

This document is intended to provide instructions for the following GASARC products:

Published by GASARC

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MANUAL CONTROL PANEL

Tech Master	Lab Master	Spec Master	Chem Master
GPM4000 Series	LGM5000 Series	HPM6000 Series	SGM6000 Series
GPM4200 Series		HPM6200 Series	SGM6200 Series

1 INTENDED USE OF PRODUCT

The Tech Master Product range is designed for use with non-corrosive or non-toxic, technical gases up to grade 4.5 purity (99.995%).

The Lab Master Product range is designed for use with non-corrosive or non-toxic, high purity gases up to grade 5.0 purity (99.999%).

The Spec Master Product range is designed for use with non-corrosive or non-toxic, high purity gases up to grade 6.0 purity (99.9999%).

The Chem Master Product range is designed for use with corrosive, toxic and high purity gases up to grade 6.0 purity (99.9999%).

WARNING

An appropriately sized pressure relief device downstream of the regulator should be installed in your system to prevent damage to equipment and/or injury to personnel should an internal failure of the regulator occur.

WARNING

For regulators with tube fittings, select the appropriate tubing. Use seamless tubing with the proper consideration given to wall thickness and material. Please contact your gas supplier for more information.

2 USER RESPONSIBILITY

This equipment will perform in conformity with the description contained in this manual and accompanying marking, labels and/or inserts when installed, operated and maintained in accordance with the instructions provided. This product is designed to supply and/or protect piping of a nominal diameter of less than 25mm and therefore meet the EU PED criteria „Sound Engineering Practice“ and will not be CE marked. It is the user's responsibility to ensure that the control panel is suitable for the gas being used. This equipment must be checked periodically. Improperly working equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. For further information please contact GASARC customer services department.

This equipment or any of its parts should not be altered without prior written approval by GASARC. The user of this equipment shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than GASARC or a service facility designated by GASARC.

3 CUSTOMER SERVICE

In the event of equipment failure, contact the GASARC customer services department. Please be prepared to provide the model number of the equipment involved, in addition to some details regarding its application.

Website: <http://esabspecgas.com/contact/>

email: specgasmail@esab.com

Things to consider before removing the control panel from the box

- ✓ Know the properties and special handling requirements of the gas being used. Many gases are very dangerous (flammable, toxic, corrosive asphyxiants or oxidisers). Equipment failure or misuse may lead to problems such as a release of gas through the relief valve or regulator diaphragm. Proper safety measures should be established to handle these and other component failures.
- ✓ Be sure that the assembly purchased is suitable for the gas and type of service intended. The control panel marking and labelling provides information on the product type and the maximum inlet pressure.
- ✓ Be sure that the equipment received conforms to the order specifications. The user is responsible for selecting equipment compatible with the gas in use, and conditions of pressure, temperature, flow etc. Selection information can be found on the technical data sheets available to download on the website <http://esabspecgas.com/contact/>. In addition, GASARC representatives are trained to aid in the selection process.
- ✓ Inspect the assembly upon receipt to be sure that there is no damage or contamination. Pay particular attention to connecting threads. While GASARC assembles system components to exacting leak tight standards, the customer should also inspect for any loosening of parts that may occur in shipping or installation. Loose parts may be dangerously propelled from an assembly. If there are adverse signs (leakage or other malfunction), return the assembly to the supplier.
- ✓ Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as nitrogen.
- ✓ If the control panel, outlet point regulator or cylinder connection hose includes gas specific inlet connections, their purpose is to prevent usage on the wrong gases. Adaptation or alteration for use on other gases can be dangerous, and is not recommended.

4 GENERAL SAFETY PRACTICES

- Comply with precautions listed in relevant geographic and regional Codes of Practice where applicable.
- Always ensure appropriate Personal Protective Equipment (PPE) is used at all times.
- No smoking should be permitted near Oxygen, Nitrous Oxide, any other oxidiser, flammable gases or flammable mixtures, or in areas where cylinders are stored.
- Never use an open flame when leak testing.
- Consult the cylinder distributor for the proper use of cylinders and for any restrictions on their use (such as flow rate and temperature requirements).
- Store cylinders with valve caps screwed on, and cylinders chained to a supporting wall or column.
- Handle cylinders carefully and only with valve caps screwed on. The cap will reduce the chance that the cylinder valve will break off if the cylinder is accidentally dropped or falls over. The cap also protects the cylinder valve from damage to screw threads, which could cause leaky connections.
- Never lift gas cylinders with a magnetic lifting device.
- Always open valves slowly when high-pressure gases are being used.
- Always be sure that the gas in the system is the correct gas for the intended use.
- Always remove all empty cylinders from a control panel before connecting full cylinders.
- Always test cylinders to be sure the cylinders are full before connecting to a control panel.
- Keep all cylinders and control panels away from any source of high temperature, over 50 °C or possible fire hazards. High-pressure gas contained in a closed cylinder becomes increasingly dangerous when exposed to high temperature because pressure increases.
- Always close all cylinder valves before disconnecting cylinders from a control panel.
- Always leak-test any control panel or distribution pipeline before using.
- Where an oxidiser (such as NO₂ or O₃) is used, the control panel and cylinders must be kept clean. No oil, grease or combustible substances should come in contact with Oxygen or Nitrous Oxide storage or handling equipment. Such materials in contact with Oxygen or Nitrous Oxide are readily ignitable and when ignited, will burn intensely.
- All control panels used with flammable gases should be provided with approved flashback arrestors to stop any burning gas in the pipeline from getting back to the control panel or cylinders.
- Always be sure that a cylinder contains the correct gas before connecting it to the control panel.

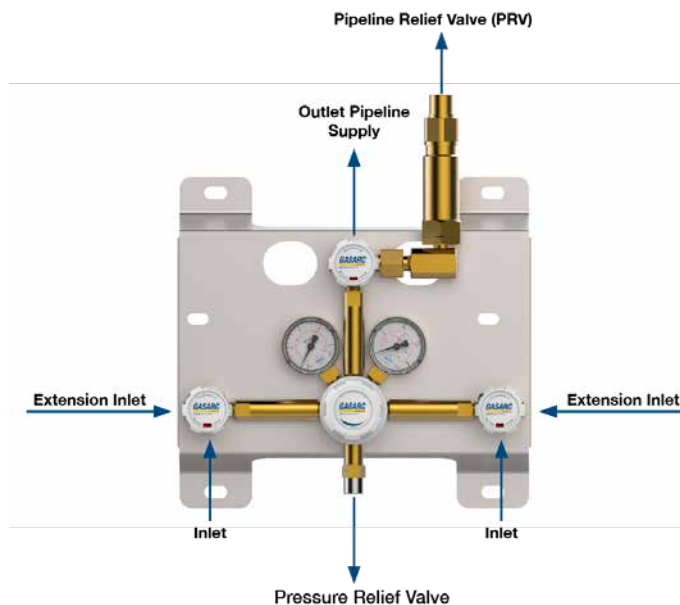
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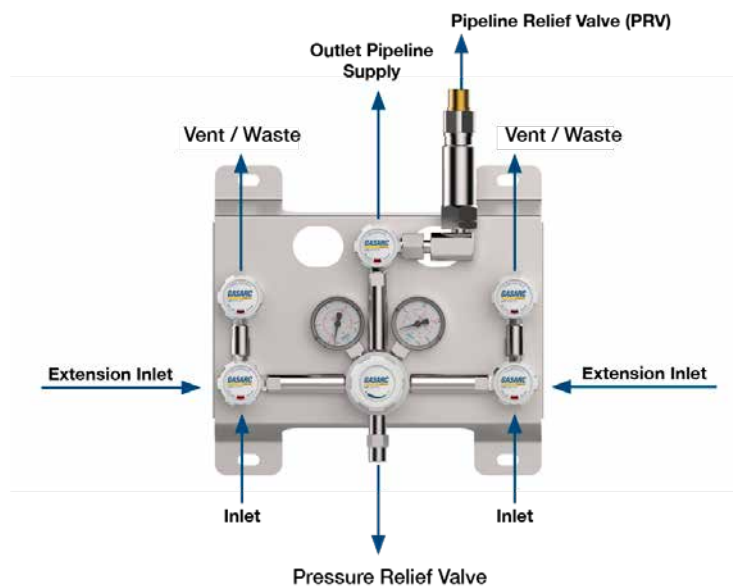
- Control panels installed in open locations should be protected from weather conditions. During winter, protect the control panel from ice and snow. In summer, shade the control panel and cylinders from continuous exposure to direct sunlight. Always leave access to the control panel for cylinder replacement.

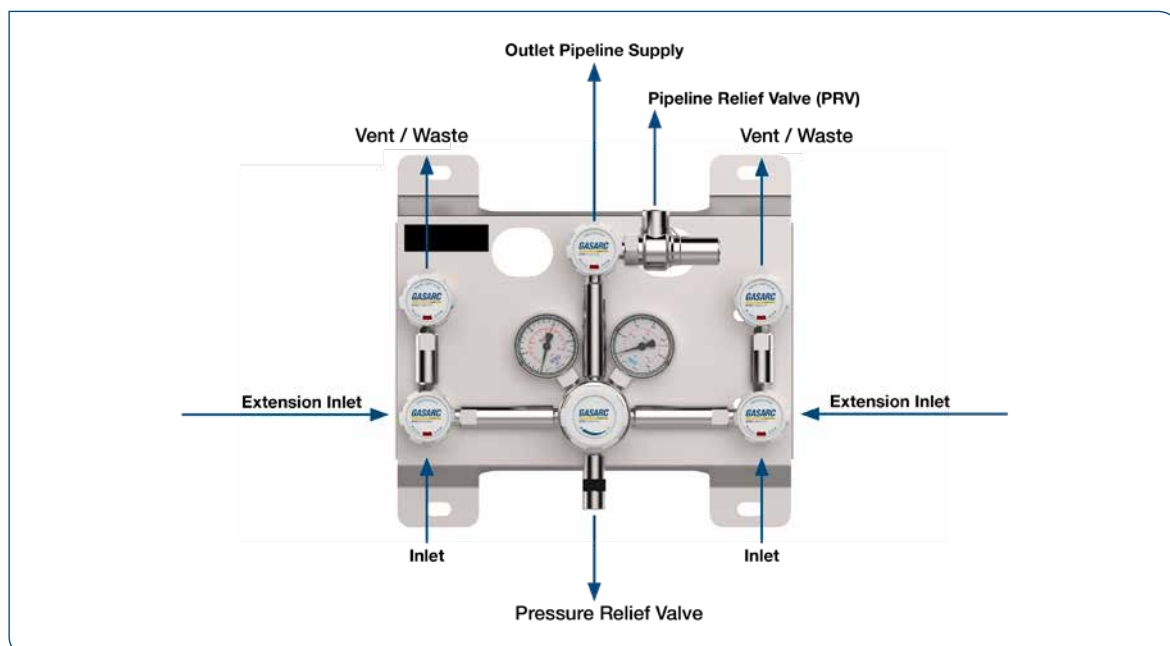
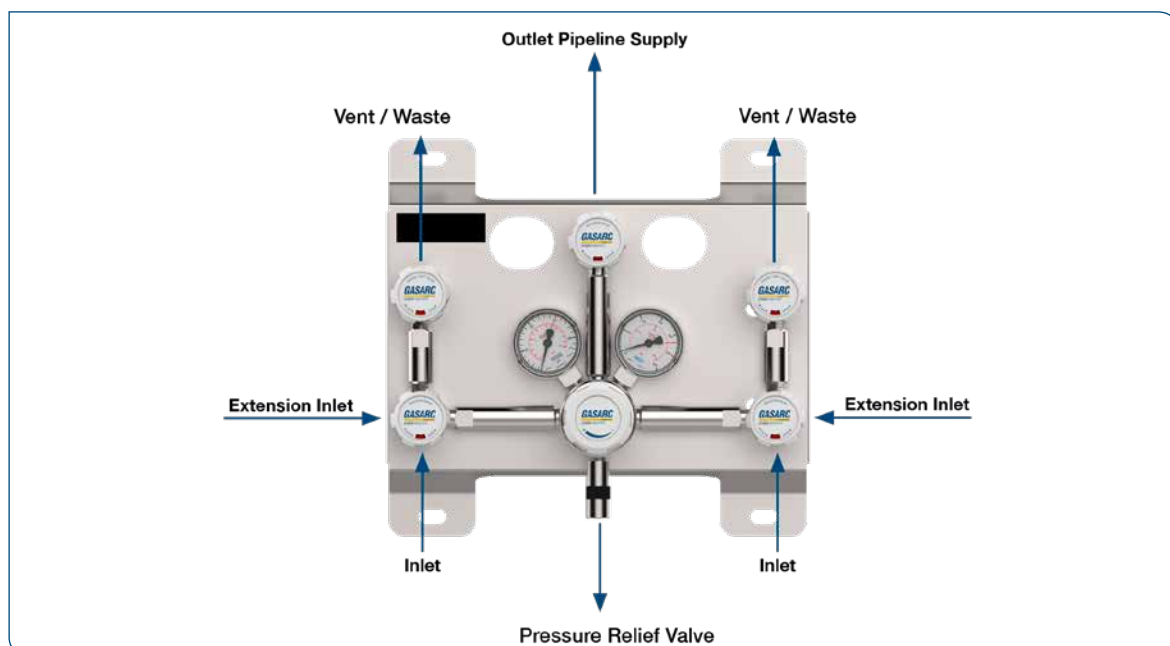
5 PRODUCT DESCRIPTION

Tech Master
Manual Control
Panel



Lab Master
Manual Control
Panel



Spec Master
Manual Control
PanelChem Master
Manual Control
Panel

Optional Features

- **Capture vent kit:** When used with toxic, corrosive, or flammable gases, the captured vent kit should be added to each of the regulators of the system. This vent kit is added to the bonnet to redirect gas in the event of a diaphragm failure. When installing the vent kit, be sure to connect suitable tubing from the vent kit fitting to the safe discharge area.
- **Purge devices:** These devices are optional. Purge devices are used to remove toxic, corrosive or flammable gases from the system to a safe discharge area. This is particularly helpful for service and maintenance.
- **Contact alarm gauges:** These devices are optional. Used in conjunction with a remote alarm, they provide a warning that one or both of the cylinder banks is about to be depleted. The contact alarm gauge switch is closed at high pressure, when the pressure drops below the gauge set point the switch opens to alarm status.

6 INSTALLATION & COMMISSIONING PREPARATION

! NOTE

It is the installer's responsibility to label the installation with the correct gas service name.

The control panel is usually commissioned in conjunction with the distribution pipeline by a responsible engineer,

who will ensure that:

- ✓ The control panel area is clear of all foreign material
- ✓ The site chosen for the control panel installation shall be level, well ventilated and at a safe distance from sources of flames, sparks and excessive heat.
- ✓ Relevant instruction cards and warning notices are displayed
- ✓ The control panel has been tested satisfactorily.

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- ✓ The control panel should not be placed in an area that may subject the control panel to damage from passing forklifts, trucks or other heavy machines.
- ✓ Oxygen control panels must not be installed under shafting, belting, or other places where oil can drip on them.
- ✓ Ensure consideration is given to all factors when selecting materials.
- ✓ Oil or grease are NOT used on fittings.
- ✓ If constant regulated pressure is required, a two-stage regulator will need to be specified either within the control panel system or downstream from the system.
- ✓ Use of open-end wrench, not a pipe wrench, to install any accessories to the autochange system.

! NOTE

GASARC uses PTFE tape on all its NPT connections. Follow these guidelines when using PTFE tape.

Inspect the NPT threads and if necessary, clean the fittings to remove any dirt or thread sealant that remains on the threads. Start the PTFE tape on the second thread as shown in **Figure 4**; make sure the tape does not overlap the end of the fitting. As the tape is wrapped in the direction of the thread spiral, pull tightly on the end of the tape so that the tape conforms to the threads. Wrap the tape around the threads twice. Cut off the excess tape and press the end firmly into the threads. **(See image below)**

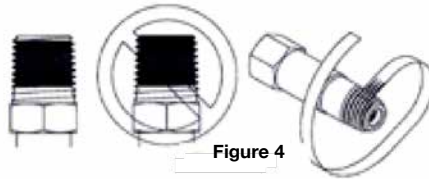


Figure 4

- ✓ On stainless steel connections, the PTFE tape helps prevent the connections from galling together when tightening or loosening.
- ✓ The siting, installation and commissioning **MUST** conform to local, regional, national and international standards and guidelines.

7 INSTALLATION & COMMISSIONING INSTRUCTIONS

1. Installing the outlet connection: The standard system typically has the outlet connection at the top of the control panel system. The connection is a female 1/4" NPT.
2. Pressurising the system for the first time:
3. Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as Nitrogen. To accomplish this, it may be necessary to use an adaptor. The recommended use of an adaptor is for temporary use only, for system start up and checks. Adaptors should never be used on a permanent basis.
4. Wear safety glasses and gloves.
5. Stand a full cylinder in place in each position on the control panel and fasten with the securing chain.
6. Screw the cylinder connector of each tailpipe into the cylinder valve of the adjacent cylinder and tighten firmly using a spanner.
7. Check that all tail pipes are connected and tightened.
8. Check that both high pressure isolating valves LH and RH are closed.

! NOTE

Earth yourself in close proximity to the installation before proceeding with fuel gas systems.

9. Open the cylinder valves one at a time very slowly.
10. As each valve is opened, check the cylinder connection for any sign of leakage, with an approved leak test solution.

11 Check that:

- ✓ **Low pressure distribution pipework is connected to the outlet of the control panel.**
 - ✓ **All outlet point valves are closed.**
 - ✓ **All connections and joints are leak tight, using an approved leak test solution.**
12. Open one valve in the distribution pipe work system, ensuring that any gas discharge will be safe and create no hazards.
 13. Screw the high pressure regulator adjusting screw fully out (anticlockwise).
 14. Open the LH control panel high pressure isolation valve slowly. The whole of the LH system and the regulator are now fully pressurized.
 15. Screw in the regulator adjusting knob very slowly and monitor the regulator low pressure gauge. The low pressure will slowly increase and when the desired controlled low pressure has been achieved, make no further adjustment to the adjusting knob.
 16. Close LH cylinder valve and close LH control panel isolation valve.
 17. Repeat this procedure from 5 for RH side of system.
 18. The controlled low pressure at the regulator gauge should be the same as when the LH bank was working.
 19. Close the outlet point valve which was opened at step 12.
 20. Open each outlet point in turn to ensure that the pipeline is thoroughly purged. Appropriate safety precautions must be taken to avoid dangerous concentrations of gas in the atmosphere. The system is now ready for operation.
 21. Purging - It is critical that all high purity equipment be thoroughly purged before use to ensure that any residual moisture is removed from the system.

The following procedure should be carried out:

Pressurize the control panel/regulator assembly to its maximum outlet operating pressure and then with the inlet pressure isolated, reduce the outlet pressure to 1 bar.

Repeat this process 3 times.

Finally at a minimum operating pressure of approximately 1 bar, purge the regulator until the operating pressure falls to 0.5 bar and hold for a period of 2 to 3 minutes.

! NOTE

To avoid Oxygen depletion or enrichment of the local environment, ensure all purging gases are safely vented.

22. Prepare two notices marked '**WORKING**' and '**STANDBY**', which can be hung over the cylinder banks, ensuring that they are correctly positioned and changed whenever the banks are changed over. Suitable instruction cards, explaining correct operation of valves and controls, are also recommended.

8 OPERATION

1. The control panel should be operated in accordance with local, regional, national and international standards and guidelines.
2. The control panel should preferably be put into operation immediately after commissioning.
3. The control panel after commissioning will be set up with one bank of cylinders, with valves open, as the working bank. The other bank will be available on standby with cylinder valves closed.
4. Operations can now commence at all outlet points.
5. At the end of each working period check that all outlet point valves are fully closed.
6. Monitor the high pressure gauges if fitted, to establish the rate of pressure fall.
7. When the cylinder pressure falls to within 2 bar of the regulated low pressure, open all cylinder valves on the standby bank slowly (ease the valve gently until you hear gas begin to flow, do not open further until audible flow has ceased then continue to open the valve slowly to a minimum of 1½ turns).
8. Open the standby bank high pressure isolation valve slowly (ease the valve off its seat [anti-clockwise] until gas begins to flow, do not open further until audible flow has ceased, then continue to open the valve slowly until fully open). Back flow into the empty bank of cylinders is prevented by the non-return valve.
9. Close the high pressure isolating valve on the empty bank of cylinders.
10. Change the '**WORKING**' label to the full bank of cylinders, then change the empty cylinders.
11. Close the cylinder valves of all cylinders on the empty bank.
12. Disconnect all tailpipes from the empty cylinders by unscrewing bull nose connectors.

! NOTE

13. **Use a spark proof spanner for all fuel gases, these connections have a LH thread.**
14. Mark all cylinders on the empty bank with chalk to show that they are '**EMPTY**'.
15. Remove one cylinder at a time, by unhooking the chain, and transfer to the empty cylinder storage position.
16. Place a full cylinder in each empty position on the control panel, correctly orientated to connect to the tailpipe, and fasten the retaining chain as tightly as is practicable.
17. Connect each tailpipe to the adjacent cylinder.
18. When all connections have been made, open each cylinder valve slowly.
19. As each valve is opened, check the cylinder connection for leakage, using an approved leak test solution.
20. Check the high pressure gauge to ensure the reading is in accordance with the pressure shown on the gas cylinder label.
21. Close all cylinder valves and leave closed until the next cylinder bank changeover.

9 MAINTENANCE

Weekly checks may be done by an operator instructed in the tasks. Six-monthly and annual maintenance should be performed by a competent person, who fully understands the operation of the cylinder control panel and the hazards involved.

A record of all maintenance should be kept.

When maintaining fuel gas systems, always earth yourself in close proximity to the installation before commencing work, by touching the control panel.

Weekly Inspection (by the user)

Check that:

- ✓ Visually, equipment is in good order, is being correctly used and all the required equipment is fitted.
- ✓ Control Panel, framework and chains are in good condition.
- ✓ Pigtails and flexible hoses are not corroded or damaged.
- ✓ Valves shut off and open correctly.
- ✓ Regulators are identified as being suitable for the gas and pressures and are not damaged.
- ✓ The system is operating normally, i.e. report if the system is using more gas than normal, if there is an unusual drop in pressure or if there is a smell of gas which could indicate a malfunction or leak.
- ✓ the control panel house is free from oil and combustible materials

Annual Inspection (by a person with appropriate experience and knowledge)

Check that:

- ✓ All repairs and modifications (including removals and additions of components) and extensions carried out conform to the relevant Code of Practice.
- ✓ Changes in the vicinity of the installation do not affect its operation or safety.
- ✓ Examples are location of heat sources or burners, moving of machines or work places, occurrence of vibrations, use of a pipeline as an electrical earth or as a support for other items, proximity to electrical installations and to other piping systems.
- ✓ There is adequate identification of above ground pipework/pipelines and route markers for buried pipework/pipelines.
- ✓ The system is free from leaks by testing at the designated operating pressure.
- ✓ Buried pipelines are in ground which is free from encroachment by other services, buildings or civil structures.
- ✓ Filters are in good condition and are not blocked. Clean or replace them where necessary.

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GAS SAFETYSAFETY

- **TOXIC & CORROSIVE GASES:**
Pipe all vents to a safe area, ensure adequate ventilation
- **OXYGEN:**
Use no oil or grease, ensure adequate ventilation
- **FLAMMABLE GAS:**
Control ignition sources, ensure adequate ventilation
- **INERT GAS:**
ensure adequate ventilation

10 SERVICE

- A unit, which is not functioning properly, should not be used until all required repairs have been completed and the unit has been tested to ascertain that it is in proper operating order.
- **GASARC 'Chem Master'** products are designed to work with corrosive and toxic gases. To protect our staff and to comply with Health & Safety regulations, we must be fully informed of all gases and substances that have been in contact with the product.
- If you wish to return product to us, for any reason, you must contact GASARC to obtain a **Request for Authorisation to Return Product** form.
- Once the completed form has been returned to us we will consider your request. Where gases and substance that have been in contact with the product are unknown to us, we will require you to supply us with the appropriate safety data before we can decide if we can grant authorisation for you to return the product. If authorisation is granted for the product to be returned to us, we will supply you with a returns number and instructions on how to send it back to us.
- **We will not accept any products returned to us without prior authorisation.**
- Test control panel for leaks on a routine schedule.

11 TROUBLE SHOOTING

Symptoms	Probable Causes
Gas leakage at the regulator outlet when the adjusting screw is turned fully anti clockwise	Seat leak or creep, have regulator repaired.
With no flow through the system (downstream valve closed), outlet pressure increases steadily above the set pressure.	Seat leak or creep, have regulator repaired.
Gas leakage from ring assembly or bonnet	Diaphragm failure, have regulator repaired.
Excess drop in outlet pressure with regulator flow open.	Blockage in seat assembly or inlet filter. Have regulator repaired.
Gas leakage from any pipe thread joint.	Loose fitting - remove connection, clean, re-apply PTFE tape and re-tighten.
Gas leakage from relief valve.	Possible faulty relief valve, replace. Possible seat leak or creep, have regulator repaired.
Inconsistent repeat reading.	Seat sticking, have regulator repaired. Possible bad pressure gauge.
Inlet or outlet pressure gauge does not return to zero with no pressure applied to the regulator.	Gauge has suffered physical damage, replace gauge.

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WARRANTY INFORMATION

Please refer to **GCE Speciality** website for warranty information.

www.gce-speciality.com/en_gb/contact