SUBSLAB DEPRESSURIZATION SYSTEM
OPERATION MANUAL

Site: **158 Saratoga Avenue**
Waterford, New York

Precision Environmental Services, Inc.
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Ballston Spa, New York 12020
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Web: www.precisionenvironmentalny.com

Table of Contents

1.0 Introduction:

The purpose of this manual is to familiarize the user with the purpose and method of operation for the subslab depressurization system (SSDS) installed and activated at 158 Saratoga Avenue in Waterford, New York in November 2009. The purpose of the SSDS is to mitigate impacts to site building's indoor air quality by preventing the intrusion of vapors originating from the soils below the structure.

Within this manual are descriptions of each major component, flow diagrams, periodic maintenance requirements, troubleshooting instructions, technical and electrical information. Attachment 1 at the end of this manual includes information provided by the equipment supplier. Specifically, warranty information, electrical diagrams, and equipment specifications and manuals are provided in Attachment 1. Attachment 2 at the end of this manual provides contact information for the two contractors involved with the SSDS design, equipment supplying and fabricating, and installation.

PES recommends that any system maintenance, adjustments, repairs, or troubleshooting be performed by contractors familiar with the design, construction, and operation of subslab depressurization and soil vapor extraction remediation systems. PES will not be held liable for any damages, injuries, etc. associated with the future operation and maintenance of this SSDS.

2.0 SSDS Components and Overview:

The major components of the SSDS at this location and the purpose of these components are described below. The general location of each of these components is depicted in the attached Figure 1.

1.) SSDS Points:

Description – Five 2" diameter schedule 40 PVC pipes penetrating the basement's concrete floor.

Purpose – Points at which soil vapors are captured by the system, preventing vapor intrusion into building.

2.) Moisture Separator:

Description – Gray 55-gallon steel drum with sight tube, level floats, and manual drain valve.

Purpose – Collect and temporarily store moisture that may accumulate as air is drawn through the SSDS points.

3.) Moisture Separator (M/S) Effluent Pump:

Description – Ebara centrifugal transfer pump with 0.75 Horsepower, 230 Volt, 1 Phase, Baldor motor plumbed to moisture separator.

Purpose – Automatically drain moisture separator as necessary by use of separator's level switches and transferring accumulated water from separator to building's existing drain infrastructure.

4.) Regenerative/SSDS Blower:

Description – Gast Manufacturing fan with 2.5 HP, 208-230/460 Volt, 3 Phase, TEFC

Baldor motor.

Purpose – Creates vacuum at SSDS points by drawing air from below the basement's concrete floor and expelling it to the atmosphere through the 4" diameter schedule 40 PVC exhaust stack attached to the west side of the site building.

5.) Inlet Particulate Filter:

Description – Solberg Manufacturing, gray, steel canister with 2" inlet and outlet and polyester filter element (Element #: 851) plumbed directly before SSDS blower.

6.) Inlet Dilution Valve and Silencer:

Description – Brass 2" diameter ball valve with brass filter plumbed directly to inlet particulate filter.

Purpose – Manual method of increasing or decreasing regenerative blower's vacuum level by adjusting the volume of ambient air allowed into the inlet airstream.

7.) Regenerative Blower Enclosure with Exhaust Fan:

Description – Aluminum sound proofed structure surrounding blower with thermostatically controlled (mounted on northeast inner corner of enclosure) Dayton exhaust fan.

Purpose – Protect blower from weather conditions, dampen motor noise, and cool blower during warm weather conditions.

8.) Control Panel:

Description – NEMA 4, single door, steel enclosure with equipment control switches and indicator lights.

Purpose – Controls all electrical components of the SSDS (excluding blower enclosure exhaust fan) and provides indicators with regard to system status.

3.0 SSDS Operation:

During the subsequent discussions please refer to Figure 1, which illustrates the general location of the system components and airflow directions for the SSDS since its initial activation in November 2009.

3.1 Activation:

In order to activate the SSDS the following steps are required:

1.) Turn on power supply for sub-panel in building's main breaker panel (Breaker Numbers 17/19 – 30 Ampere Double Pole Breaker)

2.) Turn on power supply for blower enclosure exhaust fan in building's main breaker panel (Breaker Number 6 – 15 Ampere Single Pole Breaker)

3.) Turn on all breakers in sub breaker panel located adjacent to SSDS control panel (Breaker Numbers 5/7 for Regenerative Blower, 4/6 for Effluent Pump, 8 for Control Panel)

4.) Confirm that the ball valves located immediately above each of the five SSDS points are fully open

5.) Confirm that the ball valve for the inlet dilution valve within the blower enclosure is fully closed

6.) Turn switch for blower enclosure exhaust fan (located on exterior of enclosure) to on position and set thermostat within enclosure for 75 degrees or less.

7.) On the control panel, turn the green toggle switches as follows:

Control Panel to On
SSDS Blower to Auto
M/S Effluent to Auto

The SSDS blower will activate and slowly increase in speed until the full preset speed is achieved. Once the SSDS blower has reached full speed the electronic display on the control panel (VFD

Keypad) will display the value 36.2. This value represents the preset SSDS blower speed in hertz (Hz). Once full blower speed is achieved the vacuum gauge located on the vacuum piping within the blower enclosure will display a vacuum level of approximately 20-inches of water column and the vacuum gauge located above the moisture separator will display a vacuum level of approximately 10-inches of water column.

In order to deactivate the system, follow the steps above in reverse order.

3.2 Control Panel:

During system operation the green toggle switches for "Control Panel" and "SSDS Blower" will be illuminated indicating that the system is operating normally. Should the SSDS system deactivate for any reason (other than an electrical supply outage) an audible alarm will sound and one or both of the red lights on the control panel ("Moisture Separator High Level" or "VFD Fault") will be illuminated, indicating to the user what component of the system caused the deactivation. Pressing the "Alarm Silence" button on the control panel will acknowledge the alarm and cease its operation.

3.3 Airflow:

Soil vapor is initially drawn from below the basement's concrete floor to each SSDS point by the vacuum induced from the SSDS blower. The captured vapors travel upward through each SSDS point and are conveyed to the 4-inch diameter inlet of the moisture separator via 2-inch and 4-inch diameter schedule 40 pipe. Moisture that may be present in the airstream as a result of condensation is deposited in the separator and the vapors exit the separator through the 2-inch diameter outlet located on the side of the separator. After the vapors exit the separator they are conveyed through 2-inch diameter schedule 40 pipe to the side inlet on the inlet particulate filter which is located within the regenerative blower enclosure. Solids and dust that may be present within the airstream are captured by the filter as the vapor flows through the unit and exits at the bottom outlet. Once exiting the particulate filter the vapors are conveyed to the vacuum inlet port of the blower via 2-inch diameter steel pipe and exit the blower via the pressure outlet port and 2-inch diameter steel pipe. The vapor then passes through an aluminum exhaust muffler (designed to dampen noise exiting the exhaust stack). Immediately after passing through the muffler the vapors are transferred to a vertical section of 4-inch diameter schedule 40 pipe attached to the site building. The vertical 4-inch diameter pipe is designed to serve as an exhaust stack as the vapor is expelled to the atmosphere at the stack's outlet positioned above the eave of the site building's roof.

3.4 M/S Effluent Pump:

As moisture accumulates in the separator it will also fill the clear site tube plumbed to the separator at the same rate. As the water level within the site tube rises, the level sensing floats installed within the tube will rise accordingly. Should an adequate volume of water be generated to raise the two lowest level sensing floats the toggle switch for the M/S effluent pump will illuminate, the pump will activate, and water will be transferred from the separator to a drain line servicing one of the restroom sinks on the first floor of the building. Once the water level within the drum has dropped to a point at which both of the two lowest level sensing floats are no longer elevated, the M/S effluent pump will deactivate and the toggle switch will no longer be illuminated.

Should the M/S effluent pump fail to activate or transfer water from the separator to the drain with adequate speed, water will continue to accumulate within the moisture separator. Should the water level rise to where all three of the level sensing floats within the site tube are elevated, the SSDS will deactivate, the audible alarm will sound, and the red "Moisture Separator High Level" light will illuminate. Please refer to Section 5.0 Alarm Troubleshooting for instructions on addressing this alarm.

4.0 Maintenance Schedule:

Continuous operation of the SSDS is required in order to prevent soil vapors from impacting the indoor air quality of the site building. Therefore, regular maintenance of the SSDS is required and should be strictly adhered to in order to ensure proper system operation and in an attempt to prevent future system failures. ***PES strongly recommends that the maintenance program summarized below (see Table 1 for detail) be followed during the operation of the SSDS and performed no less frequently than every two weeks***.

TABLE 1 – MAINTENANCE PROGRAM

SSDS COMPONENT	CHECK	ACTION
SSDS Points	Ball Valve Position	Confirm all are fully open.
Moisture Separator	Water Level in Site Tube	Drain if above middle level sensing float by turning M/S Effluent Pump toggle to "Hand" and holding. Once drained turn toggle back to "Auto". *OR* Deactivate SSDS and drain using manual ball valve. Contact SSDS contractor (listed in Attachment 2) to address faulty M/S Effluent pump or controls.
M/S Effluent Pump	Moisture Separator Level Sensing Floats	Deactivate SSDS. Remove float assembly from site tube. Confirm that raising and holding the lower float then raising and holding the middle float activates M/S effluent pump. Confirm that lowering the middle float and then lowering the lower float deactivates M/S effluent pump. Reactivate SSDS with probe assembly out of moisture separator site tube. Confirm that raising and holding the lower float, then raising and holding the middle float, then raising and holding the upper float deactivates the SSDS, activates the alarm, and illuminates the "Moisture Separator High Level" alarm light. Wipe level sensing floats and shaft with damp cloth/soapy water to clean of possible obstructions to float movement.
Control Panel	VFD Keypad	Confirm displayed value is 36.2. Contact SSDS contractor (listed in Attachment 2) to address if value is different.
Vacuum Gauges	Vacuum Level at SSDS Blower and Moisture Separator	Confirm reading approximately 20-inches and 10-inches of water column respectively. Contact SSDS contractor (listed in Attachment 2) to address if values are significantly different.
Inlet Particulate Filter	Filter	Deactivate SSDS. Remove filter housing top and filter within. Inspect filter for solids fouling. Change if fouled or every 400 hours/60 days (Element # 851 – Refer to Attachment-3 for Suppliers).
Blower Enclosure Exhaust Fan	Operation	Confirm thermostat activates exhaust fan. Set thermostat to 75 degrees or less.
Inlet Dilution Valve	Ball Valve Position	Confirm valve is fully closed.
4" Diameter Exhaust Stack	Drain Valve at Base of Stack	Open valve and drain accumulated condensation.

5.0 Alarm Troubleshooting:

Should the SSDS system deactivate for any reason (other than an electrical supply outage) an audible alarm will sound and one or both of the red lights on the control panel ("Moisture Separator High Level" or "VFD Fault") will be illuminated, indicating to the user what portion of the system caused the deactivation.

5.1 Moisture Separator High Level Alarm:

This alarm indicates that SSDS has deactivated because the moisture separator has failed to drain and that the water level has reached the upper level sensing float. In order to address this alarm:

1.) Press the "Alarm Silence" button on the control panel to acknowledge the alarm and cease its operation.

2.) Turn the toggle switch for the "M/S Effluent Pump" from the "Auto" position to the "Hand" position and hold until the water level within the separator has dropped to a point below the lowest level sensing float in the site tube.

    Should the pump not activate turn the toggle switch for the "M/S Effluent Pump" back to the "Auto" position. Drain the moisture separator utilizing the manual drain ball valve at the base of the separator until the water level within the separator has dropped to a point below the lowest level sensing float in the site tube. Close the drain valve after reaching this level.

3.) Press the "Reset" button on the control panel and the SSDS will restart. Contact SSDS contractor (listed in Attachment 2) to troubleshoot faulty level float switches or faulty M/S Effluent Pump.

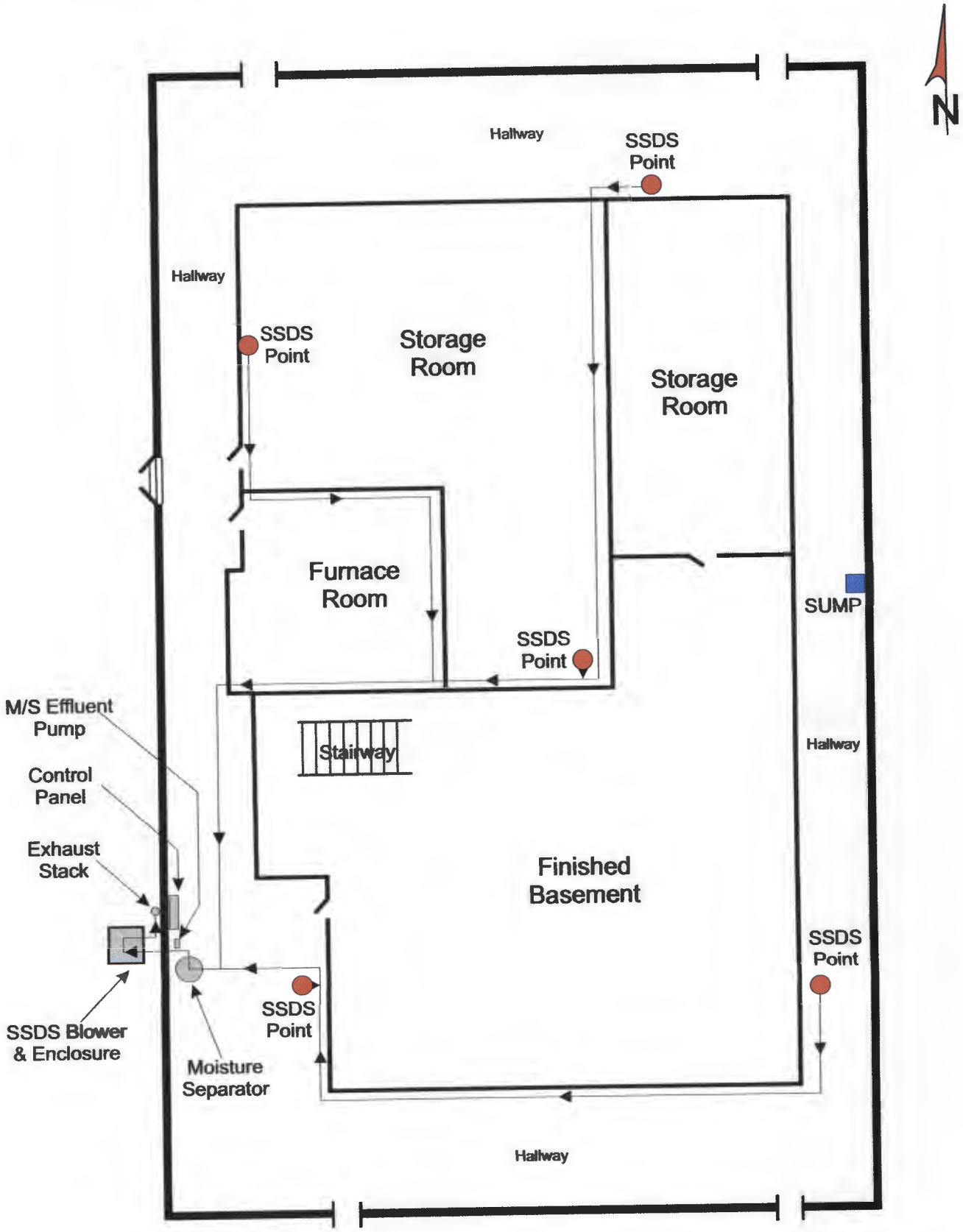
5.2 VFD Fault Alarm:

This alarm indicates that SSDS has deactivated because a problem with the SSDS blower or controls. There are multiple reasons that could result in causing a VFD Fault. In order to address this alarm:

1.) Press the "Alarm Silence" button on the control panel to acknowledge the alarm and cease its operation.

2.) Contact SSDS contractor (listed in Attachment 2) to inspect reason for alarm and remedy problem.

FIGURES



PRECISION
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SSDS SYSTEM LAYOUT & AIRFLOW
158 Saratoga Avenue
Waterford, NY

Figure: 1

ATTACHMENT - 1

Equipment Supplier Materials

NES
NATIONAL ENVIRONMENTAL SYSTEMS

NES Project: 09-198
Precision Environmental
SSDS Components
NYSDEC Project

Operation & Maintenance Manual

Phone (508) 226-1100 Fax (508) 226-1180 84 Dunham Street Attleboro, MA 02703
www.nes-inc.biz

NES
NATIONAL ENVIRONMENTAL SYSTEMS

NES Project: 09-198
Precision Environmental
SSDS Components
NYSDEC Project

Section 1 – Installation Guidelines & Warranty

Installation Guidelines

Major Component Summary Table

NES Warranty

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NES™
NATIONAL ENVIRONMENTAL SYSTEMS

For Assistance Call: (508)226-1100 Option 3 Technical Support

INSTALLATION GUIDELINES

1. Inspect exterior and interior of control panel for damage that may have occurred during shipment. Check all interior components within panel for tightness. Vibration during transport may loosen screw terminals, din rail mounted components, hardware, etc. Check motor starter overloads and reset if tripped.

2. Panel and associated wiring should be installed by a qualified, licensed, electrician familiar with remediation/water treatment equipment. All information required for proper installation is contained on the drawings or other documents within this manual. Drawings containing information on panel interior and exterior layout, line diagrams, and process and instrumentation are also included in this section for reference only.

Many remediation systems are installed in "hazardous locations" and therefore the installer must follow the National Electric Code requirement for these areas. The control panel and associated equipment should only be installed in the area for which it was designed.

Many systems utilize a combination of intrinsically safe and non-intrinsically safe circuits. Proper separation and demarcation is required. Please refer to the National Electric Code Article 504 "Intrinsically Safe Systems" and any local codes.

3. Before applying power to any equipment, the component manufacturers operation and start-up manual (compressor, blower, pump, etc.) should be reviewed. Some equipment cannot be operated in the wrong rotation even momentarily without damage. Verifying proper rotation should only be done after review of the associated equipment manual.

4. As a general rule, all fluid levels, drive components, plumbing attachments, etc. should be inspected. The equipment should be initially started in a no-load condition with non-contaminated process fluid (i.e. SVE vacuum blower started with all recovery wells shut off, and the ambient air dilution valve open fully). **Do not store equipment for more than one month without running it.** Idle blowers, pumps or other items may rust or seize if not run once a month.

5. Once proper operation of all equipment has been verified the system can be started. Turn the selector switches to "auto" or "on", and press reset if necessary. The system should run automatically.

6. If it is possible, any alarm conditions (i.e. SVE moisture separator high level) should be manually actuated to ensure proper system response.

7. The system can now be adjusted to design flow rates, pressures, etc. All adjustments should be made gradually.

National Environmental Systems
84 Dunham Street
Attleboro, MA 02703

MAJOR COMPONENT SUMMARY

Project No.: 09-198 (August 2009)

Project: Precision Environmental Services - SSDS Components (NYSDEC Project)

Component	Qty.	Manufacturer	Model	Serial Number(s) if Applicable
Control Panel				
Relay Based Control Panel	1	NES		UL No.: BT 645334
VFD	1	SD/Telemecanique	ATV31HU22M2	N/A
Audible Alarm	1	Federal Signal	LP4	N/A
SSDS Mechanical Components				
Regenerative Blower	1	Gast	R6325A2	809400696
Discharge Silencer	1	Gast	AJ121F	N/A
Inlet Filter	1	Solberg	CSL-851-200HC	N/A
Vacuum Relief Valve	1	Kunkle	215V-H01-QE0002	N/A
Moisture Separator (MS)				
Drum Style Moisture Separator	1	NES	55gal	N/A
MS Transfer Pump	1	Ebara	ACDU70/17T1C	C11895/1/1
Level Switch	1	NES	P500	N/A

NES™
NATIONAL ENVIRONMENTAL SYSTEMS

WARRANTY

All products not manufactured by National Environmental Systems, carry the original manufacturer's warranty. Copies are available on request.

National Environmental Systems, warrants its packaged and manufactured equipment against any defect in material or workmanship, under normal use and storage for a period of twelve (12) months from date of manufacture and invoice. In the event that products are found to be defective within the warranty period, National Environmental Systems, Inc., sole obligation and remedy shall be the furnishing of replacements for any defective parts, and such replacement parts shall be furnished but not installed by National Environmental Systems. NATIONAL ENVIRONMENTAL SYSTEMS WILL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES IN ANY CLAIM SUIT OR PROCEEDINGS ARISING UNDER WARRANTY, NOR WILL NATIONAL ENVIRONMENTAL SYSTEMS, INC., ACCEPT ANY LIABILITY FOR CLAIMS FOR LABOR, LOSS OR PROFIT, REPAIRS OR OTHER EXPENSES INCIDENTAL TO REPLACEMENT. The product warranty expressed above is our only warranty and may not be verbally changed or modified by any representative of National Environmental Systems. All freight costs incurred in shipping parts to or from National Environmental Systems, or to the manufacturer if necessary are at the expense of the customer.

National Environmental Systems, will invoice the cost of any replacement parts. These parts will be credited upon certification the original part was defective and the defective part was returned within one week of notifying National Environmental Systems, Inc., of the malfunction. If the part is found to have been misused no credit will be issued. In order for National Environmental Systems, to ship a replacement part on account, all outstanding invoices must be current

National Environmental Systems, expressly disclaims any warranties, expressed or implied, including any warranty of merchantability or fit National Environmental Systems for particular purpose or any warranty arising from a course of dealing or usage of trade. Except to the extent required by applicable law. National Environmental Systems, shall not be liable, in tort, contract or otherwise, for any loss or damage, whether direct, consequential or incidental, of any person or entity arising in connections with the equipment.

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NES
NATIONAL ENVIRONMENTAL SYSTEMS

NES Project: 09-198
Precision Environmental
SSDS Components
NYSDEC Project

Section 2 – Control Panel Drawings & Components

Control Panel Description

Control Panel Drawings

VFD Operating Instructions

Audible Alarm Operating Instructions

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CONTROL PANEL DESCRIPTION

Precision Environmental / NYDEC Project
NES Job number: 09-198

CONTROLLER – Relay Based with VFD (used as phase converter)

CAPABLE OF CONTROLLING

(1) SSDS Blower	2.5HP, 230V, 3 Phase TEFC
(1) M/S Effluent Pump	0.75HP, 230V, 1 Phase TEFC

ALARMS – Manual reset

- Moisture Separator High level
- VFD Fault (may auto reset)

NORMAL OPERATION

Equipment will operate if the panel switch is in the AUTO position and no alarm is present. Equipment will operate if the panel switch is in the HAND position with or without an alarm condition.

ALARM OPERATION

Alarm – Moisture Separator High level
Panel response- The SSDS blower is shut down.

Alarm – VFD Fault
Panel response – The SSDS blower is shut down.

Note: Each of the above alarms will initiate an audible alarm. Press the alarm silence button if necessary, prior to troubleshooting.

See the drawings for additional details.
Contact NES if necessary.

MODEL LP4

INSTALLATION AND SERVICE INSTRUCTIONS FOR STREAMLINE LP4 SOUNDER

MODELO LP4

INSTRUCCIONES DE INSTALACION Y REPARACION PARA EL RESONADOR STREAMLINE LP4

MODELE LP4

INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN DU RESONATEUR STREAMLINE LP4

Address all communications and shipments to:
Dirija todos la correspondencia y envíos a:
Adressez toutes les communiations et expéditions à:

FEDERAL SIGNAL CORPORATION
Electrical Products Division
2645 Federal Signal Drive
University Park, IL 60466-3195

INSTALLATION AND SERVICE INSTRUCTIONS FOR STREAMLINE LP4 SOUNDER

⚠ SAFETY MESSAGE TO INSTALLERS

People's lives depend on your safe installation of our products. It is important to read, understand and follow all instructions shipped with this product.

Selection of mounting location for this device, its controls and routing of wiring should be made by the Facilities Engineer and the Safety Engineer. Listed below are other important safety instructions and precautions you should follow.

- This unit must be installed and maintained by a qualified electrician in accordance with National and local Electrical Codes, under the direction of the authority having jurisdiction.
- Do not connect this unit to system wiring when circuits are energized.
- For optimum sound distribution do not install this device where objects would block the front of the sounder.
- All effective warning horns produce loud sounds which, in certain circumstances, may cause permanent hearing loss. Take appropriate precautions such as wearing hearing protection. Recommendations in OSHA Sound Level Standard (29 CFR 1910) should not be exceeded.
- After installation, be sure that all threaded joint are securely tightened.
- After installation and completion of initial systems test, a program for periodic testing of this device must be established.
- After installation and completion of initial system test, provide a copy of this instruction sheet to all personnel responsible for operation, periodic testing and maintenance of this equipment.

I. GENERAL.

The Federal Model LP4 sounder provides an audible signal when activated by a remotely located control panel. The sounder is a polarized device rated at 9-28VDC. The sounder is suitable for indoor/outdoor use. The LP4 can provide one of 28 different tones by setting the dip switches, located on the inside of the unit. A second or alternative tone can be activated by connecting a third wire to the negative supply. The LP4 also provides an adjustable volume control. The sound output levels, Typical Current Consumption, and Tone Variations are shown in Table 1.

Electrical Details:

Termination:	Screw terminals for 23 AWG to 13 AWG conductors.
Voltage Range:	9-28VDC
Starting Current:	30 mA for 2 mSec.
Starting Time:	1.5 mSec.
Running Current:	Varied according to tone selected. See table 1.
Monitoring:	Polarizing Diode

Mechanical Details:

Diameter:	3.66" [93 mm]
Overall Depth:	Shallow: 2.48" [63 mm]
	Deep: 4.13" [105mm]
IP Rating:	Shallow: IP54 Deep: IP65
Temp. range:	-40°F to 176°F (-40°C to 85°C)
Case Material:	ABS Plastic Body

Table 1.

No.	Tones	2nd Tone #	Code 12345	Typical Current (mA)		Typical Output (dB at 1 M)	
				12V	24V	12V	24V
1	Alt Tones 800/970Hz at 2Hz	14	11111	8	16	96	103
2	Sweeping 800/970Hz at 7Hz	14	11110	8	16	93	100
3	Sweeping 800/970Hz at 1 Hz	14	11101	8	16	93	100
4	Continuous at 2850Hz	14	11100	14	30	104	111
5	Sweeping 2400-2850Hz at 7Hz	4	11011	16	28	99	106
6	Sweeping 2400-2850Hz at 1Hz	4	11010	15	28	99	106
7	Slow Whoop	14	11001	10	18	93	100
8	Sweep 1200-500Hz at 1Hz	14	11000	7	14	92	98
9	Alt Tones 2400/2850Hz at 2Hz	4	10111	17	28	102	109
10	Intermittent Tone of 970Hz at 1Hz	14	10110	7	10	92	100
11	Alt Tones 800/970Hz at 1Hz	14	10101	8	16	97	103
12	Intermittent Tones 2850Hz at 1Hz	4	10100	12	22	103	110
13	970Hz at .25 Sec. On /1 Sec. Off	14	10011	3	6	93	100
14	Continuous at 970Hz	14	10010	9	18	99	105
15	554Hz for .1 Sec/400Hz for .4 Sec	14	10001	5	10	88	94
16	Inter 660Hz .15 Sec On/.15 Sec off	16	10000	4	7	87	92
17	Inter 660Hz 1.8Sec On/ 1.8 Sec Off	17	01111	5	10	89	95
18	Inter 660Hz 6.5 Sec On/13Sec off	18	01110	6	12	89	95
19	Continuous 660Hz	19	01101	6	12	89	95
20	Alternating 554/440 Hz at 1Hz	20	01100	5	11	89	95
21	Inter 660Hz at 1Hz	21	01011	4	8	87	93
22	Inter 2850Hz at .15 Sec On/.1Sec Off	14	01010	11	20	102	109
23	Sweeping 800-970Hz at 50Hz	14	01001	8	16	92	98
24	Sweeping 2400-2850Hz at 50Hz	4	01000	12	23	99	107
25	Inter 970Hz at .5 Sec On/.5Sec Off	25	00111	7	12	97	103
26	Inter 2850Hz at .5 Sec On/.5Sec Off	26	00110	10	18	102	109
27	Continuous at 4000Hz	27	00101	16	33	90	98
28	Alternating 800/970 at 2Hz	10	00100	8	15	96	103

II. INSTALLATION.

A. Unpacking.

After unpacking the sounder, examine it for damage that may have occurred in transit. If equipment has been damaged, do not attempt to install or operate it. File a claim immediately with the carrier stating the extent of the damage. Carefully check all envelopes, shipping labels and tags before removing or destroying them.

B. Electrical Connections

⚠ DANGER

To avoid electrical shock, do not attempt to connect wires when power is on.

A terminal block is supplied on the LP4 for field wiring. Strip 1/2" of insulation from the wiring leads. Attach the appropriate wires to the corresponding terminals. Tighten the screws to insure that the wires are firmly held in place. The terminals will accept conductor sizes 23 AWG to 13 AWG .

C. Mounting Arrangements.

The base of the LP4 provides six (6) slotted recesses for mounting, and one (1) 15/32" cable access hole.

III. TESTING/OPERATING.

⚠WARNING

Under certain conditions these devices are capable of producing sound loud enough to cause hearing damage. Adequate hearing protection should be worn if standing within close proximity to the device while testing. Recommendations in OSHA Sound Level Standard (29CFR 1910) should not be exceeded.

After completion of installation be sure to test the system to verify that each sounder unit operates satisfactory.

After completion of initial system test, a program for periodic testing of this device should be established.

Provide a copy of these instructions for the Safety Engineer(s), System Operators(s) and Maintenance personnel.

⚠ SAFETY MESSAGE TO OPERATORS

Although your warning system is operating properly it may not be completely effective. People may not hear or heed your warning signal. You must recognize this fact and ensure that your warning signal achieves its intended effect through proper test/training sequences suitable for your specific application(s).

IV. MAINTENANCE.

⚠ SAFETY MESSAGES TO MAINTENANCE PERSONNEL

Failure to follow all the safety precautions and instructions may result in property damage, serious injury, or death to you or others.

- Read and understand all instructions before performing maintenance on this unit.
- Do not perform maintenance on this unit when the circuit is energized.
- Periodic checks should be made to ensure that effectiveness of this device has not been reduced because objects have been placed in front of the sounder.
- Any maintenance to this unit MUST be performed by a trained electrician in accordance with NEC guidelines and local codes.
- Never alter this unit in any manner. Safety may be jeopardized if alterations are made to this device.
- The nameplates, which contain cautionary or other information of importance to maintenance personnel, should not be obscured if the exterior of the horn is painted.

⚠WARNING

Unauthorized servicing of this unit may result in diminished performance and/or property damage, serious injury, or death to you or others. If a malfunctioning unit is encountered, do not attempt any field repair or retro fit of parts. Refer to paragraph V. SERVICE for instructions regarding return/ repair of the unit.

V. SERVICE.

The factory will provide technical assistance with any problem that cannot be handled locally with satisfaction. Please call customer service for assistance.

If any unit is returned to the factory for repair, it can be accepted only if we are notified by mail or phone in advance of its arrival. Such notice should clearly indicate service requested and give all pertinent information regarding the nature of the problem, and if possible, it's cause.

Communication and shipments should be addressed to:

FEDERAL SIGNAL CORPORATION
Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60466-3195

INSTRUCCIONES DE INSTALACIÓN Y REPARACION PARA EL RESONADOR STREAMLINE LP4

⚠ MENSAJE DE SEGURIDAD PARA INSTALADORES

Las vidas de las personas dependen de que usted instale con seguridad nuestros productos. Por lo tanto, es importante que lea, comprenda y siga todas las instrucciones que vienen con este producto.

Las tareas de selección del lugar de montaje para este dispositivo, sus controles y el tendido de los cables deben ser realizadas por un ingeniero de instalaciones y un ingeniero de seguridad. En la siguiente lista presentamos otras importantes instrucciones de seguridad y precauciones que usted debe observar sin falta.

- Esta unidad debe ser instalada y recibir mantenimiento por parte de un electricista calificado en conformidad con la norma códigos eléctricos locales y nacionales bajo la dirección de las autoridades que tengan jurisdicción sobre la materia.
- No conecte esta unidad al cableado de un sistema eléctrico mientras los circuitos estén recibiendo energía eléctrica.
- Para lograr una óptima distribución del sonido, no instale este dispositivo en lugares en los que habría objetos bloqueando la parte frontal del resonador.
- Todas las bocinas eficaces de emergencia producen sonidos sumamente fuertes que, en ciertas circunstancias, pueden causar la pérdida permanente de la audición. Tome las precauciones apropiadas como, por ejemplo, usar protección para los oídos. No se deben exceder los niveles recomendados en la Norma sobre niveles de sonido de la OSHA (29 CFR 1910).
- Después de su instalación, asegúrese de que todas las juntas roscadas queden firmemente apretadas.
- Después de instalar y completar la prueba inicial del sistema, se debe establecer un programa para realizar periódicamente pruebas de este dispositivo.
- Después de instalar y completar la prueba inicial del sistema, entregue una copia de esta hoja de instrucciones a todo el personal encargado de operar este equipo, realizar pruebas periódicas de funcionamiento y darle mantenimiento.

I. ASPECTOS GENERALES.

El resonador Federal Modelo LP4 suministra una señal audible al ser activado por un panel de control situado en otro lugar. El resonador es un dispositivo polarizado con una capacidad nominal de 9-28 voltios de corriente continua. Este resonador es adecuado para su uso en ambientes interiores y exteriores. El LP4 puede emitir hasta 28 tonos diferentes mediante el ajuste de los conmutadores de paquete en doble hilera, situados en la parte interior de la unidad. Se puede activar un segundo tono o un tono alternativo conectando un tercer cable al conductor negativo del circuito. El LP4 ofrece también un control ajustable del volumen. En la Tabla 1 se muestran los niveles de salida del sonido, los consumos normales de corriente y las variaciones de tonos.

Detalles Eléctricos:

Terminación:	terminales de tornillo para conductores calibre 23AWG a 13AWG
Límites de voltaje:	9-28 voltios de corriente continua
Corriente inicial:	30 mA durante 2 milisegundos
Tiempo inicial:	1.5 milisegundos
Corriente normal de marcha:	varía según el tono seleccionado, Tabla 1.
Medio de supervisión:	diodo polarizante

Detalles Mecánicos:

Diámetro:	3.66 pulgadas [93 mm]
Profundidad general:	Bajo: 2.48" [63 mm] De hondo: 4.13" [105 mm]
Calificación IP:	Bajo: IP54 De hondo: IP65
Gama de temperaturas:	-40°F a 176°F (-40°C a 85°C)
Material de la caja:	Plástico de resina ABS

Tabla 1.

No.	Tonos	2nd Tono #	Código 12345	Corriente Típica (mA)		Salida Típica (dB at 1 M)	
				12V	24V	12V	24V
1	Tonos alternantes 800/970Hz a 2Hz	14	11111	8	16	96	103
2	Barrido 800/970Hz a 7Hz	14	11110	8	16	93	100
3	Barrido 800/970Hz a 1Hz	14	11101	8	16	93	100
4	Continuo a 2850Hz	14	11100	14	30	104	111
5	Barrido 2400-2850Hz a 7Hz	4	11011	16	28	99	106
6	Barrido 2400-2850Hz a 1Hz	4	11010	15	28	99	106
7	Chillido lento	14	11001	10	18	93	100
8	Barrido 1200-500Hz a 1Hz	14	11000	7	14	92	98
9	Tonos alternantes 2400/2850Hz a 2Hz	4	10111	17	28	102	109
10	Tono intermitente de 970Hz a 1Hz	14	10110	7	10	92	100
11	Tonos alternantes 800/970Hz a 1Hz	14	10101	8	16	97	103
12	Tonos intermitentes 2850Hz a 1Hz	4	10100	12	22	103	110
13	970 Hz a 0,25 segundo encendido/ 1 segundo apagado	14	10011	3	6	93	100
14	Continuo a 970Hz	14	10010	9	18	99	105
15	554 Hz durante 0.1 segundo/ 400Hz durante 0,4 segundo	14	10001	5	10	88	94
16	Intermitente 660Hz 0,15 segundo encendido/0,15 segundo apagado	16	10000	4	7	87	92
17	Intermitente 660Hz 1,8 segundos encendido/1,8 segundos apagado	17	01111	5	10	89	95
18	Intermitente 660Hz 6,5 segundos encendido/13 segundos apagado	18	01110	6	12	89	95
19	Continuo660 Hz	19	01101	6	12	89	95
20	Alternante 554/440Hz a 1Hz	20	01100	5	11	89	95
21	Intermitente 660Hz a 1Hz	21	01011	4	8	87	93
22	Intermitente 2850Hz a 0,15 segundo encendido/0,1 segundo apagado	14	01010	11	20	102	109
23	Barrido 800-970Hz a 50Hz	14	01001	8	16	92	98
24	Barrido 2400-2850Hz a 50Hz	4	01000	12	23	99	107
25	Intermitente 970Hz a 0,5 segundo encendido/0,5 segundo apagado	25	00111	7	12	97	103
26	Intermitente 2850Hz a 0,5 segundo encendido/0,5 segundo apagado	26	00110	10	18	102	109
27		27	00101	16	33	90	98
28	Alternante 800/970 a 2Hz	10	00100	8	15	96	103

II. INSTALACION.

A. Desembalaje.

Después de desembalar el resonador, examínelo para ver si sufrió algún daño durante el transporte. Si el equipo se ha dañado, no intente instalarlo ni ponerlo en funcionamiento. Presente una reclamación inmediatamente ante el transportista especificando la extensión de los daños. Revise cuidadosamente todos los sobres, etiquetas de envío y rótulos antes de sacarlos o destruirlos.

B. Conexiones Eléctricas.

⚠ PELIGRO

Para evitar descargas eléctricas, no intente conectar los cables mientras le esté llegando electricidad al circuito.

El LP4 tiene un bloque de terminales para el cableado sobre el terreno. Pele media pulgada del forro de los cables. Empalme los cables apropiados a los terminales correspondientes. Apriete los tornillos para asegurarse de que los cables queden firmemente en su sitio. En los terminales se pueden instalar conductores calibre 23 AWG a 13 AWG.

C. Medios de Montaje.

La base del LP4 proporciona seis (6) hendiduras ranuradas para montaje y un orificio de acceso para un cable de 12 mm (15/32 pulg).

III. PRUEBAS/OPERACION.

⚠ADVERTENCIA

Bajo ciertas condiciones estos dispositivos pueden producir sonidos tan fuertes que pueden causar daños para la audición. Se debe usar una adecuada protección para los oídos si se está cerca del dispositivo durante las pruebas. No se debe exceder la Norma sobre niveles de sonido OSHA (29 CFR 1910).

Después de completar la instalación, asegúrese de probar el sistema para verificar que cada unidad de resonador funcione en forma satisfactoria.

Después de completar la prueba inicial del sistema, se debe establecer un programa para las pruebas periódicas de este dispositivo.

Usted debe entregar un ejemplar de estas instrucciones al ingeniero(s) de seguridad, los operadores del sistema y el personal de mantenimiento.

⚠ MENSAJE DE SEGURIDAD PARA LOS OPERADORES

Aunque su sistema de alarma esté funcionando correctamente, es posible que no sea completamente efectivo. Puede ocurrir que la gente no escuche o no preste atención a la señal de advertencia. Usted debe tener en cuenta esta posibilidad y asegurarse de que su señal de advertencia logre el efecto deseado estableciendo las secuencias apropiadas de pruebas y entrenamiento que se ajusten a su aplicación o sus aplicaciones específicas.

IV. MANTENIMIENTO.

⚠ MENSAJES DE SEGURIDAD PARA EL PERSONAL DE MANTENIMIENTO

Si no se siguen todas las precauciones e instrucciones de seguridad pueden ocurrir daños materiales, graves lesiones o la muerte para usted u otras personas.

- Lea y comprenda todas las instrucciones antes de dar mantenimiento a esta unidad.
- No intente dar mantenimiento a esta unidad mientras el circuito esté recibiendo electricidad.
- Deben realizarse revisiones periódicas para garantizar que la eficacia de este dispositivo no se haya reducido debido a que se han colocado objetos frente al resonador.
- Únicamente un electricista calificado DEBE intentar dar mantenimiento a esta unidad en con los principios del código eléctrico nacional y los códigos eléctricos locales.
- Nunca altere esta unidad de ninguna manera. Puede poner en peligro su seguridad si se le hacen alteraciones a este dispositivo.
- Si se pinta la parte exterior de la bocina, no se deben tapar ni oscurecer las placas del fabricante que contienen ciertas advertencias u otros mensajes de importancia para el personal de mantenimiento.

⚠ADVERTENCIA

La reparación de esta unidad por parte de un personal no autorizado puede ocasionar una disminución del rendimiento y/o daños materiales, graves lesiones o la muerte para usted u otras personas. Si una unidad no funciona correctamente, no intente repararla sobre el terreno ni hacer una retroadaptación de piezas. En la Sección V "REPARACIÓN" hallará instrucciones respecto a la devolución y reparación de la unidad.

V. REPARACION.

El fabricante prestará asistencia técnica para cualquier problema que no pueda resolverse localmente a plena satisfacción. Llame por favor al Departamento de servicio al cliente para obtener esta asistencia técnica.

Toda correspondencia y todas las devoluciones deben dirigirse a:

FEDERAL SIGNAL CORPORATION
Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60466-3195

INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN DU RÉSONATEUR STREAMLINE LP4

⚠ MESSAGE DE SÉCURITÉ POUR LES INSTALLATEURS

La vie des personnes dépend de votre installation de nos produits d'une manière sécuritaire. Il est important de lire, de comprendre et de suivre toutes les instructions expédiées avec ce produit.

L'ingénieur de l'installation et l'ingénieur responsable de la sécurité doivent effectuer le choix d'emplacement d'installation de cet appareil, de ses contrôles et l'acheminent du câblage. Vous trouverez ci-après d'autres instructions et précautions de sécurité importantes à suivre.

- Cet appareil doit être installé et entretenu par un électricien qualifié conformément aux codes d'incendie et d'électricité locaux et nationaux ainsi que la norme, sous la direction de l'autorité ayant juridiction.
- Ne branchez pas cet appareil au câblage du système lorsque les circuits sont excités.
- Pour une diffusion de son optimale, n'installez pas cet appareil où des objets pourraient bloquer l'avant du résonateur.
- Tous les avertisseurs actifs produisent des sons forts qui, dans certaines circonstances, peuvent provoquer des pertes auditives permanentes. Prenez les précautions voulues comme par exemple le port de protection auditive. Il ne faut pas dépasser les recommandations sous la norme OSHA en matière de niveau de son (29 CFR 1910).
- Après l'installation, assurez-vous que tous les joints filetés sont bien resserrés.
- Après l'installation et le test initial du système, vous devez établir un programme d'essai périodique pour cet appareil.
- Après l'installation et le test initial du système, fournissez une copie de ce feuillet d'instructions à tout le personnel responsable de l'opération, des essais périodiques et de l'entretien de cet équipement.

I. GENERALITES.

Le résonateur Federal de Modèle LP4 fournit un signal audible par un panneau de commande à distance. Le résonateur est un dispositif polarisé d'une capacité nominale de 9-28 VCC Il convient pour les utilisations intérieures et extérieures ainsi. Le LP4 peut fournir une tonalité parmi 28 différentes tonalités en réglant les commutateurs DIP qui se trouvent à l'intérieur du dispositif. Vous pouvez aussi activer une deuxième tonalité ou une tonalité alternative en raccordant un troisième fil à l'alimentation négative. Le LP4 fournit aussi un contrôle de volume réglable. Les niveaux de sortie du son, les appels de courant typiques et les variations de ton sont indiqués sous le tableau 1.

Détails Electriques:

Terminaison:	Bornes à vis pour les conducteurs de 23 à 13 AWG.
Gamme de tension:	9 à 28 VCC
Courant de démarrage:	30 mA pendant 2 msec
Temps de démarrage:	1,5 msec.
Courant de fonctionnement:	Varie selon la tonalité choisie, Tableau 1.
Surveillance:	Diode de polarisation

Détails Mécaniques:

Diamètre:	3,66 po (93 mm)
Profondeur d'ensemble:	Superficiel: 2,48 po (63mm) Profond: 4.13 po (105mm)
Capacité IP:	Superficiel: IP54 Profond: IP65
Portée de température:	-40°F à 176°F (-40° à 85°C)

Tableau 1.

No.	Tonalités	2e Tonalité #	Code 12345	Courant Typique (mA)		Sortie Typique (dB at 1 M)	
				12V	24V	12V	24V
1	Tonalités alternatives 800/970Hz à 2Hz	14	11111	8	16	96	103
2	Variable 800/970Hz à 7Hz	14	11110	8	16	93	100
3	Variable 800/970Hz à 1Hz	14	11101	8	16	93	100
4	Continue à 2850Hz	14	11100	14	30	104	111
5	Variable 2400-2850Hz à 7Hz	4	11011	16	28	99	106
6	Variable 2400-2850Hz à 1Hz	4	11010	15	28	99	106
7	Whoop lent	14	11001	10	18	93	100
8	Variable 1200-500Hz à 1Hz	14	11000	7	14	92	98
9	Tonalités alternatives 2400/2850Hz à 2Hz	4	10111	17	28	102	109
10	Tonalité alternative 970Hz à 1Hz	14	10110	7	10	92	100
11	Tonalités alternatives 800/970Hz à1Hz	14	10101	8	16	97	103
12	Tonalités intermittentes 2850Hz à 1Hz	4	10100	12	22	103	110
13	970 Hz à 0,25 sec. marche/1 sec. arrêt	14	10011	3	6	93	100
14	Continue à 970Hz	14	10010	9	18	99	105
15	554Hz pendant 0,1 sec./ 400Hz pendant 0,4 sec.	14	10001	5	10	88	94
16	Intermittente 660Hz 0,15 sec. marche/0,15 sec. arrêt	16	10000	4	7	87	92
17	Intermittente 660Hz 1,8 sec. marche/1,8 sec. arrêt	17	01111	5	10	89	95
18	Intermittente 660Hz 6,5 sec. marche/13 sec. arrêt	18	01110	6	12	89	95
19	Continue 660Hz	19	01101	6	12	89	95
20	Alternative 554/440Hz à 1Hz	20	01100	5	11	89	95
21	Intermittente 660Hz à 1Hz	21	01011	4	8	87	93
22	Intermittente 2850Hz à 0,15 sec. marche/0,1 sec. arrêt	14	01010	11	20	102	109
23	Variable 800-970Hz à 50Hz	14	01001	8	16	92	98
24	Variable 2400-2850Hz à 50Hz	4	01000	12	23	99	107
25	Intermittente 970Hz a 0,5 sec. marche/0,5 sec. arrêt	25	00111	7	12	97	103
26	Intermittente 2850Hz à 0,5 sec. marche/0,5 sec. arrêt	26	00110	10	18	102	109
27	Continue à 4000Hz	27	00101	16	33	90	98
28	Alternative 800/970 à 2Hz	10	00100	8	15	96	103

II INSTALLATION.

A. Déballage.

Après avoir déballé le résonateur, examinez-le pour tout dommage de transit. SI l'équipement a été endommagé, n'essayez pas de l'installer ou de le faire fonctionner. Déposez immédiatement une réclamation auprès du transporteur indiquant l'étendue des dommages. Vérifiez avec soin toutes les enveloppes, étiquettes d'expédition et étiquettes avant de les retirer ou de les détruire.

B. Connexions Electriques.

⚠ DANGER

Pour éviter tout choc électrique, n'essayez pas de connecter les fils lorsque le courant est en marche

Un bornier est fourni sur le LP4 pour le câblage sur le terrain. Dénudez 1/2 po (1,26 cm) d'isolant des fils. Fixez les fils appropriés aux bornes correspondantes. Resserrez les vis

pour vous assurer que les fils sont bien en place. Les bornes conviennent pour les tailles de conducteur de 23 à 13 AWG.

C Configurations de Montage.

La base du LP4 dispose de six (6) fentes en retrait pour le montage et un orifice d'accès pour un (1) câble de 15/32" (12 mm).

III. ESSAI/FONCTIONNEMENT.

⚠ AVERTISSEMENT

Sous certaines circonstances, ces dispositifs peuvent provoquer des pertes auditives permanentes. Portez les protections auditives voulues si vous vous tenez près de ce dispositif durant les essais. Il ne faut pas dépasser les recommandations sous la norme OSHA en matière de niveau de son (29 CFR 1910).

Après la fin de l'installation, assurez-vous de faire l'essai du système pour vérifier que chaque unité de résonateur fonctionne correctement.

Après la fin de l'essai initial du système, vous devez établir un programme d'essai périodique pour cet appareil.

Fournissez une copie de ce feuillet d'instructions aux ingénieurs responsables de la sécurité, aux opérateurs du système et au personnel responsable de l'entretien de cet équipement.

⚠ MESSAGE DE SÉCURITÉ POUR LES OPÉRATEURS

Bien que le système d'avertissement fonctionne correctement, il peut ne pas être entièrement actif. Les personnes peuvent ne pas entendre ou respecter votre signal d'avertissement. Vous devez tenir compte de ce fait et faire en sorte que votre signal d'avertissement obtienne l'effet voulu en utilisant des séquences appropriées d'essai/ de formation convenant à votre ou vos applications précises.

IV. ENTRETIEN.

⚠ MESSAGE DE SÉCURITÉ POUR LE PERSONNEL D'ENTRETIEN

Le non-respect de toutes les précautions et instructions de sécurité peut mener à des dommages à la propriété, des blessures graves voir la mort pour vous et pour d'autres.

- Lisez et comprenez toutes les instructions avant d'effectuer l'entretien de cet appareil.
- Ne faites pas l'entretien de cet appareil si le circuit est excité.
- Vous devez faire des vérifications périodiques pour vous assurer que l'efficacité de ce dispositif n'est pas réduit parce que l'on a placé des objets devant le résonateur.
- Tout entretien de ce dispositif DOIT être effectué par un électricien formé conformément aux lignes directrices NEC et aux codes locaux.
- Ne modifiez jamais cet appareil de quelque façon que ce soit. La sécurité peut être compromise par des modifications à ce dispositif.
- Les plaques signalétiques contenant des informations de mise en garde et autres information importante pour le personnel d'entretien ne doivent pas être obscurcies si l'extérieur de l'avertisseur est peint.

⚠ AVERTISSEMENT

Toute réparation non-autorisée de cet appareil peut provoquer une performance réduite et/ou des dommages à la propriété, des blessures graves voire la mort pour vous ou pour d'autres. S'il y a défaillance de l'appareil, n'essayez pas de le réparer sur le terrain ou de modifier les pièces. Reportez-vous au paragraphe V. ENTRETIEN ET RÉPARATION pour obtenir les instructions pour la réparation ou le retour de l'appareil.

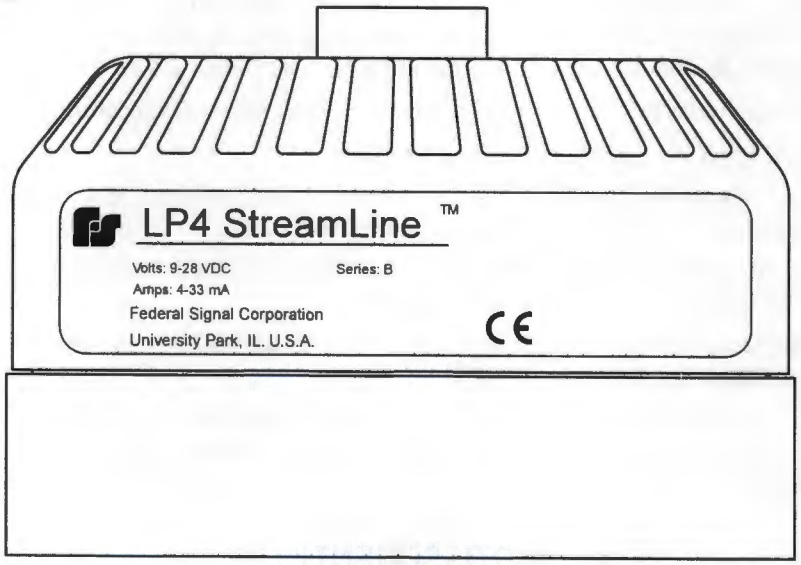
V. ENTRETIEN ET REPARATIONS.

L'usine fournira l'assistance technique pour tout problème que l'on ne peut résoudre localement avec satisfaction. Veuillez communiquer avec le service à la clientèle pour obtenir de l'aide.

Les communications et les expéditions doivent être adressées à :

FEDERAL SIGNAL CORPORATION
Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60466-3195

1



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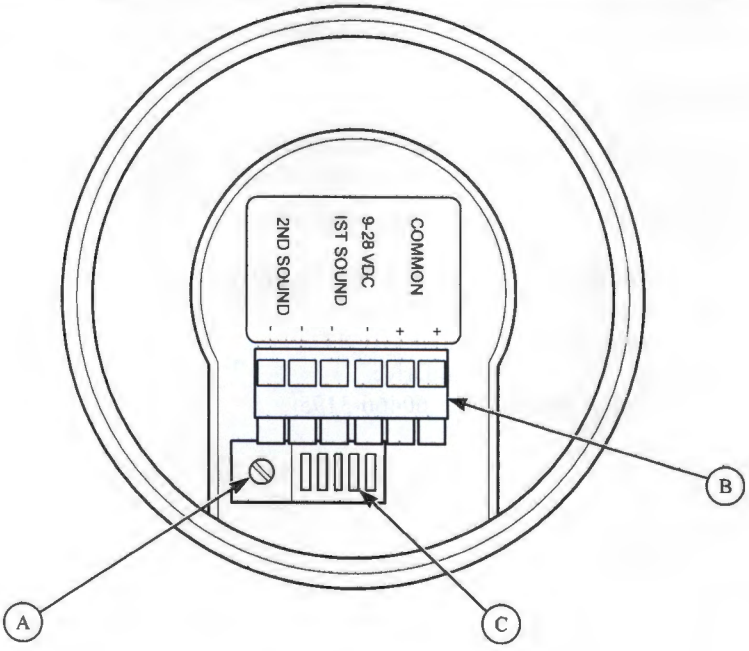

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English

A. Volume control
B. Terminal block
C. Tone select

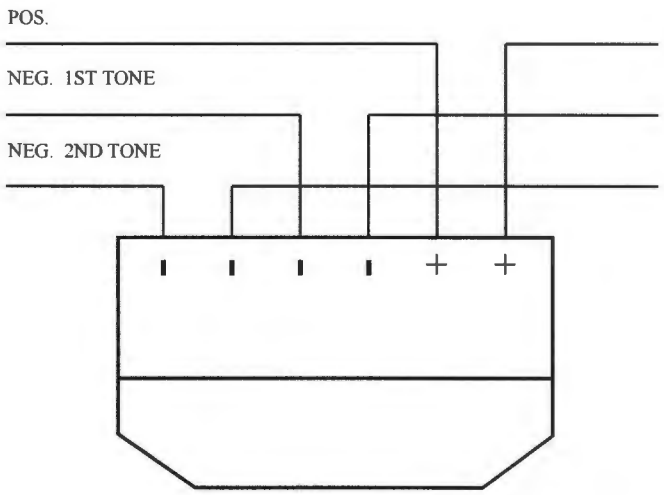
Español

A. Control de volumen
B. Bloque de terminales
C. Seleccion de tonos

Français

A. Contrôle de volume
B. Bloc de borne
C. Sélection de tonalité

3 ELECTRICAL-WIRING-DIAGRAM — Terminal Block



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NATIONAL ENVIRONMENTAL SYSTEMS

NES Project: 09-198
Precision Environmental
SSDS Components
NYSDEC Project

Section 3 – SSDS Mechanical Components

Regenerative Blower – Gast Model R6325A Specifications\

Gast Operating Instructions

Discharge Silencer – Gast Model AJ121F Specifications

Inlet Filter – Solberg Model CSL-851-200HC Specifications & Instructions

Vacuum Relief Valve – Kunkle Model 215V-H01-QE006 Specifications & Instructions

Phone (508) 226-1100 Fax (508) 226-1180 84 Dunham Street Attleboro, MA 02703
www.nes-inc.biz

R6 SERIES

MODELS R6125-2, R6325A-2, R6135J-10, R6335A-2, R6335B, R6150J-2, R6350A-2, R6350B-2

MAXIMUM PRESSURE, VACUUM AND AIR FLOW VARIES FOR THE R6 SERIES, DEPENDING ON THE MODEL(S). REFERENCE THE CHART FOR THE SPECIFIC MODEL PERFORMANCE

MODELS	Maximum Pressure ("H_2O) 60 Hz	50 Hz	Maximum Vacuum ("H_2O) 60 Hz	50 Hz	Maximum Air Flow (CFM) 60 Hz	50 Hz
~~R6125-2~~ R6325A-2	45	40	55	50	215	180
R6135J-10 R6335A-2 R6335B	80	75	80	65	215	180
R6150J-2 R6350A-2 R6350B-2	105	78	88	70	207	180

PRODUCT FEATURES

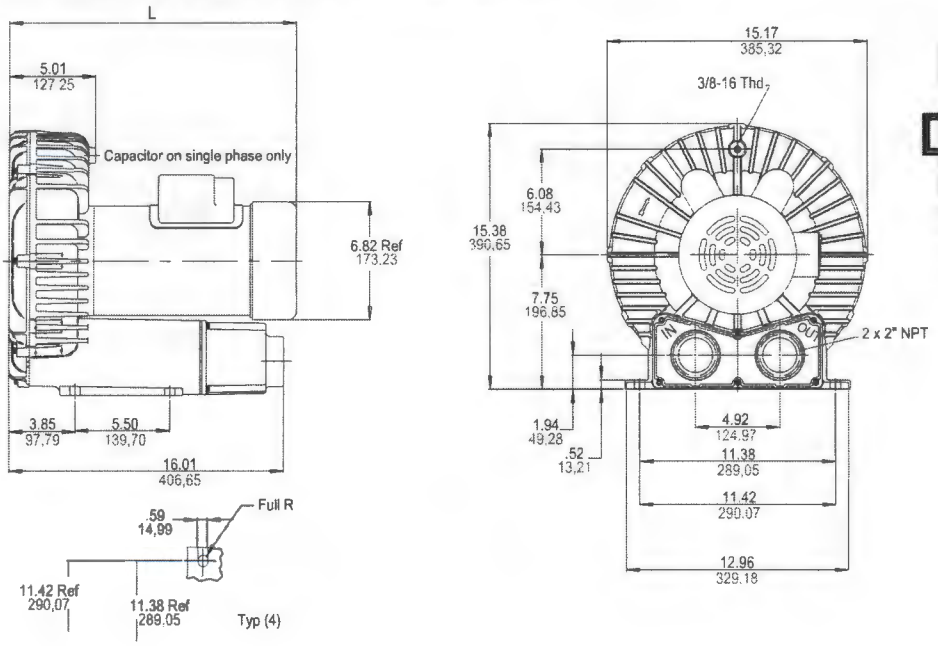
- Made in the U.S.A.
- Rugged construction, low maintenance
- Oilless operation
- UL and CSA approved TEFC motors with permanently sealed ball bearings (R6150J-2 and R6135J-10 has ODP motor)
- Automatic restart thermal protection on R6150J-2, R6125-2, R6335A-2, R6325A-2
- Aluminum cover, impeller and housing
- Inlet and outlet have internal muffling

RECOMMENDED ACCESSORIES

- Pressure gauge AE133
- Inlet filter AJ126F (pressure)
- Vacuum gauge AE134
- Inline filter AJ151G (vacuum)
- Muffler AJ121F
- Relief valve AG258
- Liquid separator RMS300 (vacuum)
- Foam replacement kit K904

Product Dimensions (in. mm)

Note: Unit must be mounted horizontally, foot pad down



MODEL	L (in)	L (mm)
~~R6125-2~~	~~16.45~~	~~418~~
R6325A-2	15.53	394
~~R6135J-10~~	~~15.86~~	~~403~~
R6335A-2	16.59	421
R6335B	16.00	406
R6150J-2	17.46	443
R6350A-2 R6350B-2	17.35	441

Gast Manufacturing Inc., A Unit of IDEX Corporation, Benton Harbor, MI USA • ph 616-926-6171 • fx 616-925-8288 • www.gastmfg.com

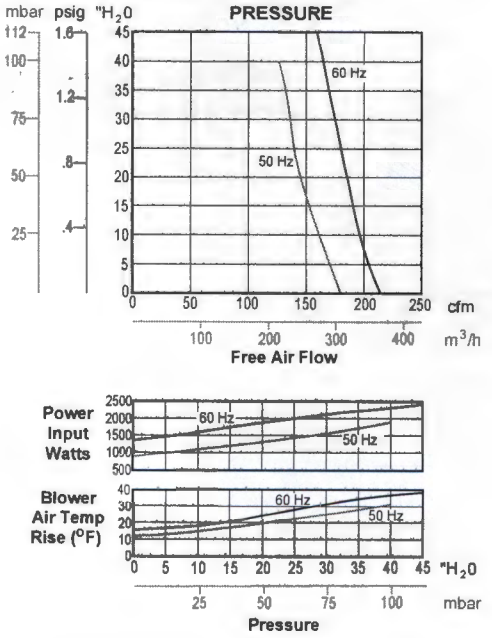
Product Specifications

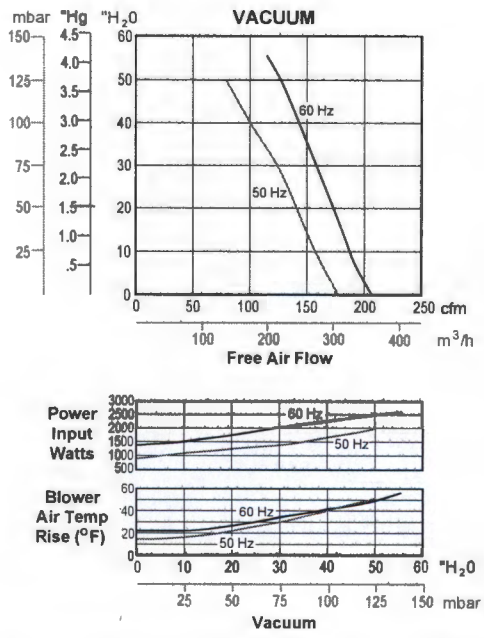
MODEL NUMBER		R6125-2	R6325A-2	R6135J-10	R6335A-2
Motor Enclosure		TEFC	TEFC	ODP	TEFC
HP/kW	60 Hz	2.5/1,9	2.5/1,9	3.5/2,6	3.5/2,6
	50 Hz	1.5/1,1	1.85/1,38	-	2.5/1,9
Voltage	60 Hz	115/208-230-1	208-230/460-3	230-1	208-230/460-3
	50 Hz	110/220-240-1	190-220/380-415-3	-	190-220/380-415-3
Amps	60 Hz	22/12.5-11	6.9-6.9/3.45	19	9.7-8.8/4.4
	50 Hz	18/9.5	6.6-6.7/3.3-3.5	-	8.8/4-3.9
Starting Amps	60 Hz	58 @ 230V	58 @ 230V	125 @ 230V	50 @ 460V
	50 Hz	42 @ 240V	23.5 @ 380V	-	40.5 @ 380V
Insulation Class		B	B	F	F
Recommended NEMA Starter Size		1/0	0/00	1P	1/0
Net Weight (lbs/kg)		87/39,5	76/34,5	112/50,8	82/37,2

MODEL NUMBER		R6335B	R6150J-2	R6350A-2	R6350B-2
Motor Enclosure		TEFC	ODP	TEFC	TEFC
HP/kW	60 Hz	3.5/2,6	5.0/3,7	5.0/3,7	5.0/3,7
	50 Hz	-	-	4.8/3,6	-
Voltage	60 Hz	575-3	230-1	208-230/460-3	575-3
	50 Hz	-	-	190-220/380-415-3	-
Amps	60 Hz	3.6	22.3	13.0-12.0/6.0	4.8
	50 Hz	-	-	14.4-13.4/7.2-6.8	-
Starting Amps	60 Hz	34.9 @ 575V	96 @ 230V	125 @ 230V	35 @ 575V
	50 Hz	-	-	57 @ 380V	-
Insulation Class		F	F	F	F
Recommended NEMA Starter Size		0	1P	1/0	0
Net Weight (lbs/kg)		82/37,2	125/56,8	112/50,8	112/50,8

Product Performance

Models R6125-2 R6325A-2





PART NO. 70 - 6000 F2-200 (REV-J)

STANDARD REGENAIR BLOWER

OPERATION & MAINTENANCE MANUAL

Model R1 Shown

Model R6P350A Shown

Model R7P Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

⚠ WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS PRODUCT. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE PRODUCT.

General information

This manual does not apply to:

- SDR Series blowers without motors
- Blowers powered with Explosion Proof Motors

Product Use Criteria:

- Pump only clean, dry air.
- Operate at -20°F - 104°F (-29°C - 40°C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- The blower must be installed with the properly sized inlet and inline filters, gauges and relief valves to protect the product from dirt and over-heating.
- Consult your Gast Distributor/Representative before using at high altitudes.

GAST

A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED

www.gastmfg.com

Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

INSTALLATION

WARNING

Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Correct installation is your responsibility. Make sure you have the proper installation conditions and that installation clearances do not block air flow.

Blocking air flow over the product in any way can cause the product to overheat.

The blower must be installed with the properly sized inlet filter, gauge and relief valve to protect the product from dirt and over-heating.

Mounting
The single impeller blower should be oriented with the shaft in a horizontal position, unless the model's product features state otherwise. The dual impeller models must be mounted with the shaft in a horizontal position. Mounting the product to a stable, rigid operating surface and using shock mounts will reduce noise and vibration.

Rotation
From the motor side of the blower, check that the blower is rotating clockwise. (The motor side is marked with an arrow on most models.) Proper rotation can also be checked by the air flow at the IN and OUT ports. On blowers powered by a 3-phase motor, incorrectly connecting any two power lines can reverse direction.

Plumbing
Remove any foreign material (burrs, chips, welding drops, slag, pipe cuttings, excess sealant, sand or lime) from plumbing.

Check motor mounting and rotation before connecting to plumbing. Inlet and outlet ports are not designed to support plumbing.

Remove plugs from the IN and OUT ports. Use a small amount of pipe thread lubricant when connecting plumbing to protect the aluminum blower threads. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. When installing two blowers in parallel, use plumbing that is two whole pipe sizes larger in diameter than that of the blower. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports.

Plumbing to remove the hot discharge air of larger blowers may be required to help maintain proper room ambient temperature. Use a relief valve to discharge excess air into the atmosphere. If the blower will be operated at 125mbar (50" H_2O) or higher, metal pipe is required for hot exhaust air.

Accessories
Install two vacuum gauges, one before and one after filter, to monitor restriction through filters. As filters become clogged, performance efficiency will be reduced. Filters should be checked periodically and replaced when necessary. See page 7 for installation.

Install a relief valve to avoid changes in pressure or vacuum that can cause overloading of large blowers. Install an intake filter with a relief valve to prevent foreign material from entering blower if blower is used in a vacuum application in a dirty environment. In applications where there is high humidity or liquids being used in the process, install a moisture separator.

See Recommended Accessories on pages 7-9 or consult your Gast Distributor/Representative for additional filter and accessories recommendations. Do Not install check valves that close with a strong spring. The recommended check valves (page 7) provide minimal pressure drop, positive sealing and are resistant to the high discharge temperatures of large blowers.

Motor Installation
It is your responsibility to contact a qualified electrician and assure that the electrical installation is adequate and in conformance with all national and local codes and ordinances.

Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses must be able to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions. Motors without automatic restart require thermal protection or magnetic over-current cutout to prevent motor overloading from one phase in a 3-phase circuit, high starting frequency or jammed blower.

The power required will rise as differential pressure increases. The wiring diagram attached to the product or on page 6 of this manual provides required electrical information. Large motors have two diagrams, one for 50Hz wiring specifications and the other for 60Hz wiring specifications. Check that the power source is correct to properly operate the dual-voltage motor. If additional information is required, please consult your Gast Distributor/Representative.

Electrical Connection

⚠ WARNING

Electrical Shock Hazard

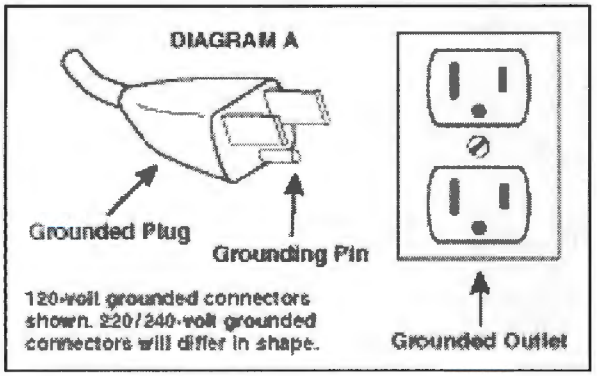
This product must be properly grounded.

Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation that is green or green with yellow stripes is the grounding wire.

Check the condition of the power supply wiring. Do not permanently connect this product to wiring that is not in good condition or is inadequate for the requirements of this product.

Failure to follow these instructions can result in death, fire or electrical shock.



Model with a power supply cord:
This product must be grounded. For either 120-volt or 220/240-volt circuits connect power supply cord grounding plug to a matching grounded outlet. **Do not use an adapter.** (See DIAGRAM A)

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product may be equipped with a power supply cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if you are not sure whether the product is properly grounded. Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

Model that is permanently wired:
This product must be connected to a grounded, metallic, permanent wiring system, or an equipment grounding terminal or lead on the product.

Power supply wiring must conform to all required safety codes and be installed by a qualified person. Check that supply voltage agrees with that listed on product nameplate.

Extension cords:
Use only a 3-wire extension cord that has a 3-blade grounding plug. Connect extension cord plug to a matching 3-slot receptacle. **Do not use an adapter.** Make sure your extension cord is in good condition. Check that the gage wire of the extension cord is the correct size wire to carry the current this product will draw.

An undersized cord is a potential fire hazard, and will cause a drop in line voltage resulting in loss of power causing the product to overheat. The following table indicates the correct size cord for length required and the ampere rating listed on the product nameplate. **If in doubt, use the next heavier gage cord. The smaller the gage number, the heavier the wire gage.**

Minimum gage for extension cords

Amps	Volts	Length of cord in feet								
	120v	25	50	100	150	200	250	300	400	500
	240v	50	100	200	300	400	500	600	800	1000
0-2		18	18	18	16	16	14	14	12	12
2-3		18	18	16	14	14	12	12	10	10
3-4		18	18	16	14	12	12	10	10	8
4-5		18	18	14	12	12	10	10	8	8
5-6		18	16	14	12	10	10	8	8	8
6-8		18	16	12	10	10	8	6	6	6
8-10		18	14	12	10	8	8	6	6	4
10-12		16	14	10	8	8	6	6	4	4
12-14		16	12	10	8	6	6	6	4	2
14-16		16	12	10	8	6	6	4	4	2
16-18		14	12	8	8	6	4	4	2	2
18-20		14	12	8	6	6	4	4	2	2

OPERATION

⚠ WARNING

Injury Hazard

Install proper safety guards as needed to prevent any close contact with blower suction area.

Keep fingers and objects away from openings and rotating parts.

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Wear hearing protection. Sound level from some models may exceed 85 dBA.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures. Do not operate R4P or larger size blowers without air flowing through the blower. Do not throttle discharge or suction pipe to reducer capacity. Throttle will increase differential pressure causing increasing power absorption and working temperatures.

Start Up

Operate blower for an hour and then check:

1. **Ambient temperature** – Check room and discharge air temperatures. Increased room temperatures may require stronger ventilation especially for larger blowers. Exhaust air should not exceed 215°F (102°C) for all blowers less than 3.5 Hp. Exhaust air should not exceed 275°F (135°C) for all blowers above 3.5 Hp.
2. **Working pressure and vacuum values** – Adjust relief valve pressure or vacuum setting, if needed.
3. **Motor current** – Check that supply current matches recommended current rating on product nameplate.
4. **Electrical overload cutout** – Check that current matches rating on product nameplate.

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for motor and that motor is turning in the proper direction.

FOR BLOWERS WITH GREASE FITTINGS

Hours of Service Per Year	Relubrication Intervals
5,000	3 years
Continual Normal Service	1 year
Seasonal Service (motor idle for 6 months or more)	1 year at beginning of season
Continuous-high ambients, dirty or moist applications	6 months

Check that all external accessories such as relief valves and gauges are not damaged before re-operating product.

MAINTENANCE

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

Some motors are thermally protected and will automatically re-start when protector resets.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

If the product is supplied with an electric power chord, protect it from twisting, cuts and abrasion. When not in use, store in a clean dry place

⚠ WARNING

Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to regularly inspect and make necessary repairs to this product in order to maintain proper operation. Make sure that pressure and vacuum is released from product before starting maintenance.

Check filter elements and noise absorbing foam used in mufflers and clean motor and blower after first 500 hours of operation. Replace filter elements and determine how frequently mufflers should be checked during future operation. This one procedure will help assure the product's performance and service life.

When there is an increase in the differential pressure across the inlet filter it is beginning to clog with dirt. Replace the cartridge when the filter will not come clean.

Small motor bearings (less than 5.5 Hp) never need to be greased. Larger motor bearings (greater than 5.5 Hp) have alemite grease fittings. Use a grease gun and apply one or two strokes of Exxon POLYREX® grease to the fittings to lubricate larger motor bearings.

WARRANTY

Gast finished products, when properly installed and operated under normal conditions of use, are warranted by Gast to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase from Gast or an authorized Gast Representative or Distributor. In order to obtain performance under this warranty, the buyer must promptly (in no event later than thirty (30) days after discovery of the defect) give written notice of the defect to Gast Manufacturing Incorporated, PO Box 97, Benton Harbor Michigan USA 49023-0097 or an authorized Service Center (unless specifically agreed upon in writing signed by both parties or specified in writing as part of a Gast OEM Quotation). Buyer is responsible for freight charges both to and from Gast in all cases.

This warranty does not apply to electric motors, electrical controls, and gasoline engines not supplied by Gast. Gast's warranties also do not extend to any goods or parts which have been subjected to misuse, lack of maintenance, neglect, damage by accident or transit damage.

THIS EXPRESS WARRANTY EXCLUDES ALL OTHER WARRANTIES OR REPRESENTATIONS EXPRESSED OR IMPLIED BY ANY LITERATURE, DATA, OR PERSON. GAST'S MAXIMUM LIABILITY UNDER THIS EXCLUSIVE REMEDY SHALL NEVER EXCEED THE COST OF THE SUBJECT PRODUCT AND GAST RESERVES THE RIGHT, AT ITS SOLE DISCRETION, TO REFUND THE PURCHASE PRICE IN LIEU OF REPAIR OR REPLACEMENT.

GAST WILL NOT BE RESPONSIBLE OR LIABLE FOR INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND, however arising, including but not limited to those for use of any products, loss of time, inconvenience, lost profit, labor charges, or other incidental or consequential damages with respect to persons, business, or property, whether as a result of breach of warranty, negligence or otherwise. Notwithstanding any other provision of this warranty, BUYER'S REMEDY AGAINST GAST FOR GOODS SUPPLIED OR FOR NON-DELIVERED GOODS OR FAILURE TO FURNISH GOODS, WHETHER OR NOT BASED ON NEGLIGENCE, STRICT LIABILITY OR BREACH OF EXPRESS OR IMPLIED WARRANTY IS LIMITED SOLELY, AT GAST'S OPTION, TO REPLACEMENT OF OR CURE OF SUCH NONCONFORMING OR NON-DELIVERED GOODS OR RETURN OF THE PURCHASE PRICE FOR SUCH GOODS AND IN NO EVENT SHALL EXCEED THE PRICE OR CHARGE FOR SUCH GOODS. GAST EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE WITH RESPECT TO THE GOODS SOLD. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTIONS SET FORTH IN THIS WARRANTY, notwithstanding any knowledge of Gast regarding the use or uses intended to be made of goods, proposed changes or additions to goods, or any assistance or suggestions that may have been made by Gast personnel.

Unauthorized extensions of warranties by the customer shall remain the customer's responsibility.

CUSTOMER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF GAST PRODUCTS FOR CUSTOMER'S USE OR RESALE, OR FOR INCORPORATING THEM INTO OBJECTS OR APPLICATIONS WHICH CUSTOMER DESIGNS, ASSEMBLES, CONSTRUCTS OR MANUFACTURES.

This warranty can be modified only by authorized Gast personnel by signing a specific, written description of any modifications.

ELECTRICAL WIRING DIAGRAMS

Models
R1102, R2103, R2105, R3105-1, R3105-12, R4110-2

	Low Voltage Single Phase		High Voltage Single Phase	
Blue	P1	Line	P1	Line
Brown	P2		P2	Insulate
Black	5	Tie together	5	
Orange	3	& Insulate	3	Tie together
White	2		2	& Insulate
Yellow	4	Tie together Line	4	Line

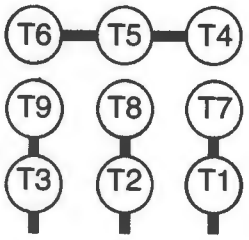
Models
R4P115, R5125-2, R6125-2

	Low Voltage Single Phase		High Voltage Single Phase	
Purple		L1	**Purple**	L1
Brown		Tie together	**Brown**	Insulate
Orange		& Insulate	**White**	Tie together
Blue			**Orange**	& Insulate
White		L2	**Blue**	
Red			**Red**	L2

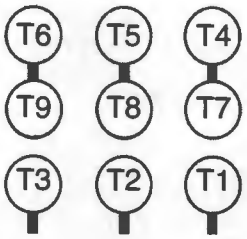
Models
R2303A, R3305A-1, R3305A-13, R4310A-2, R4P315A, R6350A-2, R6P350A, R6PP3110M, R6PS3110M, R7100A-3, R7P3180M, R7S3180M, R93150A

Note: Model R6P355A has two additional leads labeled "J" for an external thermal motor protection circuit.

Connections for 3-Phase, 9 Leads

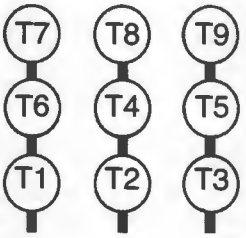


Line
Low Voltage



Line
High Voltage

Model R9P3300M, R93150A, R93150A-35



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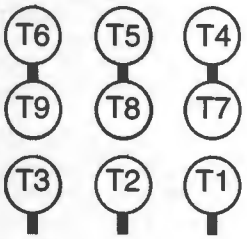
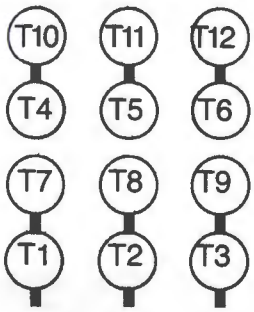
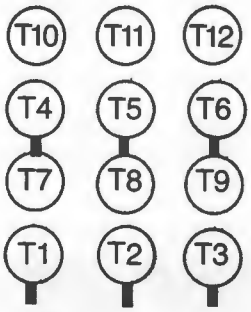


Line
High Voltage

Connections for 3-Phase, 12 Leads
Models R6335A-2, R6P335A

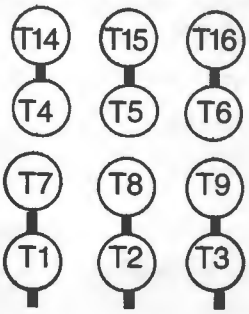


Line
Low Voltage

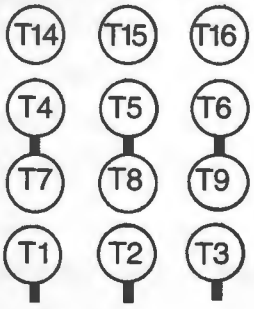


Line
High Voltage

Models R5325A-2, R6325A-2 (BEFORE 1-1-06)

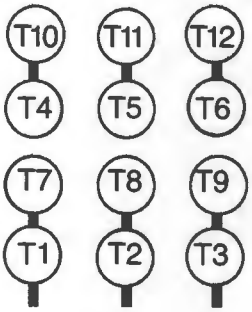


Line
Low Voltage

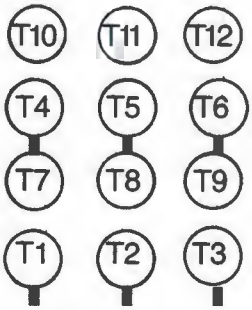


Line
High Voltage

Models R5325A-2, R6325A-2 (AFTER 1-1-06)



Line
Low Voltage



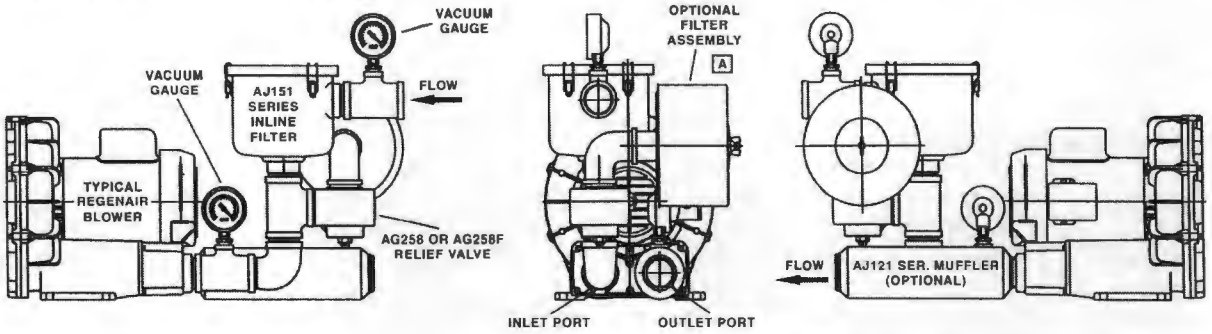
Line
High Voltage

To reverse rotation on any 3-Phase motor, interchange any two external motor line connections to any two line leads.

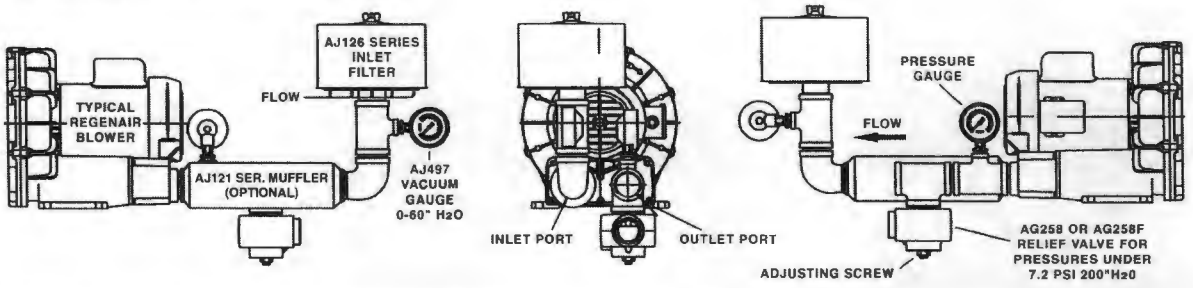
RECOMMENDED ACCESSORIES

The following diagrams are only suggested configurations for these accessories. These accessory configurations may vary depending upon a particular unit's application.

VACUUM ACCESSORIES



PRESSURE ACCESSORIES

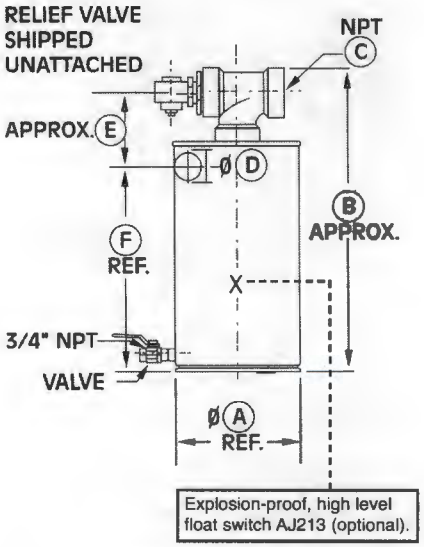


MOISTURE SEPARATOR (FOR VACUUM)

This moisture separator removes liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and the build up of mineral deposits.

For Model Number	R3, R4, R5	R4, R4H, R4P, R5	R4H, R4M, R5, R6, R6P, R6PS,	R4M, R6, R6P, R6PP, R7, R7P, R7S, R9, R9S
Part Number	**RMS160**	**RMS200**	**RMS300**	**RMS400**
CFM capacity	160	200	300	400
Liquid capacity (gal.)	10	19	19	40
Diameter (A)	14.8"	19.7"	19.7"	24"
Dimension (B)	37.5"	35"	35"	44"
NPT outlet (C)	2"	2"	2.5"	3"
Inlet diameter (D)	2"	2"	2.5"	3"
Dimension (E)	7.5"	7.5"	7.5"	9.7"
Dimension (F)	26.6"	26.6"	26.6"	29"

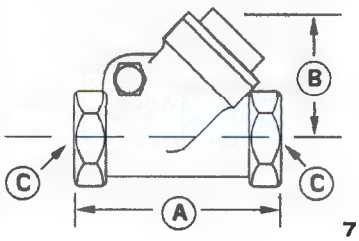
Maximum vacuum allowed: 22" Hg.



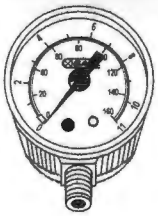
HORIZONTAL SWING TYPE CHECK VALVE

This check valve prevents backwash of fluids from entering the blower and air back-streaming. The check valve can be mounted to discharge or inlet either vertically or horizontally. The check valve will open with 3" of water pressure or vacuum.

Model Number	R1, R2	R3	R4, R5, SDR4, SDR4, R4P	R6, R6P, SDR6P, SDR6PS	R7, R7S
Part Number	**AH326B**	**AH326C**	**AH326D**	**AH326F**	**AH326G**
Dimension (A)	3.57"	4.19"	4.50"	5.25"	8.00"
Dimension (B)	2.32"	2.69"	2.94"	3.82"	5.07"
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT	2.50" NPT

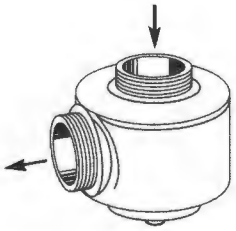


RECOMMENDED ACCESSORIES



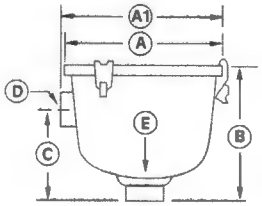
PRESSURE – VACUUM GAUGE

Pressure/Vacuum Gauges				
AJ496	2.50" Dia.	Pressure	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE133	2.50" Dia.	Pressure	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE133A	2.50" Dia.	Pressure	1/4" NPT	0-200 in. H_2O
AJ497	2.50" Dia.	Vacuum	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE134	2.50" Dia.	Vacuum	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE134F	3.50" Dia.	Vacuum	1/4" NPT	0-15 in. HG



PRESSURE – VACUUM RELIEF VALVE

Pressure/Vacuum Relief Valves		
AG258	1.50" NPT	Adjustable 30-200 in. H_2O; 200 cfm max
AJ121D		Silencer for AG258 Relief Valve
AG258F	2.50" NPT	Adjustable 25-200 in. H_2O; 560 cfm max
AJ121G		Silencer for AG258F Relief Valve



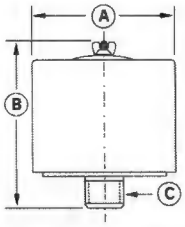
INLINE FILTERS (FOR VACUUM)

The impeller of a blower passes very closely to the housing. It is recommended to have an inlet or in-line filter to ensure a trouble-free service life.

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1	R2	R3	R4	SDR4, R4P, R4H, R5	SDR5, SDR6, R6, R6P, R7M	R6PP, SDR6P, R6PS, R7, R7S	R7S, R9, R9P, R9S
Part Number	**AJ151A**	**AJ151B**	**AJ151C**	**AJ151D**	**AJ151E**	**AJ151G**	**AJ151H**	**AJ151M**
Dimension (A)	5.88"	7.38"	7.38"	7.38	8.75	8.75"	14.00"	18.50"
Dimension (A1)	–	–	–	–	–	–	16.25"	20.75"
Dimension (B)	4.50"	6.81"	6.81"	6.81"	10.25"	10.50"	27.13"	28.13"
Dimension (C)	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	18.50"	19.50"
Dimension (D)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Dimension (E)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135H
Micron	10	10	10	10	10	10	10	10

RECOMMENDED ACCESSORIES

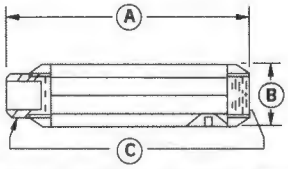


INLET FILTERS (FOR PRESSURE)

All filters are heavy duty for high-particulate service. Inlet filters for Regenair blowers are drip-proof when mounted as shown..

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1, R2	R3	R4, R4H, R4P SDR4, R5	SDR5, R6, SDR6, R5P, R6PP, R6PS	SDR6P, R7, R7P, R7S	R9, R9P, R9S
Part Number	**AJ126B**	**AJ126C**	**AJ126D**	**AJ126F**	**AJ126G**	**AJ126M**
Dimension (A)	6.00"	6.00"	7.70"	10.62"	10.00"	16.00"
Dimension (B)	4.62"	7.12"	7.12"	4.81"	13.12"	14.62"
Dimension (C)	1.00" MPT	1.25" MPT	1.50" MPT	2.00" FPT	2.50" MPT	5" MPT
Replacement Element	AJ134B	AJ134C	AJ134E	AG340	AJ135A	AJ135H
Micron	10	10	10	10	10	10



MUFFLERS

Designed to reduce noise by up to 5 dbA and remove high-frequency sound associated with all blowers.

Model Number	R1, R2	R3	R4, SDR4, R4P, R5	R4H, R6, R6P, R6PS SDR6P, SDR6	R7, R7S	R6PP, R9 Exhaust	R7P Exhaust
Part Number	**AJ121B**	**AJ121C**	**AJ121D**	**AJ121F**	**AJ121G**	**AJ121H**	**AJ121M**
Dimension (A)	7.46"	7.94"	12.75"	17.05"	17.44"	20.30"	33.60"
Dimension (B)	2.38"	2.62"	3.25"	3.63"	4.25"	4.75"	6.00"
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT	2.50" NPT	3" NPT	4"NPT

PARTS & ORDERING INFORMATION

Please reference the exploded view on Page 11 for the following model and parts table.

REF#	ITEM	QTY	R1102 R1102C R1102K	R2103 R2303A	R2105	R2305B	R3105-1 R3305A-1 R3305B-1
1	COVER	1	AJ101A	AJ101B	AJ101B	AJ101B	AJ101C
2	LOCK NUT	1	BC187	BC187	BC181	BC181	BC181
3	IMPELLER	1	AJ102A	AJ102BQ	AJ102B	AJ102B	AJ102C
4	SQUARE KEY	1	AH212C	AH212	AB136A	AB136A	AB136A
5	SHIM SPACER	Δ	AE686-5	AE686-3	AJ109	AE686-3	AJ109
6	RETAINING RING	1	AJ145	AJ145	AJ149	AJ145	AJ149
7	HOUSING	1	AJ103A	AJ103BQ	AJ103B	AJ103B	AJ103C
8	–	–	–	-	–	–	–
9	–	–	–	-	–	–	–
10A	FOAM	Δ	AJ112A(4)	AJ112BQ(6)	AJ112BQ(6)	AJ112BQ(6)	AJ112C(4)
10B	FOAM	2	–	–	–	–	AJ112CQ
11	MUFFLER EXTENSION	1	AJ106A	AJ106BQ	AJ106BQ	AJ106BQ	AJ106CQ

Δ As required.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

PARTS & ORDERING INFORMATION

Please reference the exploded view on the next page for the following model and parts tables.

REF#	ITEM	QTY	R3105-12 R3305A-13	R4110-2 R4310A-2 R4310B-1	R4P115 R4P315A†	R5125-2 R5325A-2 R5325B-1	R6125-2 R6150J-2 R6325A-2 R6335A-2 R6335B R6350A-2 R6350B-2	R6P335A R6P350A R6P350B	R6135J-10
1	COVER	1	AJ101C	AJ101D	AJ101L	AJ101EQ	AJ101FB	AJ101K	AJ101FB
2	LOCK NUT	1	BC181	BC181	BC181	AJ259	AJ259	AJ259	AJ259
3	IMPELLER	1	AJ102CA	AJ102D	AJ102L	AJ102E	AJ102FR	AJ102K	AJ102FR
4	SQUARE KEY	1	AB136A	AB136D	AB136D	AB136	AB136	AB136	AB136
5	SHIM SPACER	Δ	AJ109	AJ109	AJ109	AJ109	AJ109	AJ109	AJ260A
5†	SHIM SPACER†	1	–	–	AJ109A†	–	–	–	–
6	RETAINING RING	1	AJ149	AJ149	AJ149	–	–	–	–
7	HOUSING	1	AJ103C	AJ103DR	AJ103L	AJ103EQ	AJ103FQ	AJ103K	AJ103FQ
8	MUFFLER BOX	1	–	–	–	–	–	AJ104K	–
9	SPRING	2	–	AJ113DR	AJ113DQ	AJ113DQ	AJ113FQ	AJ113FQ	AJ113FQ
9A	SCREEN	2	–	–	AJ123EQ	AJ123EQ	AJ123FB	–	AJ123FB
10A	FOAM	Δ	AJ112C(4)	AJ112DS(4)	AJ112ER(6)	AJ112ER(6)	AJ112FC(6)	AJ112K(8)	AJ112FC(6)
10B	FOAM	2	AJ112CQ	AJ112DR	–	–	–	–	–
11	MUFFLER EXTENSION	1	AJ106CQ	AJ106DQ	AJ106EQ	AJ106EQ	AJ106FR	–	AJ106FR

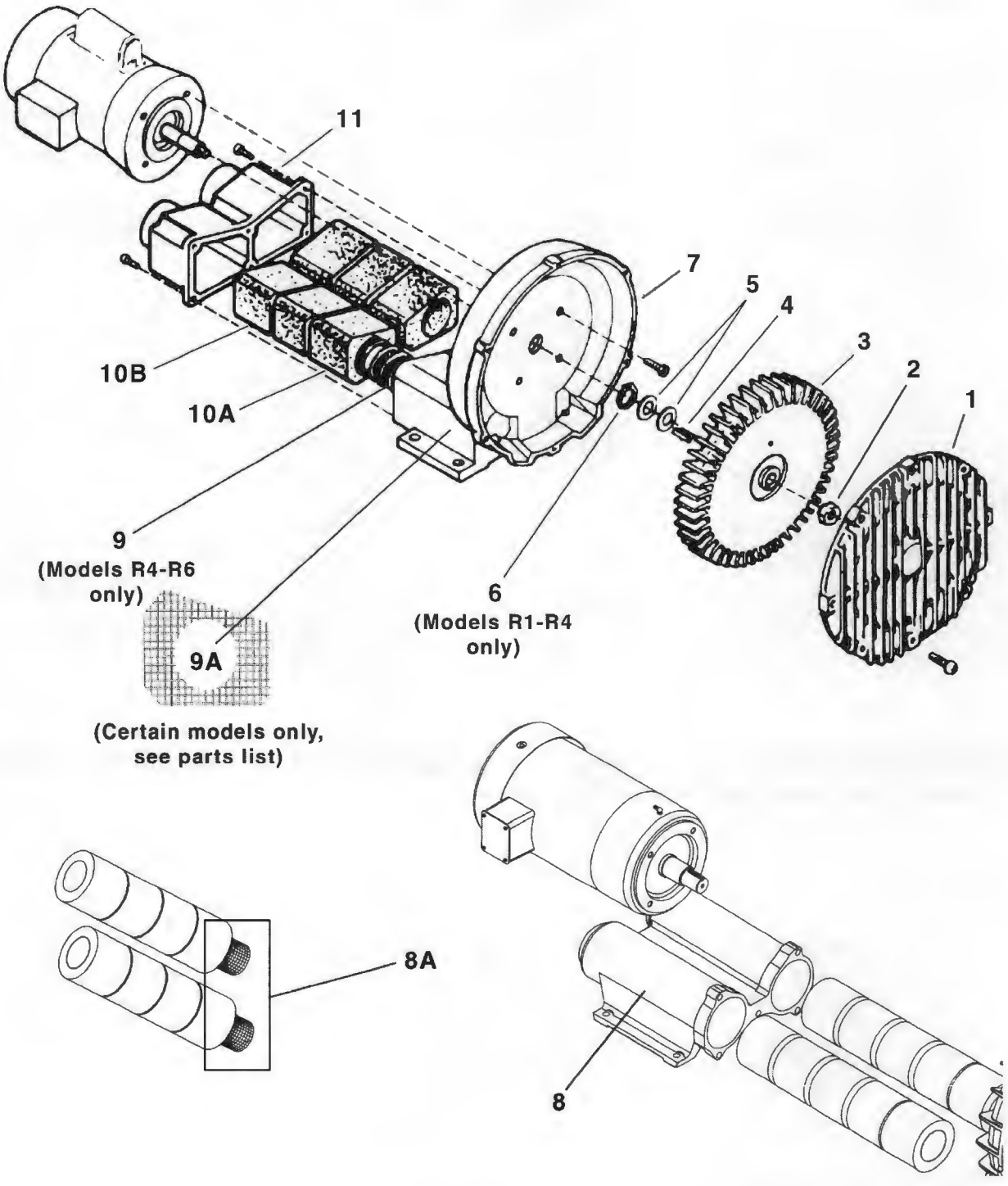
REF#	ITEM	QTY	R6P355A R6P350A R6P350B	R6PP3110M*	R6PS3110M*	R7100A-3	R7100B-1
1	COVER	1	AJ101K	AJ101KA(2)	AJ101KA(2)	AJ101G	AJ101G
2	LOCK NUT/BOLT	1	AJ259	BB750(2)	BB750(2)	BB750	BB750
3	IMPELLER	1	AJ102K	AJ102KA(2)	AJ102KA(2)	AJ102GZ	AJ102GA
4	SQUARE KEY	1	AB136	AB136(2)	AB136(2)	AC628	AC628
5	SHIM SPACER	Δ	AJ109	AJ169F	AJ169F	AJ110	AJ110
6	RETAINING RING	1	–	–	–	–	–
7	HOUSING	1	AJ103K	AJ103KD(2)	AJ103KD(2)	AJ103GA	AJ103GA
8	MUFFLER BOX	1	AJ104K	–	–	AJ104GA	AJ104GA
8A	SCREEN	2	–	–	–	AJ998G	AJ998G
9	SPRING	2	AJ113FQ	–	–	–	–
10A	FOAM	Δ	AJ112K(8)	–	–	AJ112GA(8)	AJ112GA(8)
10B	FOAM	2	–	–	–	–	–
11	MUFFLER EXTENSION	1	–	–	–	–	–
12 **	O-RING	2	–	AJ175	–	–	–
13	GASKET	4	–	AJ107F	AJ107F	–	–

REF#	ITEM	QTY	R7P3180M*	R7S3180M*	R9P3300M*	R9S3300M*	R93150A
1	COVER	1	AJ101G(2)	AJ101G(2)	AJ101M(2)	AJ101M(2)	AJ101M
2	LOCK NUT/BOLT	1	BB750(2)	BB750(2)	BB707(2)	BB707(2)	BB707
3	IMPELLER	1	AJ102GZ(2)	AJ102GZ(2)	AJ102M(2)	AJ102M(2)	AJ102M
4	SQUARE KEY	1	AC628(2)	AC628(2)	AE130A(2)	AE130A(2)	AE130A
5	SHIM SPACER	Δ	AJ110	AJ110	BJ110	BJ110	BJ110A
6	RETAINING RING	1	–	–	–	–	–
7	HOUSING	1	AJ103GA(2)	AJ103GA(2)	AJ103M(2)	AJ103M(2)	AJ103M
8	MUFFLER BOX	1	–	–	–	–	AJ104MP
8A	SCREEN	2	–	–	–	–	AJ998M
9	SPRING	2	–	–	–	–	–
10A	FOAM	Δ	–	–	–	–	AJ112M(10)
10B	FOAM	2	–	–	–	–	–
11	MUFFLER EXTENSION	1	–	–	–	–	–
12 **	O-RING	2	AJ175G	–	AJ175G	–	–

† R4P315A only.
* Dual models.
** Not shown.
Δ As required.

Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEW



TROUBLESHOOTING CHART

Problem	Reason	Remedy
Increased sound.	Noise absorbing foam is damaged. Impeller rubbing inside.	Replace foam. Send unit to a Gast Authorized Service Facility.
Excessive vibration.	Damaged impeller. Motor and/or impeller are dirty.	Replace impeller. Clean motor and impeller periodically.
Ambient and exhaust temperature increases.	Motor and/or blower are dirty. Filters dirty.	Clean motor and blower periodically. Replace filters.
Decreased inlet air pressure	Inlet air filter is clogged.	Clean inlet filter. Replace cartridge.
Unit is very hot.	Wrong wiring. Low voltage. Inlet air filter is clogged. Motor and/or blower are dirty. Operating at too high a pressure or vacuum.	Check wiring. Supply proper voltage. Clean inlet filter. Replace cartridge. Clean motor and blower periodically. Install a relief valve and pressure or vacuum gauge.
Unusual sound.	Impeller is damaged or dirty. Bearing going bad.	Clean or replace impeller. Send unit to a Gast Authorized Service Facility.
Motor overload	Low voltage.	Check power source. Check wire size and wire connections.
Unit does not start.	Incorrect electrical connection or power source. Impeller is damaged.	Check wiring diagram, circuit fusing and circuit capacity. Clean or replace impeller. Install proper filtration.

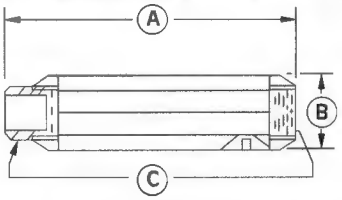
We have Gast Certified Service Centers throughout the world. For the most up-to-date listing, contact one of our sales offices below:

World Headquarters
P.O. Box 97
2550 Meadowbrook Rd.
Benton Harbor, MI 49023-0097
Ph: 269/926-6171
FAX: 269/925-8288
www.gastmfg.com

Gast Hong Kong
Unit 12, 21/F, Block B
New Trade Plaza
6, On Ping Street, Shatin
N. T. Hong Kong
Ph: (852) 2690 1008
Fax: (852) 2690 1012
www.gasthk.com

Mufflers

Designed to reduce noise by 5-8 dBa and remove high frequency sound associated with all blowers .



Part No.	Dim. A	Dim. B	Dim. C	Used On
AJ121B	7.46"	2.38"	1" NPT	R1, R2
AJ121C	7.94"	2.62"	1¼" NPT	R3
AJ121D	12.75"	3.25"	1½" NPT	R4, R5, R4P, R4H, R7
AJ121F	17.05"	3.63"	2" NPT	R4H, R6, R6P, R6PP, R6PS
AJ121G	17.44"	4.25"	2½" NPT	R7, R7P, R7S,
AJ121H	20.25"	4.75"	3" NPT	R6PP (Exhaust), R9, R9P, R9S
AJ121M	33.50"	6.00"	4" NPT	R7P (Exhaust)

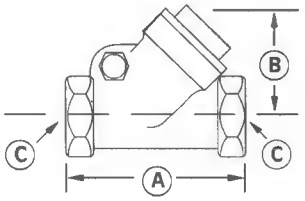
Pressure-Vacuum Gauge

To monitor the system performance so maximum duties are not exceeded. Using two gauges (one on each side of the filter) is a great way to know when the filter needs servicing.

Part No.			Used On
AJ497	Vacuum gauge	0-60" H_2O, 1/4" NPT connection	R1, R2, R3, R4 R4H, R4P, R5, R7, R7P, R7S, R9, R9P, R9S
AE134	Vacuum gauge	0-160" H_2O, 1/4" NPT connection	R4P, R6PP, R6PS, R6P, R4M, R6, R7, R7S, R7P, R9, R9P, R9S
AE134F	Vacuum gauge	0-15" Hg, 1/4" NPT connection	R4H,
AE133	Pressure gauge	0-160" H_2O, 1/4" NPT connection	R6PP, R6P, R5, R4P, R6, R7P, R9, R9P
AE133A	Pressure gauge	0-200" H_2O, 1/4" NPT connection	R6PS, R7, R7S
AE133F	Pressure gauge	0-15 psi, 1/4" NPT connection	R4H, R9S
AJ496	Pressure gauge	0-60" H_2O, 1/4" NPT connection	R1, R2, R3, R4

Check Valve

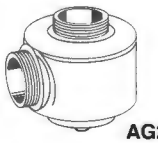
Designed to prevent back-wash of fluids that would enter the blower. Also prevents air back-streaming if needed. Can be mounted with discharge either vertical or horizontal. Valve will open with 3" of water pressure.

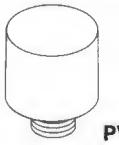


Part No.	Dim. A	Dim. B	Dia. C
AH326B	3.57"	2.32"	1" NPT
AH326C	4.19"	2.69"	1¼" NPT
AH326D	4.50"	2.94"	1½" NPT
AH326F	5.25"	3.82"	2" NPT

Relief Valve

By setting a relief valve at a given pressure/vacuum you can ensure excessive duties will not harm the blower or products in your application.


AG258 Series


PV Series

Part No.			Used On
AG258	Relief valve	1-1/2" NPT adjustable 30-200" H2O, vac. or press., 200 CFM max.	R4, R4H, R4P, R5, R6, R6P, R6PS, R7
AG258F	Relief valve	2-1/2" NPT adjustable 25-200" H2Os, vacuum or pressure, 570 CFM	R6PP, R7P, R7S, R9, R9P, R9S
PV102	Relief valve	For pressure, pre-set for 10.2 psi, 1-1/4" NPT connection (60Hz)	R4H

INLET VACUUM AIR FILTERS

"CSL" Series 3/8" - 3" FPT

APPLICATIONS

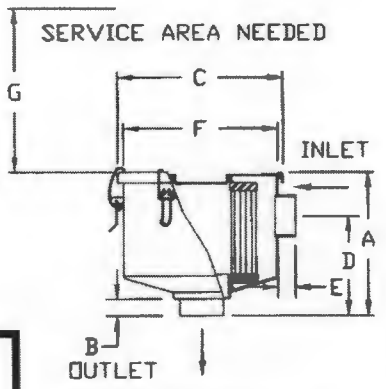
- Vacuum Pumps & Systems
- Vacuum Packaging Equipment
- Vacuum Lifters
- Intake Suction Filters
- Blowers - Side channel & PD Type
- Pneumatic Conveying Systems
- Soil Venting/Remediation
- Remote Installations for Piston and Screw Compressors
- Printing Industry
- Factory Automation Equipment
- Leak Detection Systems
- Woodworking Industry
- Medical Industry

FEATURES & SPECIFICATIONS

- Vacuum level: Typically $1x10^{-3}$ mmHg ($1.3x10^{-3}$ mbar)
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron
- Brazed fittings for high vacuum duty
- Stainless steel torsion clips for durability
- Rugged all steel construction with Baked enamel finish
- Low pressure drop
- Positive sealing O-ring seal system
- Large dirt holding capacity and easy field cleaning, especially when mounted horizontally or inverted
- Fully-drawn one piece canister
- Temp (continuous): min -15°F (-26°C) max 220°F (104°C)
- Filter change out differential: 10"-15" H_2O Over Initial Delta P
- Pressure drop graphs available upon request

OPTIONS (Inquiries Encouraged)

- Vacuum regulator & gauge available
- Various media available
- Support brackets
- Epoxy coated housings
- Special connections
- Available in ***Stainless Steel***
- Activated carbon prefilter to reduce odor
- Alternate Top-to-canister fastening system for low pressure or pulsating systems
- Dome hood for high holding capacity



Dimension tolerance ± 1/8"

I = Industrial Duty S = Severe Duty

	with Polyester Element	with Paper Element	FPT Inlet & Outlet	DIMENSIONS - inches A	B	C	D	E	F	G	Rated Flow SCFM Nominal Rating	Element Rating	Approx. Wt. lbs
I	* CSL-825-038HC	* CSL-824-038HC	3/8"	3 5/8	9/16	3 3/4	1 7/8	9/16	3 1/2	3	18	25	0.88
I	* CSL-825-050HC	* CSL-824-050HC	1/2"	3 5/8	9/16	3 3/4	1 7/8	9/16	3 1/2	3	18	25	0.88
I	CSL-843-050HC	CSL-842-050HC	1/2"	4 3/8	9/16	5 7/8	2 1/2	9/16	5	3 1/4	20	55	3
I	* CSL-825-075HC	* CSL-824-075HC	3/4"	3 3/4	9/16	3 3/4	1 7/8	9/16	3 1/2	3	24	25	0.88
S	CSL-843-075HC	CSL-842-075HC	3/4"	4 3/8	9/16	5 7/8	2 1/2	9/16	5	3 1/4	25	55	3
I	CSL-843-100HC	CSL-842-100HC	1"	4 3/8	3/4	5 7/8	2 1/2	3/4	5	3 1/4	35	55	3
S	CSL-849-100HC	CSL-848-100HC	1"	6 1/2	3/4	7 5/16	4 1/2	3/4	6 13/16	5 1/4	40	115	5
I	CSL-843-125HC	CSL-842-125HC	1 1/4"	4 3/8	3/4	5 7/8	2 1/2	3/4	5	3 1/4	55	55	3
S	CSL-849-125HC	CSL-848-125HC	1 1/4"	6 1/2	3/4	7 5/16	4 1/2	3/4	6 13/16	5 1/4	60	115	5
I	CSL-849-150HC	CSL-848-150HC	1 1/2"	6 1/2	3/4	7 5/16	4 1/2	3/4	6 13/16	5 1/4	80	115	5
I	CSL-851-200HC	~~CSL-850-200HC~~	2"	10 1/4	3/4	8 3/4	5	3/4	7 5/8	9 1/4	175	290	15
~~I~~	~~CSL-851-250HC~~	~~CSL-850-250HC~~	~~2 1/2"~~	~~10 1/2~~	~~1 1/4~~	~~8 3/4~~	~~5 1/2~~	~~1 1/4~~	~~7 5/8~~	~~9 1/4~~	~~215~~	~~290~~	~~15~~
I	* CSL-239-300C**	CSL-238-300C**	3"	15 3/4	2 7/8	13 1/4	8 3/4	2 7/8	12	11	300	570	33

***New Size**

****1/4" taps standard on inlet and outlet**

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Inlet Vacuum Filters
Maintenance Manual

www.solbergmfg.com

Note: Please read the maintenance instructions given by the OEM for the machinery first. The OEM's manual should be adhered to in order to protect the equipment. Solberg Manufacturing, Inc has made every effort to make sure that these instructions are accurate but is not responsible for any typos, slight variations or for human errors that may occur.

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Maintenance Manual

SOLBERG Inlet Vacuum Filters

CONTENTS

**For Further Information Please Call: 630-773-1363*

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Section A

INTRODUCTION

The purpose of this manual is instruction on the proper assembly and care of Solberg inlet vacuum filters.

WARNING

This manual must be read and thoroughly understood before using and caring for this air filter. Failure to comply could result in explosion, product/system contamination or personal injury.

This manual should be used as a supplement to the user's understanding of the proper care needed to maintain a safe and dependable air filter. It is the responsibility of the user to interpret and explain all instructions to persons who do not read or understand English BEFORE they are allowed to maintain and use this filter.

This manual should be readily available to all operators responsible for operation and maintenance of the vacuum inlet filters.

We thank you for selecting products from Solberg Manufacturing, Inc. We are confident that our superior filter designs will exceed your application requirements.

Section B

GENERAL INFORMATION

1. Identification of Solberg Vacuum Inlet Filters.

All Solberg inlet vacuum air filters should have an identification label/nameplate that gives the following information:

Assembly Model #
Replacement Element #

(The exception is OEM supplied units. In this case please enter the OEM part numbers below.)

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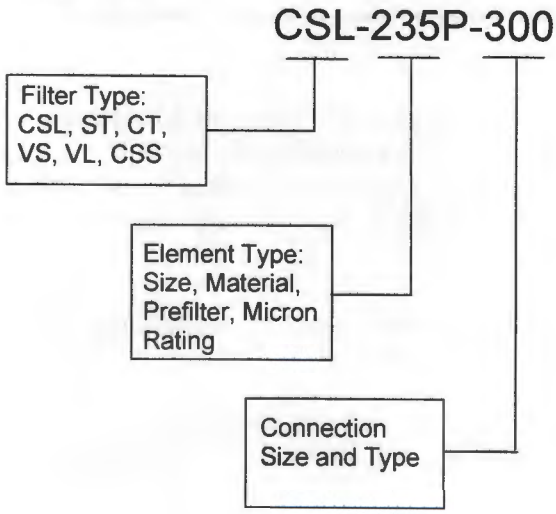
Fill in the actual nameplate data from your new Solberg inlet filter(s):

No.	Filter Model Number	Replacement Element
1		
2		
3		
4		
5		

Table 1

The model number designates the filter type, the original element configuration and housing connection size. For example, the following part number identifies the filter as being a 'CSL' design filter with a 235 element with prefilter and 3" MPT connection size:



2. Filtration Rules of Thumb

General: For peak output performance from a compressor, blower, vacuum pump, engine, or any other machine that consumes air, one must have clean, unrestricted air. Proper filtration can help stabilize the working environment within rotating equipment even when the external conditions may be quite severe. A critical component in creating the right working conditions is filter sizing. With the properly sized filter, equipment will run smoothly over its entire expected operating life.

A major factor in filtration and filter sizing is air velocity through the filter media. Generally, the slower the velocity of air through a media the higher the filter

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efficiency and, conversely, the lower the pressure drop. Therefore, the primary goal in filter sizing is to optimize the velocity of air through the media (sometimes called face velocity).

Rule of Thumb #1: Always begin with the filter cartridge requirements when sizing a filter. Once the appropriate element has been selected then move on to the housing requirements.

Rule of Thumb #2: Always ask or specify a filter based on a micron rating **with** filtration efficiencies. As an example, stating a requirement for a 1-micron filter is misleading because no efficiency rating has been specified. A 1-micron filter at 95-% efficiency may be less efficient than a 5-micron filter at 99% efficiency. For proper air system performance in light and industrial duty environments, a filter with a minimum of 99% filtration efficiency at 5 microns is required.

Rule of Thumb #3: Size your filter correctly by understanding the impact air velocity through a media has on efficiency and pressure drop. Maintain the suggested Air-to-Media ratios listed below based on the external environment listings and Filtration efficiency needs.

Filtration Efficiency Requirements (99+% efficiency)	**Environmental Conditions**	**Air to Media Ratio**	
Industrial Grade 2-micron **Paper**	Industrial Duty (clean, office/warehouse-like)	30 CFM/ft^2	(51m^3/h)/cm^2
	Severe Duty (workshop, factory-like)	15 CFM/ft^2	(25.5m^3/h)/cm^2
	Extreme Duty (Foundry, Construction-like)	10 CFM/ft^2	(17m^3/h)/cm^2
Industrial Grade 5-micron **Polyester**	Industrial Duty (clean, office/warehouse-like)	50 CFM/ft^2	(85m^3/h)/cm^2
	Severe Duty (workshop, factory-like)	40 CFM/ft^2	(68m^3/h)/cm^2
	Extreme Duty (Foundry, Construction-like)	25 CFM/ft^2	(42.5m^3/h)/cm^2
Industrial Grade 1-micron **Polyester**	Severe Duty (Foundry, Construction-like)	10 CFM/ft^2	(17m^3/h)/cm^2
Industrial Grade 0.3-micron **HEPA** Glass @ 99.97% efficiency	Industrial Duty (clean office/warehouse-like)	10 CFM/ft^2	(17m^3/h)/cm^2
	Severe Duty (workshop, factory-like)	7 CFM/ft^2	(12m^3/h)/cm^2
	Extreme Duty (Foundry, Construction-like)	5 CFM/ft^2	(8.5m^3/h)/cm^2

Table 2

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Rule of Thumb #4: Pressure drop is also caused by the dirt holding capacity of the element. As the element fills up with dirt, the pressure drop increases. It is important to document the pressure drop across a given filter when it is new and then clean or replace it when the pressure drop increases by 10" to 15" / 250-380mm H_2O from the original reading.

Rule of Thumb #5: The inlet connection greatly influences the overall pressure drop of the filter system. To minimize the restriction contributed by an inlet filter, a velocity of 6,000 ft/min (10200m^3/h) or less is suggested through the outlet pipe. The table below lists the suggested flows based on pipe size:

Pipe Size (inches)	Max Airflow		Pipe Size (inches)	Max Airflow		Pipe Size (inches)	Airflow	
1/4"	6 CFM	10m^3/h	1 ¼"	60 CFM	102m^3/h	6"	1,100 CFM	1870m^3/h
3/8"	8 CFM	14m^3/h	1 ½"	80 CFM	136m^3/h	8"	1,800 CFM	3060m^3/h
1/2"	10 CFM	17m^3/h	2"	135 CFM	230m^3/h	10"	3,300 CFM	5610m^3/h
3/4"	20 CFM	34m^3/h	2 ½"	195 CFM	332m^3/h	12"	4,700 CFM	7990m^3/h
1"	35 CFM	60m^3/h	3"	300 CFM	510m^3/h	14"	6,000 CFM	10200m^3/h
			4"	520 CFM	884m^3/h			
			5"	800 CFM	1360m^3/h			

Table 3 **Note: This information is for general use only. A qualified engineer must properly design each system.*

3. Element Specifications

Temperature Range: -15° to 220°F / -26° to 105°C
Filter Change-Out Differential: 10" to 15" / 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
Standard Paper	99+% @ 2 micron
Standard Polyester	99+% @ 5 micron
"S" Series Wire Mesh	Epoxy Coated Wire Mesh
"Z" Series Polyester	99+% @ 1 micron
"HE" Series HEPA	99.97% @ 0.3 microns
"U" Series Polyester	99+% @ 25 micron
"W" Series Polyester	99+% @ 100 micron
"S2" Series	Stainless Steel Wire Mesh
"AC" & "ACP" Series	N/A
"Y" Series Polypropylene	99+% @ 5 micron

Table 4

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Temperature Range: -15° to 385°F / -26° to 196°C
Filter Change-Out Differential: 10" to 15" / 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
"MX" & "MXD" Series – Nomex Cloth	99+% @ 5 micron

Table 5

4. **Element Cleaning**

Some types of Solberg inlet filter elements can be cleaned and reused. However, damage can occur to an element during cleaning so it is imperative that care is taken during disassembly, cleaning and re-assembly. Damaged elements can allow particulate bypass, which will damage rotating equipment.

A. ***Polyester Element***: The polyester element may be washed in warm soapy water, vacuumed, gently blown out or replaced. The element should be dry before reinstallation.
B. ***Paper Element***: The paper element may be lightly blown with low pressure air. It is disposable and in most cases should be replaced with a new element.
C. ***Polyurethane Prefilter***: The prefilter may be washed as a sponge or replaced to give the element a longer service life.
D. ***Epoxy Coated Wire Mesh and Stainless Steel Wire Mesh Elements***: Cleaning instructions similar to polyester, except mild solvents may be used.
E. ***Activated Carbon Element***: Not cleanable
F. ***Polypropylene Element***: Cleaning instructions similar to polyester
G. ***Nomex Cloth Element***: Cleaning instructions similar to polyester

If you are not confident that the integrity of the element was maintained during cleaning, it is recommended that a new element be installed. Also, spare parts such as gaskets, wingnuts and washers can be supplied upon request.

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Section C

PROCEDURES

1. **Installation.**

   A. Maximum inlet gas stream temperature for most Solberg inlet vacuum filter products is 220°F / 105°C. Temperatures in excess of this could cause damage to elements, media and elastomers.

   B. Direction of flow is typically from the outside of the element to the inside of the element. Most products have arrows indicating direction of flow on inlet and outlet ports.

   C. Ensure that pipe/flange connections are adequately sealed so the potential for leaks is reduced to a minimum.

2. **Disconnecting canister top from canister base.**

   A. ST/CT/Small CSL: Release wire-form clips or loosen wing nut on "claw" bolts.

   B. Large CSL: Loosen wing nut or hex head on T-bolts.

   C. CSS: Twist upper housing to release.

   D. VS/VL: Remove V-clamp by loosening Hex Nut or T-bolt and releasing.

   E. Lift off canister top.

3. **Removing element for service/maintenance.**

   A. Remove retaining hex head/wing-nut and washer carefully, and then remove element. Some elements will have a top plate that should also be removed.

   B. Clean sealing surfaces of housing, top & base plates, and element endcaps so that they are free of dirt or any other particulate.

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WARNING

Failure to comply with these instructions may result in system or pump contamination.

4. **Securing Element.**

   A. Place new or cleaned element evenly on base plate. Be sure element seats properly on base and there is no dirt or particulate present on sealing surfaces.

   B. Place top plate (if necessary) on element by centering on tap bolt.

   C. Secure washer and wing nut to end cap (or top plate) and tap bolt. Element must be tightly secured. Note: DO NOT over tighten!

WARNING

Defective installation may cause system or pump contamination. Use only genuine Solberg replacement parts.

5. **Securing canister top to canister base.**

   A. Make sure all surfaces are free from dust and other particulate.

   B. Hemisphere o-ring must rest evenly along canister/casting base o-ring groove.

   C. ST/CT/Small CSL: Hold canister housing against o-ring or sealing ring on main filter head. Re-fasten wire-form clips or "claw" bolts.

   D. Large CSL: Replace housing top plate. Feed T-bolts into corresponding slots and tighten evenly around perimeter. Note: Do NOT over tighten!

   E. VS/VL: Secure V-clamp by disconnecting hex nut or T-bolt portion and placing V-clamp along the diameter of canister o-ring groove. Fasten T-bolt and secure tightly. V-CLAMP LEGS MUST REST UNIFORMLY ALONG ENTIRE O-RING GROOVE.

   F. CSS: Reassemble top housing to bottom housing by aligning tabs and turning into place.

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Section D

MAINTENANCE RECOMMENDATIONS

1. Pressure drop readings are recommended to have an effective air filter. Always document initial pressure drop during start-up when element is clean. Replacement cartridge is needed when system experiences 10" to 15" / 250-380mm H_2O higher pressure drop above the initial reading. Refer to page 4 for instructions.

2. Always check replacement cartridge gaskets to insure they are adhered uniformly along the end caps during handling. If not, contact Solberg Manufacturing, Inc. immediately. Do not modify or change from Solberg specified parts!

3. Always check inlets/outlets, element base and its components when replacing element to insure cleanliness. Wipe clean if necessary.

4. Operate only when a proper seal exists.

5. VS/VL: Never operate without absolute assurance that V-clamp is secured correctly along entire diameter of canisters. Check along V-clamp for wear. Replace if any distortion occurs due to handling and usage.

SPARE PARTS LIST:

CSL/CT/VS/VL Series

		Housing						Element		
Parent Model Model-Element-Connection	Prefilter Model	Top Model No.	O-Ring Model No.	Gasket(s)/ Adapter Model No.	Wingnut(s) Model No.	Washer(s) Model No.	Clips/ Bolts Model No.	Top Plate Model No.	Wingnuts/ Bolt Model No.	Washer(s) Model No.
CSL-825/824-xxx	N/A	T824	OR337	BG224	N/A	N/A	CPWF	N/A	N/A	N/A
CSL-843/842-xxx	PF842	T842	OR550	BG268	N/A	N/A	CPWF	N/A	N/A	N/A
CSL-849/848-xxx	PF848	T848	OR675	BG281	N/A	N/A	CPWF	N/A	N/A	N/A
CSL-851/850-xxx	PF850	T850	OR750	BG412	N/A	N/A	CPWF	N/A	N/A	N/A
CSL-239/238-xxx	PF238	TD238	OR1250	N/A	N/A	N/A	CPWF	N/A	WN38X16	WR38X16
CSL-235/234-xxx	PF234	TC1400	OR1200	N/A	WN38X16	WR38X16	BT38163	T8000437	WN38X16	WR38X16
CSL-335/334-xxx	PF334	TC1400	OR1200	ADEX300	WN38X16	WR38X18	BT38163	T8000437	WN38X16	WR38X16
CSL-245/244-xxx	PF244	TC1850	OR1600	N/A	WN38X16	WR38X16	BT38163	T1000437	WN38X16	WR38X16
CSL-345/344-xxx	PF344	TC1850	OR1600	ADEX300	WN38X16	WR38X16	BT38163	T1000437	WN38X16	WR38X16
CSL-275/274-xxx	PF274	TC1850	OR1600	N/A	WN38X16	WR38X16	BT38163	T12000437	WN38X16	WR38X16
CSL-375/374-xxx	PF374	TC1850	OR1600	ADEX300	WN38X16	WR38X16	BT38163	T12000437	WN38X16	WR38X18
CSL-377/376-xxx	PF376	TC2250	OR2000	N/A	WN38X16	WR38X16	BT38163	T14750625	HN50X13	WR50X13
CSL-384(2)-xxx	PF384(2)	N/A	OR2400	N/A	WN38X16	WR38X16	BT38163	T19750625	HN50X13	WR50X13
CSL-685-xxx	PF684	N/A	OR2400	N/A	WN38X18	WR38X18	BT38163	T19750625	HN50X13	WR50X13
CSL-485(2)/484(2)-xxx	PF484(2)	N/A	OR2400	N/A	WN38X16	WR38X16	BT38163	T19750625	HN50X13	WR50X13
CT-851/850-xxx	PF850	N/A	OR725	BG412	N/A	N/A	CPWF	N/A	N/A	N/A
CT-235/234-xxx	PF234	N/A	GCT1100	ADCT234	N/A	N/A	CPWF	T8000437	BH38X16	WR38X88
CT-275/274-xxx	PF274	N/A	OR386	ADCT234	N/A	N/A	KITCT274	T12000437	BH38450	WR38X16
VS-275/274-xxx	PF274	N/A	OR386	N/A	N/A	N/A	N/A	T12000437	WN38X16	WR38X16
VL-275/274-xxx	PF274	N/A	OR386	N/A	N/A	N/A	N/A	T12000437	WN38X16	WR38X16

*Note: Spare parts are for standard products. See page 4 for replacement element.

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Models 215V ~~and 007~~

tyco

KUNKLE

Model 215V is Non-code Vacuum ~~and Model 337~~ is ASME Section VIII, Air/Gas Vacuum, 'UV' National Board Certified, Safety Valves

Features

- **Large nozzle design** provides high capacity.
- **Flat bronze valve seats are lapped** for optimum performance.
- **Warn ring offers easy adjustability** for precise opening with minimum pre-open or simmer and exact blowdown control.
- **Pivot between disc and spring** corrects misalignment and compensates for spring side thrust.

Model Descriptions

- **Model 337 has 'pull-ring' lift device** for easy manual testing.
- **Every valve is 100% tested/inspected** for pressure setting, blowdown and leakage.
- **All adjustments are factory sealed** to prevent tampering or disassembly.

Option

- SS trim. (nozzle and disc) (Variation 03)

Applications

- Protection of low to medium pressure high volume blowers, compressors and pneumatic conveying systems.
- Bulk hauling trailers/equipment.
- Light gauge tanks.
- Protection of high volume vacuum pumps and conveying systems.

Vacuum Limits

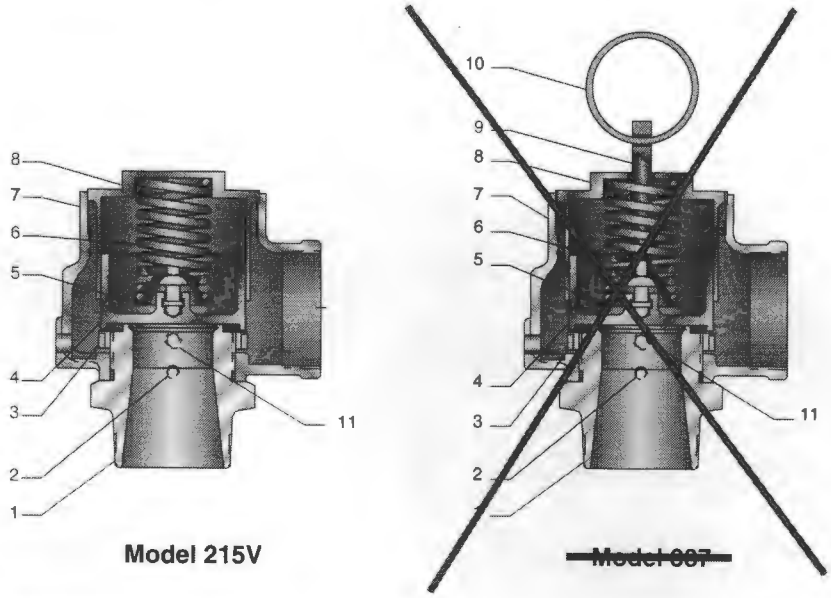
Model 215V:
2-inch HG
to 29-inch HG
[67.7 to 982 mbarg]
-20° to 406°F [-29° to 208°C]

~~**Pressure and Temperature Limits**~~
~~**Model 007:**~~
~~1 to 60 psig [0.07 to 4.1 barg]~~
~~20° to 400°F [-29° to 208°C]~~

Total Flow Control Solutions

Models 215V ~~and 337~~

Parts and Materials



Model 215V ~~Model 337~~

Models 215V and 337

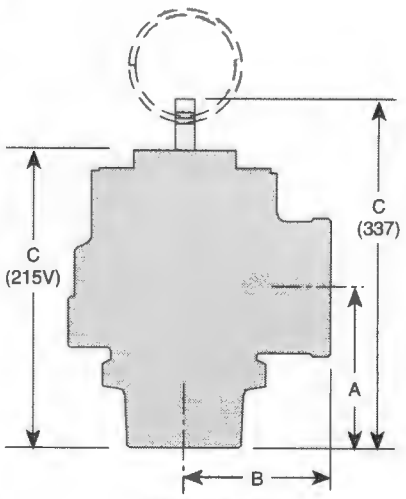
No.	Part Name	215V	~~337~~
1	Nozzle[1]	Bronze, SB62	Bronze, SB62
2	Set Screw	Steel A108-1018 Brass Plated	Steel A108-1018 Brass Plated
3	Regulator Ring	Bronze B584 Alloy 84400	Bronze B584-C84400
4	Disc[1]	Bronze B584 Alloy 84400	Bronze B584-C84400
5	Spring Step	Steel A-109 Coated[3]	Steel A109 Coated[3]
6	Spring	SS, A313 TY 302	SS A313-302
7	Body	Cast Iron, Zinc Plated, B633	Iron A-126 CL A or B
8	Compression Screw	Bronze, B-584 Alloy 84400	Bronze, B584-C84400
9	Stem[2]	N/A	Brass B16
10	Lift Ring[2]	N/A	SS A313-302
11	Regulator Ring Set Screw	N/A	Brass B16

Notes

1. Disc and nozzle available in SSA-479 TY 316.
2. Stem and lift ring available on Model 337 only.
3. Corrosion preventative coating.

Specifications

Size Inlet and Outlet	Dimensions, in [mm] A	B	C 215V	~~C 337~~	Weight lb [kg]
2" [50.8 mm]	3¼ [82.5]	3 [76.2]	6½ [165.1]	~~7 [177.8]~~	8 [3.6]
~~2½" [63.5 mm]~~	~~3¾ [95.3]~~	~~3½ [88.9]~~	~~7¾ [196.8]~~	~~8 [203.2]~~	~~12 [5.4]~~
3" [76.2 mm]	4¼ [107.9]	4 [101.6]	8½ [215.9]	9 [228.6]	20 [4.1]



Model 337

Models 215V and 337

Model 215V

Non-code Vacuum Air (SCFM) - Flow Coefficient

Relief Set (in, HG)	Valve Inlet and Outlet Size		
	2" Orifice Area, in² 1.84	2½" Orifice Area, in² 2.79	3" Orifice Area, in² 4.04
2	229	347	503
5	369	512	742
10	415	630	912
15	426	646	936
20	426	646	936

Non-code Vacuum Air [Metric, Nm³/h]

Relief Set [mbarg]	Valve Inlet and Outlet Size		
	5.08 cm Orifice Area [11.86 cm²]	6.35 cm Orifice Area [17.97 cm²]	7.62 cm Orifice Area [26.05 cm²]
50	328	498	722
100	450	682	988
150	533	807	1170
200	593	899	1303
250	638	966	1400
300	669	1014	1470
350	690	1046	1516
400	701	1062	1540
450	704	1067	1546
500	704	1067	1546
550	704	1067	1546
600	704	1067	1546
650	704	1067	1546
700	704	1067	1546
750	704	1067	1546

Model 337

Non-code[1] and ASME Section VIII Air (English, SCFM)

Set Pressure (psig)	Valve Inlet and Outlet Size		
	2"	2½"	3"
1	240	364	527
5	531	805	1166
10	741	1124	1628
15	948	1436	2081
20	1092	1656	2399
25	1237	1875	2718
30	1382	2095	3036
35	1542	2337	3386
40	1701	2578	3736
45	1860	2820	4086
50	2020	3061	4436
55	2179	3303	4786
60	2338	3544	5136

Note

1. No code stamp or 'NB' on nameplate below 15 psig set.

Non-code[1] and ASME Section VIII Air [Metric, Nm³/h]

Set Pressure [barg]	Valve Inlet and Outlet Size		
	50 mm	63 mm	80 mm
0.5	1049	1589	2303
1.0	1457	2208	3200
1.5	1888	2861	4147
2.0	2235	3387	4910
2.5	2613	3959	5739
3.0	2995	4538	6579
3.5	3377	5117	7418
4.0	3760	5696	8258

Note

1. No code stamp or 'NB' on nameplate below 1.1 barg set.

Models 215V ~~and 337~~

Model Number/Order Guide

Model Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	2	1	5	V	—	H	0	1	A	Q	E	0	0	0	2

Model
215V
~~0337~~

Inlet Size
H - 2-inch [50.8 mm]
~~J - 2½-inch [63.5 mm]~~
~~K - 3-inch [76.2 mm]~~

Variation (01 through 99)
01 - Bronze Disc and Nozzle
~~02 - SS Disc and Nozzle~~
~~03 - BSP Connections~~

Design Revision
Indicates non-interchangeable revision. Current Design is at Revision 'A'

Valve Service
~~K - All ASME Section VIII (Model 337 only)~~
Q - Vacuum (Model 215V only)
~~N - Non-code Air/Gas (Model 337 only)~~

Spring Material
E - SS Type 316
~~M - SS (26 psi thru 60 psi set) Type 17-7~~

Set Pressure
~~Model 337, 1 psig [0.7 barg] (0001) through 60 psig [4.1 barg] (0060)~~
Model 215V, 2-inch HG [68 mbarg] (0002) through 29-inch HG [982 mbarg] (0029) vacuum

Facility Phone: 828-669-3700

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KUNKLE PRESSURE RELIEF VALVES

Installation and Operating Instructions

Pre-Installation Handling

This pressure relief valve is designed to protect equipment from overpressure. The valve should be handled with care, not subjected to heavy shock loads, and protected to prevent contamination from getting inside. It should be installed correctly per A.S.M.E. Boiler & Pressure Vessel Code requirements. Failure to do so could result in property damage or serious injury to personnel. When hoisting the valve into position for installation, care should be exercised so that lifting straps do not contact the valve lift lever.

Installation

Always wear proper safety equipment, including safety glasses and ear protection.

1. Mount the valve in a vertical position so that the valve body is self-draining. If a body drain port is provided, make sure it is open when required by the ASME code. Do not plug any bonnet vent openings. The inlet piping should be as short as possible, with no elbows, and equal to or greater than the size of the pressure relief valve inlet connection. This will help to limit the inlet pressure drop to 3% or less when the valve is relieving.

2. When discharge piping is connected to valve outlet, make sure it is self draining if a body drain port is not used. The valve should not be connected to any discharge pipe that contains pressure before the valve opens or to any pipe where the pressure build-up is greater than 10% of the set pressure when the valve is open and relieving.

   Discharge piping, other than a short tailpipe, must be supported. For steam service, a drip pan elbow or flexible connection between the valve and the pipe should be used to prevent excessive pipe stress, due to thermal expansion, from being imposed on the valve body.

3. For threaded valves, to prevent sealing compound from entering and damaging the valve, apply a small amount of pipe thread sealing compound to external threads only. Do not put any sealing compound on the first thread or on any internal threads. To do so may cause the sealing compound to enter the valve and cause seat leakage.

   Do not use the valve body or bonnet for installing the valve in threaded connections. Use the wrench flats provided to tighten the valve to the connecting pipe, and do not overtighten. To do so may cause valve leakage.

4. For flanged valves, use new gaskets and tighten the mounting studs evenly.

Operation

1. Maintain a system operating pressure at least 5 psig or 10% below the set pressure of the valve, whichever is greater. Operating too close to the valve set pressure will cause seat leakage and will shorten the time between valve maintenance.

2. Do not use the safety valve as a control valve to regulate system operating pressure. Excessive operation will cause the seat to leak and will require more frequent valve maintenance.

3. ASME Section I and VIII valves equipped with lift levers are designed to be operated only when the system pressure is 75% of set pressure or greater. ASME Section IV valves may be operated at any set pressure. When hand operating the valve, hold it open long enough to purge any foreign matter from the seat area. If a cable or wire is attached to the lift lever for remote actuation, make sure the direction of pull is the same as it would be if the lever were pulled directly by hand.

Maintenance

Maintenance should be performed on a regular basis. An initial inspection interval of 12 months is recommended. Depending on the service conditions and the condition of the valve, the inspection interval may be decreased or increased. Use only Kunkle parts for repair. Depending on the local jurisdictional requirements where the valve is installed, repairs may have to be made by a repair facility holding a VR stamp.

WARNING!

Removal of the seal wires or any attempt to adjust, repair or modify this product by non-qualified or non-authorized persons voids the product guarantee and may cause serious damage to equipment, personal injury, and death. Kunkle Valve is not liable for any damage resulting from misuse or misapplication of its products.

Kunkle Valve Division
Rev B 01/14/2002
Phone: 828-669-5515 953 Old US 70, Black Mountain, NC 28711 Fax: 828-669-4017

Procedure to Reset Kunkle Vacuum Relief Valves

To field reset a Kunkle vacuum relief valve, first turn off the vacuum pump that the valve serves. After the equipment completely stops, you can begin to work on the valve. Note that it is potentially dangerous to adjust the valve while the vacuum pump is in operation.

The valve setting is maintained by compressing a spring which is located within the valve body. This spring is compressed by turning the bronze valve cap clockwise until the necessary compression is obtained.

Begin by clipping the seal on the lock wire holding the two nameplate screws in place. Remove the nameplate screws. You must remove these screws in order to turn the valve body cap. Now rotate the valve body cap on full turn. Replace the nameplate screws. Clear all loose items away from the inlet of the valve. Turn on the vacuum pump and induce the desired relief valve setting vacuum level on the system. If the valve opens you have not sufficiently increased compression. Shut off the pump, remove the nameplate screws and turn the valve cap again one full turn. Follow the test procedure as above. Repeat until the desired set point is obtained. Once the final set point has been reached, replace the nameplate screws and reseal with a new lock wire seal.

In no case should the et point of the valve be increased in excess of the vacuum pumps maximum design capability or to the point that the motor exceeds its nameplate horse power rating (including service factor).

NES
NATIONAL ENVIRONMENTAL SYSTEMS

NES Project: 09-198
Precision Environmental
SSDS Components
NYSDEC Project

Section 4 – Moisture Separator (MS)

Moisture Separator – NES 55gal. Tank Style Specifications & Instructions

MS Transfer Pump – Ebara Model ACDU70/17T1C Specifications

Ebara Operating Instructions

MS Level Switch – NES Model P500 Specifications & Instructions

Phone (508) 226-1100 Fax (508) 226-1180 84 Dunham Street Attleboro, MA 02703
www.nes-inc.biz

MOISTURE SEPARATOR

GENERAL THEORY

The moisture separator removes liquids from the process stream in soil venting applications to help protect the blower from corrosion and mineral deposits caused by water.

DESIGN INFORMATION

NES moisture separators operate on the principles of cyclonic section aided by velocity reduction. The moisture separator inlet pipe is set tangential to the tank wall, a stringer pipe extends down past the separator inlet is placed in the center of the tank. The moisture laden air stream is forced into a cyclonic rotation. The centrifugal force produced throws the water droplets to the outer wall of the separator where they fall and collect at the bottom. Additional efficiency is produced when the velocity is reduced to values between 1500 fpm and 6000 fpm. For a separator of this type, moisture separation efficiency is typically 95% or greater for moisture droplets greater than 10 micron.

CONSTRUCTION

NES moisture separators are constructed of carbon steel with bronze drain valves, removable lid with EPDM gasket, mechanical ball and float assembly standard for drum style separators. Sight glass, emergency high-level switch and pump out switches are optional. Tank style separators are standard with carbon steel construction, bronze drain valves, flanged clean-out port, sight glass and emergency high level switch. Pump-out switches and mist eliminator are optional. All separators are primed and coated with a rust inhibitor to prevent corrosion.

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DRUM STYLE SEPARATOR

TANK STYLE SEPARATOR

NORMAL SERIES OF OPERATION FOR MOISTURE SEPARATOR LEVEL SWITCHES

1. Water level rises and actuates low level switch (wired normally open).
2. Switch closes and sends signal to controller.
3. Water level continues to rise and actuates high level switch (wired normally open).
4. Switch closes and sends signal to controller to activate moisture sepaator transfer pump.
5. Water level drops when pump activates.
6. De-energizes high switch.
7. Continues to drop.
8. De-energizes low switch.
9. Controller calls off pump.
10. Series repeats.

ACTIVATION OF EMERGENCY HIGH LEVEL SWITCH

1. Water level rises and actuates low level switch (wired normally open).
2. Switch closes and sends signal to controller.
3. Water level continues to rise and actuates high level switch (wired normally open).
4. Switch closes and sends signal to controller to activate moisture separator transfer pump.
5. Problem with pump, level switch or down stream process, water level does not drop.
6. Water level rises until emergency high switch (wired normally closed) is actuated.
7. Appropriate process equipment is de-energized (i.e. pump, SVE blower)

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Contents

Item No.	Specifications	Selection Chart	Performance Curve	Pump Dimensions	Sectional View
CDU70/1-3/4HP CDU70/3-1½HP CDU70/5-2HP CDU120/1-1HP CDU120/3-1½HP CDU120/5-3HP CDU200/1-½HP CDU200/3-3HP CDU200/5-3HP	301	302	303	310	311

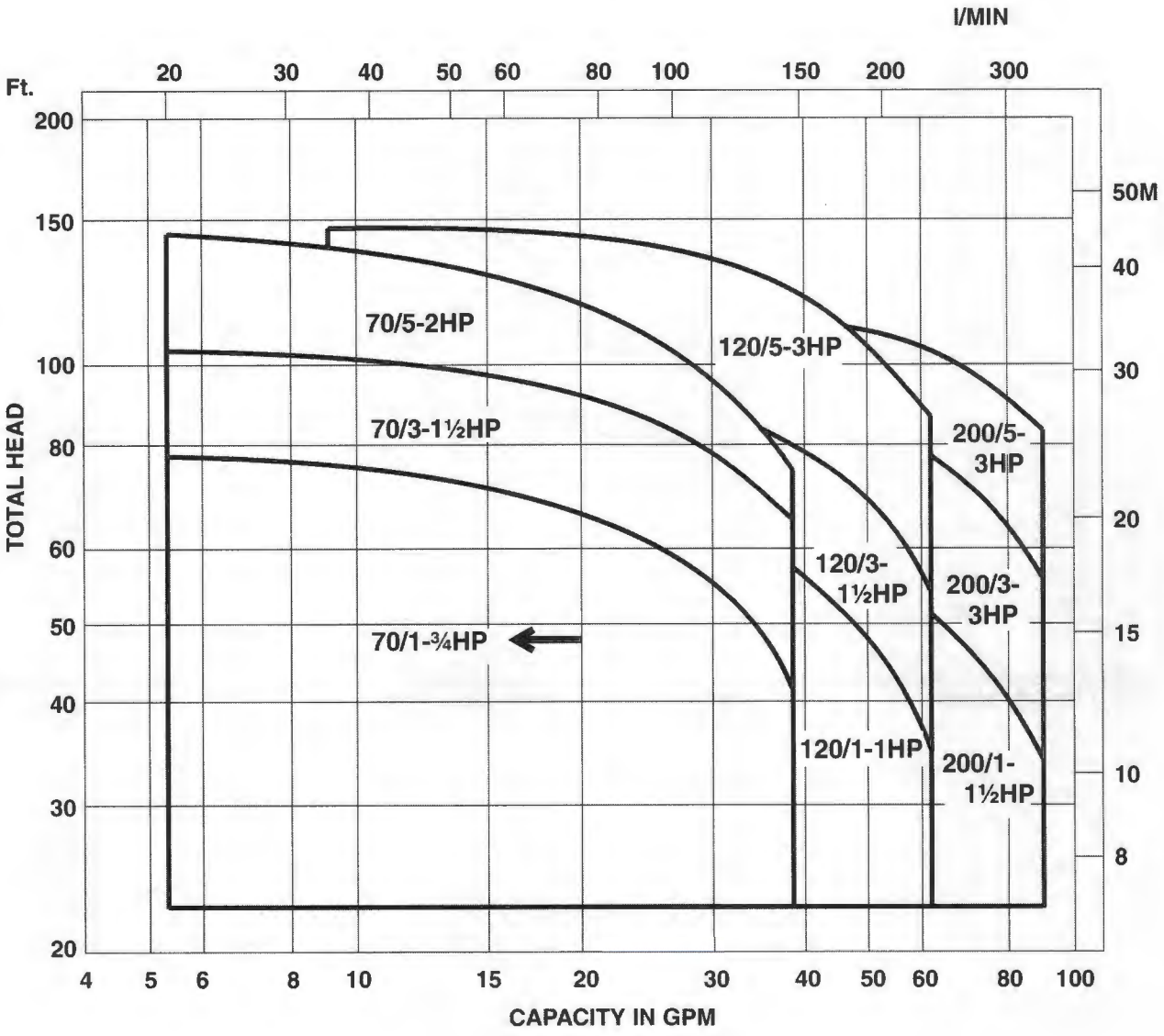
Specifications

	Standard	Optional
Size		
Suction	CDU70 – 1¼" NPT thread ←	
	CDU120 – 1¼" NPT thread	
	CDU200 – 1½" NPT thread	
Discharge	1" NPT thread	
Range of HP	¾ HP to 3 HP	
Range of Performance		
Capacity	5.5 to 95 GPM at 3450 RPM	
Head	26 to 144 feet at 3450 RPM	
Liquid handled		
Type of liquid	Water	
Temperature	212°F (100°C)	Max. 250°F (121°C) with optional high temperature seal
Max. working pressure	125 PSI (9 Bar)	
Materials		
Casing	304L Stainless Steel	
Impeller (closed type)	304L Stainless Steel	
Shaft	Stainless Steel	
Bracket	Aluminum	
Shaft Seal	Mechanical Seal – Type 21	High temperature version Mild chemical version
Bearing	Ball Bearing	
Direction of Rotation	Clockwise when viewed from motor end	
Motor		
Type	NEMA 56J Frame	
Speed	60 Hz, 3450 RPM (2 poles)	
Single Phase	TEFC – ¾ HP to 3 HP ←	
	ODP – ¾ HP to 3 HP, 115/230V	Explosion proof – consult factory
Three Phase	TEFC – ¾ HP to 3 HP	Washdown duty – consult factory
	ODP – ¾ HP to 3 HP, 208-230/460V	
Motor Protection	Built-in overload protection (single phase)	

Model CDU **EBARA Stainless Steel Centrifugal Pumps**

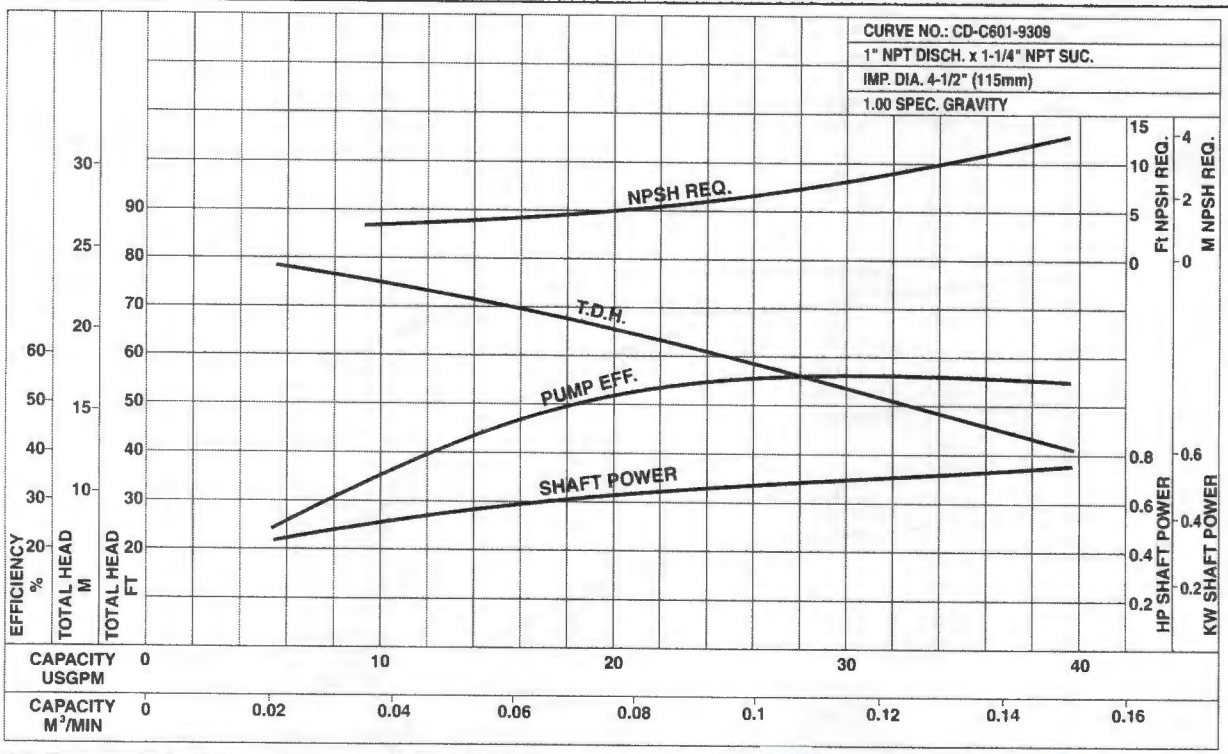
Selection Chart

Synchronous Speed 3450 RPM

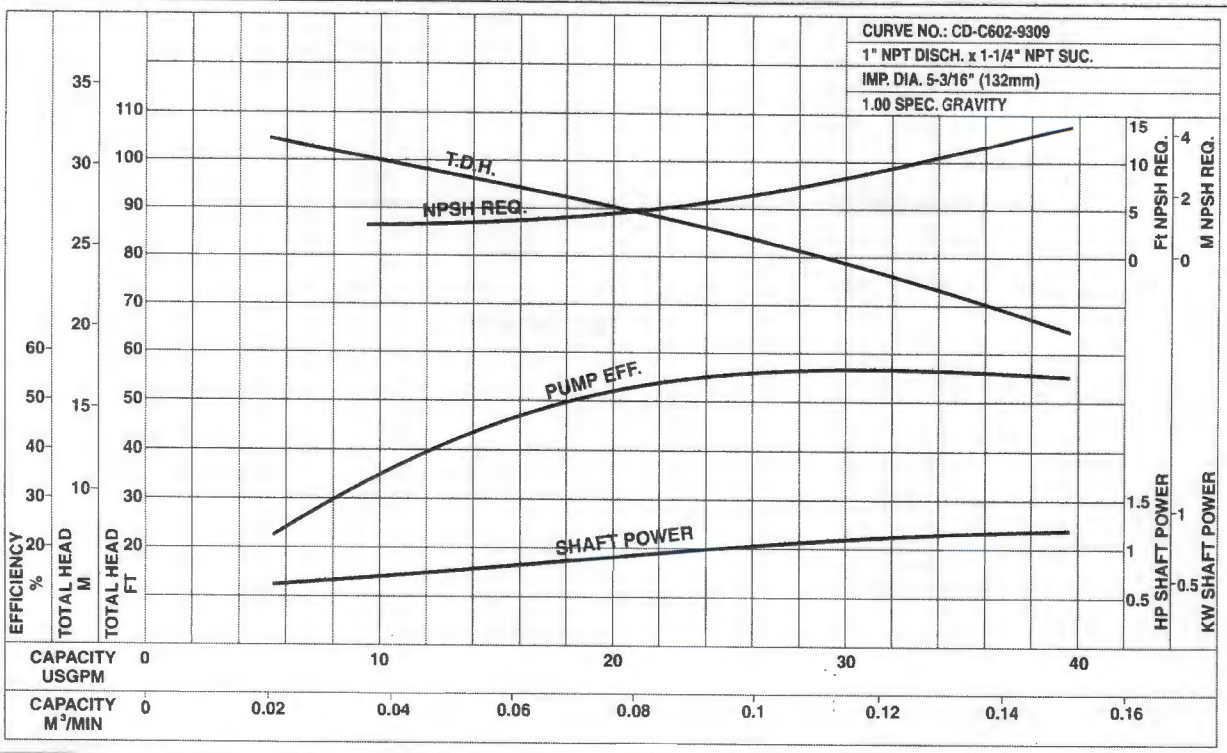


Performance Curves

CDU70/1-¾ HP — Synchronous Speed: 3450 RPM — Size: 1 x 1¼ x 4½



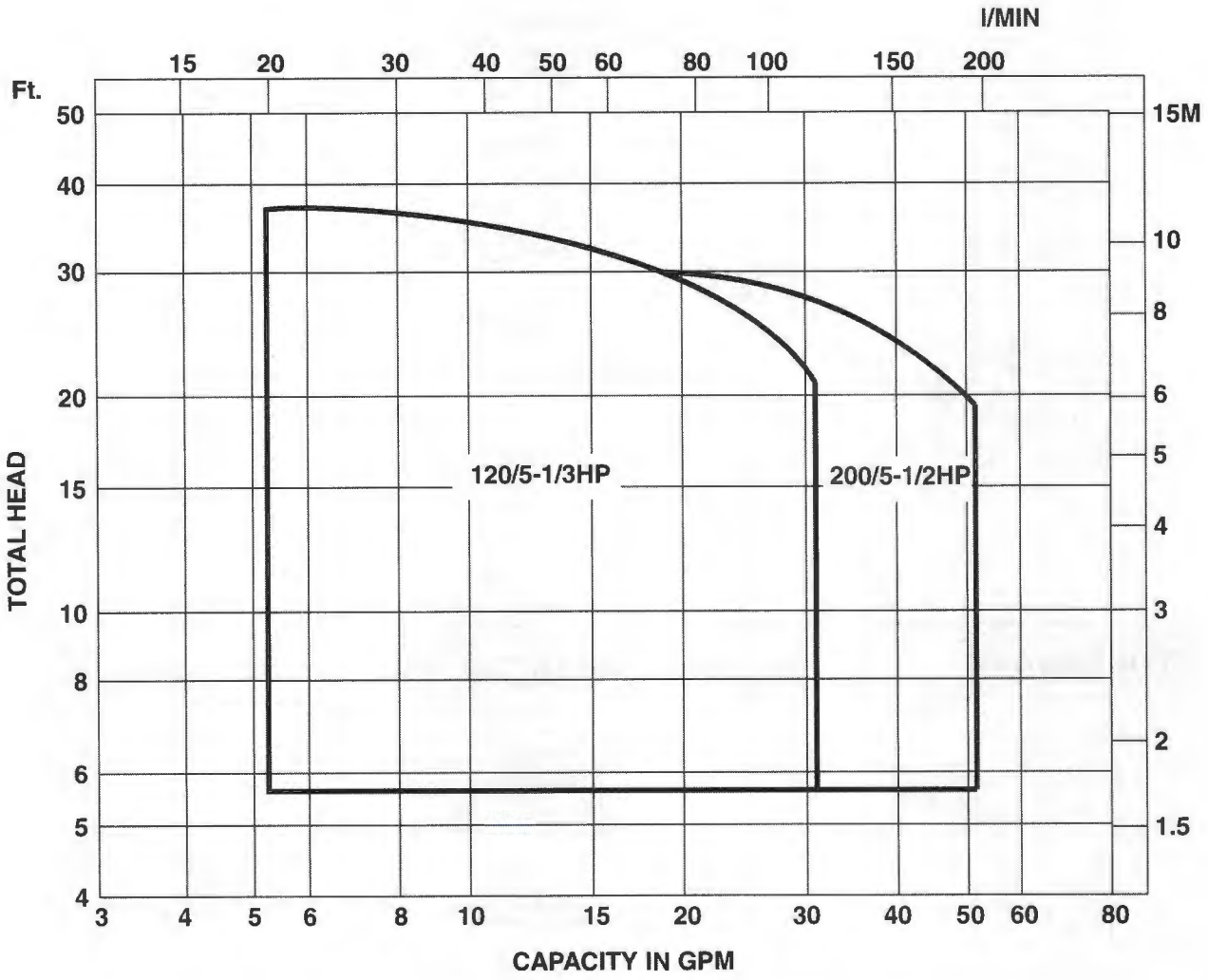
CDU70/3-1½ HP — Synchronous Speed: 3450 RPM — Size: 1 x 1¼ x 5³/₁₆



Model CDU — **EBARA Stainless Steel Centrifugal Pumps**

Selection chart

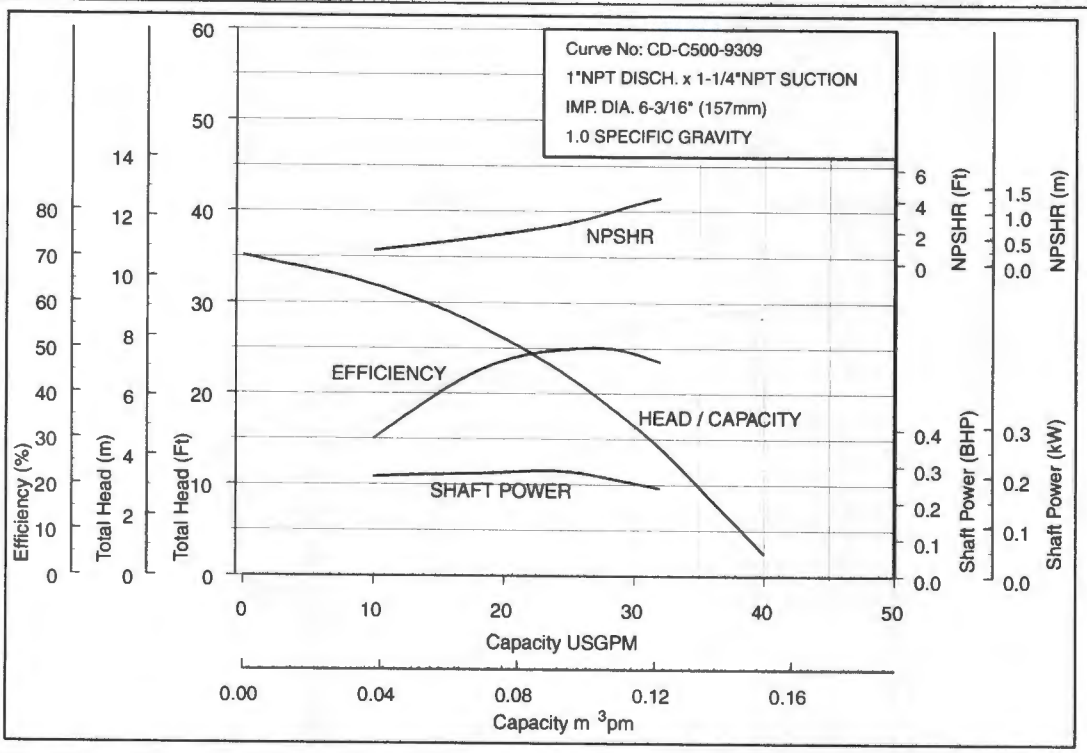
Synchronous Speed 1725 RPM



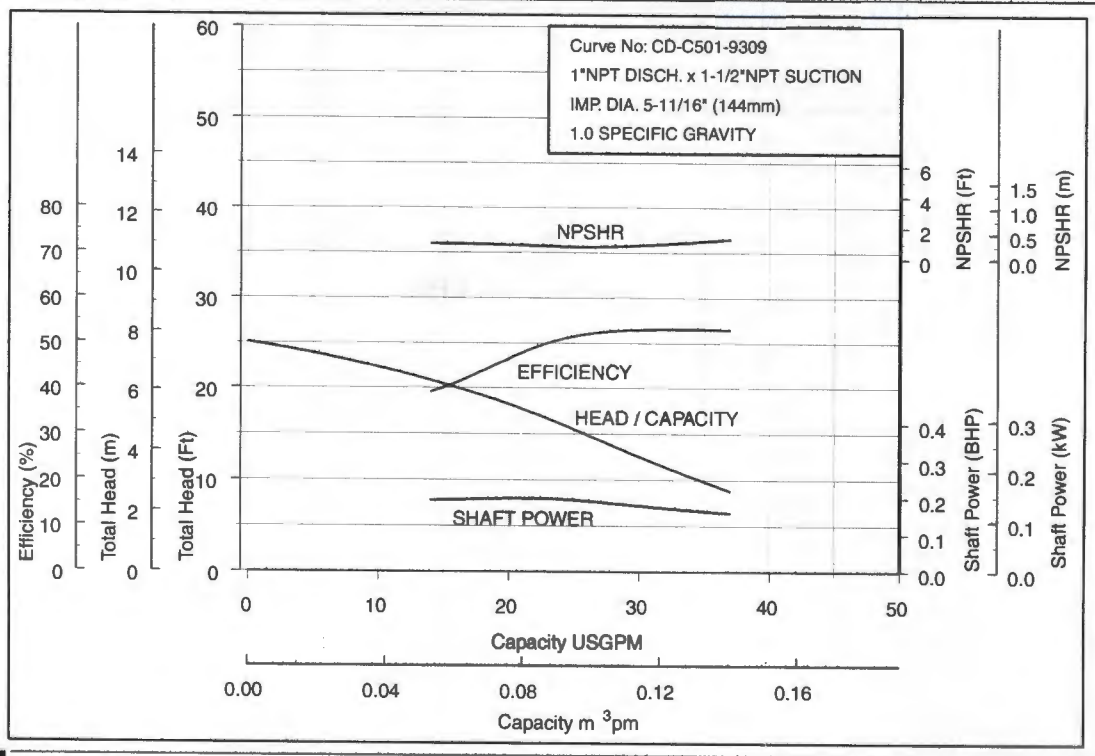
Model CDU — EBARA Stainless Steel Centrifugal Pumps

Performance Curves

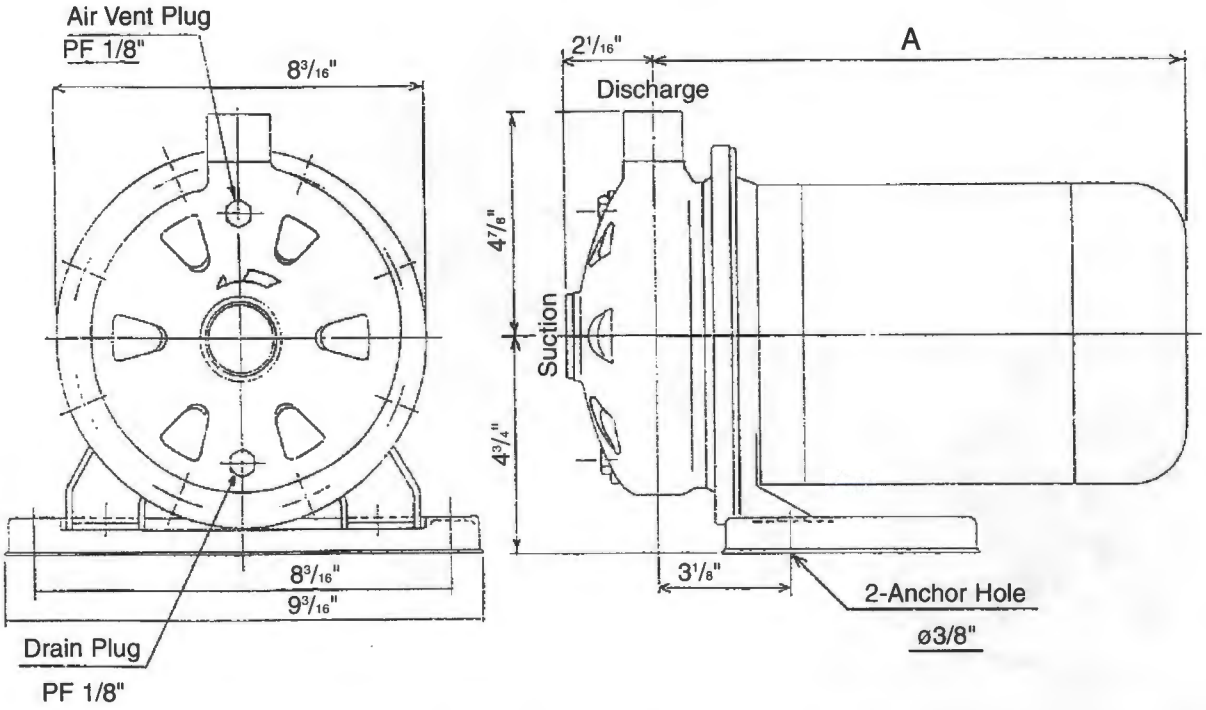
CDU4 120/5-1/3 HP — **Synchronous Speed: 1725 RPM** — **Size: 1 x 1 1/4 x 6 3/16**



CDU4 200/5-1/2 HP — **Synchronous Speed: 1725 RPM** — **Size: 1 x 1 1/2 x 5 11/16**



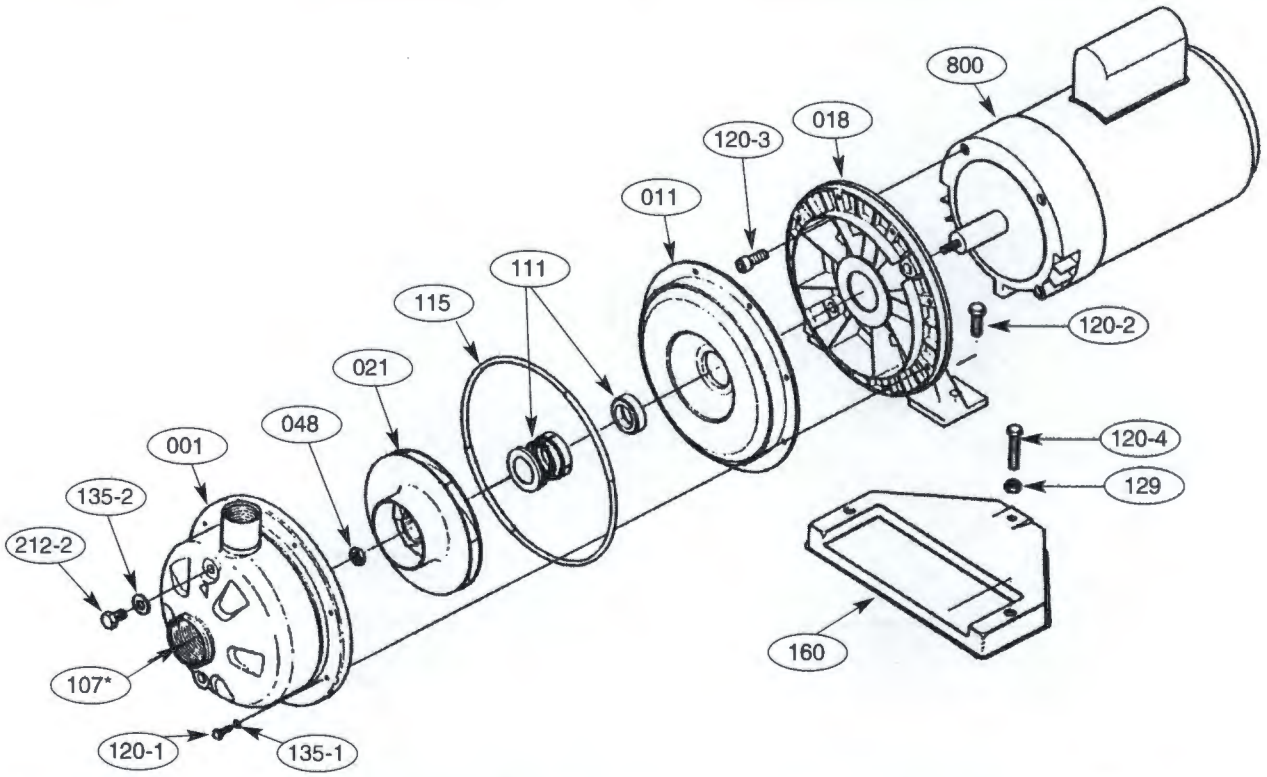
Pump Dimensions



Model	Model	Pump Size – NPT (Inch)		Dimension (Inch)	Unit Weight (lbs.)			
					Single Phase		Three Phase	
		Suction	Discharge	A	ODP	TEFC	ODP	TEFC
CDU70/1-3/4HP	1 x 1 1/4 x 4 1/2	1 1/4	1	13 1/8 Max.	36	41	31	31
CDU70/3-1 1/2HP	1 x 1 1/4 x 5 3/16	1 1/4	1	13 9/16 Max.	47	50	39	39
CDU70/5-2HP	1 x 1 1/4 x 6 3/16	1 1/4	1	14 7/16 Max.	51	58	44	48
CDU120/1-1HP	1 x 1 1/4 x 4 1/2	1 1/4	1	13 9/16 Max.	41	46	33	32
CDU120/3-1 1/2HP	1 x 1 1/4 x 5 3/16	1 1/4	1	13 9/16 Max.	47	50	39	39
CDU120/5-3HP	1 x 1 1/4 x 6 3/16	1 1/4	1	14 7/16 Max.	59	66	51	60
CDU200/1-1 1/2HP	1 x 1 1/2 x 4 1/2	1 1/2	1	13 9/16 Max.	47	50	39	39
CDU200/3-3HP	1 x 1 1/2 x 5 3/16	1 1/2	1	14 7/16 Max.	58	65	50	59
CDU200/5-3HP	1 x 1 1/2 x 5 11/16	1 1/2	1	14 7/16 Max.	58	65	50	59

Model CDU — EBARA Stainless Steel Centrifugal Pumps

Sectional View



Part No.	Part Name	Material	No. for 1 Unit
001	Casing	304L Stainless	1
011	Casing cover	304L Stainless	1
018	Bracket	Aluminum	1
021	Impeller	304L Stainless	1
048	Impeller nut	304L Stainless	1
107*	Casing ring (*CDU 70 series only)	Viton	1
111	Mechanical seal	—	1
115	O-Ring	Viton	1
120-1	Bolt	304L Stainless	8
120-2	Bolt	304L Stainless	2
120-3	Bolt	304L Stainless	4
120-4	Bolt	304L Stainless	1
129	Nut	304L Stainless	1
135-1	Washer	304L Stainless	8
135-2	Washer	Aluminum	2
160	Base	Steel	1
212-2	Plug	304L Stainless	2
800	Motor	—	1

3 FLOAT SIGHT GLASS PROBE
NES P-500

Description:
The 3 float sight glass probe is designed to work in conjunction with a National Environmental Systems control panel to control the liquid level in a tank or sump. The brass float guide and buna floats provide long-term trouble free use and durability against corrosion. The probe is assembled with a standard length cable and a nipple (1/2" mnpt) for electrical junction box attachment.

Operation:
Each probe has three floats positioned with the brass collars at varying lengths from one to another. The top float is referred to as the "e-high", the middle is referred to as "high", and the bottom is referred to as "low", (in some custom applications an additional 1 or 2 floats can be added). The float is constructed to have a specific gravity less then water so it will float in water. As the float (with internal magnet) rises and falls within the stop collars, it opens and closes a small reed switch (electrical contacts) located within the stainless steel float guide. A typical arrangement has the lower float turning a discharge pump off, middle float turning a discharge pump on, and the top float signaling an alarm and turning a feed pump off.
Note: In some cases, if there is product within a tank (such as gasoline) it may not actuate the float because it has lower specific gravity than water.

Installation:
The probe should be installed within a sight glass or tank manufactured by National Environmental Systems. A junction box should also be provided within close proximity to the probe to allow it to be removed easily for repair or maintenance.

Maintenance:
Periodic inspection, cleaning, and testing are recommended to be performed at least once a week after the initial deployment of the probe. This schedule can be adjusted to more or less in frequency, depending upon site conditions.

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To clean the probe assembly, power to the control panel should be disconnected. The probe should be removed from the sight glass or tank, and all components cleaned with any type of cleaner compatible with the materials of construction (stainless steel and buna). Great care should be taken not to move the float collars, **they are not readily field adjustable. However collars can be repositioned if instructed properly by NES technical support staff.**

Test Procedures:

1. Disconnect probe wires from the nearest junction box, remove the probe from the sight glass, and move all the floats to the lowest point within the collars.
2. Connect an ohm meter to the red and black leads of the probe, meter should read approximately 0 to 1 ohm (switch closed).
3. Submerge the probe in the water, or manually move the e-high float to the highest point within the collars, the meter should now read infinite ohms or OL on some digital meters (switch open).
4. Connect the ohm meter to the green and black leads of the probe, meter should read infinity (switch open)..
5. Submerge the probe in water, or manually move the high float to the highest point within the collars, the meter should read approximately 0 to 1 ohm (switch closed).
6. Connect the ohm meter to the white and black leads of the probe, meter should read infinity (switch open).
7. Submerge the probe in water, or manually move the low float to the highest point within the collars, the meter should read approximately 0 to 1 ohm (switch closed).

Contact NES if your level sensor needs adjustment or replacement.

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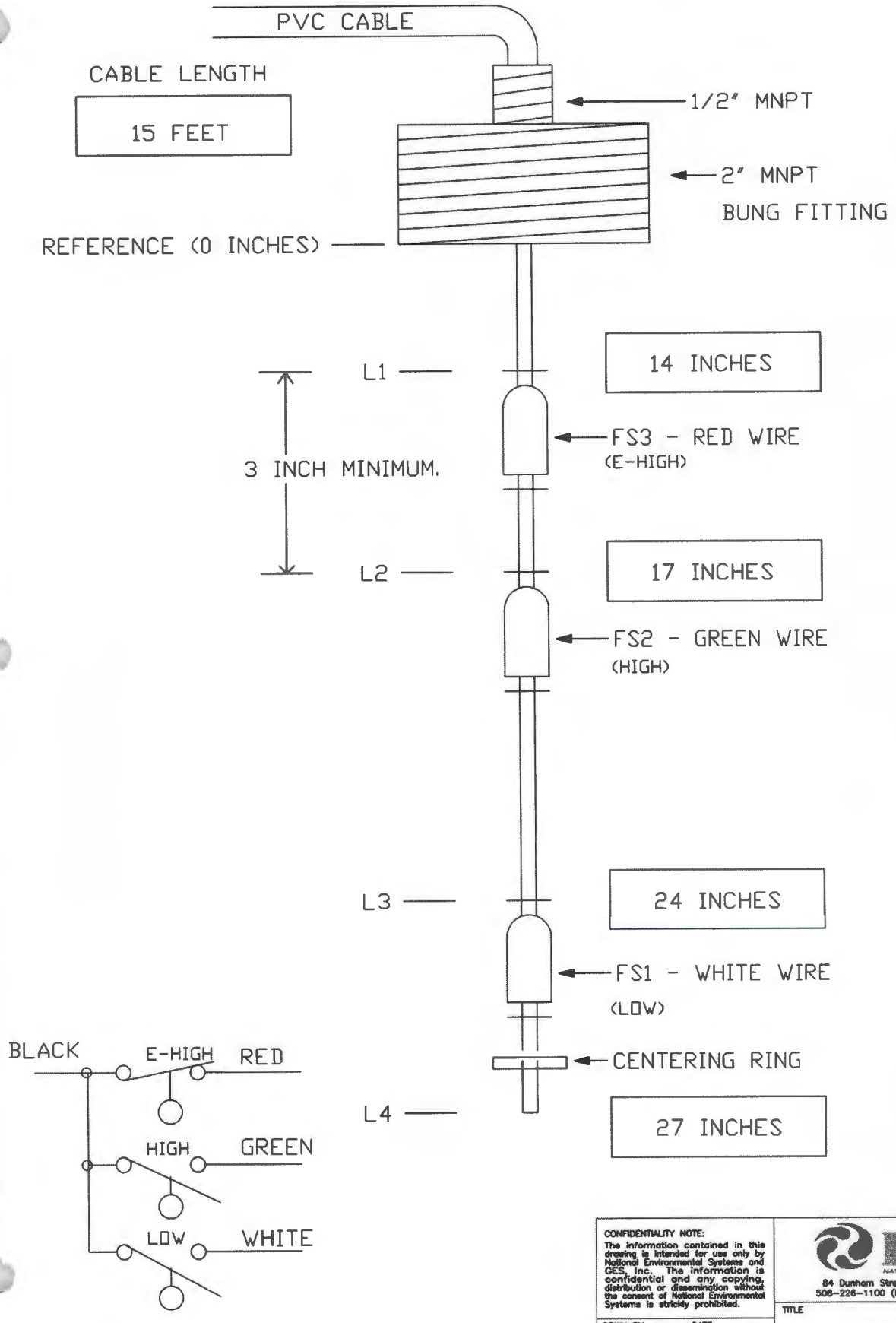
P500



DRWN BY: PRS	DATE: 6/25/09
CHK BY	DATE
APPR BY	DATE

NES NATIONAL ENVIRONMENTAL SYSTEMS
84 Dunham Street – Attleboro, Massachusetts
508-226-1100 (Phone) / 508-226-1180 (Fax)

TITLE: MOISTURE SEPARATOR PROBE

PRECISION ENVIRONMENTAL
NY DEC – SSDS

JOB NO. 09-198

SCALE	SIZE	DWG NO.	SHEET	REV
N/A	A	08-143-MS-500	1 OF 1	

ATTACHMENT - 2

Subslab Depressurization System Contractors

Precision Environmental Services, Inc.
831 NYS Route 67, Lot 28
Ballston Spa, NY 12020
Tel: 518-885-4399

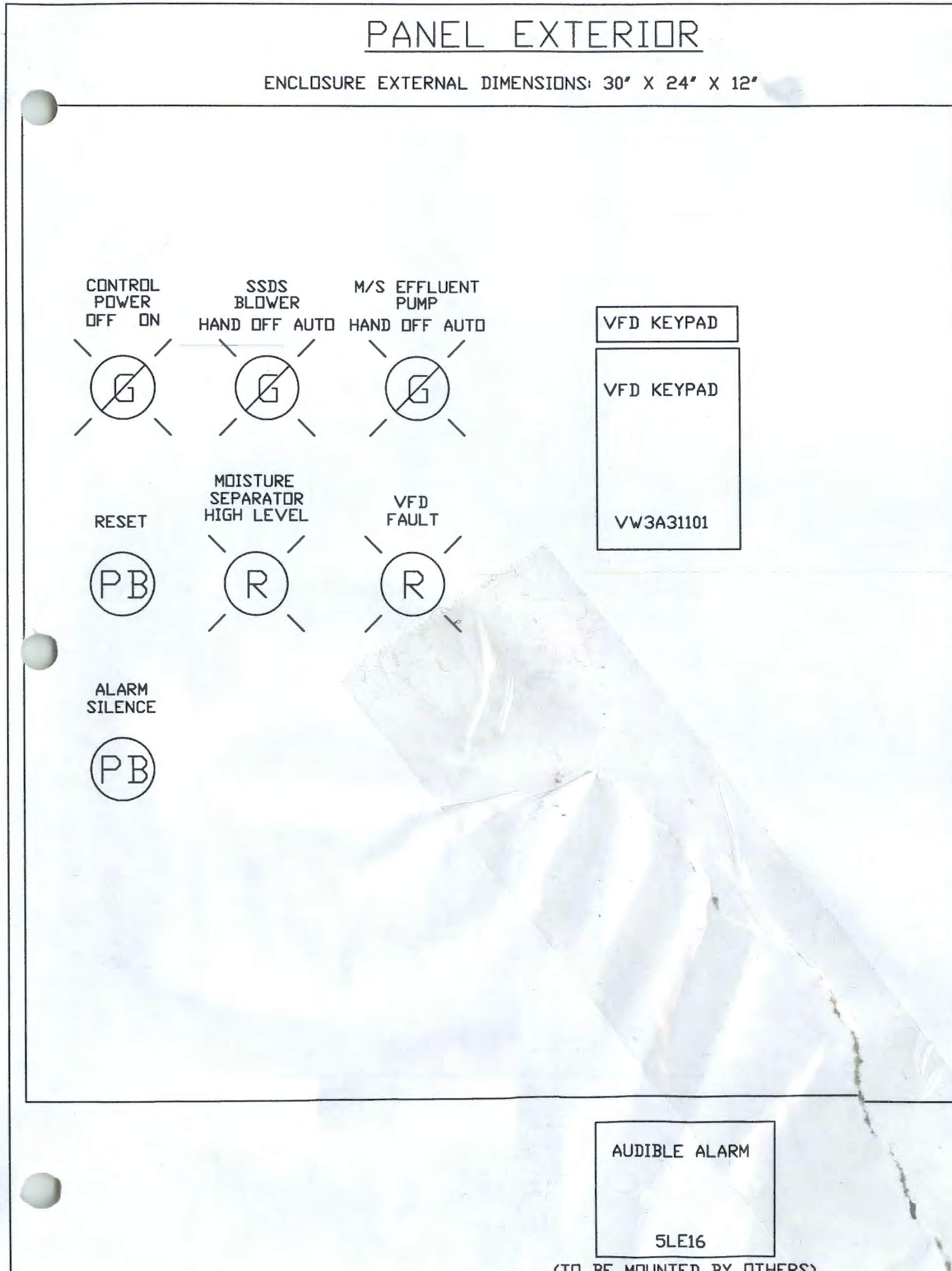
National Environmental Systems, Inc.
84 Dunham Street
Attleboro, MA 02703
Tel: 508-226-1100

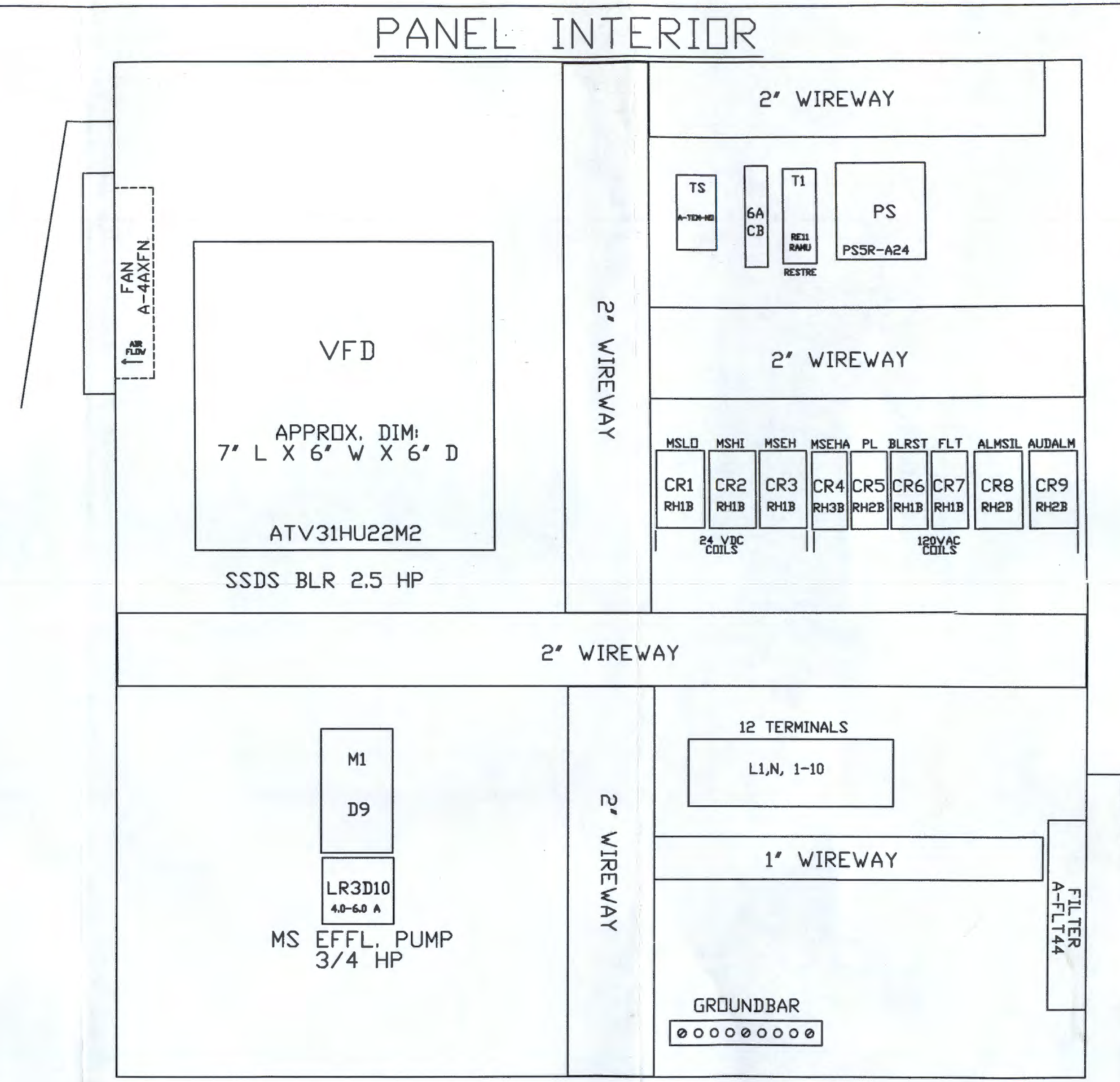
ATTACHMENT - 3

Inlet Particulate Filter Suppliers
(Solberg Replacement Filter Element #: 851)

Grainger Industrial Supply
35 Corporate Circle
Albany, NY 12203
Tel: 518-869-1414
Web: www.grainger.com
(Grainger Item No.: 6JC96)

Solberg Manufacturing, Inc.
1151 Ardmore Ave
Itasca, IL 60143
Tel: 630-616-4400
Web: www.solbergmfg.com





CONFIDENTIALITY NOTE:
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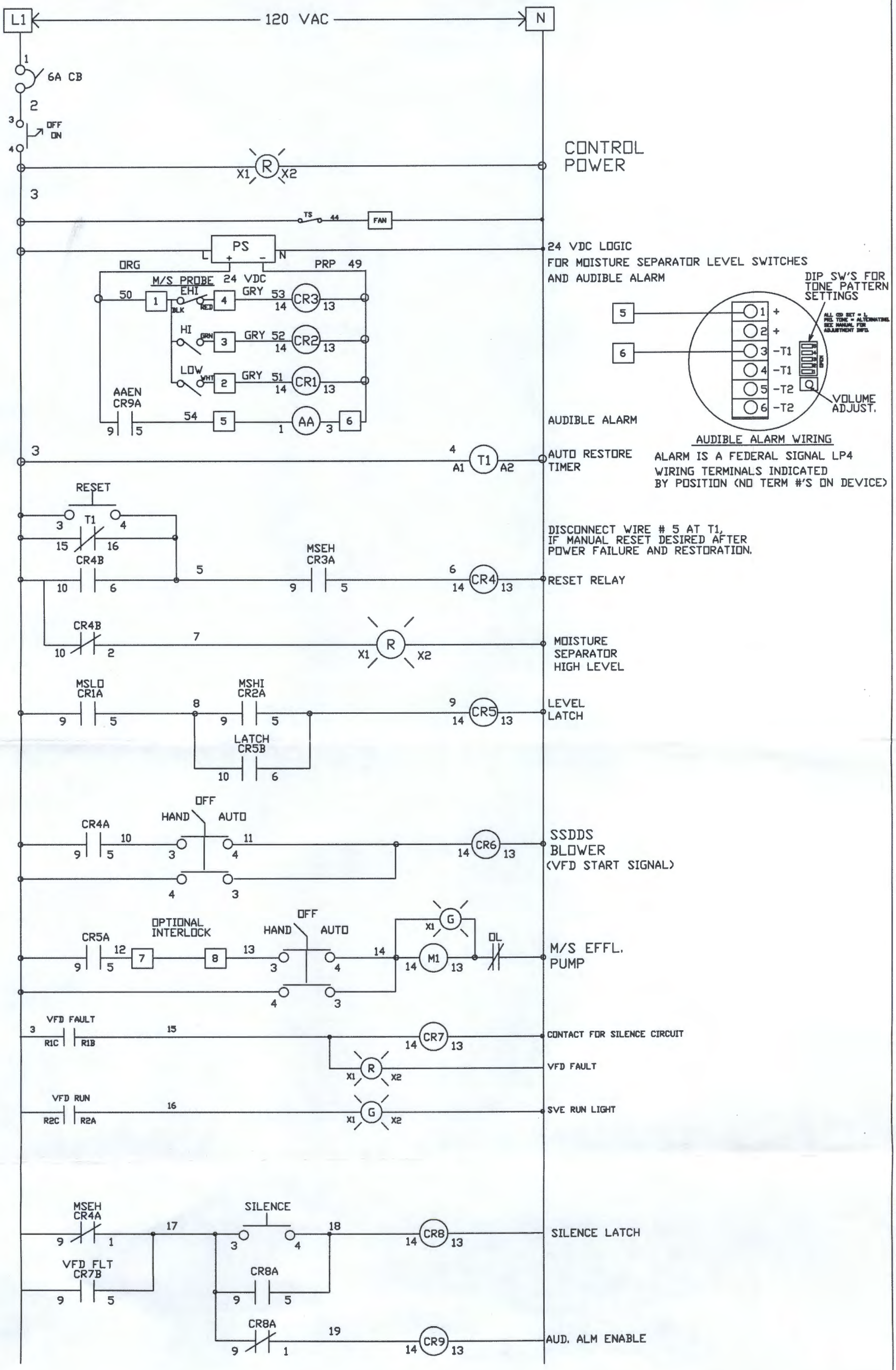
DRWN BY RJD/EMB	DATE 7/30/09	TITLE CONTROL PANEL EXTERIOR/INTERIOR LAYOUT			
CHK BY RJD	DATE 7/24/09	PRECISION ENVIRONMENTAL NY DEC PROJECT LOC=?		JOB NO. 09-198	
APPR BY RJD	DATE 7/24/09	SCALE N/A	SIZE D	DWG NO. E1 PNL_IX	SHEET E-1	REV

LADDER LOGIC DIAGRAM



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508-226-1100 (Phone) / 508-226-1160 (Fax)
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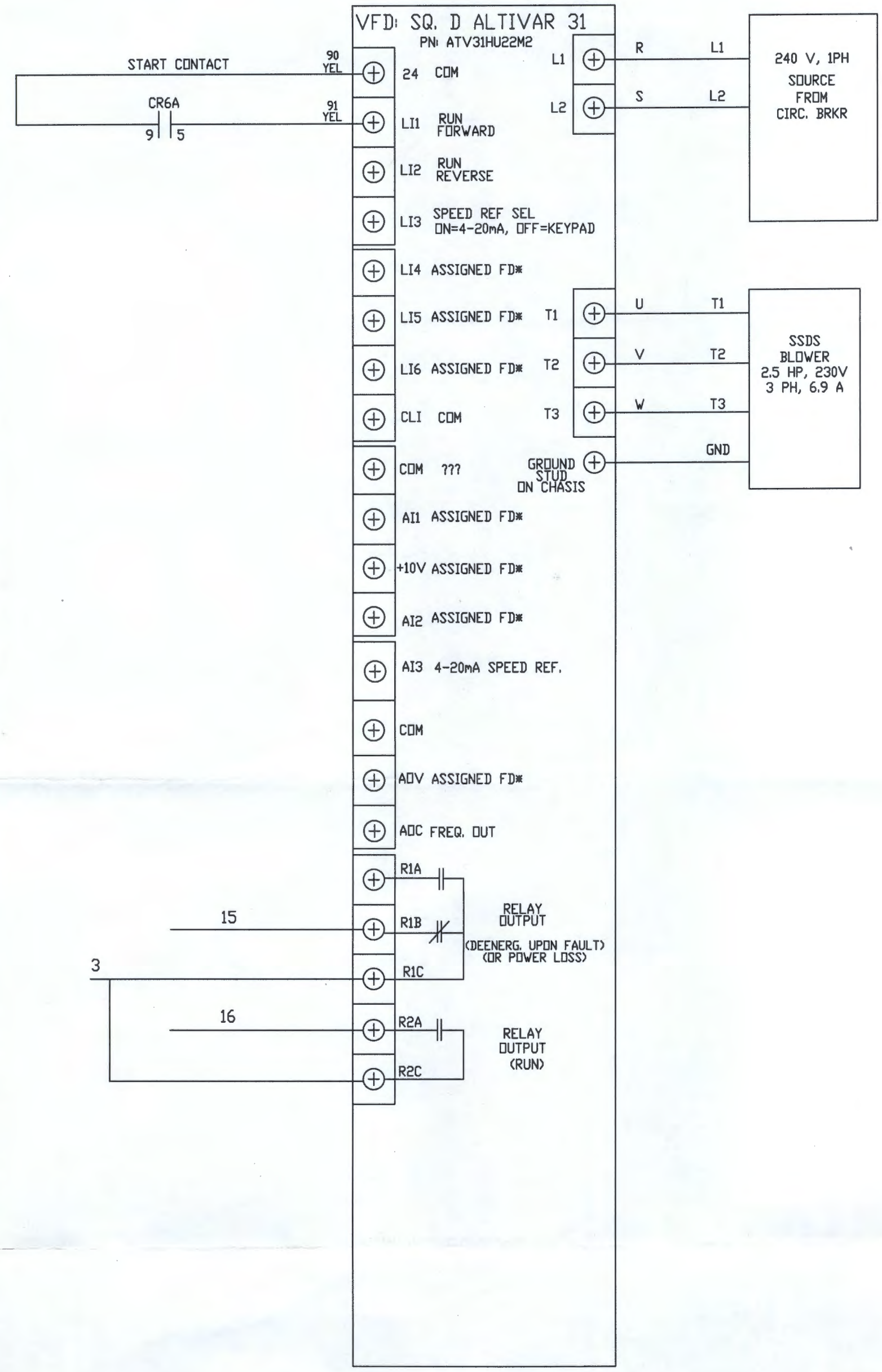
DRWN BY RJD	DATE 7/30/09	TITLE: LADDER LOGIC				
CHK BY RJD	DATE 7/24/09	PRECISION ENVIRONMENTAL NY DEC PROJECT			JOB NO. 09-198	
APPR BY RJD	DATE 7/24/09	SCALE N/A	SIZE D	DWG NO. E2 LADDER	SHEET E-2	REV



NOTES:

1.) SEE ALTIVAR 31 MANUAL FOR ADDITIONAL WIRING INFORMATION IF NECESSARY.
2.) WIRING TERMINALS ARRANGED DIFFERENTLY THAN SHOWN ABOVE, SEE VFD INTERIOR DRAWING.
3.) SEE OTHER DRAWINGS FOR MORE DETAILS.
4.) ASSIGNED FD*= SETTING REMAINS AT FACTORY DEFAULT SETTING FROM SQUARE D.

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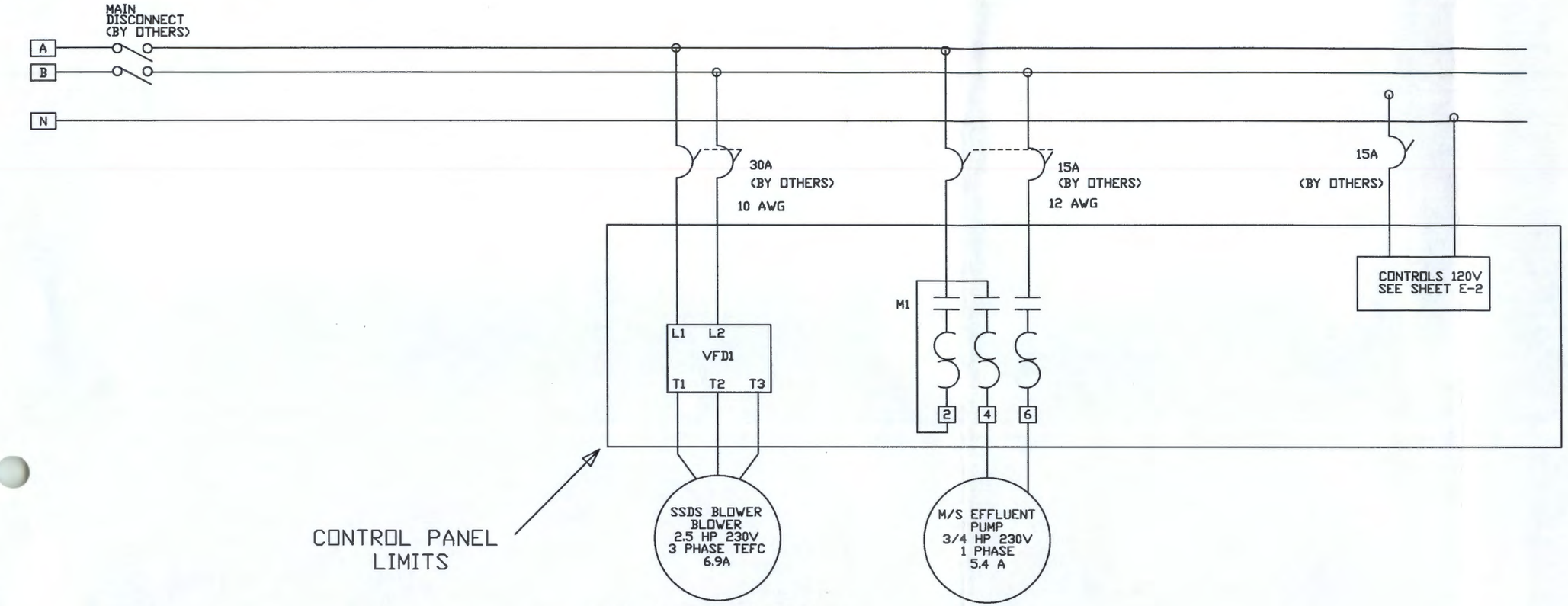
DRWN BY RJD	DATE 7/23/09	TITLE: VFD WIRING				
CHK BY RJD	DATE 7/23/09	PRECISION NYDEC PROJECT			JOB NO. 09-198	
APPR BY RJD	DATE 7/23/09	SCALE N/A	SIZE D	DWG NO. E3 VFD WIRING	SHEET E-3	REV

SOURCE:
1PH, 120/240 V.,3W
APPROXIMATE TOTAL LOAD (NES EQUIP. ONLY): 25 AMPS



APROX. 16A, 1PH (SOURCE AMP DRAW)

NOTES:
1.) ALL POWER WIRING #12 AWG UNLESS NOTED OTHERWISE

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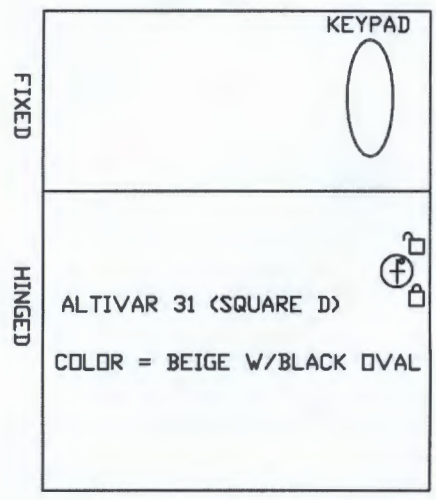
DRWN BY: RJD	DATE: 7/23/09	TITLE: LINE DIGRAM			
CHK BY: RJD	DATE: 7/23/09	PRECISION NYDEC PROJECT			JOB NO.: 09-198
APPR BY: RJD	DATE: 7/23/09	SCALE: N/A	SIZE: D	DWG NO.: E4 LINE	SHEET: E-4 / REV

VFD EXTERIOR

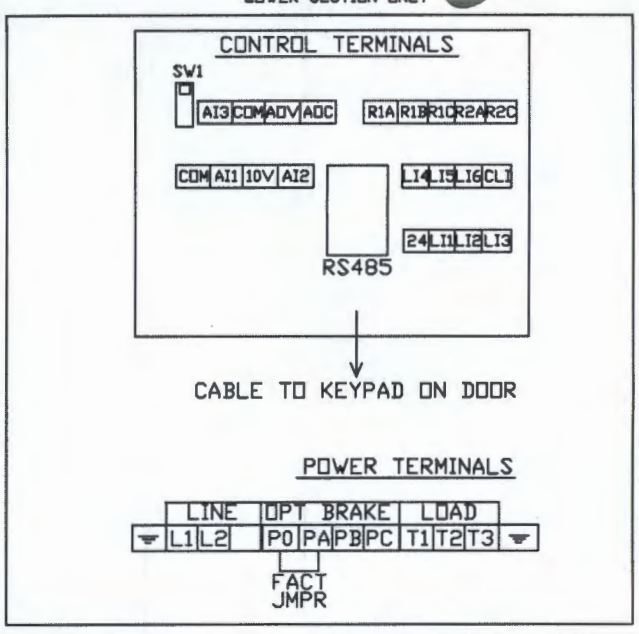


TO OPEN (ONLY LOWER SECTION OPENS):
LOOSEN PHILLIPS SCREW 1/4 TURN (UN-LOCK) AND PULL OPEN DOOR
DOT ON SCREW AND LOCK SYMBOL INDICATES STATE.

TO CLEAR FAULTS
1. CORRECT CONDITION CAUSING FAULT.
2. PRESS ESC TO CLEAR FAULT. IF FAULT CLEARS (I.E. "OCA")
3. CYCLE STOP/RUN CONTACT (AUTO TO OFF THEN BACK TO AUTO)

VFD INTERIOR

LOWER SECTION ONLY



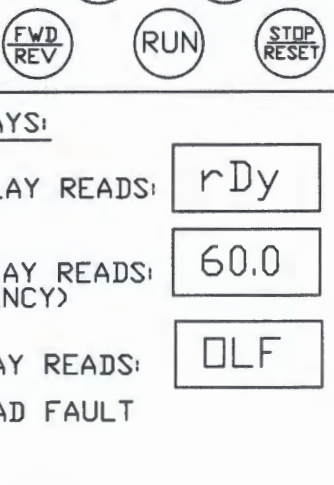
VFD PARAMETER SETTINGS

AS ADJUSTED/PROGRAMMED BY NES

MANUAL PAGE #	MENU	SUB MENU	PARAMETER CODE	DESCRIPTION	SETTINGS BY NES
53	FUn	StC	Stt	STOP CONTROL (nST=COAST)	nST
63	FUn	UPd	Str	SAVE SPEED REF. SETPT (AFT CYCLED)	EEP
34	IO		AOIt	SET MIN OUTPUT CURRENT TO 4mA.	4A
34	IO		dO	SETS OUTPUT CURRENT TO FREQ. OUT	OFr
34	IO		r2	SETS RELAY 2 TO RUN	rUn
30	dRc		bFr	MOTOR NAMEPLATE FREQUENCY	60 (HZ)
30	dRc		FrS	MAX ALLOWABLE OUTPUT FREQUENCY	60 (HZ)
32	dRc		tFr	MAX FREQUENCY FOR ANALOG OUTPUT	60 (HZ)
26	SEt		LSP	MIN OUTPUT FREQUENCY	30 (HZ)
26	SEt		HSP	MAX OUTPUT FREQUENCY	bFr (=60 (HZ))
46	CtL		LAC	SETS USER LEVEL ACCESS	L2
46	CtL		Fr1	SETS FREQ (SPEED) REF. 1 (KEYPAD)	UPdH
46	CtL		Fr2	SETS FREQ (SPEED) REF. 2 (PROC, 4-20mA)	AI3
47	CtL		rFC	SETS SPEED REF SELECTION TO LI3	LI3
56	FUn	SAI	SA2	DISABLES SUMMING INPUTS	nO
58	FUn	PSS	PS2	DISABLES FACTORY SPEED REF ASSNGMNT	nO
58	FUn	PSS	PS4	DISABLES FACTORY SPEED REF ASSNGMNT	nO
80	FLt		OPL	DISABLES OUTPUT PHASE LOSS FAULT	yES (see note 3)
80	FLt		IPL	NOT AVAILABLE WITH THIS VFD MODEL	
33	IO		tCt	STARTS AFTER PWR CYCLED (WHEN=LEL)	LEL
35	IO		SCS	STORES ABOVE CONFIGURATION FOR RECALL	YES (STR1)
52	FUn	rPC	ACC	ACCELERATION TIME (RAMP UP)	10 SEC
26	SET		ItH	MOTOR FULL LOAD (OVERCURRENT PROT.)	6.9 (AMPS)

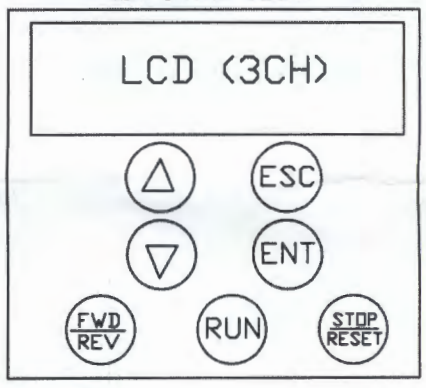
VFD KEYPAD

(ON VFD)



REMOTE KEYPAD

(ON SWING DOOR)



NOTES FOR ABOVE TABLE

1. ALL PARAMETERS NOT LISTED ABOVE REMAIN AT FACTORY DEFAULT SETTINGS.
2. SEE DRAWINGS FOR VFD AND MOTOR SIZES.
3. SET TO "nO" FOR BENCH TESTING

TO PROGRAM VFD

1. PRESS ENT DISPLAY GOES TO [SET] FOR MENU TREE SEE MANUAL P19
2. PRESS △ OR ▽ TO GO TO DESIRED MENU (NO PASSWORD REQ'D).
3. PRESS △ OR ▽ TO GO TO DESIRED SUB MENU OR PARAMETER.
4. PRESS ENT TO PROGRAM PARAMETER (HOLD TIL FLASH IF NECESSARY-LAC)
5. PRESS △ OR ▽ TO REVEAL CHOICES OF PARAMETERS
6. PRESS ENT TO SAVE PARAMETER CHOICE. (SCREEN BLINKS).

MONITORING VALUES IN "SUP" MENU

1. PRESS ENT △ DISPLAY GOES TO [SUP]
2. ARROW TO DESIRED PARAMETER (SEE P85)
   - LCr = MOTOR CURRENT
   - LFt = LAST FAULT
   - rTH = RUN TIME HOURS
3. PRESS ENT DISPLAY SHOWS PARAMETER VALUE

NOTE: SEE SQUARE D ALTIVAR FULL MANUAL FOR ADDITIONAL INFORMATION IF NECESSARY. PAGE REFERENCES REFER TO THIS MANUAL.

COMMON DISPLAYS:

DRIVE STOPPED DISPLAY READS: rDy

DRIVE RUNNING DISPLAY READS: 60.0 (OUTPUT FREQUENCY)

DRIVE FAULT DISPLAY READS: OLF (FLASHING)
OLF=MOTOR OVERLOAD FAULT

FOR MANUAL ADJUSTMENT OF MOTOR SPEED (VFD FREQUENCY)

1. WITH VFD RUNNING PRESS KEYS ON VFD (OR KEYPAD) BELOW:
   - A.) ENT △ GOES TO "SUP" MENU
   - B.) ENT ▽ GOES TO "rFr" SETTING I.E. [60.0]
   - C.) PRESS △ OR ▽ TO INCREASE OR DECREASE.
   - D.) LEAVE DRIVE AT THIS PARAMETER IF NECESSARY FOR ADJUSTMENT.
2. VFD WILL RETURN TO SETPOINT KEYPAD FREQUENCY WHEN POWER IS REMOVED AND RESTORED, OR RUN CYCLED.

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DRWN BY RJD/EMB	DATE 7/30/09	TITLE: VFD LCD AND SETTINGS			
CHK BY RJD	DATE 7/24/09	PRECISION ENVIRONMENTAL NY DEC PROJECT		JOB NO. 09-186	
APPR BY RJD	DATE 7/24/09	SCALE N/A	SIZE D	DWG NO. E5 VFD_LCD IX	SHEET E-1 / REV