SEI INDUSTRIES

High Pressure
Aviation Refueling System

HPARS Commercial OPERATIONS Manual

2018 VERSION F

HPARS OPERATIONS MANUAL - Version F

Issue Date: April 2018

PLEASE READ BEFORE USING.

SEI INDUSTRIES LTD.
7400 Wilson Avenue
Delta, B.C. Canada
V4G 1H3

Phone: (604) 946-3131
Fax: (604) 940-9566
E-Mail: seisales@sei-ind.com
Website: www.sei-ind.com

COPYRIGHT © 2018 SEI INDUSTRIES LTD. ALL RIGHTS RESERVED
PRINTED IN CANADA

Table of Contents

Section 1: Introduction

Manual Overview

This manual provides the following information:

- General description of the HPARS
- Installation instructions
- Basic operating instructions
- Maintenance guidelines
- Relevant drawings
- Product manufacturer manuals and info sheets

System Description

The High Pressure Aviation Re-Fueling System (HPARS) is intended for the fueling and de-fueling of aircraft and tanker trucks using jet fuel.

The system uses a self-priming centrifugal pump driven by an electric motor. Filtration is provided by a horizontal filter separator per API.

A flow meter is included to measure the amount of fuel delivered. Flow is controlled by an automatic pilot operated diaphragm valve. The system is rated for a maximum flow rate of 800 litres per minute.

A deadman switch is also provided to shut off the flow of fuel in an emergency.

Section 2: Installation

Installation Instructions

WARNING

Operating the pump in the wrong direction of rotation will reduce performance and may cause the impeller nut to loosen and therefore damage the pump.

1. Once power has been connected, operate the electric motor briefly (jog the motor) to check the direction of motor rotation. The motor must turn in the direction indicated by the arrow cast in the pump casing. If the rotation is incorrect, turn off the power source and swap two of the incoming power leads. Restore power and re-check the direction of rotation.

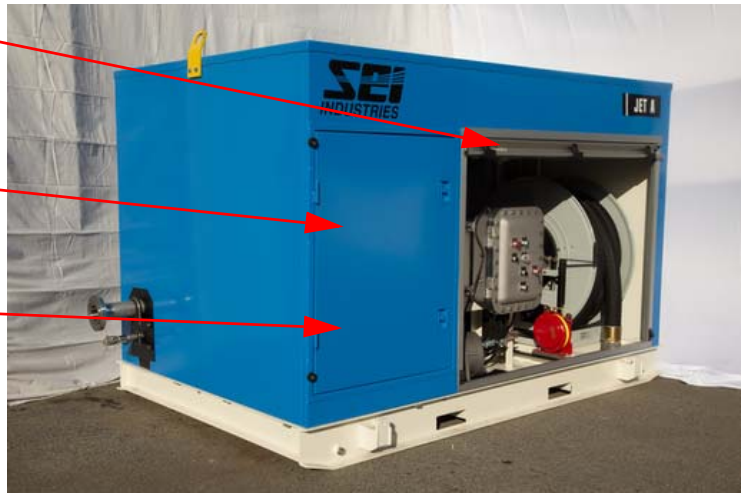
Ensure correct motor rotation.

2. Connect the pump skid frame to ground. A grounding lug is provided on the pump casing.
3. Attach a ground wire from the lug provided on the pump housing to a grounding rod or plate buried next to the HPAR.
4. If the fuel pump is dry, prime by manually filling the pump casing with fuel through the priming port located on the top of the pump.

Roll up door.

System schematic.

Filter access door.



Section 3: Operation

Operating Procedures

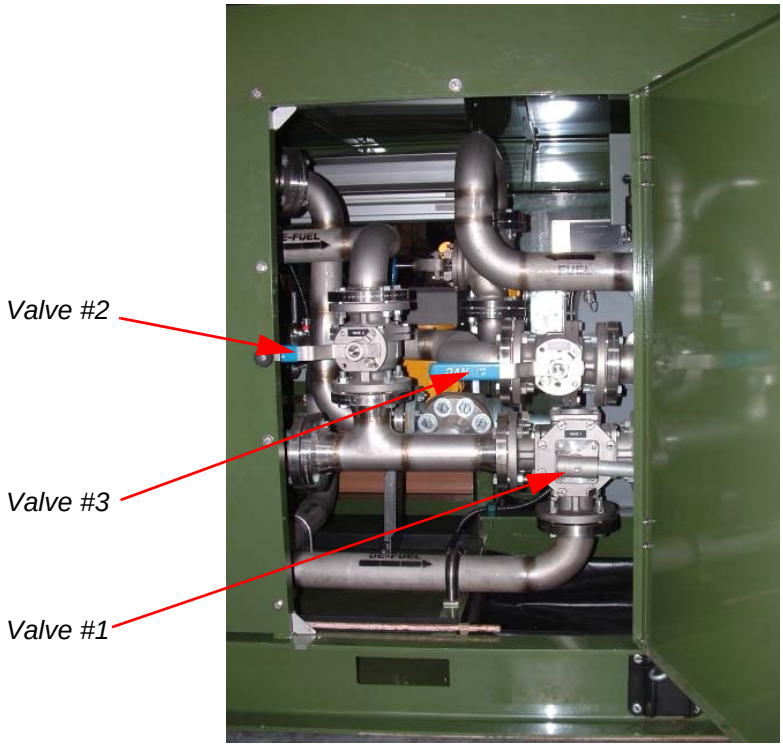
Controls

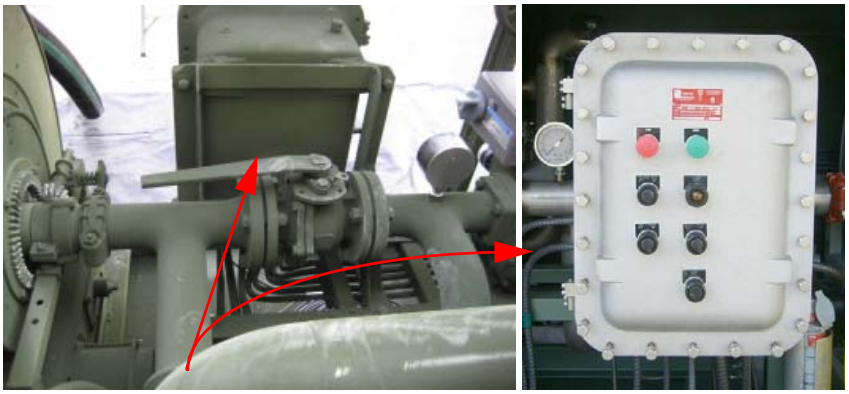
Fueling

Important Note

Refer to the system schematic, drawing No. PS-D-506, posted on the filter access door and found in *Section 5* of this manual.

1. Connect the supply hose(s) from the fuel source to the pump skid inlet.
2. Open all the valves in the supply line. Ensure that the ball valves on the system pumping skid are positioned for fueling as shown on the system schematic, drawing No. PS-D-506, posted on the filter access door.
3. Valve #1 (three way valve) has the handle positioned horizontal. Ball valve # 2 is closed. Ball valves # 3 and #4 are open (valve #4 can be found behind the control panel, see photo on next page). Make all grounding connections.





Valve #4 is located behind the control panel.

4. When starting the pump for the first time, if the layout does not provide flooded suction to the pump, the pump must be primed.
5. Remove the camlock plug on the top of the pump casing, open the valve and pour in fuel until the pump casing is full.
6. Replace the pipe plug. Close the deadman switch and start the pump. The pump will prime itself when the casing is filled with fuel. If there are long hoses connected to the suction side of the HPARS, it may take several minutes for the pump to pull all of the air out of the hoses and prime itself.
7. Once the pump begins to move fuel, you will hear air coming out of the vents on the filter housing and the meter.
8. When you no longer hear the air venting and the flow meter register begins to turn, the system is primed and ready to deliver fuel.

Priming port.

De-Fueling

Important Note

Refer to the system schematic, drawing No. PS-D-506 found in *Section 5* of this manual.

1. Connect the supply hose(s) from the pump inlet to the fuel destination (tank). Open all valves in the supply line.
2. Ensure that the ball valves on the system pumping skid are positioned for de-fueling as shown on the system schematic, drawing No. PS-D-506.
3. Valve #1 (three way valve) has the handle positioned vertical. Ball valve #4 is closed. Ball valves #2 and #3 are open.
4. Make all grounding connections. Connect the nozzle to the aircraft or fuel tender.

5. When filling an empty storage tank and during some de-refueling operations, it is necessary to restrict the velocity of fuel flow to a maximum of one meter per second. This equates to a flow rate of 270 liters per minute for the three-inch line used on the HPARS.
6. The flow can be reduced during de-fueling by partially closing the ball valve at the filter inlet, Valve No. 3.
7. The flow rate can be reduced during fueling by partially closing the butterfly valve located behind the control panel, Valve No. 4.
8. Observe the volume recorded by the flow meter over a one-minute period to determine the flow rate.

Flow Counter

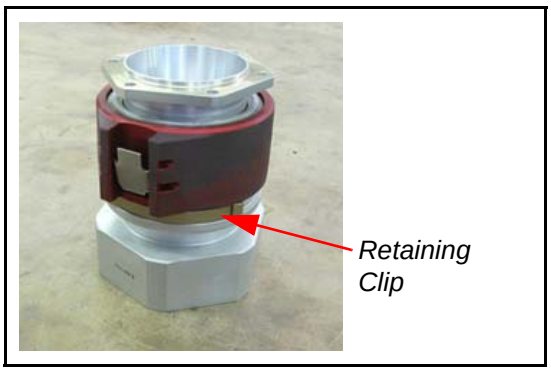
Hose End Coupler Operation

The hose is equipped with a quick connect dry-break coupling so that different fittings or nozzles may be attached.

Connect fittings as follows:

1. Place the fitting over a bucket or pan to collect any fuel remaining in the fitting.
2. Open the fitting valve (or nozzle) to relieve any pressure in the hose.\
3. Remove the retaining clip from the coupling.

4. Press in the two tabs and pull the collar back. Insert the male half of the coupling.
5. Press the male half of the coupling all the way in, until the collar will return to it's original position.
6. Replace the retaining clip.



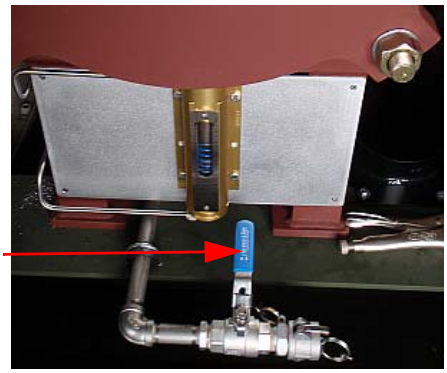
Section 4: Maintenance

Maintenance Procedures

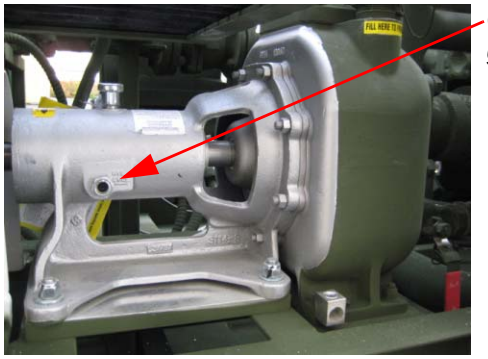
Daily – Before and After Operation

- Drain water from the filter sump.

Filter sump drain.



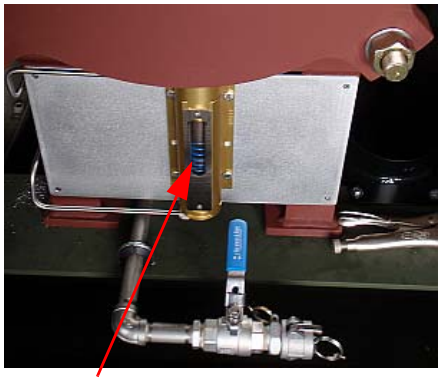
- Check operation of the deadman switch
- Do not leave hoses full of fuel for extended periods of time. Temperature changes may cause the fuel left in the hose to expand, raising the pressure in the hose. High pressure trapped in the hose may cause leakage or difficulty making connections. Open the values to relieve pressure back to the storage tank.
- Inspect oil level in pump bearing housing (use sight glass).



Oil level sight glass.

Annually

- Grease hose reel bearings. Refer to the Nordic manual for grease fitting locations in the appendix of this manual.
- Change oil in pump bearing housing annually. Use SAE 30 non-detergent oil.
- Change filter elements annually or when the differential pressure across the filters exceeds 15 psi during operation (see Infiltek manual for filter element change-out procedure).



Filter differential pressure gauge.

Filter Change Procedure

Replace the coalescer elements when the differential pressure gauge shows a 15 psi pressure drop during operation, while fuel is flowing through the filter. The green Teflon coated separator element does not require replacement unless it has been damaged.

WARNING

The filter housing operates under pressure. Prior to opening the housing, ensure that the vessel has been isolated from all pressure sources, vented and drained.

Caution

Wear rubber gloves when handling used elements. Fuel may contain toxic additives.

Disassembly

1. Close the filter inlet ball valve (valve #3).
2. Close the flow control valve.
3. Drain the housing using the sump drain valve. Drain the fuel into a suitable container. Remove the plug and open the valve at the filter air eliminator to allow air into the filter housing.
4. Loosen the large hex nuts securing the housing cover until the eye bolts can be swung back. Swing the housing cover aside.
5. Remove the hex nuts. Remove the aluminium support from the coalescer elements. Remove the aluminium filter caps.
6. Remove the coalescer elements. Grasp the element and carefully slide it off the center rod to remove. Discard used coalescer elements.
7. Clean the inside of the filter housing.

Caution

Used filter elements are a fire hazard. They should be stored in a metal container until they can be properly disposed of.

8. Inspect the separator element visually to determine if it is dirty or damaged. If found to be clean and undamaged, leave it in place.
9. If the separator element is dirty or damaged, remove the hex nuts, washers and aluminium support, then carefully remove the separator element. Do not touch the separator screen with your bare hands or allow it to come in contact with grease.
10. Dirty separator elements may be cleaned with a soft brush (see the separator cleaning procedure below as supplied by the component manufacturer).

Cleaning Procedure

It is recommended that this procedure is carried out with every coalescer change to ensure full potential and longer life of the separator. Make sure hands are kept clean and free of grease or other contamination throughout the cleansing operation.

It is also recommended that gloves (preferably thin rubber) be worn throughout this operation so as to avoid contact between bare hands and the separator screen / mesh.

1. CAREFULLY remove each element from the filter separator
2. Submerge the element in clean, dry fuel and wash it using a gentle, reciprocating action, holding the element firstly by one end cap and then the other. (DO NOT touch the separator screen / mesh with your bare hands, or allow any grease to come into contact with the element.)
3. Allow excess fuel to run off. Holding the element by the end cap, visually inspect the entire surface of the screen for damage and contamination. If there are any visible flaws or debris that have not been removed by washing, the cartridge should be replaced
4. Allow the separator to drain for 10 to 15 minutes.
5. Hold the element horizontal and allow tap water to drip onto the screen. The water must not be sprayed and it must not fall more than 3" (7.5 cm) before contacting the screen. The water will run off instantly if the element is not contaminated. Continue testing the element by slowly rotating and moving it back and forth until the entire surface has been tested. Id the water does not run off, but disappear through the screen and is found inside the element, the element has to be further cleaned as described in step 7.
6. If the element passes the surface inspection (step 3) and the water test (step 5), rinse it thoroughly in clean fuel to remove traces of water and air dry prior to reinstalling.
7. If the element fails the water test (step 5), it may be further cleaned by repeating the cleaning stage (step 2) using isopropyl alcohol in place of fuel. After cleaning, the element should be drained and rinsed in clean, dry fuel to remove all traces of isopropyl alcohol. After draining for 10-15 minutes, repeat the water test (step 5). If the element does not pass the water test after this operation, it must be replaced.
8. If there are visible tears, nicks, or cuts, they can be repaired as long as they are not larger than 1/8" in diameter. Use clear fingernails polish to repair the area. After you have repaired the element, wet the element in fuel and repeat the water test (step 5).

Note:

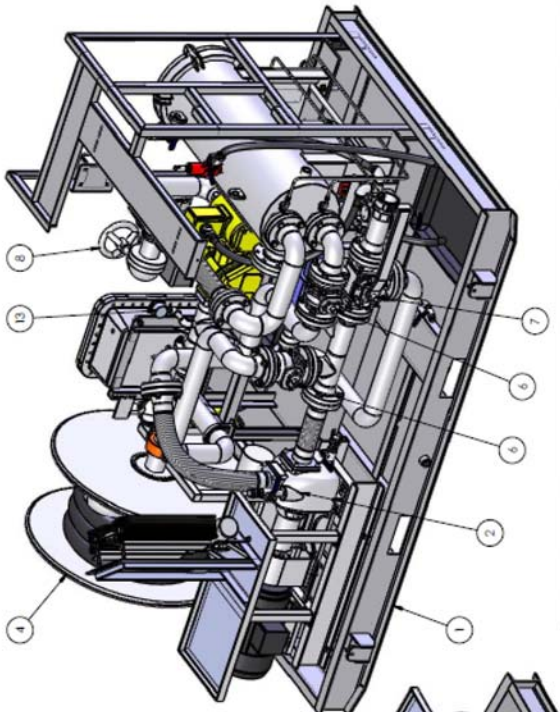
- The use of water, detergents (i.e. soap, powder cleanser of any kind), steam, or compressed air during any of the operation IS NOT RECOMMENDER because they can affect the operation of the separator.
- The use of isopropyl alcohol is RECOMMENDED for use in the above operation because it removes surfactant build-up and kills microorganisms.

Reassembly

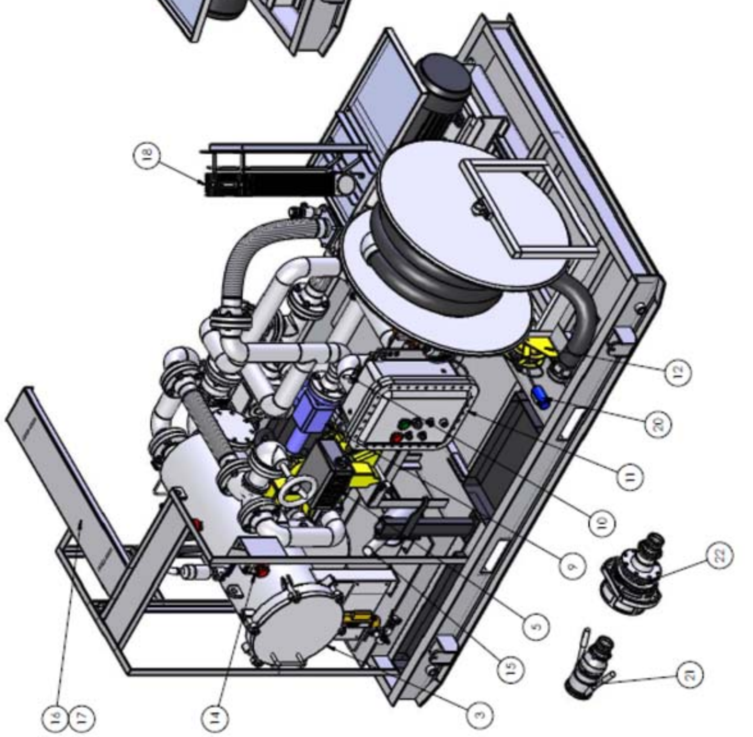
1. Slide the separator element over its center rod and ensure that the end of the element is properly seated.
2. Reassemble the aluminium support, hex nuts and washers to the separator element. Tighten the hex nut securing the separator element to 7 ft-lb. (9 N-m).
3. Install new coalescer elements. Slide the element over its center rod and ensure that the end of the element is properly seated.
4. Reassemble the end caps, hex nuts and washers to the coalescer element. Tighten the hex nuts securing the coalescer element to 20 ft-lb. (27 N-m).
5. Re-install the aluminium support. Tighten the hex nuts securing the support to 7 ft-lb. (9 N-m).
6. Inspect the housing cover O-ring. Replace if damaged. Clean the O-ring groove.
7. Swing the housing cover closed, taking care to ensure that the cover O-ring remains in place.
8. Install cover hex nuts hand tighten.
9. Tighten the cover hex nuts in a crossing pattern (like flange bolts) in three stages. Torque first to 25 ft-lb. (34 N-m), then 35 ft-lb. (47 N-m) and finally 45 ft-lb. (61 N-m).
10. Re-open valve #3 and the flow control valve.

Section 5: Drawings

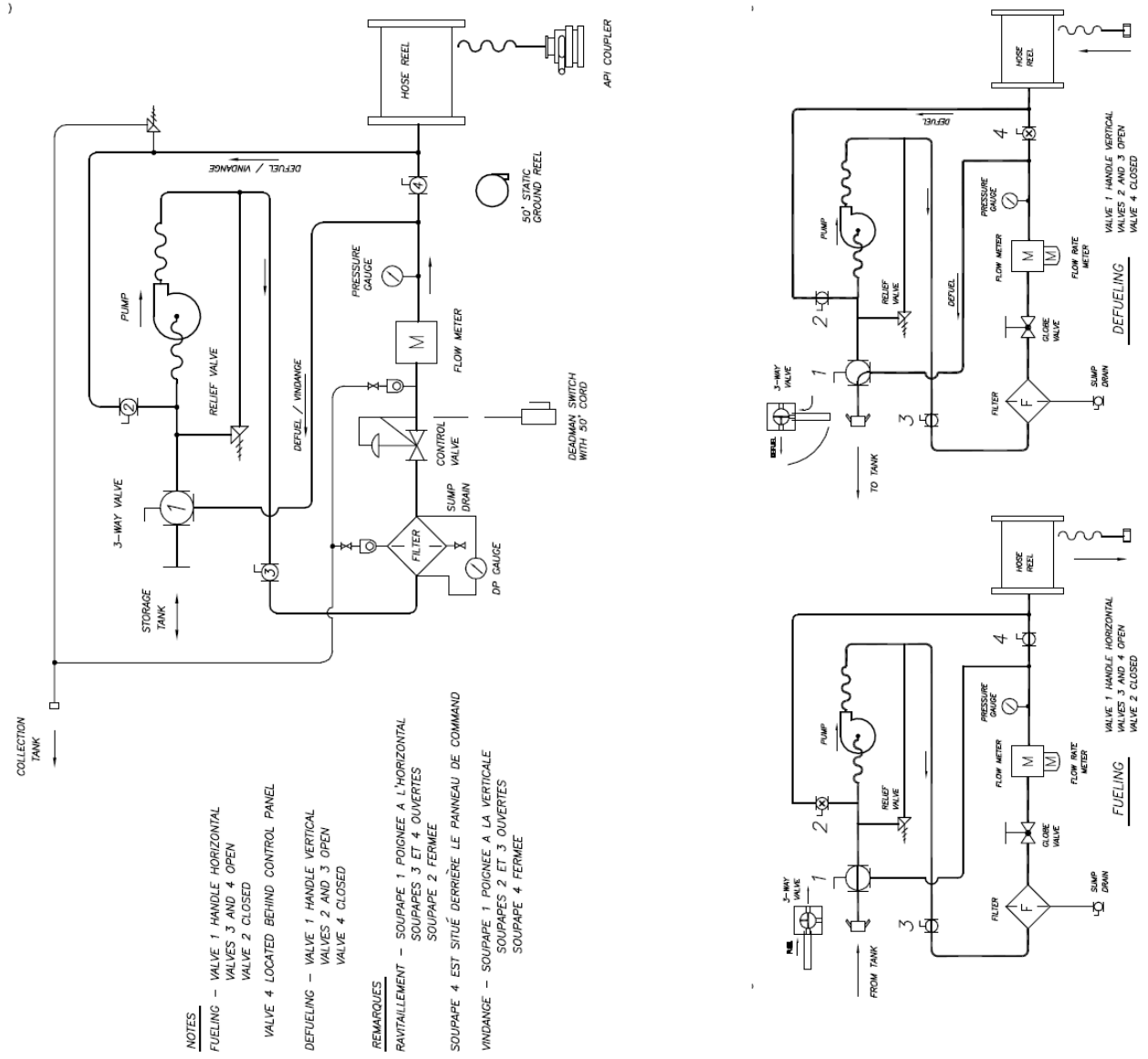
HPARS Assembly



ITEM	QTY.	Description	Material	PartNo	U/M	T.QTY
22	1	API COUPLER, ASSY, HPARS.	SEE PS-D-1143	011375	EA	1
21	1	CARTER NOZZLE	-	003219	EA	1
20	1	DEADMAN SWITCH	-	-	EA	1
19	1	HOSE, 3"x50'	-	-	EA	1
18	1	HEATER	-	011554	EA	1
17	1	LED LIGHT BAR, WHITE	-	-	EA	1
16	1	LED LIGHT BAR, RED	-	-	EA	1
15	1	HAND LAMP	-	003192	EA	1
14	1	ASSEMBLY, EMERGENCY STOP		006458	EA	1
13	1	PRESSURE GAUGE, 2.5", 0-60	-	-	EA	1
12	1	REEL, GROUND, STATIC, 100'	STEEL	003561	EA	1
11	1	ELECTRICAL ENCLOSURE	SEE PS-D-548	-	EA	1
10	1	VALVE, BUTTERFLY 3", SS	SS	006347	EA	1
9	1	RELIEF VALVE, 2-1/2"	-	003164	EA	1
8	1	GLOBE VALVE	-	003170	EA	1
7	1	BALL BALVE, 3-WAY, 3"	SS	003166	EA	1
6	2	BALL VALVE, 3"FL		006578	EA	2
5	1	FLOW METER, LC-M25-C2	-	003162	EA	1
4	1	REEL, HOSE, 3", 5900-39-16	-	003165	EA	1
3	1	FILTER ASSY, HPARS	SEE PS-D-1122	-	EA	1
2	1	PUMP & MOTOR ASSY	SEE PS-D-1121	-	EA	1
1	1	FRAME ASSY	SEE PS-D-1123	-	EA	1



HPARS Flow Schematic PS-D-506



Section 6: Bill of Materials

Bill of Materials, HPARS Commercial

BOM - 014569 · PUMP ASSY,AVI,200GPM HPARS 3					
No.	Drawing No.	Description	Description 2	Quantity	UOM
014593	PS-D-1121	PUMP,SUB-ASSY,HPARS		1.00	EACH
014590	PS-D-1122	FILTER,ASSY,HPARS		1.00	EACH
014579	PS-D-1478	FRAME,ASSY	HPARS,COMMERCIAL	1.00	EACH
014580	PS-D-1479	ENCLOSURE,HPARS-COMMERCIAL	ROYAL BLUE	1.00	EACH
014561		METER,FLOW,3",TCS,70030SP4AL	W/AIR-ELIMIN&STRNR,LT-SEALS	1.00	EACH
014567	PS-D-1475	FLANGE,TCS,3",SS	SOCKET-WELD	2.00	EACH
003164		VALVE,RELIEF,2.5"		1.00	EACH
003165		REEL,HOSE,115V REWIND		1.00	EACH
003581		HOSE,AVI,ARC,3"x50',ASSY		1.00	EACH
011549		COUPLER,4"API,BOTTOM-LOAD	W/LT-SEALS,INSTALLED	1.00	EACH
010713		ADAPT,4"APIx3"FNPT	D290TF-400-300AL&D40TT-400LT	1.00	EACH
003166		VALVE,BALL,3WAY,3",SS		1.00	EACH
003168		COUPLER,3",VICTAULIC,STYLE77,	GALV,W/GASKET,M-2	2.00	EACH
006578		VALVE,BALL,3",SS,FIRE SAFE	150# FLANGED	2.00	EACH
006347		VALVE,BUTTERFLY3"SS W/LOCLEVER		1.00	EACH
013366		VALVE,FLOW-CONTROL,3",150#	W/STRAINER&SOLENOID,120VAC	1.00	EACH
007353		VALVE,RELIEF,1/2"NPT,75PSI		2.00	EACH
014556	PS-D-540-1	PIPE,ASSY,SS,INLET,HPARS		1.00	EACH
006358	PS-D-540-2	PIPE,ASSY,SS-FLEX,PUMP-INLET	HPARS	1.00	EACH
007466	PS-D-540-3	PIPE,ASSY,SS,METER-OUTLET	HPARS	1.00	EACH
006357	PS-D-540-4	PIPE,ASSY,SS-FLEX,PUMP-OUTLET	HPARS	1.00	EACH
014557	PS-D-540-5	PIPE,ASSY,SS,FILTER-INLET	HPARS	1.00	EACH
007462	PS-D-540-6	PIPE,ASSY,SS,METER-RETURN	HPARS	1.00	EACH
007463	PS-D-540-7	PIPE,ASSY,SS,FILTER-OUTLET	HPARS	1.00	EACH
014558	PS-D-540-8	PIPE,ASSY,SS,INLET-ELBOW	HPARS	1.00	EACH
007464	PS-D-540-9	PIPE,ASSY,SS,METER-INLET	HPARS	1.00	EACH
014577	PS-D-540-14	PIPE,ASSY,SS-FLEX,FILTR-OUTLET	HPARS,W/OCV VALVE	1.00	EACH
014559	PS-D-540-13	PIPE SPOOL,FLANGED,3"X24"	HPARS	1.00	EACH
011554		HEATER,2000W,600V,3P,W/THERMO	CLASS-1,DIV-1,GR-A,B,C,D	1.00	EACH
003521		CLAMP,PIPE,3"		8.00	EACH
006522		NIPPLE,.75"NPTx12",SS		3.00	EACH
003204		FLANGE,BLKHD,3/8"TUBE		1.00	EACH
003205		FITTING,1/2"MNPTx3/8"TUBE		1.00	EACH
006489		TUBE,SS,3/8"OD,.035,316		10.00	FEET
004058		TUBE,RND,SS,1/4"x0.035"	304	8.00	FEET
003561		REEL,GROUND,STATIC,100'		1.00	EACH
001887		GASKET,3",GRAFOIL,SS		15.00	EACH
001882		GASKET,2-1/2",GRAFOIL,SS	#150	2.00	EACH
000356		BOLT,5/8-11x3-1/2,HX,PLT		60.00	EACH
010281		NUT,HX,5/8-11,SS	ASTM-A194,GR8M	60.00	EACH
001817		WASHER,FLT,5/8,SAE,PLT,HRDN		120.00	EACH
003183		SHUTTER,CFG 111,68"x47",AL-ANO		1.00	EACH
006441		SPRING,GRASS HOPPER 10002034		3.00	EACH
014588	PS-D-1474 SH	ENCLOSURE,BREAKER-PANEL	HPARS,COMMERCIAL	1.00	EACH
014589	PS-D-1474 SH	ENCLOSURE,CONTROL-PANEL	HPARS,COMMERCIAL	1.00	EACH
010121		E-STOP,FUEL MODULE	CX1333-X1-N4-N5-N6	1.00	EACH
013310		LIGHT,LED,2'LENGTH,EXPL	XPL2/UNV1 S917	2.00	EACH
012074		RECEPTACLE,20A,250V,TWIST	EXPL,3/4"-INLET	1.00	EACH
003200		PLUG,EXPLOSION-PROOF	20AMP,250V	1.00	EACH
003201	S201-C10	BREAKER,CIRCUIT,10A		3.00	EACH
006442		TERMINAL BLOCK WEIDMULLER		4.00	EACH
007242		FITTING,TECK,1/2",AL,XP		10.00	EACH
007516		FITTING,TECK,3/4/AL,XP		3.00	EACH
000771		FITTING,CORD,1/2",PLS		4.00	EACH
001427		WIRE,TECK90,14AWG/2		12.00	METRE
001416		WIRE,TECK90,10AWG/3&4AWG/3		6.00	METRE
001432		WIRE,TECK90,14AWG/4		3.00	METRE
006527		LABEL,LAMA,BLK,W/WHT,2A,SUMP		1.00	EACH
006528		LABEL,LAMA,B&W,10A HOSE REEL		1.00	EACH
006529		LABEL,LAMA,E-STOP,RED/WHT		1.00	EACH
006563		BUSHING,M IRON,1"x3/4",T&B		3.00	EACH
006564		BUSHING,M IRON,1"x1/2",T&B		1.00	EACH

Bill of Materials (continued)

006565		ELBOW,M IRON,3/4",T&B		1.00	EACH
014698	TTMB13243-1	BERM,MINI,CHEM	13"x24"x3",NO FOAM, HPARS	1.00	EACH
014699	TTMB05283-1	BERM.MINI,CHEM	5.5"x28"x3",NO FOAM,HPARS	1.00	EACH
007205	TTMB16236	BERM,MINI,CHEM	16"x23.5"x6",HPARS	1.00	EACH
008783	TTMB08203-1	BERM,MINI,CHEM,HPAR	7.5"x20.5"x3" NO FOAM	1.00	EACH
000773		BOX,JUNC,2-PORT,GRFC	GRFC50	1.00	EACH
014582		CONTACTOR,SQ-D,HPARS-COMM	8502-SC02V02S	1.00	EACH
014583		TRANFORMER,600V/120V,1000VA	PH1000AJ W/PFK3	1.00	EACH
003196		SYSTEM,CIRCUIT,DEADMAN	w/HANDLE&50'SOOW	1.00	EACH
006756		MANUAL	HPARS	1.00	EACH
011424		FUSE,CLASS,CC,5A		4.00	EACH
011423		HOLDER,FUSE,2-POLE		2.00	EACH
011422		BLOCK,TERMINAL,3-POLE		2.00	EACH
007592		GAUGE,2-1/2"DIA,SS,1/4NPT	0-100PSI,BCKMOUNT,LIQUIDFILLED	1.00	EACH
011457	PS-D-693	LABEL,SET,LAMACOID,HPARS	COMMERCIAL	1.00	SET
004798	PS-D-871	LABEL,PUMP SYSTEM,AL	3.75"x4.75	1.00	EACH
011458	PS-D-506	LABEL,SCHEMATIC,FLOW,HPARS	12"x8",COMMERCIAL	1.00	EACH
007069		HOLDER,DOOR,F34DS,CAST		3.00	EACH
006853		VALVE,BALL,1/2"FNPT,SS		2.00	EACH
002767		NIPPLE,1/2NPTxCLS,SS		2.00	EACH
002880		PLUG,1/2"MNPT,SQHD,SS		1.00	EACH
003518		CLAMP,PIPE,1"	CUSH-A-CLAMP	1.00	EACH
002799		NIPPLE,3/4"MNPTxCLS,SS		1.00	EACH
002629		VALVE,BALL,3/4"FNPT,SS		1.00	EACH
002800		ELBOW,STREET,1/2"NPT,SS		2.00	EACH
007609		ELBOW,1/2"FNPT,SS		1.00	EACH
002754		NIPPLE,1/2"MNPTx3",SS		1.00	EACH
002861		BUSHING,1"MNPTx3/4"FNPT,HX,SS		1.00	EACH
002838		TEE,1/2"FNPT,SS		1.00	EACH
002859		BUSHING,3/4"MNPTx1/2"FNPT,HXSS		1.00	EACH
012455		ELBOW,CONDUIT,EXPL,3/4",ALU	LBY25A	1.00	EACH
006499	PS-D-1491	BRACKET,FLANGE,2.5",150#		1.00	EACH
014628	PS-D-1497	SUPPORT, INLET, 3in, HPARS		1.00	EACH
014629	PS-D-1498	SUPPORT, VENT, 1in, HPARS		1.00	EACH
014630	PS-D-1499	PLATE, SPLIT, ENCL, HPARS		2.00	EACH
014650		NIPPLE,1"x16",SS		1.00	EACH
003424	PS-B-557	SLING,4 LEG,ASSY,HPARS	5000LB WLL	1.00	EACH
001791		SHACKLE,ANCHOR,SCREW,7/16,GLV	1.50T WLL	4.00	EACH
014677		NIPPLE,1"MNPTx10",SS		1.00	EACH
014714		HOSE,ASSY,1"X10',DSL,DSCH,	W/BRASS,1"MNPT-ENDS	1.00	EACH
014715		NIPPLE,VICTAULIC,3"X8-5/8",SS		1.00	EACH
014719		COUPLER,DRY-BRK,CLA-VAL,3"FNPT	344GF	1.00	EACH
014738		ADAPTER,MALE,QUICK-DISCONNECT	CLAVAL,347GF,PART-M	1.00	EACH

Appendix

Manufacturer Component Manuals