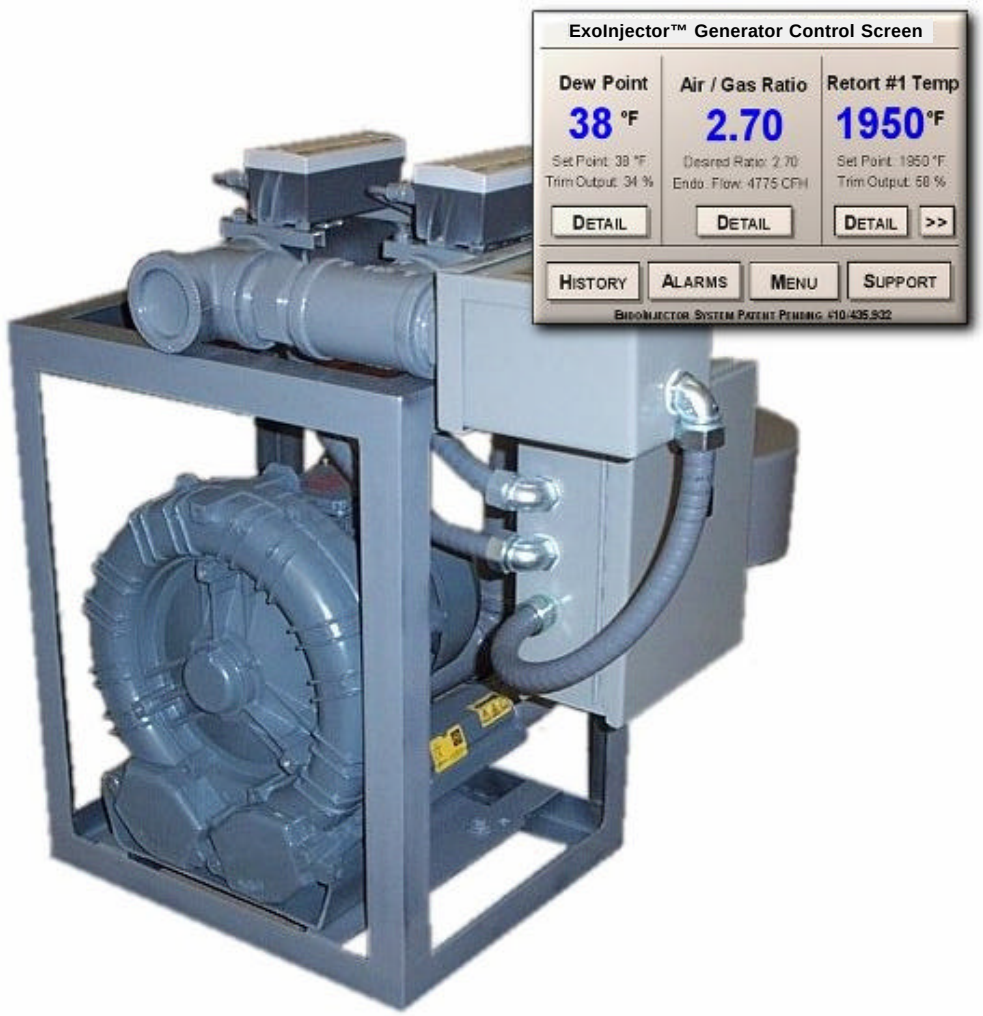
ExoInjector™ Installation and Operation Manual



NOTICE

This bulletin contains important safety information and should be read and understood by all installation and operation personnel.

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TABLE OF CONTENTS

NOTICE

This Bulletin contains important safety information and should be read and understood by all individuals who install, use, or service this equipment.

Failure to follow the precautions and recommendations of this manual may subject personnel and property to dangerous conditions.

WARNING

The valves used for gas flow control do not provide positive gas shut off. Valve may leak gas into retort and cause asphyxiation or poisoning to personnel within confined spaces.

Install appropriate lockable gas shut off valves for positive gas shut off.

CAUTION

The ExoInjector™ is designed to accurately mix air and gas at the specific ratios required to produce high quality exothermic gas. Setting the ratio outside the recommended values described in this manual could subject personnel and property to dangerous conditions.

TECHNICAL ASSISTANCE

Contact Atmosphere Engineering Company with any questions or concerns regarding the installation, operation, or setup of the ExoInjector™ mixing system.
Phone: 414-331-2457 Fax: 414-332-2457 E-Mail: sales@atmoseng.com

EXPRESS WARRANTY ON ATMOSPHERE ENGINEEIRNG EQUIPMENT

ATMOSPHERE ENGIENERING COMPANY (AEC) warrants it's products for a period of one (1) year from the date of shipment from AEC to the original purchaser to be free from defects in material and workmanship under normal recommended use, service, inspection, and maintenance. Normal recommended use, service, inspection, and maintenance, mean:

1. Not to be used in excess of nor below the rated capacity, pressure, and temperature ranges specified in the applicable quotation, purchase order, acknowledgment, marketing literature, nameplate, specification sheet, or the Installation, Operation, Inspection, and Maintenance Manual (THE MANUAL); and

2. Using only clean gases free of solids and other contaminants not considered constituents of the gas; and

3. Installation, operation, inspection, and maintenance in compliance with THE MANUAL; and

4. The AEC products being used only in:

   a. Ambient environments lower than 132 ° Fahrenheit (54 °Celsius) unless specifically designed and so labeled by AEC for higher temperatures; and

   b. Non-corrosive environments; and

   c. Completely protected from moisture, rain, snow, or other outside environments; and

   d. Not to be used below 32 °Fahrenheit (0 °Celsius) unless precautions are taken for low temperature conditions as shown in THE MANUAL.

5. Being used only for applications permitted by THE MANUAL or other AEC literature or special applications approved in a separate written authorization by AEC.

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This Warranty does not apply to damage caused by any or all of the following circumstances or conditions:

1. Freight damage;

2. Parts, accessories, materials, or components not obtained from nor approved in writing by AEC;

3. Any consequential or incidental damages including but not limited to loss of use, loss of profits, loss of sales, increased costs, arising from the use of any product system or other goods or services manufactured, sold, or provided by AEC;

4. Misapplication, misuse, and failure to follow THE MANUAL or other literature, instructions, or bulletins (including drawings) published or distributed prior to THE MANUAL.

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Purchasers of AEC products, equipment, goods, or services waive subrogation on all items covered under their own or any other insurance.

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AEC reserves the right to make design and other changes, modifications or improvements to it's products, services, literature, or systems, without any obligation, to furnish or install same on any previously sold or delivered products or systems.

(Continued on page 5)

(Continued from page 4)

LIMITATION OF LIABILITY

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1. The performance or nonperformance of any obligations set forth in this Warranty and Warranty Policy;

2. Any agreement including specifications between AEC and the customer;

3. Negligence, active, passive or otherwise of AEC or any of it's agents or employees;

4. Breach of any judicially imposed warranty or covenant of workmanship, durability or performance; and

5. Misrepresentation (under the Restatement, common law or otherwise) and/or strict liability involvement;

6. Liability for fraud-in-the-inducement.

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If warranty Field Service at the request of the purchaser or user is rendered and the difficulty is found not to be with AEC's product, the purchaser shall pay the time and expense (at the prevailing rate at the time of the service) of AEC's field representative(s). Charges for service, labor, and other expenses that have been incurred by the purchaser, it's customer or agent without written approval of AEC will not be accepted. The OEM or other reseller is responsible for transmitting installation and operating instructions, THE MANUAL or other service literature supplied by AEC with the equipment.

DESCRIPTION

The ExoInjector™ is a precision gas mixing system designed specifically to provide an accurately controlled mixture of air and gas for exothermic gas generators. The system includes the ControlCarb™ gas control system designed by Atmosphere Engineering to utilize electronic flow measurement and precision gas injection valves to constantly provide the ideal gas mixture for high quality exothermic gas generation.

The ExoInjector™ incorporates the latest technology in regenerative blower design that is capable of significant turndown for multi-retort generators. When combined with the precise TrueTrim™ software, the ExoInjector™ delivers flow on demand throughout the working range of any generator down to 20% of rated capacity. This feature eliminates exothermic gas waste during production while maintaining the precise gas mixture required.

The ExoInjector™ comes factory assembled and tested to perform to the exact specifications required by the exothermic gas generator.

SPECIFICATIONS

Check the Orifice Meter Calibration reports attached to this manual for flow rate and capacity information. Contact Atmosphere Engineering with any questions.

Temperature Limits: 32°F to 130°F
Flow Meter Pressure Limits: 5 psig max.
Inlet Gas Supply Pressure: 3 - 5 psig (min-max)

Blower Motor (Check Horsepower)

Horsepower: 3/4 HP
Power: 3 Phase 208-230/460 VAC 60 Hz
Rated F.L. Current: 2.9-2.6/1.3 Amps

Horsepower: 2 HP
Power: 3 Phase 208-230/460 VAC 60 Hz
Rated F.L. Current: 6.9-6.2/3.1 Amps

Horsepower: 3 HP
Power: 3 Phase 208-230/460 VAC 60 Hz
Rated F.L. Current: 8.9-8.0/4.0 Amps

Horsepower: 5 HP
Power: 3 Phase 208-230/460 VAC 60 Hz
Rated F.L. Current: 15.5-14.0/7.0 Amps

ControlCarb™ Controller

Power: 85—264 VAC 50/60 Hz
Recommended Fuse: T type (time-lag type) 1A

COMPONENT OVERVIEW

The ExoInjector™ contains many individual components that are all pre-assembled and tested to perform to the exact specifications required by the endothermic gas generator.

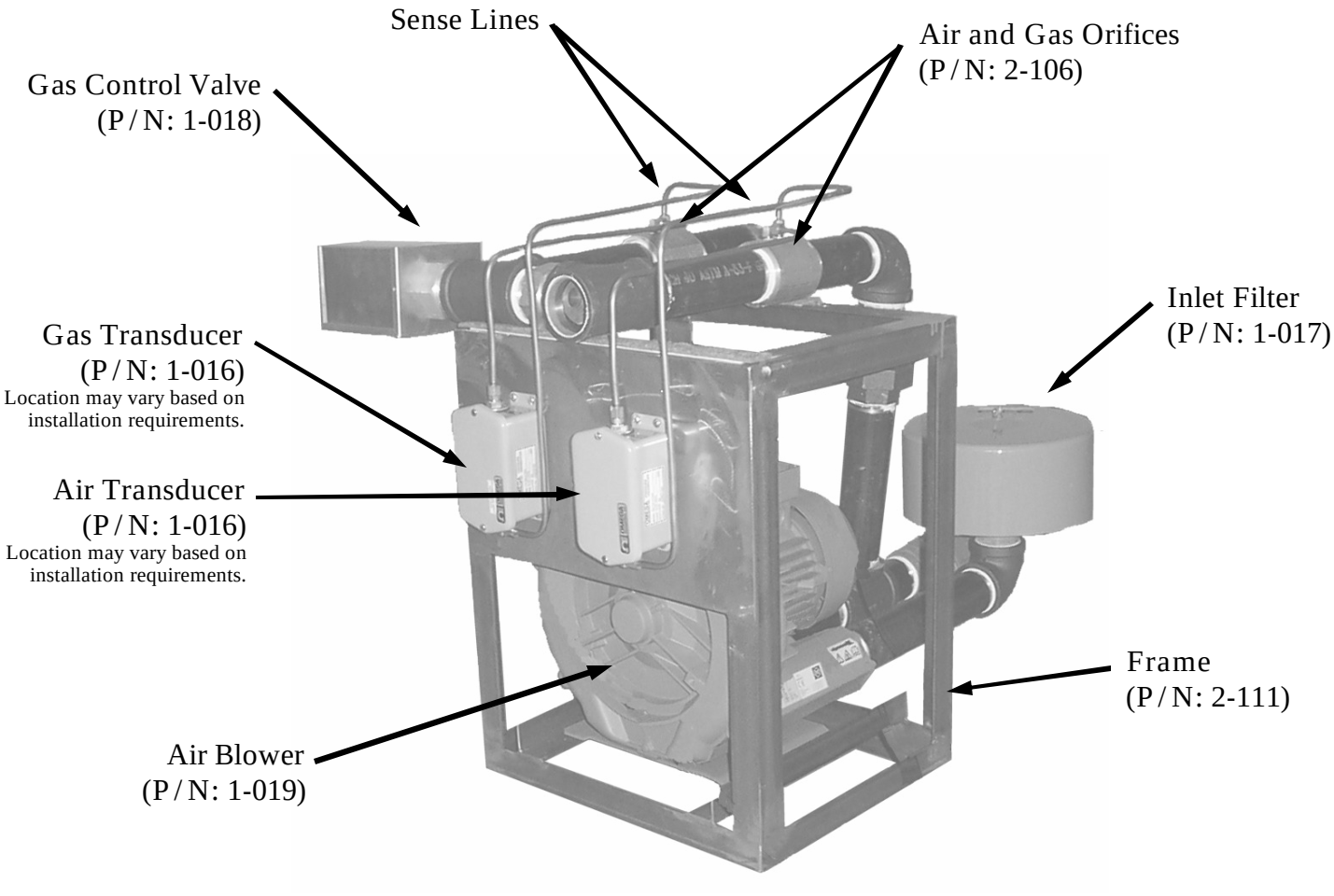


Figure 1

Not pictured is the ControlCarb™ Controller (P/N: 1-020-SS).

INSTALLATION

MECHANICAL CONNECTION

The ExoInjector™ is shipped as a complete unit as shown in figures 1 and 2. The ControlCarb™ Controller is shipped in a separate container and must be installed in a suitably cooled enclosure.

- Inspect the EnxoInjector for any damaged or missing components.
- Secure the mixing system to the generator frame using mounting holes. Mixing system should be mounted level and should be insulated from radiant heat sources.
- Attach main gas supply to gas inlet. Gas supply must be pressure regulated to at least 1 psig greater than the desired output pressure and be fitted with the appropriate safety pressure switches per local regulations or using the guidelines set out in NFPA 86 & 86C.
- Attach mixed gas outlet to appropriate fire check valve.
- Air Relief valve should be fitted with muffler (included). Note: the relief valve controls the main output pressure of the mixing system and therefore should be piped to an accessible location.
- Mount ControlCarb™ Controller inside suitably cooled controls enclosure.

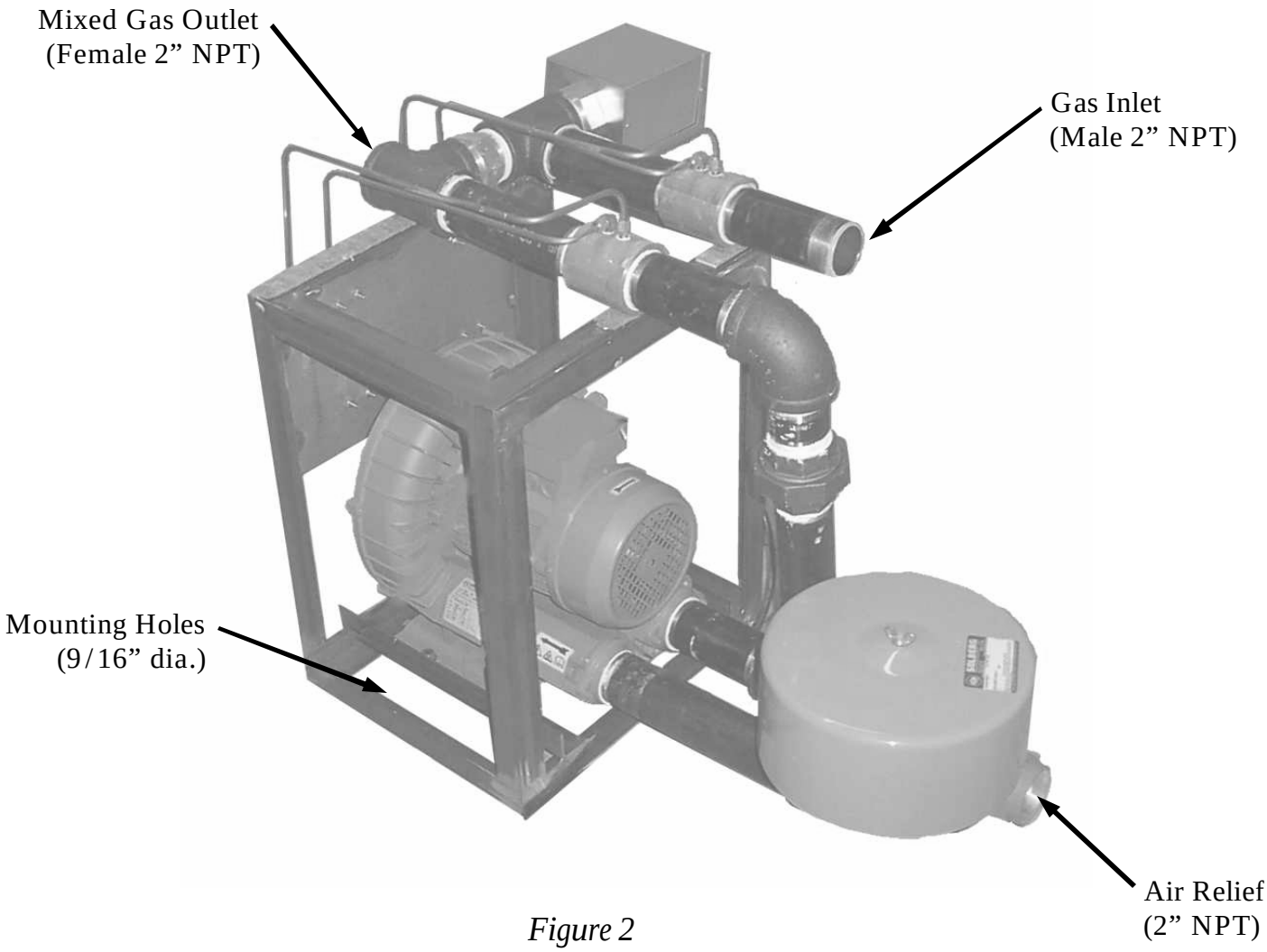


Figure 2

MECHANICAL CONNECTION (cont.)

Flow and Control System Diagram.

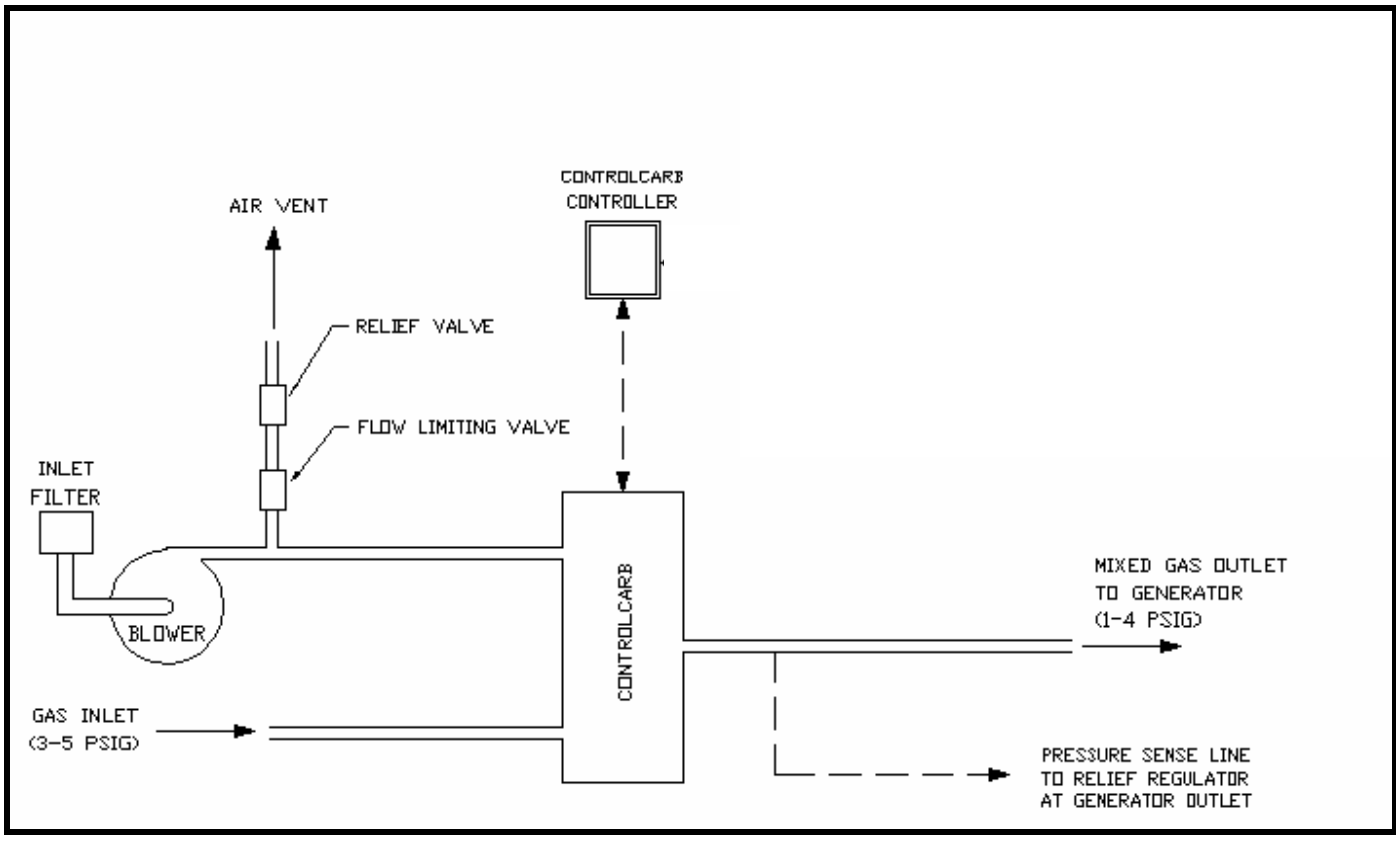


Figure 3

ELECTRICAL WIRING

The electrical connections are made to the screw terminals on the ControlCarb™ controller and to the terminals located in the electrical enclosure mounted to the ExoInjector™ mixing system. They accept wire sizes from 14 to 18 AWG and should be tightened to a torque of 3.5 lb-in. Caution should be taken to prevent hands or metal from making accidental contact with live wires. The ExoInjector is a precision instrument that requires a properly grounded power source to ensure signal integrety. Review the attached installation wiring diagram for complete wiring details.

BLOWER MOTOR WIRING

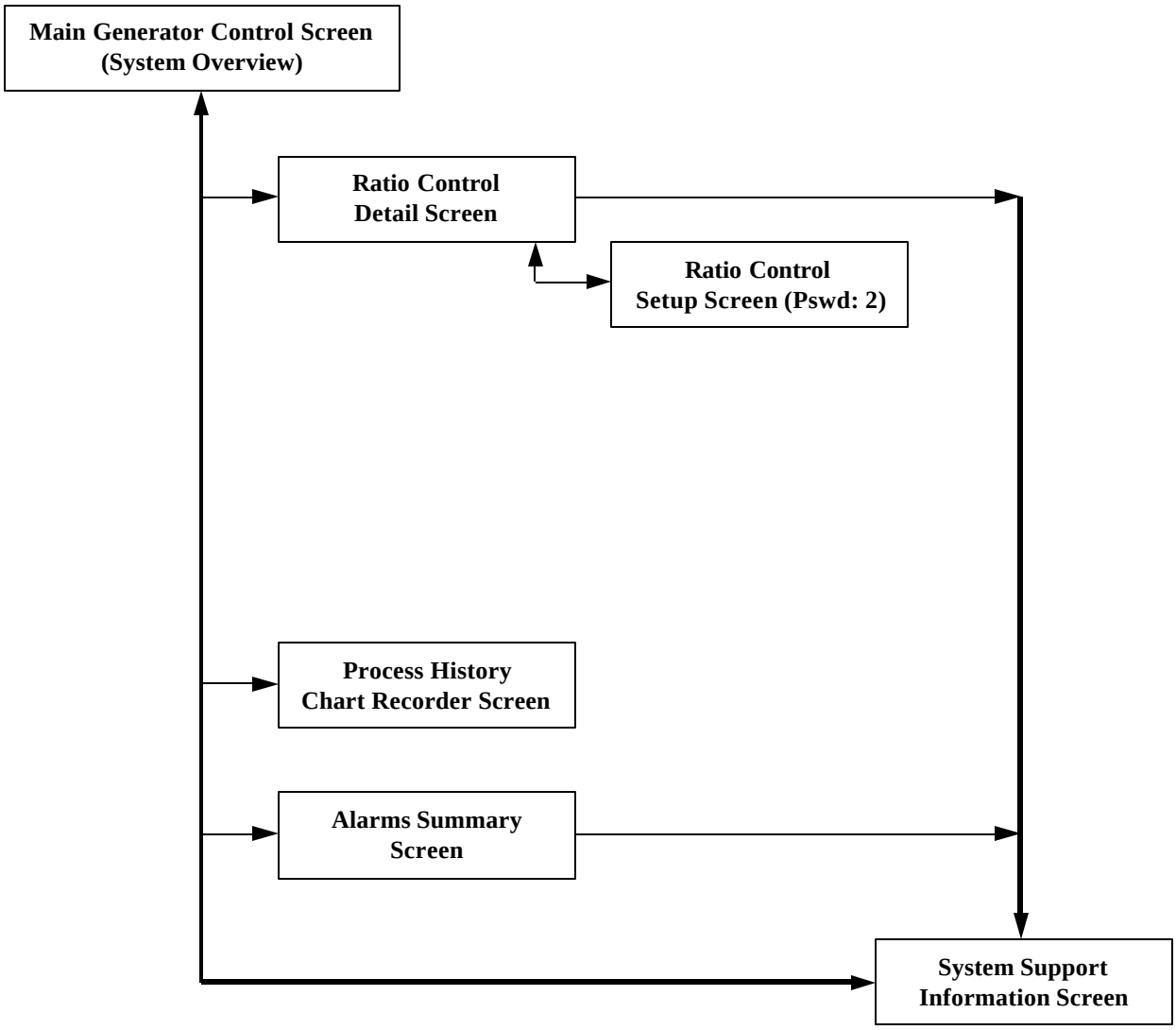
Each blower is selected to provide the exact amount of air flow required by the endothermic gas generator. Therefore, the horsepower and electrical requirements depend on the capacity of the mixing system. A detailed wiring diagram is located under the electrical cover of each blower motor. Consult this diagram and informational labels attached to the blower.

↗ IMPORTANT: CHECK TERMINAL JUMPER LOCATIONS ON BLOWER MOTOR TO ENSURE CORRECT LOCATION ACCORDING TO VOLTAGE REQUIREMENTS. PROPER LOCATION IS DESCRIBED ON DECALE UNDER MOTOR ENCLOSURE COVER.

The ExoInjector™ utilizes the ControlCarb™ controller with a touch screen interface and software designed specifically for use with exothermic gas generators. **Misapplication of this mixing system could result in damage to the process being controlled and/or personal injury.**

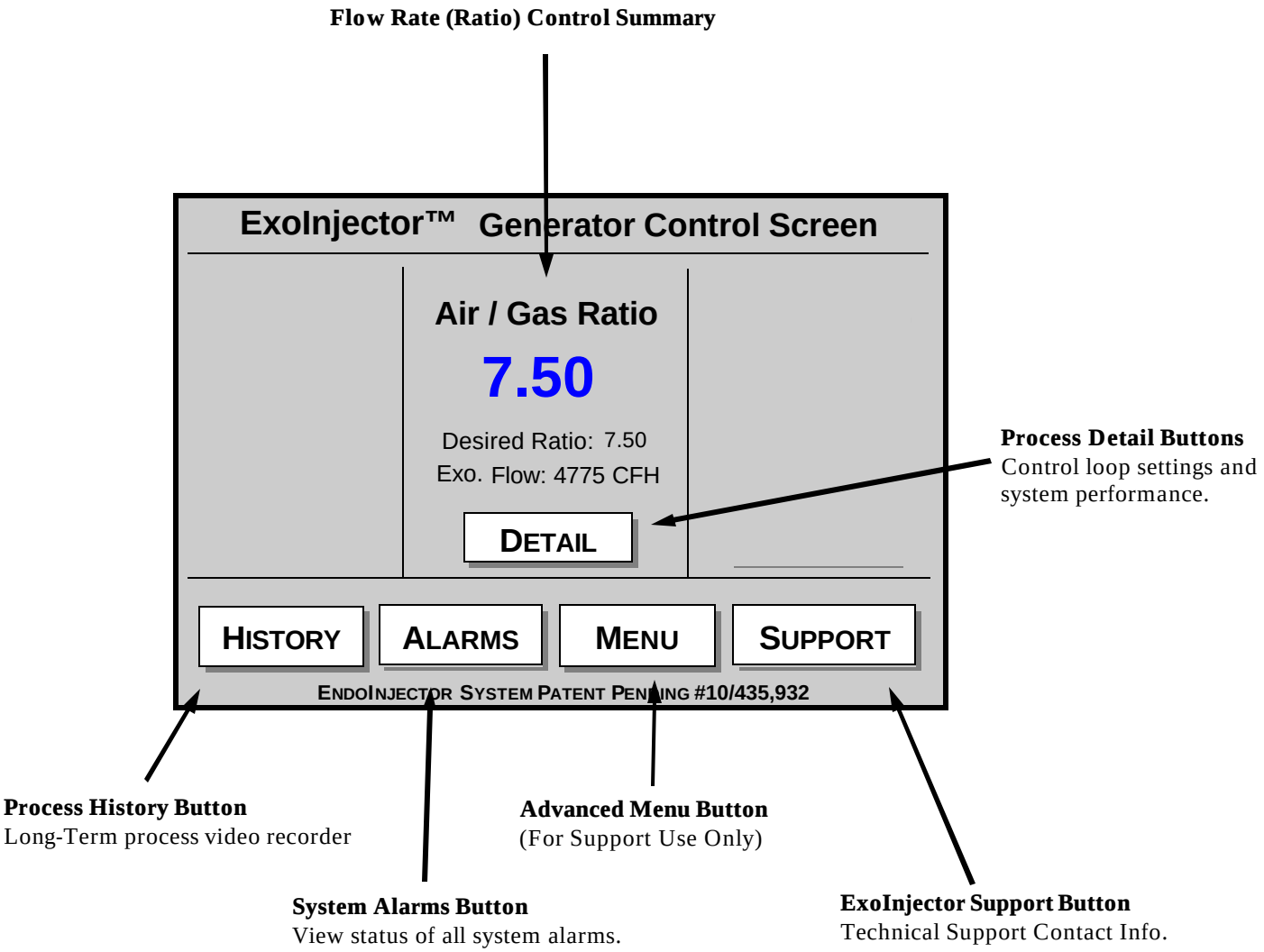
OPERATOR INTERFACE (TOUCH SCREEN NAVIGATION)

The ExoInjector™ utilizes a color touch screen navigation system that provides all generator process information in one bright and easy to understand display screen. The following is a overview of each screen available. It should be noted that all variables and setpoints are password protected to prevent accidental changes. If you would like to make any system adjustments refer to the "Setup" screen in this manual associated with the function to be changed.



MAIN GENERATOR CONTROL SCREEN (SYSTEM OVERVIEW)

The "Main Control Screen" serves as a generator overview that displays all important process factors. Process factors are "Blue" when within expected limits and "RED" when outside of the prescribed deviation band.



RATIO CONTROL DETAIL AND SETUP SCREENS

The "Air/Gas Ratio Detail" screen provides complete information regarding the flow rate and fuel injection performance of the ExoInjector mixing system.

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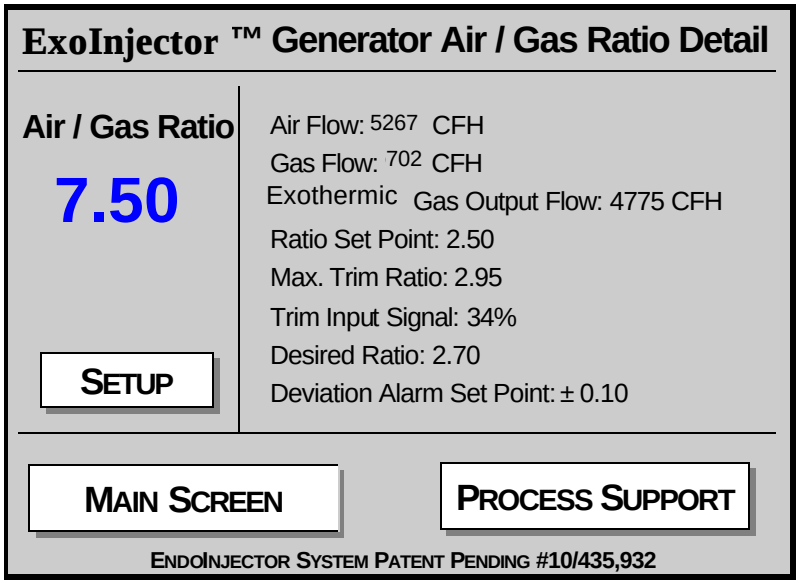
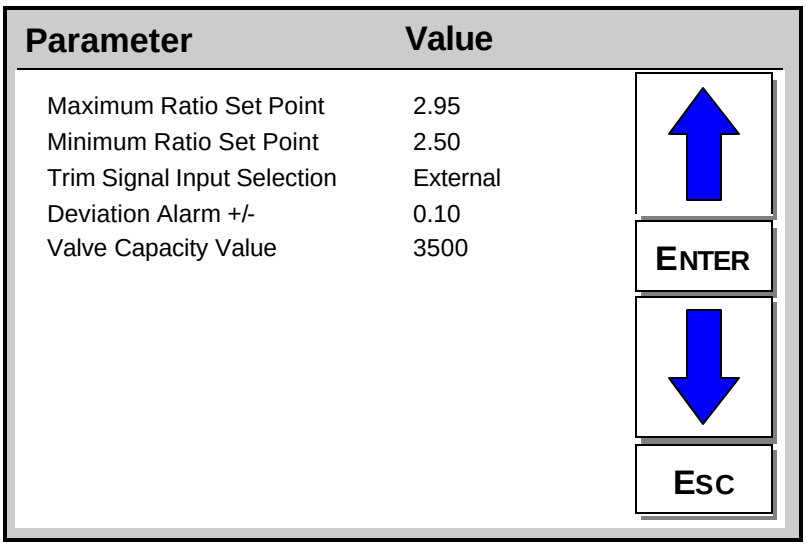


Ratio Control Detail Screen
(READ ONLY)

Values can not be modified on this screen. To change these values press the "Setup" button on this screen and enter the password number **2**.



Ratio Control Setup Screen
(Login Password Required)
Password = 2

IMPORTANT: CHANGES TO THIS SCREEN WILL EFFECT THE CURRENT OPERATION OF THE EXOINJECTOR. Review this manual for a complete description of all Setup Parameters prior to adjustments.

AIR / GAS RATIO CONTROL SETUP SCREEN PARAMETERS *(LOGIN PASSWORD = 2)*

These parameters define the control of the air / gas mixing function of the ExoInjector. Changes to these parameters will take effect immediately.

Maximum Ratio Set Point (Limits: 0.00 to 99.99)

Maximum Air / Gas Ratio to be introduced based on a 100% (20 mA) ratio trim signal. The default setting of 7.50 may differ slightly due to specific generator characteristics. If the dew point is too low and the trim signal is 100% then the Maximum Ratio Set Point should be increased to provide proper dew point control. NOTE: Do not set this value above 9.50 as excessive water vapor may be produced within the generator retorts. Consult the generator manual for troubleshooting guidelines or contact Atmosphere Engineering for further support.

Minimum Ratio Set Point (Limits: 0.00 to 99.99)

Minimum Air / Gas Ratio to be introduced based on a 0% (4 mA) ratio trim signal. The default setting of 7.50 may differ slightly due to specific generator characteristics. If the dew point is too high and the trim signal is 0% then the Minimum Ratio Set Point can be decreased to provide proper dew point control. NOTE: Should not be necessary to set this value below 6.00. Consult the generator manual for troubleshooting guidelines or contact Atmosphere Engineering for further support.

Trim Control Selection (Values: External, Internal)

The Trim Control selection parameter defines where the trim signal originates.

External: Separate dew point controller with trim output signal.

Internal: When built-in dew point control software is utilized.

Ratio Deviation Alarm (Limits: 0 - 3.0)

This value defines the limit for the ratio deviation alarm. When the actual air / gas ratio deviates from the working ratio more than this value, the Deviation Alarm LED will turn “ON”.

Valve Capacity Value (DO NOT CHANGE THIS VALUE)

This value defines the speed of the fuel injection valve control response. (Note: A lower number increases the valve speed). Required during initial installation and generator start-up.

ADDITIONAL DOCUMENTATION

- Assembly Wiring Diagram
- Installation Wiring Diagram
- Pipeline Diagram
- Installation Setup Sheet