

NVE

National Vacuum Equipment



Owner's Manual

866 Challenger Rotary Vane Pump



800-253-5500 | natvac.com

866 CHALLENGER

Owner's Record

Date of Purchase: _____

Purchased from: _____

Serial Number: _____

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Revision: 8 (Release) August 2019

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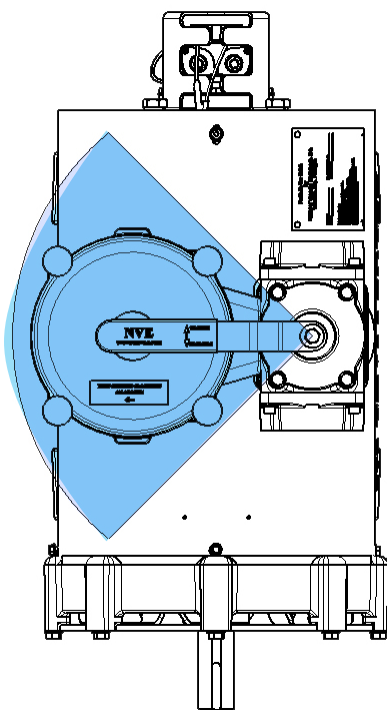
*If your pump was manufactured after June 1, 2014,
it contains a NVE manufactured 4 port oil pump.*

See pages 12 - 13 for additional information

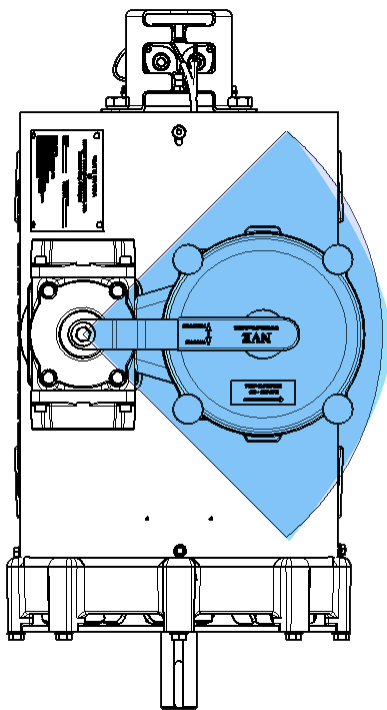
IMPORTANT INFORMATION FOR INSTALLING PUMP

866 CHALLENGER SERIES PUMPS AERIAL VIEW

***SHADED AREA MUST BE KEPT CLEAR
FOR SERVICING THE FILTER***



**Counter Clockwise
Rotation**



**Clockwise
Rotation**

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INTRODUCTION

General Information



About National Vacuum Equipment

Congratulations! You now own a quality vacuum/pressure pump proudly manufactured in the U.S.A. by National Vacuum Equipment, Inc. You have not only acquired a superior piece of equipment from a qualified dealer, you have hired a team of vacuum experts. We stand ready to work with your dealer to answer your questions and provide you with the information necessary to keep your equipment in peak working condition.

Thank you for putting your trust in National Vacuum Equipment.

Our Mission

We are dedicated to the production and wholesale distribution of quality vacuum system products at a reasonable price, on a timely basis. We are a “one-stop shop” for manufacturers and distributors of vacuum equipment.

Our History

National Vacuum Equipment, Inc. was founded in 1980 by Bruce Luoma. The Company started as a retailer of vacuum pumps. Soon after it started, the Company secured the rights to exclusive distribution of the Battioni vacuum pumps in North America. This helped the Company to evolve into its current status as a wholesale supplier.

To reach the goal of becoming a full service supplier of vacuum system components, the Company began fabrication of its own line of componentry, purchased and developed its own line of vacuum pumps, and began purchasing for resale, various valves and accessories.

Today, NVE has full service machine, fabrication and powder-coating shops complete with CNC-controlled production equipment designed for close tolerance work. The company has a highly trained staff, all of whom are dedicated to quality.

LIMITED WARRANTY

866 Challenger



Warranty

National Vacuum Equipment, Inc.

Guarantees that the product it provides is free of manufacturer's defects, including materials and workmanship. Properly installed and maintained product is warranted for a period of one (2) year subject to the following conditions:

1. A properly completed warranty registration card must be received by us within 30 days of sale to end user for pump sales to be considered warrantable. All pumps received for warranty consideration must retain the original NVE serial number tag.
2. The one (2) year period shall begin the day the product is shipped from our warehouse, unless we are provided with an authentic copy of the original resale invoice, in which case the one (2) year period shall begin at such invoice date.
3. The covered product must be used in an application for which it was intended. We do not recommend our product for particular uses or applications.
4. Vane breakage, or damage caused by vane breakage, is not warrantable.
5. Damage caused by improper use or lack of proper maintenance is not warrantable.

- 6. Manufacturer's liability under this or any other warranty, whether express or implied, is limited to repair of or, at the manufacturer's option, replacement of parts which are shown to have been defective when shipped.**
- 7. Manufacturer's liability shall not be enforceable for any product until National Vacuum Equipment, Inc. has been paid in full for such product.**
- 8. Except to the extent expressly stated herein, manufacturer's liability for incidental and consequential damage is hereby excluded to the full extent permitted by law.**
- 9. Manufacturer's liability as stated herein cannot be altered except in writing signed by an officer of National Vacuum Equipment, Inc.**

The maximum allowable operating vacuum will vary depending on R.P.M., ambient temperature, altitude and time running. The basic principle to keep in mind is - faster R.P.M., higher air temperature and longer run time all equal more heat in pump. When installing an NVE 866 pump we recommend a normal R.P.M. of 1000. Other speeds are ok as long as exhaust gas temperatures read on the supplied thermometer do not exceed 380 degrees F.

Weights and measurements are for reference only.

866 CHALLENGER

Model-Specific Information



Application

Designed for extended operation

- Duty cycle will vary depending on several factors, including altitude, RPM & ambient temperature.
- The 866 Challenger is a severe duty vacuum pump, designed to be used in liquid waste pumping systems where extended operation is desired.
- Proven applications are:
 - Oil field
 - Restaurant Grease
 - Septic
 - Industrial Waste

Pump Specifications

866 Calculated Flow Data

RPM		Pressure (PSI)				Free Flow	Vacuum (in Hg)					
		20	15	10	5	0	6	12	15	18	21	27
1150	Hp	44	36	30	23	19	18	22	23	25	26	29
	CFM					461						
1000	Hp	37	30	24	18	10	14	18	20	22	23	26
	CFM					410						
900	Hp	33	25	22	16	8	12	15	17	18	20	23
	CFM					352						

Note: Ambient temperature, altitude, and a variety of other factors will affect the values listed above.

System Requirements

High Quality Components

- The 866 Challenger is a high performance vacuum pump and requires compatible, high quality components as manufactured by NVE.

Shutoffs

- We recommend the use of NVE Part #: 200-1206-4HB portal/portal shutoff, and NVE Part #: 216-140-4NPT-C, 14 gallon scrubber/secondary shutoff.

Final filter

- We also require the use of a final filter. You can use our remote mounted filter. (NVE Part #: 220-120-4NPT)

Hose

- Use 4" or larger hose to pump your system. We recommend you use a hose that can withstand high temperatures and pressures such as hot tar-asphalt hose.

Pressure relief and vacuum relief valves

- A pressure relief valve (2" or larger) and vacuum relief valve (1.5" or larger) should also be incorporated into the system between the vacuum pump and moisture trap.
- Your vacuum pump will potentially produce more pressure than is safely allowed for you vacuum tank. Consult with your tank manufacturer to determine the appropriate pressure rating.
- The vacuum relief valve will vary due to factors such as vacuum pump RPM, ambient temperature, altitude of operation, and should be set for operating vacuum of 20" Hg.
- Run the pump for 30 minutes with all tank valves closed monitoring exhaust temperature. The relief valves should be set to where the pump operates at a maximum temperature of 375 degrees F.
- Extremely hot and humid days will require close monitoring of pump exhaust temperatures and may limit maximum duty cycle vacuum.

WARNING: The vacuum pump will likely put up far more pressure than your vacuum pressure tank is designed to withstand. Over pressurizing

Drive System

- The pump should be mounted on a level, horizontal surface, secured with Grade 8 fasteners.
- The drive system should be sized to supply the required horsepower to the pump plus a reserve to insure long life.
- Make certain that all shafts, pulleys or turning parts are properly guarded.
- Check the ratio of the drive system prior to installation to verify that the pump will be turning at the proper speed and direction.
- Immediate engagement at working rpm for any rotating equipment will cause failure or premature wear. It is the responsibility of the installer and user to ensure the vacuum pump or blower is not being over torqued at start up.
- The pump should be set up to engage slowly to avoid initial torque damage.

Direction of Rotation

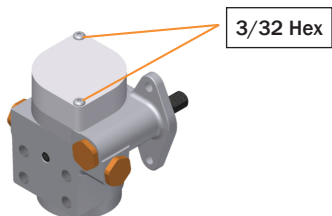
- The direction of rotation and RPM are marked on the front of the pump.
- The direction of rotation required by your drive system should be determined prior to ordering the pump.
- If during assembly of your unit you find you need the opposite rotation, call NVE for instructions.

Factory Settings

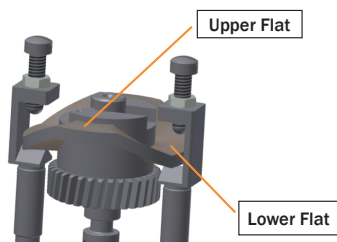
- The automatic lubrication pumps are set at the factory during pump testing and should require no further adjustment during pump installation. The pump should consume 12-14 oz of oil per hour if operated at 900 RPM.
- It is the responsibility of the installer to ensure proper vacuum/

Oil Pump Flow Rate Adjustment Procedures

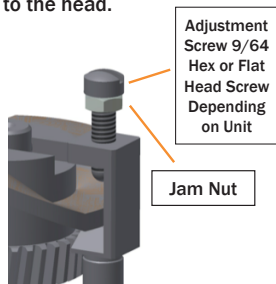
1. Remove oil pump cap (3/32 hex).
 - Ensure o-ring stays intact.



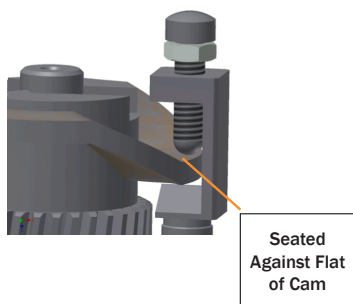
2. Move cam so adjustment screws are resting on lower flats



3. Hold adjustment screw (9/64 hex or flat head screw) while loosening jam nut (1/4" wrench). Spin jam nut all the way up to the head.
 - Adjustment Screw 9/64 Hex or Flat Head Screw Depending on Unit



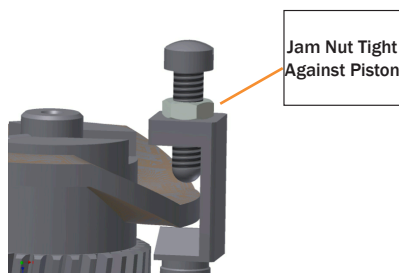
4. Tighten adjustment screw (CW) until it seats on the cam. (Do not force!)
 - Seated Against Flat of Cam



5. Back the screw off the desired amount of turns (CCW) - 5 turns if running at 900 RPM

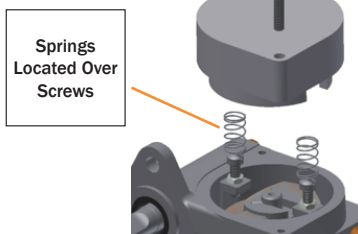
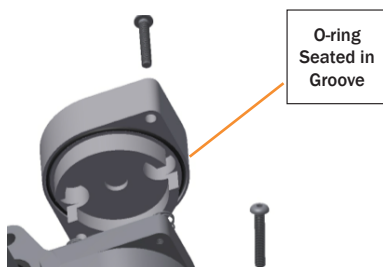
Tip: More turns out equals less oil flow.

- Fewer turns out equals more oil flow.
6. Retighten jam nut while holding adjustment screw.



7. Repeat process for other adjustment screw.

8. Reassemble cover onto pump
 - assuring o-ring does not fall out of groove, and springs are located over adjustment screws



If oil pump requires further adjustment, the rule is 1/2 turn CW = 1 oz/ hr higher oil flow.

Adjusting Factory Oil Settings Continued

NVE 4 Port Oil Pump Adjustment Rate Chart Tested at 1100 RPM

Turns From Bottom	Ounces Per Hour
7.5	6
7.25	7
7	8
6.75	9
6.5	10
6	11
5.5	12
5	13
4.75	14
4.5	15
4.25	16

OPERATING INSTRUCTIONS

866 Challenger



Normal Operation

Oil Reservoir

- Check oil reservoir daily and fill as required.
- Drain and clean periodically depending on service.
- Clean the ballast air filter with diesel fuel regularly

Recommended RPM

- The 866 vacuum/pressure pump operates between 900 and 1200 RPM. Lower RPM result in less airflow (352 CFM at 900 RPM) but will result in higher working vacuum level (27 " Hg at 900 RPM). Higher RPM will result in increased air flow (461 CFM at 1150 RPM) and less working vacuum (23 " Hg at 1150 RPM). RPM should be set to meet the needs and expectations of the operator. Vacuum relief valves should be adjusted for a maximum working exhaust temperature of 375 degrees Fahrenheit. Pressure relief valves should be adjusted to meet the tank manufacturer specifications.
- Too low of an RPM can cause the vanes to clatter (inconsistent contact with the housing) causing wear.

Suction Valve

- To operate the suction valve, move the handle in the appropriate direction for either vacuum or pressure; center is neutral.

Vacuum Levels

- Do not operate your pump for extended periods of time at vacuum levels which cause the pump exhaust gas temperature to exceed 375 degrees Fahrenheit.

Guards

Make certain all guards are in place prior to running your pump.

Think Safety!

Recommended Lubricant

- We recommend that turbine oil be used in our pumps. Turbine oil is much more resistant to breakdown due to heat than normal motor oil, thereby avoiding the problems associated with motor oil such as lacquering and excessive wear.
- NVE ISO 150 Oil is our recommended pump oil for the Challenger series vacuum pumps. Challenger Vacuum Pump Oil is sold by the case, six-1 gallon containers of oil per case.

Ballast Valve System

- The Challenger 866 Vacuum Pump features an integral ballast air cooling system. It works by allowing cooling air to enter the pump at higher vacuum levels just prior to the exhaust port. This allows the pump to dissipate the heat produced by friction. The overall result is cooling of the housing and rotor will no appreciable drop in vacuum level. At lower vacuums, sufficient air is moving through the pump to accommodate heat dissipation. The ballast valve features an integral check system that automatically opens once a predetermined vacuum level has been reached (usually at 12" Hg). Inclusion of the ballast system greatly enhances the 866's duty cycle. The 866 should never be run for extended periods above 12" Hg without the allowance of ballast air.

Ballast Valve Troubleshooting

- Ballast valve not opening
 - Ballast valve adjustment screw set to open too high (see next section)
 - Clogged ballast air filter
 - Loose vacuum line fitting/leaking vacuum line
 - Vacuum line blockage
 - Torn ballast valve diaphragm (see ballast valve rebuilding section)
 - Defective O-Ring on Boss plug in ballast valve cover
- Ballast valve stays open
 - Ballast valve adjustment screw set to open too low (see next section)
 - Debris caught in ballast valve plunger (see ballast valve rebuilding section)
 - Worn ballast valve plunger pilot (see ballast valve rebuilding section)

Adjusting Ballast Valve Opening Level

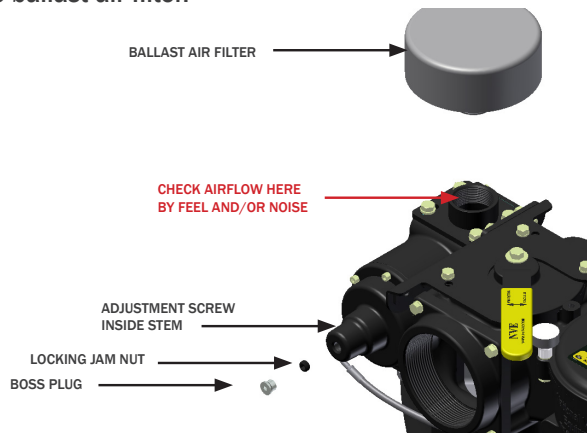
The following tools will be required to adjust the ballast valve opening level:

- 7/32" hex drive
- 1/4" hex drive
- Flat head screwdriver

- Using the 7/32" hex drive, remove the boss plug from the cover of the ballast valve.
- Using the 1/4" hex drive, remove the locking jam nut.
- The ballast valve opening adjustment screw lies under the locking jam nut.
- Remove the ballast air filter from the top of the ballast valve.
- Run pump to desired ballast opening vacuum level (recommend 12" Hg).
- If ballast is not open (and should be), turn adjustment screw CCW slowly with flat-head screwdriver until air just begins to flow.
- If ballast opens before desired vacuum has been reached, turn adjustment screw CW slowly with flat-head screwdriver until air is just flowing.
- Place thumb over adjustment hole and ensure opening level is accurate.

*Without the boss plug, vacuum chamber is not sealed, thus opening level may vary slightly.

- If adjustment holds accurate, replace locking jam nut, boss plug, and the ballast air filter.



Ballast Valve Rebuilding

If, from the troubleshooting guide shown previously, a ballast valve is determined to require rebuild, a rebuilding kit can be obtained from NVE. This kit will include all the components necessary to rebuild the ballast valve. The ballast valves have been designed to be field rebuild-able. The procedure is shown below:

1. Remove the ballast valve vacuum line from the ballast valve cover (1/2" Wrench).
2. Remove the six socket head bolts from the ballast valve cover.

Caution: The cover will be under slight spring tension

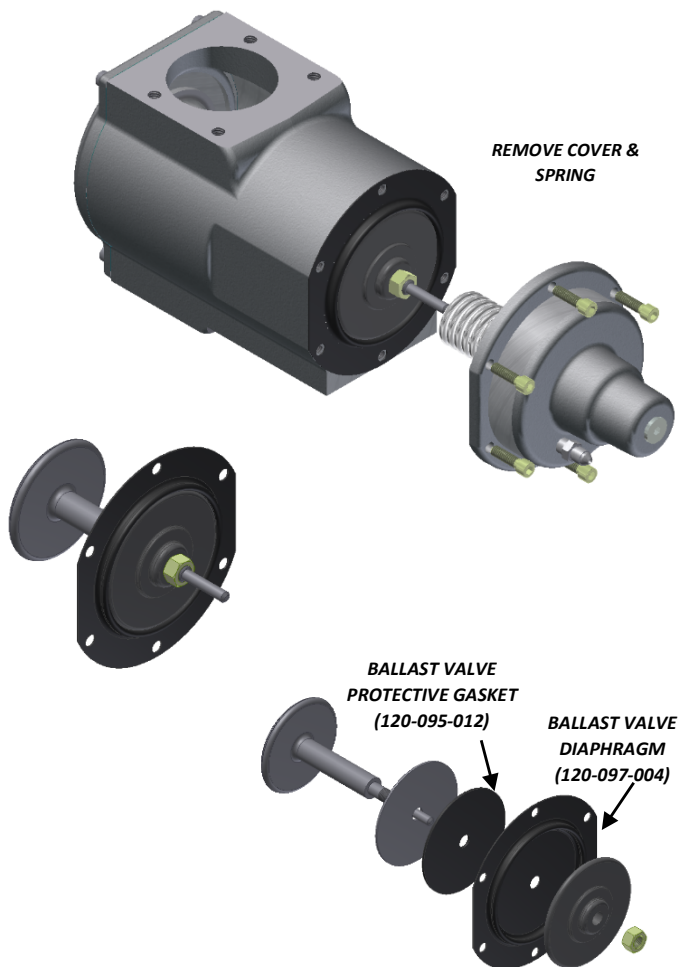
3. Remove cover carefully (spring should stay in cover).
4. Remove plunger assembly from ballast valve.
5. Remove nut from plunger assembly and disassemble.
6. Replace ballast valve diaphragm and the ballast valve protective gasket and reassemble plunger assembly.
7. Place a small amount of Loc-tite on threads and an mating face of nut and tighten.
8. Ensure plunger sealing face and internal housing sealing face are free of burrs.
9. Insert plunger assembly back into ballast valve housing.
10. Place spring in the cover pilot, align JIC fitting downward and close to the pump, and replace cover.

Note: Spring tension will have to be overcome to start bolts

Important: The shorter bolt goes in the 6 o'clock position

11. Tighten bolts evenly.
12. Remove and replace the boss plug in the ballast valve cover.

Ballast Valve Rebuilding



***Since adjustment wasn't altered, ballast valve should retain previous opening level**

Maintenance

Washing

- Periodically wash the mud and dirt off of your pump as it must be clean to allow the fins to dissipate heat properly.

Flushing

We recommend periodic flushing of your pump. To do this:

1. Connect the hose to the flush valve located on the side of the inlet port.
2. Put the end of the hose in a one pint container of diesel fuel. Start your pump and run as slow as possible.
3. With the 4-way valve in the vacuum position, open the flush valve and monitor the diesel flow to your pump.
4. When the diesel fuel is gone, switch the 4-way valve to neutral and run the pump for 2 minutes.
5. Speed the pump up to normal RPM, switch the 4-way valve to vacuum.
6. Close the valve and remove the hose.
7. Drain oil catch muffler and properly dispose of used oil and flushing fluid.

Checking Vane Wear

We recommend checking vane wear, at a minimum, every 12 months.

- A new vane is flush with the outside diameter of the rotor.
- Remove the plug from the vane check port, insert a clean rod to rotor O.D., rotate rotor until the rod falls into one of the vane slots. If the rod falls more than a 1/4" into any of the 6 vane slots, it's time to replace the vanes.
- Vanes should be replaced in sets and it is always a good idea to have an extra set of vanes on hand for emergencies.

[illegible]

TROUBLESHOOTING

NVE 866 Vacuum Pump



Pump Overheats

- No oil in pump
- Oil pump adjustment set too lean
- RPM too fast
- Prolonged operation at excessive vacuum or pressure levels,
- Pump is dirty
- Ballast filter is clogged or dirty.

Pump Uses Too Much Oil

- Oil pump set too rich
- Leaving pump under vacuum between jobs
- Product running through pump

Pump Doesn't Turn

- Broken vane or bearing
- Pump is frozen
- Problem in the drive train

No Vacuum

- Suction valve is in neutral
- Worn seals or vanes
- Pump is not turning fast enough
- Check valve or suction valve is clogged
- Leak in the tank or fittings
- Collapsed hose between the pump and shutoffs
- Ballast filter clogged

System Troubleshooting

Locating the source of the trouble

If you notice a decrease in pump performance, start troubleshooting at the pump.

- Remove the suction and discharge hoses at the pump
- Start the pump and run it in vacuum only at its normal rpm
- Check the vacuum level at the pump inlet. The 866 Challenger in new condition will develop 27-28.5" Hg.
- If the pump checks out ok, check the vacuum level at the secondary, then the primary shutoff. Keep working your way back until you find the problem.

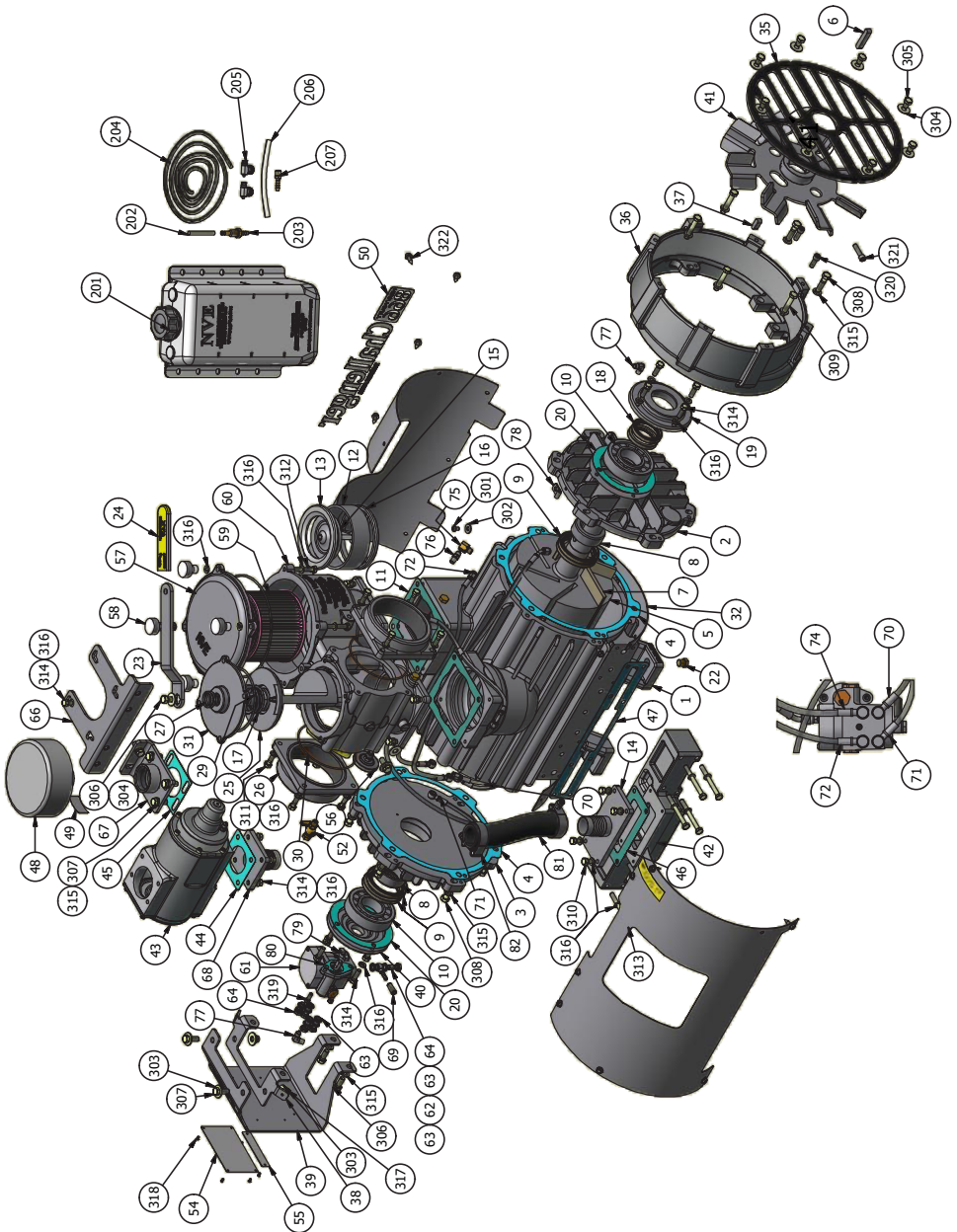
For rebuild instructions please visit our website at www.natvac.com or call us at 800-253-5500.

Making a Vacuum Tester

1. Procure a flange to mount on your four-way valve, a short 4" pipe nipple, a 4" pipe cap and a vacuum gauge.
2. Drill and tap a 1/4" NPT thread in the pipe cap.
3. Assemble the flange, nipple, pipe cap and vacuum gauge.
4. Remove a flange from the four-way valve on your pump.
5. Start the pump and confirm the location you have chosen to test from is at vacuum.
6. Using the existing O-ring, fasten the testing flange to your pump.
7. Start your pump and read the vacuum level on the gauge.

PARTS BREAKDOWN

NVE 866 Challenger Fan Cooled | Parts Diagram



NVE 866 Challenger - Fan Cooled Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	120-001-506	HOUSING 506/866
2	1	120-003-506-D	ENDPLATE, 866 FAN CW
3	1	120-003-506-S	ENDPLATE, 866 FAN CCW
4	2	120-004-460	GASKET ENDPLATE 460
5	1	120-005-506-D 120-005-506-S	ROTOR 866 CW ROTOR 866 CCW
6	1	120-006	KEY 3/8" X 3/8" X 2"
7	6	120-007-506	VANE 506
8	2	120-009-506	SEAL SLEEVE 506
9	4	120-018-506	SEAL 65 X 85 X 8 VITON
10	2	120-019-506	BEARING NJ309 C3
11	2	120-039-506	GASKET, 4" INT/EXH FLANGE
12	1	120-041-001	INTERNAL CHECK VALVE, BODY, 866
13	1	120-041-002	INTERNAL CHECK VALVE, TOP PLATE, 866
14	1	120-041-017	BALLAST PORT, HOSE CONNECTION WELDMENT
15	1	120-041-506	CHECK VALVE 4"
16	1	120-042-506	RETAINER CHECK VALVE 4"
17	1	120-045	SPRING 4-WAY FTR VALVE
18	2	120-053-506	SEAL 45 X 62 X 8 VITON
19	1	120-054-506	BEARING COVER
20	2	120-055-506	GASKET BEARING COVER
21	2	120-058	PLUG BRASS HEX HEAD 1/8" NPT
22	3	120-059	PLUG BRASS HEX HEAD 1/4" NPT
23	1	120-060-001	HANDLE, 367 GEN 2
24	1	120-060-002	GRIP, HANDLE W/ LOGO
25	1	120-062-006	PLUG 866
26	2	120-063-506	FLANGE 4" NPT
27	2	120-064-002	O-RING, 2-214 VITON
28	1	120-064-004	O-RING, 2-265 VITON
29	1	120-064-007	O-RING, 2-248 VITON
30	2	120-064-506	ORING, 2-158 SILICONE
31	1	120-065-001	TOWER 866
32	1	120-070-005-D 120-070-005-S	SHROUD LOWER 866 CW SHROUD LOWER 866 CCW
33	1	120-071-005-D 120-071-005-S	SHROUD UPPER 866 CW SHROUD UPPER 866 CCW
34	1	120-072-005-D 120-072-005-S	SHROUD SERVICE PANEL 866 CW SHROUD SERVICE PANEL 866 CCW
35	1	120-073-E	FAN COVER 607/866 E-COAT
36	1	120-074-506	FAN SHROUD 506/866
37	1	120-076	KEY 3/8" X 3/8" X 1"
38	1	120-077-005	SHROUD/OPG SUPPORT 866
39	1	120-079-009	GUARD NVE OIL PUMP 866 W/ TAG MOUNT
40	1	120-080-506	BEARING COVER, 506 OIL PUMP

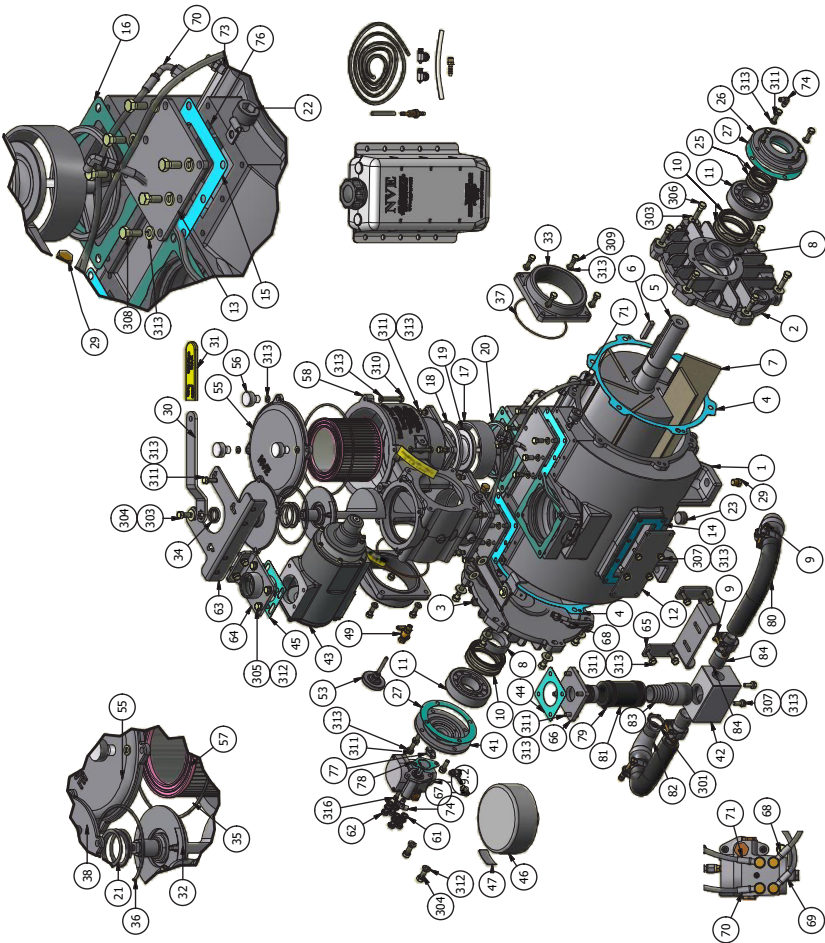
NVE 866 Challenger - Fan Cooled Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
41	1	120-084-002 120-084-001	FAN ASSY, CW, 866 FAN ASSY, CCW, 866
42	1	120-090-506	LOWER BALLAST MANIFOLD
43	1	120-095-100	CHECK VALVE ASSEMBLY VAC OPERATED
44	1	120-097-003	GASKET BALLAST VALVE LOWER
45	1	120-097-006	GASKET BALLAST VALVE TOP
46	1	120-097-506-E	GASKET BALLAST ELBOW
47	1	120-097-506-M	GASKET LOWER BALLAST MANIFOLD
48	1	120-099-506-4 120-099-506-5	BALLAST FILTER ASSEMBLY, REMOTE FLTER ELEMENT 866 REMOTE
49	1	120-100-012	DECAL CLEAN FILTER REGULARY YELLOW
50	1	120-100-866	DECAL 866 CHALLENGER HD
51	1	120-101-003 120-101-004	DECAL CW ROTATION ARROW DECAL CCW ROTATION ARROW
52	1	120-102	VALVE, DRAIN 1/8" NPT
53	1	120-103-367	DECAL, IMPORTANT, MAX OPERATING TEMP
54	1	120-105-866	NAME PLATE SS, 866
55	1	120-107-001	SERIAL TAG SS
56	1	120-220	THERMOMETER, 50- 400 DEG, 2" FACE
57	1	120-310-001	COVER, FILTER 607/866
58	4	120-312-002	KNOB, 5/16-18UNC
59	1	120-314-001	FILTER ELEMENT 607/866
60	1	120-320-002	MANIFOLD, 866, MACHINED
61	1	123-000-004	OIL PUMP 4 PORT BIDIRECTIONAL
62	1	123-408-017	BANJO ADAPTER TO 0.250" HB
63	10	123-013-001	WASHER 3/8" SEALING NBR
64	5	123-408-014	BANJO BOLT 1/8" BSPP
66	1	280-355-135	BALLAST VALVE PUMP BRACKET
67	1	280-355-136	BALLAST VALVE MOUNTING BRACKET
68	1	280-355-152	LOWER FLANGE WELDMENT, 866 BALLAST CHECK VALVE RETROFIT
69	1	320-083-011	CAP OIL PUMP FEED LINE FITTING
70	1	320-407-005Z	OIL LINE -3 SST FEMALE JIC TO BANJO 6.75"
71	1	320-407-011	OIL LINE -3 SST FEMALE JIC TO BANJO 16.50"
72	1	320-407-012	OIL LINE -3 SST FEMALE JIC TO BANJO 26.75"
73	1	320-407-034	OIL LINE -3 SST 90 DEG JIC TO STR -3 FEMALE JIC 14.75"
74	1	320-407-036	OIL LINE -3 SST 45 DEG JIC TO BANJO 31.5"
75	2	320-408-002	ADAPTER, ELBOW 1/8 MNPT-FNPT
76	2	320-408-016	FITTING STR -3 MJIC X 1/8 MNPT
77	3	320-408-017	FITTING ELBOW -3 MJIC X 1/8 MNPT

NVE 866 Challenger - Fan Cooled Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
78	2	320-409-003	P-CLIP, OIL LINE 1/4" X 5/16
79	2	320-LF8	DRIVE TAB
80	1	320-R31	GASKET, OIL PUMP
81	1	426-150-TAR-0950	HOSE, 1.5", HOT TAR AND ASPHALT, 9.5"
82	2	426-150-TBC	CLAMP T-BOLT 2" DIA
200	1	OWNERS MANUAL - 866	OWNERS MANUAL - 866
201	1	320-082-001	OIL TANK, 5QT, W/ LOGO
202	1	320-083-009	OIL TANK FILTER, 100 MESH
203	1	320-083-010	FILTER FITTING, OIL TANK 1/4 NPT
204	5 FT	320-407-003	OIL LINE, BLK 1/4" ID 30R7
205	2	416-025-1WC	CLAMP, WORM, 1/4" DIA
206	6 IN	320-R102	OIL LINE, 3/8" X 1/4" ID X 6" LG
207	1	310-LP5	HOSE BARB 1/4" X 1/8" NPT STRAIGHT

NVE 866 Challenger Liquid Cooled | Parts Diagram



NVE 866 Challenger Liquid Cooled | Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	120-001-506-L	HOUSING 866 LIQUID COOLED
2	1	120-003-506-LD	ENDPLATE, 866 LIQ CW
3	1	120-003-506-LS	ENDPLATE, 866 LIQ CCW
4	2	120-004-460	GASKET ENDPLATE 460
5	1	120-005-506-D 120-005-506-S	ROTOR, 506 CW (102-866-LD) ROTOR, 506 CCW (102-866-LS)
6	1	120-006	KEY 3/8" X 3/8" X 2"
7	6	120-007-506	VANE 506
8	2	120-009-506	SEAL SLEEVE 506
9	4	120-015	CLAMP T-BOLT 1.5"
10	4	120-018-506	SEAL 65 X 85 X 8 VITON
11	2	120-019-506	BEARING NJ309 C3
12	1	120-021-367	COVER PLATE, 367 WATER JACKET
13	2	120-021-506	COVER PLATE, 506 TOP JACKET
14	1	120-022-367	GASKET, 367/506 COVER PLATE
15	2	120-022-506	GASKET, 506 TOP COVER PLATE
16	2	120-039-506	GASKET, 4" INT/EXH FLANGE
17	1	120-041-001	INTERNAL CHECK VALVE, BODY, 866
18	1	120-041-002	INTERNAL CHECK VALVE, TOP PLATE, 866
19	1	120-041-506	CHECK VALVE 4"
20	1	120-042-506	RETAINER CHECK VALVE 4"
21	1	120-045	SPRING 4-WAY FTR VALVE
22	1	120-047	DRAIN PLUG, 3/4" NPT
23	1	120-047-1	DRAIN PLUG, 3/4" NPT MAGNETIC
24	1	120-049	BUSHING, 3/4" NPT X 1/8" FNPT
25	2	120-053-506	SEAL 45 X 62 X 8 VITON
26	1	120-054-506	BEARING COVER
27	2	120-055-506	GASKET BEARING COVER
28	1	120-058	PLUG BRASS HEX HEAD 1/8" NPT
29	3	120-059	PLUG BRASS HEX HEAD 1/4" NPT
30	1	120-060-001	HANDLE, 367 GEN 2
31	1	120-060-002	GRIP, HANDLE W/ LOGO
32	1	120-062-006	PLUG 866
33	2	120-063-506	FLANGE 4" NPT
34	2	120-064-002	O-RING, 2-214 VITON
35	1	120-064-004	O-RING, 2-265 VITON
36	1	120-064-007	O-RING, 2-248 VITON
37	2	120-064-506	ORING, 2-158 SILICONE
38	1	120-065-001	TOWER 866
39	1	120-077-005	SHROUD/OPG SUPPORT 866
40	1	120-079-009	GUARD NVE OIL PUMP 866 W/ TAG MOUNT
41	1	120-080-506	BEARING COVER, 506 OIL PUMP
42	1	120-089-866	BALLAST BLOCK 866 LIQ COOLED
43	1	120-095-100	CHECK VALVE ASSEMBLY VAC OPERATED
44	1	120-097-003	GASKET BALLAST VALVE LOWER
45	1	120-097-006	GASKET BALLAST VALVE TOP
46	1	120-099-506-4	BALLAST FILTER ASSEMBLY, REMOTE
47	1	120-100-012	DECAL CLEAN FILTER REGULARY YELLOW
48	1	120-101-003	DECAL CW ROTATION ARROW

NVE 866 Challenger - Liquid Cooled Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
49	1	120-102	VALVE, DRAIN 1/8" NPT
50	1	120-103-367	DECAL, IMPORTANT, MAX OPERATING TEMP
51	1	120-105-866	NAME PLATE SS, 866
52	1	120-107-001	SERIAL TAG SS
53	1	120-220	THERMOMETER, 50- 400 DEG, 2" FACE
54	1	120-220-1	THERMOMETER 220 F 1/8" NPT
55	1	120-310-001	COVER, FILTER 607/866
56	4	120-312-002	KNOB, 5/16-18UNC
57	1	120-314-001	FILTER ELEMENT 607/866
58	1	120-320-002	MANIFOLD, 866, MACHINED
59	1	123-000-004	OIL PUMP 4 PORT BIDIRECTIONAL
60	1	123-408-017	BANJO ADAPTER TO 0.250" HB
61	10	123-013-001	WASHER 3/8" SEALING NBR
62	5	123-408-014	BANJO BOLT 1/8" BSPP
63	1	280-355-135	BALLAST VALVE PUMP BRACKET
64	1	280-355-136	BALLAST VALVE MOUNTING BRACKET
65	1	280-355-151	MANIFOLD BRACKET, 866 LIQUID, BALLAST CHECK VALVE RETROFIT
66	1	280-355-152	LOWER FLANGE WELDMENT, 866 BALLAST CHECK VALVE RETROFIT
67	1	320-083-011	CAP OIL PUMP FEED LINE FITTING
68	1	320-407-005	OIL LINE -3 SST FEMALE JIC TO BANJO 6.75"
69	1	320-407-006	OIL LINE -3 SST 90 DEG JIC TO BANJO 17.5"
70	1	320-407-009	OIL LINE -3 SST 90 DEG JIC TO BANJO 30"
71	1	320-407-010	OIL LINE -3 SST FEMALE JIC TO BANJO 37.50"
72	1	320-407-034	OIL LINE -3 SST 90 DEG JIC TO STR -3 FEMALE JIC 14.75
73	2	320-408-016	FITTING STR -3 MJIC X 1/8 MNPT
74	3	320-408-017	FITTING ELBOW -3 MJIC X 1/8 MNPT
75	1	320-408-034	ADAPTER STRAIGHT 1/8" MNPT X 1/8" FNPT BRASS
76	6	320-409-003	P-CLIP, OIL LINE 1/4" X 5/16
77	2	320-LF8	DRIVE TAB
78	1	320-R31	GASKET, OIL PUMP
79	2	416-100-1WC	CLAMP, WORM, 1"-2" DIA
80	2	426-100-TAR-1100	HOSE 1"D X 11"L
301	2	CPF-1.00D	1" CONDUIT LOCKNUT
302	6	FW - 3_8	FLAT WASHER, 3/8"
303	13	FW - 3_8 USS	FLAT WASHER - 3/8 USS
304	3	HHCS - 3_8-16 UNC X 0.75	HEX HEAD CAP SCREW - 3/8-16 UNC X 0.75
305	8	HHCS - 3_8-16 UNC X 1.00	HEX HEAD CAP SCREW - 3/8-16 UNC X 1.00
306	12	HHCS - 3_8-16 UNC X 1.50	HEX HEAD CAP SCREW - 3/8-16 UNC X 1.50
307	6	HHCS - 5/16-18 UNC X 0.875	HEX HEAD CAP SCREW - 5/16-18 UNC X 0.875
308	12	HHCS - 5/16-18 UNC x 0.75	HEX HEAD CAP SCREW - 5/16-18 UNC x 0.75
309	8	HHCS - 5_16-18 UNC X 1.25	HEX HEAD CAP SCREW - 5/16-18 UNC X 1.25
310	4	HHCS - 5_16-18 UNC X 2.00 - FULL THREAD	HEX HEAD CAP SCREW - 5/16-18 UNC X 2.00 FULL THREAD
311	28	HHCS - 5_16-18 UNC x 1.00	HEX HEAD CAP SCREW - 5/16-18 UNC x 1.00
312	8	LW - 3_8	LOCK WASHER, 3/8"
313	62	LW - 5_16	LOCK WASHER, 5/16"
314	2	NYLOCK NUT - 3/8 UNC	NYLOCK NUT - 3/8 UNC

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