Instruction Manual for Nitrogen/Helium Gas Mixer

Model: 0801-4429

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Introduction

This manual was prepared for use as a reference document for personnel who will be installing and using the SuperFlash Gas Mixer.

Please read this instruction manual carefully before set-up, commissioning, and operating the gas mixer. Its purpose is to enable you to use the gas mixer safely and properly.

If after reading this document there are areas which are unclear or additional information is required, please contact the Customer Service Department at SuperFlash Compressed Gas Equipment so that we may assist you. Our address and telephone numbers are:

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The information contained in this manual is current as of its date of publication. Over time however, the product design and specifications may be changed without notice. As it becomes necessary, updates to this manual will be published to reflect these changes. Should you wish to receive these revisions (at no charge), we ask that you e-mail SuperFlash Compressed Gas Equipment at **sales@oxyfuelsafety.com**.

WARRANTY

All SuperFlash Compressed Gas Equipment Gas Mixers are warranted against defects in materials and workmanship for the period of one year from the date of purchase. This warranty will be null and void for any unit that has been subjected to misuse, negligence, accident, operation with unapproved or faulty equipment not supplied by SuperFlash Compressed Gas Equipment, or repairs other than those performed by SuperFlash Compressed Gas Equipment. See the Limited Warranty on page 12 for more details.

Safety Information

The gas mixer corresponds with the current state-of-the-art and accepted technical rules as well as with the requirements of current standards and regulations and is safe to operate when these instructions are followed. It is imperative that all safety instructions are observed in order to avoid potential hazards that may occur during the use of the gas mixer. Only authorized personnel who have been properly trained should work on the gas mixer. Potential hazards may result from un-trained personnel using the gas mixer beyond its intended use.

Explanation of Safety Alert Signals

Any information which is marked with a safety alert signal warns of potential hazards and has to be followed in order to avoid injuries and damages.

Safety Alert Signals

	**CAUTION** Used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Table 1

Intended Use
The gas mixer is a component of a gas supply system and is to be used for the continuous flow of the gas mixture from two different supply gases.

The gas mixer should be used according to the technical specifications provided in this manual.

Non Intended Use
Use of the gas mixer for purposes other than its intended use may result in potential safety hazards. The following are examples of going beyond the intended use; they include, but are not limited to:

- Use with gases in the liquid phase.
- Use outside the listed pressure and temperature ranges.
- Use with gases not listed in this manual.
- Use outside the intended installation areas such as areas that may have an explosion hazard.

If you are unsure if your use is a non-intended use, please contact SuperFlash Compressed Gas Equipment for help.

General Safety Instructions

- Follow all relevant country regulations and gas safety standards.
- Maintenance shall only be performed by trained personnel.
- Never modify the gas mixer.
- Use piping, control equipment, and seal materials designed for the type of gases used with the gas mixer.
- Use safety relief devices to ensure the maximum gas inlet pressures are not exceeded at the inlet of the gas mixer.
- Perform periodic leak checks on all joints and connections to ensure a gas tight system using an oxygen compatible leak test solution.
- Use in a well ventilated area. Escaped gases may cause asphyxiant conditions.
- Not for use in areas which are not well ventilated. When using oxygen and CO_2 monitor the area for minimum oxygen and maximum CO_2 levels.
- Do not use with toxic or corrosive gases.

CAUTION!
All components and connections should be free of oil, grease, and contaminants when used with oxygen gas.

Principle of Operation

The supply gases used for the mixture are connected to the inlet fittings. These fittings are equipped with non-return valves and filters. The gases are mixed under constant pressure in order to maintain the correct mixed gas ratio even as operating pressure is reduced. The operating pressure is displayed on the pressure gauge.

Note: The mixed gas output will be interrupted if there is a loss of pilot gas from the supply.

The mixing valve is used to set the required mixture ratio. The mixed gas then flows through the mixed gas flow valve and to the gas outlet. The mixed gas flow valve controls the percentage of maximum mixed gas flow. This will vary depending on the inlet pressure and set operating pressure.

Note: The mixed gas flow valve must not be set below the minimum flow value or 20% of the mixed gas flow to ensure precision of the mixed gas.

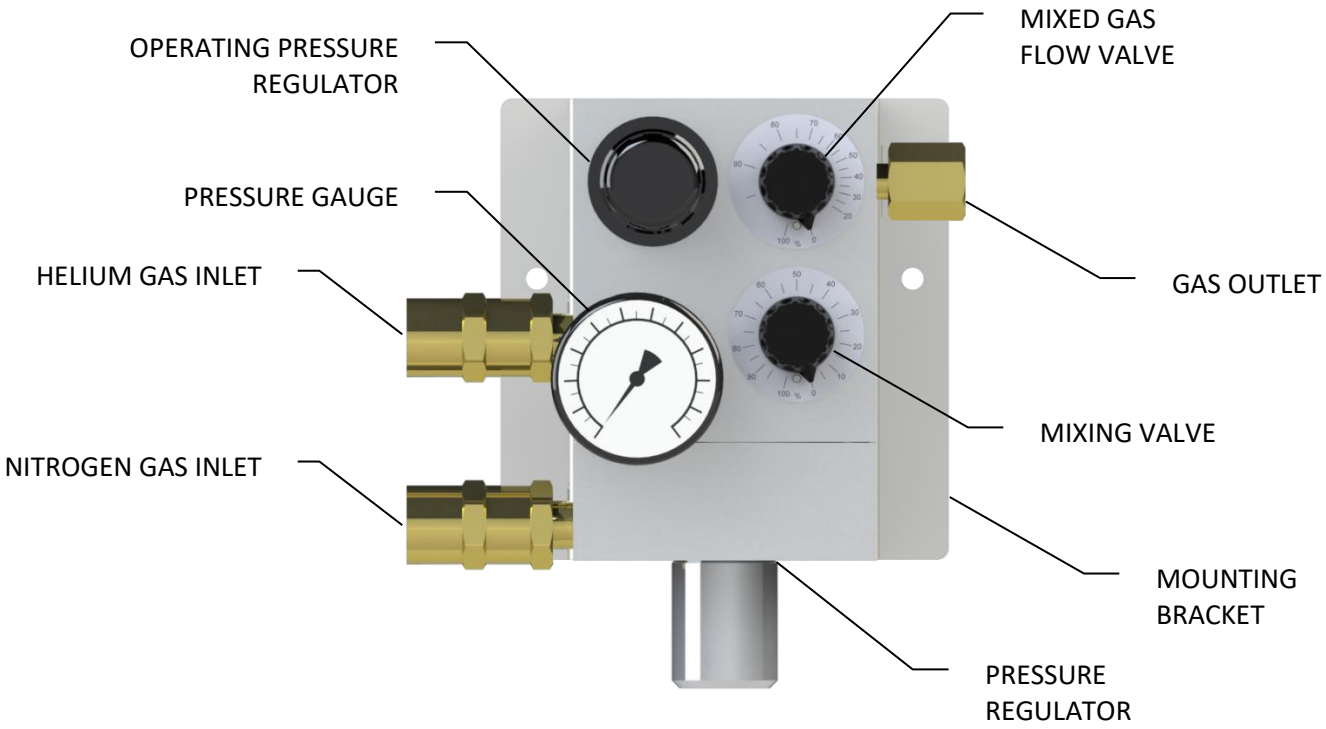

Figure 1

Installation

Transport Damage

Please check the gas mixer for transport damage upon receipt. It is not approved for use with damaged components.

Assembly Instruction

The gas mixer should be installed in accordance with guidelines stated by the Compressed Gas Association, Occupation Safety Health Administration, and all applicable local codes. The gas mixer should not be placed in a location where the temperature will exceed 100°F (38°C) or fall below 20°F (-7°C). The gas mixer should be mounted in a well ventilated area protected from the weather. Do not install in direct sunlight or near sources of heat.

A mounting bracket is included with the gas mixer. The mounting bracket should be anchored to a wall with the appropriate fasteners depending on the wall type.

CAUTION!
The fasteners chosen must be sized to hold the weight of the gas mixer. Undersized fasteners could allow the gas mixer to fall from the wall and cause injury.

Installation to Gas Supply

All supply pipes and fittings must be free of oil, grease, and contamination. The lines should be blown out with nitrogen or clean, oil free air to ensure any contaminants are removed prior to installation. The inlet gas supply pressure must not exceed 145 PSIG. The installation of a safety relief valve is recommended to ensure the inlet of the gas mixer is not over-pressurized.
The gas type is marked for each ¼" NPT inlet fitting on the gas mixer. The gas supply piping should be connected to the corresponding inlet fitting using Teflon® tape. The use of appropriate shut-off valves upstream of the gas mixer inlet is recommended.

Installation to Point of Use

A ¼" NPT gas outlet fitting is provided with the gas mixer. The ¼" NPT outlet fitting shall be attached to the delivery piping using Teflon® tape. The piping from the gas mixer to the point of use should take the shortest path possible.
An appropriate shut-off valve should be installed before the point of use.

Installing a vent line downstream of the gas outlet and prior to the point of use is recommended to perform the following tasks:

1) To vent incorrectly mixed gas during initial commissioning

2) To vent incorrectly mixed gases during changes to the gas mixture

3) To vent incorrectly mixed gases during servicing and repairs

The vent line should be appropriately sized and installed in accordance with guidelines stated by the Compressed Gas Association, Occupation Safety Health Administration, and all applicable local codes.

Set-up and Operation

Set-up

1. Ensure the gas supply pressure is turned off.
2. Pull out the adjusting knob on the operating pressure regulator and rotate counter clockwise until it stops.
3. Rotate the mixed gas flow valve to 0%.
4. If a vent line is installed, ensure it is open.
5. Open the gas supply for the helium gas and adjust the inlet pressure within the inlet pressure range (See technical data).
6. Open the gas supply for nitrogen gas and adjust the inlet pressure within the inlet pressure range (See technical data).
7. Rotate the mixing valve to set the required mixed gas composition.
8. Check the inlet pressure to the gas mixer.
9. Rotate the knob on the operating pressure regulator clockwise until the required operating pressure is observed on the pressure gauge. (See technical data) The operating pressure should be at least 22 psi below the inlet pressure. Once the required operating pressure is set push the regulator adjusting knob until it locks into place. The operating pressure setting is now secured. The adjusting knob must be pulled back before changes can be made to the operating pressure.
10. Rotate the mixed gas flow valve to the required flow output (See technical data).

Note: To ensure the precision of the mixed gas the mixed gas flow valve should not be set below the minimum flow value, or 20% on the mixed gas flow.

11. Check inlet and operating pressure (See technical data).
12. Close the vent line.

Note: Leak testing on all joints and connections must be performed to ensure a gas tight system after initial operation and at periodic intervals using an oxygen compatible leak test solution.

Operation

- Allow gas to flow to the point of use.
- After a short period the required gas is present at the point of use.
- The gas mixer will operate automatically and will generate the mixed gas as required.
- The mixed gas can be drawn at any flow between the minimum and the maximum gas output.
- The mixture ratio can be changed by rotating the mixing valve to the desired setting.

Note: It is recommended that the maximum flow of gas at the output be allowed to flow for a short period of time after changing the mixture ratio.

Troubleshooting

Loss of mixed gas output or low gas output

- Make sure gas supply piping is correctly sized to meet flow requirements
- Make sure the mixed gas flow valve is at the proper setting
- Check to make sure the inlet filters are not blocked
- Increase the inlet pressure if it has dropped below the minimum

Increase in gas consumption

- Make sure the mixed gas flow valve is at the proper setting
- Check for leaks in the system

Incorrect Mixture

- Make sure the mixed gas flow valve is at the proper setting
- Make sure the gas mixing valve is at the proper setting
- Check to make sure the inlet filters are not blocked
- Increase the inlet pressure if it has dropped below the minimum

Taking Out of Operation (Periods of greater than 12 hours)

1. Open vent valve and close shut-off valve at the point of use
2. If no vent valve is installed open shut-off valve at the point of use
   Note: The mixing valve and mixed gas flow valve must not be set to 0% during shut down
3. Shut off the gas supply of the non-pilot gas
4. Allow the gas to safely flow until the pressure has decreased
5. Shut off the gas supply for the pilot gas
6. Allow the remaining pressure in the system to decrease until there is no pressure
7. Release the operating pressure regulator

CAUTION!
For technical reasons small amount of residual pressure remains in the gas mixer. The gas will vent out when the inlet fittings are disconnected.

Note: For short term interruptions in work (periods of less than 12 hours) the gas need only to be shut off at the point of use.

Maintenance

Only authorized and trained personnel should service the gas mixer.

No liability will be assumed for consequences resulting from incorrect services which are performed by the user or a third party without the supplier's authorization. The warranty is void for damage to the product caused by incorrect maintenance.

The following items should be inspected periodically (at least once a month).

- Verify the gas inlet pressures are within the specified range (see technical data).
- Verify the correct setting on both the mixing valve and the mixed gas flow valve.
- Verify the operating pressure is within the specified range (see technical data).
- Check to make the sure the inlet filters are not blocked. If the filters need to be cleaned or replaced, the unit must be taken out of operation in order to remove the inlet connections to get to the filters. The filter can be blown out with nitrogen or replaced if necessary.
- Clean the gas mixer with a damp cloth. Do not use any solvents or high pressure cleaners.
- Leak testing on all joints and connections must be performed periodically to ensure a gas tight system using an oxygen compatible leak test solution.
- The mixed gas output should be connected to a gas analyzer at regular intervals in order to monitor the concentration of the mixed gas.

Repair

Only the manufacturer may repair the gas mixer.

There will be no liability assumed for consequences resulting from repairs and modifications which are performed by the user or a third party without the supplier's authorization.

Appendices

Technical Data

Model Number.....0801-4429

Use Location.....Indoors

Operating Temperature.....20°F to 100°F (-7°C to 38°C)

Storage Temperature.....0°F to 120°F (-18°C to 49°C)

Weight.....7.5lbs

Gas Inlet Temperature Range ..... 14°F to 113°F

Gas Type (Balance).....Nitrogen (Balance)

Gas Type (Pilot) ..... Helium (0-100%)

Inlet Pressure Range ..... 36 PSIG to 145 PSIG

Difference between the gas inlet pressures .....max 43 PSI

Gas Inlet/Outlet Ports ..... ¼" NPT (F)

Example pressure settings:

Gas Inlet Pressure:	82 PSIG		
Operating Pressure:	60 PSIG (Should be at least 22 PSIG below inlet pressure)		
Outlet Pressure (Flowing):	25 PSIG		
Max Flow Valve Setting:	100%	50%	30%
Flow Rate (SCFH 25% He in N2):	268	134	80
Number of Welders:	6	3	2

Assuming 40 SCFH usage per welder

Flow Rate Table (SCFH Air)

	Outlet Pressure→	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116
Inlet Pressure (PSIG) ↓	Operating Pressure Flowing (PSIG) ↓																
40	18	78															
47	25	111	84														
54	32	144	126	90													
61	39	168	156	132	102												
68	46	204	192	174	150	108											
75	53	228	222	192	186	156	114										
82	60	252	246	234	222	198	168	126									
89	67	282	276	264	252	234	192	174	126								
96	74	312	306	300	288	270	252	222	186	138							
103	81	336	336	330	324	300	288	264	234	198	150						
110	88	366	366	360	348	336	324	306	282	246	210	150					
117	95	396	396	390	384	372	360	342	324	300	264	228	156				
124	102	420	420	414	408	396	384	366	348	336	312	276	234	156			
131	109	444	444	438	432	426	420	408	390	372	348	324	288	228	174		
138	116	468	468	468	462	456	444	432	420	396	372	360	318	300	258	192	
145	123	498	498	498	492	486	474	468	450	432	420	396	372	342	312	252	204

1) Max flow valve at 100%
2) Outlet pressure regulated by flow control valve downstream from mixer outlet.
3) Constant inlet pressure

Gas Mixture He/N2		
% He	% N2	Conversion Factor
5	95	1.039
10	90	1.064
15	85	1.089
20	80	1.117
25	75	1.147
50	50	1.345
75	25	1.702

Ex:
For 25% He in Nitrogen
Flow Rate = 234 SCFH Air x 1.147 = 268 SCFH 25% He in N2

LIMITED WARRANTY

WARRANTY AND REMEDY: The Seller warrants the product sold hereunder to be free from defects in material and workmanship at the date of shipment. NO OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABLILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL EXIST IN CONNECTION WITH THE SALE OR USE OF THIS PRODUCT. All claims under this warranty must be made in writing and delivered to Seller prior to the expiration of 1 year from the date of shipment from the factory, or be barred. Upon receipt of a timely claim, the Seller shall inspect the part or parts claimed to be defective, the Seller shall repair, or at its option, replace any part or parts which Seller determines to have been defective at the time of shipment from the Seller: provided, however, that if circumstances are such as to preclude the remedying of warranted defects by repair or replacement, Seller shall, upon return of goods, refund the Buyer any part of the purchase price of the goods theretofore paid to Seller. Inspection shall be performed at the Seller's plant, and freight for returning products to the plant for inspection shall be paid by Buyer. The foregoing states the sole and exclusive remedy for any breach of warranty or for any other claim based on any defect in, or non-performance of, the products, whether sounding in contract, warranty or negligence. Without limiting the generality of the foregoing, Seller shall under no circumstances be liable for any other charges, labor costs, or any other incidental or consequential loss or damage of any kind or description whatsoever arising out of, or in any way relating to, any such breach of warranty or claimed defect in or nonperformance of the products. The advice of the Technical Staff of Seller is available to the trade, but Seller does not warrant or guarantee and disclaims any responsibility for such advice.

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