



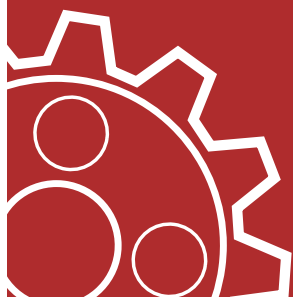
Dominator Series



Perfect for:

Rental Stores • Shopping Centers • Trucking • Schools • Marinas • Warehouses • Hospitals • Chemical Processors

Service Manual



Engine Driven

Model DH4040HDOF

P/N I4405-SBL013

INSTALLATION DATE

MAKE/MODEL

SERIAL NUMBER

SELLER

ADDRESS

CITY/STATE/ZIP

WARNING: Detectable amounts of chemicals known to the State of California to cause cancer, birth defects or other reproductive harm may be found in pressure washing equipment and accessories. California Health and Safety Code 25249.5

Advertencia: cantidades detectables de sustancias químicas conocidas en el estado de California como causantes de cáncer, defectos de nacimiento u otros daños reproductivos pueden ser encontrados en equipos de lavado a presión y accesorios. California 25249.5 del Código de Salud y Seguridad

Avertissement : des quantités de produits chimiques connus de l'État de Californie pour causer le cancer, dommages à la naissance ou autre peut être trouvé dans l'équipement de lavage à pression et accessoires. La santé de la Californie et au Code de sécurité 25249.5



**WARNING:
ADVERTENCIA:
AVERTISSEMENT:**

California Prop 65 Warning

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Machine Record

[illegible]

Specifications

Performance

Discharge Volume

4.0 gal/m / 15.1 L/m

Pump Head Pressure

4000 psi / 275 bar

Temperature Limit

210°F / 99°C

Heat Input

352,800 Btu/h / 88,905 kcal/h

General

Pump

Triplex Oil Bath, Ceramic Plunger
Direct Drive

Combustion Smoke/Bacharach Scale

#1 OR #2 SMOKE

Carbon Monoxide Allowed

0.01%

Draft/Stack Installation

0.2" – 0.04" WC READING

Chemical

Precise Metering

Dimensions

W-32" X L-48" X H-39"

Wheels

Ball Bearing Pneumatic

Burner

Pressure Atomizing, Auto Ignition

Minimum Inlet Water Pressure

Over 65 psi / 4.5 bar may require water
inlet regulator
10 psi / 2.8 bar

Battery – 12V-22F

p/n F05-00210

Spray Tip

Red (#4. 0 - 40°) p/n JA0-40040-2
Yellow (#4.0 - 15°) p/n JA0-15040-2
Green (#4.0 - 25°) p/n JA0-250640-2
White (#4.0 - 40°) p/n JA0-40040-2

Weight

560 Lbs / 204 Kg

Fuel Tank

8 Gal / 30.3 Lt

Coil

14" OD x 1/2" ID x 126' Schedule 80

Coil Back Pressure (New)

5 psi / 0.34 bar

Coil Back Pressure Requiring Descaling

50 psi / 3.40 bar

Pump Engine

p/n	F05-00488
Make	Honda GX390
Horsepower	13 hp / 9.7 kw
Fuel	Gasoline
Engine Starting	Electric
Engine Air Filter	p/n F05-000462-10
Engine Air Pre-Cleaner	None
Engine Oil Filter	None
Fuel Tank Capacity	6.4 Qt / 6.5 L
Oil Capacity	1.16 Qtl / 6.5 L
Engine Oil Alert	Yes

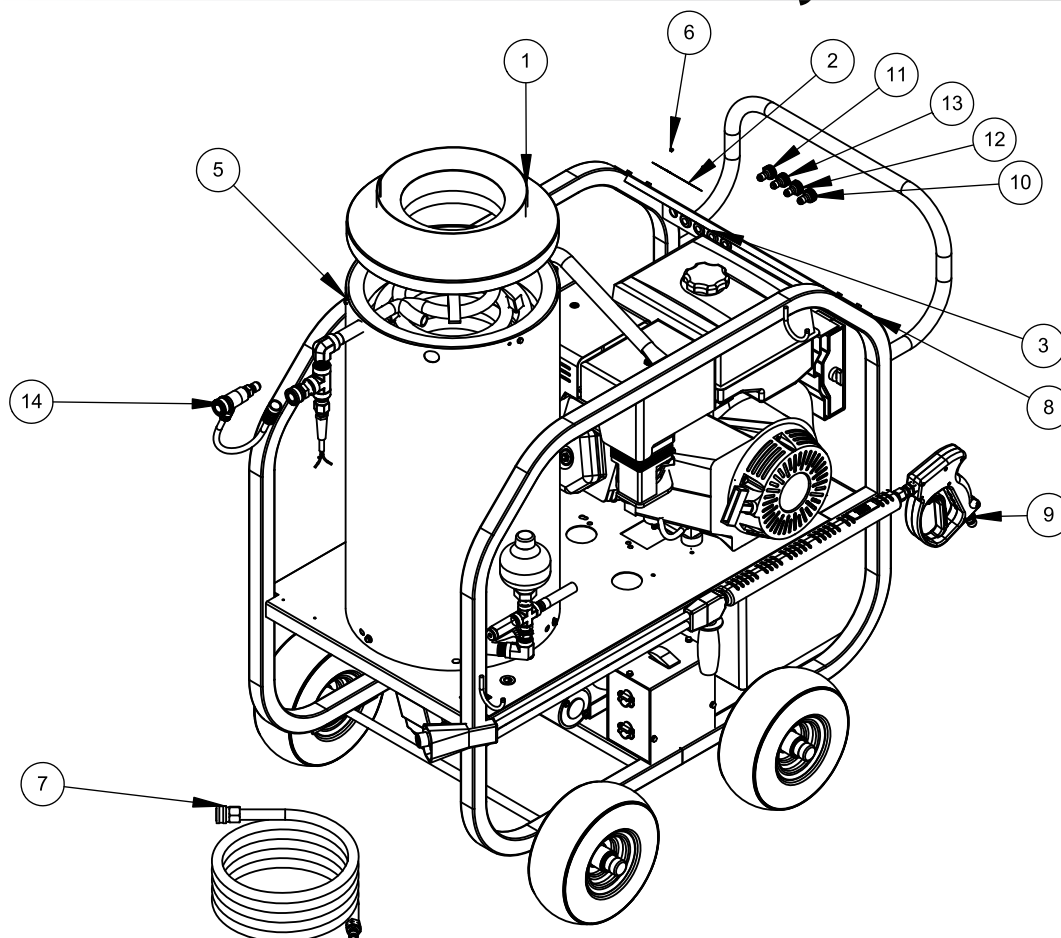
BURNER

Burner Part Number	V03-ACS102
Burner Type	Pressure Atomizing
Fuel Type	#1 or #2 Fuel Oil
Fuel Pressure	125 PSI / 9 BAR
Voltage	12 vdc
Shutter Setting	10
Air band Setting	7

Burner Nozzle 2.25 Gallon per Hour 80 Degree B
p/n V2.25 80DB

Fuel Consumption 2.52 Gal/Hr / 9.5 L/Hr

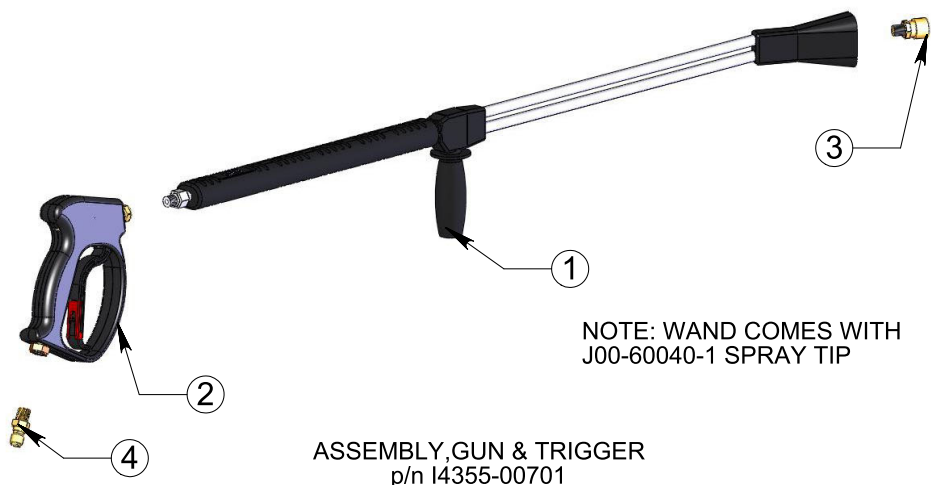
Final Assembly



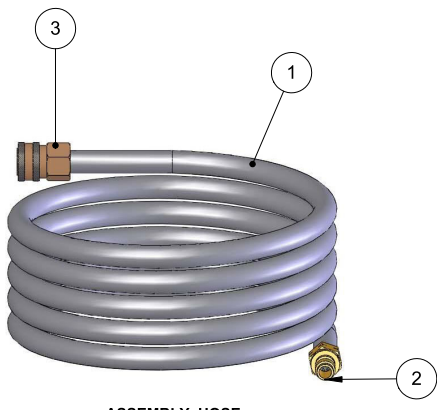
MODEL DH4040HDOF
p/n: I4405-SBL013
10/16/2014

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	2122-00210	ASSEMBLY, COIL TOP	1
2	D02-00001C	DECAL, SERIAL NO. - ALL AM	1
3	F04-00451	GROMMET, RUBBER	4
4	F05-00210-2	STRAP,BATTERY-BOX	1
5	H04-19011	SCREW, SELF TAP	3
6	H09-12500	RIVET, POP	2
7	i2142-00710	ASS'Y, HOSE - 3/8 X 50 100R1 w/Couplers	1
8	I4305K-00607	CLEANER ASSEMBLY	1
9	I4355-00701	ASSEMBLY, RIGGER GUN AND DUAL LANCE WAND	1
10	J00-00040-2	TIP, SPRAY	1
11	J00-15040-2	TIP, SPRAY	1
12	J00-25040-2	TIP, SPRAY	1
13	J00-40040-2	TIP, SPRAY	1
14	J06-00244	INJ, CHEM - DOWN STREAM	1
15	Y02-00061	GAUGE, GAS - CAP	1

Trigger Gun & Wand



ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	J06-00152	WAND, DUAL LANCE	1
2	J06-00158	GUN, TRIGGER	1
3	W04-24121-A	COUPLER, 1/4 FEMALE X 1/4 MNPT	1
4	W04-31135-B	COUPLER, 3/8 MALE X 3/8 MNPT	1



ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	K02-03150E1	ASSEMBLY, HOSE 3/8" X 50'	1
2	W04-31231-B	COUPLER, 3/8	1
3	W04-34231-A	COUPLER, QUICK DISCONNECT	1

Trigger Gun

BREAKDOWN, GUN - TRIGGER

EXPLODED VIEW - P/N J06-00158

SPECIFICATIONS

MAXIMUM VOLUME.....10.0 GPM / 37.9 LPM
MAXIMUM PRESSURE.....5000 PSI / 344.7 BAR
RATED TEMPERATURE.....300 F / 150 C
WEIGHT.....1.8 LBS. / 0.8 KG
INLET.....3/8" NPT FEMALE
OUTLET.....1/4" NPT FEMALE

YG3500

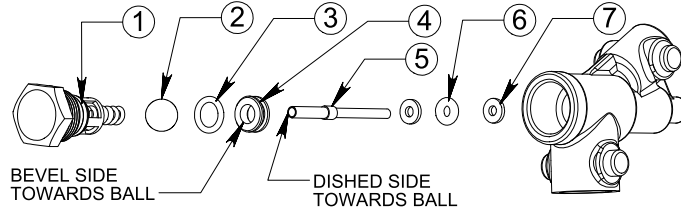
REPAIR INSTRUCTIONS

1. Remove screws from handles and remove handle housings.
2. With 18mm socket remove retainer being careful to catch the spring and ball as they fall out of the housing.
3. Remove and replace parts with those found in the kit.
4. Assembly in reverse order.

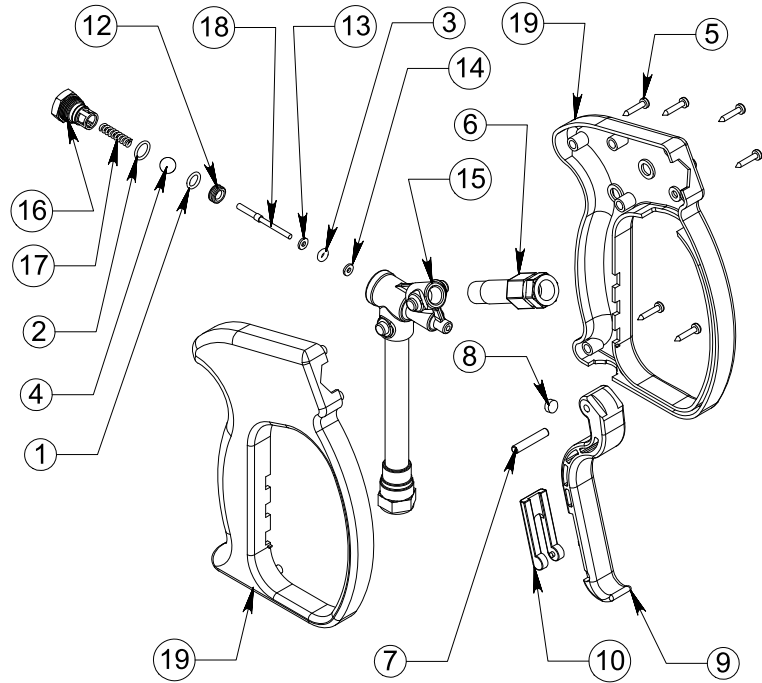
WARNING:
DO NOT USE ACID CONCENTRATES THROUGH THE GUN

WARNING:
Never secure trigger gun in an open position (trigger pulled back) by means other than the operator's hand. Bodily harm may occur if the operator loses control of the trigger gun.

CAUTION:
Always engage trigger safety latch when not in use.



KIT, REPAIR PART - NUMBER J06-99158C



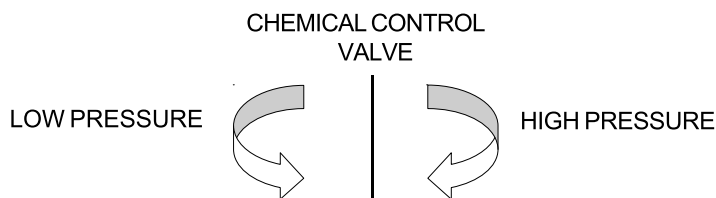
PART LISTS

ITEM	PART NUMBER	PART DESCRIPTION	QTY.
1	C07-01300-08	O-RING - 1/16CS X 5/16ID	1
2	C07-01425	FILTER, WATER	1
3	J06-00121-07	O-RING - 3/32 CS X 1/8 ID	1
4	J06-00121-15	BALL, SS 5/16	1
5	J06-00132-19	SCREW, SELF TAP - 3.5MM X 18MM	7
6	J06-00158-01	FITTING, DISCHARGE - 1/4 FNPT	1
7	J06-00158-02	PIN, TRIGGER - 5MM X 27.5MM	1
8	J06-00158-03	CAM	1
9	J06-00158-04	TRIGGER	1
10	J06-00158-05	LATCH, SAFETY	1
11	J06-00158-06	FITTING, INLET - 3/8 FNPT	1
12	J06-00158-08A	SEAT, VALVE	1
13	J06-00158-09	WASHER, FLAT	1
14	J06-00158-10	WASHER, FLAT - BRASS	1
15	J06-00158-11	HOUSING, VALVE	1
16	J06-00158-12A	RETAINER, VALVE	1
17	J06-00158-13	SPRING, COMPRESSION	1
18	J06-00158-14	PIN, VALVE - 4MM X 44MM	1
19	J06-99158A	HOUSING, HANDLE	1

Wand, Dual Lance

BREAKDOWN, DUAL LANCE

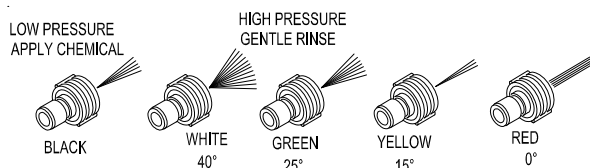
EXPLODED VIEW - P/N J06-00152



Dual lance wands are designed for hot or cold water systems. The lance provides a convenient method of operating a downstream chemical injection system by turning the adjustment handle clockwise for high pressure and counter clockwise for low pressure chemical application.

NOTE: Machines with PRESSURE SWITCHES, because of lower pressures may lose heat during soaping.

SPRAY TIPS



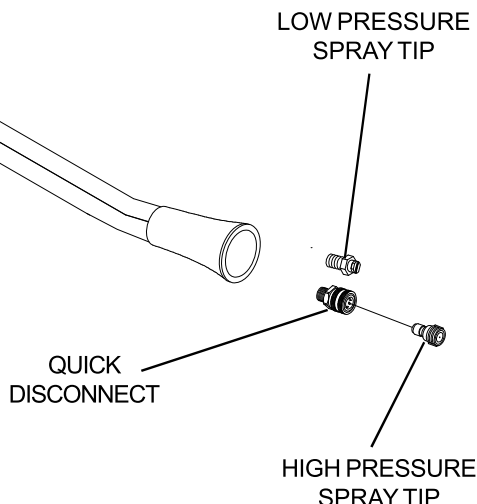
Quick-Connect spray tips have fixed spray patterns that are more consistent than those produced by an adjustable nozzle. Each tip is color-coded for easy identification.

White (40°): produces a wide-fan spray for general cleaning and light washing, washing and rinsing of automobiles and boats, cleaning roofs, windows, patios and driveways..

Green (25°): provides a narrower-fan spray for tough stains in general cleaning of dirt, mud and grime, roofs, gutters and downspouts, removing light mildew stains, algae and bacteria build-up from pools, rinsing surfaces in preparation for painting.

Yellow (15°): maintains a tight-fan spray with intense cleaning power for removing paint from wood, masonry or metal, grease or dirt from equipment, heavy mildew stains, marine growth from boats and marine equipment, rust from steel and oxidation from aluminum.

Red (0°): creates a concentrated pinpoint water jet removing caked on mud from heavy construction, farm or lawn equipment, cleaning tar, glue or stubborn stains from concrete, cleaning overhead areas, rust from steel and oxidation from aluminum.



WARNING: RISK OF INJECTION OR SEVERE INJURY. KEEP CLEAR OF NOZZLE. DO NOT DIRECT DISCHARGE STREAM AT PERSONS. THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS.

AVERTISSEMENT: RISQUE D'INJECTION ET DE BLESSURES GRAVES. SE TENIR À L'ÉCART DU JET. NE PAS DIRIGER LE JET DE SORTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION DE CE MATÉRIEL À UN OPÉRATEUR QUALIFIÉ.

ADVERTENCIA: RIESGO DE LA INYECCIÓN O SEVERO LESIÓN. CLARO DE LA SUBSISTENCIA DEL INYECTOR. NO DIRIJA LA CORRIENTE DE LA DESCARGA EN LAS PERSONAS. ESTO EL EQUIPO DEBE SER UTILIZADO SOLAMENTE LOS OPERADORES ENTRENADOS.

REPAIR PARTS

PART NUMBER	DESCRIPTION
J06-99152	KIT, REPAIR
J06-99152-01	KIT, VALVE - BACK-UP RING
J06-99152-02	KIT, VALVE - O-RING

08-31-06 Z08-05625

Chemical Injector

J06-00244

Downstream Injector Operation

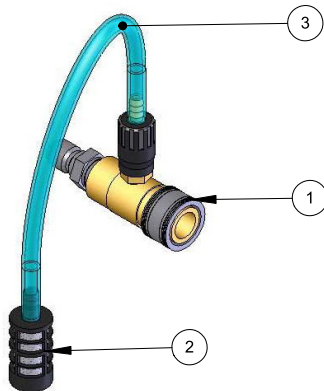
A downstream injector works by maintaining a certain psi on the pump side of the injector by means of an orifice installed into the injector body. When the psi drops by at least a 30% differential on the outlet side of the injector it creates a vacuum draw that pulls your pre mixed chemical solution into the injector body and mixes it with the flow of water traveling through the injector and out the hose and gun assembly of the pressure washer.

Pressure Washer Chemical Injector Kit consists of the chemical suction screen, 6 FT of clear tube, adjustable knob, injector and 3/8" quick connect couplers.

Operation:

1. Quick connect the pressure washer chemical injector on the outside (discharge side) of the pump.
2. Place the soak suction filter into a container chemical and attach the black low pressure soap nozzle to the tip of the wand.
3. Start your pressure washer as normal and the pressure washer chemical injector will do the rest. You are always supposed to soap from the bottom up and rinse from the top down.
4. When you are done applying cleaning solution onto the surface, turn off the chemical adjustable knob and replace the soap nozzle with a 0° (red color) or 15° (yellow color) nozzle to remove loosened dirt.

You should never use anything but pressure washer safe cleaning solutions. Use of other chemicals such as bleach will damage seals and o-rings in the gun, wand, hoses and pumps. What chemicals can be used? Use only chemicals designed for pressure washer use (pressure washer approved). They will not damage your pressure washer, plus they are biodegradable and environmentally friendly.



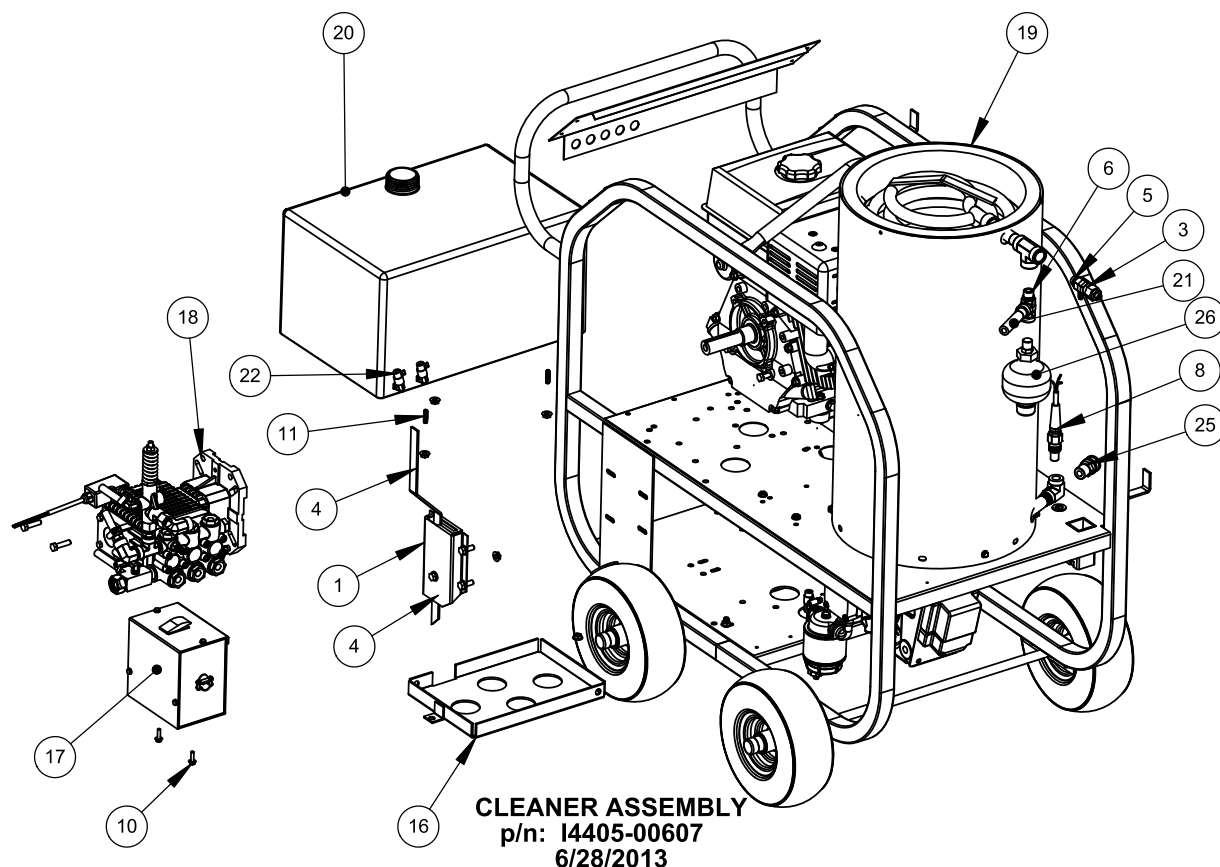
INJ, CHEM - DOWN STREAM
p/n: J06-00244
10/21/2009



Turn counter -clockwise
to start drawing chemical.

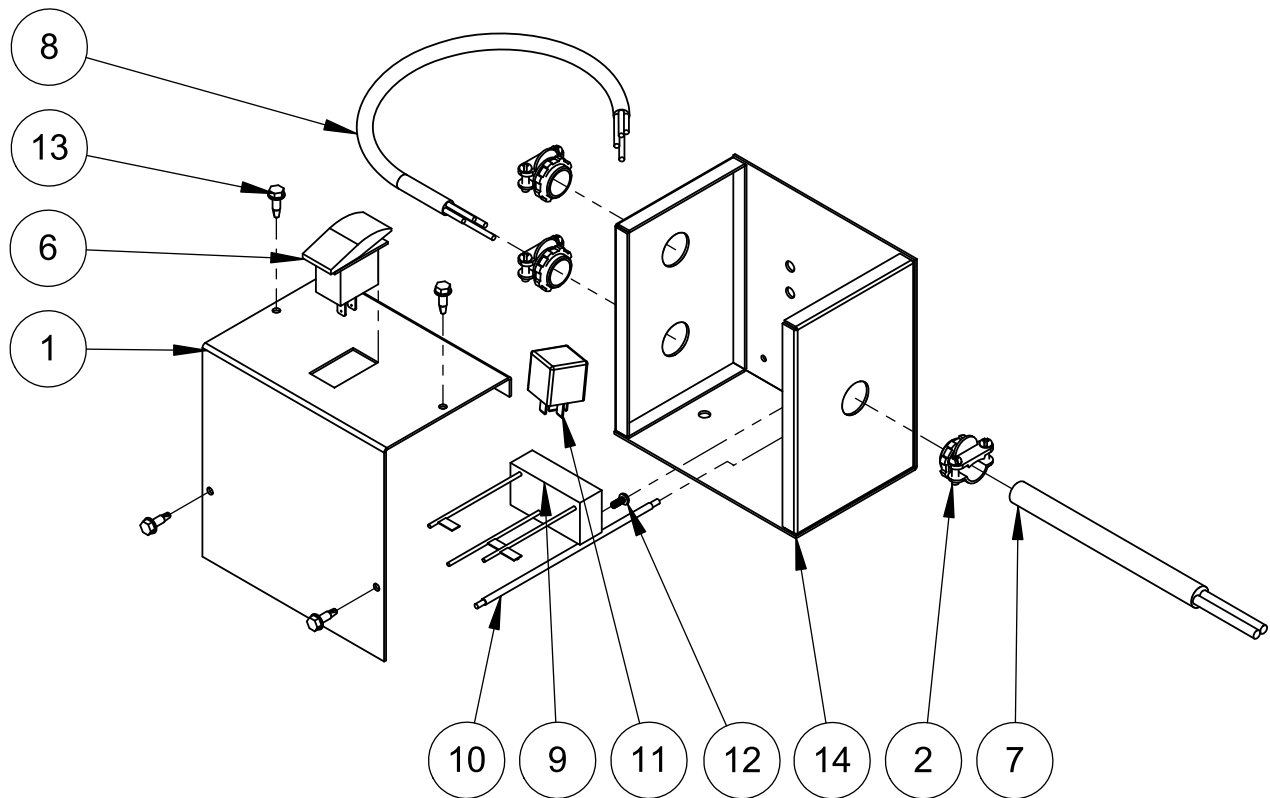
ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	J06-00234	INJECTOR, CHEMICAL - 3 - 5 GPM 3500 PSI 2.1MM ORIFICE	1
2	C04-00130	STRAINER, W/CHECK VALVE - 1/4" BARB	1
3	Z01-08413-2	HOSE, POLYBRAID - 1/4 X 84"	1

General Assembly



ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	AS14-00616-NPB	BRACKET, BRAKE	1
2	AS1692026NPB	COVER, CONTROL	1
3	C03-00548	VALVE, RELIEF - SS	1
4	D430M-10176R	HANDLE, BRAKE	1
5	E04-00006-58	BUSHING, PIPE - 5000PSI	2
6	E10-00021-58	TEE, STREE - 3/8	1
7	F04-00420	BUSHING, INSULATION	1
8	F04-00845	SWITCH, HI-LIMIT	1
9	H04-19011	SCREW, SELF TAP	4
10	H04-25002	SCREW, CAP	2
11	H04-25035	SCREW, SET - 1/4-20UNC x 1	3
12	H04-31306	SCREW, CAP - 5/16 X 3/4	5
13	H04-31311	SCREW, CAP	4
14	H06-25003	NUT, HEX	2
15	H06-31300	NUT, LOCK - 5/16"	10
16	I3305-00193A	WELDMENT, BATTERY BOX	1
17	I3307-00304B	J-BOX WIRING, ASSY	1
18	I4405-00501	ASSEMBLY, PUMP	1
19	I4405-00657	PRE-CLEANER ASSY	1
20	i4355-00125	TANK, FUEL - PLASTIC, 8 GAL	1
21	K02-03222A2	ASSEMBLY, HOSE - 3/8 x 22'"	1
22	K23	HOSE, FUEL - 1/4 X 1"	2
23	W02-00033	CLAMP, HOSE	4
24	W02-10031-3	BARB, HOSE	2
25	W04-34155-A	COUPLER, QUICK	1
26	Y01-00123	ACCUMULATOR	1

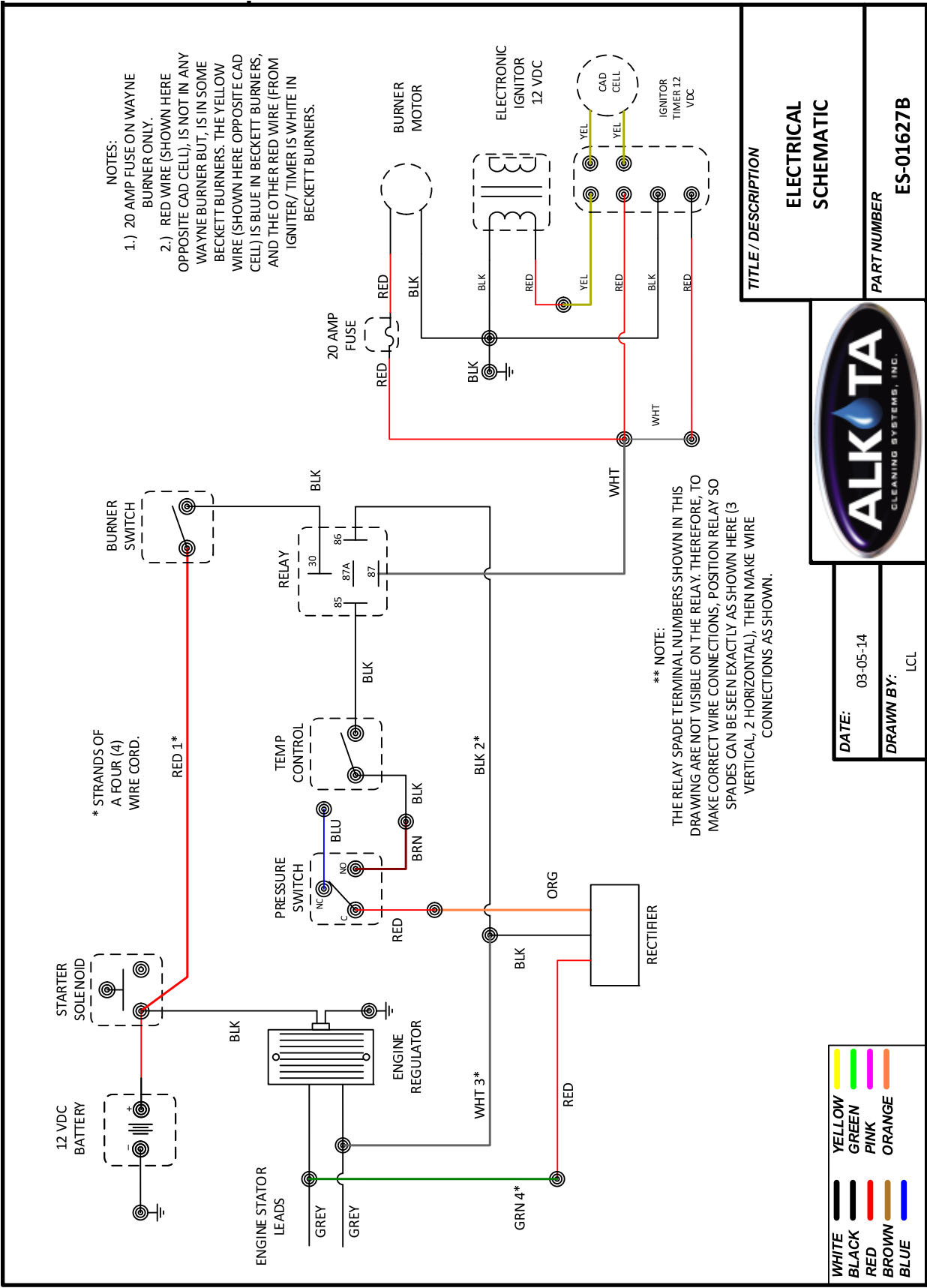
Control Panel Assembly



ASSY,J-BOX WIRING RELAY, F5-168 I3307-00304B

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	AS16-01068PB	COVER, JUNCTION BOX	1
2	F04-00310	CONNECTOR, CONDUIT	3
3	F04-00615	TERM, SPLICE	3
4	F04-00616	TERM, INSULATOR	3
5	F04-00618	INSULATED SPADE	5
6	F04-00693	SWITCH, ROCKER - 12V	1
7	F04-02459	CORD, ELECTRIC - 14/2SOOW X 24	1
8	F04-05533	CORD, ELEC - 14/4SOOW X 46"	1
9	F05-00168A	MODULE, RECTIFIER	1
10	F14-00610	WIRE, BLACK - 14GA X 6"	2
11	FA5-00063	RELAY, AUTOMOTIVE - 12V	1
12	H04-13808	SCREW, MACHINE	1
13	H04-19011	SCREW, SELF TAP	4
14	I4405-00310	WELDMENT,J-BOX	1

Electrical Schematic



TITLE / DESCRIPTION

ELECTRICAL
SCHEMATIC

PART NUMBER

ES-01627B



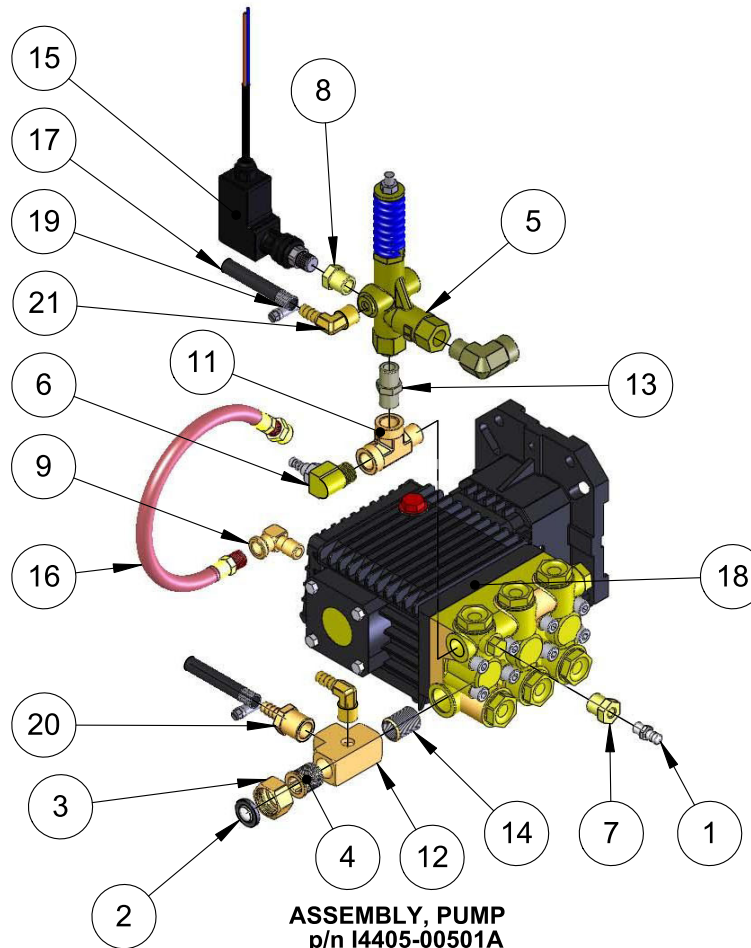
DATE:

03-05-14

DRAWN BY:

LCL

Water Pump Assembly



ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	C03-00810	VALVE, AIR	1
2	C04-00121	SCREEN, GARDEN HOSE	1
3	C05-00270-1	NUT, GARDEN HOSE	1
4	C05-00270-2	ADAPTER, SWIVEL	1
5	C07-04506	VALVE UNLOADER	1
6	C09-00008	VALVE, EASY START	1
7	E04-00002-58	BUSHING, PIPE	1
8	E04-00016-58	BUSHING, 3/8 - 1/4	1
9	E08-00006-48	ELBOW, PIPE	1
10	E08-00011-58	ELBOW, PIPE	1
11	E10-00021-58	TEE, STREE - 3/8	1
12	E11-00012-4T	TEE, PIPE	1
13	E14-00010-68	NIPPLE, HEX - 3/8MNPT	1
14	E15-00010-48	NIPPLE, CLOSE - 1/2"NPT	1
15	F04-00790	SWITCH, PRESSURE	1
16	K21-02214-1/4	ASSEMBLY, HOSE-OIL, DRAIN	1
17	K33-01300	HOSE, WATER - 3/8 X 13"	1
18	N07-00065	PUMP, WATER	1
19	W02-00032	CLAMP, HOSE	2
20	W02-10030-8	BARB, HOSE	1
21	W02-10040-8	BARB, HOSE	2

Pump Maintenance

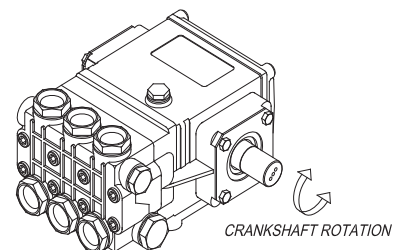
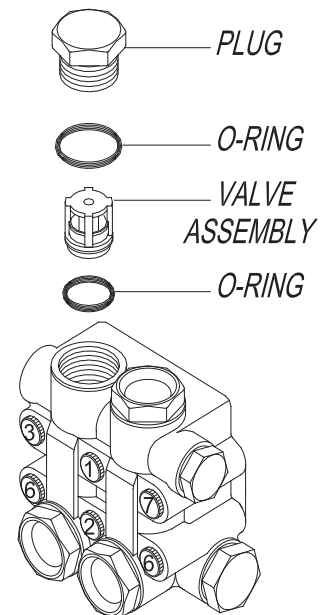
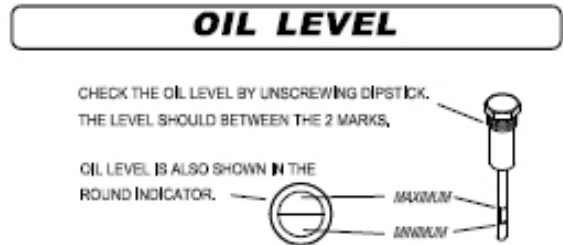
General

PACKING EXTRACTION KIT
COMPLETE TOOL KIT

P/N Z09-00028
P/N Z09-00021

Valve Service

1. Remove the plugs holding the valve assemblies.
2. Remove and discard o-rings from the plugs. Clean plugs with solvent or soap and water. Allow to dry.
3. Using needle nose pliers, fingers, or hook shaped tool, remove the valve assemblies from the head. Remove and discard the o-rings from the valve assemblies and/or head. Examine each valve assembly and discard damaged parts. Refer to the PUMP BREAKDOWN for part numbers of any replacement items.
4. Clean any accumulated debris from the valve cavities and flush with water.
5. Wash the valve assemblies in clean water and rinse. While still wet, test each valve assembly by sucking on the valve seat. A properly sealing valve will allow a good vacuum to be developed and maintained, while a malfunctioning valve will not. Good valve assemblies should be set aside for installation in step 7.
6. Malfunctioning valve assemblies must be replaced.
7. Lubricate a new o-ring with the pump crankcase oil and install into valve cavity in the head. Install a good valve assembly into the cavity as illustrated.
8. Lubricate a new o-ring with pump crankcase oil and place on a plug cleaned in step 2 above.
9. Install a plug into the pump head. Tighten plug by hand.
10. Torque the plug to the value indicated in the TORQUE section of the pump specifications.
11. Repeat steps 7 through 11 for remaining valve assemblies.



Head Removal

1. Remove the cap screws holding the pump head to the crankcase. A metric tool is required for this step. Be careful not to lose the washer on each cap screw.
2. Remove the head by rotating the crankshaft and tapping the head away from the crankcase with a soft mallet. Keep rear surface of the head parallel to the front surface of the crankcase to prevent binding on the plungers.
3. Once the head is removed, protect the plungers from damage.

Plunger Service, Removal, Installation

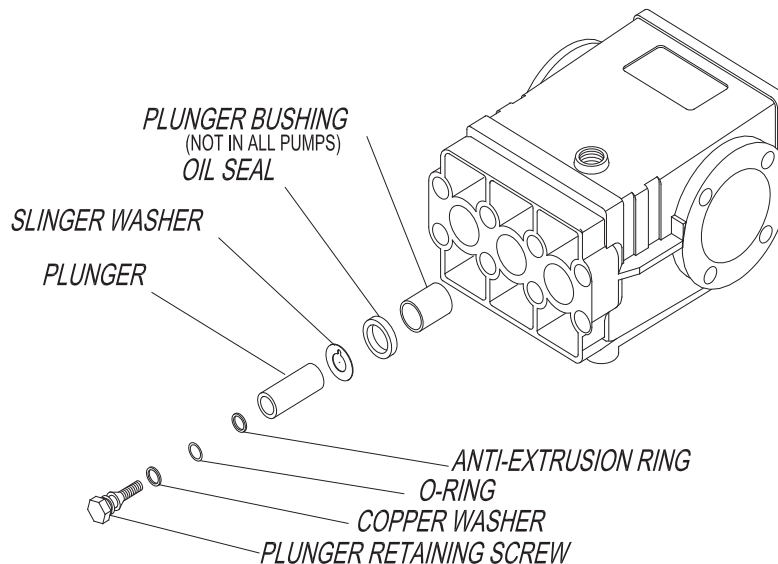
Plunger Service

1. Remove pump head per HEAD REMOVAL.
2. Remove any packings and retainers left on the plungers by pulling them straight off.
3. Examine each plunger, looking for a smooth surface free of any scoring, cracks, or pitting. Any defective plungers should be removed per PLUNGER REMOVAL.
4. Discard and replace any defective plungers.
5. Reinstall the plunger per PLUNGER INSTALLATION.
6. Reinstall head per HEAD INSTALLATION.

Plunger Removal

NOTE: When the plunger screw is removed, it is important to install new o-ring, anti-extrusion, and copper washers.

1. When the plunger screw is removed, it is important to install a new o-ring, anti-extrusion, and copper washers.
2. Remove the plunger retaining screw by turning counterclockwise. Remove and replace copper washer.
3. Remove and discard o-ring and anti-extrusion ring from retainer screw.
4. Remove the plunger from the cross head and examine it for cracks, scoring, or pitting.
5. Remove and discard copper plunger washer, clean with solvent and allow to dry.



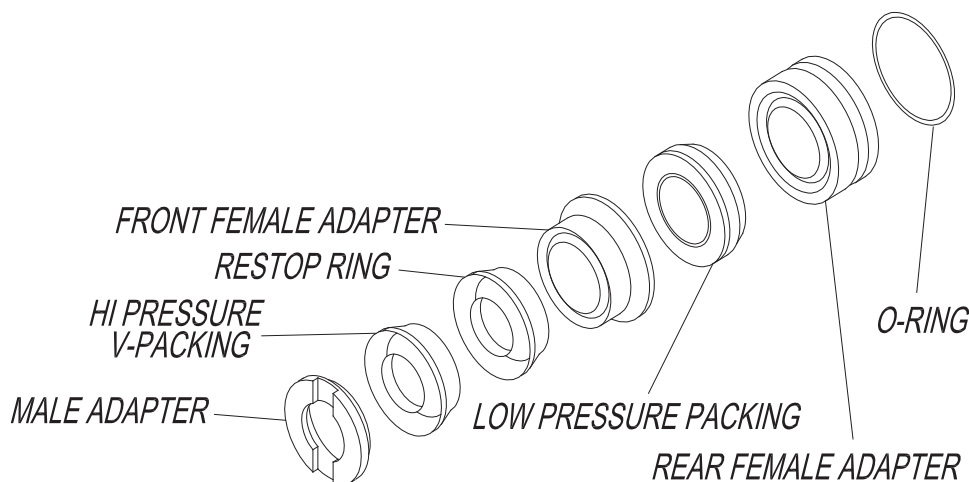
Plunger Installation

1. Install the copper flinger washer onto the cross head.
2. Slide the plunger onto the crosshead.
3. Lubricate an o-ring with crankcase oil and install into the groove on the plunger screw. Install the anti-extrusion ring into the groove next to the o-ring. NOTE: The o-ring should be nearest the screw head and the anti-extrusion ring nearest the threads.
4. Apply a drop of thread sealant to the threads of the retainer screw.
5. Thread the plunger retainer screw into the cross head making sure the copper flat washer is installed onto the screw.
6. Torque the plunger retainer screw to the value indicated in the torque section of the pump specifications.

Packing Service

Packing Service

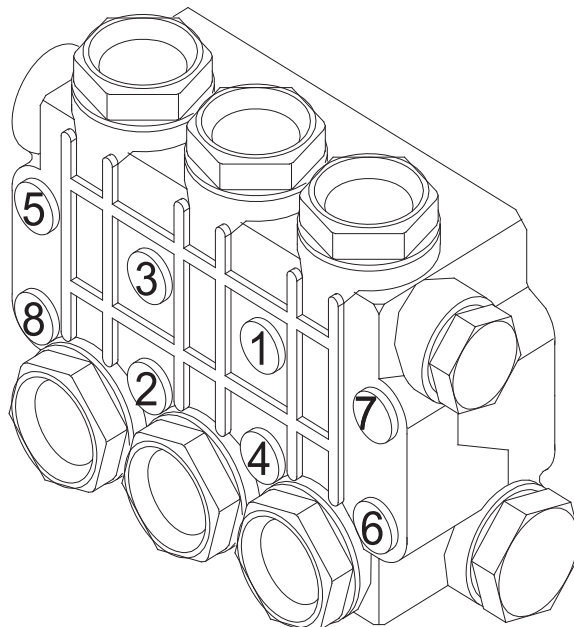
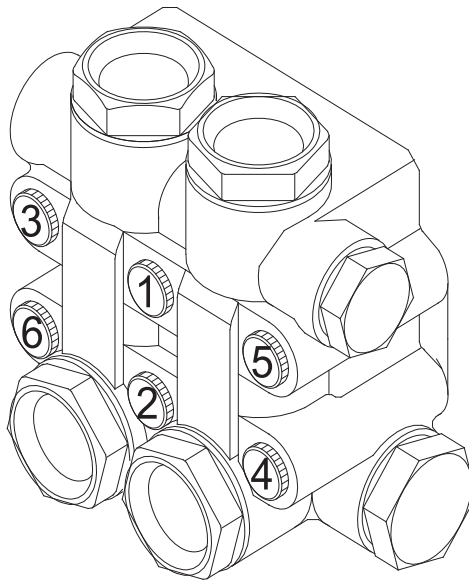
1. Remove the head per PUMP HEAD REMOVAL.
2. Remove any packings and female adapters left on the plungers by pulling them straight off. Insert proper packing extractor onto the extractor hammer. Insert packing extractor and tool through the packings and adapters remaining in the head. Tighten the hammer and remove the remaining items in the head. Remove packings and o-rings from adapters. Discard the o-rings and packings.
3. Clean the packing canities in the head and rinse with clean water.
4. Clean exposed plungers. Clean male and female adapters with soap and water and allow it to dry.
5. Examine male and female adapters, discard worn items. Trial fit the female adapters into the head checking for binding or damage. Discard and replace damaged items
6. Lubricate packing cavities in the head and all packings and adapters with pump crankcase oil.
7. Lay head on the bench with packing cavities up. Install one male adapter in each cavity with the flat side down.
8. Install one v-packing into each cavity with the lips pointing down. A packing insertion tool of the appropriate size is recommended for this operation.
9. Install the re-stop ring with the lips pointing down.
10. Install a front female adapter into each cavity with the flat side up. Make certain the adapter goes all the way down into the cavity.
11. Install the low pressure packing with the flat side down.
12. Install the rear female adapter into each cavity with the lips pointing down.
13. Lubricate o-rings with pump crankcase oil and install one into the groove of each adapter.
14. Install one adapter and o-ring into each cavity with the flat side up. Each adapter and o-ring assembly should push into the head to approximately 1/16 inch of being flush with the surface of the head. Only hand pressure should be required to perform this operation. This step is VERY IMPORTANT. If the rear female adapter does not fit is obtained, proceed to step 16. If a proper fit is not obtained, remove the female adapters from the offending cavity and reinstall items per steps 8 through 15.
15. Install head per HEAD INSTALLATION.



Head Installation - Torque Sequence

Head Installation

1. Prepare pump head per instructions in PACKING SERVICE.
2. Rotate the plungers so the outer plungers are projecting the same distance from the crankcase.
3. Lubricate the exposed plungers with crankcase oil.
4. Start the head onto the plungers and, using a soft mallet, tap the head evenly until it comes in contact with the crankcase.
5. Start the cap screws through the head and into the crankcase. Do not forget the lock washer on each screw.
6. Tighten all cap screws by hand.
7. Torque the cap screws to the value indicated in the TORQUE section of PUMP SPECIFICATIONS. Torque the cap screws in the order listed below.



Pump Maintenance Record

	Oil Change	
Month/Day/Year	Operating Hours	Oil Brand & Type

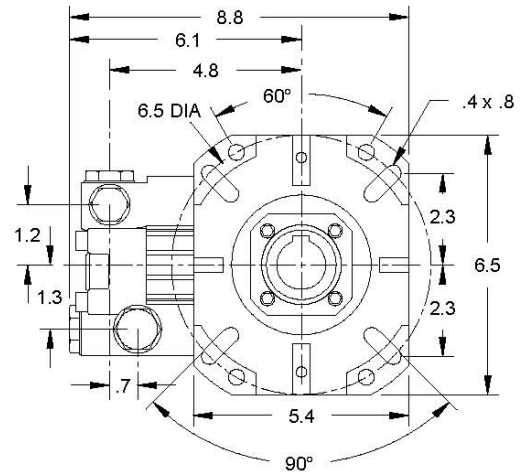
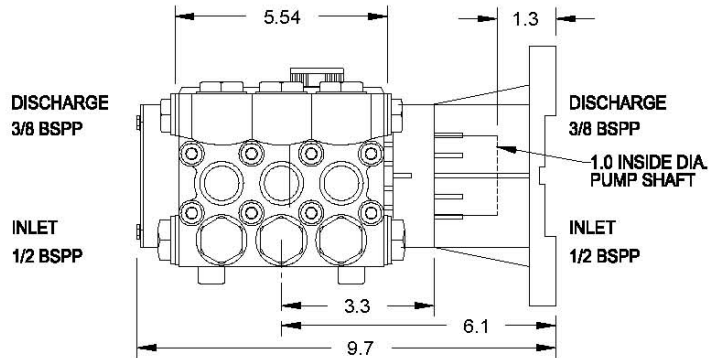
	Pump Service	
Month/Day/Year	Operating Hours	Type of Service

Pump Specifications

PUMP, WATER - P/N N07-00065

DIMENSIONS

EZ4040
GENERAL



ALL DIMENSIONS ARE IN
INCHES UNLESS OTHERWISE
NOTED. 1 INCH = 25MM

PERFORMANCE

DISCHARGE VOLUME.....4.0 GPM / 15.1 LPM
PUMP HEAD PRESSURE.....4000 PSI / 276.0 BAR

GENERAL

CRANKSHAFT ROTATION.....CLOCKWISE AND COUNTER CLOCKWISE
MAXIMUM SPEED.....3400 RPM
MAXIMUM PUMPED FLUID TEMPERATURE.....165°F / 74°C
INLET PRESSURE.....-9 IN HG @ 75°F TO 116 PSI / -0.3 BAR @ 24°C TO 8 BAR
WEIGHT (WET).....20 LBS / 9.1 KG

LUBRICATION

OIL CHANGE INTERVALAFTER FIRST 50 HOURS THEN AFTER 500 HOURS
OIL TYPE.....SAE 20 OR SAE 30 (NON-DERTERGENT)
CRANKCASE CAPACITY.....14.0 FL OZ / 0.4 LT

TORQUE

VALVE PLUG (ITEM 42).....73.7 FT LBS / 10.2 KG M
MOUNT TO CRANKCASE (ITEM 20).....7.3 FT LBS / 1.0 KG M
PLUNGER NUT TO CROSSHEAD (ITEM 44).....11 FT LBS / 1.5 KG M
REAR CRANKCASE COVER TO CRANKCASE (ITEM 15).....7.3 FT LBS / 1.0 KG M
HEAD TO CRANKCASE (ITEM 36).....14.7 FT LBS / 2.0 KG M
BEARING RETAINER TO CRANKCASE (ITEM 1).....14.7 FT LBS / 2.0 KG M

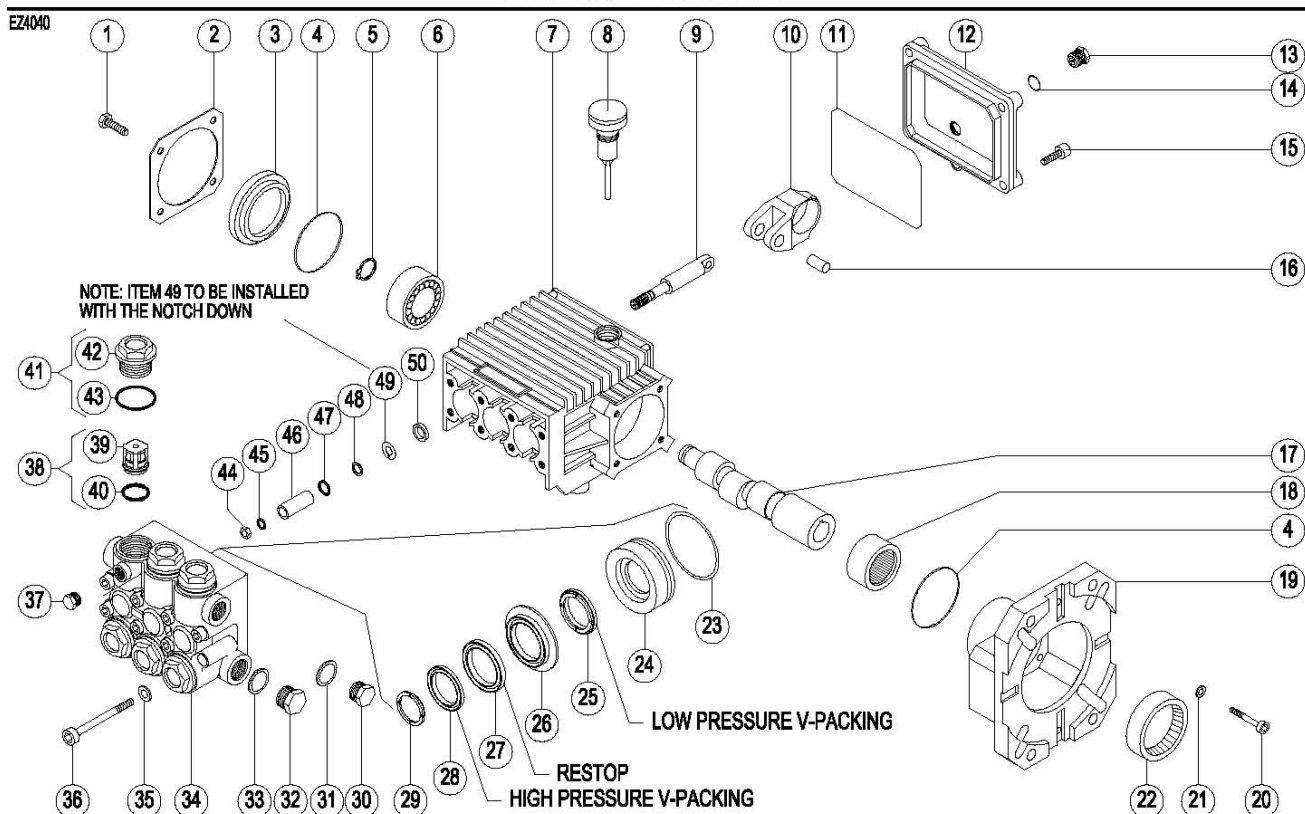
REPAIR PARTS PACKAGES

PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY
N07-99023	OIL SEALS			N07-99123	VALVE ASSEMBLIES	38		N07-99156	PLUNGER PACKING		
	OIL SEAL	50	3		ASS'Y, CHECK VALVE	39	6		O-RING	23	1
					O-RING	40	6		RETAINER, PACKING	24	1
N07-99153	LOW & HIGH V-PACKING - 13MM			N07-99124	PLUGS & O-RINGS	41			PACKING, LOW PRESS.	25	1
	PACKING, LOW PRESS	25	3		PLUG	42	6		ADAPTER, FRONT	26	1
	RESTOP	27	3		O-RING	43	6		RESTOP	27	1
	PACKING, HIGH PRESS	28	3	N07-99152	REAR RETAINER & O-RING - 13MM				PACKING, HIGH PRESS	28	1
					RETAINER, PACKING	24	3		ADAPTER, MALE	29	1
					O-RING	23	3	KIT #N07-99156 IS FOR ONE PLUNGER ONLY ORDER 3 FOR COMPLETE PUMP REPAIR.			

Exploded View

BREAKDOWN, PUMP - N07-00065

EXPLODED VIEW



PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	N07-20018	SCREW, CAP	26	N07-65013	ADAPTER, FEMALE - FRONT- 13MM
2	N07-20019	RETAINER, BEARING	27	N07-65062	RING, RESTOP - 13MM
3	N07-47029	COVER, CRANKSHAFT	28	N07-65012	PACKING, V - HIGH PRESS. - 13MM
4	N07-20021	O-RING	29	N07-65014	ADAPTER, MALE - 13MM
5	N07-12053	RING, SNAP	30	N07-20049	PLUG, PIPE
6	N07-20022	BEARING, BALL	31	N07-20011	WASHER, FLAT
7	N07-47023	CRANKCASE	32	N07-20050	PLUG, PIPE
8	N07-20024	DIPSTICK, OIL	33	N07-20051	WASHER, FLAT
9	N07-65038	CROSSHEAD	34	N07-65001	HEAD, PUMP
10	N07-47034	ROD, CONNECTING	35	N07-20003	WASHER, FLAT
11	N07-29026	O-RING	36	N07-20002	SCREW, CAP
12	N07-47025	COVER, CRANKCASE	37	C07-19512	PLUG, PIPE
13	N07-20030	PLUG, PIPE	38	N07-99123	KIT, VALVE ASSEMBLY
14	N07-20028	O-RING	39	—	ASSEMBLY, VALVE
15	N07-20027	SCREW, CAP	40	N07-20004	O-RING
16	N07-47032	PIN, CROSSHEAD	41	N07-99124	KIT, PLUGS & O-RINGS
17	N07-47031	CRANKSHAFT	42	—	PLUG
18	N07-47042	BEARING, ROLLER	43	N07-20009	O-RING
19	N07-47019	HOUSING, PUMP MOUNT	44	N07-12056	NUT, HEX
20	N07-60027	SCREW, CAP	45	N07-12042	WASHER, FLAT
21	N07-20036	WASHER, LOCK	46	N07-65040	PLUNGER
22	N07-47045	SEAL, OIL	47	J06-20209	O-RING
23	N07-20016	O-RING	48	F04-76509	RING, ANTI-EXTRUSION
24	N07-65015	RETAINER, PACKING	49	N07-65039	WASHER, FLINGER - COPPER
25	N07-65063	PACKING, V - LOW PRESS. - 13MM	50	N07-99023	KIT, OIL SEAL

Troubleshooting

Pump

Trouble	Possible Cause	Remedy
Oil leaking in the area of water pump crankshaft	Worn crankshaft seal, bad bearing, grooved shaft, or failure of retainer o-ring.	Remove and replace.
Excessive play on crankshaft	Defective bearings.	See "Worn bearing."
	Excess shims.	Set up crankshaft.
Loud knocking in pump	Loose connecting rod screws.	Tighten connecting rod screws per PUMP SPECIFICATIONS
	Worn connecting rod.	Replace connecting rod per PUMP MAINTENANCE.
	Worn bearings.	Replace bearings per PUMP MAINTENANCE.
	Loose plunger bushing screw.	Tighten plunger screw per PUMP SPECIFICATIONS.
Oil leaking at the rear portion of the pump	Damaged or improperly installed oil gauge window gasket or rear cover.	Replace gasket or o-ring.
	Oil gauge loosed.	Tighten oil gauge.
	Rear cover screws loose.	Tighten rear screws to torque values in PUMP SPECIFICATIONS.
	Pump overfilled with oil, displaced through crankcase breather hole in oil cap/dipstick.	Drain oil. Refill to recommended oil level as stated in OIL LEVEL in PUMP MAINTENANCE.
Water in crankcase	May be caused by humid air condensing into water inside.	Maintain or step up lubrication schedule.
	Worn or damaged plunger screw o-ring.	Remove and replace. See PLUNGER SERVICE in PUMP MAINTENANCE.
Worn bearing	Excessive belt tension.	See BELT TENSION in MACHINE MAINTENANCE.
	Oil contamination.	Check oil type and change intervals per PUMP SPECIFICATIONS.
Short bearing life	Excessive belt tension.	See BELT TENSION in MACHINE MAINTENANCE.
	Misalignment between pump and motor.	Re-align pump and motor.
	Oil has not been changed on regular basis.	Check oil type and change intervals per PUMP SPECIFICATIONS.
Short seal life	Damaged plunger bushing.	Replace plunger bushing.
	Worn connecting rod.	Replace connecting rod.
	Excess pressure beyond the pump's maximum rating.	Match pressure stated in PUMP SPECIFICATIONS.
	High water temperature.	Lower water temperature stated in PUMP SPECIFICATIONS.

Dirty or worn check valves	Normal wear.	Remove and replace.
	Debris.	Check for lack of water inlet screens.
Presence of metal particles during oil change	Failure of internal component.	Remove and disassemble to find probable cause.
	New pump.	New pumps have machine fillings and debris and should be drained and refilled per PUMP SPECIFICATIONS.
Water leakage from under head	Worn packing.	Install new packing.
	Cracked/scored plunger.	Remove and replace plunger.
	Failure of plunger retainer o-ring.	Remove and replace plunger retainer o-ring.
Loud knocking noise in pump	Pulley loose on crankshaft.	Check key and tighten set screw.
	Defective bearing.	Remove and replace bearing.
	Worn connecting rod, crankshaft, or crosshead.	Remove and replace.
Frequent or premature failure of the packing	Scored, damaged, or worn plunger.	Remove and replace plungers.
	Overpressure to inlet manifold.	Reduce inlet pressure.
	Abrasive material in the fluid being pumped.	Install proper filtration on pump inlet pumping.
	Excessive pressure and/or temperature of fluid being pumped.	Check pressures and fluid inlet temperature. Be sure they are within specified range.
	Over pressure of pumps.	Reduce pressure.
	Running pump dry.	Do not run pump without water.
Low Pressure	Dirty or worn check valves.	Clean/replace check valves.
	Worn packing.	Remove and replace packing.
	Belt slipping.	See BELT TENSION in MACHINE MAINTENANCE.
	Improperly sized spray tip or nozzle.	See MACHINE SPECIFICATIOSN for specified spray tip or nozzle.
	Inlet filter screen is clogged.	Clean inlet filter screen.
	Pitted valves.	See VALVE SERVICE in PUMP MAINTENANCE.

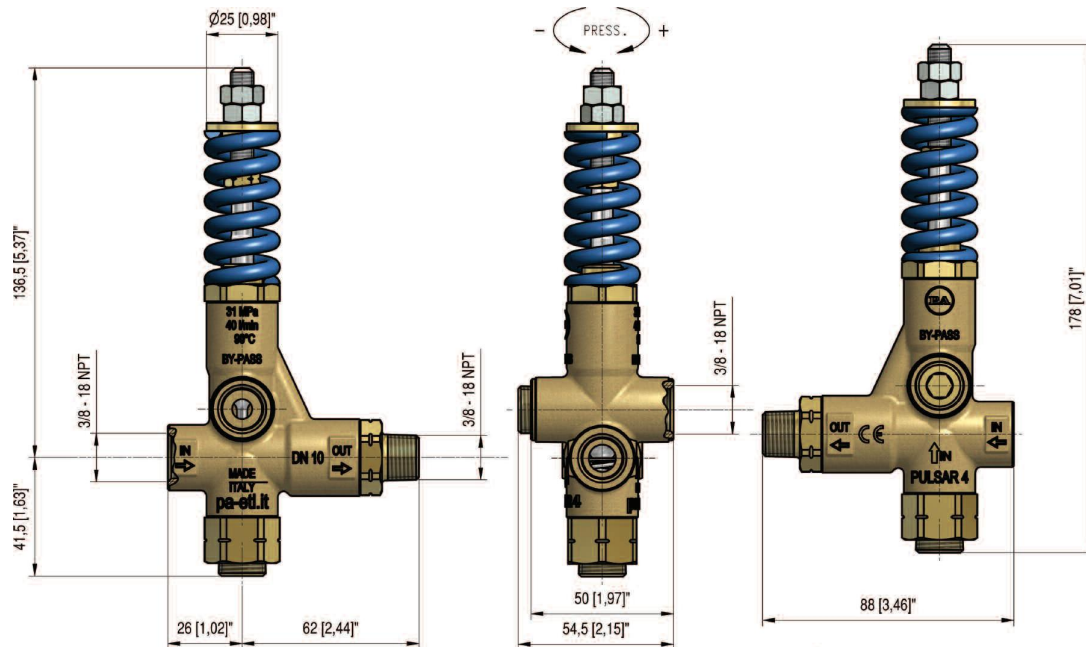
Erratic pressure; pump runs rough	Dirty or worn check valves.	Clean/replace check valves.
	Foreign particles in valve assemblies.	
	High inlet water temperature.	See temperature in PUMP SPECIFICATIONS.
Excessive vibration	Dirty or worn check valves	See "Dirty or worn check valves."
Scored plungers	Abrasive material in fluid being pumped.	Install proper filtration on pump inlet plumbing.
Fitted plungers	Cavitation.	Decrease inlet water temperature and/or increase inlet water pressure.
Cavitation	High inlet fluid temperature, low inlet pressure.	Lower inlet fluid temperature and raise inlet fluid pressure.

Unloader

p/n C07-04506 - 11/22/2017

Specifications

Maximum Flow	10.5 gal/m / 40L/m
Unloading Press	
Rated	4050 psi / 280 bar
Max	4500 psi / 310 bar
Maximum Temperature	195°F / 88°C
Weight	1.54 lbs / 700 G
Bypass	3/8 FNPT
Inlet	3/8 FNPT
Discharge	3/8 MNPT



Trouble Shooting

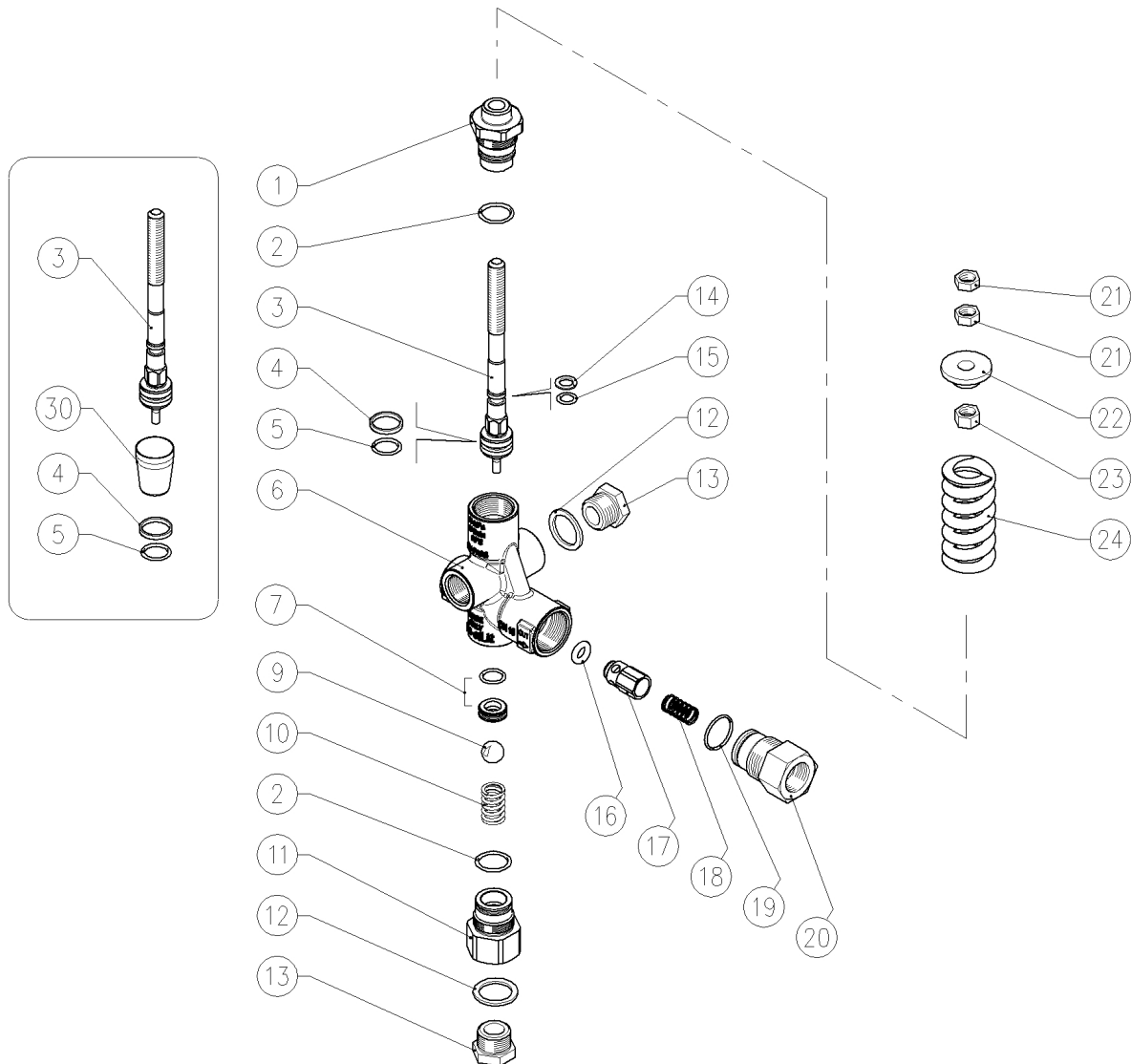
p/n C07-04506 - 11/22/2017

Troubleshooting

Trouble	Possible Cause	Remedy
Frequent valve recycles	Damaged check valve O-ring	Remove and replace
	Leaking connections	Check or renew
	Restricted bypass or too small diameter of	Clean or adapt passage diameter
Valve does not reach pressure	Piston O-rings worn out	Remove and replace
	Debris between seat and shutter	Clean the seat
	Seat worn out	Remove and replace
	Nozzle worn out	Remove and replace
	Incorrect choice of nozzle	Fit with smaller nozzle
High pressure peaks at gun closure	There is not a minimum of 5% of total flow discharged in bypass	Reset Correctly
	Excessive flow in bypass	Change type of valve or adjust passages
	Adjustment with spring totally compressed	Loosen adjustment screw and eventually
Valve does not discharge at low pressure at gun closure	Jammed check valve	Jammed check valve
	Debris on check valve	Clean

Maintenance - Exploded View

p/n C07-04506 - 11/11/2017



UNLOADER PRESET AT FACTORY – DO NOT READJUST **Unloading Adjustment – Adjustment only after repair or replacement**

1. Install an appropriate pressure gauge in pump head outlet. The gauge should have a range twice the operating pressure.
2. Install the spray nozzle in the end of the wand.
3. Ensure the relief valve is set properly.
4. Loosen top lock nut (upper Item 21) and turn the nut (lower Item 21) counter clockwise until minimum spring tension.
5. With machine turned on, open the trigger gun, start the pump, and observe pressure gauge reading. Slowly loosen the nut (lower Item 21) until pressure starts to drop on the gauge.
6. Tighten adjusting nut (lower Item 21) on the unloader. Pressure should start to increase. Tighten adjusting nut (lower Item 21) until pressure stops climbing.
7. Close and open the trigger gun to check unloading pressure and bypass function of the unloader valve. The unloading pressure should not exceed operating pressure more than 400 PSI.
8. Lock the setting by tightening the lock nut (upper Item 21).

Parts List

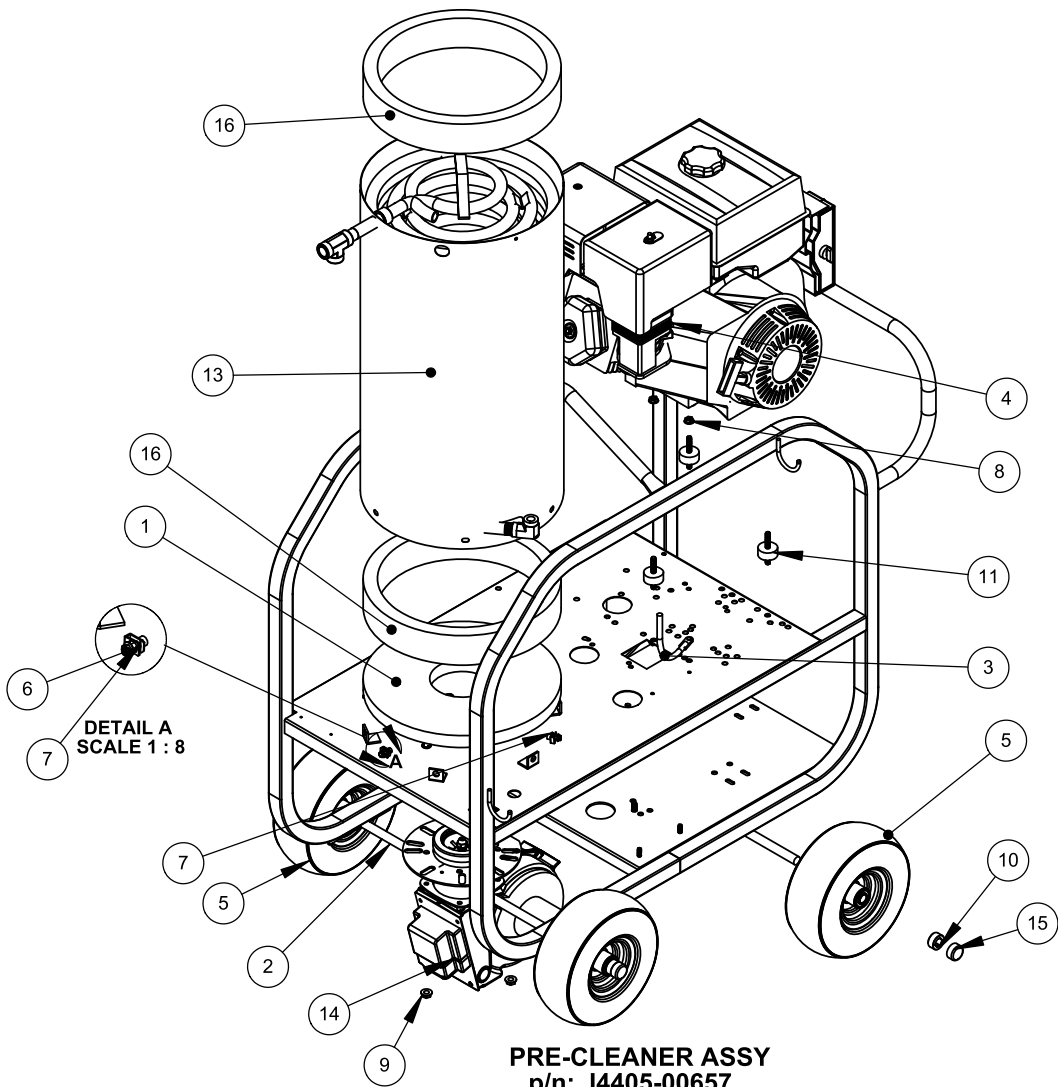
p/n C07-04506 - 11/22/2017

Item	Part Number	Description	Qty	Kit
1	C07-04504-11	Guide, Piston	1	
2	C07-04504-01	O-Ring	2	*
3	C07-04504-09	Piston – SS	1	
4	C07-04504-02	Ring, Back-Up	1	*
5	N07-20028	O-Ring	1	*
6	-----	Housing	1	
7	C07-04500A-05	Kit Seat & O-Ring	1	*
7A	C07-02300-08	O-Ring 1/16CS x 11/16OD	1	
9	C07-04500-03	Ball, SS-13/32	1	
10	C07-02700-06	Spring, 1.6x11x20MM	1	
11	C07-04506-04	Coupling, Inlet 3/8 NPT SS	1	
12	N16-28110084	Washer, Flat	2	
13	C07-04504-05	Plug-3/8NPT	2	
14	C07-04504-07	Ring, back-up	1	*
15	P04-00215	O-Ring, 1.78 x 6.07mm	1	*
16	C07-03200-20	O-Ring, 3 x 6mm	2	*
17	C07-04500-15	Valve, Check	1	
18	C07-01009A-18	Spring, Compression	1	
19	C07-04504-16	O-Ring, 1/16cs x 5/8	1	*
20	C07-04506-10	Fitting, Outlet – 3/8”M SS	1	
21	C07-04504-14	Nut, Hex	2	
22	C07-04504-13	Follower, Spring	1	
23	C07-04504-15	Nut, Hex - Brass	1	
24	C07-04500-13	Spring, Comp. Blue	1	
	C07-9904504	Kit, Repair - Parts Package		*

ATTENTION: the nut in position 21 is a mechanical security device that limits the maximum pressure; it must absolutely NOT be removed.

MAINTENANCE STANDARD: every 400 working hours, check and lubricate the seals with water resistant grease.

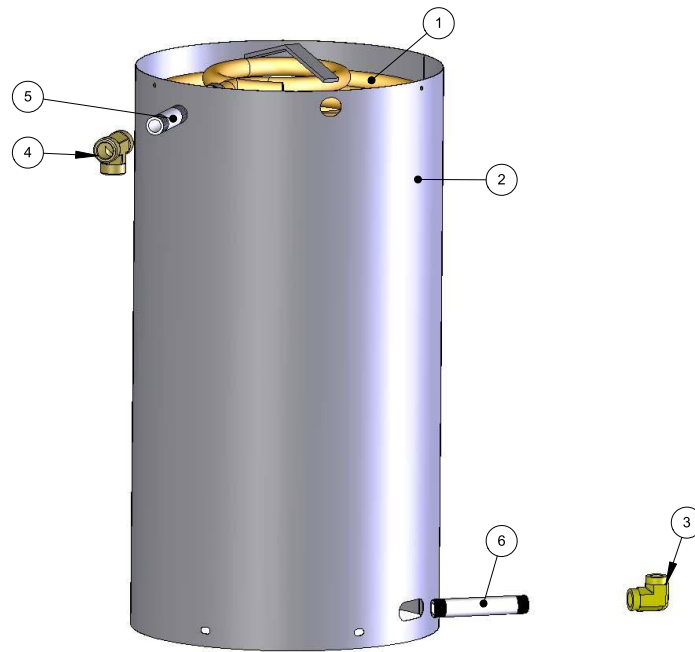
Pre-Cleaner Assembly



PRE-CLEANER ASSY
p/n: I4405-00657
04/23/2014

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	90-00119	INSULATION - 1 x 14DIA	1
2	AR34-02901	ROD, CRS - 5/8" X 29 5/8"	1
3	F05-00220-1	CABLE, BATTERY - 20" CLAMP/EYE BLACK	1
4	F05-00488	13HP HONDA	1
5	G02-10016C	ASSEMBLY, TIRE - RIM 13"	4
6	H04-25002	SCREW, CAP	6
7	H06-25007	NUT, TINNEMAN - 1/4"	6
8	H06-31300	NUT, LOCK - 5/16"	8
9	H06-37500	NUT, LOCK-3/8-16UNC HEX	3
10	H06-75002	COLLAR, SHAFT - 3/4"	4
11	H10-31306	MOUNT, SHOCK	4
12	I3305-00130	FRAME, PUMP & ENGINE	1
13	I3305-05206	COIL, ASSEMBLY - SS WRAPPER	1
14	I4305A-00401	ASSEMBLY BURNER	1
15	Z01-00048	CAP, VINYL - ROUND	4
16	Z01-05043	INSULATION, CERAMIC FIBER	2

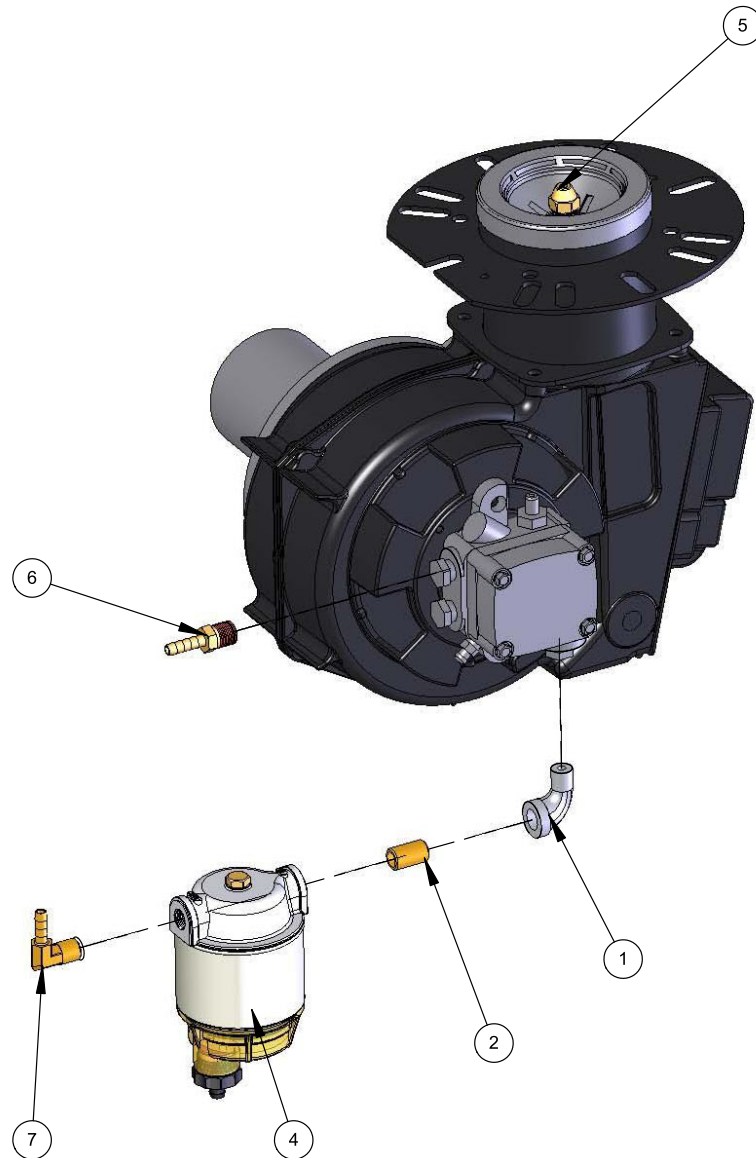
Coil Assembly



COIL, ASSEMBLY - SS WRAPPER
p/n: I3305-05206
9/27/2011

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	120-00204A	COIL, REMOVABLE	1
2	AS16-94425PR	WRAPPER, COIL - PSS	1
3	E08-00012-5	ELBOW, REDUCING PIPE	1
4	E10-00005-5	TEE, PIPE - HI PRESSURE	1
5	E15-00035-9	NIPPLE, 1/2 MNPT-3 1/2, GS PIPE SCH80, GS	1
6	E15-00045-9	NIPPLE, PIPE - GS	1

Oil Burner Assembly

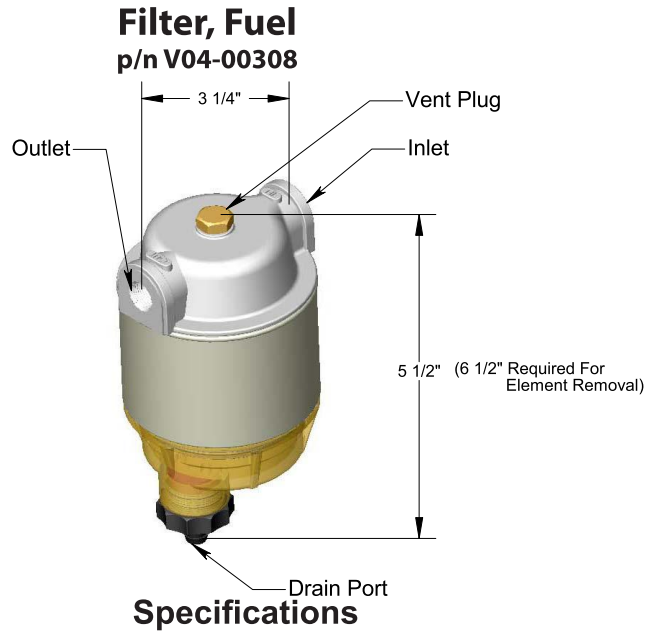


ASSEMBLY BURNER
p/n: I4305A-00401
10/4/2011

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	E08-00006-2	ELBOW, PIPE	1
2	E13-00010-2	NIPPLE, PIPE - 1/4"	1
3	V03-ACS102	BURNER, BECKET	1
4	V04-00308	FILTER, FUEL	1
5	V2.25 80DB	NOZZLE, BURNER	1
6	W02-10019-8	BARB, HOSE	1
7	W02-10031	BARB, HOSE	1

Fuel Filter Breakdown

Specifications, Troubleshooting



Maximum Flow	15 GPM / 57 LPM
Maximum Filtration	2 Microns
Maximum Temperature	212°F / 100°C
Weight	1.0lbs / 340km
Inlet	¼ NPT
Outlet	¼ NPT

All dimensions are in inches unless otherwise noted.
25.4 mm = 1 inch

Maintenance Procedures

Priming the machine

Shut off the fuel tank valves. Spin off the clear bowl, fill with clean fuel and coat the round gasket (3) with fuel. Reinstall the clear bowl and tighten ¼ to 1/3 turns after the gasket contacts the upper housing. Turn on the fuel tank valves. Start the machine and check that there are no leaks.

Draining water

Check the collection bowl daily. Drain off water contaminants by unscrewing the clear bowl turning counter-clockwise. Start the machine and allow air to purge from the fuel system prior to operating the equipment.

Element replacement frequency

Frequency of element replacement is determined by contamination level in the fuel. Replace the element every 500 hours.

Note: Foul smelling diesel fuel is an indication of microbiological contamination. A change in fuel source is recommended. Always carry a spare filter element as one tank full of contaminated fuel will plug the fuel filter element prematurely.

Element replacement procedure

1. Shut off the fuel tank valves.
2. Unscrew the clear bowl turning counter-clockwise.
3. Remove and discard the filter element.
4. Follow listed procedures under "PRIMING."

Maintenance Procedure & Schedule

Filter, Fuel p/n V04-00308

Maintenance Schedule

Gaskets

Inspect for deterioration or tearing.

Remove and replace.

Bowls

Inspect rim of bowl to insure it is free of nicks, cracks, or scratches.

Filter Element

Inspect for damage or deterioration.

Remove and replace.

Fuel Bowl

If contaminants are found, check more frequently.

EVERY
100 HRS
Weekly

PART LIST

ITEM	PART NUMBER	PART DESCRIPTION	QTY
1	V04-00308-02	Housing, Upper	1
2	V04-00308-07	Assembly, Drain	1
3	V04-00308-K	Bowl, Amber – 3"	1
4	V04-00308-01	Element, Filter	1
5	V04-00308-05	O-Ring – 3/32CS x 2 1/2ID	1
6	V04-01300-08	O-Ring – 1/16CS x 5/16ID	1
7	-----	Plug, Pipe	1
8	V04-00308-03	Ring, Flat	1
9	V04-00308-K	Kit, Replacement Bowl	1
10	V04-00308-04	Vent Plug & O-ring	1



Troubleshooting

Trouble	Possible Cause	Remedy
Fuel bowl leaking	Deteriorated gasket	Remove and
	Housing cracked	Remove and replace housing
	Bowl rim cracked, nicked, or cracked	Remove and replace bowl
	Gasket missing	Replace gasket
	Loose fuel bowl	Tighten fuel bowl onto filter
Air leaking into system (indicated by air bubbles in bowl during operation)	Cracked component	Inspect filter bowl, filter housing, and gasket
	Loose filter bowl	Tighten fuel bowl onto fuel filter
	Loose valve assembly	Tighten valve assembly

Burner Maintenance

Burner Specifications

Prepare Before Installing

WARNING Owner's Responsibility



Incorrect installation, adjustment, and use of this burner could result in severe personal injury, death, or substantial property damage from fire, carbon monoxide poisoning, soot or explosion.

Contact a professional, qualified service agency for the installation, adjustment and service of your oil heating system. This work requires technical training, trade experience, licensing or certification in some states and the proper use of special combustion test instruments.

Please carefully read and comply with the following instructions:

- Never store or use gasoline or other flammable liquids or vapors near this burner or appliance.
- Never attempt to burn garbage or refuse in this appliance.
- Never attempt to light the burner/appliance by throwing burning material into the appliance.
- Never attempt to burn any fuel not specified and approved for use in this burner.
- Never restrict the air inlet openings to the burner or the combustion air ventilation openings in the room.

WARNING Impaired Burner Performance and Fire Hazard.

Do NOT operate the burner beyond specifications outlined in the table to the right.

- For applications beyond these limits, consult Beckett Technical Service at 1-800-645-2876.
- NOTE: Some packaged appliances with burners may be agency listed as a unit to operate beyond these limits. Consult the appliance manufacturer's specifications and agency approvals for verification.

Specifications

Capacity	'F' Head Firing Rate: 0.75 - 2.50 GPH Input: 105,000 - 350,000 Btu/h
Fuels	USA: No. 1 or No. 2 diesel fuel or kerosene; No.1 or No. 2 heating oil (ASTM D396)  CAUTION DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE.
Electrical	Power Supply: 13.5 Vdc Operating Load w/ igniter on: 15 Amps w/ igniter off: 8 - 10 Amps Motor: 13.5Vdc, 1/6 hp, 3450 RPM, 10 Amps (max.) NEMA "M" Flange, rotation CCW when facing shaft end. Ignition Secondary: 20KVpk 25mA Interrupted duty OR optional continuous duty.
Pump	Outlet pressure: Note 1
Dimensions	Height (maximum): 11 1/2 inches Width (maximum): 14 3/8 inches Depth (chassis only): 6 9/16 inches Air tube diameter: 4 inches
Ambient Operating Temperature	+32° F. (0° C.) Minimum +115° F. (+46° C.) Maximum (See Warning on Impaired Burner Performance and Fire Hazard.)

Note 1. See equipment manufacturer's burner specifications for recommended outlet pressure. Pressure is 100 psig unless otherwise noted.

Notice Special Requirements

NOTICE

If you discover damage to the burner or controls during unpacking, notify the carrier at once and file the appropriate claim.

NOTICE

When contacting Beckett for service information — Please record the burner serial number (and have available when calling or writing). You will find the serial number on the silver label located on the left rear of the burner. See **Figure 1**.

Burner Ventilation

⚠ WARNING Adequate Voltage Required

A low or erratic power supply could result in impaired burner operation, severe delayed ignition or an explosion inside the heat exchanger resulting in a burn and/or asphyxiation hazard.

- The Model ADC requires a continuous supply of 11 to 16 volts DC at 15 amps measured at the burner during operation.
- An automotive or small engine charging system that is capable of supplying the required continuous voltage/ amperage is recommended with certain road equipment, such as asphalt hot patchers and similar applications.
- This is especially true while maintaining nominal load temperatures during idle periods.

⚠ WARNING Adequate Combustion and Ventilation Air Supply Required

Failure to provide adequate air supply could seriously affect the burner performance and result in damage to the equipment, asphyxiation, explosion or fire hazards.

- The burner cannot properly burn the fuel if it is not supplied with a reliable combustion air source.
- Follow the guidelines in the latest editions of the NFPA 31 and CSA-B139 regarding providing adequate air for combustion and ventilation.

Table 2. Air Tube Combination (ATC) Codes

Firing Rate GPH	Head	Static Plate Size	ATC Codes for Usable Air Tube Lengths: (“A” in inches see Fig. 2)		
min-max		inches	4-1/2	5-3/8	6-5/8
0.40 - 0.75	F0	3-3/8U	AF44XR	AF53XR	AF65XR
0.75 - 1.25	F3	2-3/4	AF44XN	AF53XN	AF65XN
0.85 - 1.35	F4	2-3/4	AF44WH	AF53WH	AF65WH
0.85 - 1.65	F6	2-3/4	AF44YB	AF53YB	AF65YB
1.10 - 2.00	F12	2-3/4	AF44XO	AF53XO	AF56XO
1.65 - 2.50	F22	2-3/4	AF44XP	AF53XP	AF56XP

*See page 3 for capacity and voltage specifications.

General Information

Refer to the Troubleshooting section of this manual when experiencing a possible fault condition.

A. Equipment Located in Confined Space

The confined space should have two permanent openings: one near the top of the enclosure and one near the bottom of the enclosure. Each opening shall have a free area of not less than one square inch per 1,000 BTU's per hour of the total input rating of all equipment within the enclosure. The openings shall have free access to the building interior, which should have adequate infiltration from the outside.

B. Exhaust Fans and Other Air-Using Devices.

Size air openings large enough to allow for all air using devices in addition to the minimum area required for combustion air. If there is any possibility of the equipment room developing negative pressure (because of exhaust fans, for example), either pipe combustion directly to the burner or provide a sealed enclosure for the burner and provide it with its own combustion air supply.

C. Clearances to Burner and Equipment

Provide space around burner and equipment for easy service and maintenance. Check minimum clearances against those shown by the equipment manufacturer and by applicable codes.

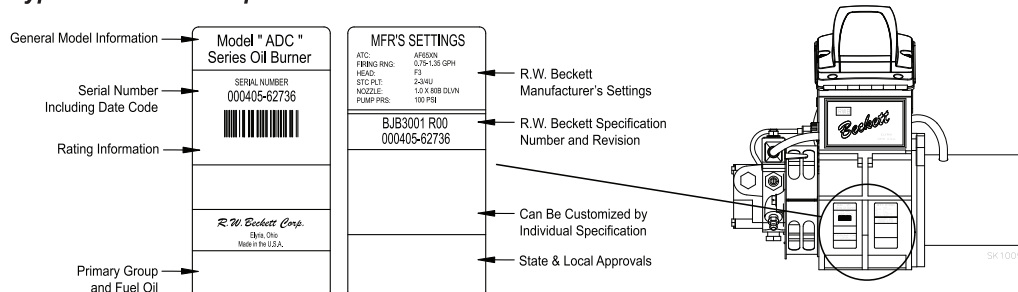
D. Exhausting Hazardous Fumes

See warning on this page. Also be conscious of any fumes produced by the materials that are being heated. Always ensure adequate ventilation to exhaust all fumes.

Table 1. Low Firing Rate Baffle

Head Type	Low Firing Rate Baffle (if specified)
F0	up to 0.65 gph
F3	up to 0.85 gph
F4 or F6	up to 0.90 gph

Figure 1. Typical Burner Nameplate



Burner Nozzle Replacement & Electrode Adjustment

E. Low Firing Rate Baffle.

The low firing rate baffle (See LFRB in Replacement Parts) reduces the air flow and pressure. The LFRB is sometimes used for firing rates under 1.00 gph as listed in **Table 1**. Refer to the equipment manufacturer's instructions. Do not omit the LFRB when specified. Omitting the baffle when specified or installing the baffle when not specified could result in poor burner performance.

Nozzle Assembly Maintenance

WARNING Correct Nozzle and Flow Rate Required



Incorrect nozzles and flow rates could result in impaired combustion, under-firing, over-firing, sooting, puff-back of hot gases, smoke and potential fire or asphyxiation hazards.

Use only nozzles having the brand, flow rate (gph), spray angle and pattern specified by the appliance manufacturer.

Follow the appliance manufacturer's specifications for the required pump outlet pressure for the nozzle, since this affects the flow rate.

- Nozzle manufacturers calibrate nozzle flow rates at 100 psig.
- When pump pressures are higher than 100 psig, the actual nozzle flow rate will be greater than the gph stamped on the nozzle body. (Example: A 1.00 gph nozzle at 140 psig = 1.18 gph)

Securely tighten the nozzle (90 torque inch pounds). For typical nozzle flow rates at various pressures refer to **Table 3**.

A. Replace the Burner Nozzle.

1. If applicable, remove the plastic plug protecting the nozzle adapter threads.

2. Place a 3/4" open-end wrench on the nozzle adapter. Insert the nozzle into the adapter and finger tighten. Finish tightening with a 5/8" open-end wrench.
3. If the nozzle is already installed, remove the nozzle line assembly to verify that the nozzle size and spray pattern are correct for the application (per equipment manufacturer's information). Verify that the electrode tip settings comply with **Figure 2**.



Use care when removing or installing an oil nozzle

A damaged nozzle could cause impaired combustion, sooting, puffback of hot gases, oil leakage and potential fire or asphyxiation hazards.

- Inspect the nozzle adapter to insure that the sealing surface is not grooved or scratched.
- To insure that the nozzle functions properly, check the orifice and strainer for dirt, scratches or other damage before installation.
- Do NOT attempt to install or remove a nozzle without securing the adapter to prevent seriously damaging the alignment.
- Use care when handling the nozzle line assembly to prevent changing the electrode tip settings or damaging the ceramic electrode insulators.
- Ensure that the electrode settings match the values shown in **Figure 2**.

Figure 2. Electrode Tip Setting

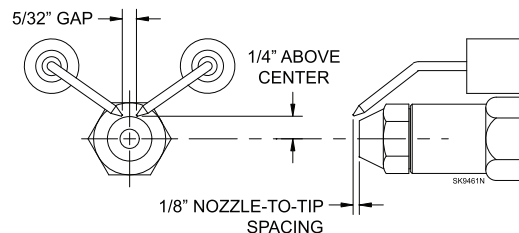
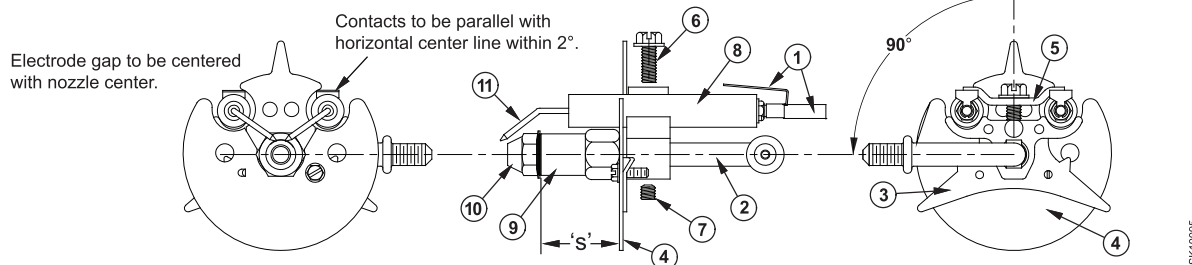


Figure 5. Nozzle, Line & Electrode Assembly



Item #	Description
1	Electrode Contact (3" ATC or extension over 3")
2	Nozzle Line
3	Spider spacer assembly
4	Static Plate
5	Electrode clamp
6	Electrode clamp retaining screws

Item #	Description
7	Nozzle line setscrew
8	Electrode Insulator
9	Nozzle adapter
10	Nozzle tip
11	Electrode tip

Burner Electrode Adjustment, Ignitor Maintenance

B. Check/Adjust Electrodes

Check the electrode tip settings. Adjust if necessary to comply with the dimensions shown in **Figure 2**. To adjust, loosen the electrode clamp screw and slide/rotate electrodes as necessary. Securely tighten the clamp screw when finished.

C. Igniter Maintenance

The igniter assembly does not require any adjustments beyond making sure the springs and the burner electrode rods make solid contact when the igniter is in the closed position. The sealing surfaces of the gaskets should be checked and replaced at the first signs of any damage or deterioration. Clean any dirt or residue from the porcelain bushings, springs, and baseplate.

The simplest way to check igniter operation is by supplying voltage to the input and checking to see whether an arc is produced. Check by either looking or listening to see if there is an arc across the electrodes while the burner is running and the igniter is energized.

The igniter must be grounded to the burner before checking the following. To check the igniter, ensure all power to the burner is off and use an ohmmeter to check the resistance between the two springs. The meter should read between 480 - 580 ohm.

The igniter should be replaced if the meter indicates an open circuit, or the spring-to-spring resistance exceeds the 480 - 580 ohm range by more than 10%.

D. Servicing Nozzle Line Assembly

Before proceeding, turn off power to the burner.

1. Disconnect the oil connector tube from the nozzle line.
2. Referring to **Figure 3**, loosen the two screws securing the igniter retaining clips (**a**) and rotate both clips to

release the igniter baseplate. Then tilt the igniter back on its hinge.

3. Remove the splined nut (**b**).
4. Remove the nozzle line assembly from the burner, being careful not to damage the electrodes or insulators while handling. To ease removal of short assemblies, it may be necessary to loosen the escutcheon plate (**c**). Reset to the edge of the label.
5. To replace the nozzle line assembly, reverse the above steps.

E. Check/Adjust “Z” Dimension

Refer to **Figure 4**. The critical “Z” dimension is the distance from the face of the nozzle to the flat face of the head. This distance for F heads is 1-1/8”. The “Z” dimension is factory set for burners shipped with the air tube installed but should always be verified during service and installation. If the “Z” dimension is out of adjustment, perform the following steps.

Before proceeding, turn off power to the burner.

1. Disconnect the oil connector tube from the nozzle line.
2. Referring to **Figure 5**, loosen the splined nut from the nozzle line. Loosen the hex head screw securing the escutcheon plate to the burner housing.
3. A Beckett T650 gauge should be used to set the Z dimension.
4. Place the end of a ruler at the face of the nozzle and, using a straight edge across the head, measure the distance to the face of the head.
5. Slide the nozzle line forward or back until this dimension for F heads is 1-1/8”.
6. Tighten the hex head screw to secure the escutcheon plate to the burner chassis. Then tighten the splined nut and attach the oil connector tube.
7. Recheck the “Z” dimension periodically when servicing to ensure the escutcheon plate has not shifted. You will need to reset the “Z” dimension if you replace the air tube or nozzle line assembly.

Figure 3. Igniter Hinge & Retainer Clips

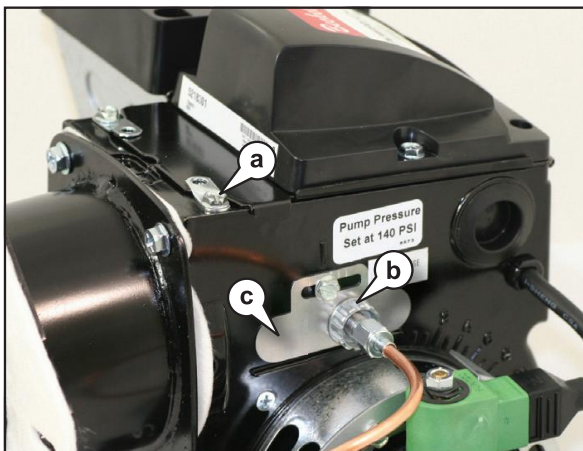
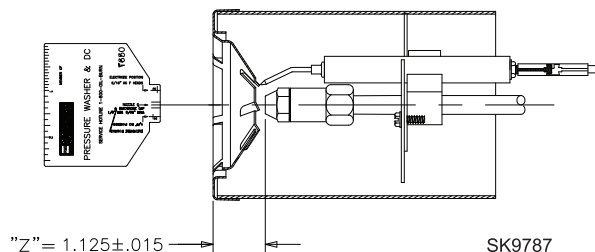


Figure 4. ‘Z’ Dimensions Using Gauge



Burner Fuel Supply

NOTICE

The Beckett Z gauge (part number Z-2000) is available to permit checking the F head "Z" dimension without removing the burner.

Fuel Supply

A. Connect Fuel Lines

WARNING

Do Not Install Bypass Plug with 1-Pipe System

Failure to comply could cause immediate pump seal failure, pressurized oil leakage and the potential for a fire and injury hazard.

- The burner is shipped without the bypass plug installed.
- Install the bypass plug in two-pipe oil supply systems ONLY.

For oil supply system specifications for tanks not mounted on machines, carefully follow the pump manufacturer's literature and the latest edition of the National Fire Protection Association (NFPA) 31 standard.

NOTICE

Pumps with automatic bypass do not require a bypass plug. Verify by referring to the pump manufacturer's instructions.

B. Fuel Supply Level with or Above Burner

The burner may be equipped with a single stage pump. If a one-pipe system is installed, verify a bypass plug is not installed in the pump, then connect the fuel supply to the burner with a single supply line. Note that manual bleeding of the pump is required on initial start-up or when the equipment runs out of fuel. When connecting a two-pipe fuel system, install the pump bypass plug.

CAUTION

Oil Supply Pressure Control Required

Damage to the filter or pump seals could cause oil leakage and a fire hazard.

- The oil supply inlet pressure to the burner **cannot exceed 3 psig**.
- Ensure that a pressure limiting device is installed in accordance with the latest edition of NFPA 31.
- **Do NOT install valves in the return line.** (NFPA 31, Chapter 8.)
- **Gravity Feed Systems:** Always install an anti-siphon valve in the oil supply line or a solenoid valve (RWB Part # 22246U) in the pump/nozzle discharge tubing to provide backup oil flow cut-off protection.

C. Fuel Supply Below Level of Burner

When the fuel supply is more than eight feet below the level of the burner, a two-pipe fuel supply system is required. Depending on the fuel line diameter and the horizontal and vertical length, the installation may also require a two-stage pump. Consult the fuel unit manufacturer's literature for lift and vacuum capability.

D. Fuel Line Replacement (Remote Tank Only)

When replacing fuel lines, continuous lengths of heavy wall copper tubing is recommended. To ensure a tight seal, always use flare fittings. Never use compression fittings. Always install fittings in an accessible location. To avoid vibration noise, fuel lines should not run against the appliance or the ceiling joists.

E. Fuel Line Valve and Filter

CAUTION

Do Not Use Teflon Tape

Damage to the pump could cause impaired burner operation, oil leakage and appliance soot-up.

- Never use Teflon tape on fuel oil fittings.
- Tape fragments can lodge in fuel line components and fuel unit, damaging the equipment and preventing proper operation.
- Use oil-resistant pipe sealant compounds.

Shutoff valves should be located in the oil supply line. Do not install valves in the return line.

Burner Wiring

A. Burner installed on equipment

Refer to appliance manufacturer's wiring diagram for electrical connections.

WARNING

Electrical Shock Hazard

Electrical shock can cause severe personal injury or death.

- Disconnect electrical power before installing or servicing the burner.
- Provide ground wiring to the burner, metal control enclosures and accessories. (This may also be required to aid proper control system operation.)

B. Burner Replacement

Burner wiring may vary, depending on the actual primary control and furnished options. Refer to **Figure 6** for typical burner wiring, showing cad cell primary controls. Note that the relay and control, shown in the wiring diagram are optional features.

Burner Wiring

Figure 6A. Typical Wiring For Constant Duty Ignition - With No Primary Control

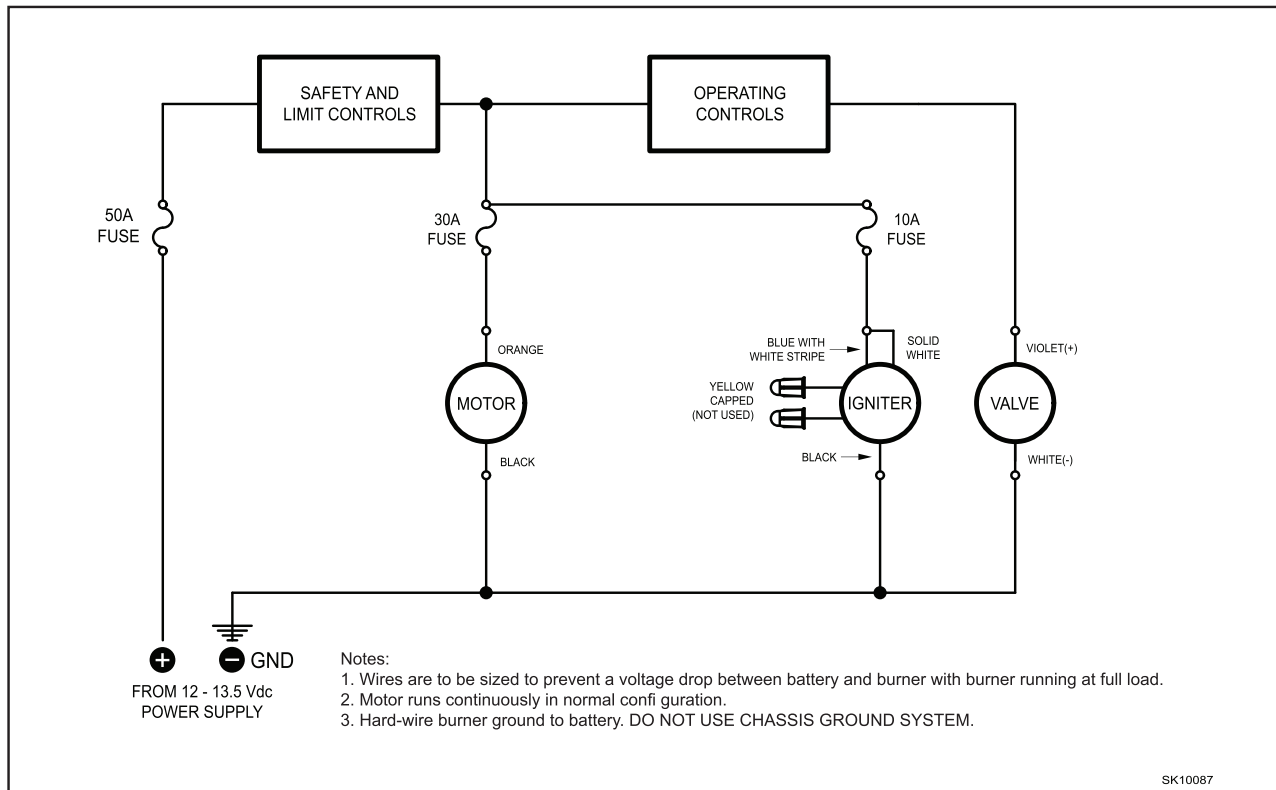
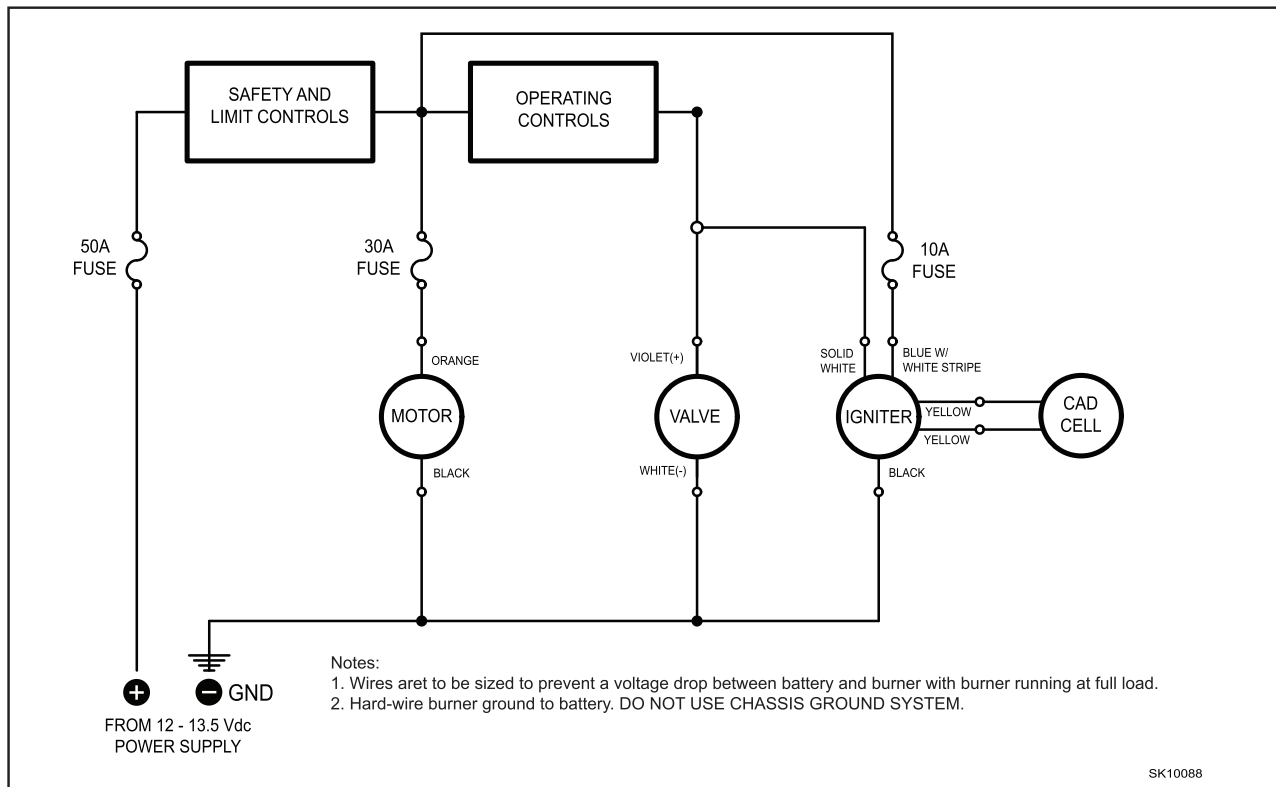
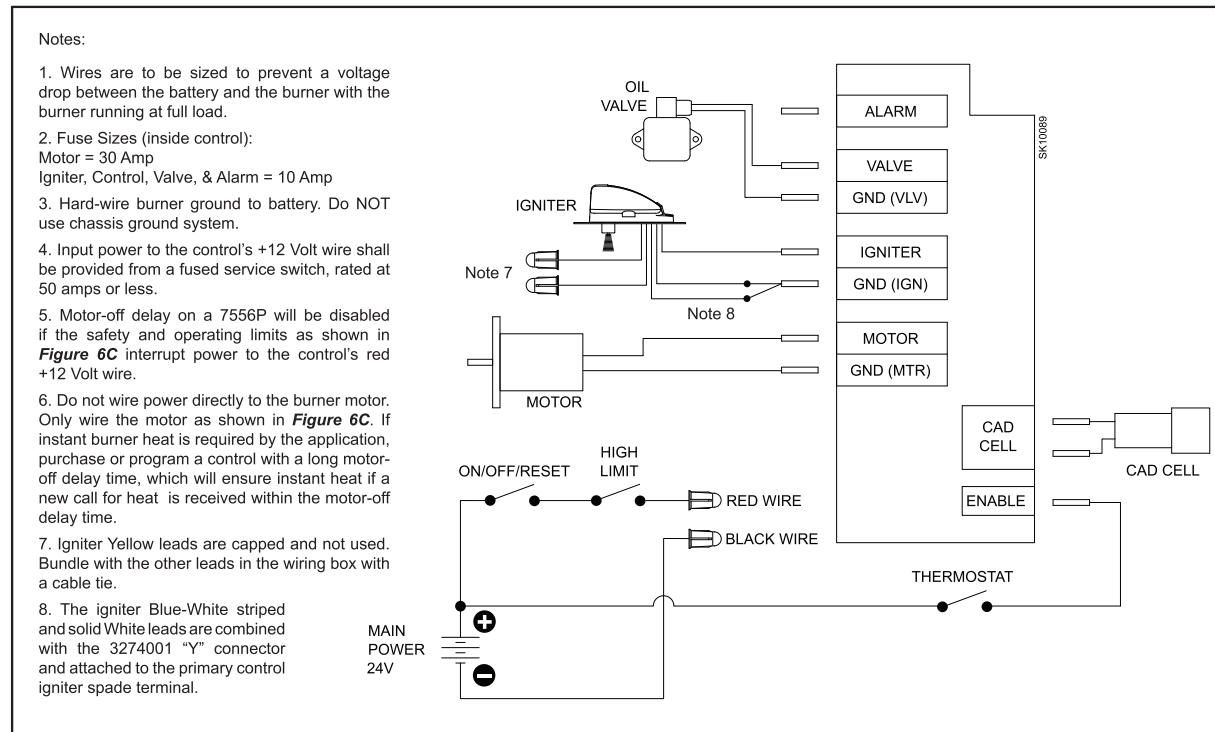


Figure 6B. Typical Wiring For Interrupted Ignition - With No Primary Control



Burner Blower & Coupling Replacement

Figure 6C. Typical Wiring with 7556 Primary Safety Control



Drive Component Maintenance

A. Motor, Blower Wheel, and Coupling Replacement

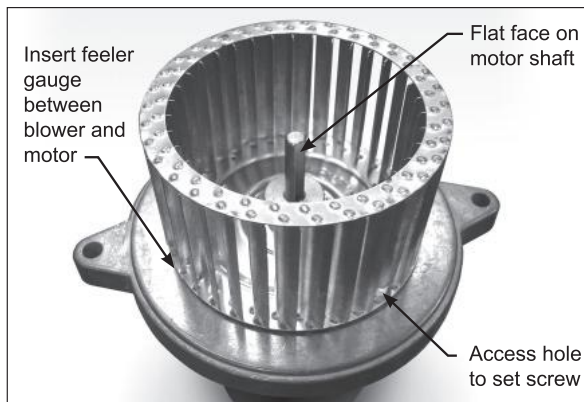
The motor will require replacement if the proper voltage is measured at the motor input, and the motor will either not run, or the current draw with a free running pump exceeds 10% of the rated current.

To replace the burner motor, coupling and/or blower wheel perform the following steps.

1. Before servicing, turn off and/or disconnect all power to the burner.
2. Disconnect the burner motor wires.
3. Remove the bolts securing the motor to the burner housing.
4. Remove the motor, coupling, and blower wheel.
5. Loosen the set screw on the blower wheel to slide the existing wheel off the shaft.
6. Slide the new blower wheel onto the old shaft (after thoroughly cleaning housing) and/or slide the old blower wheel onto the new motor shaft.
7. Place a .030" (1/32" $\pm$ 1/64") feeler gauge between the blower wheel and the motor housing.

8. Slide the blower wheel toward the motor until it contacts the feeler gauge.
9. Rotate the blower wheel until the setscrew is centered on the flat of the motor shaft. Tighten the setscrew to secure the wheel.
10. Slide the motor coupling on the motor shaft, then install the motor on the burner housing. Ensure that the motor coupling fits between the motor shaft and the pump shaft inside the housing. Tighten the motor retaining screws. Reconnect the wires.
11. Restore power, start the burner and perform the combustion test described previously in this manual.

Figure 7. – Blower Wheel



Burner Pump mianteance, Solenoid Replacement

B. Pump Maintenance

General Pump Information

Important information - Long or oversized inlet lines may require the pump to operate dry during initial bleeding period. In such cases, the priming may be assisted by injecting fuel oil in the pump gear set. Under lift conditions, lines and fittings must be air tight. To assure this, "Pipe Dope" may be applied to both the used and unused inlet and return fittings. **Do NOT use Teflon tape or compression fittings**

Mounting Position - Beckett CleanCut pump may be mounted in any position (except upside-down in a single pipe installation).

Vacuum Check - A Vacuum Gauge may be installed in either of the 1/4" NPT inlet ports.

Pressure Check - When a pressure check is made, use the nozzle port. If the bleed port is used, the reading on the gauge should be approximately 5 psig higher than the pressure reading on the nozzle port. See **Figure 8**.

Cutoff Check - To check cutoff pressure dead head a pressure gauge in the nozzle port. Run the burner for a short period of time. Shut the burner off. The pressure will drop and hold above zero. Pressurized or gravity feed installations must not exceed 3 psig on inlet line or return line at the pump per NFPA 31. A pressure greater than 10 psig may cause damage to the shaft seal.

C. Valve Coil and Stem Replacement

To determine if the valve coil requires replacement perform the following steps.

1. Remove the cord set from the valve.
2. Place the leads from an ohmmeter across the coil.
3. A 12Vdc volt coil should measure between 15 and 25 ohms.
4. If the meter indicates an open circuit, replace the coil.

To check pump operation perform the following.

1. Check the operating pressure by removing the copper tubing from the nozzle line and installing a pressure gauge in the line. With the motor running and the coil energized, check the gauge. The pressure should read 100 psig unless otherwise stated.
2. To check the cutoff function, deadhead the pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off; the pressure should drop and hold.

To replace the coil and/or pump assembly perform the following steps.

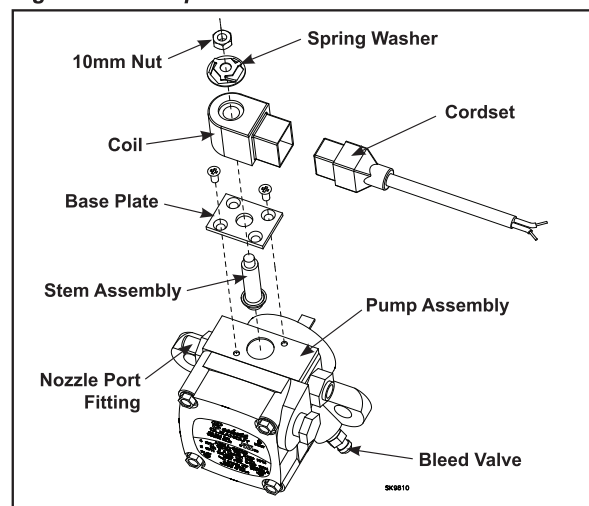
1. Before servicing, turn off and/or disconnect all power to the burner.
2. Remove the copper tube assembly when replacing the pump or when removing the coil and the tube blocks the coil.
3. Using a flat tip screwdriver, press the flat tip into the spring washer to prevent it from rotating.
4. Using a 10mm wrench or adjustable wrench, remove the nut and spring washer.
5. Remove the coil by lifting it straight up.
6. Remove the two base plate screws, then the base plate by lifting straight up.
7. Remove valve stem assembly by pulling straight up.
8. To install the new stem and coil assemblies, follow the above steps in reverse order, tightening each part as you go.
9. Restore power, start the burner and perform the combustion test described previously in this manual.

Start Up Burner & Set Combustion

A. Basic Burner Operation

Typical Constant Duty Ignition Configuration - With this Beckett ADC oil burner configuration, the motor and igniter operate continuously while the valve that controls oil flow is cycled by the switches on the power washer. The motor is used to drive the blower and pump. The rotational speed of the motor is determined by the voltage supplied and the load placed on the motor. Pump pressure and air settings are the main factors affecting the motor load. The igniter converts battery DC voltage into a high voltage spark to ignite the oil. The igniter is capable of running continuously as long as the blower wheel is circulating air across the igniter base. The pump and solenoid valve are used to control the flow of oil from the reservoir to the nozzle.

Figure 8. – Pump and Valve Assemblies



Burner Combustion Setting

Igniter with Interrupted Duty Ignition - This optional control circuit is available to reduce current draw on the charging system by turning the igniter off after a flame has been established. This option controls igniter operation based on a signal from a light sensing cad cell. When light hits the cell the control will sense a decrease in resistance across the sensor. A few seconds delay will occur prior to the igniter switching off. As long as sufficient light is reaching the cell eye, the igniter will remain off. If light is removed from the sensor, the igniter will turn on until light is again sensed by the cad cell.

With 7556 Primary Safety Control - The 7556 control provides the same benefits as the ignition control board as described above as well as added safety, convenience, and performance features. It adds a valve on delay and motor-off delay to the burner's operation sequence that promote clean burner operation. It has a lock-out function that shuts the burner down if it is not operating properly. The control adds fusing at the burner to protect against component failures. The control also has redundant motor relays that are checked for proper operation every heat cycle.

Variations to the burner circuits may occur due to optional temperature, pressure, and vacuum switches that control burner operation. Note that when external switches are used to control motor operation they must be sized correctly for the rated current or a relay should be installed to isolate the switches from the motor's full load current.

B. Combustion Set-up

As soon as burner motor starts rotating bleed all the air from the pump. (Required with single-pipe systems.)

WARNING Explosion and Fire Hazard



Failure to follow these instructions could lead to equipment malfunction and result in heavy smoke emission, soot-up, hot gas puff-back, fire and asphyxiation hazards.

- Do not attempt to start the burner when excess oil has accumulated in the appliance, the appliance is full of vapor, or when the combustion chamber is very hot.
- Do not attempt to re-establish flame with the burner running if the flame becomes extinguished during start-up, venting, or adjustment.
- **Vapor-Filled Appliance:** Allow the unit to cool off and all vapors to dissipate before attempting another start.
- **Oil-Flooded Appliance:** Shut off the electrical power and the oil supply to the burner and then clear all accumulated oil before continuing.
- If the condition still appears unsafe, contact the Fire Department. Carefully follow their directions.
- Keep a fire extinguisher nearby and ready for use.

To bleed the pump, attach a clear plastic hose over the vent fitting. Loosen the fitting and catch the oil in an empty container. Tighten the fitting when all air has been purged from the supply system. Note: If the burner stops after a flame is established, the unit probably requires additional bleeding. Continue to bleed the system until the pump is primed and a flame is established when the bleed valve is closed.

C. Set Combustion with Instruments

1. Allow the burner to run for approximately 5 to 10 minutes.
2. Follow these four steps to properly adjust the burner:

Step 1: Adjust the air until a trace smoke level is achieved.

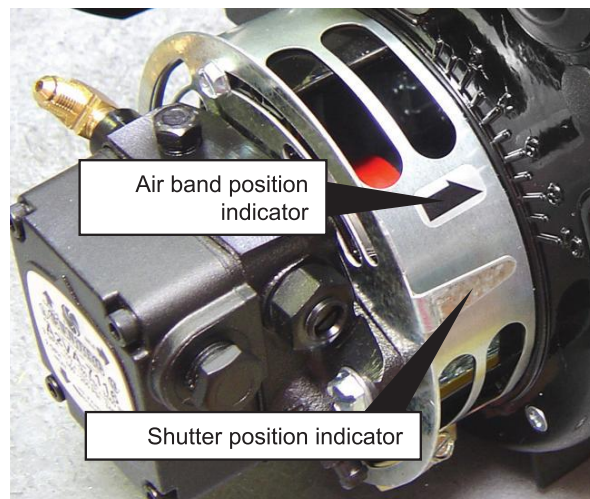
Step 2: At the trace of smoke level, measure the CO₂ (or O₂). This is the vital reference point for further adjustments.

Step 3: Increase the air to reduce CO₂ by 1 percentage point (O₂ will be increased by approximately 1.4 percentage points).

Step 4: Recheck the smoke level. It should be zero.

3. This procedure provides a margin of reserve air to accommodate variable conditions.
4. Once the combustion level is set, tighten the fasteners on the air band and air shutter.
5. Start and stop the burner several times to ensure satisfactory operation.
6. Test the equipment safety controls to verify they function according to the manufacturer's specifications.

Figure 9. – Air supply components



Burner Troubleshooting

Table 4. Troubleshooting Chart

Symptom	Possible Cause
Oil Not Igniting	If the burner is not igniting, the burner motor, drive coupling, and oil pump are operating and oil is flowing to the nozzle through the solenoid valve, check the following possibilities. 1. Check the air shutter adjustment. If the air shutter is opened too far, the flow of air may prevent the arc from reaching the oil spray. This may appear as a white vapor exhaust from the heater. [Refer to section “Start up burner and set combustion”] 2. The ignition system may have failed to supply an adequate arc to ignite the oil. Check the battery and charging system to insure a continuous supply of 11 to 16 volts DC (15 amps). [Refer to section “Nozzle Assembly Maintenance”] 3. Check the electrodes for wear and damage. Insure that the electrodes are adjusted properly. [Refer to section “Nozzle Assembly Maintenance”]
No Flame	If there is no flame, the burner motor and igniter operate continuously and the oil solenoid valve is functional, check the following possibilities. 1. Check for a plugged oil nozzle. [Refer to section 3] 2. If the coil on the solenoid valve is actuating, insure that the valve is opening or closing properly. [Refer to section “Fuel Supply”] 3. Check for sufficient fuel pressure. Pressure is 100 psig with valve energized, unless otherwise noted. [Refer to section “Drive Component Maintenance”] 4. Check the pump pressure. Check for air in fuel lines. 5. Check burner for broken motor coupling. If the coupling is broken check pump rotation prior to replacing the coupling. [Refer to section “Drive Component Maintenance”] 6. Check for contaminated fuel and/or partially plugged fuel filter. [Refer to section “Fuel Supply”]
Motor Not Operating	If the blower motor is not operating, check the following possibilities. 1. Check voltage at the motor to insure that switches and relays, in line with the motor, are operating properly. [Refer to section “Burner Wiring”] 2. Check pump and motor shaft operation. They should work freely without binding. [Refer to section “Drive Component Maintenance”]
No Oil Spray	If the blower motor is operating, there is fuel in the tank, but oil does not spray out the end of the nozzle, check the following possibilities. 1. Check for a broken or stripped coupling between the pump and the motor. [Refer to section “Drive Component Maintenance”] 2. Check the pump output for oil. [Refer to section “Drive Component Maintenance”] 3. Check operation of the oil valve. [Refer to section “Drive Component Maintenance”] 4. Check for a plugged nozzle. [Refer to section “Nozzle Assembly Maintenance”] 5. Check for air in the oil line. [Refer to section “Nozzle Assembly Maintenance”] 6. Check for fuel contamination or plugged filter. [Refer to section “Nozzle Assembly Maintenance”]
Fluctuating or No Pump Pressure	If the pump pressure, as determined by a pressure gauge, is erratic or does not exist, check the following possibilities. 1. Check motor rotational speed. Low rpm can cause erratic or no pump pressure. [Refer to section “Drive Component Maintenance”] 2. Check for a broken or worn motor coupling. [Refer to section “Drive Component Maintenance”] 3. Check that the pump turns freely. [Refer to section “Drive Component Maintenance”] 4. Check for air leaks in the lines. [Refer to section “Fuel Supply”] 5. Check for oil froth at the bleed point. [Refer to section “Fuel Supply”] 6. Check voltage at the motor. [Refer to section voltage rating on nameplate] 7. Check for fuel contamination or partially plugged filter.
Slow Motor Rotation	If the blower motor is not operating at the rpm's listed on the nameplate, check the following. 1. Check the supply voltage to the motor. [Refer to section voltage rating on nameplate] 2. Check for free operation of the motor shaft and pump assembly. [Refer to section “Drive Component Maintenance”]

Burner Breakdown

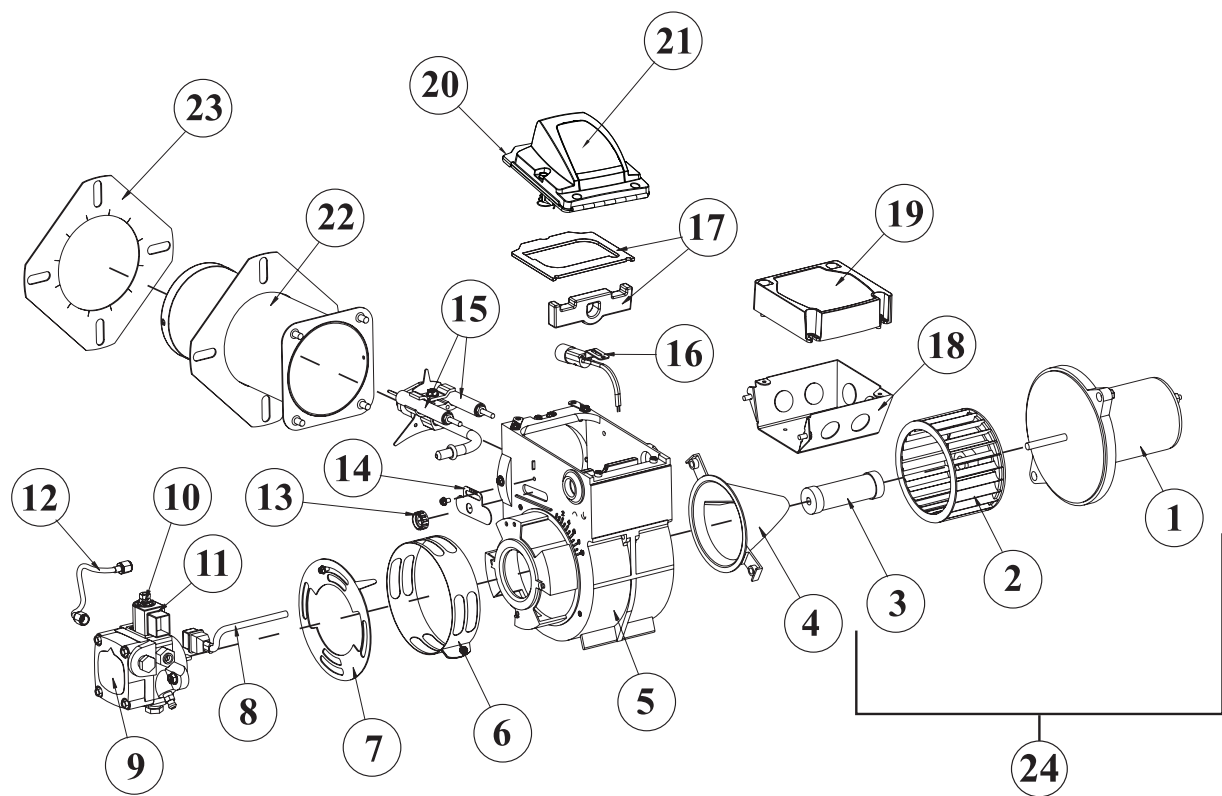


Illustration #	Description	Part#
1	DC Motor	n/a
2	Blower Wheel	V0B-2999U
3	Coupling	V0B-21405
4	Air Guide	V0B-31231U
5	Burner Housing - Black	V0B-5874BKU
6	Air Band	
7	Air Shutter - 4 Slot Air Shutter - 8 Slot	V0B-BPW201-4 V0B-03494
8	Cord set	V0B-21807U
9	Pump (CleanCut)	V0B-2184402U
10	Valve Stem	V0B-21877U
11	12 Volt Coil	V0B-21754U
12	8" Copper Tubing	V03-05394
13	Nut	V03-03666

Illustration #	Description	Part#
14	Cover, Slot	V0B-03493
15	Electrode Kit over 3-5/8"	V0B-578730
16	Cad Cell Detector	V0B-07492
17	Igniter Gasket Kit	
18	4X4 Wiring Box Kit	
19	Control Kit	
20	Igniter Assy with baseplate	V03-51776U
21	Igniter only	V0B-7435U
22	Air Tube Ass'y	Specify
23	Flange Mounting Gasket	Specify
24	Motor Kit with Blower Wheel and Coupling	V0B-52145U
Not Shown	Tune-up Kit for 30 & 35 Air Tube Lengths	V0B-578730

BURNER

Burner Part Number	V03-ACS102
Burner Type	Pressure Atomizing
Fuel Type	#1 or #2 Fuel Oil
Fuel Pressure	125 PSI / 9 BAR
Voltage	12 vdc
Shutter Setting	10
Air band Setting	7

Burner Troubleshooting

Trouble	Possible Cause	Remedy
Burner will not ignite	Electrodes out of alignment.	See "ADJUSTING ELECTRODE ASSEMBLY" in BURNER MAINTENANCE SECTION.
	Electrode insulator failure.	Remove and replace if there are breaks, cracks, or spark trails.
	Water flow switch not closing.	Adjust, repair, or replace switch.
	Vacuum switch not closing.	Adjust, repair, or replace switch.
	Temperature control switch not closing.	Adjust or replace the TEMPERATURE CONTROL.
	Fuel solenoid valve not opening.	Clean, repair, or replace solenoid.
	Weak transformer.	Clean and check transformer terminals. Check transformer for spark pre "TRANSFORMER TEST" in BURNER MAINTENANCE SECTION.
	Faulty cad cell (if equipped).	Clean and test cad cell, replace if required.
	Faulty primary control (if equipped).	Replace primary control.
	Burner motor thermal protector locked out.	See "Burner motor thermal protector locked out."
	Wiring.	All wire contacts are to be clean and tight. Wire should not be cracked or frayed.
	Burner switch.	Test switch operation. Remove and replace as necessary.
	Pump pressure.	See "Low fuel pressure."
	Venting.	A downdraft will cause delayed ignition. Soot deposits on the coil and burner can interrupt air flow, and cause shorting of the electrodes. Clean as required.
	Sooting.	Soot deposits on the coil and burner can interrupt air flow, and cause shorting of the electrodes. Clean as required.
	No fuel.	See "No fuel."
No fuel	Clogged fuel filter.	Remove and replace filter per FUEL FILTER SECTION.
	Fuel leak.	Repair as necessary.
	Kinked or collapsed fuel line.	Remove and replace fuel line.
	Low fuel pressure.	See "Low fuel pressure."
	Faulty burner oil pump.	Adjust pressure or replace.
	Air leak in intake lines.	Tighten all fittings.
	Clogged burner nozzle.	Remove and replace (do not clean).
Low fuel pressure	Clogged fuel filter.	See "No Fuel."
	Clogged fuel pump filter screen.	Remove pump cover and clean strainer using a brush and clean fuel oil, diesel oil or kerosene.
	Fuel oil too viscous.	Operate a lighter oil or in warmer area.
	Air leaks in intake lines.	Tighten all fittings.

	Kinked or collapsed fuel line.	Remove and replace.
	Burner shaft coupling slipping.	Remove and replace.
	Fuel nozzle worn.	Remove and replace with specified nozzle on BURNER ASSEMBLY.
	Faulty oil pump.	Remove and replace.
Pulsating pressure	Partially clogged fuel pump strainer or filter.	Remove and replace strainer per FUEL PUMP FILTER in OIL BURNER MAINTENANCE section.
	Air leaking around fuel pump cover.	Check fuel pump cover screws for tightness and damaged gasket.
Unit smokes	Improper fuel.	Refuel with FUEL specified on MACHINE SPECIFICATIONS.
	Air to burner insufficient.	See AIR BAND ADJUSTMENT in OIL BURNER MAINTENANCE section.
	Fuel nozzle interior loose.	Replace nozzle.
	Water in fuel	Inspect fuel filter for water presence.
	Gun out of alignment.	Bend oil pipe to center burner nozzle.
Burner motor thermal protector kicked out	Low voltage.	Voltage must match those specified in the BURNER section of MACHINE SPECIFICATIONS section.
	Fuel too viscous.	See "Low fuel pressure."
	Fuel pump defective.	Check that fuel pump turns freely.
	Motor defective.	Call service technician or take motor to repair/warranty station.
Delayed ignition (rumbling, noise starts)	Dirty or damaged electrodes.	Clean or replace.
	Air adjustment open too far.	Readjust per AIR BAND ADJUSTMENT in OIL BURNER MAINTENANCE section.
	Poor fuel spray pattern.	Remove and replace with fuel nozzle specified in BURNER ASSEMBLY.
	Incorrect electrode setting.	Readjust per ADJUSTING ELECTRODE ASSEMBLY in OIL BURNER MAINTENANCE section.
	Weak transformer.	See TRANSFORMER CHECK on OIL BURNER MAINTENANCE section.
Burner does not electrically come on	Burner motor reset button tripped.	Reset if necessary. CAUTION: Do not keep hitting the "reset" button if you have oil pressure you are just filling the burner combustion chamber with oil and if ignited will cause an explosion.
	High limit temp control reset tripped if so equipped.	Reset if necessary.

Water Heater Troubleshooting

<i>Trouble</i>	<i>Possible Cause</i>	<i>Remedy</i>
Machine will not rise to operating temperature	Low fuel pressure.	See BURNER on MODEL SPECIFICATIOSN for specified pressure.
	Water in fuel piping.	Drain fuel tank and remove and replace filter per FUEL FILTER INSERT.
	Fuel filter clogged.	Remove and replace fuel filter element per FUEL FILTER INSERT.
	Poor combustion.	See "Poor combustion."
	Improper fuel supply.	Use fuel specified in BURNER section of the MODEL SPECIFICATIONS.
	Temperature control inoperative (if equipped).	See TEMPERATURE CONTROL INSERT.
Machine overheats	Insufficient water.	See "Low operating pressure" on MACHINE TROUBLESHOOTING insert.
	Temperature control inoperative.	See TEMPERATURE CONTROL INSERT.
	Improper fuel supply.	Use fuel specified in BURNER section of the MODEL SPECIFICATIONS.
Dry steam (very little moisture, very hot steam)	Insufficient water.	See "Low operating pressure" on MACHINE TROUBLESHOOTING insert.
	Improper fuel supply.	Use fuel specified in BURNER section of the MACHINE SPECIFICATIONS.
	Improper fuel pressure.	See BURNER on MODEL SPECIFICATIONS for specified pressure.
Machine smokes (sweet smelling exhaust)	Improper fuel supply.	Use fuel specified in BURNER section of MODEL SPECIFICATIONS.
	Insufficient combustion air.	See AIR BAND ADJUSTMENT on OIL BURNER MAINTENANCE insert.
	Leaking fuel system.	Correct leakage problem.
	Clogged or improper burner nozzle.	Remove (DO NOT CLEAN) and replace nozzle per BURNER ASSEMBLY INSERT.
	Loose burner nozzle.	See BURNER MAINTENANCE insert.
Machine fumes (exhaust burns eyes)	Too much combustion air.	See BURNER TROUBLESHOOTING insert.
	Improper fuel pressure.	See FUEL on MODEL SPECIFICATIONS for specified pressure.

Excessive oil dripping from laydown coil condensate.	Loose nozzle.	See BURNER TROUBLESHOOTING insert.
	Fuel pressure too high.	See FUEL PRESSURE ADJUSTMENT section on BURNER MAINTENANCE insert.
	Burner nozzle defective.	Remove and replace with appropriate nozzle found on the BURNER ASSEMBLY or BREAKDOWN insert.
	Incorrect burner nozzle.	Remove and replace with appropriate nozzle found on the BURNER ASSEMBLY or BREAKDOWN insert.
Poor combustion	Low fuel pressure.	See "Low fuel pressure" on BURNER TROUBLESHOOTING insert.
	Improper fuel supply.	See "Low fuel pressure" on BURNER TROUBLESHOOTING insert.
	Insufficient combustion air.	See AIR BAND ADJUSTMENT section on OIL BURNER MAINTENANCE.

Evaporative Emission Control Warranty Statement

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The EPA and California Air Resources Board and Alkota Cleaning Systems is pleased to explain the evaporative emission control system's warranty on your 2017 small off-road engine equipment. New equipment that use small off-engines must be designed, built, and equipped to meet the stringent anti-smog standards. Alkota Cleaning Systems must warrant the evaporative emission control system on your small off-road engine for the period listed below provided there has been no abuse, neglect or improper maintenance of your equipment.

Your evaporative emission control system may include parts such as: fuel tanks, fuel lines, fuel caps, valves, canisters, filters, vapor hoses, clamps, connectors, and other associated components.

MANUFACTURER'S WARRANTY COVERAGE:

This evaporative emission control system is warranted for two years. If any evaporative emission-related part on your equipment is defective, the part will be repaired or replaced by Alkota Cleaning Systems.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the small off-road engine equipment owner, you are responsible for performance of the required maintenance listed in your owner's manual. Alkota Cleaning Systems recommends that you retain all receipts covering warranty issues on your Evaporative system (tank, fuel cap-fuel line and canister) but Alkota Cleaning Systems cannot deny warranty solely for the lack of receipts.
- As the small off-road engine equipment owner, you should however be aware that Alkota Cleaning Systems may deny you warranty coverage if your fuel tank and related evaporative components have failed due to abuse, neglect, or improper maintenance or unapproved modifications.
- You are responsible for presenting your Evaporative components to an Alkota Cleaning Systems service center as soon as the problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact: Kenny Barnes(1-605-934-2222,Ext 1440)

GENERAL EVAPORATIVE EMISSIONS WARRANTY COVERAGE

The evaporative emissions warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. Alkota Cleaning Systems warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board; and free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to the part as described in the manufacturer's application.

THE WARRANTY ON EVAPORATIVE EMISSIONS RELATED PARTS IS AS FOLLOWS:

- (1) Any warranted part that is not scheduled for replacement as required maintenance is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, the part will be repaired or replaced by Alkota Cleaning Systems at no charge to the owner. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
- (2) Any warranted part that is scheduled only for regular inspection is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
- (3) Any warranted part that is scheduled for replacement as required maintenance is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by (the manufacturer) at no charge to the owner. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
- (4) Add-on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

a) **Evaporative Emission Warranty Parts List:**

Fuel tank
Fuel cap
Carbon canister
Fuel line

Warranty

Machines are guaranteed to be free from defects in material or workmanship under normal use and service for period of one year after delivery from the factory. Any part (other than vendor items) that is determined to be warranty will be repaired or replaced at **NO CHARGE** provided the warranty registration form is filled out in its entirety and the part is sent back freight prepaid. Any replacement parts accepted as warranty will be returned to you freight prepaid.

Our heating coil will carry a seven-year prorated warranty credit. The manufacturer will repair or replace the coil without charge for five years after delivery date from the factory for any defect in the coil that was caused by workmanship or defective steel. After the five years have expired, the credit will be prorated as follows:

First 5 years 100% Credit

Years 6 & 7 50% Credit

After 7 Years No Credit Allowed

All parts supplied to us by other manufacturers will be subject to their guarantee and warranty. Generators, motors, and engines are required by vendors to be repaired or replaced by authorized warranty repair stations. The manufacturer will assist you in locating warranty stations around the country in cases where that is necessary. Select items carry a six-month warranty such as unloaders, triggers guns, etc.

The manufacturer, at its option, will repair or replace defective parts only, and does not allow for field labor charges for removal, installation, analysis, travel expense, or special freight expenses incurred for replacement parts.

Warranty does not apply to normal wear and tear including, but not limited to, freezing damage, freight damage, damage caused by misuse or misapplication, chemical related failures, contaminated filters and screens, moisture related fuel pump failures, stuck check valves, pump packings or seals, nozzles or orifices, paint, hoses, and gauges.

For full warranty information, contact your delivering distributor or contact the manufacturer at info@warrantysvc.com

