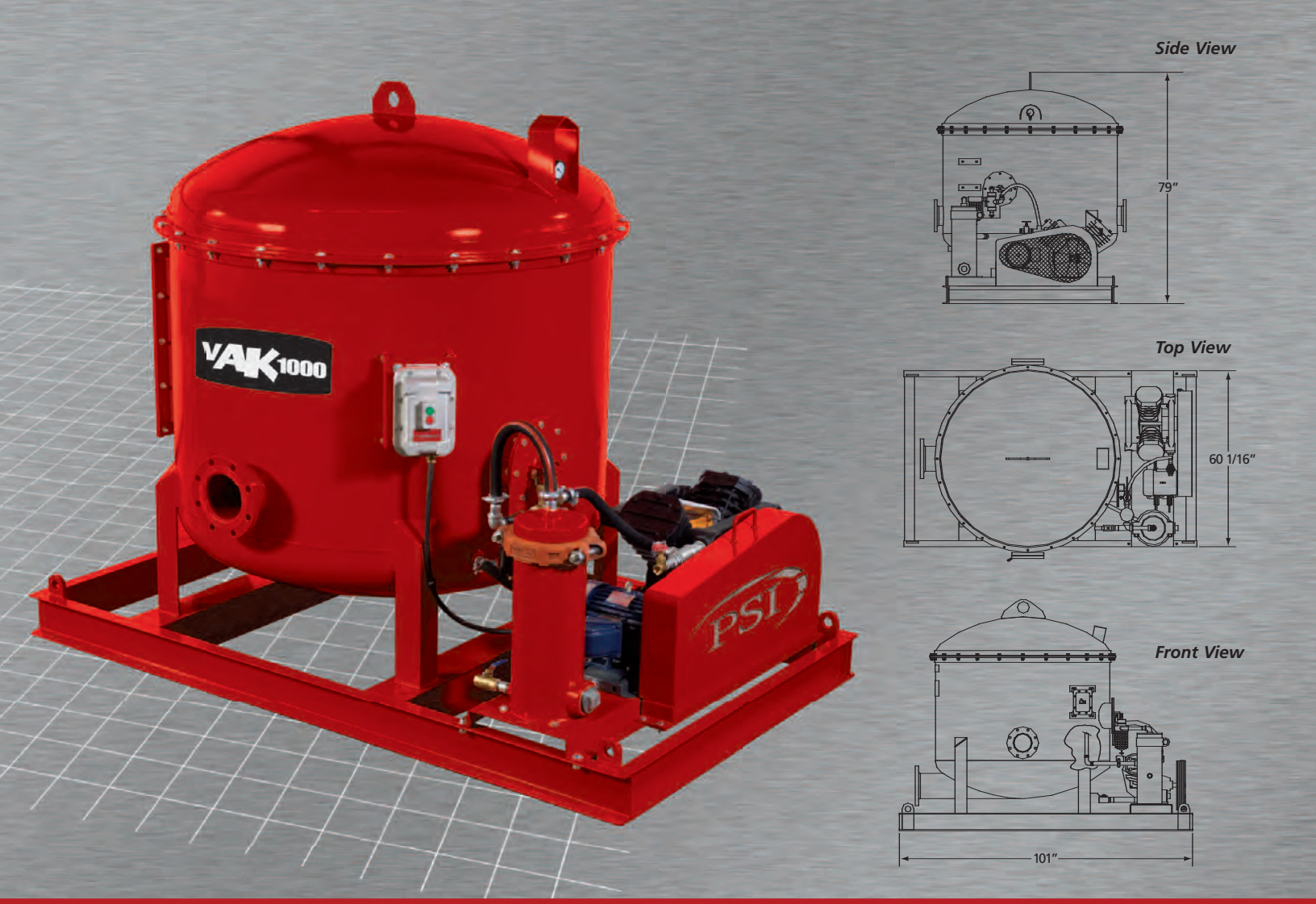


Side View

Top View

Front View

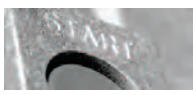
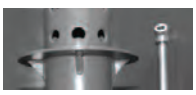
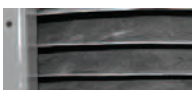
vAK1000 VACUUM DEGASSER

MAX2000®
The Exclusive Line of PSI

The vAK1000 Degasser is a rugged vacuum unit designed to safely and efficiently remove 99.9% of entrained air and gasses such as methane, H_2S and CO_2 from drilling fluids. Designed for the rigors of field use, the unit features a 5 hp, 50 or 60 Hz industrial-grade TEXP motor rated for continuous operation, which powers an Ingersold-Rand vacuum pump. A push-button starter gives operators fingertip control. This self-contained, skid mounted unit supplies up to 29" Hg of vacuum to efficiently handle high-viscosity fluids.

Features:

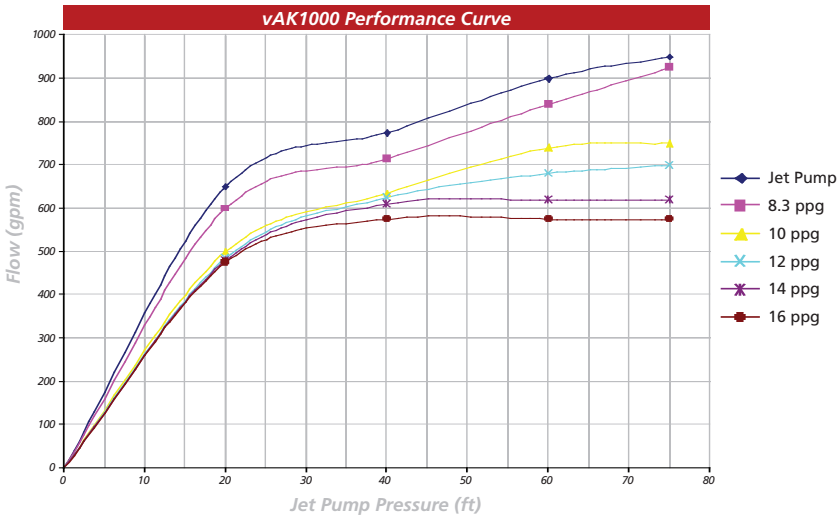
- TEXP 5 hp motor with starter and fan guard
- Up to 29" Hg performance for viscous fluids
- 4600 IN^2 baffle surface area
- Epoxy coated internal surfaces resist corrosion
- Fail-safe overflow valve
- Low-maintenance float assembly
- Easy access to baffles and float switch
- Compact design for easy placement
- Skid mounted, self-contained unit
- Minimum moving parts for reliable operation
- 4000 lb. dry weight


MAX2000®

vAK1000 VACUUM DEGASSER

The vAK1000 operates on the 'thin strata principle' in which a thin layer of drilling fluid is forced over seven baffle plates arranged to maximize surface area and vacuum exposure. Vacuum is applied to the mud as it flows across the baffles. These forces combine to 'break out' 99.9% of entrained gasses. Degassed mud is passed on to downstream handling equipment while waste gas is routed from the rig to be flared or captured by environmental control equipment.



Clean, properly formulated drilling fluids increase the efficiency of drilling operations, reducing down time and extending equipment life.

The vAK1000 features a heavy duty starter complete with weatherproof push-button start / stop control panel.

Innovative separating baffles are made of corrugated fiberglass infused with epoxy for long life. An access plate allows easy maintenance of the baffle and float assemblies.

Constructed of high-quality American steel that meets or exceeds industry standards, the unit houses 4600 IN^2 of innovative separating baffles made of corrugated fiberglass infused with epoxy for long life. The vAK1000 features welded inlet / outlet flanges for easy connections. Welds are inspected and pressure tested to ensure structural integrity. All internal surfaces are coated with industrial epoxy to resist wear and corrosion. A side mounted access plate allows easy access for maintenance.

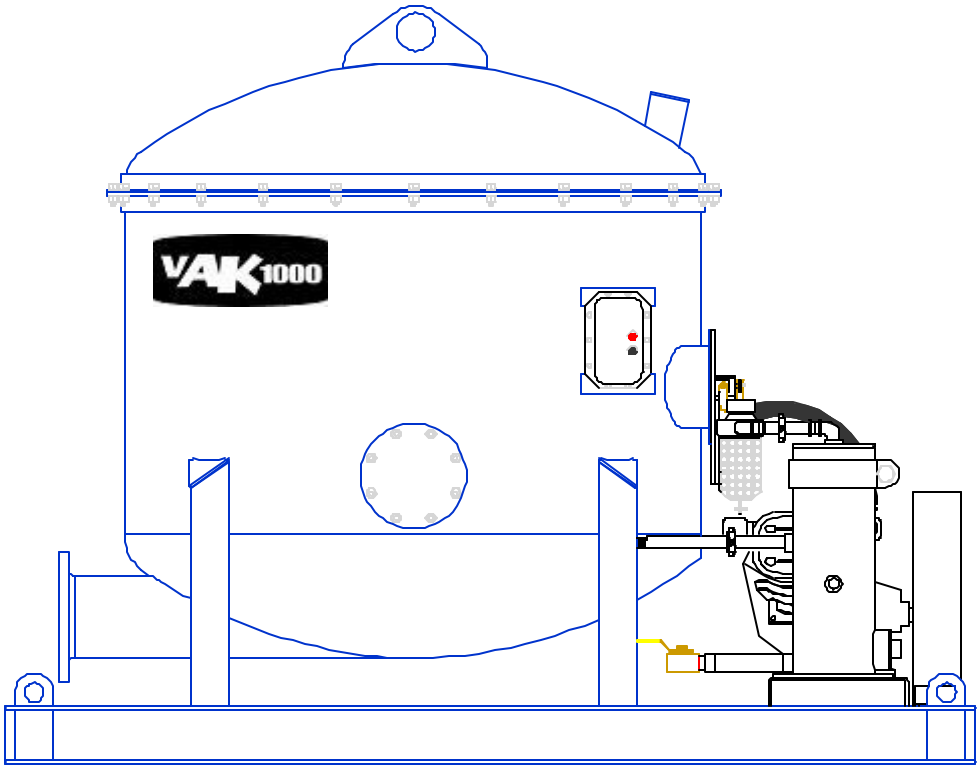
The vAK1000 works with your system to deliver clean, predictable drilling fluids that streamline operations, reduce down time and extend equipment life. Degassing improves workplace safety by minimizing the possibility of an explosive blowout. And it helps you manage gas by products in conformance with environmental standards and regulations.

vAK1000 VACUUM DEGASSER

PSI
Process Solutions International™

5119 Hiltonview Drive | Houston, Texas 77086 | P. (281) 893-4PSI(4774) | Toll (866) 866-4PSI | *psimax2000.com*

VACUUM DEGASSER
vAK1000



INSTALLATION, OPERATION, & MAINTENANCE MANUAL

PROCESS SOLUTIONS INTERNATIONAL
Houston, Texas

Safety First!
Cautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of the vAK1000 Degasser. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the equipment. In addition, the safety precautions below should be followed at all times.

* **TURN OFF. LOCK OUT, and TAG OUT** the electrical power supply to the units before working on the electrical system.

* **Lift the equipment only at lift points** detailed in this manual and use properly rated slings capable of handling the equipment weight. Look for a build up of dried solids or stored equipment in or on the equipment that may cause the lift load to exceed those listed in this manual.

* The structure on which the unit is to be installed must be capable of supporting the operational (wet) weight listed in this manual.

* The unit should only be installed in an area where walkways, lighting, and handrails allow safe access for periodic maintenance.

* Never make weld repairs to the vessel or attach external loads, like cuttings chutes, to the components of the equipment.

* Never lay tools or equipment on degasser.

* Inspect the unit regularly and replace damaged or worn components only with parts supplied by the origianl equipment manufacturer.

Table of Contents

List of Illustrations

Section 1 - Introduction

A. Principle of Operation

The vAK1000 takes advantage of “thin strata” principle. The degassing vessel forces drill mud to flow over seven (7) internal baffle plates with a large surface area so that a thin layer of mud is exposed to the vacuum within the vessel. The thin layer of mud shortens the distance that the gas must migrate through to escape or “break out” of the mud. Mud exits the vessel under the action of the venturi and is returned to the mud system.

The operation of the degasser consists of three separate functions: mud circulation, vacuum creation and gas removal. A venturi nozzle or jet nozzle located in the discharge piping creates vacuum within the vessel and circulates mud by drawing gas-entrained mud into the vessel. The jet nozzle can be plumbed to either the high or low-pressure mud system.

A float within the vessel controls a valve, which opens the tank to atmosphere, stopping the inlet flow of mud when the mud level gets too high. As the level drops the valve closes, vacuum is restored and the mud resumes flowing through the vessel.

The vacuum pump runs continuously to evacuate gas from the vessel. The discharge gas is plumbed to the rig’s flare stack or environmental control system.

B. Role of Degasser

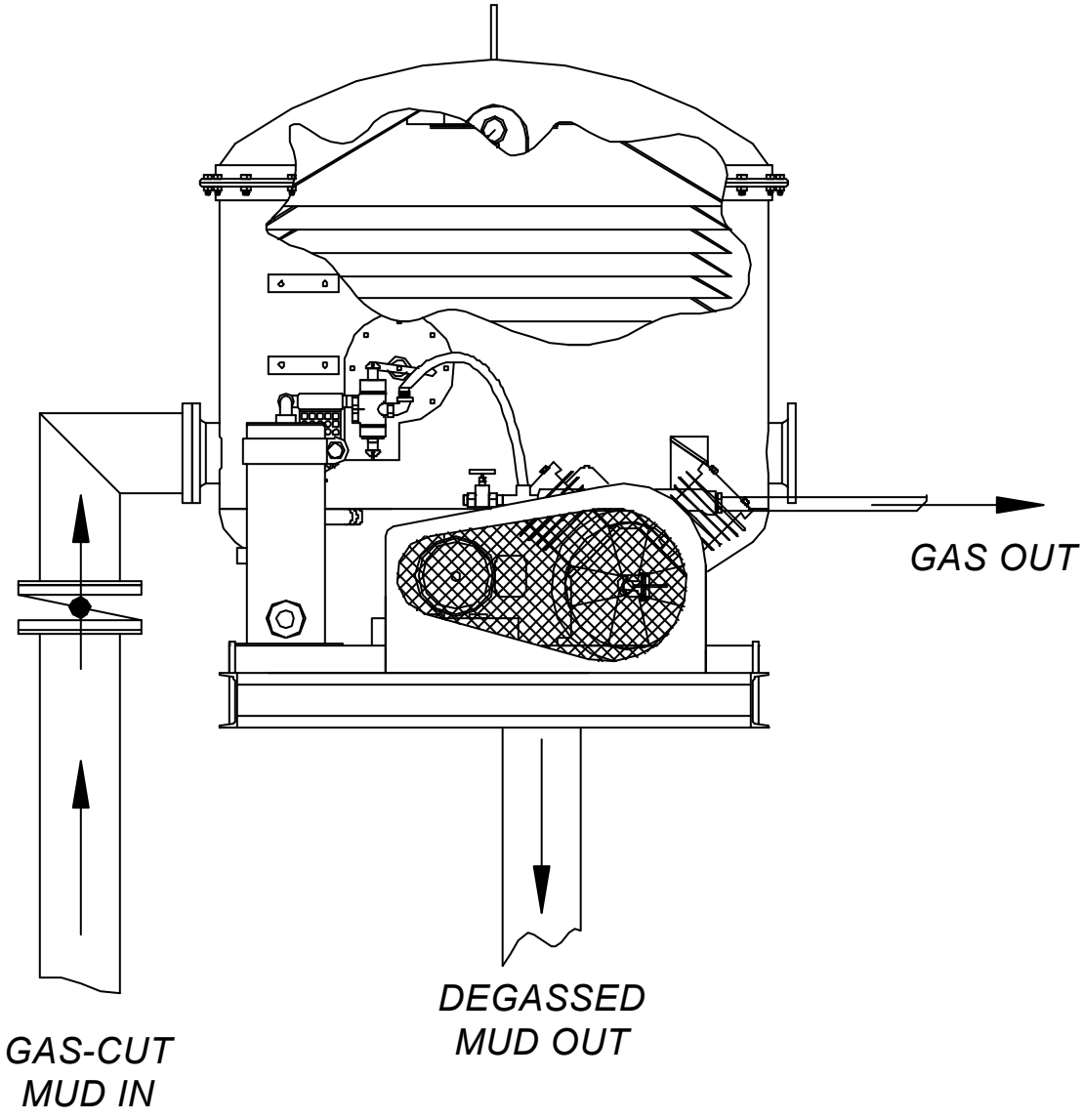
There are two means of degassing mud, vacuum or atmospheric. Tests indicate that vacuum degassing provides superior performance when drilling with weighted muds or when an un-weighted mud’s yield point is greater than 10.

The Process Solutions vAK1000 is a compact design that minimizes deck space. This makes the vAK1000 an effective means of removing entrained gas from the mud prior to re-circulation down hole.

Typically, the vAK1000 is installed downstream of the sand trap ensuring that gas is removed from the mud prior to circulating through the mud system pumps or other solids control equipment.

Section 1 - Introduction

Figure 1.1: PRINCIPLES OF OPERATION



Section 2 - Installation

A. Dimensions

The dimensions and weight for the degasser are given in Figure 2-1 as listed below. This information should be used for reference purposes only. *Certified drawings provided with the equipment will take precedence over any information in this manual.*

B. Lifting Information

Lift the degasser only at lift points only. Use properly rated slings capable of handling the weight of the equipment. Look for a build up of dried solids or unsecured equipment on the unit that may fall during the lift or cause the lift load to exceed those listed in this manual. Use spreaders to avoid damage to the unit. Lift the unit where indicated and placed in position on the support structure.

C. Unpacking

The vAK1000 Degasser is not shipped with both suction and discharge piping. If ordered, remove any coverings from the suction and discharge ports. Remove all tape and strapping to prepare the equipment for inspection.

D. Inspection

The vAK1000 Degasser should be inspected for shipping damage. Manipulate all controls and moving parts to determine that they are mechanically operable. If inspection reveals that the equipment has been damaged in shipment, a report should be filed promptly with the transporting company involved.

E. Foundation/Substructure Requirements

The mud tank or support structure on which the degasser is to be installed must be capable of supporting the maximum wet weight listed in this manual.

F. Location

The vAK1000 Degasser should be installed on or near the mud pit with the bottom of the skid not to exceed 3 feet above the normal operating mud level. Rig design and mud tank design will dictate the placement of the vAK1000.

G. Flow Connections

Suction and discharge pipe should be kept as short as possible. For best results, the bottom of the inlet pipe should be at least six (6) inches above the tank floor and roughly three (3) feet below mud level.

The discharge pipe should extend below the operating mud level. A weir is normally used to permit overflow between suction and discharge pits.

A vent line from the vacuum pump outlet manifold to a safe area should be installed and connected to the flare stack with proper back flow prevention.

Section 2 - Installation

H. Electrical Installation

1. A qualified electrician should make all electric connections to the unit. **Check motor rotation.**

2. Underwriters' Laboratories, Inc. has approved the electric motor for Class 1, Group D hazardous locations. It is strongly recommended that the user refers to the National Electric Code (NEC), Article 501, on Class 1 locations or other codes as applicable so as to select proper electrical equipment for connection of the motor.

3. The service line should be equipped with a diconnecting devise having sufficient interrupting capacity to clear the maximum fault current capability of the immediate power supply system, in the event of a short circuit not cleared by the branch circuit over current devices provided in the motor starters.

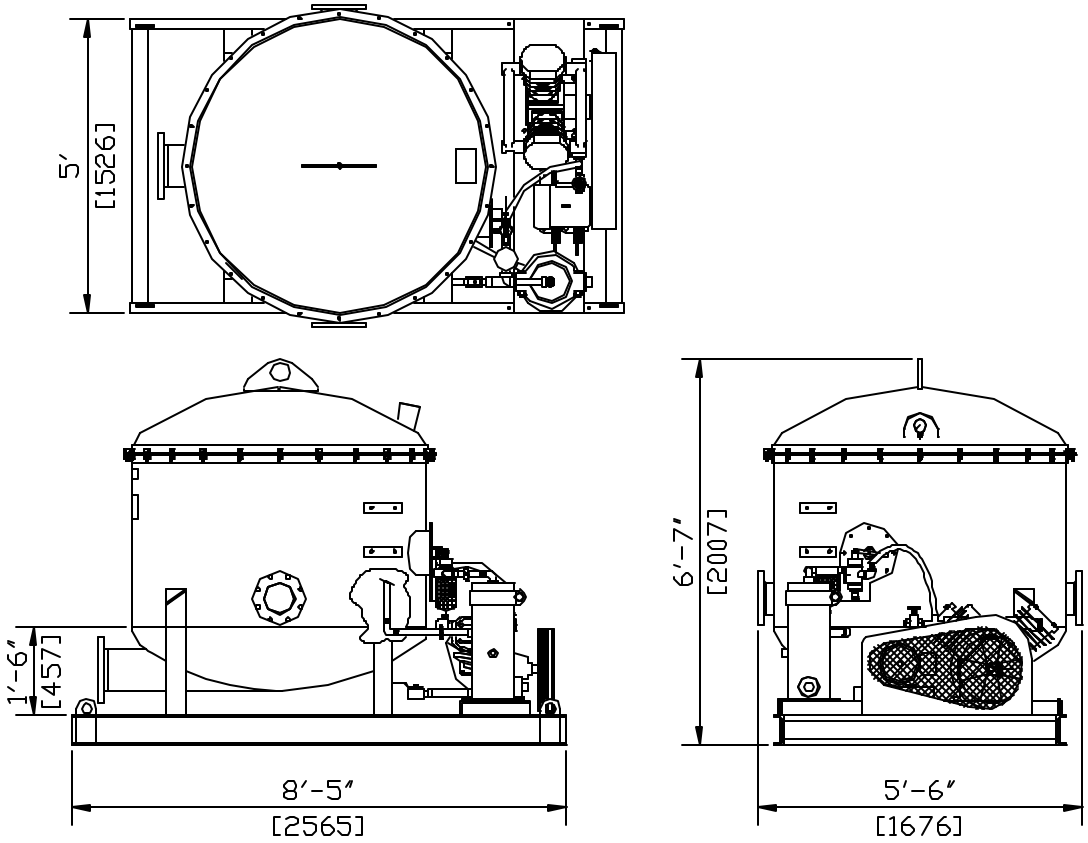
4. Make sure unit is grounded.

CAUTION:
USER MUST PROVIDE A DISCONNECTION DEVICE BREAKER IN ACCORDANCE WITH LOCAL ELECTRICAL CODES.

Section 2 - Installation

FIGURE 2.1: DIMENSIONAL & WEIGHT DATA

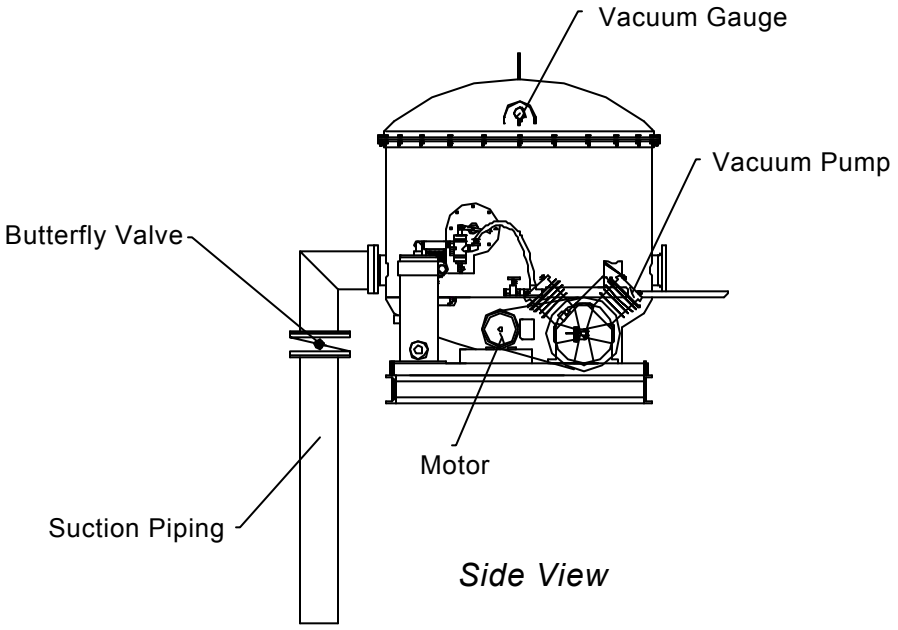
vAK100 Degasser



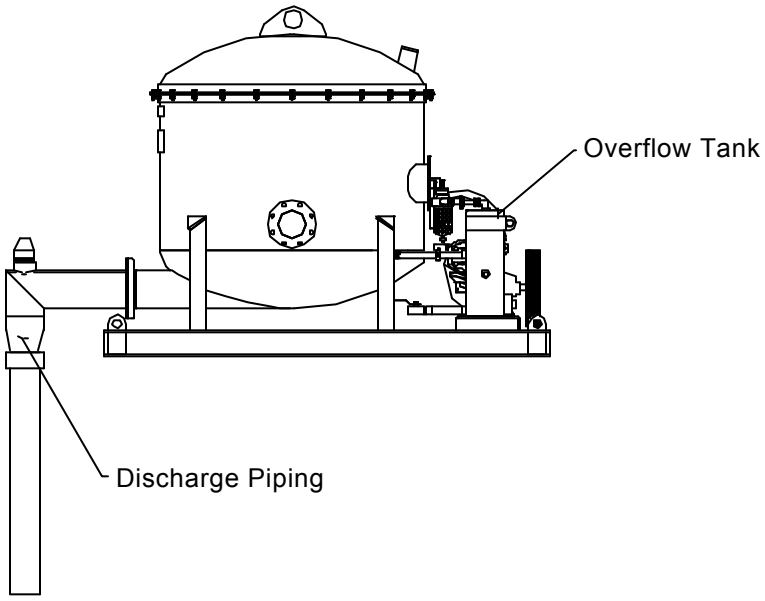
	Lb	Kg
Dry Weight	**2,895**	**1,314**
Wet Weight	**11,900**	**5,177**

Section 2 - Installation

Figure 2.2: MAJOR COMPONENTS



Side View



Front View

Section 3 - Operation

A. Inspection

Prior to starting, a visual inspection should be made of the unit. If the unit has to be moved or has not run for an extended time then a more thorough inspection process would be warranted to determine that dried solids have not accumulated within the vessel.

B. Starting the Degasser

1. After installing and thoroughly inspectiong the unit make sure that no foreign objects are laying on the degasser.
2. Drain overflow tank.
3. Check the oil in the vacuum pump and change if dirty or contaminated with water. Change the oil at leat once each month. Use SAE30 or SAE40 oil, non-detergent.
4. Check the belts.
5. Open the 1” valve in the vertical vacuum line between the float operated control valve and the vacuum pump.
6. Adjust the butterfly valve on the suction line.
7. Start the motor on the vacuum pump.
8. Open the jet nozzle valve.
9. Open the valve in the mud line to the discharge jet nozzle.

Before Repair/Maintenance make sure both precautions below are followed.

Turn Off, Lock Out, and Tag Out the electrical power before attempting to perform maintenance on the vAK1000.

Turn Off, Lock Out, and Tag Out the pump feeding the discharge jet.

Section 4 - Maintenance

A. Lubrication

Check the crankcase oil level of the vacuum pump daily and add oil as required, to overflow point. Drain and replace oil at least once each month, for best performance. Replace with SAE30 or SAE40 weigh non-detergent oil.

B. Motor Maintenance

The explosion proof motor requires no lubrication or maintenance.

C. V-Belt

The vacuum pump V-belt may need tightening periodically.

D. Float and Three Way Valve

The float and three way valve must be regularly check to be sure that there is free movement and that the valve is still operational.

Section 5 - Troubleshooting

ITEM	PROBLEM AREA	CAUSE/ SOLUTION
1	**Low Flow**	**Cause**: Insufficient jet nozzle pressure. **Solution**: Increase the mud flow to jet nozzle.
		Cause: Jet nozzle partially plugged. **Solution**: Remove and clean jet nozzle.
		Cause: Mud suction covered by sand or plugged **Solution**: Remove sand or plugging.
		Cause: Butterfly valve partially closed. **Solution**: Open butterfly valve.
2	**Air in Mud**	**Cause**: Leak in pump packing. **Solution**: Check leaks; repack if required.
		Cause: Leak in discharge line between degasser & jet nozzle. **Solution**: Tighten fittings on discharge piping.
		Cause: Suction line picking up air because insufficient mud level. **Solution**: Lower suction pipe or throttle back on damper valve to decrease flow through unit
3	**Vacuum Pump**	**Cause**: The vacuum pump uses or discharges oil. **Solution**: Piston rings are excessively worn or defective. Replace piston rings.
		Cause: Knocking in vacuum pump by worn or damaged crankpin bearings. **Solution**: Check bearings and replace if necessary.
		Cause: Connecting rods broken or loose. **Solution**: Check and repair as necessary.
		Cause: Crankshaft broken or cracked. **Solution**: Check and repair as necessary.
		Cause: Piston pins loose or missing. **Solution**: Check and repair as necessary.
4	**Motor**	**Cause**: Excessive motor noise or overheating. Motor bearings worn. **Solution**: Overhaul or replace motor.

Section 6 – Parts Lists

A. Ordering Spare Parts

Replacement parts for the vAK1000 can be ordered from Process Solutions. The following illustrations and part lists give a part number, which may be used to place orders.

Process Solutions stocks replacement parts for immediate shipment. It is important to identify the serial number of the degasser when ordering parts.

B. Field Service

Process Solutions experienced field service personnel available. Contact Process Solutions, should you need a factory-trained representative to visit your location.

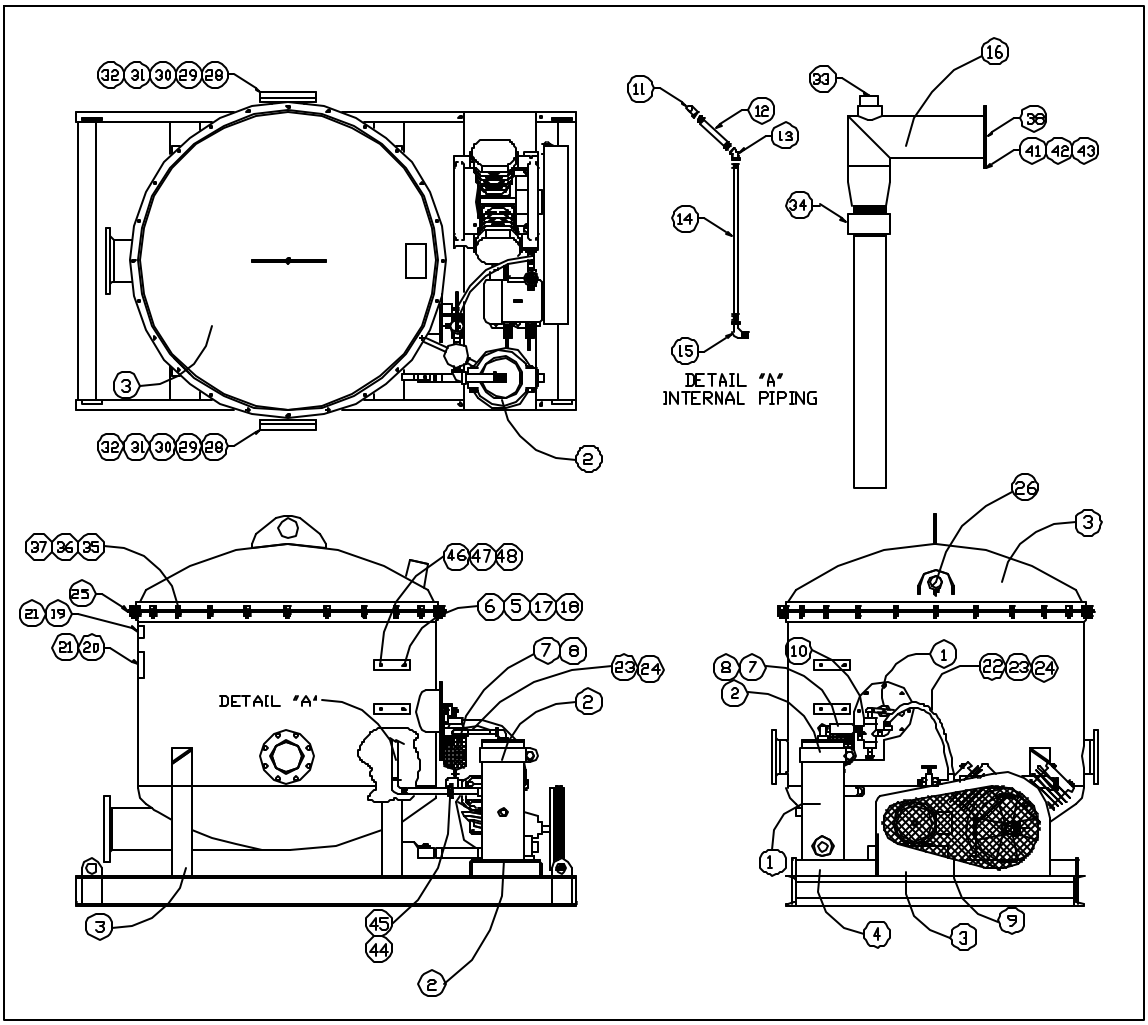
C. Getting Help

To order parts, schedule service, or get answers to questions contact:

Process Solutions
Houston, Texas
Direct: 281-893-4774
Toll Free: 866-866-4774

Section 6 – Parts Lists

FIGURE 6.1: DEGASSER ASSEMBLY



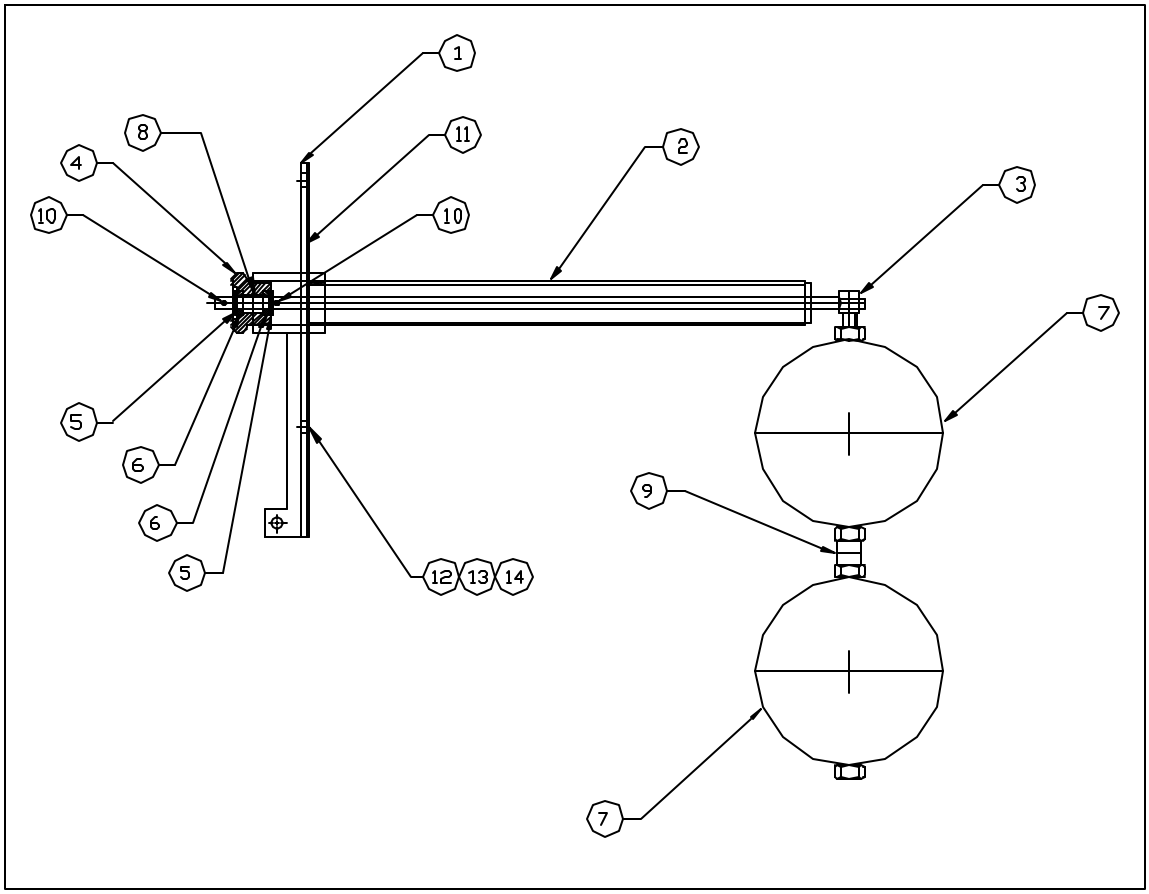
DEGASSER ASSEMBLY			
ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
1	FLOAT SHAFT ASSEMBLY	1	N/A
2	PUMP VAC., COND. TANK & MOTOR ASSY	1	N/A
3	BASE & VESSEL WELDMENT vAK1000	1	AK1204031
4	VACUUM PUMP & MOTOR ASSY	1	D255
5	HEATER	3	B-049
6	STARTER MANUAL	1	B-050
7	FILTER, AIR	1	AK1204035
8	ELEMENT FILTER AIR	REF	N/A
9	GUARD, BELT VAK	1	AK1204027
10	VALVE, 3 WAY	1	AK1204018
11	TEE, 1"	1	AK1204015
12	NIPPLE, 1" X 8-1/2"	1	AK1204016

Section 6 – Parts Lists

DEGASSER ASSEMBLY			
ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
13	ELBOW, 45 DEG. 1"	1	AK1204017
14	PIPE, NIPPLE 1" X 31.5”	1	AK1204014
15	STREET L, 1"	1	AK1204013
16	PIPING, DISCHARGE ASSEMBLY	1	N/A
17	CABLE, ARMORED	4'	10-4GEXOL050
18	SEAL ¾ NPT X/P	1	753A-3/4
19	NAMEPLATE S/N	1	N/A
20	NAMEPLATE Process Solutions 5 X 13	1	N/A
21	SCREW DRIVE #7	8	N/A
22	NIPPLE KC 1" NPT 1" HOSE	6	AK1204071
23	HOSE CLAMP	1	AK1204045
24	HOSE 1” X 18”		AK1204043
25	GASKET, 60"	1	AK1204036
26	GAUGE, VACUUM 1/2" NPT BOTTOM	1	AK1204030
27	LEAF FIBERGLASS vAK1000	7	AK1204070
28	GASKET, 6" 150#	6	AK1204064
29	BLANK FLANGE 6" 150 #	2	AK1204065
30	SCREW HEX CAP 3/4 -10 X 3	16	N/A
31	NUT HEX 3/4 -10	16	N/A
32	WASHER LOCK 3/4	16	N/A
33	NIPPLE, JET X 1-1/2"	1	N/A
34	COUPLING FULL 6" NPT	1	AK1204071
35	BOLT 1/2" X 2-1/2"	24	N/A
36	NUT, 1/2" NYLOCK	24	N/A
37	WASHER FLAT 1/2	24	N/A
38	G X G 6"		AK1204063
41	SCREW HEX 5/8-11 X 2	8	N/A
42	WASHER LOCK 5/8	8	N/A
43	NUT HEX 5/8-11	8	N/A
44	UNION 1”	1	N/A
45	NUT 3/8–16 HEX	8	N/A
46	SCREW 3/8 –16 X 3/4	8	N/A
47	WASHER 3/8 FLAT	8	N/A
48	SPACER LEAF FIBERGLASS	7 as needed	AK1204069

Section 6 – Parts Lists

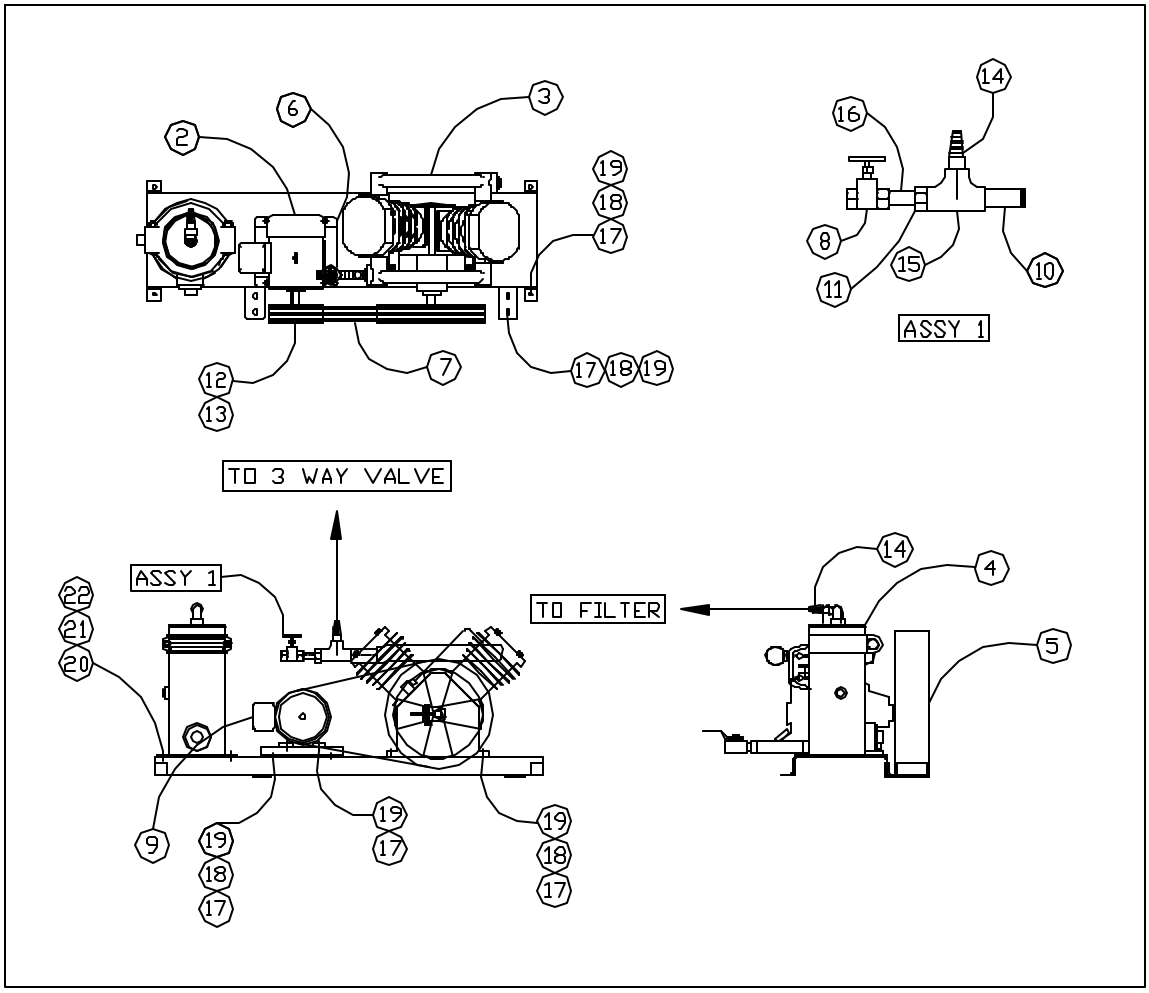
Figure 6.2: FLOAT SHAFT ASSEMBLY



FLOAT SHAFT ASSEMBLY			
LINE ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
1	FLANGE, FLOAT SHAFT vAK1000	1	AK1204001
2	GUIDE FLOAT SHAFT vAK1000	1	AK1204002
3	SHAFT, FLOAT SHAFT vAK1000	1	AK1204003
4	BUSHING, FLOAT SHAFT vAK1000	1	AK1204004
5	WASHER, FLAT ½	1	N/A
6	SEAL FLOAT SHAFT vAK1000	2	AK1204005
7	FLOAT BALL 8" STAINLESS	2	AK1204006
8	BEARING BRONZE FLOAT SHAFT	1	AK1204068
9	STUD, 5/8” X 4-1/2” LG	1	AK1204007
10	PIN, ROLL	2	AK1204008
11	GASKET 8 HOLE 10.25 BC	1	AK1204009
12	SCREW HEX ½ -13 X 1-1/2	8	N/A
13	NUT HEX ½ -13	8	N/A
14	WASHER LOCK ½	8	N/A

Section 6 – Parts Lists

Figure 6.3: PUMP VAC., COND. TANK & MOTOR ASSEMBLY



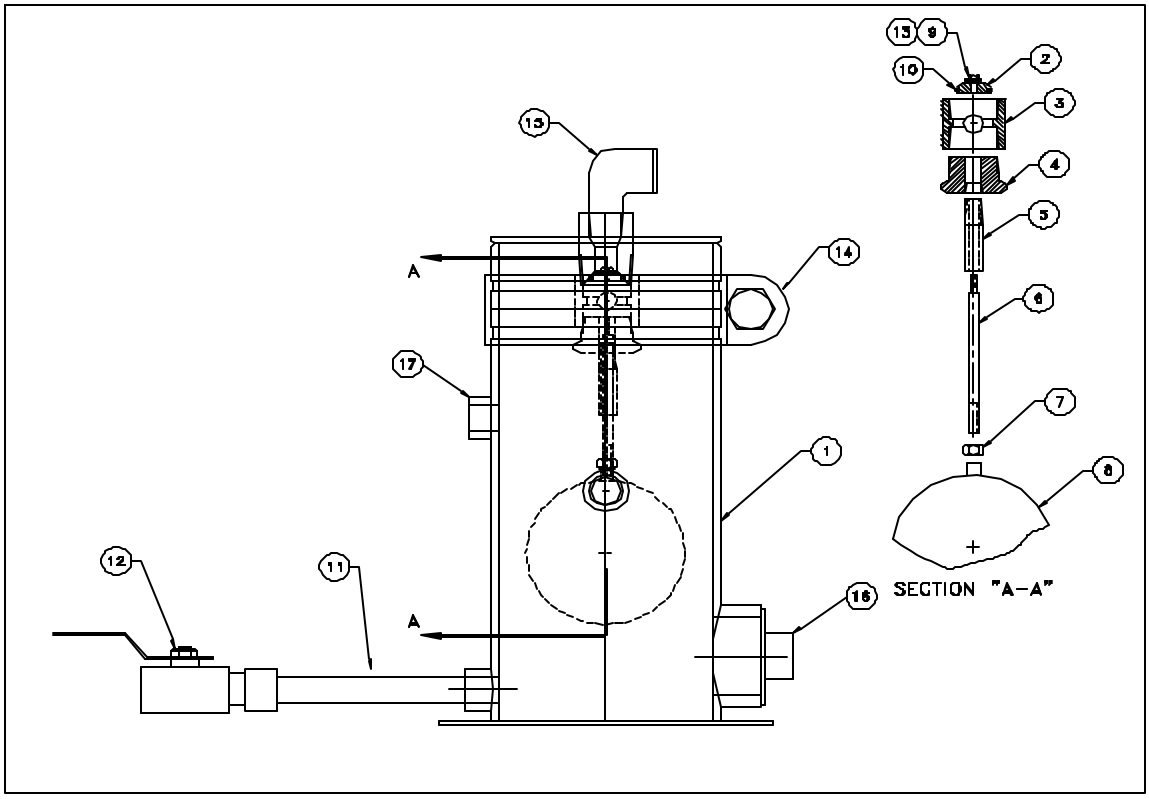
PUMP VAC., COND. TANK & MOTOR ASSEMBLY			
LINE ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
1	BASE EQUIP vAK1000	1	N/A
2	MOTOR EXP 5HP 1800 RPM	1	XP5184T
3	PUMP VACUUM FITS vAK1000-48	1	D255
4	CONDENSATE TANK ASSY	1	N/A
5	GUARD BELT vAK1000	1	AK1204027
6	MOTOR BASE 184T	1	AK1204060
7	BELT AX-78	3	AX78
8	3/4" GATE VALVE	1	AK1204055

Section 6 – Parts Lists

PUMP VAC., COND. TANK & MOTOR ASSEMBLY			
LINE ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
12	BUSHING QD SK X 1-1/8 BORE	1	118SD
13	SHEAVE A/B 3GR 46 SD	1	AK1204024
14	NIPPLE KC 1" NPT X 1" HOSE		AK1204071
15	REDUCER TEE 1 1/12 X 1 1/2 X 1	1	AK1204051
16	PIPE NIPPLE 3/4" X 3" SCH 40	1	AK1204053
17	NUT 1/2 -13 HEX	18	N/A
18	SCREW 1/2 -13X 2-1/2 HHC GR5	18	N/A
19	WASHER 1/2 LOCK	18	N/A
20	NUT 5/8-11 HEX	4	N/A
21	SCREW 5/8-11 X 1-1/2 HHC GR5	4	N/A
22	WASHER 5/8 LOCK	4	N/A

Section 6 – Parts Lists

Figure 6. 4: CONDENSATE TANK



CONDENSATE TANK			
LINE ITEM	**DESCRIPTION**	**QTY REQUIRED**	**PART NUMBER**
1	TANK, CONDENSATE vAK-1000-48	1	AK1204072
2	SEAT, BUMP VALVE vAK-1000-48	1	AK1204073
3	COLLAR BUMP VALVE vAK-1000-48	1	AK1204074
4	BUSHING, GUIDE vAK-1000-48	1	AK1204075
5	GUIDE, ROD FITS vAK-1000-48	1	AK1204076
6	ROD, BUMP VALVE vAK-1000-48	1	AK1204077
7	NUT, 3/8-24 UNF NYLOCK SST	1	
8	BALL, FLOAT 6" SST vAK-1000-48	1	AK1204078
9	NUT, HEX 10-24 SST	1	AK1204079
10	O-RING 1.06 ID X 1.31 OD	1	AK1204080
11	NIPPLE, PIPE 1" X 4" LG SCH 40	1	AK1204081
12	VALVE, BALL 1	1	AK1204059
13	WASHER, FLAT #10 SST	1	AK1204083
14	CLAMP, VICT. 8" W/SEAL	1	AK1204066
15	ELBOW, STREET 1" NPT	1	
16	PLUG 3” NPT SQ HEAD	1	AK1204084
17	PLUG 1” NPT SQ HD	1	AK1204085

Section 7 - Recommended Spare Parts

FOR VERTICAL vAK1000

ITEM	DESCRIPTION	1 YEAR QTY.	PART NO.
1	HEATER, B11.5	9	AK1204049
2	FILTER AIR	1	AK1204035
3	3-Way Valve	1	AK1204018
4	VACUUM PUMP OIL	5	AK1204086
5	FLOAT SHAFT SEAL	2	AK1204005
6	BELTS, AX78	6	AX78
7	6” BLIND FLANGE GASKET	2	AK1204074
8	MANWAY / INSPECTION PORT GASKET	2	AK1204041
9	VACUUM GAUGE, 30” Hg	2	AK1204030
10	HOSE CLAMP, 1”	4	AK1204023
11	VACUUM HOSE, 1” X 18”	4	AK1204043
12	CERAMIC JET NOZZLE	1	9620258
13	HOLDER FOR CERAMIC NOZZLE	1	9620257
14	JET NOZZLE REDUCER SWEDGE, 4X2	1	9620108
15	5 HP, XP, 1800 RPM, 230/460V MOTOR	1	XP 5 184T
16	GASKET, LID, 60” DIAMETER	2	AK1204036
17	GASKET, SUPPORT PLATE	2	AK1204009

Section 8 – Subcomponents

Manual Motor Starter

- **Single and 3 Phase**
- **Front Accessible**
- **Pressure Type Wire Connectors**
- **Complete Line of Enclosures**
- **Low Voltage Protection (LVP) Option**
- **Remote Stop Control**
- **Pilot Light Indication**
- **Padlock Option**
- **Meets OSHA Requirements**
- **UL Approved File #E10590**
- **CSA Certified File #LR6535**

NEMA 7 & 9
Class I Group C & D
Class II Group E, F & G

Across the line manual starters and contactors provide control for machinery where start stop remote control is not required (optional remote stop available). Class 11 manual starters are used for single and poly-phase motors up to 10 Hp. Starters have melting alloy overload relays which help protect against damage due to excessive current caused by a sustained overload, low line voltage or single phasing of the motor.

Contactors provide control for inherently protected motors. Typical applications include metal and woodworking machinery, grinders, power saws, conveyors, fans, pumps, blowers, textile and packaging machinery, slitters, and paper cutters.

Class 11 manual controllers have front accessible pressure type wire connectors. Ample wiring space is provided for easy wiring.

A complete line of general purpose and industrial duty enclosures is available as well as open type mounting for custom-built enclosures. These manual controllers are available with low voltage protection, which will automatically open the power poles when the voltage drops or the power is interrupted. A remote stop function may be incorporated with the low voltage protection coil as a factory option to provide remote or semi-automatic operation.

Class 11 controllers provide the OSHA requirements for protecting personnel from potential injury caused by the automatic start up of machinery following a voltage drop or power interruption when low volt-age protection is specified.

Open styles and devices in NEMA 1, 4, 7 & 9, 12 enclosures can be padlocked in the Off position.

Section 8 – Subcomponents

Coil Data (for units with LVP option)

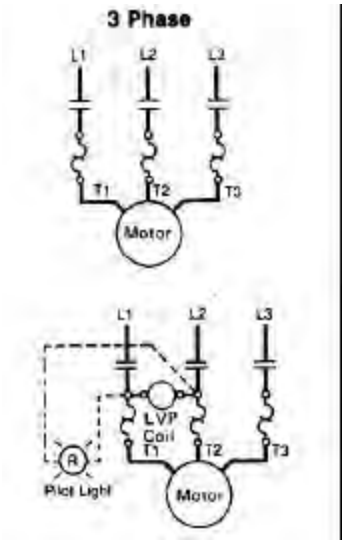
Class	Watts	Volts 60Hz	Inrush Open Magnet Amps	Inrush Open Magnet VA	Normal Sealed Magnet Amps	Normal Sealed Magnet VA
		120	.15		.108	
11	4	240	.075	18	.054	13
		480	.037		.027	

Manual Motor Starter

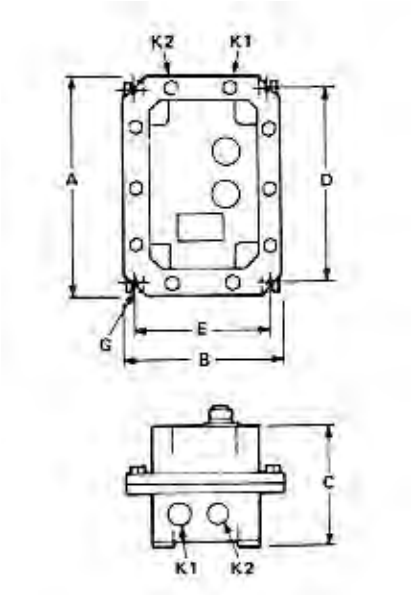
Replacement AC Coils

Description	Size	Model	Volts, 60Hz	Cat No
For Replacement	All	B	120	
Only on Starters			208	
With Low Voltage			240	
Protection			480	

Wiring Diagram



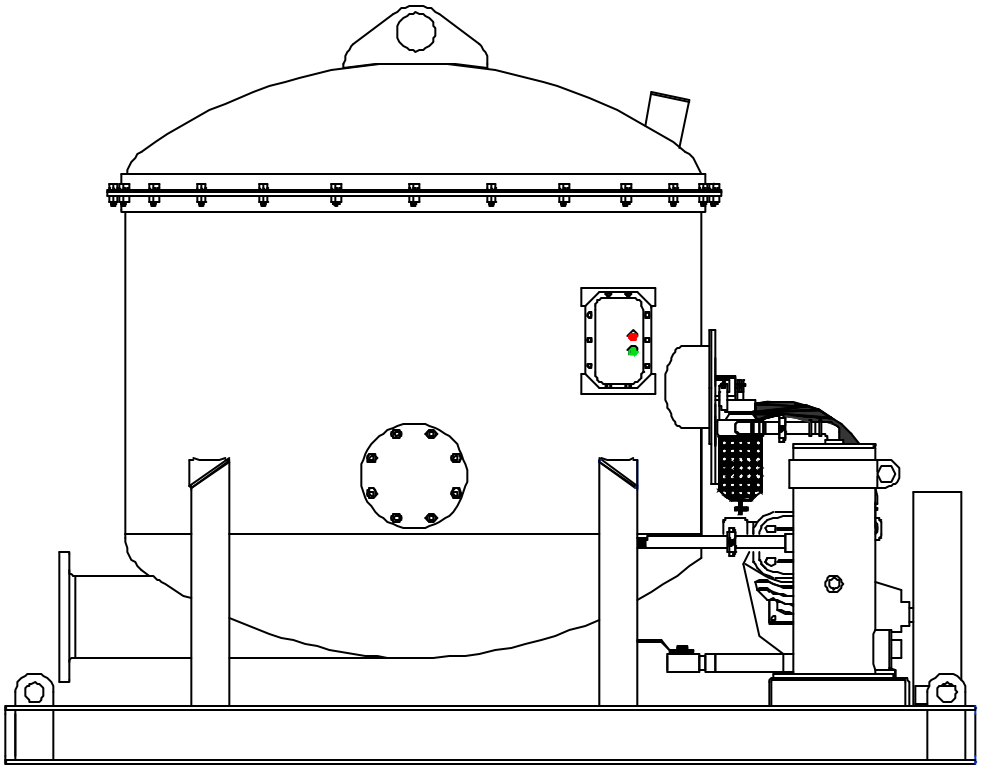
Dimensions (Inches)



Dimensions

Enclosure Type	Outline Dimensions A	B	C	Mtg Dimensions D	E	Mtg Screw G	Conduit Size K1	K2	Max Wire Size
NEMA 7&9	11	7 1/8	5 7/8	9 3/16	6 1/16	3/8	1/2	3/4	8

VACUUM DEGASSER
vAK500



INSTALLATION, OPERATION, & MAINTENANCE MANUAL

PROCESS SOLUTIONS INTERNATIONAL
5119 Hiltonview Road
Houston, TX 77086
(281) 893-4774
(281) 893-1027 fax

Safety First!
Cautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of the vAK500 Degasser. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the equipment. In addition, the safety precautions below should be followed at all times.

? TURN OFF. LOCK OUT, and TAG OUT the electrical power supply to the unit before working on the electrical system.

? Lift the equipment only at lift points detailed in this manual and use properly rated slings capable of handling the equipment weight. Look for a build up of dried solids or stored equipment in or on the equipment that may cause the lift load to exceed those listed in this manual.

? The structure on which the unit is to be installed must be capable of supporting the operational (wet) weight listed in this manual.

? The unit should only be installed in an area where walkways, lighting, and handrails allow safe access for periodic maintenance.

? Never make weld repairs to the vessel or attach external loads, like cuttings chutes, to the components of the equipment.

? Never lay tools or equipment on degasser.

? Inspect the unit regularly and replace damaged or worn components only with parts supplied by the original equipment manufacturer.

Table of Contents

List of Illustrations

Section 1- Introduction

A. Principle of Operation

The vAK500 takes advantage of “thin strata” principle. The degassing vessel forces drill mud to flow over four internal baffle plates with a large surface area so that a thin layer of mud is exposed to the vacuum within the vessel. The thin layer of mud shortens the distance that the gas must migrate through to escape or “break out” of the mud. Mud exits the vessel under the action of the venturi and is returned to the mud system.

The operation of the degasser consists of three separate functions, mud circulation, vacuum creation, and gas removal. A venturi nozzle or jet nozzle located in the discharge piping creates vacuum within the vessel and circulates mud by drawing gas-entrained mud into the vessel. The jet nozzle can be plumbed to either the high or low-pressure mud system.

A float within the vessel controls a valve, which opens the tank to atmosphere, stopping the inlet flow of mud when the mud level gets too high. As the level drops the valve closes, vacuum is restored and the mud resumes flowing through the vessel.

The vacuum pump runs continuously to evacuate gas from the vessel. The discharge gas is plumbed to the rig’s flare or environmental control system.

B. Role of Degasser

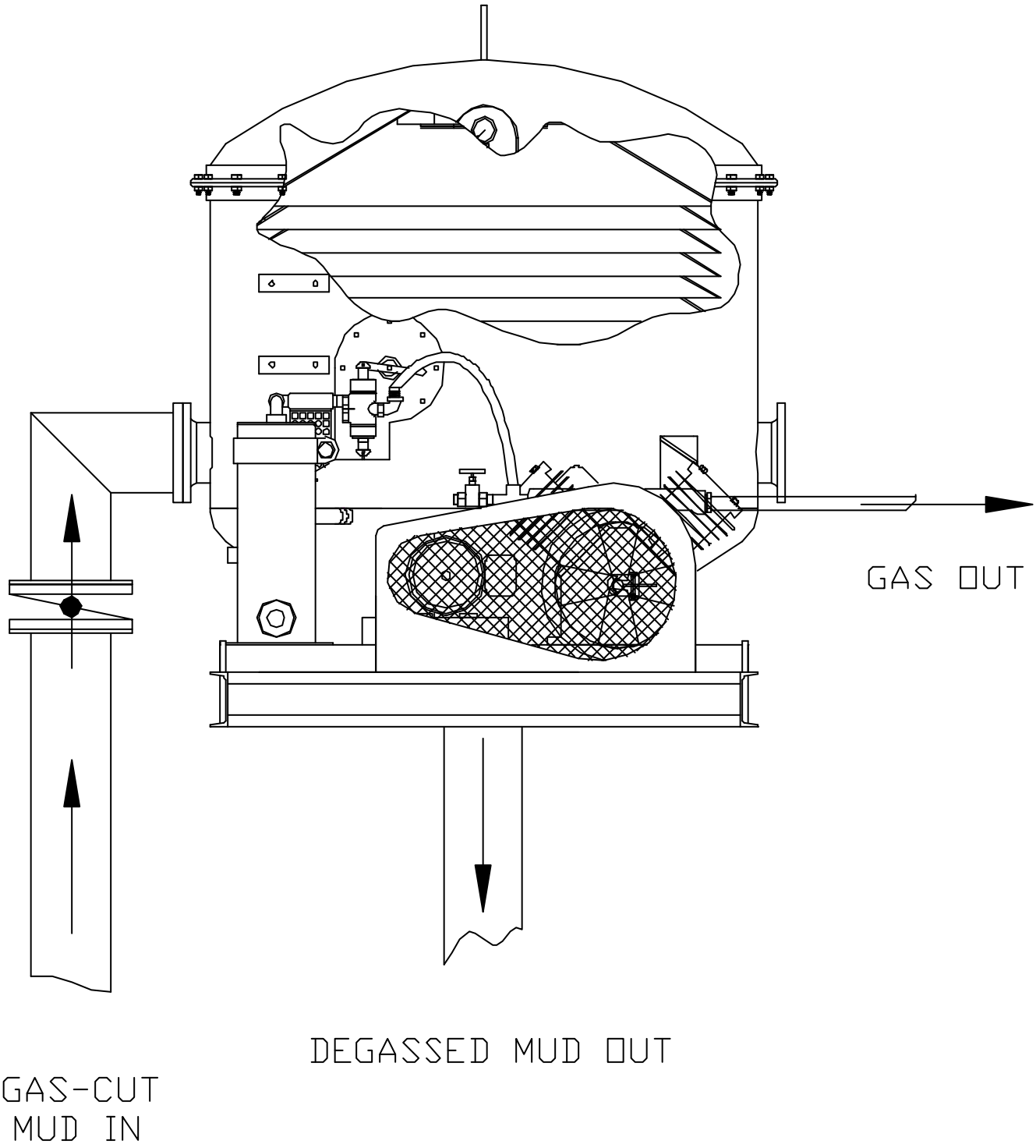
There are two means of degassing mud, vacuum or atmospheric. Tests indicate that vacuum degassing provides superior performance when drilling with weighted muds or when an un-weighted mud’s yield point is greater than 10.

The Process Solutions vAK500 is a compact design that minimizes deck space. This makes the vAK500 an effective means of removing entrained gas from the mud prior to re-circulation down hole.

Typically, the vAK500 is installed downstream of the sand trap, ensuring that gas is removed from the mud prior to circulating through the mud system pumps or other solids control equipment.

Section 1 - Introduction

Figure 1.1: PRINCIPLES OF OPERATION



Section 2 - Installation

A. Dimensions

The dimensions and weight for the degasser are given in Figures 2-1 as listed below. This information should be used for reference purposes only. *Certified drawings provided with the equipment will take precedence over any information in this manual.*

B. Lifting Information

Lift the degasser only at lift points only. Use properly rated slings capable of handling the weight of the equipment. Look for a build up of dried solids or unsecured equipment on the unit that may fall during the lift or cause the lift load to exceed those listed in this manual. Use spreaders to avoid damage to unit. Lift the unit where indicated and place in position on the support structure.

C. Unpacking

The vAK500 Degasser is not shipped with both suction and discharge piping. If ordered, remove any coverings from the suction and discharge ports. Remove all tape and strapping to prepare the equipment for inspection.

D. Inspection

The vAK500 Degasser should be inspected for shipping damage. Manipulate all controls and moving parts to determine that they are mechanically operable. If inspection reveals that the equipment has been damagaed in shipment, a report should be filed promptly with the transporting company involved.

E. Foundation/Substructure Requirements

The mud tank or support structure on which the degasser is to be installed must be capable of supporting the maximum wet weight listed in this manual.

F. Location

The vAK500 Degasser should be installed on or near the mud pit with the bottom of the skid no t to exceed 3 feet above the normal operating mud level. Rig design and mud tank design will dictate the placement of the vAK500.

G. Flow Connections

Suction and discharge pipe should be kept as short as possible. For best results, the bot tom of the inlet pipe should be at least six inches above the tank floor and roughly three feet below the mud level.

The discharge pipe should extend below the operating mud level. A weir is normally used to permit overflow between suction and discharge pits.

A vent line from the vacuum - pump outlet manifold to a safe area should be installed and connected to the flare stack with proper back flow prevent.

Section 2 - Installation

H. Electrical Installation

1. A qualified electrician should make electric connections to the unit. Check motor rotation.

2. Underwriters Laboratories, Inc. for Class 1, Group D hazardous location. It is strongly recommended that the user refers to the National Electric Code, Article 501, on Class 1 locations or other codes as applicable so as to select proper electrical equipment for connection of motor.

3. The service line should be equipped with a disconnecting device having sufficient interrupting capacity to clear the maximum fault current capability of the immediate power supply system in the event of a short circuit not cleared by the branch circuit over - current devices provided in the motor starters.

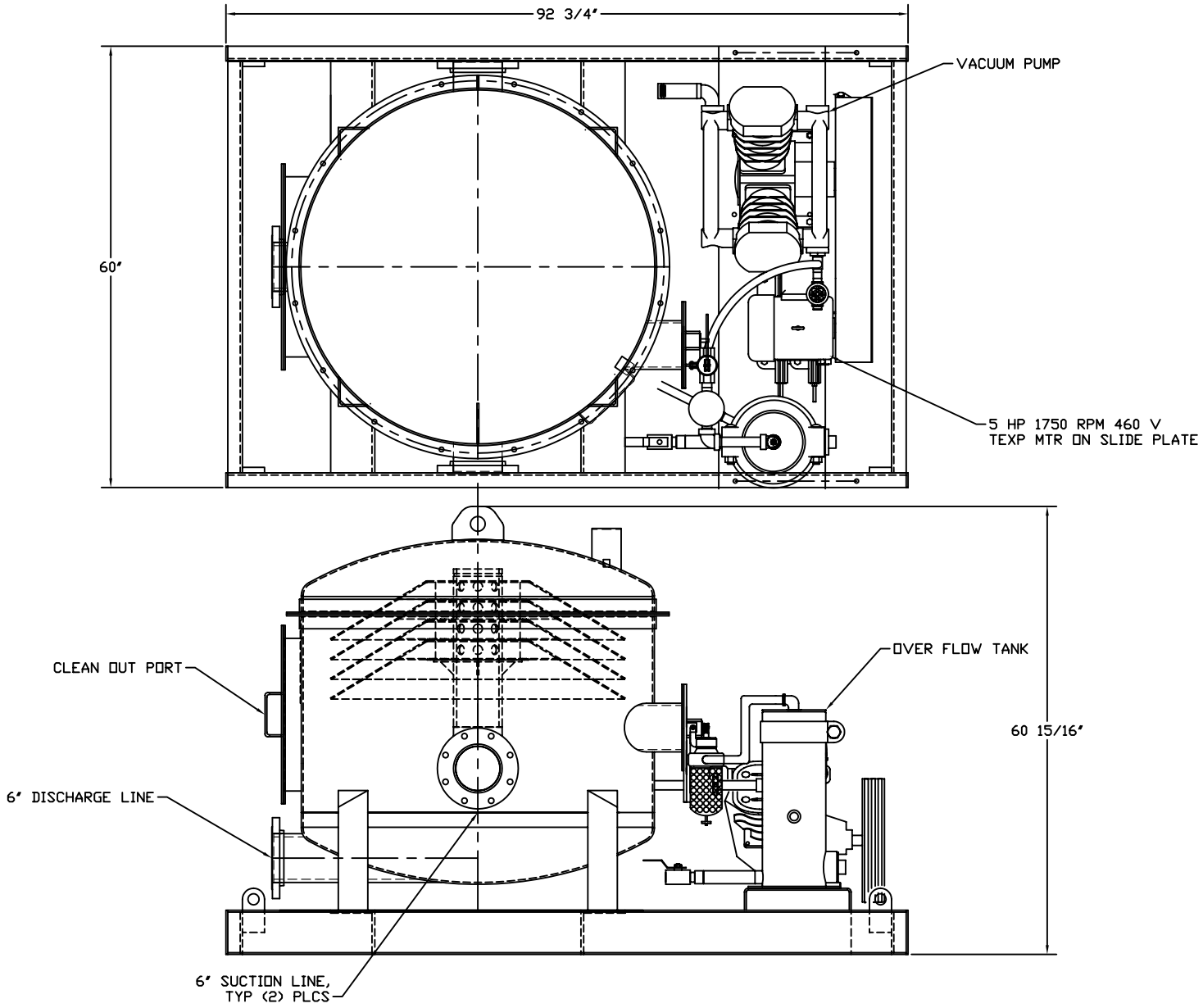
4. Make sure unit is grounded.

CAUTION:
USER MUST PROVIDE A
DISCONNECTING DEVICE
BREAKER IN ACCORDANCE
WITH LOCAL ELECTRICAL CODES.

Section 2 - Installation

FIGURE 2.1: DIMENSIONAL & WEIGHT DATA

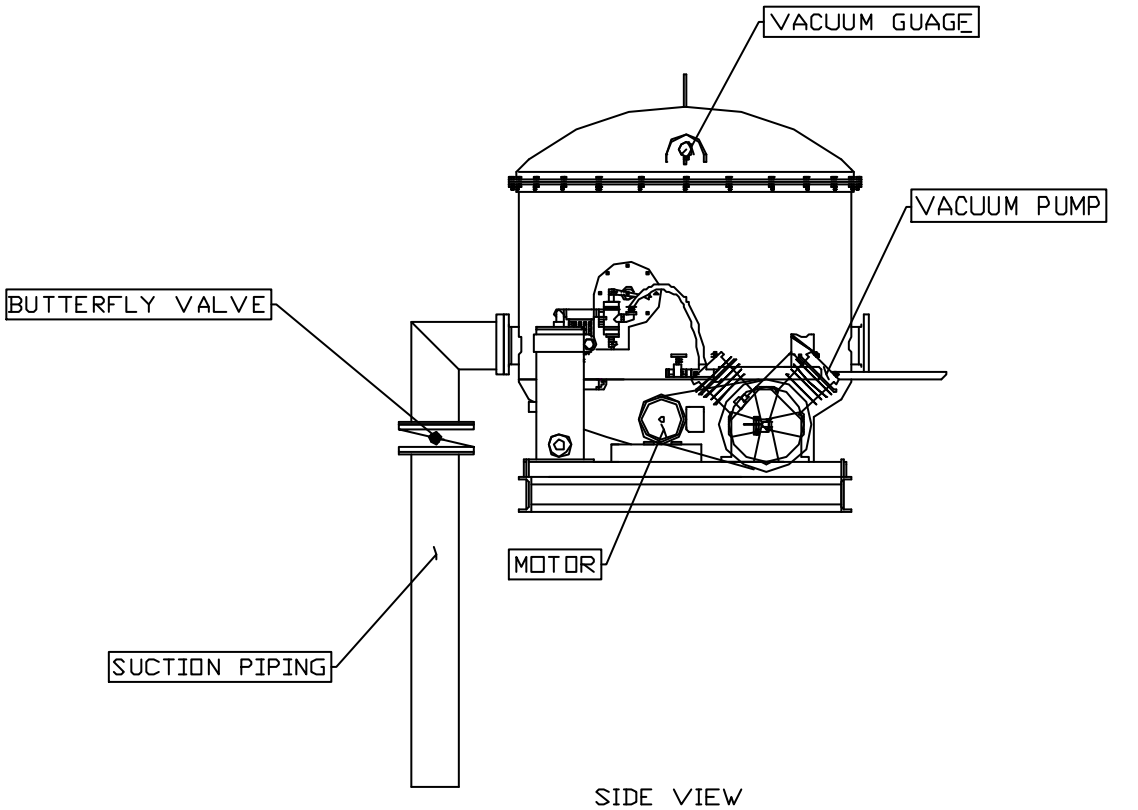
vAK500 Degasser



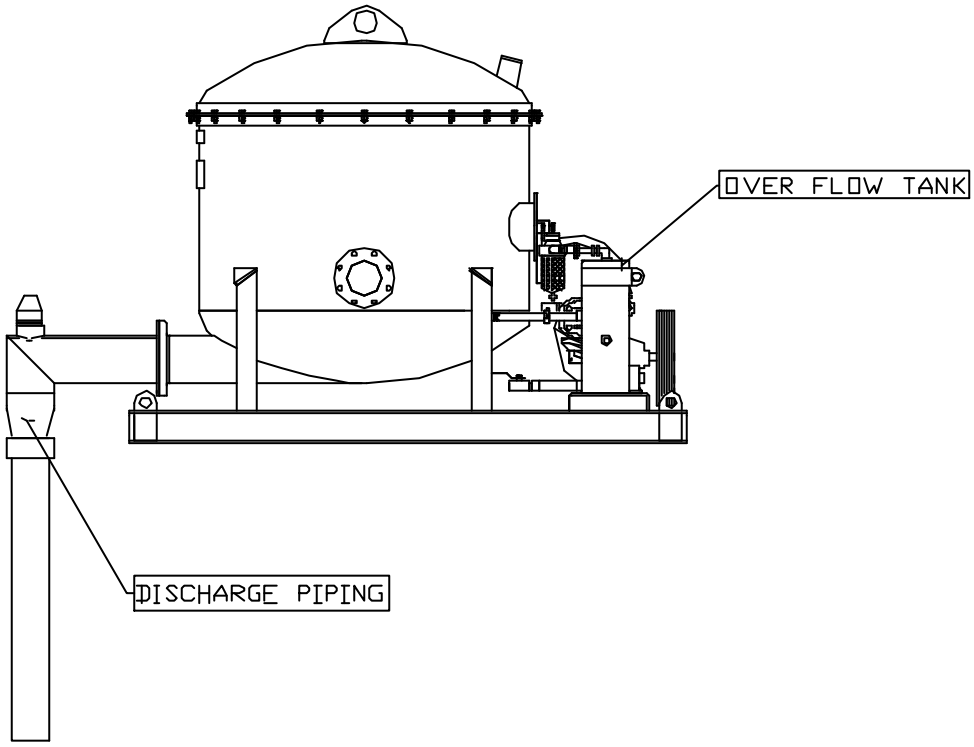
	Lb	Kg
Dry Weight	2,410	1,094
Wet Weight	10,700	4,855

Section 2 - Installation

Figure 2.2: MAJOR COMPONENTS



SIDE VIEW



FRONT VIEW

Section 3 - Operation

A. Inspection

Prior to starting, a visual inspection should be made of the unit. If the unit has to be moved or has not run for an extended time then a more thorough inspection process would be warranted to determine that dried solids have not accumulated within the vessel.

B. Starting the Degasser

1. After installing and thoroughly inspecting the unit make sure that no foreign objects are laying on the degasser.
2. Drain overflow tank.
3. Check the oil in the vacuum pump and change if dirty or contaminated with water. Change the oil at least once each month. Use SAE30 or 40 oil, non-detergent.
4. Check the belts.
5. Open the 1” valve in the vertical vacuum line between the float operated control valve and the vacuum pump.
6. Adjust the butterfly valve on the suction line.
7. Start the motor on the vacuum pump.
8. Open the jet nozzle valve.
9. Open the valve in the mud line to the discharge jet nozzle.

Before Repair/Maintenance make sure both precautions below are followed.

Turn Off, Lock Out, and Tag Out the electrical power before attempting to perform maintenance on the vAK500.

Turn Off, Lock Out, and Tag Out the pump feeding the discharge jet.

Section 4 - Maintenance

A. Lubrication

Check the crankcase oil level of the vacuum pump daily and add oil as needed to overflow point. Drain and replace oil at least once each month, for best performance. Replace with SAE30W - 40W non-detergent oil.

B. Motor Maintenance

The explosion proof motor requires no lubrication or maintenance.

C. V-Belt

The vacuum pump V-belt may need to be tightening periodically.

D. Float and Three Way Valve

The float and three way valve must be regularly check to be sure that there is free movement and that the valve is still operational.

Section 5 - Troubleshooting

ITEM	PROBLEM AREA	CAUSE/ SOLUTION
1	**Low Flow**	**Cause**: Insufficient jet nozzle pressure. **Solution**: Increase the mud flow to jet nozzle.
		Cause: Jet nozzle partially plugged. **Solution**: Remove and clean jet nozzle.
		Cause: Mud suction covered by sand or plugged **Solution**: Remove sand or plugging.
		Cause: Butterfly valve partially closed. **Solution**: Open butterfly valve.
2	**Air in Mud**	**Cause**: Leak in pump packing. **Solution**: Check leaks; repack if required.
		Cause: Leak in discharge line between degasser & jet nozzle. **Solution**: Tighten fittings on discharge piping.
		Cause: Suction line picking up air because insufficient mud level. **Solution**: Lower suction pipe or throttle back on damper valve to decrease flow through unit
3	**Vacuum Pump**	**Cause**: The vacuum pump uses or discharges oil. **Solution**: Piston rings are excessively worn or defective. Replace piston rings.
		Cause: Knocking in vacuum pump by worn or damaged crankpin bearings. **Solution**: Check bearings and replace if necessary.
		Cause: Connecting rods broken or loose. **Solution**: Check and repair as necessary.
		Cause: Crankshaft broken or cracked. **Solution**: Check and repair as necessary.
		Cause: Piston pins loose or missing. **Solution**: Check and repair as necessary.
4	**Motor**	**Cause**: Excessive motor noise or overheating. Motor bearings worn. **Solution**: Overhaul or replace motor.

Section 6 - Parts Lists

A. Ordering Spare Parts

Replacement parts for the vAK500 can be ordered from Process Solutions. The following illustrations and part lists give a part number, which may be used to place orders.

Process Solutions stocks replacement parts for immediate shipment. It is important to identify the serial number of the degasser when ordering parts.

B. Field Service

Process Solutions experienced field service personnel available. Contact Process Solutions, should you need a factory trained representative to visit your location.

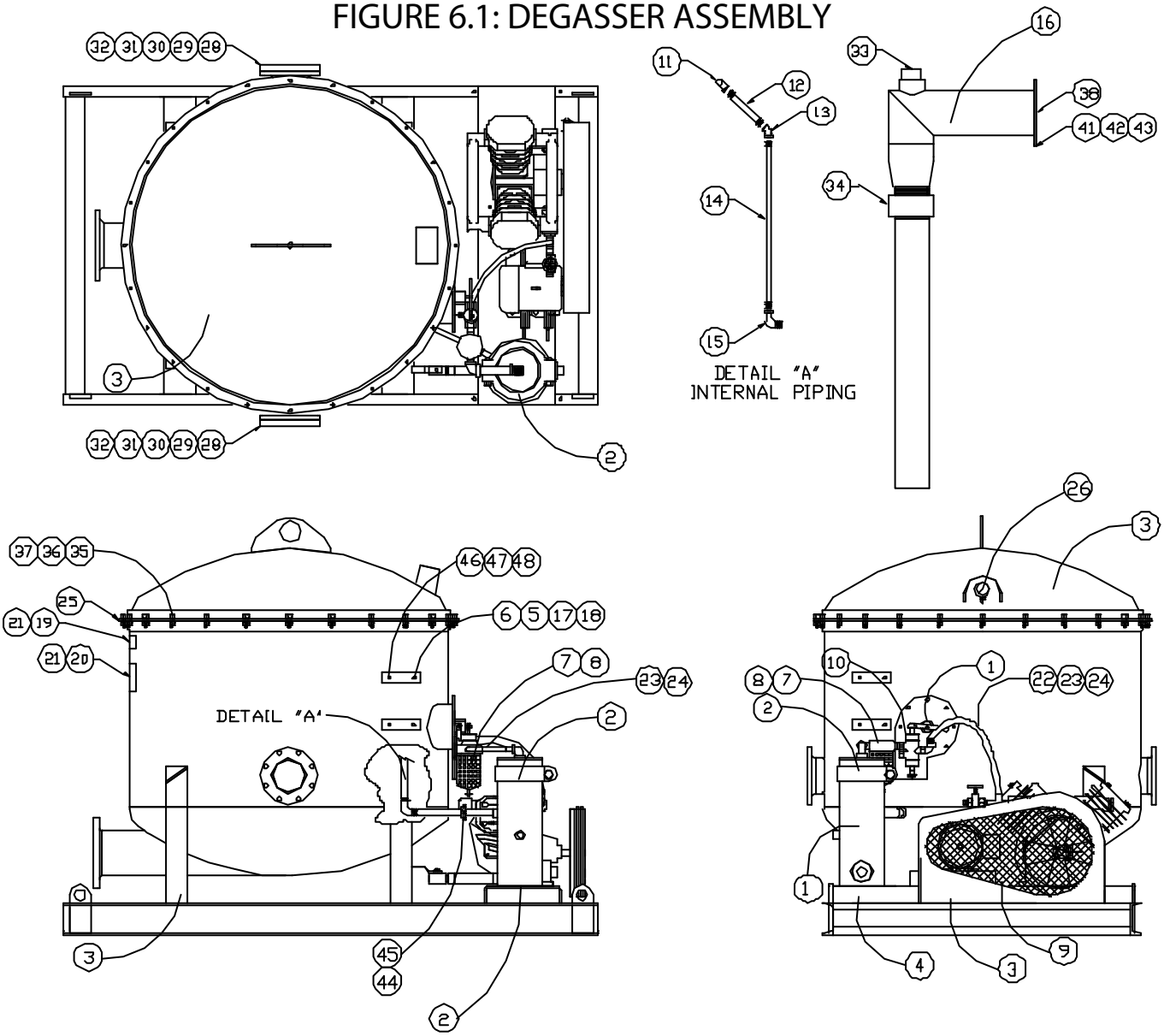
C. Getting Help

To order parts, schedule service, or get answers to questions contact:

Process Solutions International
Houston, Texas
Direct: 281-893-4774
Toll Free: 866-866-4774

Section 6 – Parts Lists

FIGURE 6.1: DEGASSER ASSEMBLY



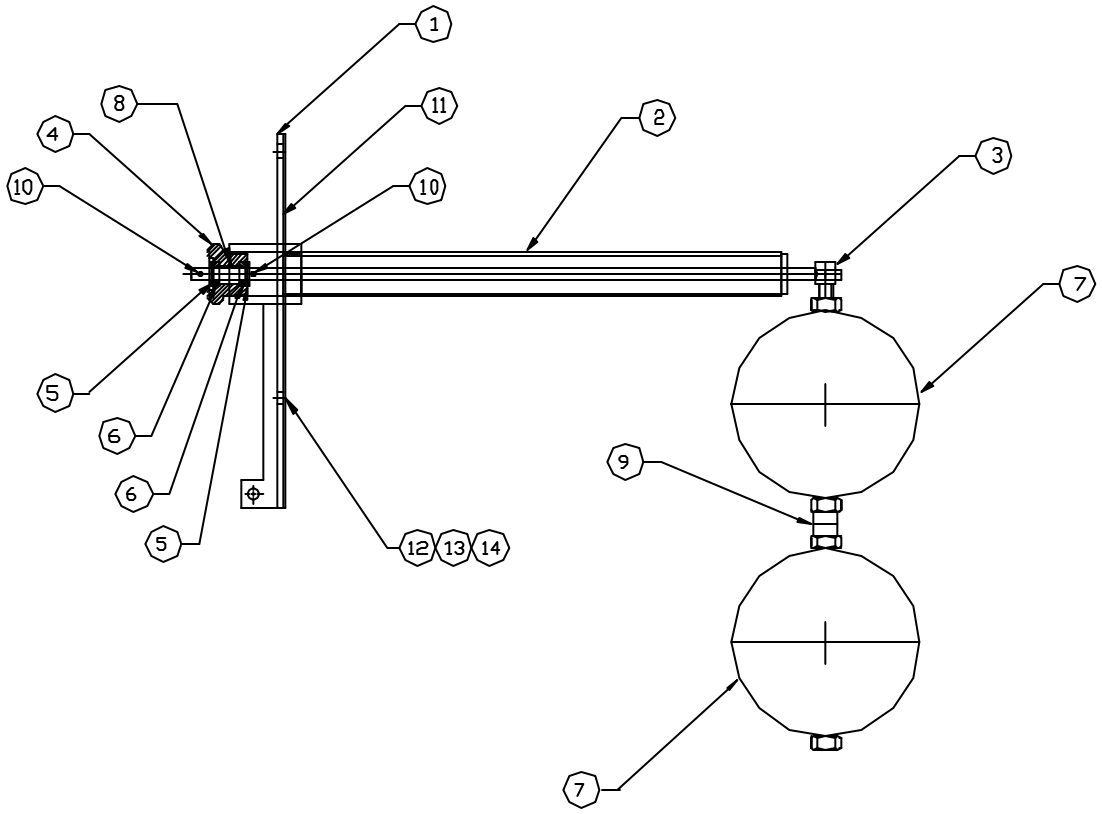
DEGASSER ASSEMBLY			
ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
1	FLOAT SHAFT ASSEMBLY	1	N/A
2	OVERFLOW TANK ASSEMBLY	1	N/A
3	BASE & VESSEL WELDMENT	1	AK1204031
4	VACUUM PUMP & MOTOR ASSY	1	D255
5	HEATER	3	B-22
6	STARTER MANUAL	1	MAN 5 HP ST
7	FILTER, AIR	1	AK1204035
8	ELEMENT FILTER AIR	REF	N/A
9	GUARD, BELT	1	AK1204027
10	VALVE, 3 WAY	1	AK1204018
11	TEE, 1"	1	AK1204015
12	NIPPLE, 1" X 8 - 1/2"	1	AK1204016

Section 6 - Parts Lists

DEGASSER ASSEMBLY			
ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
13	ELBOW, 45 DEG. 1"	1	AK1204017
14	PIPE, NIPPLE 1" X 31.5"	1	AK1204014
15	STREET L, 1"	1	AK1204013
16	PIPING, DISCHARGE ASSEMBLY	1	
17	CABLE, ARMORED	4'	10-4GEXOL050
18	SEAL ¾ NPT X/P	1	753A-3/4
19	NAMEPLATE S/N	1	N/A
20	NAMEPLATE Process Solutions 5 X 13	1	N/A
21	SCREW DRIVE #7	8	N/A
22	NIPPLE KC 1" NPT 1" HOSE	6	AK1204071
23	HOSE CLAMP	1	AK1204045
24	HOSE 1" X 18"	3	AK1204043
25	GAS KET, 60"	1	AK1204036
26	GAUGE, VACUUM 1/2" NPT BOTTOM	1	AK1204030
27	LEAF FIBERGLASS	4	AK5004070
28	GASKET, 6" 150#	6	AK1204064
29	BLANK FLANGE 6" 150 #	2	AK1204065
30	SCREW HEX CAP 3/4-10x3"	16	N/A
31	NUT HEX 3/4-10	16	N/A
32	WASHER LOCK 3/4	16	N/A
33	NIPPLE, JET X 1-1/2"	1	N/A
34	COUPLING FULL 6" NPT	1	AK1204071
35	BOLT 1/2" X 2-1/2"	24	N/A
36	NUT, 1/2" NYLOCK	24	N/A
37	WASHER FLAT 1/2	24	N/A
38	G X G 6"		AK1204063
41	SCREW HEX 5/8-11 x 2"	8	N/A
42	WASHER LOCK 5/8	8	N/A
43	NUT HEX 5/8-11	8	N/A
44	UNION 1"	1	N/A
45	NUT 3/8–16 HEX		
46	SCREW 3/8 –16 X 3/4		N/A
47	WASHER 3/8 FLAT		
48	SPACER LEAF FIBERGLASS	4	AK1204069

Section 6 - Parts List

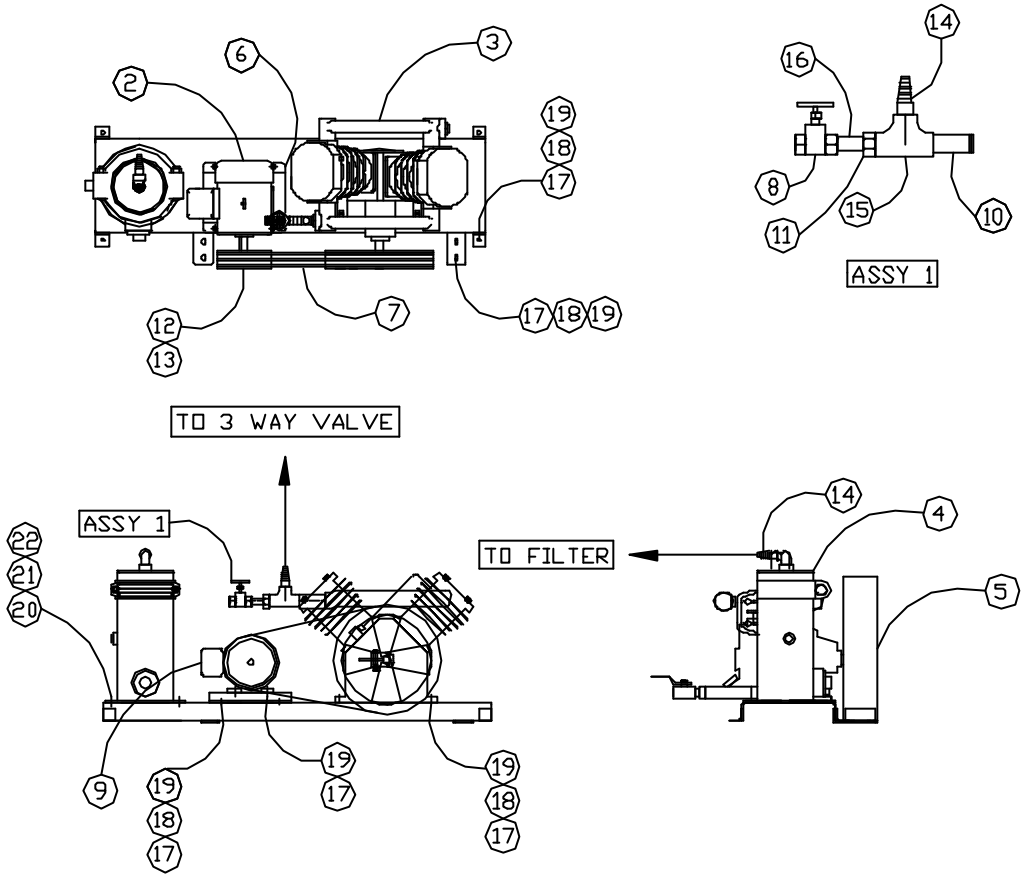
Figure 6.2: FLOAT SHAFT ASSEMBLY



FLOAT SHAFT ASSEMBLY			
LINE ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
1	FLANGE, FLOAT SHAFT	1	AK1204001
2	GUIDE FLOAT SHAFT	1	AK1204002
3	SHAFT, FLOAT SHAFT	1	AK1204003
4	BUSHING, FLOAT SHAFT	1	AK1204004
5	WASHER, FLAT ½	1	N/A
6	SEAL FLOAT SHAFT	2	AK1204005
7	FLOAT BALL 8" STAINLESS	2	AK1204006
8	BEARING BRONZE FLOAT SHAFT	1	AK1204068
9	STUD, 5/8" X 4-1/2" LG	1	AK1204007
10	PIN, ROLL	2	AK1204008
11	GASKET 8 HOLE 10.25 BC	1	AK1204009
12	SCREW HEX ½" - 13 x 1-1/2"	8	N/A
13	NUT HEX ½" - 13	8	N/A
14	WASHER LOCK ½	8	N/A

Section 6 - Parts List

Figure 6.3: PUMP VAC., COND. TANK & MOTOR ASSEMBLY



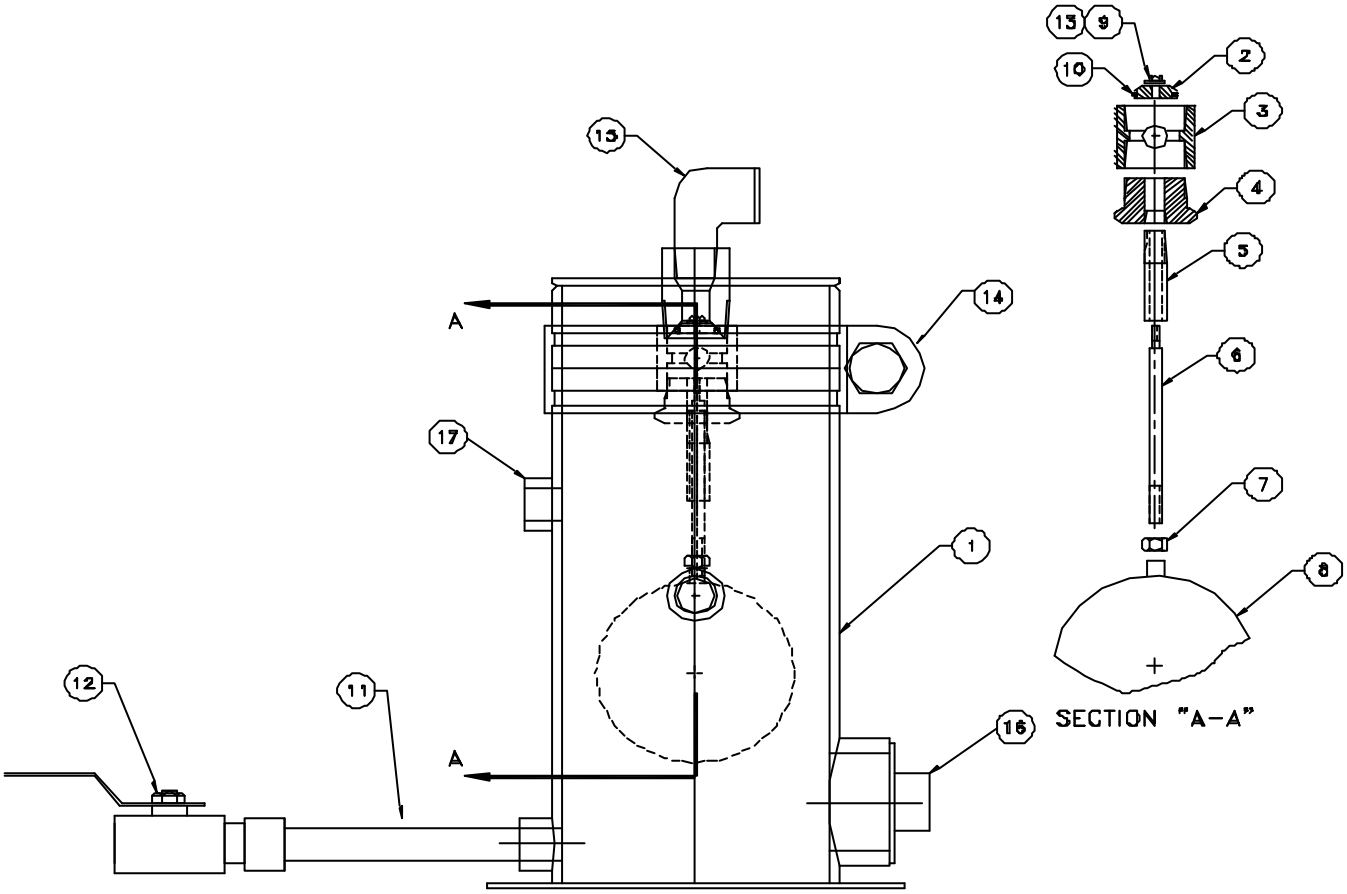
PUMP VAC., COND. TANK & MOTOR ASSEMBLY			
LINE ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
1	BASE EQUIP	1	N/A
2	MOTOR EXP 5HP 1800 RPM	1	XP5184T
3	PUMP VACUUM FITS	1	D255
4	CONDENSATE TANK ASSY	1	N/A
5	GUARD BELT	1	AK1204027
6	MOTOR BASE 184T	1	AK1204060
7	BELT AX-78	3	AX78
8	3/4" GATE VALVE	1	AK1204055

Section 6 - Parts List

PUMP VAC., COND. TANK & MOTOR ASSEMBLY			
LINE ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
12	BUSHING QD SK X 1-1/8" BORE	1	118SD
13	SHEAVE A/B 3GR 46 SD	1	AK1204024
14	NIPPLE KC 1" NPT X 1" HOSE	6	AK1204071
15	REDUCER TEE 1-1/2 X 1-1/2 X 1"	1	AK1204051
16	PIPE NIPPLE 3/4" X 3" SCH 40	1	AK1204053
17	NUT 1/2-13 HEX	18	N/A
18	SCREW 1/2-13 X 2-1/2 HHC G5	18	N/A
19	WASHER 1/2 LOCK	18	N/A
20	NUT 5/8-11 HEX	4	N/A
21	SCREW 5/8-11 X 1-1/2" HHC G5	4	N/A
22	WASHER 5/8 LOCK	4	N/A

Section 6 - Parts List

Figure 6. 4: CONDENSATE TANK



CONDENSATE TANK			
LINE ITEM	DESCRIPTION	QTY REQUIRED	PART NUMBER
1	TANK, CONDENSATE	1	AK1204072
2	SEAT, BUMP VALVE	1	AK1204073
3	COLLAR BUMP VALVE	1	AK1204074
4	BUSHING, GUIDE	1	AK1204075
5	GUIDE, ROD	1	AK1204076
6	ROD, BUMP VALVE	1	AK1204077
7	NUT, 3/8-24 UNF NYLOCK SST	1	
8	BALL, FLOAT 6" SST	1	AK1204078
9	NUT, HEX 10-24 SST	1	AK1204079
10	O-RING 1.06 ID X 1.31 OD	1	AK1204080
11	NIPPLE, PIPE 1" X 4" LG SCH 40	1	AK1204081
12	VALVE, BALL 1	1	AK1204059
13	WASHER, FLAT #10 SST	1	AK1204083
14	CLAMP, VICT. 8" W/SEAL	1	AK1204066
15	ELBOW, STREET 1" NPT	1	
16	PLUG 3” NPT SQ HEAD	1	AK1204084
17	PLUG 1” NPT SQ HD	1	AK1204085

Section 7 - Recommended Spare Parts

FOR VERTICAL vAK500

ITEM	DESCRIPTION	1 YEAR QTY.	PART NO.
1	HEATER, B11.5	9	AK1204049
2	FILTER AIR	1	AK1204035
3	3-Way Valve	1	AK1204018
4	VACUUM PUMP OIL	5	AK1204086
5	FLOAT SHAFT SEAL	2	AK1204005
6	BELTS, AX78	6	AX78
7	6” BLIND FLANGE GASKET	2	AK1204074
8	MANWAY / INSPECTION PORT GASKET	2	AK5004041
9	VACUUM GAUGE, 30” Hg	2	AK1204030
10	HOSE CLAMP, 1”	4	AK1204023
11	VACUUM HOSE, 1” X 18”	4	AK1204043
12	CERAMIC JET NOZZLE	1	AK5000258
13	HOLDER FOR CERAMIC NOZZLE	1	AK5000257
14	JET NOZZLE REDUCER SWEDGE, 4X2	1	AK5000108
15	5 HP, XP, 1800 RPM, 230/460V MOTOR	1	XP 5 184T
16	GASKET, LID, 48” DIAMETER	2	AK5004036
17	GASKET, SUPPORT PLATE	2	AK1204009

Section 8 - Subcomponents

Manual Motor Starter

- ? Single and 3 Phase
- ? Front Accessible
- ? Pressure Type Wire Connectors
- ? Complete Line of Enclosures
- ? Low Voltage Protection (LVP) Option
- ? Remote Stop Control
- ? Pilot Light Indication
- ? Padlock Option
- ? Meets OSHA Requirements
- ? UL Approved File #E10590
- ? CSA Certified File #LR6535

NEMA 7 & 9
Class I Group C & D
Class II Group E, F & G

Across the line manual starters and contactors provide control for machinery where start stop remote control is not required (optional remote stop available). Class 11 manual starters are used for single and poly-phase motors up to 10 HP. Starters have melting alloy overload relays which help protect against damage due to excessive current caused by a sustatined overload, low line voltage or single phasing of the motor. Contactors provide control for inherently protected motors. Typical applications include metal and woodworking machinery, grinders, power saws, conveyors, fans, pumps, blowers, textile, packaging machinery, slitters and paper cutters.

Class 11 manual controllers have front accessible pressure type wire connectors. Ample wiring space is provided for easy wiring. A complete line of general general purpose and industrial duty enclosures are available as well as open open type mounting for custom built enclosures. These manual controllers are available with low voltage protection, which will automatically open the power poles when the voltage drops or the power is interrupted. A remote stop function may be incorporated with the low voltage protection coil as a factory option to provide remote or semi automatic operation. Class 11 controllers provide the OSHA requirements for protecting personnel from potential injury caused by the automatic start up of the machinery following a voltage drop or power interruption when low voltage protection is specified. Open styles and devices in NEMA 1, 4, 7 & 9 enclosures can be padlocked in the off position.

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		480	.037	.027

Manual Motor Starter Replacement AC Coils

Description	Size	Model	Volts, 60Hz	Cat No
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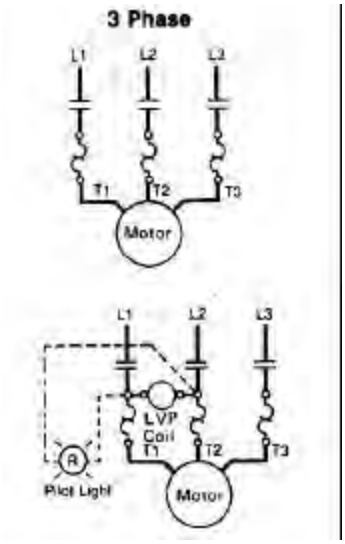
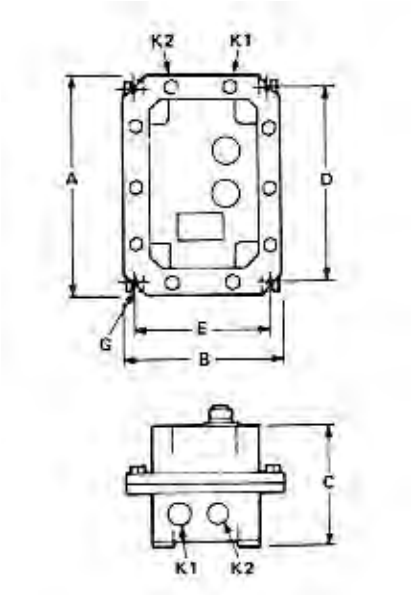
Only on Starters			208	
With Low Voltage			240	
Protection			480	

Wiring Diagram



Dimensions (Inches)



Dimensions

Enclosure Type	Outline Dimensions A	B	C	Mtg Dimensions D	E	Mtg Screw G	Conduit Size K1	K2	Max Wire Size
NEMA 7 & 9	11	7 1/8	5 7/8	9 3/16	6 1/16	3/8	1/2	3/4	8