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APPROVAL REPORT

Project No:	3055291
Class:	9010
Product Name:	Type 6500/6600 Volume Booster
Product Type:	Volume Booster
Name of Listing Company:	Controlair Inc
Address of Listing Company:	8 Columbia Dr Amherst NH 03031 United States
Customer ID:	1000000397-1
Customer website	www.controlair.com

Prepared by

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16 December 2015
Date of Approval

FM Approvals
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1 INTRODUCTION

1.1 Controlair Inc requested examination of the apparatus listed in Section 1.4 for compliance with the standards in Section 1.3 as SIL 3.

1.2 This report may be freely reproduced only in its entirety and without modification.

1.3 Standards

Title	Number	Issue Date
Functional Safety of Electrical / Electronic / Programmable Electronic Safety-Related Systems - General Requirements	IEC 61508 part 1	2010
Functional Safety of Electrical / Electronic / Programmable Electronic Safety-Related Systems - Requirements for electrical / electronic / programmable electronic safety related systems	IEC 61508 part 2	2010

1.4 Listing:

The product will appear in the Approval Guide, an on-line resource of FM Approvals, as follows:

- Functional Safety of Safety Related Systems and Components

Type 6500/6600 Pneumatic Volume Booster

"Fit for Use" in a SIL1, 2, 3 SIL Applications *(for SIL reference table below)*

Description	Series	Type	HFT	SFF	PFD	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU} (FIT)
Volume Booster	6500 & 6600	Type A Pneumatic-Component	0	0.935	1.54E-05	3.46E-08	4.35E-09	1.15E-08	3.49E-09

Note: PFD Average Calculation is based on a proof test interval of 1-year, a Hardware Fault Tolerance (HFT) of 0, a Mean Time of Repair (MTR) of 8 hours, and Mean Time To Restoration (MTTR) of 8-Hours.

Condition of Use:

1) *The analysis shows the design of the Type 6500/6600 Volume Booster can meet the hardware requirements of IEC61508 SIL 3 depending on the complete final element design.*
2) *1oo1 Low Demand Configuration*

2 DESCRIPTION

The Type 6500/6600 Volume Booster is a purely mechanical device which may be used in a safety system, in conjunction with a valve actuator, to perform a safety-related function. The only function of this device is to provide a large volume of air to a valve actuator at a designated pressure to allow for rapid actuator stroking. The greater air flow allows a valve to actuate more rapidly, which would then allow a safety shut-off

system to reach a safe state quicker. Without this device air may need to flow through a regulator, which typically has much lower flow rates.

The Type 6500/6600 Volume Booster unit can safely operate within a 0-150 psi output pressure and -40 to 200 degrees Fahrenheit temperature range. Within these normal operating ranges, the unit can be expected to produce an output pressure within the specified tolerance of the signal pressure; with a designed signal-to-output ratio of 1:1. This unit is a normally closed device, meaning it will not produce an output if there is no signal pressure provided or upon loss of signal pressure. Because this device is purely mechanical, a loss-of-power scenario will have no direct effect on this device. This device will continue to function as long as it is supplied both a supply and signal pressure, even if the rest of the system does not have electrical power.

The Volume Booster has no manual shutdown or reset ability. Should the safety system require a manual shutdown, a separate device must be used to provide the capability of a manual shutdown. To reset the device, it must be depressurized by opening each port to atmosphere. It also does not have any built-in bypass ability. Again, a separate device should be used to bypass the volume booster if the system requires a method to bypass this device. The use of a second Volume Booster in parallel can be a form of redundancy in a safety system, allowing the system an alternative should one Volume Booster fail to open or receive signal.

3 EXAMINATIONS AND TESTS

Samples of the Type 6500/6600 Volume Booster were submitted for examination and testing. The Type 6500/6600 Volume Booster samples were considered to be representative of the product line and were examined, tested, and compared to the manufacturer's drawings. All data is on file at FM Approvals along with other documents and correspondence applicable to this program. Fault insertion testing was performed at the Control Air Facility for verification of FMEDA conducted and witnessed by FM Approvals.

All testing and analysis considered appropriate was conducted and verified to be in compliance with the Standards defined in Section 1.3.

4 MARKING

There are no required markings on the product per IEC61508.

5 REMARKS

5.1 Installations shall comply with the latest edition the manufacturer’s instruction manual.

5.2 Annual proof testing must be accomplished per the instructions in the maintenance documents

6 SURVEILLANCE AUDIT

The design and manufacturing facilities at the following location(s) shall be visited on a routine basis. The facility processes and quality control procedures in place have been determined to be satisfactory to manufacture product identical to that tested and Approved. An FM Approved Products/Specification-Tested Revision Request Form shall

be submitted to FM Approvals for requesting to manufacture product at any additional or alternate manufacturing facilities which are not listed below.

Design/ Manufacturing
Controlair Inc
8 Columbia Dr
Amherst NH
03031
United States

7 MANUFACTURER'S RESPONSIBILITIES

7.1 Documentation that is applicable to this approval is on file at FM Approvals and listed in the Documentation File, Section 8, of this report. No changes of any nature shall be made unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The FM Approved Products/Specification-Tested Revision Request Form, shall be forwarded to FM Approvals as notice of proposed changes.

7.2 The manufacturer shall supply copies of the Safety Manual number 441-622-149 with each Volume Booster.

7.3 The manufacturer shall make any Special Conditions of Use available to the user of the Product.

7.4 The manufacturer shall carry out verifications or tests necessary to ensure that the product produced complies with the documentation listed in section 8.

7.5 In accordance with the Master Agreement, the manufacturer shall make full and immediate disclosure to FM Approvals of all information concerning any defect in, or potential hazard of, the product or service manufactured or provided by the Customer which is Approved by, or being examined by, FM Approvals. The manufacturer shall make all necessary arrangements for the investigation of complaints / anomalies applicable to this approval and shall keep records of all complaints / anomalies including actions taken.

8 DOCUMENTATION

See attached blueprint report.

9 CONCLUSION

The apparatus described in section 1.4 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, FM Approval is effective on the date of this report.

PROJECT DATA RECORD: 3055291

ATTACHMENTS: Blueprint Report (3055291)

Blueprint Report

ControlAir Inc. (1000000397)

Class No 9010

Original Project I.D. 3055291

Drawing No.	Revision Level	Drawing Title	Last Report	Electronic Drawing
441-622-149	11/11/2015	Safety Manual	3055291	Yes (pdf)
6500 FMEDA WORKBOOK	2	6500 FMEDA WORKBOOK	3055291	Yes (pdf)