Dry Bulk Blower
Service Manual

WARNING
DO NOT WORK ON MACHINERY BEFORE READING MANUAL FULLY

PARAGON™

(800) 471-8769

05/14 Rev. 1

Table of Contents

Introduction

Carefully read this Service Instruction prior to dismantling and service of the P857 blower.

Ensure that this Servcie Instruction is available to the staff and that work is performed in accordance with the instruction therein.

Scope of application of the Service Instruction

This Servcie Instruction exclusively contains information for the service of the P857 blower. This Service Instruction does not apply to any other blower type or model.

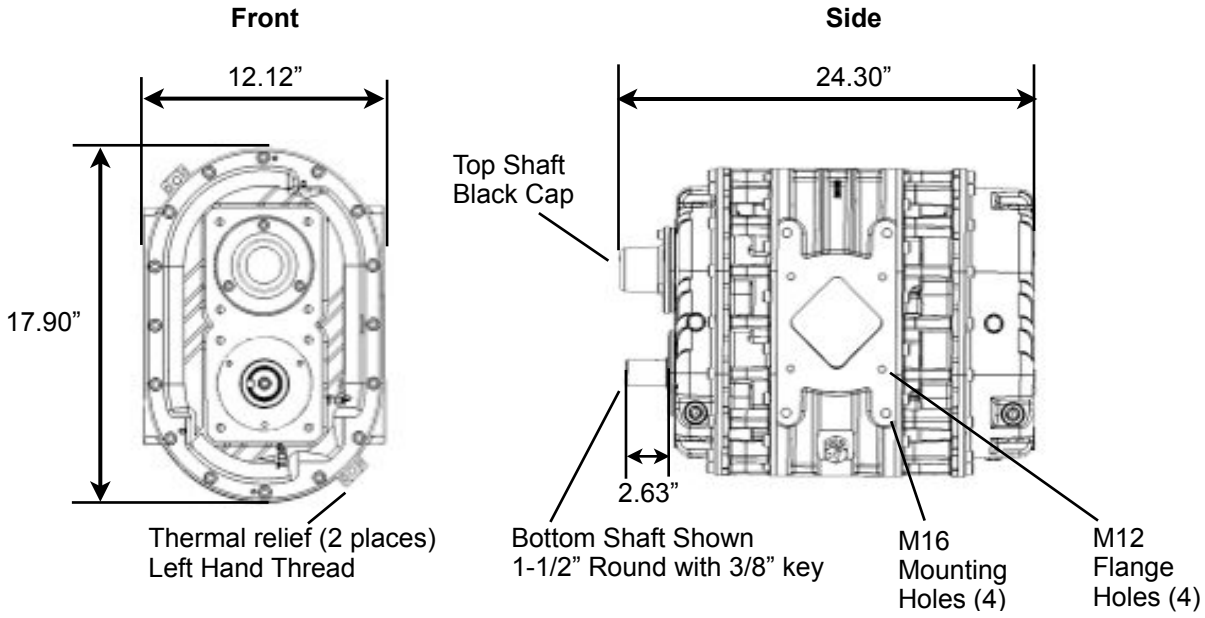
Blower Specifications

	Air Flow CFM	Max. Pressure	Max. Vacuum	Speed Range	Weight
P857	390-1000	20 psi (see note 1)	17” Hg.	1800-3000 (see note 2)	361 lbs

Note:

1) Reduce the maximum operating pressure by 1 psi for each 2000 feet of altitude.
(Example: at an altitude of 4000 feet, the maximum working pressure of the blower will decrease by 2 psi)

2) Maximum RPM for P.T.O. drive is 2500 RPM.



Performance Chart for Power Take-off Operation

Blower Speed RPM	Pressure Performance and Horsepower						Vacuum Performance and Horsepower					
	12 PSIG		16 PSIG		20 PSIG		12” of Hg.		16” of Hg.		17” of Hg.	
	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP
1800	473	36	446	47	424	59	482	19	436	22	418	25
1900	510	38	480	50	460	63	520	20	475	25	460	27
2000	545	40	518	52	496	65	559	21	515	27	494	29
2100	580	42	555	55	530	69	595	22	545	28	530	30
2200	618	44	590	58	568	72	632	23	571	29	555	31
2300	645	46	625	60	605	75	665	24	610	30	695	33
2400	690	48	662	63	640	78	697	25	655	31	636	34
2500	718	50	690	66	675	81	740	26	690	33	670	36

Disassembly

1. Ensure blower is cleaned and rotor chamber is free of debris.

2. Drain Oil from both covers by removing the magnetic drain plugs.

3. Mark all parts with a marker pen so that they can be reassembled in the same position (rotors, endplates, housing etc).

4. Remove driveshaft key (Item 41).

5. Remove shaft blank cap (Item 35).

6. Remove front and rear oil tanks, held by M10 socket head capscrews. It may be necessary to tap oil tanks with a soft mallet to break the sealant (do not use a pry bar).

7. Note the orientation before removing breather tubes. (Items V & W).

8. Heat lip seal wear sleeves using a burner and quickly remove before the shaft heats up (Item 21).

9. Remove spacer ring.

10. Flatten locknut tabs then loosen oil slinger locknut and remove oil slinger assembly.

11. Remove both drive end bearing retaining plates (Item 33).

12. Remove sixteen drive end sideplate capscrews (Item 43 & Item 3).

Item 1

Item 5

Item 6

Item 6

Item 7

ItemItem

Item 10

Item 12

Disassembly Continued

13. Remove the six gear clamping bolts and discard (Item 43).

14. Remove gear clamping bushes and discard (Item 31).

15. Using a plastic mallet lightly tap all around the gear until it loosens (Item 28).

16. Carefully slide both gears off the shafts. Taper locks (item 30) will come out with gears.

17. Attach two pullers to the gear endplate with each center rod pushing each rotor center. (Use a puller with a rotating rod end)

18. Alternating from one puller to the next slowly push the rotors forward, this will also push the drive end sideplate (Item 3) off the housing. Continue pushing until both rotors are loose from the double row bearings.

19. Remove the gear end sideplate (item 2).

20. Remove oil deflector plate (Item 25).

21.Remove both drive end bearing retaining plates (Item 33)

22. Remove both gear end bearing retaining plates (Item 33).

23. Remove the bearings from both housings (Items 14 and 15).

24. Remove the circlip (Item16) holding the Labyrinth seals (Item 10).

Item 13

Item 14

Item 15

Item 17

Item 18

Disassembly Continued

25. Remove the breathers (Item 39) from both sideplates (if they are to be replaced). Do not re-use clogged breathers.

26. Using a burner quickly heat the inner front bearing races then remove them from the rotors.

Cleaning and Inspection of Parts

Before reassembling the blower any parts that are to be reused should be cleaned thoroughly.

Ensure all threads are clean, if needed run tap through threads. Clean threads will ensure correct bolt toque.

Parts need to be free from rust, Loctite residue and burrs

Assembly

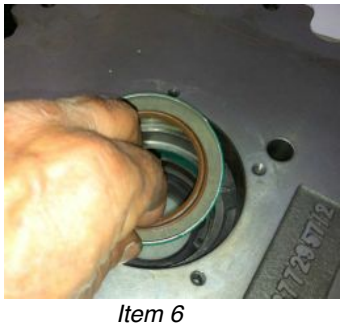
1. Install dowel pins to rotor housing (Item 47).
2. Install spring pins in both sideplates (Item 13).
3. Apply o ring grease (Parker O-lube or similar to labyrinth o ring (Item 10).
4. Install labyrinth seals (Item 10) into both sideplates using punch tool, be sure to align the hole in the Labyrinth seal with the pin in the sideplate.
5. Install labyrinth seal circlips into both sideplates (Item 16).
6. Install inner lip oil seals, flat side down (item 11) into both sideplates using punch tool. Apply o ring grease (Parker O-lube or similar) to the lips only.
7. Install the breathers (Item 39) into both sideplates.
8. Heat up bearing inner races using a heater plate to 212 deg F (Item 14).
9. Fit the inner races to the rotor shafts and seat them using the punch tool (tool 564-005).
10. Lightly lube outer roller bearings (Item 14) then install into drive end sideplate (Item 3) cage side facing outwards.
11. Fit bearing retainer plates (Item 33) to drive end sideplate (Item 3). Use Loctite 242 on capscrews (Item 44). Torque per chart.

Item 1

Item 1

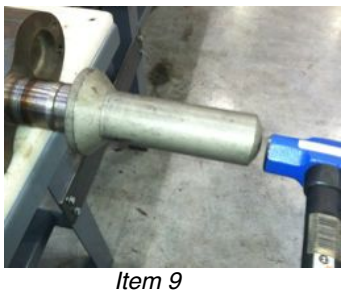
Item 3

Item 5



Item 6

Item 6



Item 9

Item 10

Item 11

Assembly

12. Using Loctite 192010 on body face fit drive end sideplate (Item 3) to rotor housing, line up the marks from when they parts were disassembled. Use Loctite 242 on M10 capscrews, torque per chart.

13. Carefully slide each rotor through housing, be sure not to damage lip seals or labyrinth seals during this process. To aid this process position the sideplate and body facing down on wood blocks.

Item 13

14. Fit gear end sideplate (Item 2) to rotor housing, line up the marks from when the parts were disassembled.

Item 14

15. Using punch tool (564-005) to seat both ball bearings (Item 15) into gear end sideplate. (Item 2). Note the bearing number “3308” must face outwards.

Item 15

16. Seat the inner races by fitting lock collar tool (564-007) over rotor shaft, tighten each capscrew to recommended torque. Place a block of wood between the rotors to stop them rotating while tightening the capscrews. Repeat this for both rotors.

17. Remove the lock collar.

18. Fit Bearing locking collars(Item 33), use Loctite 242 on capscrews.

Item 18

19. Fit bottom gear oil deflector (Item 25).

Assembly

20. Carefully fit gears to shafts. The gear with the helix pointing to the left installs to the bottom rotor (Item 27, closest to the sight glass and with oil deflector ring). Install four locking rings (Item 30), shown in drawing (marked Z) per gear and the locking collar (Item 31), hand tighten the six M10 capscrews.

Item 20

21. Tighten the three M10 capscrews on the bottom gear per torque chart using a small amount of Locktite 242 on the threads.

22. Proceed to setting the Timing.

23. Install spacer ring (Item 18) on the shaft of the bottom rotor.

24. Pre-install oil slinger (Item 24) on the hub (item 22) with four capscrews (Item 44).

25. Install the taper locking sleeve (Item 20) onto the shaft of the lower rotor, push the oil slinger assembly onto the adaptor sleeve and secure using lock nut and locking tab washer (Item 20). Ensure the assembly is pushed fully against the spacer ring. Align slinger per the drawing, torque nut (Item 20) to recommended setting using locknut tool (564-010).

26. Install spacer bushing (item 17) onto top shaft.

27. Heat up wear sleeves to 212 deg Fahrenheit then use bearing punch tool (564-005) to seat sleeves.

28. Install longer breather tube (Item 54) with clamping elements on gear end aligned per Fig 28, at 45 degrees.

Item 28

Assembly

29. Install short breather tube (Item 53) with clamping elements on gear end aligned per Fig 29, at 45 degrees.

30. Install front cover oil seals (Item 12) using punch tool (564-009). Use Parker o ring lub or similar on the lips.

31. Tape over keyways to prevent damage to the lips seals before installing front cover.

32. Install front cover (Item 4) using Loctite 192010.

33. Remove tape from keyways.

34. Install blank cap (Item 35) over top shaft.

35. Install key on drive shaft and secure with tape.

36. Install gear end cover using Loctite 192010.

37. Install all plugs and breathers in accordance to the mounting arrangement (horizontal or vertical) desired.

38. Rotate the blower by hand to ensure there is no touching or knowing, labyrinth seals and oils seals will have some resistance to turning.

Item 29

Setting the Timing and Checking Clearances

1. Lock the bottom rotor (rotor with timing gear Item 27) using rotor lock tool 564-012..
2. Both rotors should have even clearances between the lobes on both sides of the machine.
3. Starting with a 0.013” feeler gauge position the feeler gauge between the rotors shown in position 1 and Picture 5.
4. Rotate top rotor by hand tightly against the feeler gauge.
5. Rotate the gear tightly against the other gear and tighten the three M10 Capscrews by hand.
6. Check clearances at positions 1,2,3 and 4. if even proceed to Item 7 otherwise repeat Items 3 through 6 until all clearances are equal.
7. One at a time remove and replace (with Locktite 242 on the threads) the three M10 capscrews, each capscrew should be torqued per the chart below.
8. Recheck the clearances at Positions 1, 2, 3, 4 shown below values should be 0.0127”-0.019” and even.

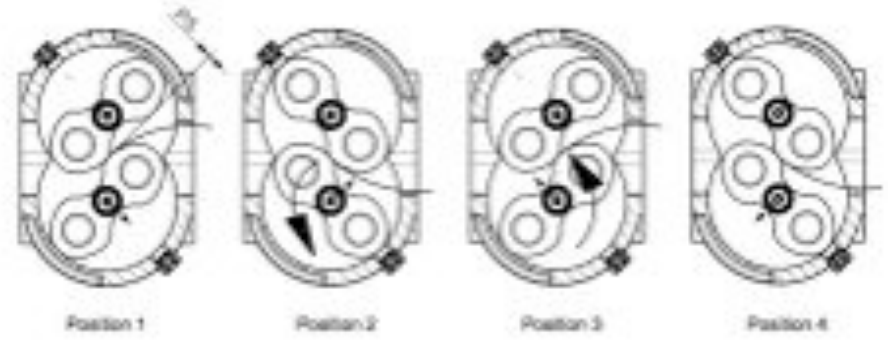
Item 3

Setting the Timing and Checking Clearances

9. Check rotor to gear end sideplate clearance shown in drawing as GS value should be 0.0035” - 0.011”.

10. Check rotor to drive end sideplate clearance shown in drawing as GS value should be 0.0010” - 0.021”

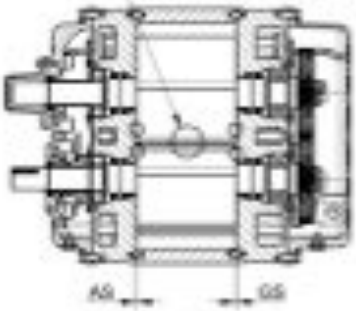
11. Check radial clearances around the body to the rotor values should be 0.0078” - 0.011”



For the measurements bottom rotor to be rotated (counter clockwise) by 90°

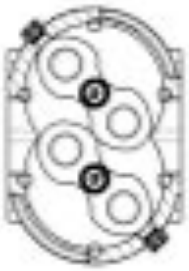
5
Picture

For setting and measurement of profile gap place feeler gauge in the mid of port



Measuring points for end face clearances and profile gap

6
Picture



Measuring points for radial clearances

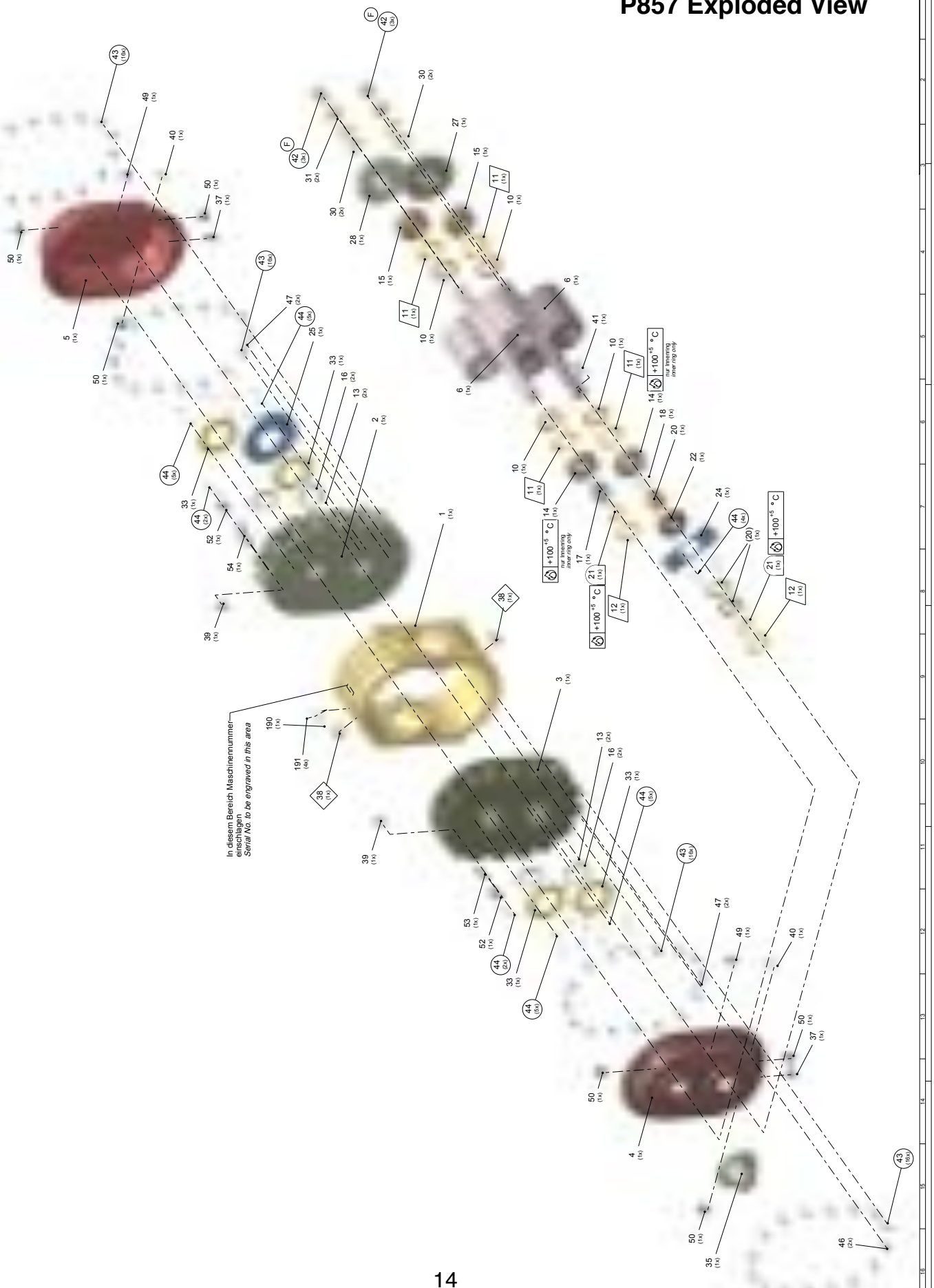
Setting the Timing and Checking Clearances

Blower Clearances	Min	Max
Interlobe	0.0127”	0.019”
Gear End	0.035”	0.011”
Drive End	0.010”	0.021”
Radial	0.0078”	0.011”

Torque Settings

Item	Size	Torque (in-lbs)	Torque (ft-lbs)	Torque (N-m)
20	M45 x 1.5	619	51.5	70
43	M10	515	43	58
44	M6	106	8.8	12
45	M8	247	20	28
42	M10	706	58.6	79.5

P857 Exploded View



Special Tools

Part Number	Description	Function
564-005	Bearing Punch	Seat ball bearings, roller bearings inner race, wear sleeves
564-006	Lip Seal Punch	To seat inner lip seals
564-007	Lock collar	To seat inner race of ball bearing
564-008	Crank Handle	To rotate lobes while timing
564-009	Lip Seal Punch	To seat outer shaft lip seals
564-010	Locknut socket	To tighten oil slinger locknut
564-011	Lab seal punch	To seat labyrinth seals
564-012	Shaft lock	To lock one rotor while setting the timing
564-013	Lip seal protector	install over shafts to protect lip seals during assembly

Lubrication Instructions

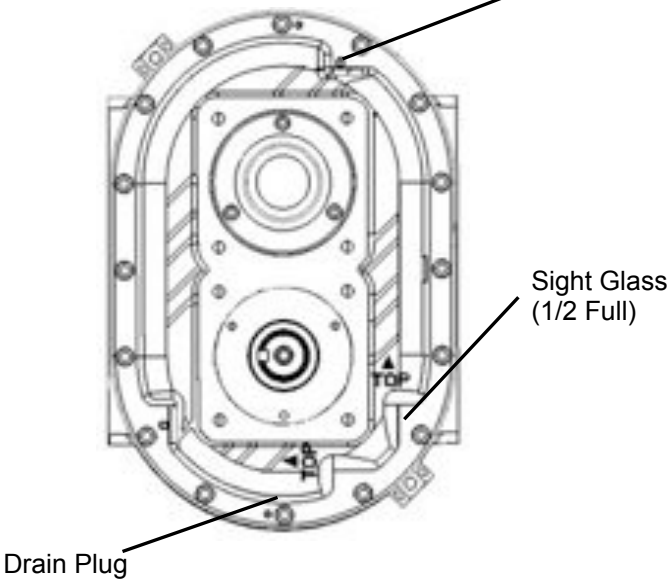
Oil Capacity	Horizontal Air Flow (Standard Mount)	Vertical Air Flow
Drive End Non-Drive End	15 oz. (0.5qt.) 25 oz. (0.9 qt.)	28 oz. (0.9 qt.) 48 oz. (1.5 qt.)

Standard Oil: P857 oil (Paragon part number: 409-001)

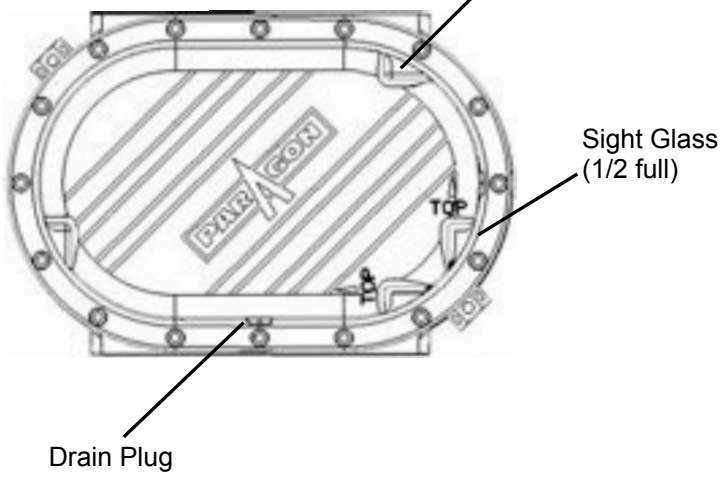
Caution: *Mixing or incorrect oil can result in gear and bearing failure.*

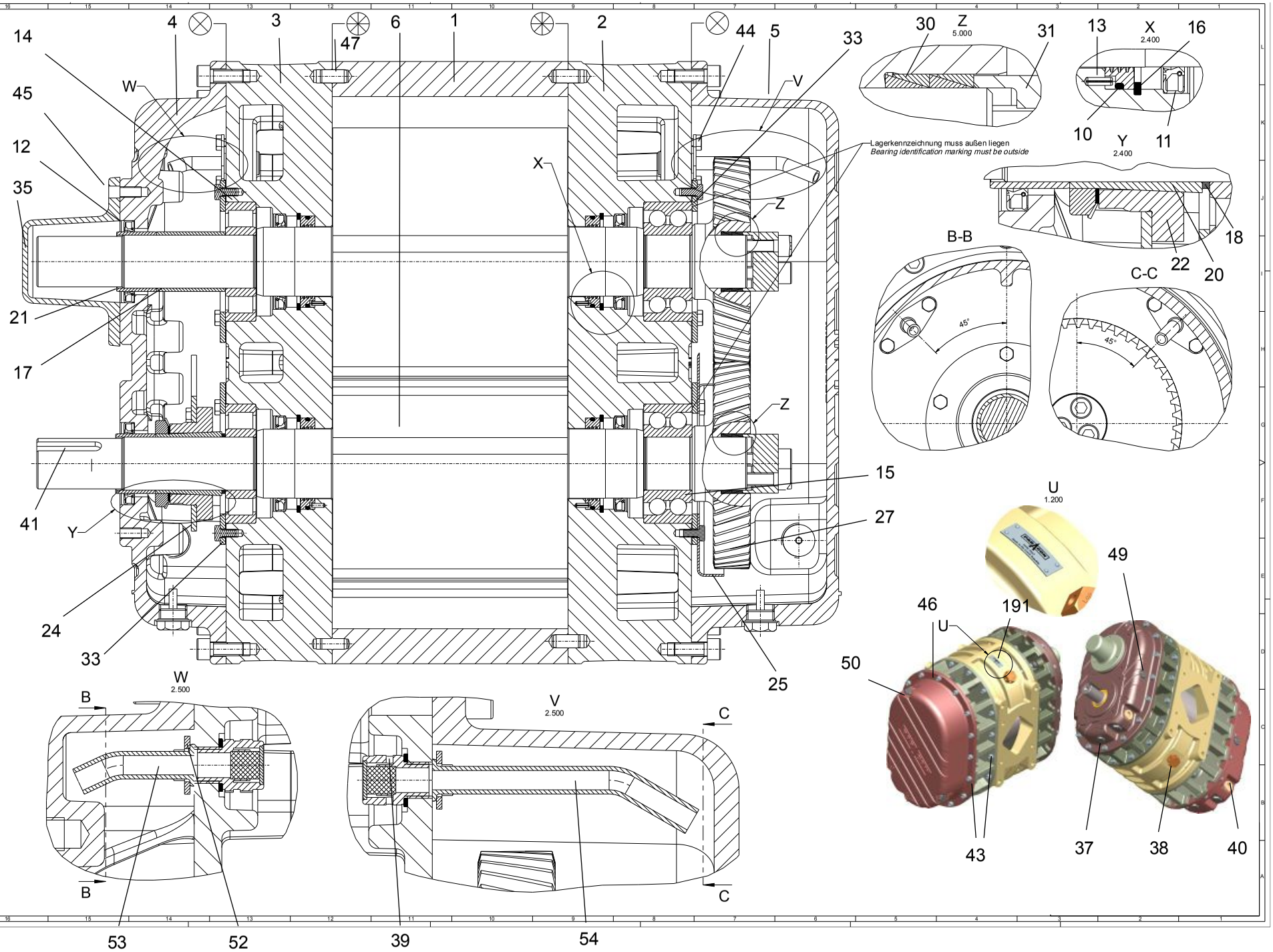
Note: *Change oil every 500 hours, twice a year or as necessary (based upon duty cycle) to prevent premature bearing wear.*

Front



Rear




14
4
3
47
6
1
2
44
5
33
45
W
V
12
X
35
Z
21
17
Z
15
41
Y
27
24
33
25
Lagerkennzeichnung muss außen liegen
Bearing identification marking must be outside
30
Z
5.000
31
13
X
2.400
16
10
Y
2.400
11
18
B-B
C-C
22
20
45°
45°
U
1.200
49
46
191
U
50
43
37
38
40
W
2.500
B
B
V
2.500
C
C
53
52
39
54

Parts Listing

Item	Part #	Description	QTY
1	500-001	Body	1
2	501-000	Sideplate - NDE	1
3	501-001	Sideplate - DE	1
4	523-002	Oil Tank - DE	1
5	523-001	Oil Tank - NDE	1
6	502-000	Rotor	2
10	556-037	Lab Seal **A**	4
11	555-003	Oil tank seal **A**	4
12	555-004	Shaft seal **A B**	2
13	174-002	Pin **A**	4
14	512-000	Roller Bearing **C**	2
15	510-002	Ball Bearing **C**	2
16	197-001	Ring, Retaining	4
17	571-007	Spacer Bush	1
18	571-008	Spacer Ring	1
20	571-009	Adaptor Sleeve	1
21	571-006	Wear Sleeve **A B**	2
22	571-010	Oil Slinger Hub	1
24	527-005	Oil Slinger	1
25	527-006	Oil Deflector	1
27	529-000	Gear Set	1
30	582-009	Locking Element	4
31	582-012	Clamping Bush Kit	2
33	582-011	Bearing Retainer Plate	4
35	522-002	Drive shaft cap	1
37	141-000	Magnetic Plug	2
38	543-002	Melt Plug	2
39	359-003	Breather **A**	2
40	355-005	Oil Sight Glass	2
41	298-010	Key **A**	1
43	124-004	Socket Head Capscrew M10 x 25	64
44	124-014	Socket Head Capscrew M6 x 12 8.8	28
45	124-003	Socket Head Capscrew M8 x 20	3
46	174-001	Pin **A**	2
47	174-000	Pin **A**	4
49	323-001	Plug G1/2 x 16	2
50	323-002	Plug G3/4 x 17	6
52	582-008	Clamping element	2
53	588-004	Breather tube	1
54	588-005	Breather tube	1
191	192-001	Pin	4
-	409-001	Oil, Quart P857	3
-	620-000	Repair kit, Seal (Full) - P857	1
-	620-001	Repair kit, Dust Seal (Shaft Seals) - P857	1
-	621-008	Repair kit, Rotating - P857	1
NOTE: **A** INCLUDED IN SEAL KIT **B** INCLUDED IN DUST SEAL KIT **C** INCLUDED IN BEARING KIT			

WARRANTY - TRUCK BLOWERS

Subject to the terms and conditions hereinafter set forth and set forth in General Terms of Sale, Paragon Tank Truck Equipment LLC (the seller) warrants products and parts of its manufacture, when shipped and its work (including installation and start-up) when performed, will be of good quality and will be free from defects in material and workmanship. This warranty applies only to Seller's equipment, under use and service of products, for a period as stated in the table below. Due to the varying condition of installation and operation, all performance claims are subject to a plus or minus 5% variation. (Non-standard materials are subject to a plus or minus 10% variation)

THIS WARRANTY EXTENDS ONLY TO BUYER AND/OR ORIGINAL END USER, AND IN NO EVENT SHALL THE SELLER BE LIABLE FOR THE PROPERTY DAMAGE SUSTAINED BY A PERSON DESIGNATED BY THE LAW OF ANY JURISDICTION AS A THIRD PARTY BENEFICIARY OF THIS WARRANTY OR ANY OTHER WARRANTY HELD TO SURVIVE SELLER'S DISCLAIMER.

All accessories furnished by seller but manufactured by others bear only that manufacturer's standard warranty

All claims for defective products, parts, or work under this warranty must be made in writing immediately upon discovery and, in any event within one year from the date of shipment of the applicable item and all claims for defective work must be made in writing immediately upon discovery and in any event within one year from date of completion thereof by Seller. Unless done with prior written consent of Seller, any repairs, alterations, or disassembly of Seller's inspection and warranty. Installation and transportation costs are not included and defective items must be held for Seller's inspection and returned to Seller's Ex-works upon request.

THERE ARE NO WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE.

After Buyer's submission of claim as provided above and its approval, Seller shall either repair or replace its product, part, or work at the original Ex-works point of shipment, or refund an equitable portion of the purchase price

The products and parts sold hereunder are not warranted for operation with erosive or corrosive materials or those which may lead to build up of material within the product supplied, nor those which are incompatible with the materials of construction. The Buyer shall have no claim whatsoever and no product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action nor for problems resulting from build-up of material within the unit nor for problems due to incompatibility with the materials of construction.

Product Type	**Warranty Duration**
New	18 months from date of shipment, or 12 months after initial startup date, whichever occurs first.
Remanufactured	12 months from date of shipment, or 12 months after initial startup date, whichever occurs first.
Repair	12 months from date of shipment, or remaining warranty period, whichever is greater

Any improper use, operation beyond capacity, substitution of parts not approved by Seller, or any alteration or repair by others in such manner as in Seller's judgment affects the product materially and adversely shall void this warranty.

No employee or representative of Seller other than an Officer of the Company is authorized to change this warranty in any way or grant any other warranty. Any such change by an Officer of the Company must be in writing.

The foregoing is Seller's only obligation and Buyer's only remedy for breach of warranty, and except for gross negligence, willful misconduct and remedies permitted under the General Terms of Sale in the sections on **CONTRACT PERFORMANCE, INSPECTION AND ACCEPTANCE,** and the **PATENTS** Clause hereof, the forgoing is **BUYER'S ONLY REMEDY HEREUNDER BY WAY OF BREACH OF CONTRACT TORT OR OTHERWISE, WITHOUT REGARD TO WHETHER ANY DEFECT WAS DISCOVERED OR LATENT AT THE TIME OF DELIVERY OF THE PRODUCT OR WORK.** In no event shall Buyer be entitled to incidental or consequential damages. Any action for breach of this agreement must commence within one year after the cause of action has occurred.

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