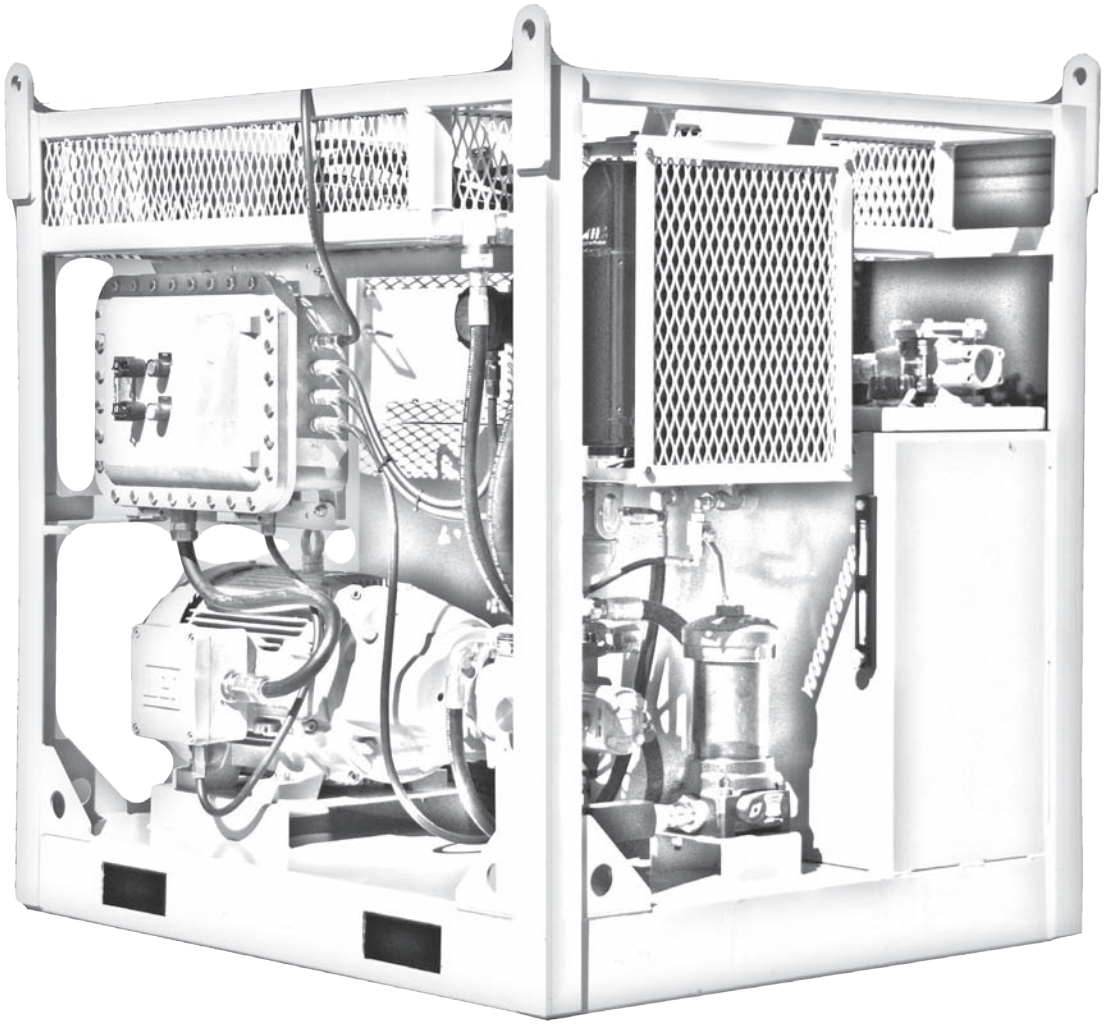
Blohm + Voss Oil Tools, LLC

Hydraulic Power Unit 9PU-7200

Technical Documentation



Manual Rev 000, October 2011.

Warnings and Notes

WARNING: A "WARNING" INDICATES A DEFINITE RISK OF EQUIPMENT DAMAGE OR DANGER TO PERSONNEL. FAILURE TO OBSERVE AND FOLLOW PROPER PROCEDURES COULD RESULT IN SERIOUS OR FATAL INJURY TO PERSONNEL, SIGNIFICANT PROPERTY LOSS, OR SIGNIFICANT EQUIPMENT DAMAGE.

NOTE: A "*NOTE*" indicates that additional information is provided about the current topics.

NOTE: In the event of problems that cannot be solved with the aid of this manual, please contact one of the addresses listed below.

Intended use of this manual

WARNING: THIS TECHNICAL DOCUMENTATION CONTAINS INSTRUCTIONS ON SAFETY, INSTALLATION, OPERATION AND MAINTENANCE. IT MUST BE STUDIED BEFORE WORKING WITH THE TOOL.

This manual is intended for use by field service, engineering, installation, operation, and repair personnel. Every effort has been made to ensure the accuracy of the information contained herein. Blohm + Voss Oil Tools, LLC, will not be held liable for errors in this material, or for consequences arising from misuse of this material. Anyone using service procedures or tools, whether or not recommended by Blohm + Voss Oil Tools, LLC, must be satisfied that neither personal safety nor equipment safety will be jeopardized.

Intellectual property

All information contained in this manual is based upon the latest product information available at the time of printing.
Dependent on ongoing technical improvements (ISO 9001) "Blohm + Voss Oil Tools, LLC" reserves the right to change the design and specifications without announcement.
The values specified in this manual represent the nominal values of a unit produced in series. Slight deviations in the case of the individual devices are possible.

General remarks

As with all rig equipment, the GraySpin HPU must be operated in accordance with accepted rig safety practices and procedures. All operators should be familiar with all safety precautions and recommended installation and operating procedures, including the information provided in this manual and any other safety publications by Blohm + Voss Oil Tools, LLC Listed on the next page are safety considerations and warnings found throughout this manual.

Limited Warranty

The warranty provided will be void if the GraySpin HPU is:

1. Repaired or serviced by a service facility which was not authorized by Blohm + Voss Oil Tools, LLC.
2. Replacement parts not manufactured by Blohm + Voss Oil Tools, LLC are used.
3. Modifications were made to the FloorHand which were not approved by Blohm + Voss Oil Tools, LLC.

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Fax: +65-6734-9115
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Safety Issues

WARNING: ONE SHOULD AVOID CREATING IGNITION SOURCES, LIKE HEAT, AS A RESULT OF THE USE OF THE TOOL WITH OTHER TOOLS OR EQUIPMENT.

WARNING: THE WARNING PLATES, SIGNS AND LABELS MUST BE PRESENT ON THE TOOL. DO NOT REMOVE THE LABELS. IF THEY ARE MISSING, REPLACING IS MANDATORY.

WARNING: ALL WARNING PLATES, SIGNS AND LABELS ATTACHED TO THE EQUIPMENT MUST BE OBSERVED.

WARNING: DO NOT USE THE TOOL FOR ANY OTHER PURPOSE THAN MAKING UP AND BRAKING OUT WITHIN ITS SPECIFICATION.

WARNING: FAILURE TO CONDUCT ROUTINE MAINTENANCE COULD RESULT IN EQUIPMENT DAMAGE OR INJURY TO PERSONNEL.

WARNING: THE TOOL MUST ONLY BE SERVICED BY TRAINED BLOHM + VOSS PERSONNEL OR BY AUTHORIZED PERSONNEL.

WARNING: WEAR PERSONAL PROTECTION EQUIPMENT WHILE WORKING WITH THE EQUIPMENT.

WARNING: IF ANY SAFETY ELEMENTS (LIKE SAFETY ROPES, WIRE, SAFETY SHEETS, PLATES OR WASHERS) WERE DISASSEMBLED DUE TO MAINTENANCE WORK, DO NOT RE-USE THEM. ALWAYS REPLACE THEM WITH NEW SAFETY ELEMENTS.

WARNING: KEEP HANDS AND ARMS CLEAR OF ALL MOVING PARTS WHEN CONNECTING, DISCONNECTING OR OPERATING THE UNIT.

WARNING: ALWAYS WEAR PROTECTIVE GEAR FOR EYES, HEAD, HANDS AND FEET.

WARNING: WHEN SERVICING UNIT, BE SURE ALL POWER IS OFF AND SUPPLY LINES ARE DISCONNECTED AND INTERNAL PRESSURE IS BLED FROM THE TOOL.

WARNING: LUBRICATE UNIT ONLY WHEN SUPPLY LINES ARE DISCONNECTED. VERIFY THAT SYSTEM PRESSURE IS -0- PSI.

WARNING: ALWAYS USE LIFTING APPARATUS (SLINGS, CABLES, SHACKLES AND THE LIKE) THAT HAVE BEEN INSPECTED AND ARE IN GOOD CONDITION AND ARE PROPERLY SIZED. ENSURE THAT ALL RIGGING AND LIFTING PROCEDURES ARE IN ACCORDANCE WITH ACCEPTED OILFIELD PRACTICES AND STANDARDS.

WARNING: ALWAYS CHECK THE UNIT FOR LOOSE FASTENERS AND HYDRAULIC CONNECTIONS AS WELL AS ANY OTHER DAMAGE PRIOR TO TURNING ON THE POWER UNIT.

Revision History Table

REV.	SECTION	SUB-SEC.	PARA.	CHANGE REQUEST #	DATE	AUTHORIZED BY
Draft	All	All	All	N/A	10/01/10	KJ
0	All	All	All	N/A	03/19/12	KJ

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DESCRIPTION

General Components

All components of the Hydraulic Power Unit are mounted within a rugged but lightweight frame. The components are mounted with consideration for easy access during operation, maintenance and repair.

The Hydraulic Power Unit utilizes a pressure compensated hydraulic pump close-coupled to an electric motor. When the Hydraulic Power Unit is in operation, it supplies a constant pressure but varies the flow rate depending on the requirements of the FloorHand. Attached to the end of the pump is a separate circulation pump, which constantly circulates tank oil through the cooler and return filter.

Temperature control is factory set depending on the operating environment and the requirements of the customer. Typically, for use with moderate to high ambient temperature environments, a radiator type cooler with a thermostatically controlled fan is installed. For use in cold weather environments, an anode type heater with integral thermostat is installed.

Motor

The motor on the hydraulic power unit is a 40hp explosion proof motor. This power required would be 50 amps, 480 volt, 3 phase. The motor provides 40hp at 60 Hz.

Hydraulics

The hydraulic system on the power unit has an operating flow of 2500 psi (175.81 kg/cm) with a maximum operating pressure of 3,400 psi (239.10 kg/cm). The flow is 26 GPM or 98.42 LPM.

Tank

Capacity of the tank is 95 gallons. The power unit is equipped with a level sensing switch in the reservoir. If the level gets too low, the switch will cause the hydraulic power unit to shut off. Conventional petroleum based hydraulic fluid is usually specified but care should be taken to ensure that it is compatible with the environment it will be operated in, particularly the ambient temperature range.

Filters

Because of the vital importance of CLEAN, FILTERED HYDRAULIC OIL to the operation and longevity of all components in the FloorHand System, the hydraulic power unit utilizes suction strainers as well as pressure and return filters.

Cooler/Heater

Depending on your location, Blohm+Voss will have either an oil cooler or a heater built into the unit.

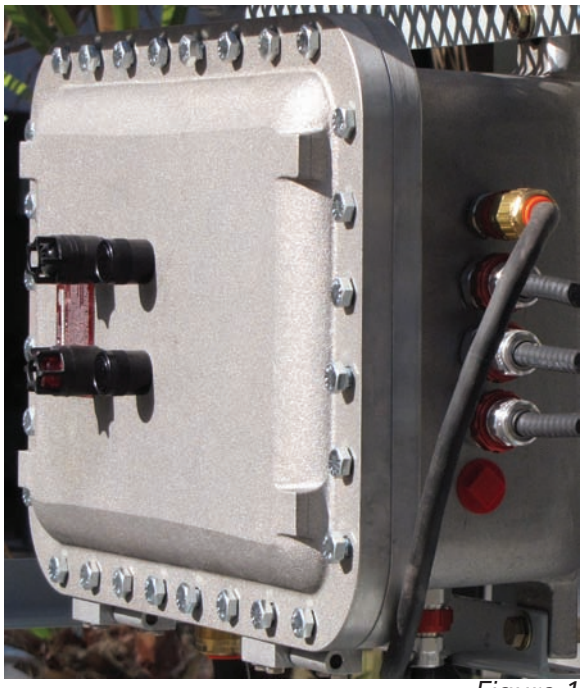

Figure 1

Explosion Proof Box

The electical system on the hydraulic power unit is a self contained and requires only a power connection between the motorstarter box and the rig generator house or other appropriate electric power source.

Specifications

The FloorHand is equipped with a Closed Center Hydraulic System. The unit should only be operated in coordination with a pressure compensated variable displacement Hydraulic Power Source. Depending on the environment, as well as customer requirements, the electrical specifications may vary.

Location of Identification Tag

An Identification tag can be located on the base near the front left forklift slot.

WARNING: USE OF A CONSTANT DISPLACEMENT PUMP WILL RESULT IN DAMAGE AND/OR FAILURE THUS VOIDING WARRANTY.

Hydraulic Specifications

Hydraulic pressure:	
Operating:	2,500 PSI (17,236 kPa)
Maximum:	3,400 PSI (23,443 kPa)
Hydraulic flow:	
Operating:	26 GPM (98.42 Liters)
Pressure Line Connection:	1” Male JIC
Return Line Connection:	1 1/4” Male JIC
Electrical Horsepower:	40 HP @ 60 Hz
Electrical power required:	50 amps, 440 volt, 3 Phase
Pressure and Return Filters:	10 Micron

Shipping Data

Height (without flanges)	60 inches *(152.4 cm*
Width	50 inches *(127 cm)*
Depth	60 inches *(152.4 cm)*
Weight	2174 lbs *(988.18 Kgs)*

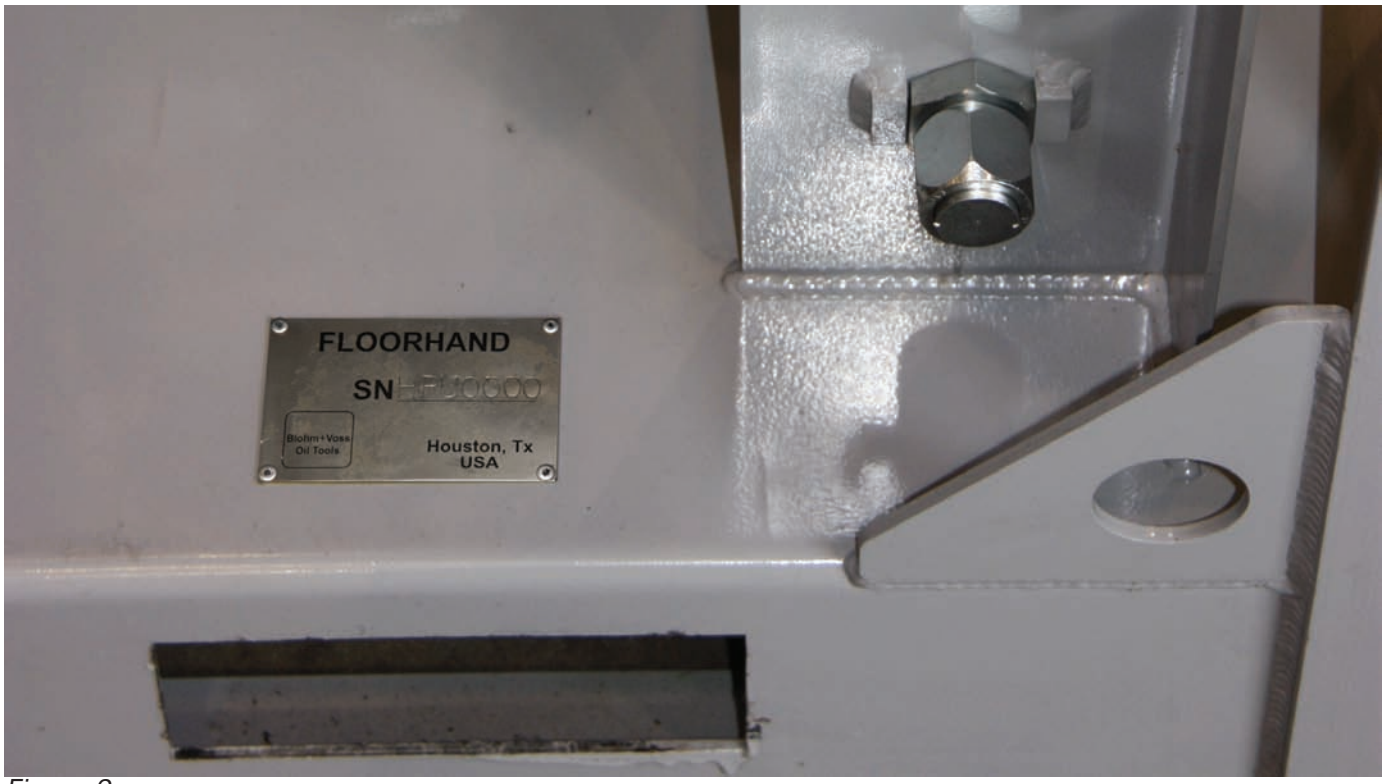

Figure 2

COMMISSIONING

Document Front Page

0	11/04/2010	FloorHand Shop Test/ Commisioning Procedure	DT	CT	MT
Draft	10/28/1020	Issued	DT	CH	MT
Rev./Status	Date	Description	Made by	Checked By:	Approved:

	Suppiler References:
	Procurement References:
	TAG No:

Date:	Signature:	SDRL Code:	Area:	System:	Pages:	Encl:

Company:	Document Title/ Equipment: Commissioning Check Sheet for FloorHand (Iron Roughneck)
Rig/Vessle/Customer Order:	Equipment Serial No:
Supplier: Blohm + Voss Oil Tools, LLC	Document No:

FloorHand Commissioning Procedure

This test procedure is to be performed by authorized B+V personnel only!

Note: When performing the following steps, appropriate PPE will be used and standard safety practices must be followed at all times.

Note: When commissioning, H.P.U Commissioning must be completed prior to FloorHand commissioning. If installing FloorHand to customer supplied hydraulics, hoses must be flushed completely before connecting to FloorHand.

1. ___ Connect FloorHand (using flow meter) to Hydraulic power source of 2,500-2,800 psi and 25-28 gpm. If pressure is above 2,800 psi, a Pressure Release Valve (PRV) should be used. _____If flow rate is above 28 gpm, a pressure compensated flow control should be used._____
2. ___ H.P.U should be powered up a minimum of 20 minutes before moving to next step, to bring all oil to required operating oil temperature, record oil temp._____

Note: Throughout entire test, observe FloorHand for leaks, and or malfunctions, repair as necessary.

3. ___ Run spinner motors in make direction for 20 seconds, check that rotation of all four rollers are correct, check for leaks. Monitor flow meter, record max flow. _____ See step 1.
4. ___ Run spinner motors in break direction for 20 seconds, check for leaks.

Note: After making fresh hydraulic connections, or a rig move, it is best to always run the spinner before anything else. The spinner is the only system that is close to a direct system. For example, there are no PRV's, check valves, shuttle valves, diverter valves, pilot operated check valves, etc. in the spinner motor system, only a flow divider. This means, by running the spinner first, any small trash or contaminants that may be in the lines, will be flushed through with minimal to no damage. If there were trash in the lines, and the torque, or clamp system were operated first, there is a chance of contaminants getting lodged in a small orifice, in one or more of the many valves in the other systems.

5. ___ Without pipe, clamp and unclamp lower wrench 10 times, check that die blocks extend and retract evenly, check for leaks.

Note: This helps to remove air from the lower clamp system so that the flow divider may work correctly.

6. ___ Without pipe, clamp lower wrench.
7. ___ Clamp and unclamp upper wrench 10 times, check that die blocks extend and retract evenly, check for leaks.
8. ___ Unclamp lower wrench.
9. ___ Without pipe, clamp and unclamp spinner 10 times, check for leaks.

Note: spinner may, or may not close evenly, this is normal.

10. ___ Back torque adjustment knob out completely, then turn in (clockwise) 4 turns, Blohm + Voss Oil Tools, LLC.
11. ___ Actuate torque cylinder 10 complete strokes in each direction and check for leaks.
12. ___ Adjust make up speed flow control for a 5 second stroke. Verify during commissioning.
13. ___ Install test gauge on lower clamp cylinder outboard test port.
14. ___ Clamp lower wrench.
15. ___ Observe the test gauge on lower wrench clamp cylinder, and Pressure Release Valve (PRV) if applicable.
16. ___ Set Pressure Release Valve (PRV) output to obtain 600 psi at lower clamp

cylinder. Verify during commissioning.

17. ___ Clamp upper wrench, ensure that system pressure is now present on lower clamp cylinders also (PRV reading should not change), unclamp upper wrench, unclamp lower wrench.
18. ___ Mock up test pipe, with torque, at end of stroke, check that gauge dump valve functions correctly.
19. ___ Stall spinner in make direction and hold for 5 seconds and check for leaks.
20. ___ Stall spinner in break direction and hold for 5 seconds and check for leaks.
21. ___ Operate manipulator / lift cylinder full up & down 10 times to remove all air from cylinder and counterbalance valve, check for leaks. If commissioning, inform rig crew that this should be done after every rig-up.
22. ___ Raise manipulator / lift cylinder to mid stroke, check that counterbalance valve holds.
23. ___ If applicable, extend and retract manipulator full out and in 5 times, check for proper function, check for leaks.
24. ___ WARNING: Clamp lower wrench, verify that manipulator functions do not operate.
25. ___ Unclamp lower wrench.
26. ___ Connect test gauge to return system test port, run spinner motors and hold while checking pressure filter bypass indicator (if applicable), and monitoring system back pressure, not to exceed 250 psi. Record back pressure _____
27. ___ If applicable, check shutoff valve for proper function.
28. ___ Remove test gauges, and reattach the cap ports.
29. ___ Install any panels / covers removed for test.
30. ___ Ensure rig personnel fully understand all functions and basic maintenance of the FloorHand, including but not limited to: Importance of keeping fresh dies installed, proper make up torque adjustment, proper breakout procedure. Demonstrate how to remove and install the following: Dies, die blocks, and drive rollers.

Tech: _____
Signature: _____
Date: _____

Record of Training

Technician:

Signature:

Date:

Name:	Areas of Training: (Lubrication/Frequency/PM,etc.)	Signature:	Date:
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My signature above indicates that I have read and understand the opening instructions and have been trained to use the above machine by Blohm + Voss Oil Tools, LLC Technicians.			

Acknowledgement of Rig Superintendant / Tool Pusher

Name	Signature	Date

My signature above indicates acceptance of commissioning and the above personnel training.

INSTALLATION

Lifting

The Hydraulic Power Unit frame incorporates lifting lugs on the uppermost corners of the frame. The unit should always be lifted using a four point sling with equal length legs, one leg of the bridle attached to each of the brackets.

The hose basket and lifting frame is designed to support hoses and cables with a combined weight not to exceed 250 lbs.

Electrical

The electrical system on the Hydraulic Power Unit is self contained and requires only a power connection between the motor starter box and the rig generator house or other appropriate electrical power source.

Before connecting the Hydraulic Power Unit to the electrical power source, it is imperative that the supply voltage be verified to be compatible with the electrical motor on the hydraulic power unit.

All electrical connections should be made by a licensed electrician in accordance with the appropriate electrical codes and standard industrial safety practices.

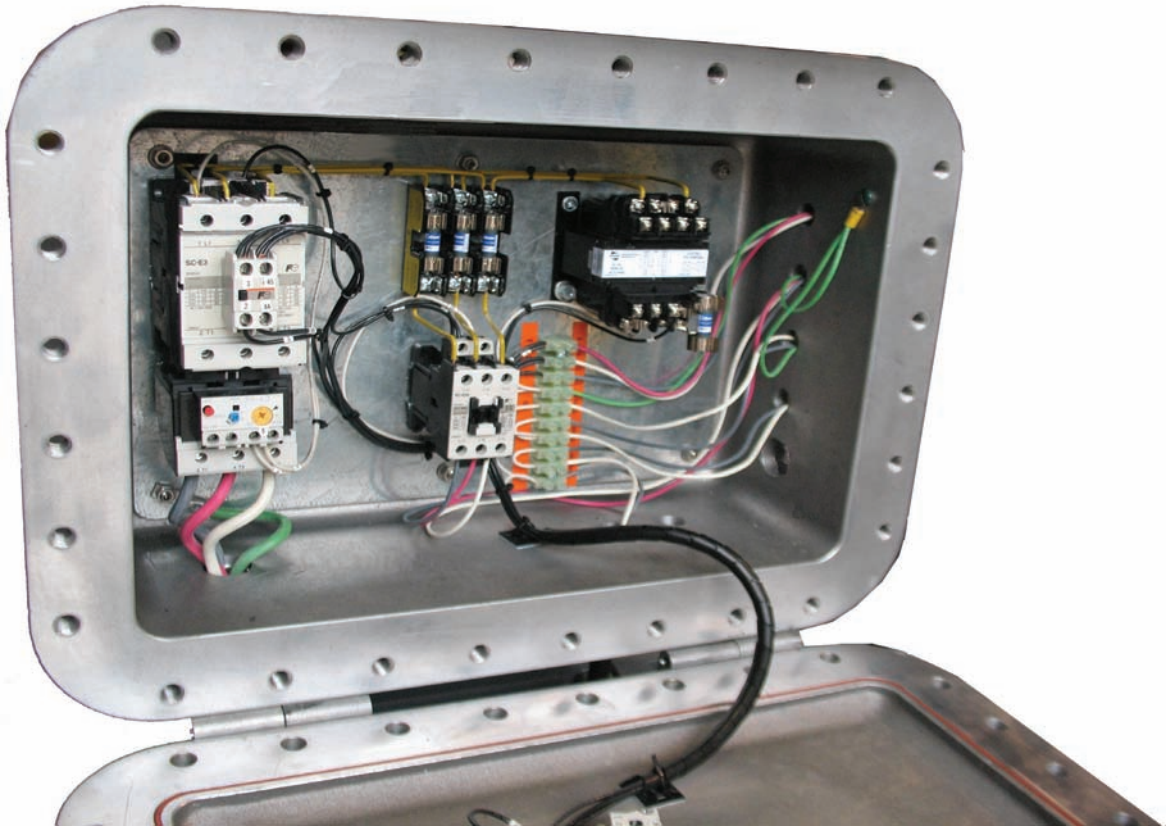


Figure 3

Attaching the Hydraulic Lines

Remove cap or plug and ensure that mating parts of the hydraulic connection are clean and free from dirt or other contaminants. Carefully thread the connection together and tighten appropriately.

Filling the Reservoir

The reservoir is filled via the breather connection on the top of the reservoir. Conventional petroleum based hydraulic fluid is usually specified but care should be taken to ensure that it is compatible with the environment it will be operated in, particularly for the ambient temperature range.

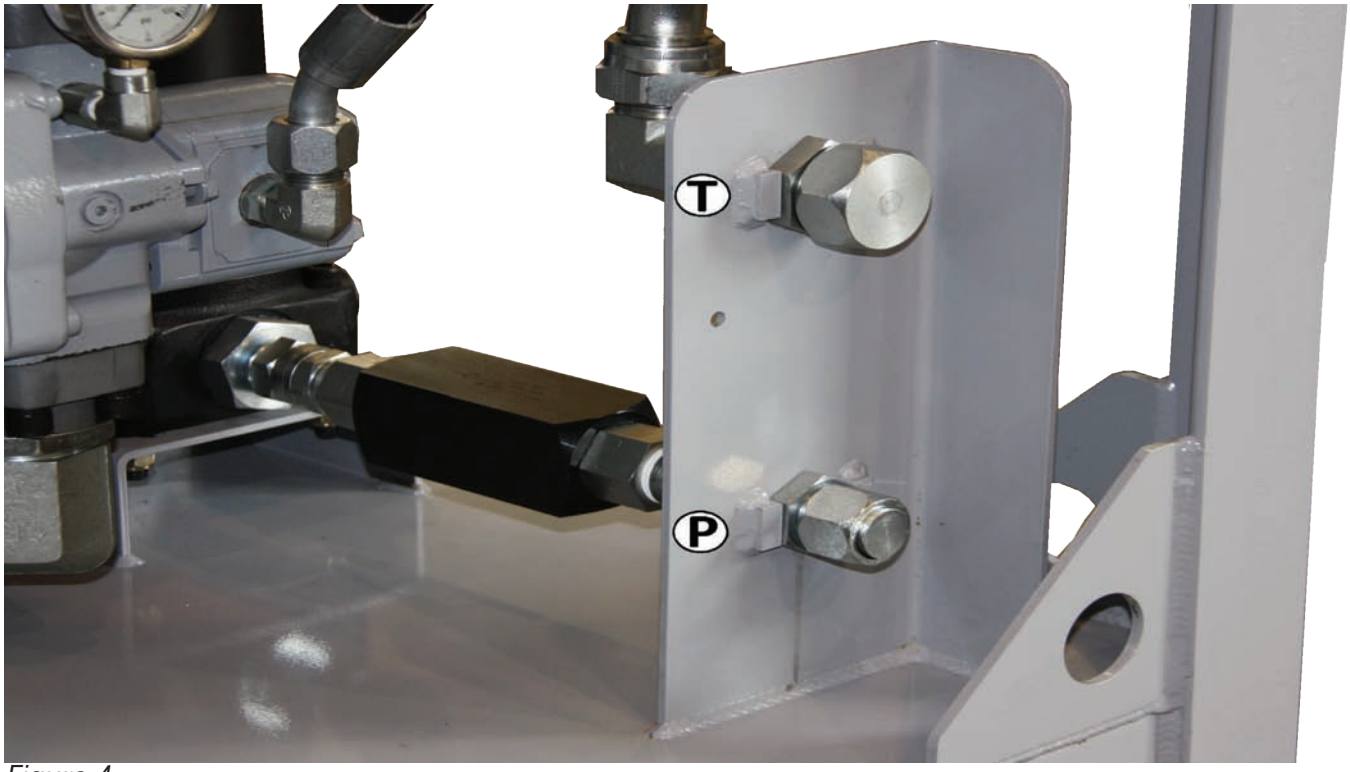


Figure 4

Note: The compensator should be open, (unloaded) for all cold starts, only closing once oil has warmed up.

Note: The Hydraulic Power Unit is factory set for the correct operating pressure for proper operation of the FloorHand and should not need to be adjusted. For troubleshooting or to correct unauthorized tampering, a factory instruction sheet is included at the end of this section for the Parker P2 series pump. Any adjustments other than P-Max will void warranty.

OPERATIONS

There are two pumps incorporated with the Hydraulic Power Unit.

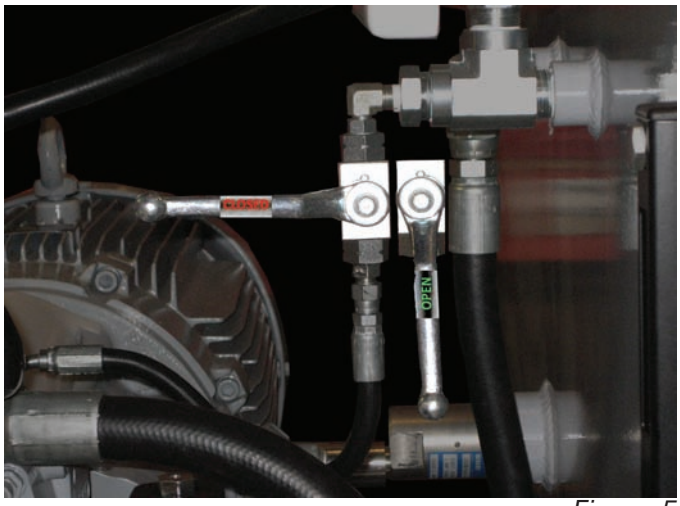


Figure 5

The first pump is a large pressure compensated hydraulic pump. Essentially, it is one that senses outlet pressure and adjusts displacement accordingly. The pump has a 3/4" case drain with no restriction. The pump has its own bypass-able, inlet strainer and ball valve. This pump has a pressure filter downstream of the pump outlet. After the filter, there is a check valve. Both the filter and the check valve are inline before reaching the power unit bulkhead. FloorHand oil is strained, pumped, filtered, used, cooled, then filtered again, prior to returning to the tank.

The second pump (a circulation gear pump) is a small gear type pump that also has its own suction strainer and valve and uses the meshing of gears to pump fluid by displacement. The strainer on this pump is also bypass-able. The sole purpose of this pump is to circulate oil through the cooler and return filter even when the FloorHand is not being used. The small pump strains fluid from the tank and then sends the fluid to the cooler. From the cooler the fluid is then pumped through a return line filter and back to the tank.

There is a small amount of oil that is not filtered prior to returning to the tank. This is oil that is taken from a small port on the outside of the cooler to flow over the temperature probe. The fluid is not run through the filter as to not cause any restriction. There is a free flow of fluid over the probe then to the tank to keep an accurate temperature reading
The explosion proof temp switches will vary slightly, they normally turn the fan on between 123 and 130 °F (50.5 and 54.4 °C) and then they cool the oil for a drop of 15-20 °F (-9.4 to -6.6 °C) before turning off.

Start-up procedure

Verify that the main suction inlet ball valve and circulation pump inlet ball valve are in the open position.

Verify that the compensator control ball valve is in open position. Verify that the main pump case is filled with oil. The Hydraulic Power unit has been operated, tested and adjusted at the factory for use with the FloorHand Wrench and Spinning Tool. Transportation requirements are such that the pump must be drained. Once the unit has been delivered,
The pump will always need to be primed.

Loosen a fitting in the main hydraulic pump discharge line to allow the air to be bled during the priming procedure. When oil is present at the loosened coupling, and the line is free of air, the coupling may be retightened.

Remove the plastic cover that shields the motor coupling.

Jog the motor once (DO NOT ALLOW THE PUMP TO RUN AT THIS TIME) and verify that the direction of the rotation of the motor is consistent with the directional arrow tags on the motor. If the direction is incorrect, have the electrician correct the motor wiring and recheck.

Replace the plastic cover that shields the motor coupling.

Jog the motor three to six more times to ensure priming of the pump.

Start the motor and allow the pump to run with the compensator control ball valve in the open position for several minutes. Once the unit has been unloaded, inspect the unit for leaks and correct as needed.

Slowly close the compensator control valve and verify that system pressure is 2,650 PSI.

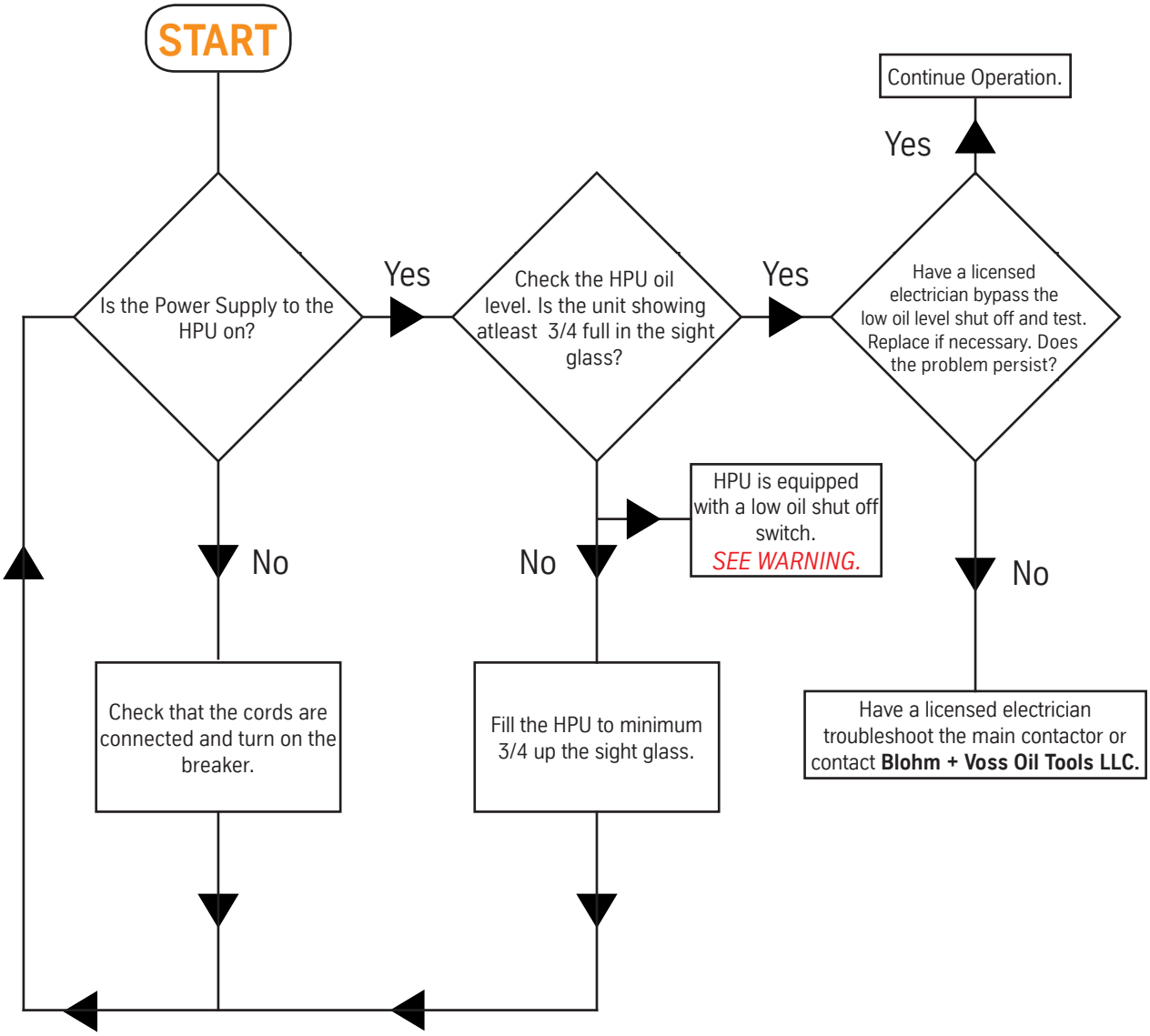
While running the FloorHand spinner motors, check the pressure filter indicator and the return line filter indicator to ensure that they are not operating in the “BYPASS” mode. Replace the filter elements as required.

After the FloorHand and the manipulator have been cycled to ensure that the entire system is filled with fluid, top off the reservoir to the correct operating level.

The Hydraulic Power Unit is equipped with an explosion proof remote start/stop station to be located within easy reach of the driller. After the initial installation/start-up procedure, the Hydraulic Power Unit is normally started and stopped using the buttons on the remote start/stop station.

Note: Pressure and return filters are 10 micron. Both filter housings are equipped with filter cleanliness/bypass indicators. The power unit incorporates a low oil level shut off switch, with sight glass (maximum capacity, 110 gallons). DO NOT FILL COMPLETELY.

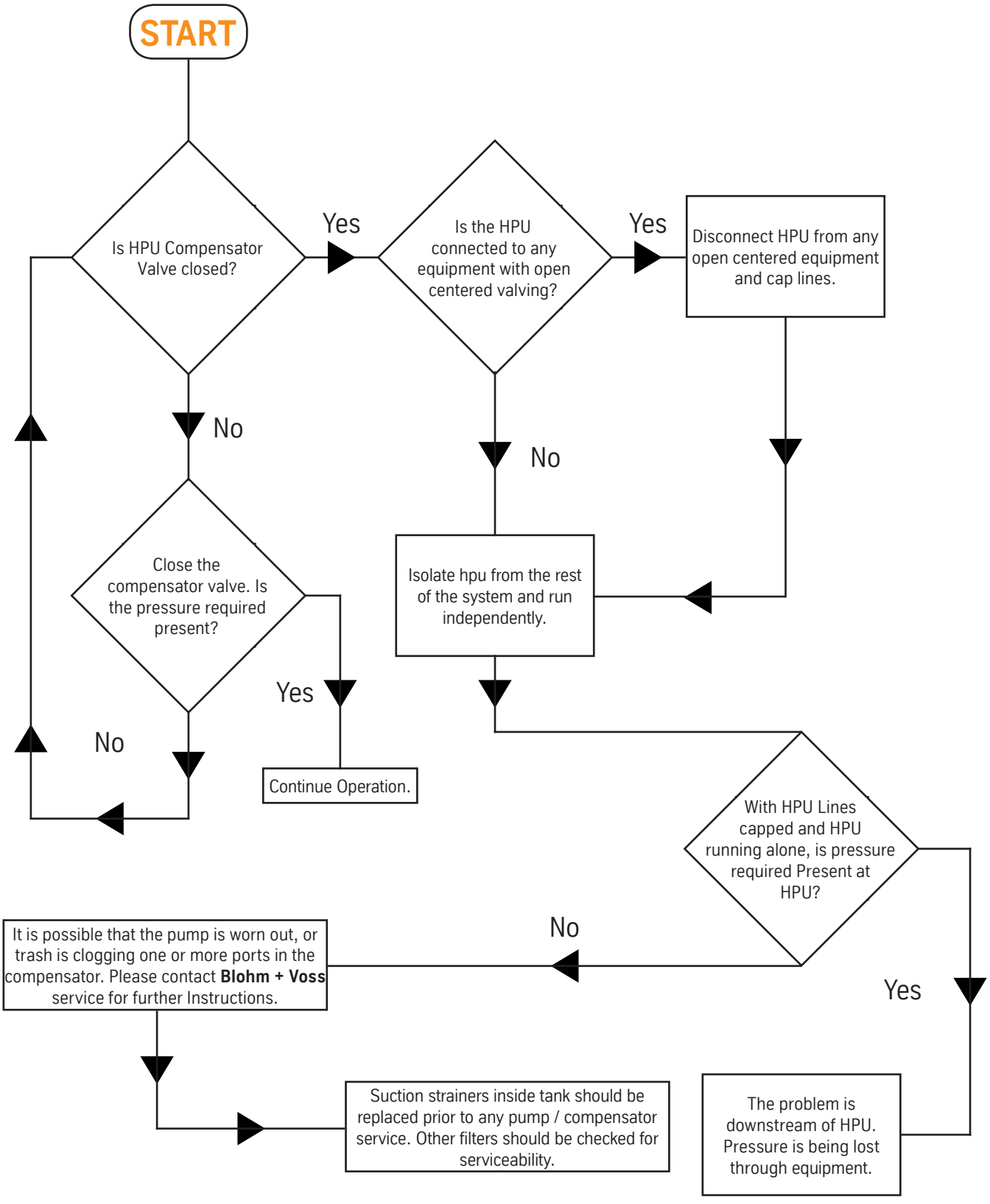
HPU will not power up.



WARNING:
MANUALLY OVERRIDING THE LOW OIL LEVEL SHUT OFF SWITCH BY HOLDING IN THE CONTACTOR WILL BURN-OUT THE CONTACTOR, THUS VOIDING ANY WARRANTY ON ELECTRICAL COMPONENTS.

Troubleshooting

HPU powers up, but will not build pressure.



MAINTENANCE & INSPECTION

Electric Motors

Electric motors should be lubricated as indicated by the motor manufacturer. Grease zerks are installed, do not over lubricate.

Note: It is important to monitor the filters during the initial start-up and during the break-in period.

Note: Indicators must be checked while Spinner motors are running.

Figure 6

Figure 7

Reservoir

The fluid level in the reservoir should be checked. If the level is low, return fluid to its normal operating range. The fluid should be changed after the initial 10 hours of operation and every 100 HOURS thereafter.

Figure 8

Filters

The Hydraulic Power Unit is equipped with two suction strainers and one low pressure return filter as well as a high pressure filter. Each filter is equipped with a visual indicator, the element should be changed when the indicator shows that the filter is approaching “BYPASS” mode. Low pressure strainers without visual indicators should be changed after the initial 10 hours of operation and every 100 hours thereafter.

Note: It is recommended that the filters and strainer elements be changed whenever the FloorHand is put back into service after overhaul.

SPARE PARTS

Recommended Spare Parts for One Year Operation

Item	Reference number	Description	Qty/ No.
25	9PU-8006	DRIVE COUPLING	1
SP3 & 4	9FH-01152-7	HPU MAIN SUCTION STRAINER	2
SP4 & 7	9FH-01152-8	HPU CIRCULATING SUCTION STRAINER	2
SP2	9FH-01152-6	HPU RETURN FILTER ELEMENT	2
SP1	9FH-01152-4	HPU PRESSURE FILTER ELEMENT	2
32	9PU-8003	GAUGE	1
33	9PU-8005	COVER	1

NOTE: Item Numbers refer to the numbers that identify the various parts listed in the Diagrams section of this manual.

DRAWINGS

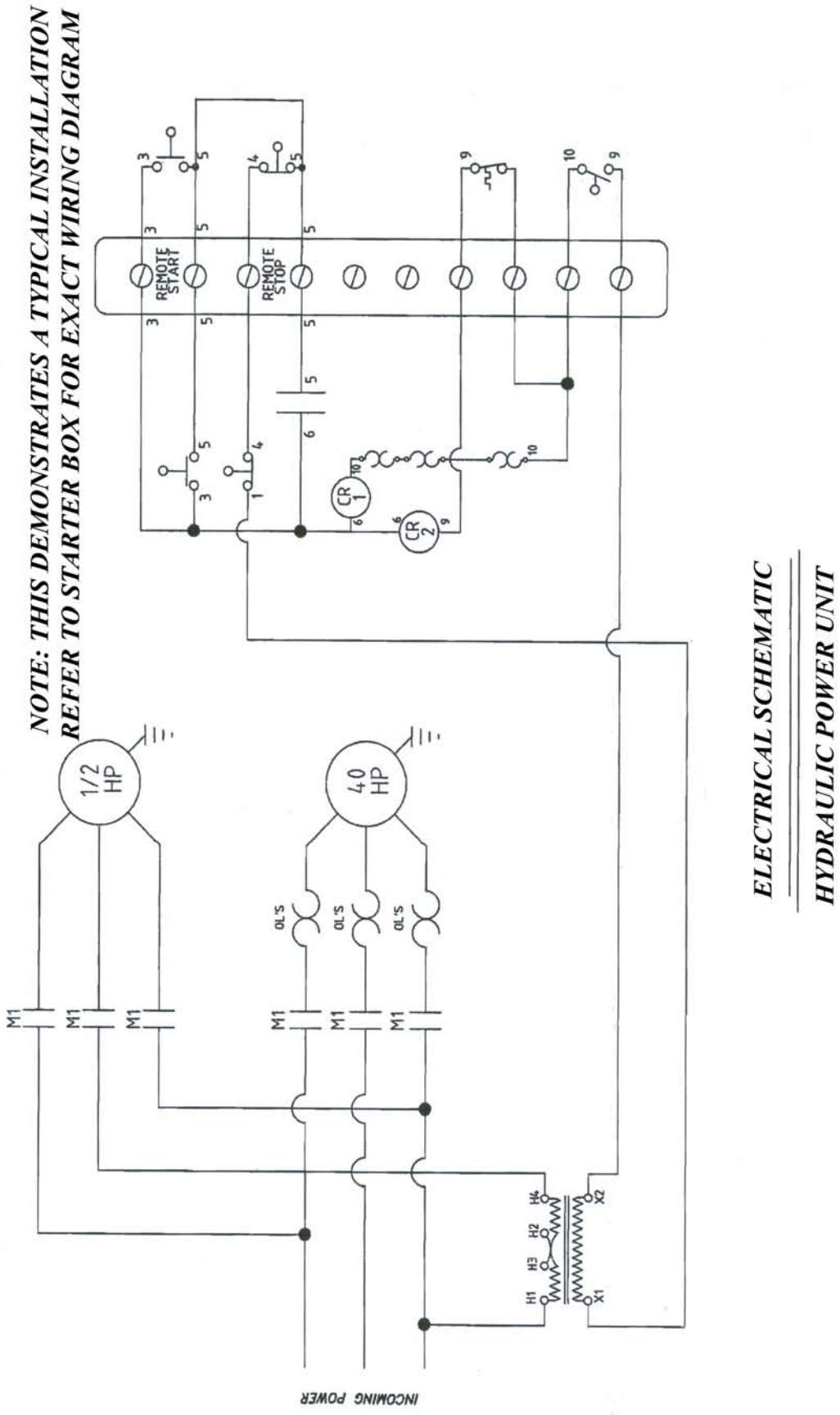

NOTE: THIS DEMONSTRATES A TYPICAL INSTALLATION
REFER TO STARTER BOX FOR EXACT WIRING DIAGRAM
REMOTE START
REMOTE STOP
CR 1
CR 2
1/2 HP
40 HP
M1
OL'S
H1
H2
H3
H4
X1
X2
INCOMING POWER
ELECTRICAL SCHEMATIC
HYDRAULIC POWER UNIT

Figure 9

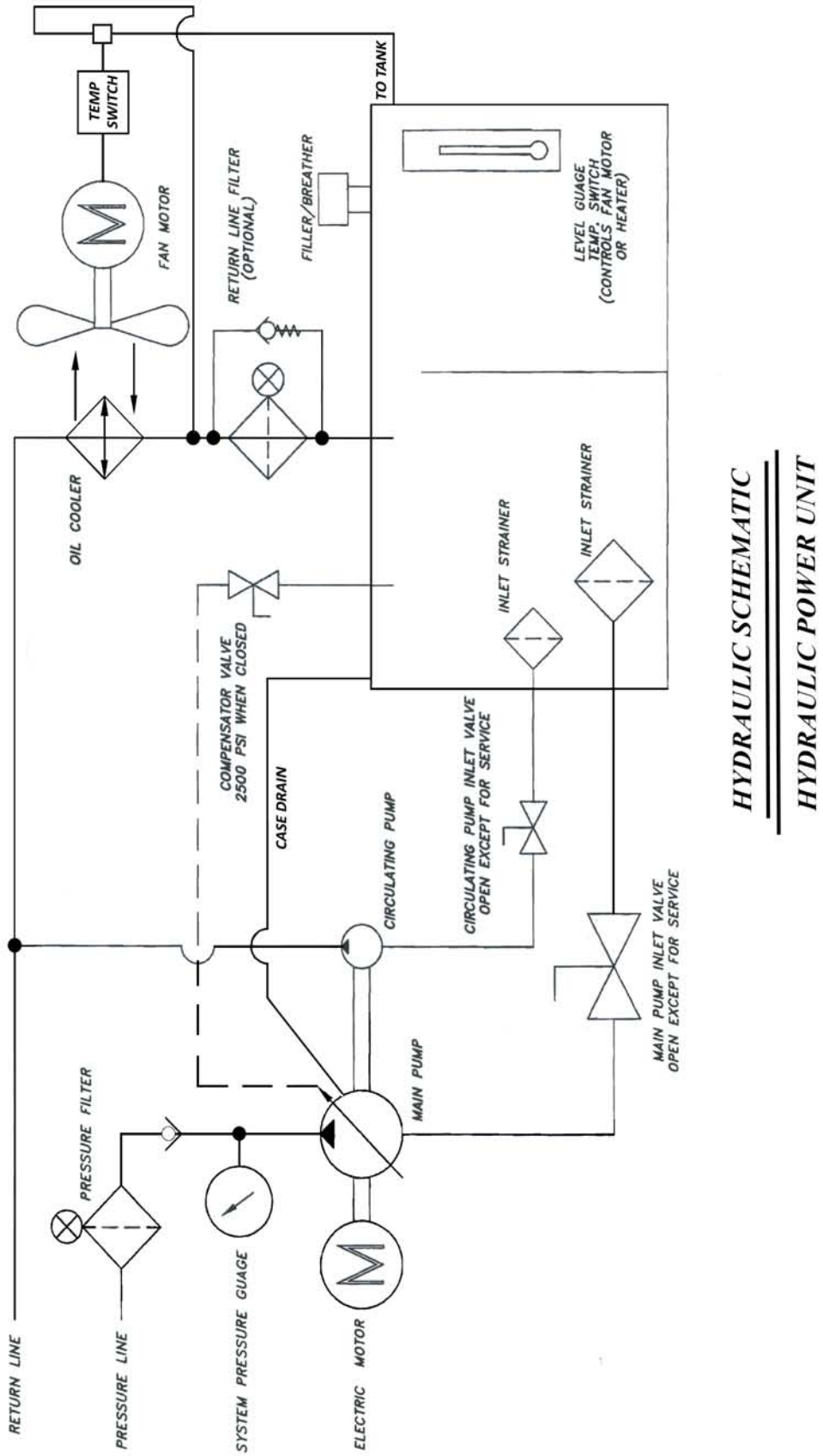

TEMP SWITCH
FAN MOTOR
OIL COOLER
RETURN LINE FILTER (OPTIONAL)
FILLER/BREATHER
TO TANK
LEVEL GUAGE TEMP. SWITCH (CONTROLS FAN MOTOR OR HEATER)
COMPENSATOR VALVE 2500 PSI WHEN CLOSED
CASE DRAIN
INLET STRAINER
INLET STRAINER
CIRCULATING PUMP
CIRCULATING PUMP INLET VALVE OPEN EXCEPT FOR SERVICE
MAIN PUMP INLET VALVE OPEN EXCEPT FOR SERVICE
PRESSURE FILTER
MAIN PUMP
RETURN LINE
PRESSURE LINE
SYSTEM PRESSURE GUAGE
ELECTRIC MOTOR
HYDRAULIC SCHEMATIC
HYDRAULIC POWER UNIT

Figure 10

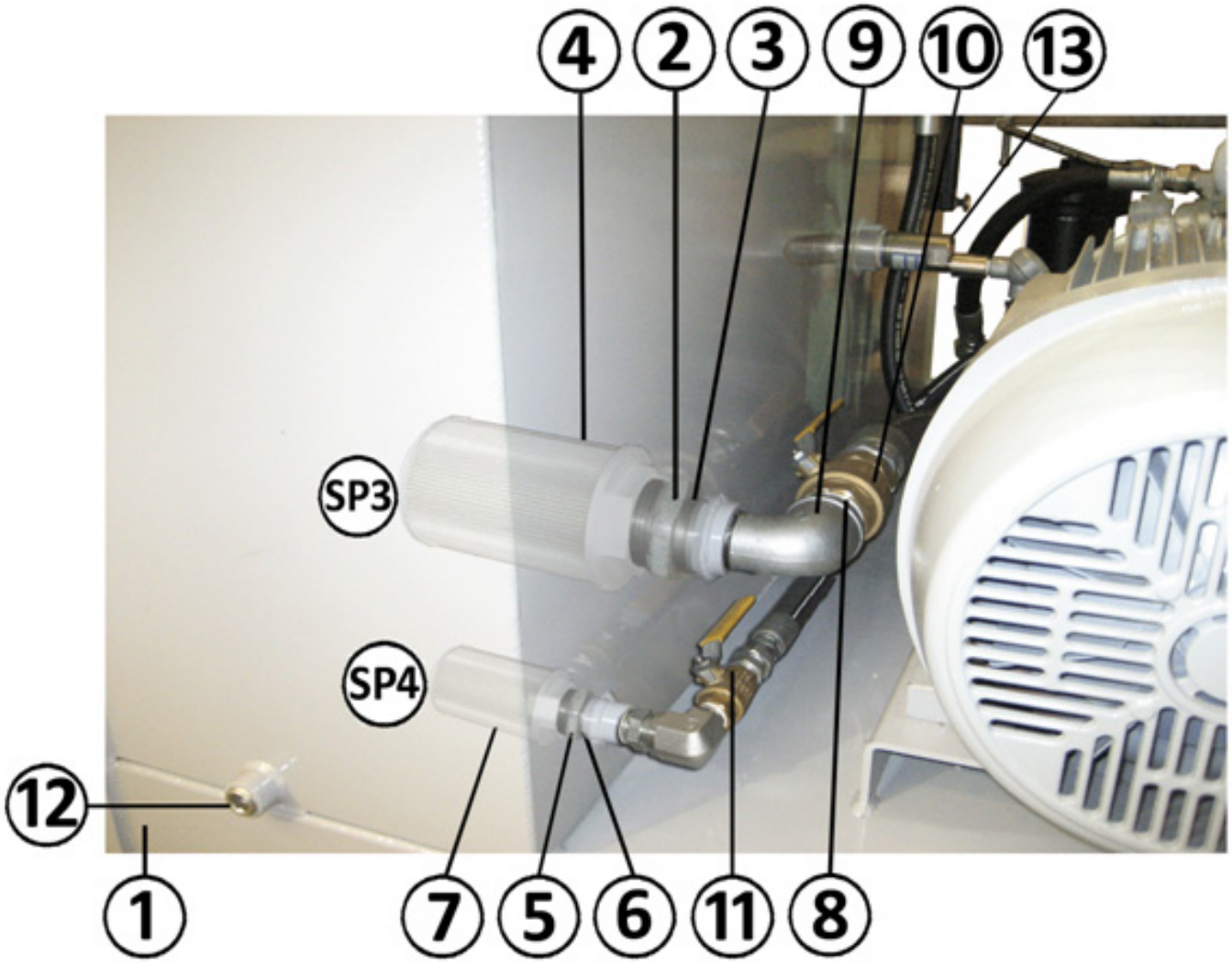


Figure 11

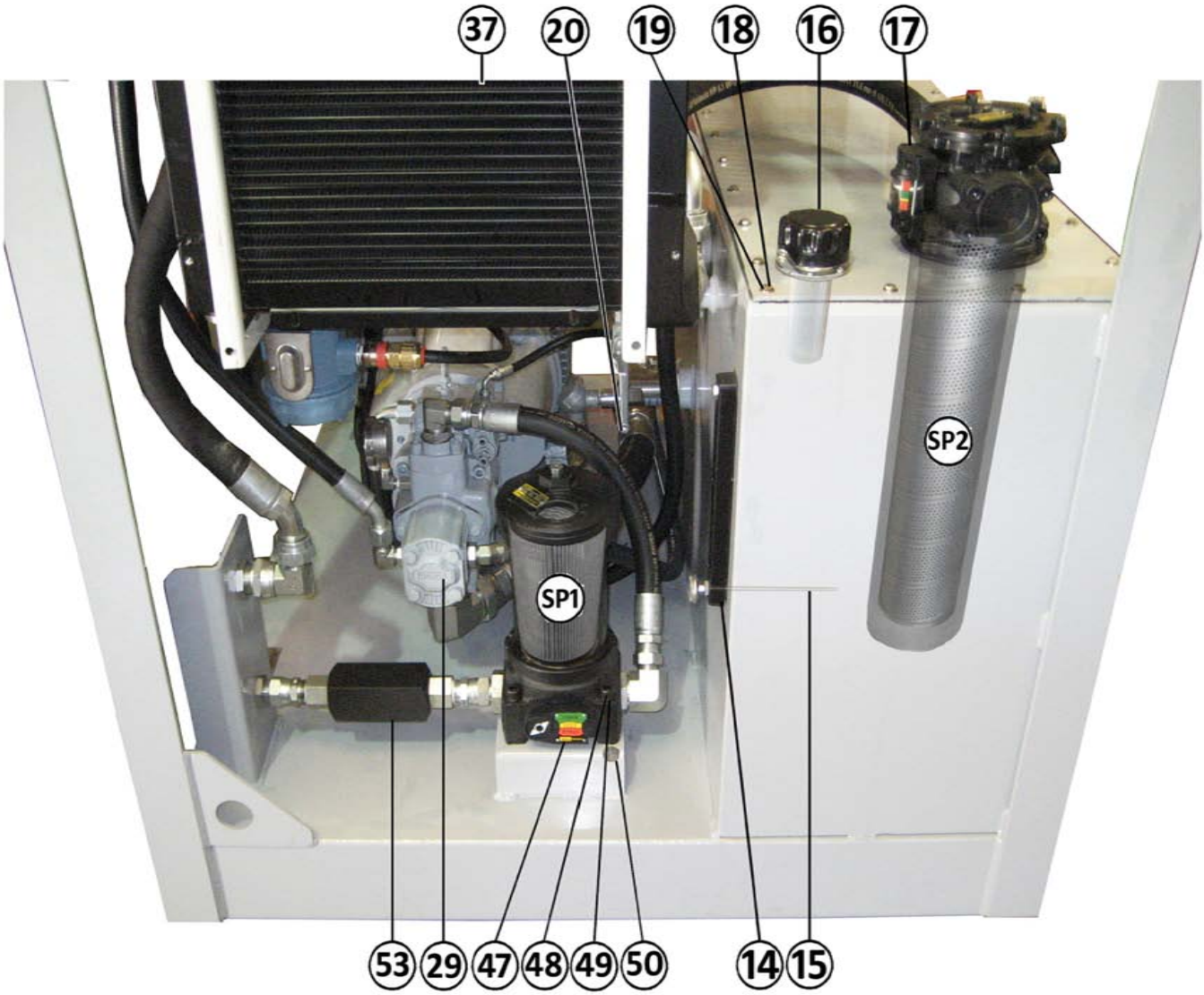


Figure 12

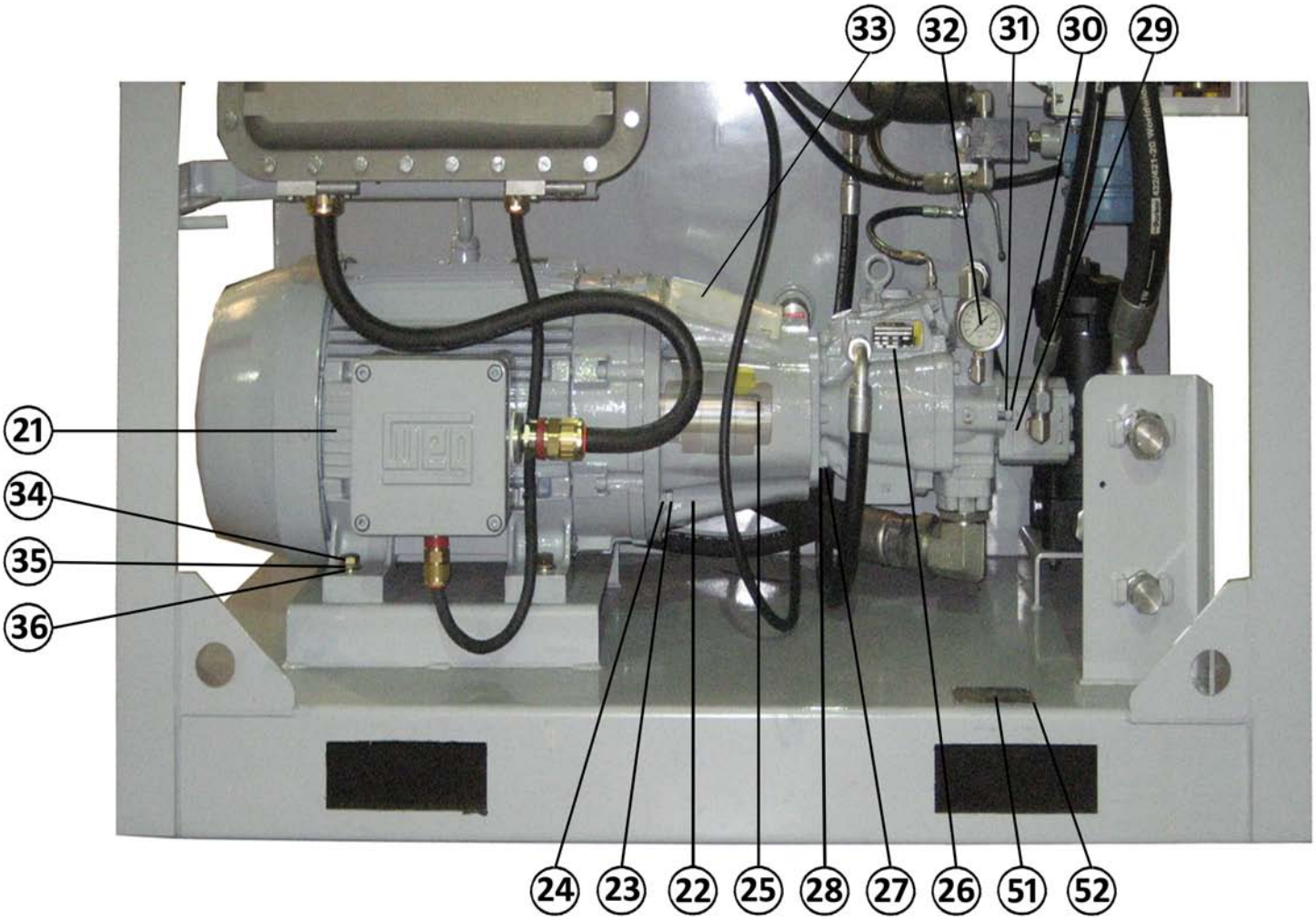


Figure 13

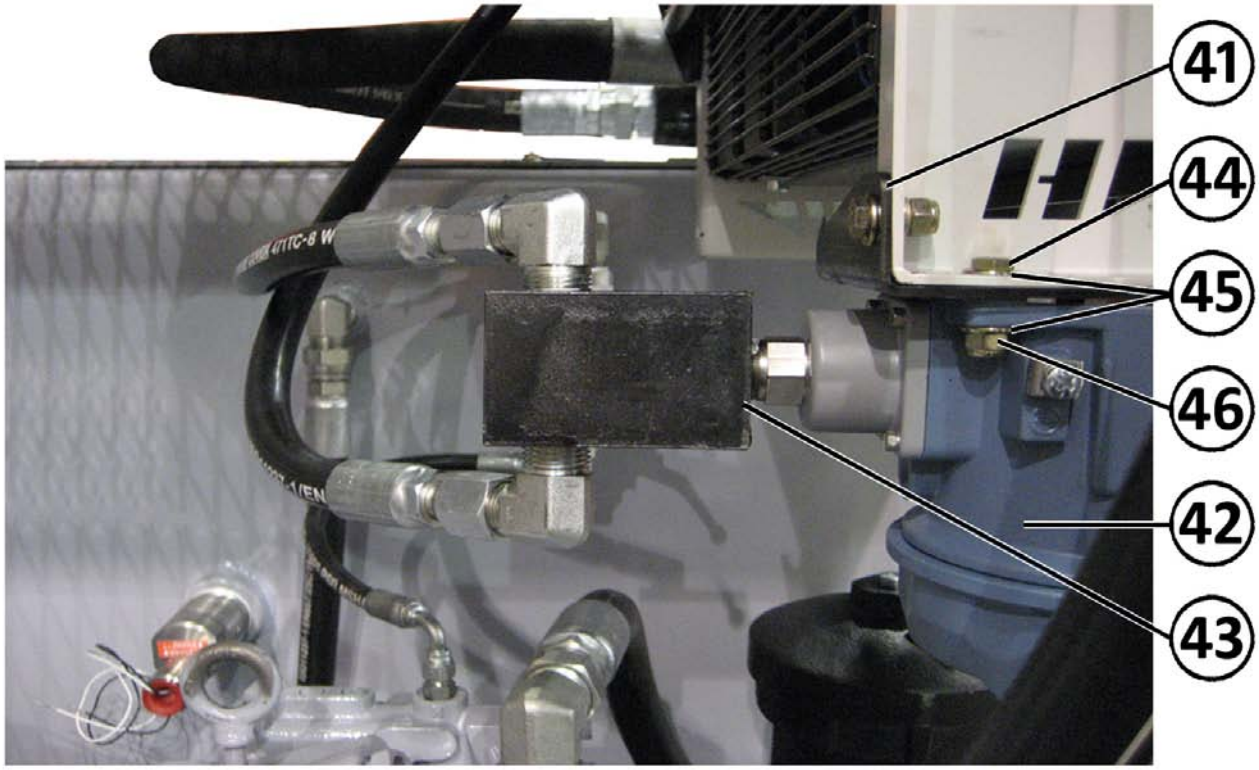


Figure 14

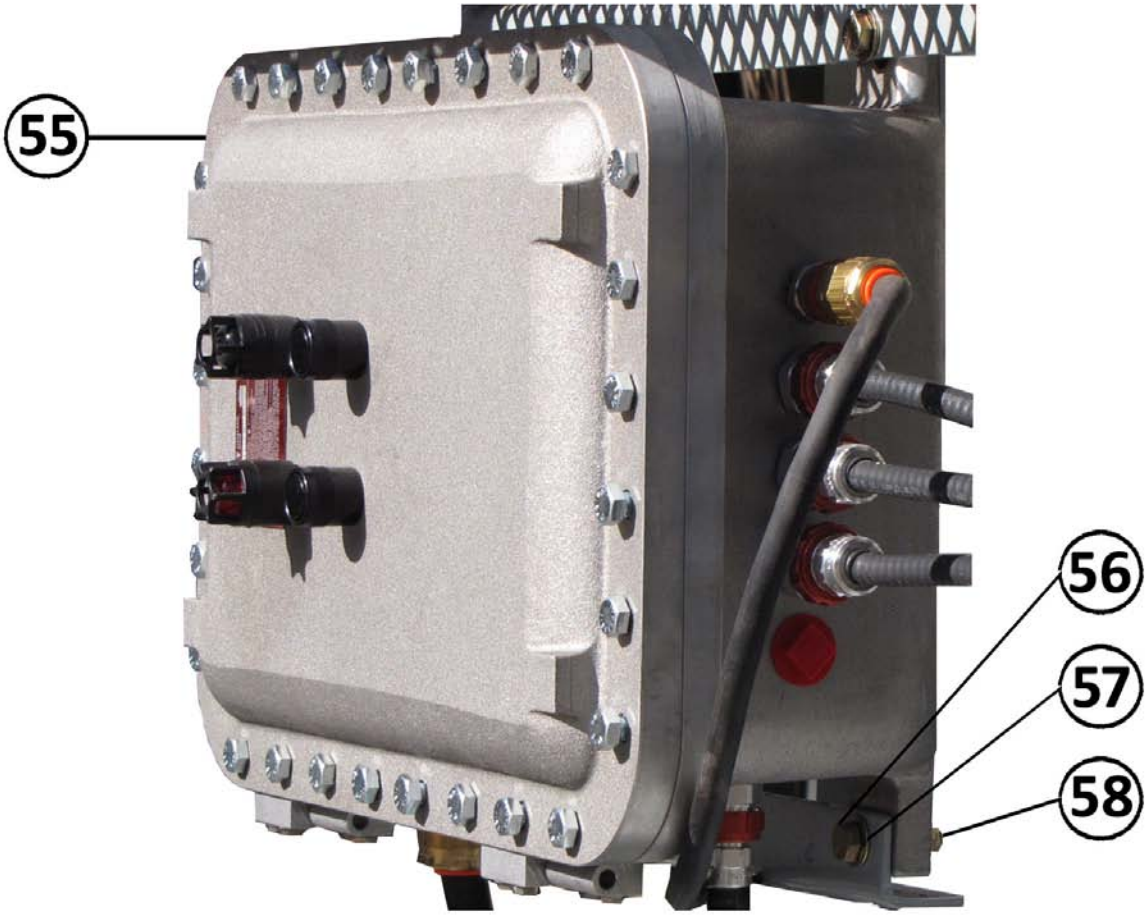


Figure 15

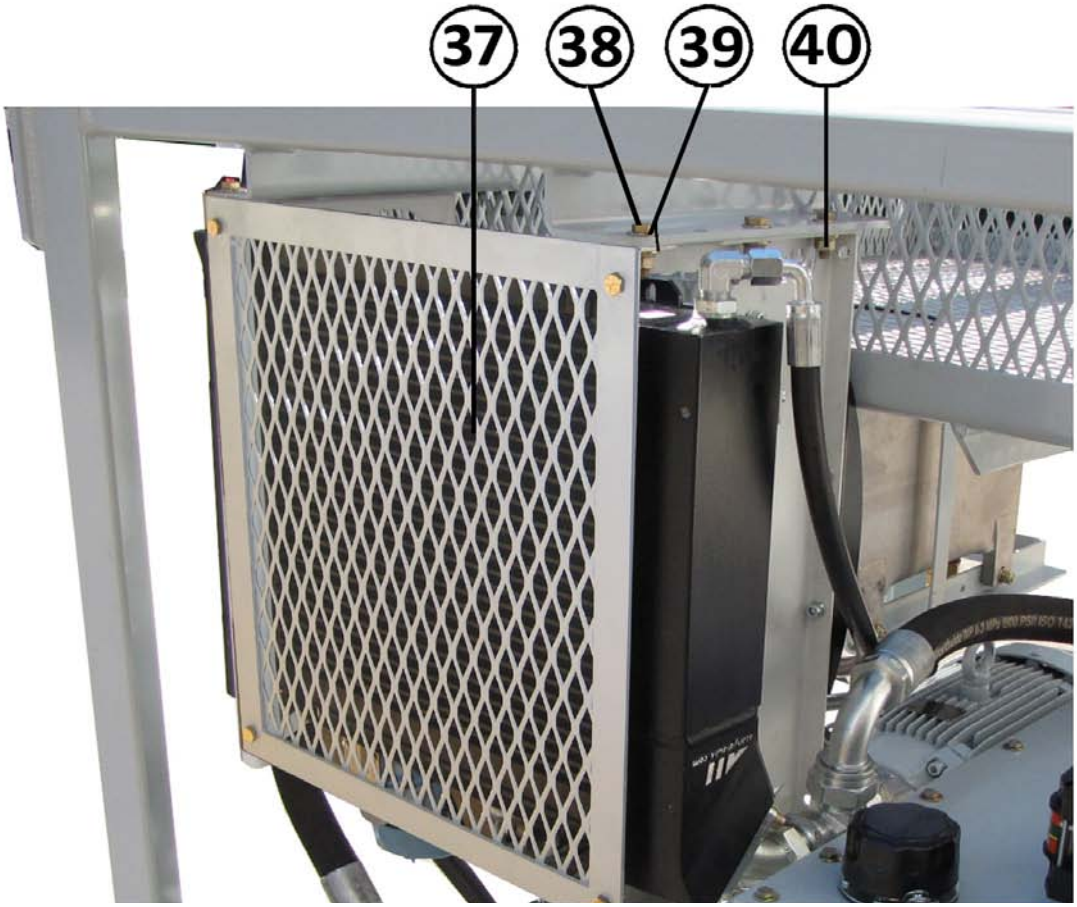


Figure 16

Item	Part Number	Description	Qty
1	9PU-7100FRM	HYDRAULIC POWER UNIT FRAME	1
2	9AF3X2B	BUSHING	1
3	9AF2XCLN	CLOSE NIPPLE	1
4	9FH-01152-7	HPU MAIN SUCTION STRAINER	1
5	9AF1X34B	BUSHING	1
6	9AF34X2N	NIPPLE	1
7	9FH-01152-8	HPU CIRCULATING SUCTION STRAINER	1
8	9AF2XCLN	CLOSE NIPPLE	1
9	9AF2S90	STREET 90	1
10	9PU-8008	BALL VALVE	1
11	9PU-8009	BALL VALVE	1
12	9HC12HHP	COUNTERSUNK PLUG	1
13	9PU-8019	EXPLOSION PROOF LEVEL SWITCH	1
14	9PU-8021	EXPLOSION PROOF SIGHT GLASS	1
15	9PU-8017	OIL PROBE THERMOMETER	1
16	9PU-8010	FILTER BREATHER	1
17	9PU-8002	RETURN FILTER AND HOUSING	1
18	9BN0115003	HEX HEAD CAP SCREW	28
19	9BN1133857	FLAT WASHER	28
20	9PU-8013	BALL VALVE COMPENSTOR	1
21	9PU-8023	EXPLOSION PROOF MOTOR	1
22	9PU-8004	PUMP MOTOR ADAPTER	1
23	9BN0115311	HEX HEAD CAP SCREW	4
24	9BN1133897	SPLIT LOCKWASHER	4
25	9PU-8006	DRIVE COUPLING	1
26	9PU-8016	PRESSURE COMPENSATED HYD PUMP	1
27	9BN0115210	HEX HEAD CAP SCREW	4
28	9BN1133895	SPLIT LOCKWASHER	4
29	9PU-8007	SECONDARY GEAR PUMP	1
30	9BN0115107	HEX HEAD CAP SCREW	2
31	9BN1133893	SPLIT LOCKWASHER	2
32	9PU-8003	GAUGE	1
33	9PU-8005	COVER	1
34	9BN0115315	HEX HEAD CAP SCREW	4
35	9BN1133897	SPLIT LOCKWASHER	4
36	9BN1133819	SAE FLAT WASHER	4

Item	Part Number	Description	Qty
37	9PU-8020	EXPLOSION PROOF COOLER	1
38	9BN0115107	HEX HEAD CAP SCREW	6
39	9BN1133815	SAE WASHER	12
40	9BN1137185	NYLON LOCK NUT	6
41	9FH-01402	HPU TEMP SWITCH MOUNT BRACKET	1
42	9PU-8018	EXPLOSION PROOF TEMP SWITCH	1
43	9FH-01401	HPU TEMP SWITCH MANIFOLD	1
44	9BN0115005	HEX HEAD CAP SCREW	3
45	9BN1133857	FLAT WASHER	6
46	9BN1137183	NYLON LOCK NUT	3
47	9PU-8012	PRESSURE FILTER AND HOUSING	1
48	9BN1123419	SOCKET HEAD CAP SCREW	4
49	9BN1133861	FLAT WASHER	4
50	9BN1137187	NYLON LOCK NUT	4
51	9FH-01018-11	FLOORHAND S/N TAG	1
52	9BN41203	RIVET	4
53	9PU-8015	CHECK VALVE	1
54	9PU-7220	HPU HOSE & FITTING KIT	1
55	9PU-8000	J&L ELECTRIC - EXPLOSION PROOF	1
56	9BN0115211	HEX HEAD CAP SCREW	4
57	9BN1133861	FLAT WASHER	4
58	9BN1137187	NYLON LOCK NUT	4

Revision History

Revision	Section	Sub-Section	Para.	DCR#	Date	Prepared	Reviewed	Approved
Draft	All	All	All	N/A	10/01/10	RH	DR	KJ
0								

Change Description

Revision	Change Description
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