Directions For Use
Calibration Gas Generator

CG22L

Peak Scientific Instruments Ltd
Fountain Crescent
Inchinnan Business Park
Inchinnan
Renfrewshire
PA4 9RE

T.(Europe) +44 (0) 141 812 8100
T.(USA) +1 866 647 1649 (sales)
T.(USA) +1 866 732 5427 (tech support)

F. (Europe) +44 (0) 141 812 8200

info@peakscientific.com
sales@peakscientific.com
support@peakscientific.com

www.peakscientific.com

CE

Document Change History

Issue No	Changed	Initials	Date
1	Document Created	HD	15/04/03
3	USA Technical support number updated	FAD	17/11/04
4	New front cover added	FAD	31/03/05

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 to the rear. The generator will be warm to touch and will give off heat.

The generator should be placed on a steady and level base. It is designed to fit under most workbenches alternatively it may be placed on a bench or in any convenient location.

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 euro connector located on the bottom right hand side of the cabinet adjacent to the off/on switch. The fuse is rated at 6.3 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" female.

The minimum required air conditions for the Peak CG22L Generator are as follows: -

Pressure: - 110 / 120 PSI
Inlet Flow: - 37 Litres/minute (minimum)

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 Chambers 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.

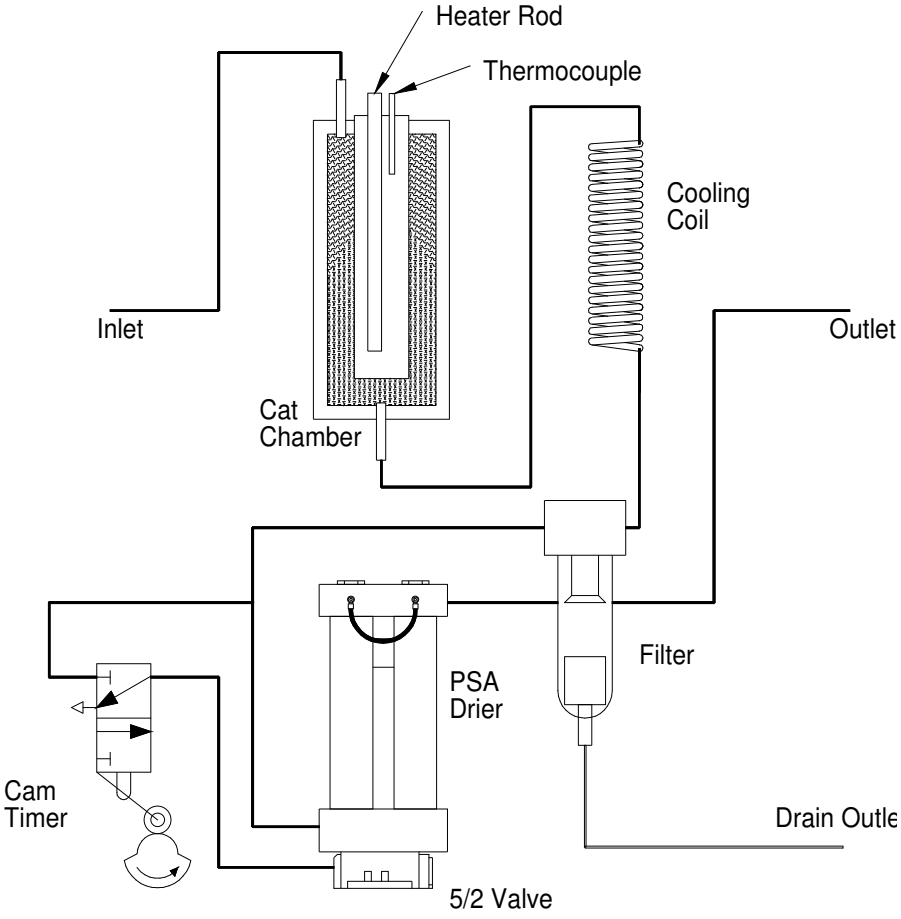
The air supply should be connected to the generator inlet on the lower left side of the cabinet. The user's application should be connected to the outlet on the lower right side of the cabinet. To avoid leakage/impurity ingress, use PTFE tape on all fittings.

Slowly, turn on the air supply until the desired pressure is attained. There is no physical method restricting the gas output from the generator. Demand in excess of the rated capacity will result in higher levels of hydrocarbons in the delivered gas.

5 Principle of Operation

The Peak Scientific Instruments Calibration Gas Generator works on the basis of two fundamental processes as illustrated in the following schematic 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.



Zero Air Generation

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 cam 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 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 cam on the timer is rotating. The Digital Displays show the Catalyst Chamber temperatures. This is factory set at 400ºC

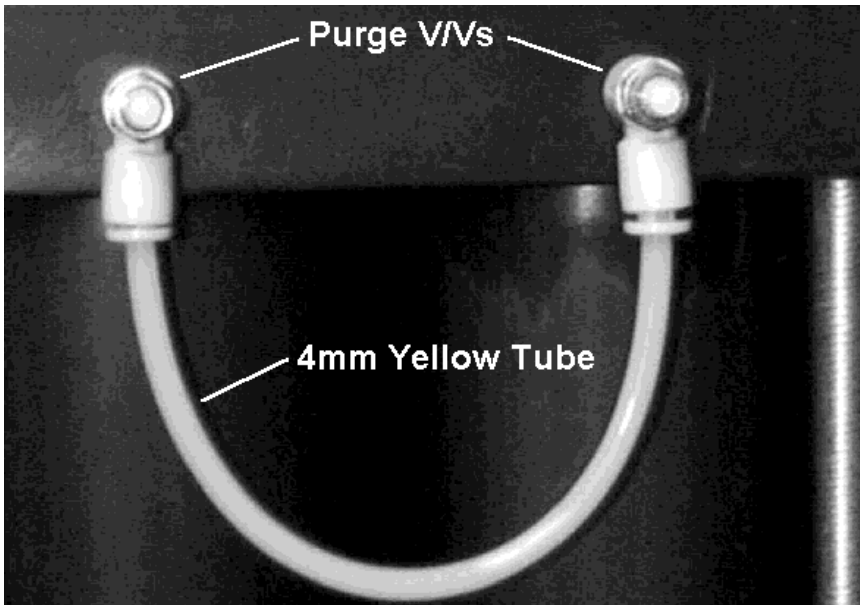
After a maximum of 2 minutes the timer should operate to change over the columns on the PSA drier unit. This is accompanied by an audible rush of exhaust air from the drain outlet.

After a maximum time of 40 minutes the Catalytic Chambers should have reached temperature. The heaters are controlled by a PID controller maintaining near constant 400ºC. The heaters will cycle as required.

Do not touch any part of the Catalytic Chambers 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 correct setting is 12 l/min. This assumes a maximum generator output of 22 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 CG22L 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.

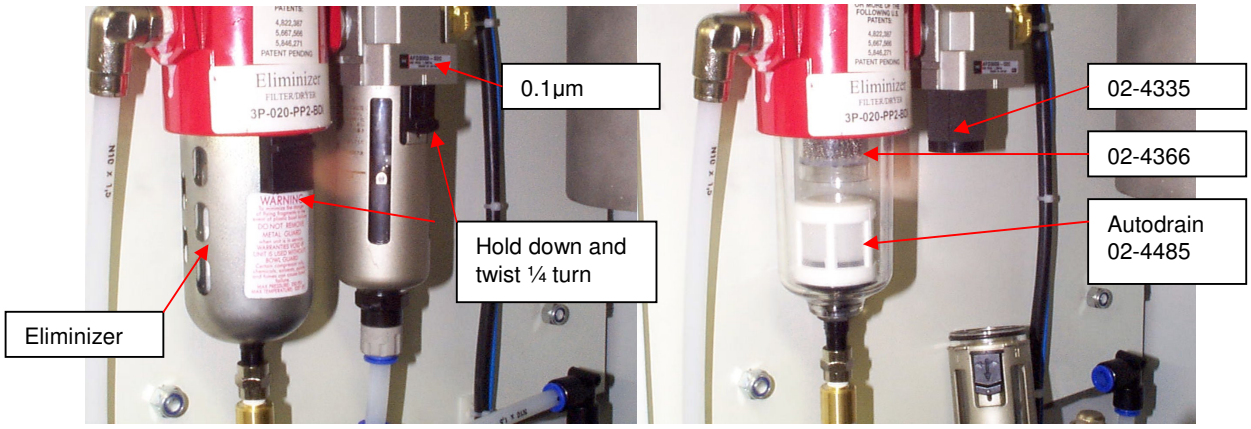
The Generator MUST be de-pressurised prior to attempting to remove ANY filter bowl. Failure to do this may cause injury.

Eliminizer & Coalescing Filter Elements

These elements should be changed at 12-month intervals. Part Numbers 02-4366 & 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 & 02-1033.

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

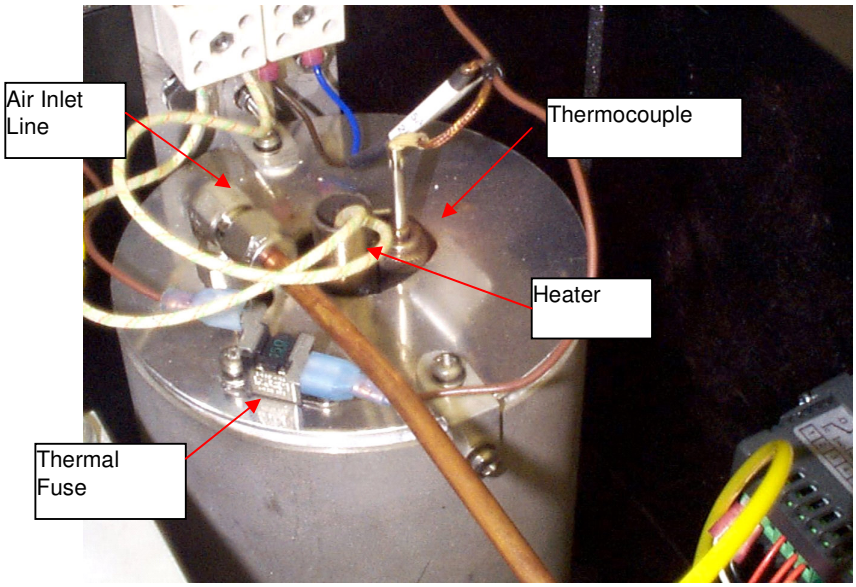
Disconnect the drain fittings from the bottom of the bowl.

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.

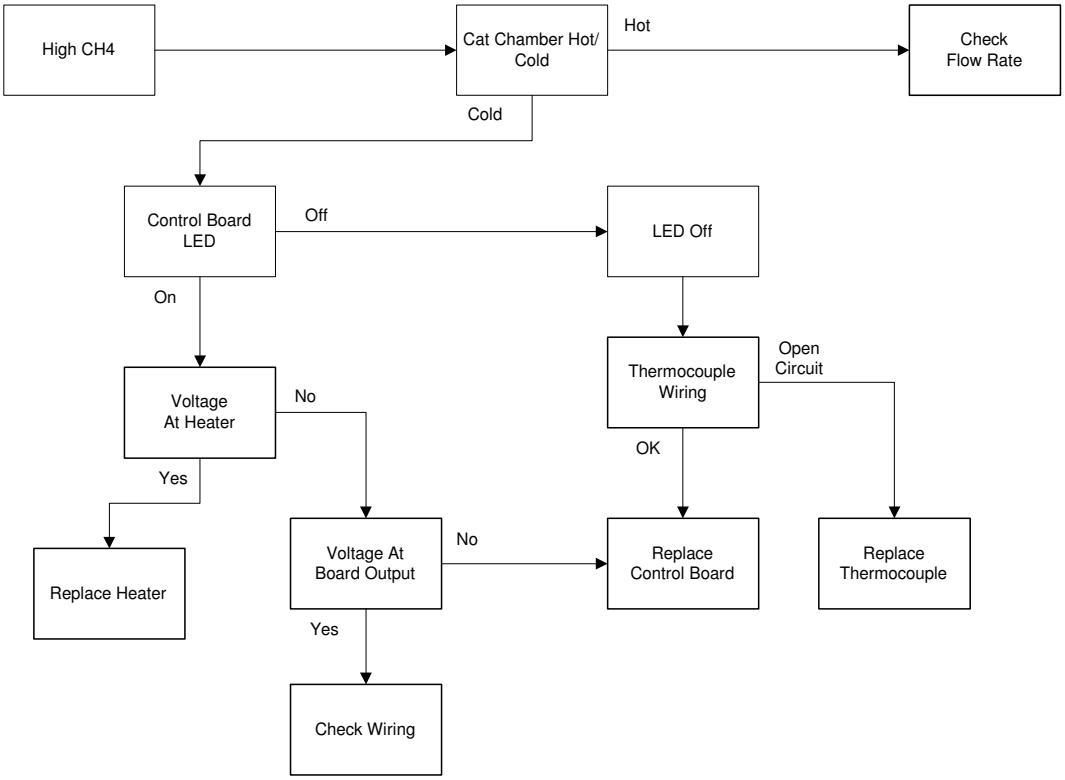
Note: - The thermal fuse will not blow under normal operation. A blown thermal fuse indicates that a fault exists which MUST be rectified before attempting to replace the thermal fuse. Refer to the trouble shooting chart on page 14 for guidance.

8 Troubleshooting

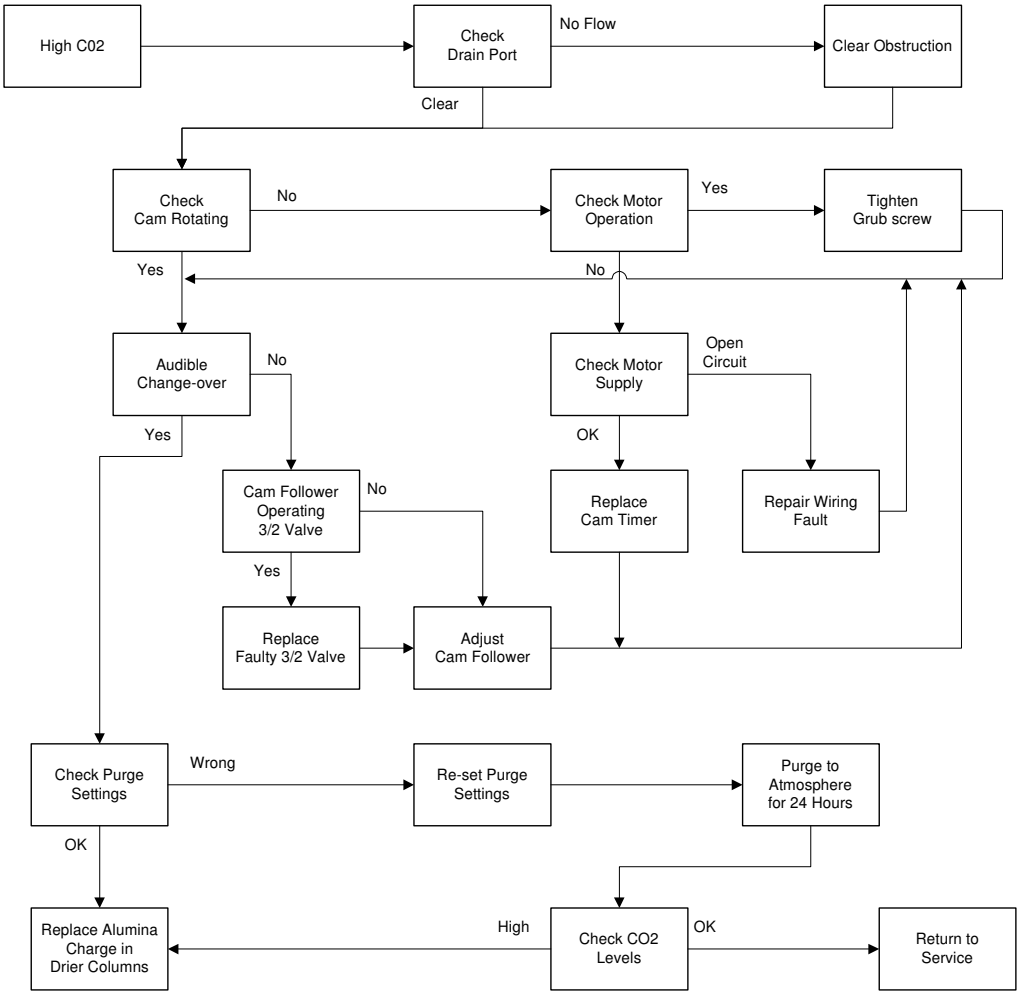
Problems with the GC22L will most probably be shown up by increased levels of Hydrocarbons or CO_2 being detected on the baseline. The following procedure should be followed to identify the source of the problem.

Reference should be made to the following Fault Finding Charts.

1. High CH_4



2. High CO_2


High C02
Check Drain Port
No Flow
Clear Obstruction
Clear
Check Cam Rotating
No
Check Motor Operation
Yes
Tighten Grub screw
Yes
No
Audible Change-over
No
Check Motor Supply
Open Circuit
Yes
OK
Cam Follower Operating 3/2 Valve
No
Replace Cam Timer
Repair Wiring Fault
Yes
Replace Faulty 3/2 Valve
Adjust Cam Follower
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

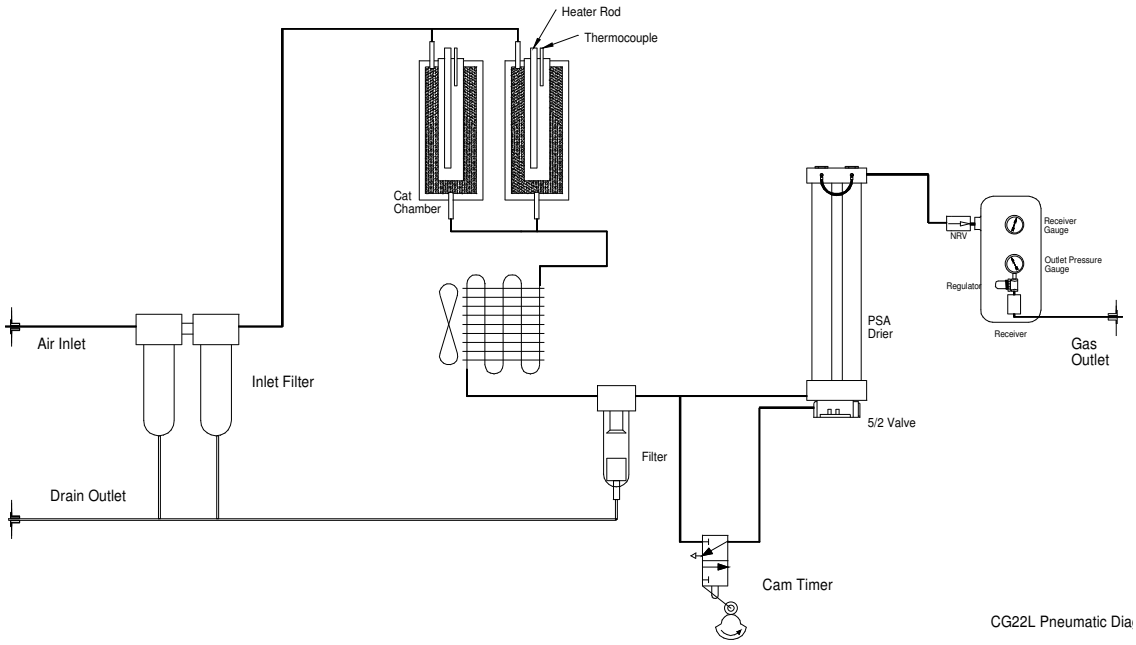
9 Technical Specifications

General Details

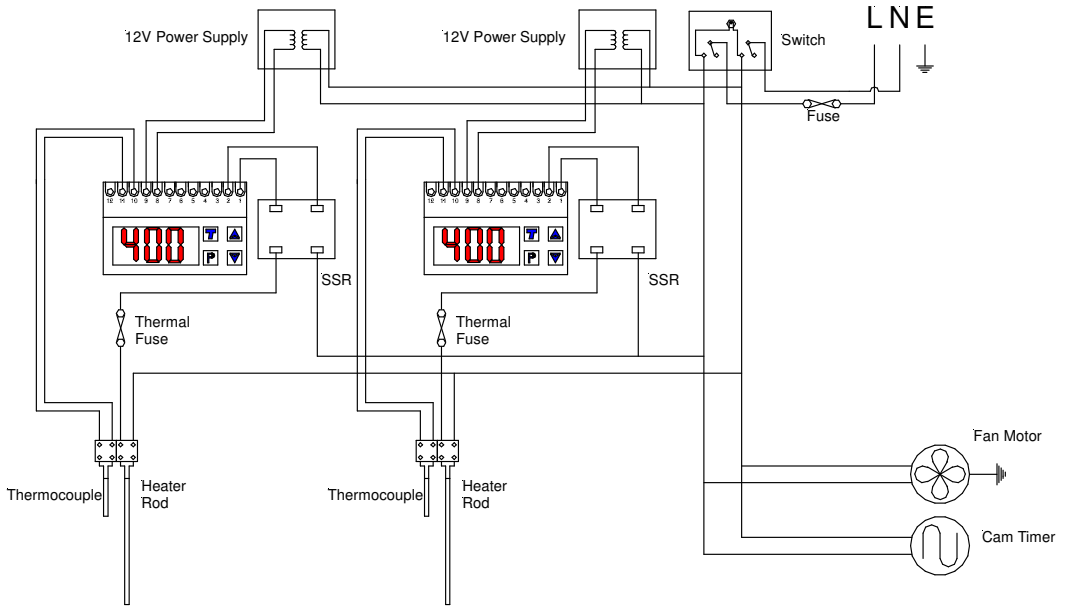
Minimum Operating Ambient Temperature	5 °C (41 °F)
Maximum Operating Ambient Temperature	45 °C (113 °F)
Inlet Conditions (Free of oil and bulk moisture)	
Minimum Air Inlet Pressure	7.5 Bar (110 PSI)
Maximum Air Inlet Pressure	8.27 Bar (120 PSI)
Minimum Air Inlet Flow Rate	37 Litres/min (ATP)
Outlet Gas	
Maximum Pressure Drop (Outlet-Inlet) δP	0.7 Bar (10 PSI)
Maximum Gas Outlet Pressure	Max Inlet-δP
Maximum Gas Outlet Flow for specified hydrocarbons	22 Litres/min (ATP)
Pressure Dewpoint	-75°C (-103°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
O_2 level	20%
Electrical Requirements	
230V ac (50/60Hz)	8.7 AMPS
Electrical Connection	IEC-Euro connector
General	
Dimensions W x D x H cm	43x41x88
Weight Kg	37
Shipping Dimensions W x D x H cm	100 x 57 x 67
Shipping Weight Kg	64

Parts List

Item	Part No
Heater Element	04-1058
Thermocouple	04-1050
Temperature Controller	04-4459
Cooling Fan	04-1021
Timer	04-1020
Eliminizer Filter	02-4549
Element	02-4366
AFD 3000 Filter	02-4486
Element	02-4335



CG22L Pneumatic Dia



CG22L Electrical Diagram

Maintenance Log

Model- CG **Serial number**

Work Done	Remarks	Date	Name

Notes