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# **INSTRUCTIONS FOR SERIES SG3090 BANANA GAS EQUIPMENT**

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**THIS BOOKLET CONTAINS PROPRIETARY INFORMATION OF  
ADVANCED SPECIALTY GAS EQUIPMENT CORP. AND IS PROVIDED  
TO THE PURCHASER SOLELY FOR USE IN CONJUNCTION WITH  
SERIES SG3090 BANANA GAS EQUIPMENT.**

## **IMPORTANT**

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These instructions are for experienced operators who know the general principles and safety precautions to be observed in handling specialty gases and operating pressure regulation equipment. If you are not certain you fully understand the safety precautions for handling gases, we urge you to obtain and read the Material Safety Data Sheet (MSDS) for each gas being used.

Do not permit untrained persons to install, operate, or maintain this equipment. Do not attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your Advanced Specialty Gas Equipment Distributor.

**Be sure this information reaches the operator. Your supplier has extra copies.**



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## **SAFETY PRECAUTIONS**

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Protect yourself and others. Read and understand the following instructions before attempting to use this equipment. Failure to understand and follow these instructions could result in serious personal injury and/or damage to equipment.

- Know and understand the physical and chemical properties of the gas being used.
- Observe general precautions for the use of gases.
- Observe safety precautions for the gas being used.
- Read and follow precautions on cylinder labels.
- Never use this equipment with gases not compatible with the materials of construction. The use of gases not compatible with the materials of construction may cause damage to equipment or injury to personnel.
- If flammable gases are used with this equipment, do not locate it near open flames or any other source of ignition.
- If toxic or flammable gases are used with this equipment, emergency equipment applicable to the gases in use should be available in the operating area.
- Many gases can cause asphyxiation by displacing oxygen in the atmosphere. Provide a device to warn personnel of oxygen depletion in the work area.
- Do not release toxic or flammable gases in the vicinity of personnel. Vent gases to the outside atmosphere, and in an area away from personnel. Be sure that venting and disposal methods are in accordance with Federal, State and local requirements. Locate and construct vent lines to prevent condensation or gas accumulation. Be sure the vent outlet cannot be obstructed by rain, snow, ice, insects, birds, etc. Do not interconnect vent lines; if more than one vent is needed, use separate lines.
- Relief devices should be installed and properly vented in all gas handling systems to protect against regulator failure and over-pressurization.
- Never use oil or grease on these regulators. Oil and grease are easily ignited and may combine violently with some gases under pressure.
- Never connect a regulator to a supply source having a pressure greater than the maximum rated pressure of the regulator. Refer to Product Specifications (page 11) for maximum inlet pressures.

## DESCRIPTION

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Series SG3090 Equipment is designed for use with Banana Gas™ a gas used to initiate the de-greening or ripening of fruit. Equipment is available for both portable package and stationary control panel applications.

The SG3091 regulator with attached flowmeter is designed for use as a portable banana gas package. Attached directly to a Banana Gas cylinder it will control flow into a ripening room at a recommended flow rate.

The SG3092 regulator and control panels (SG3093 thru SG3096) are used in stationary Banana Gas applications. The regulator is attached to a single cylinder which supplies gas to individual panel mounted flowmeters. The flowmeters can individually control flow for 2–5 ripening rooms.

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Equipment	Part No.
Banana Gas Regulator/Flowmeter Combination for portable package use	SG3091
Banana Gas Regulator for use with stationary control panels	SG3092
Stationary Control Panels	
Two-Room Control Panel*	SG3093
Three-Room Control Panel*	SG3094
Four-Room Control Panel*	SG3095
Five-Room Control Panel	SG3096
<b>Note:</b> Control Panel is designed so that additional flowmeter stations (up to a maximum of 5) may be added to meet future requirements.	
Additional Flowmeter Station Kits for Stationary Control Panels	SG3097

\* For each control panel ordered, a SG3092 Regulator is required.

## **OPERATING INSTRUCTIONS FOR PORTABLE BANANA GAS REGULATOR – MODEL SG3091**

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Gassing of a ripening room is accomplished by using the SG3091 regulator with attached flowmeter and setting the recommended flow rate for that room.

### **INSTALLATION**

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**WARNING: Before attempting to install and operate these regulators, read and fully understand the safety precautions on page 3 in this booklet. Failure to follow the safety precautions may result in serious personal injury and/or damage to equipment.**

1. Inspect the regulator and cylinder valve for physical damage and contamination. Do not connect the regulator if you detect oil, grease or damaged parts. If the regulator is contaminated or damaged contact your Advanced Specialty Gas Equipment Distributor to have the regulator properly cleaned or repaired (see "Repairs"). Contact your gas supplier if the cylinder valve is damaged or contaminated.
2. Close the regulator by turning the pressure adjusting knob counterclockwise until it reaches the stop. Do not turn the adjustment knob past the stop. Damage to the regulator could result. Close flow meter valve by turning hand knob clockwise.
3. Secure cylinder in place using a suitable restraining device such as a Model SG6203 wall clamp.

**Note:** Make sure that the 320 CGA inlet washer provided is placed between the cylinder valve and regulator connection.

4. Connect regulator directly to the cylinder valve. Securely tighten connection nut.
5. Connect the flowmeter outlet to the delivery line supplied.

## **LEAK TESTING**

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1. Use the Banana Gas to leak test the regulator.
2. Stand to one side of the regulator and slowly open the cylinder valve. Check inlet gauge for pressure into the regulator.
3. Open the regulator by turning the pressure adjusting knob clockwise until 15 psig is indicated on the outlet gauge.
4. Leak check all connections with either a soap solution, such as Snoop<sup>®</sup> or a gas leak detector. If a leak is detected, vent system to atmospheric pressure and repair. Do not repair any leaks while system is under pressure.

## **OPERATION**

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**WARNING: Never operate a regulator or flowmeter under any circumstances if it is leaking or otherwise malfunctioning.**

**DO NOT repair any leaks while system is under pressure.**

**Damage to equipment and/or injury to personnel may result.**

1. Close the regulator by turning the pressure adjusting knob counterclockwise until it reaches the stop. Do not turn the adjustment knob past the stop. Damage to the regulator could result. Close flow meter valve by turning hand knob clockwise.
2. Slowly open cylinder valve to admit Banana Gas to regulator.
3. Turn regulator pressure adjusting knob clockwise until delivery pressure gauge reads 15 psig.
4. Slowly open flowmeter control valve until the small ball in the flow tube corresponds to the setting recommended by your Banana Gas supplier or banana supplier's customer service representative.

**Note:** When the inlet pressure gauge reads 400 psig or less, replace cylinder with a new cylinder of Banana Gas. The cylinder pressure gauge will normally read 800 to 1000 psig when cylinder is full.

## **SHUTDOWN**

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1. If regulator is not to be removed from service, close cylinder valve. Always keep cylinder closed whenever the system is not in use.
2. Vent the system until both pressure gauges read zero psig.
3. Close regulator by turning pressure adjusting knob counterclockwise until it reaches the stop. This will prevent a sudden pressure surge from damaging downstream components when gas flow is restarted.
4. Close outlet flowmeter control valve by turning hand knob clockwise.

## **REMOVAL FROM SERVICE**

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1. Close cylinder or process supply valve. Always keep cylinder or supply valve closed whenever system is not in use.
2. Vent the system until both pressure gauges read zero psig.
3. After venting is complete, close regulator by turning pressure adjusting knob counterclockwise until it reaches the stop.
4. Close outlet flowmeter control valve by turning hand knob clockwise.

**CAUTION: Always remove regulator and reinstall cylinder cap before moving cylinder.**

5. Remove regulator from cylinder.

## **OPERATING INSTRUCTIONS FOR STATIONARY BANANA GAS SYSTEMS**

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Gassing of the ripening rooms is accomplished by using an individual flowmeter from a Banana Gas Control Panel piped to the room to be gassed and setting the recommended flow rate for each room.

### **INSTALLATION**

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**WARNING:** Before attempting to install and operate this equipment, read and fully understand the safety precautions on page 3 in this booklet. Failure to follow the safety precautions may result in serious personal injury and/or damage to equipment.

1. Securely mount the control panel on a wall. Mounting dimensions are shown in Fig. 1, page 13. The panel should be located such that the flowmeters are at eye level with the operator (approximately 5–6 ft.).
2. Inspect the regulator and cylinder valve for physical damage and contamination. Do not connect the regulator if you detect oil, grease or damaged parts. If the regulator is contaminated or damaged contact your Advanced Specialty Gas Equipment Distributor to have the regulator properly cleaned or repaired (see “Repairs”). Contact your gas supplier if the cylinder valve is damaged or contaminated.
3. Close the regulator by turning the pressure adjusting knob counterclockwise until it reaches the stop. Do not turn the adjustment knob past the stop. Damage to the regulator could result.
4. Secure cylinder in place using a suitable restraining device such as a Model SG6203 wall clamp.  
**Note:** Make sure that the 320 CGA inlet washer provided is placed between the cylinder valve and regulator connection.
5. Connect regulator directly to the cylinder valve. Securely tighten connection nut.
6. Connect regulator outlet to the inlet of the control panel using the plastic tubing and compression fittings supplied.
7. Using  $\frac{1}{4}$  in. tubing (not supplied), connect outlet of each flowmeter to the ripening room(s).



## LEAK TESTING

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1. Use the Banana Gas to leak test the regulator.
2. Close all flowmeter control valves located on the control panel by turning the hand knobs clockwise.
3. Stand to one side of the regulator and slowly open the cylinder. Check inlet gauge for pressure into the regulator.
4. Open the regulator by turning the pressure adjusting knob clockwise until 15 psig is indicated on the outlet gauge.
5. Leak check all connections with either a soap solution, such as Snoop® or a gas leak detector. If a leak is detected, vent system to atmospheric pressure and repair. Do not repair any leaks while system is under pressure.

## OPERATION

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**WARNING: Never operate a regulator or flowmeter under any circumstances if it is leaking or otherwise malfunctioning. DO NOT repair any leaks while system is under pressure. Damage to equipment and/or injury to personnel may result.**

1. Close the regulator by turning the pressure adjusting knob counterclockwise until it reaches the stop. Do not turn the adjustment knob past the stop. Damage to the regulator could result. Close all flowmeter control valves located on the control panel by turning the hand knobs clockwise.
2. Slowly open cylinder valve to admit Banana Gas to regulator.
3. Turn regulator pressure adjusting knob clockwise until delivery pressure gauge reads 15 psig.
4. For each room to be gassed, slowly open the appropriate flowmeter control valve until the small ball in the flow tube corresponds to the setting recommended by your Banana Gas supplier or banana supplier's representative.

**Note:** When the inlet pressure gauge reads 400 psig or less, replace cylinder with a new cylinder of Banana Gas. The cylinder pressure gauge will normally read 800 to 1000 psig when cylinder is full.

## SHUTDOWN

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1. Close cylinder valve. Always keep cylinder closed whenever the system is not in use.
2. Vent the system until both pressure gauges read zero psig.
3. After venting is complete, close the flowmeter control valves by turning each handknob clockwise.
4. Close regulator by turning pressure adjusting knob counterclockwise until it reaches the stop. This will prevent a sudden pressure surge from damaging downstream components when gas flow is restarted.

## REMOVAL FROM SERVICE

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1. Close cylinder valve. Always keep cylinder valve closed whenever system is not in use.
2. Vent the system until both pressure gauges read zero psig.
3. After venting is complete, close the flowmeter control valves by turning each handknob clockwise.
4. Close regulator by turning pressure adjusting knob counterclockwise until it reaches the stop.

**CAUTION: Always remove regulator and reinstall cylinder cap before moving cylinder.**

5. Remove regulator from cylinder.

## REPAIRS

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If a regulator leaks or malfunctions, take it out of service immediately. Do not attempt to repair these regulators. Repairs should be made by Advanced Specialty Gas Equipment Corp. who have the special tools, test equipment and trained personnel required to make a safe repair. Contact your Advanced Specialty Gas Equipment Distributor to arrange for repair.

*Warranty Repairs* are only available through Advanced Specialty Gas Equipment Corp., and will be performed at no charge for parts and labor. For information on warranty, see the last page of this instruction booklet.

*Non-Warranty Repairs* are available through your distributor. Upon receipt at the factory, the regulator will be inspected and you will be contacted by your distributor with a repair cost estimate. No item will be repaired until approval is received. There will be an evaluation charge assessed for equipment not repaired.

## **REGULATOR SPECIFICATIONS**

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Maximum Inlet Pressure	1000 psig
Inlet Pressure Gauge	0–1000 psig
Delivery Pressure Range	0–15 psig
Delivery Pressure Gauge	0–30 psig red-lined above 15 psig
Gauge Size	2 in. Dial
Operating Temperature Range	
Model SG3091	+32°F to +165°F
Model SG3092	-40°F to +165°F
Flow Coefficient	$C_V = 0.02$
Flow Capacity	See Figure 2
Inlet Connection	CGA 320
Outlet Connection	¼ in. compression
Weight (approx.)	
Model SG3091	6 lbs.
Model SG3092	5 lbs.

## **FLOWMETER SPECIFICATIONS**

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Maximum Operating Pressure and Temperature	200 psig at 250°F
Minimum Operating Temperature	32°F
Accuracy	±10% of full scale from 10% to 100% of range
Repeatability	Within 0.5% of full scale
Tube Graduations	Standard cubic centimeters per minute of Air
Scale Length	65 millimeters
Flow Range	100–950 sccm (other ranges are available)

## **REGULATOR MATERIALS OF CONSTRUCTION**

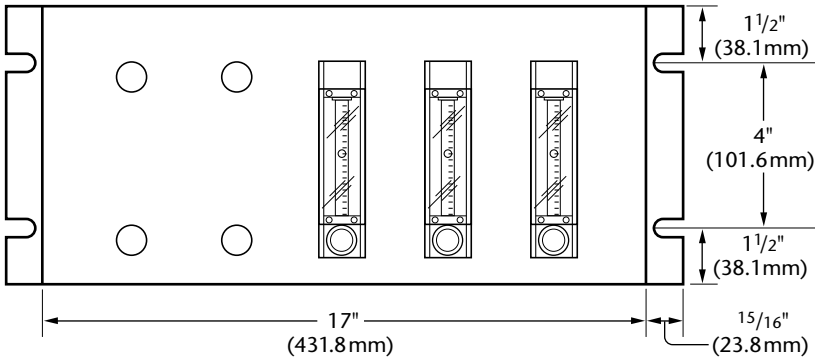
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Body	Brass Bar Stock
Outlet Valve, Gauges and Bonnet	Brass
Internal Metal Parts Exposed to Gas	Brass and Stainless Steel
Regulator Seat	Tefzel®
Diaphragm	Neoprene
Seals	Teflon®
Compression Fittings	Brass
Tubing	Polyethylene

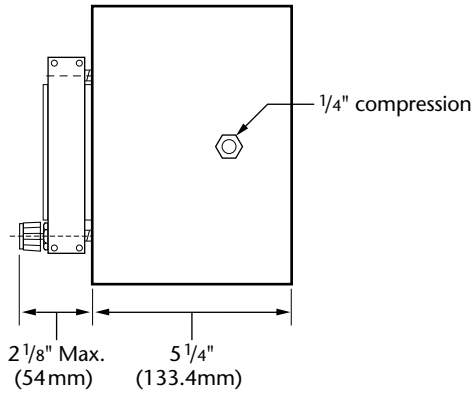
## **FLOWMETER MATERIALS OF CONSTRUCTION**

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Tube	Borosilicate Glass with float stops of Teflon®
Floats	Type 316 Stainless Steel
End Blocks, Inlet/Outlet Adaptor and Side Plates	Aluminum
Back Plate	White Plastic
Front Plate	Clear Plastic
Seals and Packing	Viton®
Valve	Type 316 Stainless Steel
Compression Fittings	Brass
Tubing	Polyethylene
Stationary Control Panel	Painted Drawn Steel



**FRONT VIEW**



**SIDE VIEW**

*Figure 1 – Model SG3094  
Three Room Control Panel Dimensions*

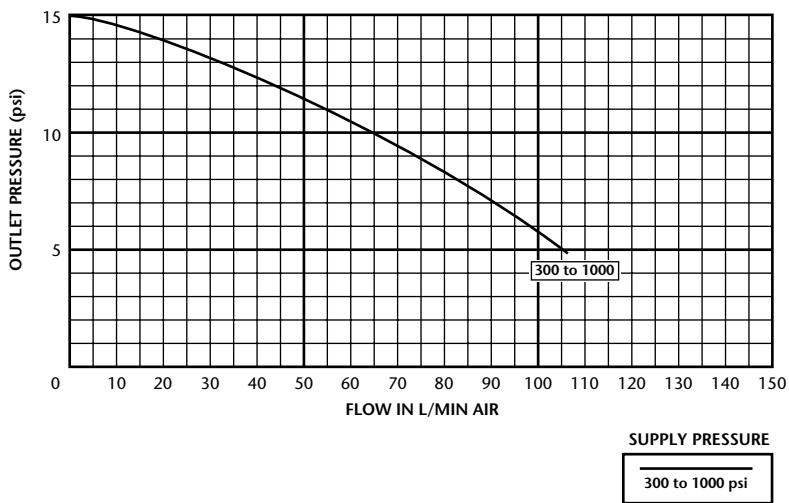


Figure 2— Typical Performance  
 Models SG3091 and SG3092 Regulators

## **WARRANTY**

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Advanced Specialty Gas Equipment Corp., (the Company), warrants to the initial purchaser of the equipment described herein, that such equipment will be free from defects in material and workmanship which result in breakdown or failure under normal use during a period of 12 months from date of shipment by the Company if used and maintained according to Advanced Specialty Gas Equipment written instructions. Purchaser is aware that this equipment is designed for specific applications and that using this equipment with the wrong or improperly purged gas or at the wrong pressure may damage or corrode the unit and cause personal injury. Purchaser must confirm that this equipment is compatible with the gas being passed through it. If there is any doubt about compatibility, consult your Advanced Specialty Gas Equipment Corp. distributor.

The Company's liability under this warranty shall be limited to the repair, or at its option, replacement or refund of the purchase price, of such equipment which proves to be defective, provided; however, that this warranty shall only apply if the purchaser (1) gives the Company written notice within ten (10) days after discovery of such defect, (2) immediately on discovery of the claimed defect, discontinues all use of such equipment, and (3) returns such equipment freight prepaid to plant of manufacture.

**THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE SPECIFIED HEREIN. NO WARRANTIES ADVANCED SPECIALTY GAS EQUIPMENT CORP. (OTHER THAN WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) SHALL BE IMPLIED OR OTHERWISE CREATED UNDER ANY APPLICABLE LAW, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.** No claim against the Company of any kind, whether as to equipment delivery or for nondelivery of equipment and whether or not based on contract, warranty, negligence, strict liability in tort or otherwise, shall be greater in amount than the purchase price of the equipment in respect of which such claim is made. Without limiting the generality of the foregoing, Advanced Specialty Gas Equipment Corp. shall not be liable for any special, indirect, or consequential damage, such as failure of parts resulting from corrosion.

If it is determined by Advanced Specialty Gas Equipment Corp. that the equipment is to be repaired or replaced under the terms of this warranty, the cost of returning said equipment to the initial purchaser will be paid by the Company. If, however, equipment returned to the Company in connection with a claim under this warranty is found by the Company not to be defective hereunder, then such equipment will be returned to the initial purchaser, shipping charges collect, and additionally, a service charge will be paid by the purchaser to the Company to cover the cost of handling and testing such equipment.



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Printed In U.S.A.

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AI 2071  
0127-0894

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