



ISO 9001  
Certified

*...Innovative liquid vaporizing and gas mixing solutions*

# ***Consta-Mix***

Gas Mixing System

## ***Operations & Maintenance Manual***

1140 NW 46 Street, Seattle, Washington, USA 98107  
Tel: 206-789-5410 Fax: 206-789-5414 Web: [www.algas-sdi.com](http://www.algas-sdi.com)

# **WARNING**

Read the OPERATION MANUAL before operating this equipment.

- **NOTE:** Algas-SDI reserves the right to use alternate manufacturers' components as vendor delivery applicability dictates. Literature contained in the Operation Manual has been supplied by vendors. Please check to be sure supplied data matches your configuration. Contact Algas-SDI if any questions exist.
- This equipment uses LPG-a flammable fuel, handled under pressure. Inherent hazards exist and a thorough understanding of the equipment is required to allow safe operation and maintenance.
- Allow only a TRAINED and FULLY QUALIFIED PERSON to service this equipment.
- Any time a component must be replaced, use the same type, model, etc. **DO NOT SUBSTITUTE!** The consequence from such actions are unpredictable and may lead to dire consequences. When components are replaced with components not approved for use in our FM/UL listed equipment, the FM/UL listing becomes void for that unit.

## ***Warranty, Copyrights and Approvals***

### ***WARRANTY***

---

Algas-SDI International, LLC (ASDI) warrants that the equipment is free of defects in materials and workmanship under normal use and service. ASDI agrees to repair or replace, at our option, without charge f.o.b. factory, any part which has proven defective to the satisfaction of Algas-SDI International, LLC within one (1) year from the date of the original installation or within 18 months from the date of shipment, whichever is earlier. Equipment, which in the opinion of ASDI, has been damaged by improper installation or operation, or has been abused or tampered with in any way, will not be accepted for return under warranty.

Algas-SDI International, LLC will not accept back charges for work performed by others upon or in conjunction with ASDI equipment, unless prior authorization is given by means of an Algas-SDI International, LLC purchase order. Algas-SDI International, LLC will not be liable by reason of shutdown, non-operation or increased expense of operation of other equipment, or any other loss or damage of any nature, whether direct or consequential, arising from any cause whatsoever.

Algas-SDI International, LLC makes NO other warranty of any kind, whatsoever expressed or implied; and all warranties of merchantability and fitness for a particular purpose are hereby disclaimed by Algas-SDI International, LLC and excluded from these terms of sale. No person has any authority to bind Algas-SDI International, LLC to any representation or warranty other than this warranty.

### ***COPYRIGHT***

---

Copyright 2000 by Algas-SDI International, LLC, Seattle, Washington 98107. All rights reserved. No part of this manual may be reproduced or copied in any form or by any means, photographic, electronic, or mechanical, without the prior express written consent from Algas-SDI International, LLC, Seattle, Washington, USA.

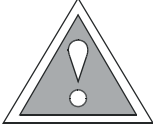
### ***APPROVALS***

---

## ***Symbols and Conventions***

Special symbols are used to denote hazardous or important information. You should familiarize yourself with their meaning and take special notice of the indicated information.

Please read the following explanations thoroughly.



### ***GENERAL WARNING OR CAUTION***

---

*Indicates hazards or unsafe practices which can result in damage to the equipment or cause personal injury. Use care and follow the instructions given.*



### ***FLAMMABLE GAS HAZARD***

---

*Indicates a potential hazard which can result in severe personal injury or death. Use extreme care and follow the instructions given.*



### ***ELECTRICAL DISCONNECT REQUIRED***

---

*Indicates a potentially dangerous situation which can result in severe personal injury or death or damage to equipment. Use great care and follow the instruction given.*

### ***PARTS AND PRICES***

---

*For parts and prices contact your Algas-SDI distributor or check our web site to locate your authorized distributor.*

*Internet: <http://www.algas-sdi.com>*

### ***ASDI CONTACT NUMBERS***

---

If you have questions, need help with your equipment, or want information on other products, contact your distributor or Algas-SDI at:

Telephone: 206.789.5410

Facsimile: 206.789.5414

Email: [sales@algas-sdi.com](mailto:sales@algas-sdi.com)

Internet: <http://www.algas-sdi.com>

## ***Table of Contents***

### **1. IntroductionIntroductionIntroductionIntroduction**

Principal Of Operation 1-1

### **2. Installation**

2-3

### **3. Operation**

Operation Of Proportioning Valve 3-5

### **4. Calibration**

Adjustment Of Proportioning Valve 4-7

Initial Adjustment 4-7

Further Adjustments 4-8

Shut-Down & Subsequent Start-Up 4-8

### **5. Maintenance**

5-9

### **6. Recommended Spare Parts**

6-11



# ***Introduction***

---

**1**

## ***Principal Of Operation***

The CONSTA-MIX valve operates on the "pull thru" principal, with two fixed orifices and two moving or "floating" cones.

The two (2) gases (air and natural gas) enter the mixing valve at atmospheric pressure. The natural gas is delivered to the system through a **FM** style gas valve train. It has a gas Zero Governor just before the CONSTA-MIX valve to reduce the gas pressure to the same pressure as the surrounding air pressure. The two (2) gases (air and natural gas) are then sucked through the CONSTA-MIX valve via one of the two (2) Eclipse Hermetic Gas Boosters. The CONSTA-MIX valve will blend just the required amount of the two gases at a preset ratio based on the demand that is required in the plant. There is no need for a holding tank or "Dome." If the demand in the plant increases the impulse line on the CONSTA-MIX valve will sense a slight minus and open to meet the correct flow demand. On a decrease in the plant demand the impulse line will sense a positive and shut the CONSTA-MIX valve to the correct flow rate required.

The zero gas governor operates basically the same as the mixing valve in how it controls the flow and holds a zero outlet pressure.

On a CONSTA-MIX system the high gas and low gas pressure switches are in different positions, on the natural valve train, then normally installed. The high gas pressure switch is mounted on the inlet of the gas valve train with the low gas pressure switch down stream of the safety shut off valves. The reason for this is that if the safety shut off valve, or both valves, fail the system will shut down and not "pump" straight air into the plant.





1. Installation should be in accordance with NFPA Standards 54 and 58 where applicable or any other standard which may take precedence as determined by the authority having jurisdiction.
2. Install the Consta-Mix Machine in an accessible location on a level concrete floor or other substantial mounting pad. The top of the base should be level.
3. Consta-Mix Machines are usually furnished as a packaged unit with the booster and proportioning valve on a common steel base, including piping between the booster inlet and the proportioning valve outlet. When physical dimensions of the booster make a common base impractical, the mixing valve is mounted on one steel base and the gas booster on a separate base. The two bases are joined at the job-site.
4. The air filter may be shipped already installed on the Consta-Mix Machine or packaged separately. On 60 CM, 116 CM and 124 CM machines, the air filter is normally shipped separately and must be installed at the top of proportioning valve marked "Air Inlet". On 32DV, 32SDV, and 40DV units, the filter is usually shipped already on the base of the Consta-Mix Machine. Air is taken in through the hollow base into bottom of proportioning valve. Do not obstruct the face of the air filter cell. The air filter must be shielded from rain or other moisture which might enter the filter and cause internal corrosion.
5. Gas flow through the zero governor must be in a horizontal line, and the spring stem must be vertically upright. Gas pressure to Eclipse Zero Governors must be between 4" w.c. and 1 psig. Gas pressure on other Zero Governors must not exceed 2 psig.
6. Check the booster motor nameplate to be sure it is correct for the electrical service available. Follow writing instructions on motor nameplate or wiring diagram provided. All wiring and fuses should be ample to supply proper voltage to the motor. All A.C. motors should be equipped with contactor or magnetic starter having thermal overload protection. Check to see that proper heaters are installed in the motor starter.

---

***NOTE***

***On initial startup, check to see that the rotor is turning in the proper direction; that is, with rotor blades turning toward the booster discharge.***

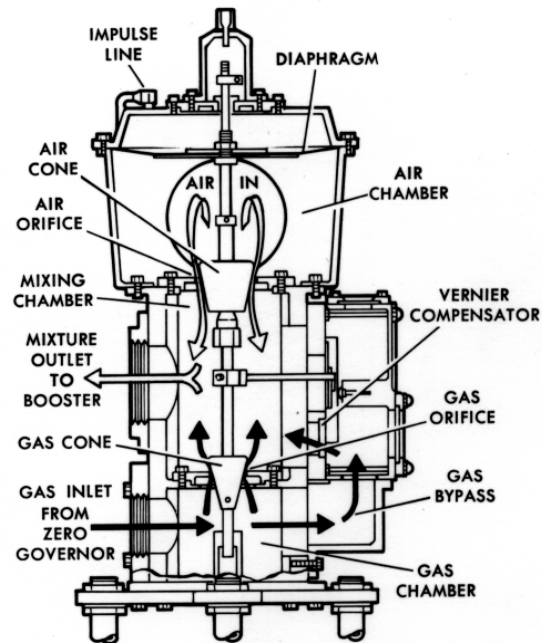
---



## Operation Of Proportioning Valve

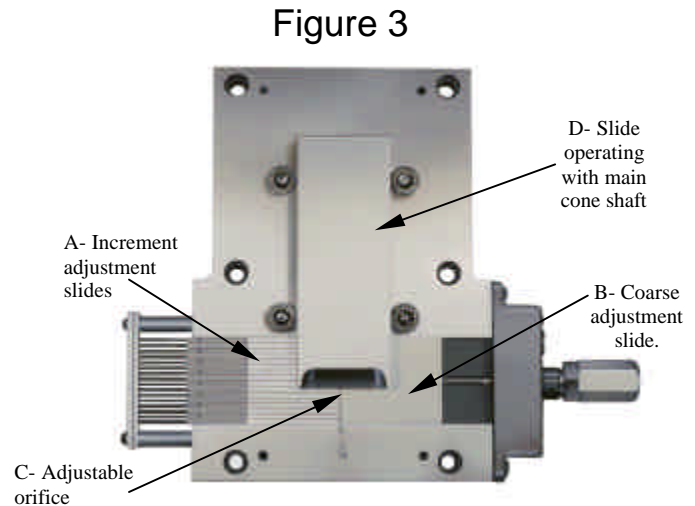
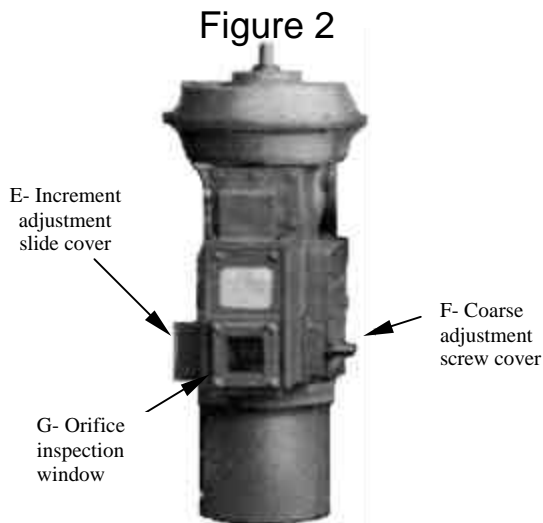
Figure 1

1. The Algas-SDI Consta-Mix Proportioning Valves operate on a principle which is similar to that of a float-type flow meter. Two precision cones mounted on a common shaft float over a pair of precision orifice plates. The annular areas defined by the outside diameter of the gas and air cones and their respective orifices are built to maintain the same proportion of air and gas from essentially zero to maximum design capacity. Because the cones are streamlined, pressure drop through the proportioning chamber is minimized.
2. As shipped from the factory, the air and gas cones are preset to just close off the annular areas, but do not actually rest on the orifice plates. Assuming clean fuel gas and air, the amount of wear in Consta-Mix Proportioning Valves is negligible. Units have been in operation for many years, which required only routine air filter maintenance.
3. Referring to figure 1 and assuming a given demand from the booster, air at atmospheric pressure enters the air filter and flows into the air chamber. Simultaneously, fuel gas which has been reduced to zero by a zero governor enters the gas chamber. The proportion of gas and air entering the mixing chamber is controlled by the gas and air cone orifice areas. Within the mixing chamber, the fuel gas and the air are mixed and drawn into the inlet of the gas booster or compressor.
4. The mixture demand is transmitted to the diaphragm through an impulse line. Should the demand increase, the diaphragm, shaft and cones move downward to allow less gas and air to flow into the mixing chamber.
5. A predetermined percentage of the fuel gas is diverted to flow through the gas bypass. The vernier compensator-which is unique with Algas-SDI Proportioning Valves- provides a very precise adjustment of gas/air ratio over the entire capacity range of operation. The vernier compensator, which is pictured on Figures 2 and 3, features a large adjustable slide for adjusting gas/air ratio over the entire range of the Consta-Mix Machine and an number of small increment slides for fine ratio adjustment at any point in the range of operation.
6. 116 CM, 124 CM, 32 DV, 32S DV, and 40 DV valve sizes generally have both a gas and air cone and orifice. Certain air/gas mixtures require only an air cone and orifice. 60 CM valves are designed for lower capacities and only an air cone and orifice are used, all of the gas enters the mixing chamber through the vernier compensator.





## Adjustment Of Proportioning Valve



## Initial Adjustment

1. Adjust high and low pressure switches to ensure satisfactory pressure conditions in the gas and mixture lines.
2. Check gas pressure upstream of the manual reset valve.
3. Remove cover "E", figure 2, from the adjustment screws for slides "A", Figure 3. Remove cover "F" form adjustment screw for slide "B".
4. Familiarize yourself with the operation of the flare or other test devices provided.
5. Connect a gas analyzer to the flare line and "zero" the analyzer.
6. Open "B" adjuster slide approximately  $\frac{1}{4}$ " from center mark.
7. Make sure the manual discharge mixture valve is closed.
8. Start the centrifugal gas booster and place the Consta-Mix Machine in operation with the manual discharge mixture valve closed.
9. Open the manual valve in the flare line until one increment of adjustment screws (A) is exposed. This is observed through orifice inspection window "G".
10. With a small screwdriver, adjust the exposed "A" increment slides to obtain the exact ratio desired.
11. Increase demand as in Step 9 and observe additional "A" slides uncovered. Continue to adjust these newly exposed slides as in Step 10. Do not move adjustment slides already set under previous steps.

12. Continue Step 11 until all “A” slides have been set, or until maximum flow requirement is reached.

### ***Further Adjustments***

13. Changing the gas/air ratio over the whole range can be accomplished by using the “B” slide. Moving this slide toward the center mark will decrease the gas-to air ratio; moving it away from the center mark increases the gas-to-air ratio. Anytime the “B” slide is used the mixture must be rechecked over the complete range.
14. When all adjustments are completed, replace adjuster covers “E” and “F”.

### ***Shut-Down & Subsequent Start-Up***

15. Shut- Down
- a. Close manual valve between the “CM” and the mixture line to the plant.
  - b. Close gas valves.
  - c. Main gas and motorized shut off valves should close.
16. Subsequent Start-Up
- a. Make sure the manual valve between the “CM” and mixture line to the plant is closed.
  - b. Open manual gas valves and push system start button.
  - c. Open flare line manual valve to purge system between mixing station and purge valve.
  - d. Open manual valve to plant.
  - e. Close off gas supply and flare valve.

The Algas-SDI CONSTA-MIX system is very easy to maintain and to do preventive maintenance on. The three (3) items that need to be watched are the time run on the boosters for greasing, the inlet air filter, and the inlet gas "Y" strainer.

- 1) The inlet gas "Y" strainer should be cleaned at least every other week for the first couple of months to make sure no "dirt" was left in the incoming gas line from the last installation. The filter should normally be cleaned once a month to keep the pressure drop through the "Y" to the minimum.
- 2) The air filter should be cleaned at least once a week. If there is a time that the air is real dusty, the air filter should be checked daily if the system is in operation.
  - A) To clean 6 HAF through 24 HAF filters supplied with 60, 116, and 124 CM valves, use the following procedure:
    - 1 Disassemble the unit by removing the hood and thumbscrew from the base. Separate filter media from the base and clean in oil dissolving detergent solution or with steam. Allow media to drain, then immerse it in, or spray with, SAE 20 to 40 oil. Drain excess oil and reassemble filter unit.
    - 2 Disposable or washable filters are used on the 32, 32S, and 40 models.

---

### ***NOTE:***

***The real reason to keep the filters clean is to help prevent any dirt getting to the generator. The CONSTA-MIX valve can stand the dirty gas and air but the downstream equipment cannot.***

---

- 3) Lubricate the booster motor according to motor manufacturer's recommendations.
  - A) For Eclipse Hermetic Boosters:
    - 1 The motor should be greased with the special Dow Corning FS 4351 silicone grease (#2 consistency) at the suggested time intervals. To keep the **UL** approval on the motors, the motors **MUST** be serviced at an approved **UL** shop that is an authorized shop of the motor manufacturer. To meet this approval, Eclipse suggests that you take the complete "sled" assembly out of the booster and take it to the service center. ("Sled" assembly is the back plate and mounting that the motor and fan are mounted on.)

To remove the "sled" assembly from the booster you will need to shut off power disconnect and disconnect the power wires from the electrical box on the rear of the booster. Once power is disconnected, remove all the bolts that are around the rear mounting plate and slide the assembly straight out of the unit. (That is why the CLEAR area behind each booster.) You will need something to help

support the rear of the "sled" when you are sliding it out of the booster. **Do not lose the spring when removing the "Sled"**.

---

***NOTE:***

***When reinstalling the "sled" assembly make sure that you have a new gasket.***

---

- 2 When you order a new gasket you will notice that it is a special cork material with the UL label imprinted on it. To use any other material will void the **UL** listing. The gasket will come to you in an UNCUT form. The reason for this is if the gasket is pre cut it will tear in shipping. The easiest way to cut the gasket is to use a circle cutter and then hold the cut gasket on the booster and punch the hole with something pointed to make sure the holes are in the correct position.

---

***NOTE:***

***Do not use any sealant on the gasket as this will void the UL listing on the booster.***

---

- 3 When reinstalling the "sled", assembly be sure to reinstall the spring in the holder to insure that the unit is correctly reassembled. Make sure the "sled" is installed so that the motor is in the horizontal position. If it is not, the motor will have unnecessary wear exerted on its bearings.
- 4 There is no set torque rating to tighten the bolts. The best test is to tighten till the gasket starts to squeeze.
- 5 Reconnect the wiring to the electrical junction box on the rear outside of the booster. Test the motor to assure that it is running in the correct rotation.



# **Recommended Spare Parts**

# **6**

Algas-SDI recommends that the following material be carried in stock:

For Eclipse Hermetic Boosters:

Replacement impeller, electric motor housing gasket, spare electric motor.

A replacement diaphragm for the proportioning valve.

A set of replacement diaphragms for the zero gas governor, or a complete replacement governor.

Filter media- See Chapter 5, Item 2

Spare parts for the automatic shut-off valve as suggested by the valve manufacturer.

## ***NOTE***

---

***When ordering parts, be sure to give the serial number of your Consta-Mix unit, booster, valves, and any other pertinent data.***

---