Pressure Regulator	02-1110	02-1110	02-1110	02-1110
Flow Regulator	02-4437	02-4437	02-4437	02-4437
Safety Valve	02-4549	02-4549	02-4549	02-4549

Maintenance Record Log

Model- CG **Serial number**

Work done	Remarks	Date	Name

Notes

Declaration of Conformity

We **Peak Scientific Instruments Ltd.**

of **Fountain Crescent, Inchinnan. Renfrewshire PA4 9RE**

Declare that:

Equipment : CG15L - 110 & 230v

Model : Purified Air Generator

To which this declaration relates, is in conformity with the applicable EC Directives, harmonized standards, and other normative requirements.

- Low Voltage Directive 2014/35/EU
  EN 61010-1: 2010
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.

- Electromagnetic Compatibility Directive 2014/30/EU
  EN 61326-1: 2013
  Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements.

All evaluation, testing and certification issued by:

York EMC Services Ltd.,
Donibristle Industrial Park,
Dunfermline , Fife , KY11 9HZ.

Signed By: 

Name: Chris Pugh

Position: Chief Technology Officer

Date: 30th January 2015

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Environmental Declaration

We Peak Scientific Instruments Ltd.

Of Fountain Crescent, Inchinnan, Renfrewshire, PA4 9RE

Declare that:

Equipment: TOC Air Generator

Model: CG15L

Is fully compliant with the following Directives

- 2012/19/EU WEEE (Waste of Electrical and Electronic Equipment)
- 2011/65/EU RoHS 2 (Restriction of Hazardous Substance)

Peak Scientific Instruments Ltd fully complies with its obligations towards the European WEEE (Waste of Electrical and Electronic Equipment) Directive 2012/19/EU. These obligations are being met within the B2B compliance group.

Peak Scientific Instruments Ltd have developed all reasonable 'due diligence' controls to ensure that our products comply with the principles and requirements of the European recast RoHS (Restriction of Hazardous Substances) Directive 2011/65/EU. Similar directives in the United States and China, for example, have also been captured within this program.

Where a specific certificate of compliance is required, this can be requested, on a product serial number basis, directly from Peak Scientific Instruments Ltd, by contacting us through our website on www.peakscientific.com

Signed:  Name: Chris Pugh

Date: 1st February 2015 Position: Chief Technology Officer