ISO-9001	CE MARK	EM MARK	S.P.A CERTI.	INCHEON CITY CERTI.	KR CERTI.

R & D Institute (No.20001464)
KR certi. - Korea Register of Shipping
CE mark - Technischer Uberwachungsverein
Incheon city Certi. - Incheon City Government
EM mark - National Institute of Industrial Standard

The All-Star Big Bertha™ Blower Regenerative Blower

Please read and fully understand this manual before using this product, to operate it safely and correctly.
We recommend that you keep this manual in a designate place after reading it so that you can refer to it whenever you need.

Manufactured by DH-M Company Ltd for All-Star Products

ALL STAR™
Regenerative Blowers
Vacuum Pumps

DH-M DH-M CO., LTD.

Contents

We appreciate your use of our products. We hope that you will take time to read and fully understand the instructions and testing in this manual so you will obtain satisfactory service and a trouble-free performance life.

I. Matters reqiring attention for safety

Read Matters Requiring Attention To Safety before using this product. This section addresses important safety concerns, which means you should follow the safety instructions at all times. This manual divides dangers into three classes.

Danger

If you operate this product without paying attention to this sign, it is quite probable that serious damage such as death or severe injury could occur.

Warning

If you operate this product without paying attention to this sign it is possible that death and severe injury could occur.

Caution

If you operate this product without paying attention to this sign, somebody could be physically harmed or these could be property loss.

Danger

1. It is essential to install a ground wire 
2. Without installing a ground wire you can be electrocuted if a short circuit occurs.
3. When installing or repairing the blower, do not touch rotating parts. Your hand could be caught in the blower.
4. This product is used to compress air. It is absolutely prohibited to use this product for gases containing explosive vapors.

Warning

1. Do not disassemble, repair or alter this product. Such work must be done exclusively by mechanics experienced with this equipment, otherwise significant damage can occur to the blower.
2. Do not touch the motor or blower while it is running. Serious burns can occur due to high surface temperatures.

Caution

1. When installing the blower, make sure that the electrical wires are connected properly.
2. Keep the operating pressure or vacuum below the specified values otherwise overloading of the blower or motor can occur.

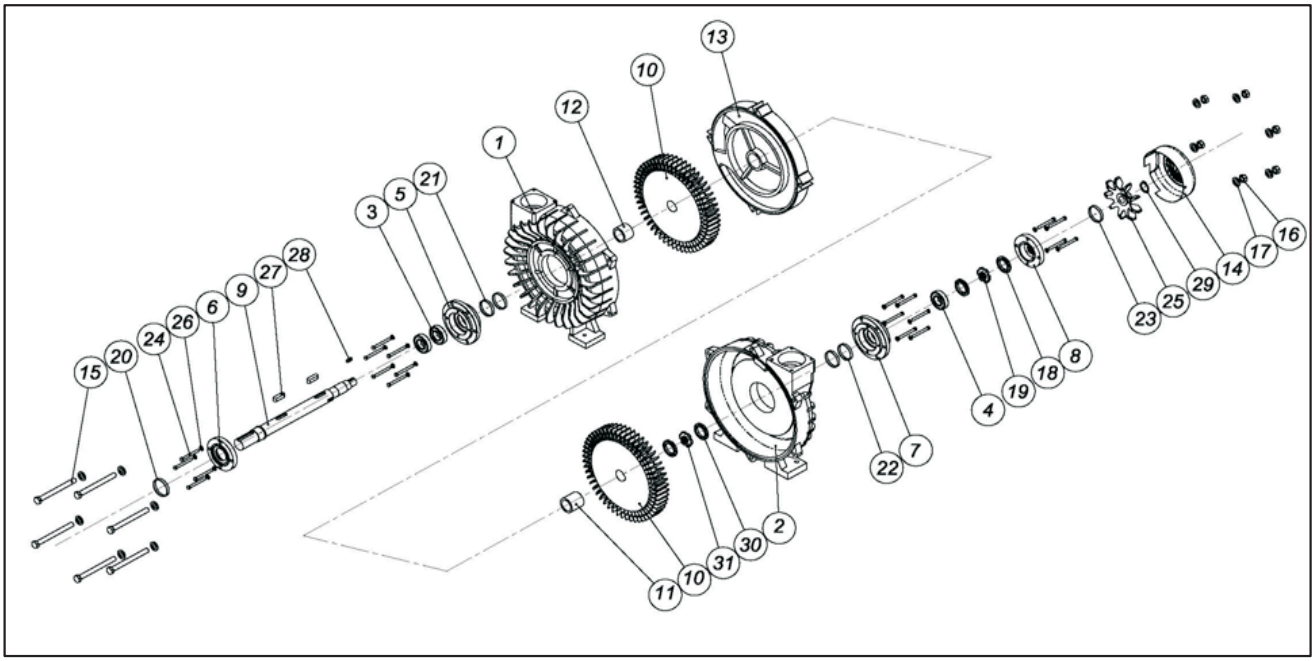
II. Structure & Features

The All-Star Big Bertha blower is available as a blower only or packaged with a direct coupled or as a V-belt package complete with the motor and accessories mounted onto a common base plate.

A. Standard Model numbering convention is classified as:
Example Model ***PBD-2201-15*** or ***PBV-2201-15***
PBD = Packaged Blower, Direct Connected Motor PBV = Packaged Blower, V-Belted Motor
2201 = Regenerative blower model Number
15 = Motor Horsepower, in this example, a 15HP motor

B. Product Structure An impeller is located inside the housing and is accelerated to a running speed of 3450 rpm. Air is absorbed by centrifugal force and is discharged to a second stage impeller, further compressing the air. The air is then discharged to the process.

C. Features
Oil free, non-pulsating clean air source
Low vibration due to centrifugal design
Light weight due to aluminum materials
Low maintenance due to no metal-to-metal design



NO.	DESCRIPTION	MAT'L	Q'TY	REMARKS.
1	FRONT COVER	AC2BC	1	
2	BACK COVER	AC2BC	1	
3	BEARING (FRONT)		2	SEE BEARING TABLE
4	BEARING (REAR)		1	SEE BEARING TABLE
5	BEARING HOUSING (FRONT)	AC2BC	1	6211
6	BEARING COVER (REAR)	AC2BC	1	6211
7	BEARING HOUSING (FRONT)	AC2BC	1	6310
8	BEARING COVER (REAR)	AC2BC	1	6310
9	SHAFT	S45C	1	
10	IMPELLER	AC2BC	2	
11	COLLAR_A	S45C	1	
12	COLLAR_B	S45C	1	
13	CASING	AC2BC	1	
14	FAN COVER	Ss41	1	
15	BOLT(FULL TH READ)		6	
16	HEX.NUT		6	
17	SPRING WASHER		6	
18	LOCK NUT		2	
19	LCCK WASHER		1	
20	OIL SEAL		1	SEE OIL SEAL TABLE
21	OIL SEAL		2	SEE OIL SEAL TABLE
22	OIL SEAL		2	SEE OIL SEAL TABLE
23	OIL SEAL		1	SEE OIL SEAL TABLE
24	HEX.BOLT		20	
25	FAN	AC2BC	1	
26	SPRING WASHER		20	
27	KEY		2	
28	KEY		1	
29	SNAPRING		1	
30	LOCK NUT		2	
31	LCCK WASHER		1	

(5) Usage range for each model

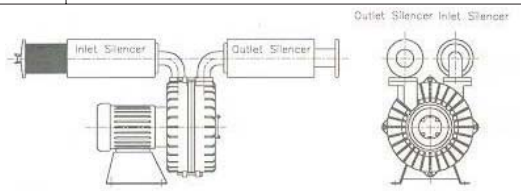
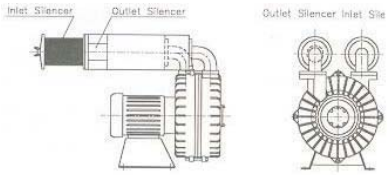
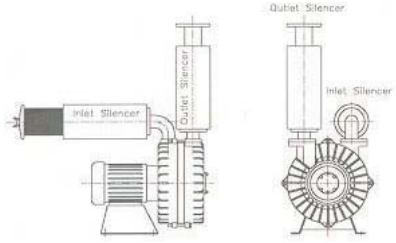
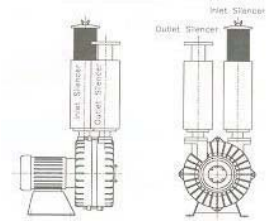
Model	Discharge bore	Discharge pressure(psi)	Flow rate(60Hz)	Power(Hp)	Weight(lbs)	Input RPM
HB2201-15	ANSI 6"	less than 2.70	600 scfm	15	860	3450
HB2201-20		less than 4.95	500 scfm	20	930	3450
HB2201-25		less than 6.68	425 scfm	25	1010	3450
HB2201-30		less than 7.94	370 scfm	30		3450
HB3701-25	ANSI 8"	less than 1.42	925 scfm	25	1490	3450
HB3701-30		less than 3.07	875 scfm	30		3450
HB3701-40		less than 5.64	820 scfm	40	1150	3450
HB3701-50		less than 7.59	787 scfm	50	1550	3450
HB5501-40	ANSI 8"	less than 0.90	1,370 scfm	40	1700	3450
HB5501-50		less than 3.50	1,225 scfm	50		3450
HB5501-60		less than 5.78	1,150 scfm	60	2060	3450
HB5501-75		less than 9.03	1,075 scfm	75	2170	3450

Caution Operating the blower higher than the values in the above table can cause the blower to fail prematurely and is not considered a warranty failure.

III. Blower Installation

A. Standard Installation Diagram

The Inlet Silencer (suction) and the Outlet Silencer (discharge) can be located in any orientation without affecting the blower performance. It is necessary to obtain additional elbows in addition to those supplied with the blower for some of the mounting arrangements.

A - TYPE	Inlet silencer horizontal - Outlet silencer opposite Preferred installation with low ceiling height	B - TYPE	Inlet silencer horizontal - Outlet silencer horizontal Preferred installation with low ceiling height and with space restriction
			
C - TYPE	Inlet silencer horizontal - Outlet silencer vertical When plumbing is toward the ceiling	D - TYPE	Inlet silencer vertical - Outlet silencer vertical When installation space is small and plumbing is toward the ceiling
			

Commissioning The Blower

A. INSTALLATION STEPS

a. Confirm the blower is correct, eg: the blower is what you ordered
b. Install in a clean, non-dusty environment and where the blower is not exposed to rain or snow
c. Insure adequate space is available to install, assemble, maintain and inspect the blower
d. Install the blower on a solid, level foundation by installing hold-down blots.

Caution Be careful not to cause fracture or bruising when installing the blower.

f. Insure the blower or the blower assembly is level by placing a level on top of the Inlet or Outlet mounting flange before installing the silencers. The blower must be perfectly horizontal to within 50 to 100mm tolerance over 1 meter distance. Insert proper sized shims to obtain tolerance
g. Once level, tighten the fixed bolts to the mounting foundation. Recheck with level after tightening
h. Blower/motor coupling alignment must verified to insure they are properly aligned following shipment and handling that occurred during installation. Refer to Table B. How To Assemble Coupling in this manual

B. CONNECTING TO EXTERNAL PIPING

Caution — Insure adequate support for the blower is provided so that the weight of the plumbing and accessories does not place an added load onto the blower. Additional external load weight can cause distortion between the blower housing and impeller.

a. Install the Inlet and Outlet Silencers. Insure they are connected incorrectly. The Inlet Silencer is the silencer with a filter screen at the end of the housing.
b. If the blower is used for aeration, a check valve must be installed between the Outlet Silencer and external piping
c. When operating the blower in an air-tight machine room, the external connection to the blower Inlet Silencer should be a minimum of five (5) times the blower Inlet Silencer diameter pipe
d. A pressure gauge should be installed in the external piping on the discharge side of the blower to verify performance
e. A pressure or vacuum relief valve is required on all installation. Operating the blower without a PRV voids the manufacturer's warranty
f. Flexible expansion piping should be installed between the Outlet Silencer port and the external piping to minimize vibration between the blower and external piping

C. WIRING

Danger — **It is essential to install a ground wire. Without doing this can result in death or serious injury when a short circuit occurs.**

Caution — **Insure the Electrical Power is disconnected before proceeding with the Installation and Plumbing work.**

a. Check the name plate electrical data to insure it is correct for your supply power
b. Confirm that the wiring is properly grounded and that the insulation material is properly wired

D. INITIAL TESTING AND INSPECTION

a. Check to insure there are no foreign substances or materials inside of the blower and plumbing
b. Clean the inside of the external piping to insure there is no welding or other materials stuck inside
c. Rotate the blower and motor by hand to insure they rotate freely
d. Confirm that the external piping is well connected
e. Insure that external piping is installed so the blower is not supporting any external weight
f. Check that the external piping is well connected to the blowers intake and discharge flanges
g. Confirm the electrical power is properly connected

Caution — **If used in the installation, insure the discharge valve is fully open.**

Caution — Be careful not to cause fracture or bruising when installing the blower.

h. After completing all operational and initial preparations, reconfirm the rotational direction of the blower by "bump starting" of the motor. Compare the direction of rotation to insure it agrees with the indication arrows on the blower. Danger

OPERATIONAL TEST

a. Once started, check the following: Caution
   1. Insure the blower is rotating in the proper direction
   2. Insure the coupling or v-belt connections are secure
   3. Check the discharge pressure gauge to insure the pressure does not exceed the rating of the blower as shown in this IOM.
   4. Measure motor current to verify the motor is operating at an acceptable current
   5. Check for any signs of excessive vibration

b. Following an initial running period of 3-4 hours, check the following:
   1. Check the discharge pressure
   2. Check the surface temperature of each part of the blower
   3. Check the motor current
   4. Check for any signs of excessive vibration

c. When the initial tests are completed and any problems are corrected, the blower can be placed into service

d. If possible, the blower should be placed into an initial one hour duty cycle. This means to run the blower for one hour and then allow the blower to rest one hour. This cycle should continue for a period of 24 hours at which time the blower can then placed into 100% continuous service

e. If any malfunction occurs during the initial start-up period, All-Star Products should be contacted for any questions not covered in this manual.

Matters to be inspected	Inspection period	What to be inspected
check input voltage and circuit breaker capacity	everyday	Operation stops when circuit breaker capacity is inadequate. (especially for single-phase)
check the rotating direction of the blower and wire connection	everyday	Impossible to operate when it rotates in the opposite direction, change wire connection. (mark is on blower casing)
noise inspection of the motor / blower bearing	everyday	If abnormal squeaking noise occurs check to find the cause.
check the temperature of the motor / blower bearing	everyday	If abnormal heatinG occurs check its causes.
check the vibration of the blower	everyday	Check if it is firmly fixed.
check inflow and pressure of cooling water	everyday	More than 40ℓ/min, from 2kG/㎠ to 3kg/㎠
inflow temperature of cooling water	everyday	Clean water whose inflow temperature is less than 20 Deg C.
outflow temperature of cooling Water	everyday	Outflow temperature should be from 35℃ to 40Deg C.
check whether 'Check Valve' is functioning properly	everyday	Check the check valve.
check the coupling	everyday	Check whether the lever is transformed or damaged. Replace it with new one if it is.
check the rated current of the motor - check measuring instrument	every week	If it is overloaded, check out what is causing it.
check absorption silencer filter	every week.	Clean the filter of any foreign substances

Check the blower flow pressure - Check gauge	every week	Check a pressure gauge.
Check leakage state of plumbing line	every week	If the leakage occurs, abnormal squeaking noise is generated.
Check the blower discharge pressure	every week	If aeration is inadequate check for causes
Check operating state of the blower motor	every week	Check the general operation state (example: heating and abnormal noise)
Check Water Jacket	every year	Inspect internal scale and clean it regularly.

NOTE: The Big Bertha blower is available with water cooling for certain applications. If your blower is not water cooled, disregard comments pertaining to water maintenance.

V. Cause of malfunction and How to manage it

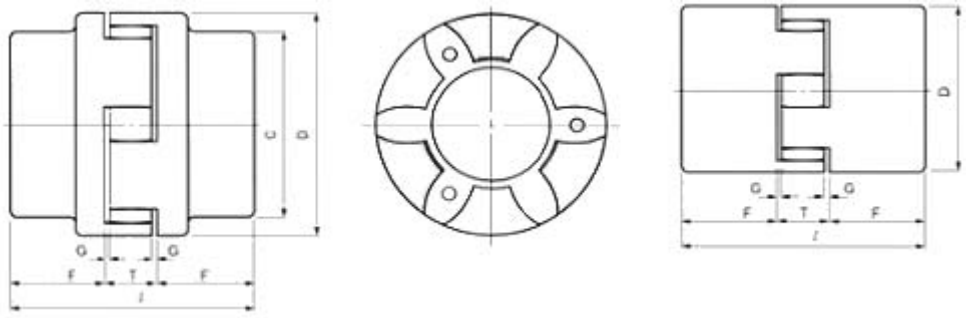
Malfunction	Cause	How to manage it
Impeller does not rotate.	1. Wiring connections to the motor is bad, 2. Foreign substances to the inside the blower 3. Impeller interference occurs because the curving of the shaft due to exterior damage of impact damage to the blower. 4. Sand-burning of impeller 5. The connection between the power supply and motor is bad - motor makes a whirring sound while operating.	1. Check the wiring connections to the power supply and the motor. (refer to wiring diagram of a motor) 2. Get after-sales service, to remove foreign substance. 3. Get after-sales service 4. Get after-sales service 5. Check the 3 lines, lead line of the motor, are well connected.
Abnormal squeaking noise	1. Inflow of foreign substance to the inside of the blower 2. Bolt has come loose 3. Bearing has worn out 4. Bolts of the silencer are loose or leakage is occurring. 5. Bad electrical contact to the impeller or damaged impeller 6. Friction occurs inside of the blower	1. Get after-sales service 2. Check the bolt and reconnect or re-tighten. 3. Get after-sales service, to change the bearing 4. Inspect and tighten a bolt and/or repair leak 5. Get after-sales service 6. Get after-sales service
Too much vibration	1. Basic bolt or blower installation bolt has come loose. 2. Improper installation 3. The support plumbing is bad 4. Too much pressure on discharge port.	1. Reconnect the bolt. 2. Readjust or re-install. 3. Firmly re-support the blower again. 4. Remove causes of pressure.
Flow rate shortage, Low pressure	1. The absorption port filter is blocked. 2. The absorption plumbing is blocked. 3. The discharging plumbing port is leaking. 4. Malfunction of the check valve (when two blowers installed) 5. Low rotational frequency (normally, 3500RPM)	1. Clean the filter. 2. Clean the plumbing. 3. Change packing, and repair leaks. 4. Check whether the check valve is open or closed. Change if necessary. 5. Check rotational frequency of the motor and input voltage.
High discharge pressure, High current	1. The valve of the discharge is locked. 2. The discharging plumbing is blocked. 3. Defective check valve 4. Malfunction of pressure gauge.	1. Open the valve. 2. Clean the plumbing. 3. Change the check valve. 4. Change pressure gauge.

Overloaded motor and high termperature	1. Friction between impeller and other component 2. Malfunction of amp meter 3. Discharge pressure higher than design rating 4. Power supply voltage or frequency is different than motor rating 5. External piping losses higher than design conditions 6. Impeller turning in wrong direction	1. Contact All-Star Products 2. Inspect amp meter 3. Adjust discharge pressure to designed rating conditions 4. Correct power supply 5. Make corrections in external piping 6. Change direction of rotation

Please, call us after checking what is listed above to get after-sales service.
We will be more than happy to help you solve any problem.

VI. COUPLING

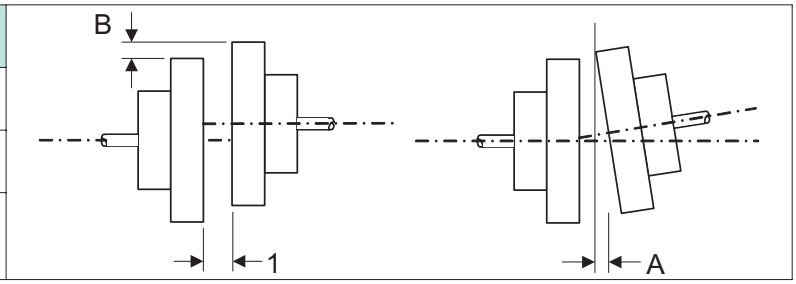
A. Dimension



Model	Size	Bore Dia(mm)		Basic Torque (Kg /m)	Torsion angel	Dimensions(mm)						
		min	max			C	D	F	T	□	G	Weight (kg)
HB2201	CR 3545	28	45	65	3.2 °	88	98	38.5	29	106	4	4.4
HB3701	CR 4560	38	60	90		98	118	45	30	120	3	7.8
HB5501	CR 6070	42	75	125		115	135	46	33	125	3.5	10

B. How to install a coupling.

Category	Acceptable error
A	below 0.05 mm
B	below 0.04 mm
X	1 ~ 2 mm



The center of the motor shaft and that of the blower shaft should be a straight line and within the above tolerances. To install the coupling halves, place lubrication oil on the shaft and, using a rubber or leather mallet, pound the coupling half onto the shaft.

VII. BEARING The kinds and types of bearings used in All -Star Big Bertha blowers are listed in the following table.

Model No	Blower Front Bearing	Type	Deg.C	Blower Rear Bearing	Type	Deg.C
HB2201	6208zzC3	Shield	-10~100	6207zzC3	Shield	-10~100
HB3701	6211zzC3	Shield	-10~100	6310zzC3	Shield	-10~100
HB5501	6211zzC3	Shield	-10~100	6310zzC3	Shield	-10~100

VIII. GREASES

A. Types and Features

Model	Thickener	Worked penetration (@25 ℃)	Dropping Point (℃)	Temperature Range (℃)
Shell Darina R2	clay	265~295	Non-melting	10/+200

B. Greases

The lubrication performance is mainly affected by the type of grease, size and type of bearing operating speed, loading conditions and the environmental conditions, eg: dust, dirt, humidity and temperature. The amount of grease required to lubricate a bearing is very small. Keep in mind that over-greasing causes more bearing failures than the lack of greasing. Greasing a bearing, if not done properly, causes an increase in axial loading on the bearing and will cause the bearing to fail prematurely.

C. Greasing Period

a. If the blower is installed in a clean environment and operating temperature is below 50 Deg C, the bearing should only require greasing every 8000 service hours
b. If the operating temperature is above 100 Deg C, the bearing should be lubricated every three months
c. If the blower is operated in a dusty or dirty environment, the bearing should be lubricated more frequently
d. If the blower is operated where it is exposed to water contamination, the bearing should be lubricated more frequently

D. Greasing Procedure

a.. Electrical power should be disconnect to the blower motor
b. The blower should be a it normal operating temperature
c. The bearing grease relief plug should be removed
d. Using a grease gun, insert grease into the bearing until the grease being discharged from the relief plug is the same color at the grease being inserted into the bearing. At this point, discontinue inserting more grease
e. Restart the blower and allow the fresh grease to reach the normal operating temperature
f. Once the fresh grease temperature is stabilized, insert the grease relief plug.

C. Substitutes for Greases

Typical Properties of Shell DARINA EP Greases				
	Test Method	DARINA Grease 0	DARINA EP Grease 1	DARINA EP Grease 2
Product Code		71520	71521	71522
NGLI Grade		0	1	2
Thickener		Microgel	Microgel	Microgel
Color	Visual	Brown	Brown	Brown
Appearance	Visual	Smooth	Smooth	Smooth
Mineral Oil				
Viscosity				
@ 40 deg. C, cSt	D 445	122	122	122
@100 deg. C, cSt	D 446	12.7	12.7	12.7
@100 deg. F, cSt	(Calc)	56.5	56.5	56.5
@210 deg. F, cSt	(Calc)	65	65	65

Worked Penetration dmm@77 Fahr.				
60 Strokes	D 217	361	330	285
100,000 Strokes	D 217	—	352	332
Dropping Point, Fahr.	D 2265	500+	501+	502+
Bomb Oxidation				
@210deg. F				
Pressure Drop @100 hrs, psi	D 942	1	1	1
Corrosion Test,				
14days	D 1743	No rust	No rust	No rust
Wheel Bearing Test				
@220deg. F, gm	D1263	—	5	5
Water Washout, wto/u loss @175 deg. F	D 1264	7	Nil	Nil
Tmken test, pass, lbs	D 2509	50	50	50
Load wear index, kg	D 2596	---	48	50
Mobility, 0 deg. F, g/minute		2.7	1.4	0.6
Lincoln Ventmeter Test				
30 deg. F, psi		190	350—	
0 deg. F, psi		475	850—	

Warranty

All-Star Products warrants all of its products against defects in material and workmanship for a period of one (1) year from the date the product is placed in service to a maximum of eighteen (18) months from the date of shipment, whichever occurs first. Purchaser is responsible for providing adequate and approved storage during the 18 month period. Nothwithstanding the foregoing, any equipment or components of the products not of All-Stars Products own manufacture and/or specified by the purchaser, is sold under only such warranty as the maker thereof extends to All-Star Products and All-Star Products is able to enforce, but such items are not warranted by All-Star Products in any way. All Star Products is not responsible for product failures caused by the purchaser or their customer misapplying the product, operating the product beyond the published ratings and values, misuse, field alterations and changes, lack of proper maintenance or improper storage, neglect or accident are also excluded from this Limited Warranty. This Limited Warranty is effective, provided (1) The purchaser immediately notifies All-Star Products in writing of the alleged defect after it becomes known to the purchaser and (2) No alterations, repairs or services have been performed by the purchaser or third parties on the product, without the written approval of an officer of All-Star Products and a properly sized intake air filter and properly set pressure relief valve has been installed. This Warranty is in lieu of all other expressed or implied warranties, including any warranty of merchantability or fitness for any purpose.

The warranty does not cover misuse or misapplication, abuse, neglect or other causes of failure beyond the manufacture's control. A properly sized intake filter and pressure or vacuum relief valve are required in for proper service life of the blower. A blower used without an air filter or relief valve will void any warranty consideration. Do not disassemble or try to repair the blower/pump or any component. Any attempt to repair or correct a problem by you or your agent will void your warranty. A disassembled unit will not be considered as a warranted

For more detailed information, visit http://www.all-star-usa.com

All-Star Products Inc
Sales Office & Warehouse
2095 Exeter Rd Ste 80-324 Memphis TN 38138
Tel 800-431-8258 Tel 901-755-9613 Fax 901-758-0816
edwardb@all-star-usa.com