

High Volume Probe Scavenger

Installation and Operation Manual



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DOCUMENTATION CONVENTIONS

This uses the following conventions to present information:



WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The Geotech High Volume Probe Scavenger (HVPSCAV) is an automatic pumping system designed to recover a wide range of floating and aromatic hydrocarbons from shallow and deep wells. A product/water probe differentiates between hydrocarbons and water, allowing for retrieval of virtually 100% water-free oil from wells 8" (20.3 cm) in diameter or larger. An optional Water Table Depression Pump (WTDP) can be used in conjunction with the HVPSCAV to create a cone of depression within the ground water to enhance hydrocarbon recovery. As hydrocarbons are recovered, they are pumped to a product recovery tank. When the product recovery tank becomes full, an optional Tankfull probe can be used to shut down the product pump to prevent overflow.



If the HVPSCAV is to be deployed with a separate water pump, Geotech recommends a minimum well diameter of at least 10" (25.4 cm). See Appendix A for more information on submersible water pumps.

The system is flexible: The pump and probe may be placed at any desired height as long as the probe is adjacent to the intake and there is at least 3' (1 m) of product and/or water in the well. The HVPSCAV can be built for product only applications where a separate WTDP pump may be installed or when there isn't a need for a water pump.

The standard HVPSCAV system (Figure 1-1) consists of a down well pump assembly that includes a product pump, power cable with an explosion proof (XP) start box, and 15' (4.6 m) of FEP/Stainless Steel flexible discharge hose along with a product/water probe, and intake hose and strainer. Stainless steel and other corrosion resistant components allow efficient usage in a variety of subsurface conditions.

HVPSCAV features also include:

- Efficient product recovery to depths of 80' (24 m)
- Lighter-than-water (LNAPL) product recovery.
- Reliable around-the-clock operation in automatic mode.
- Sensor probe technology provides water-free product recovery.
- Remote monitoring and troubleshooting capability with the optional Geotech Environmental Control Module (GECM).

All other components, including the water pump, water probe, Tankfull probe, winch, additional product discharge hose, and special fittings are sold as options to the base system. See *Section 9: Replacement Parts and System Accessories*.

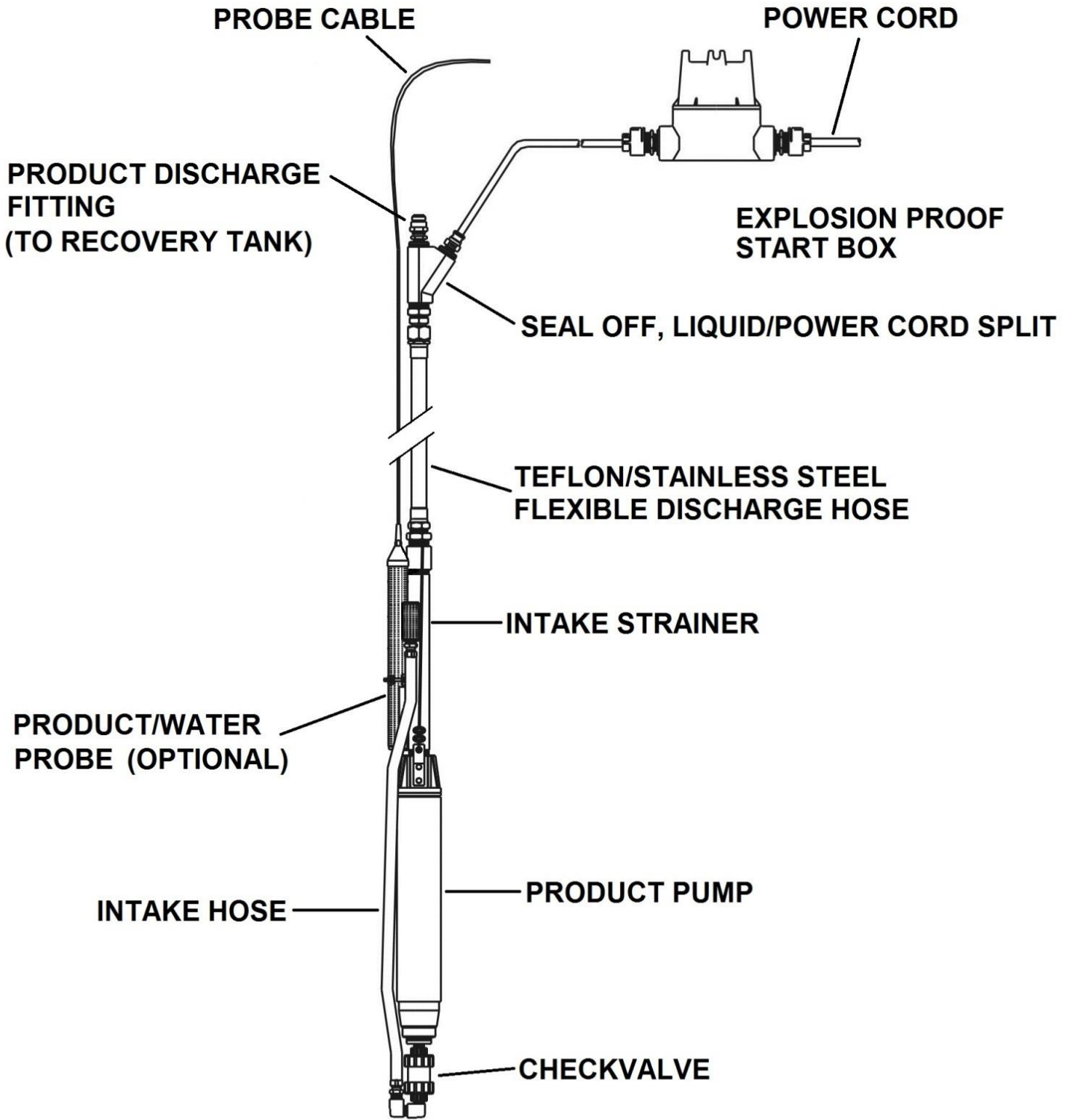


Figure 1-1: Standard HVPSCAV Assembly

A complete HVPSCAV system (Figure 1-2), with optional WTDP, can be easily controlled with the optional Geotech GECM Control Panel. All probes can be supplied with 8-pin connectors to allow quick connection to a GECM Control Panel or other control panel. Major system components are described on the following pages.

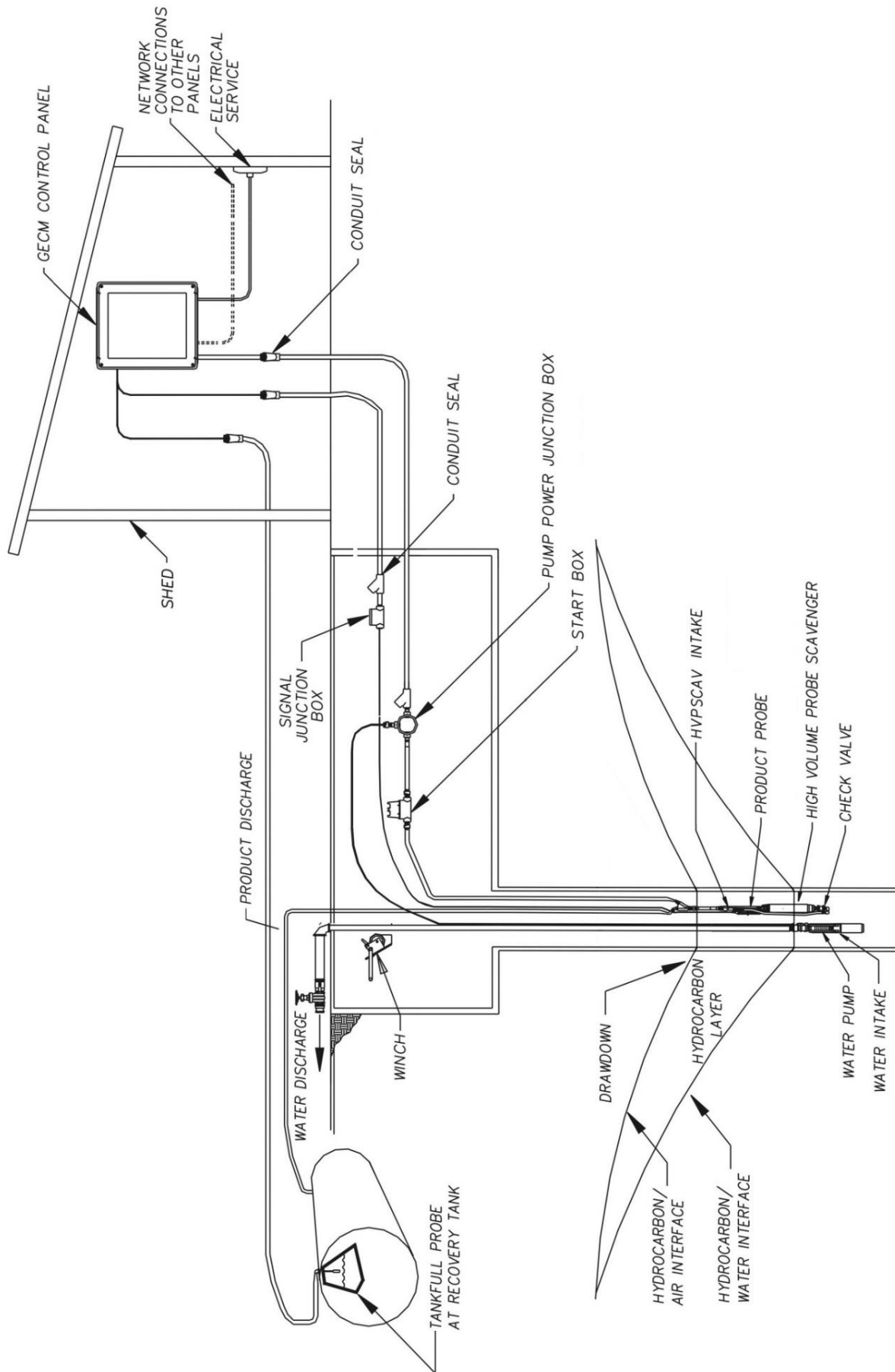


Figure 1-2: Example of HVPSCAV system with options.

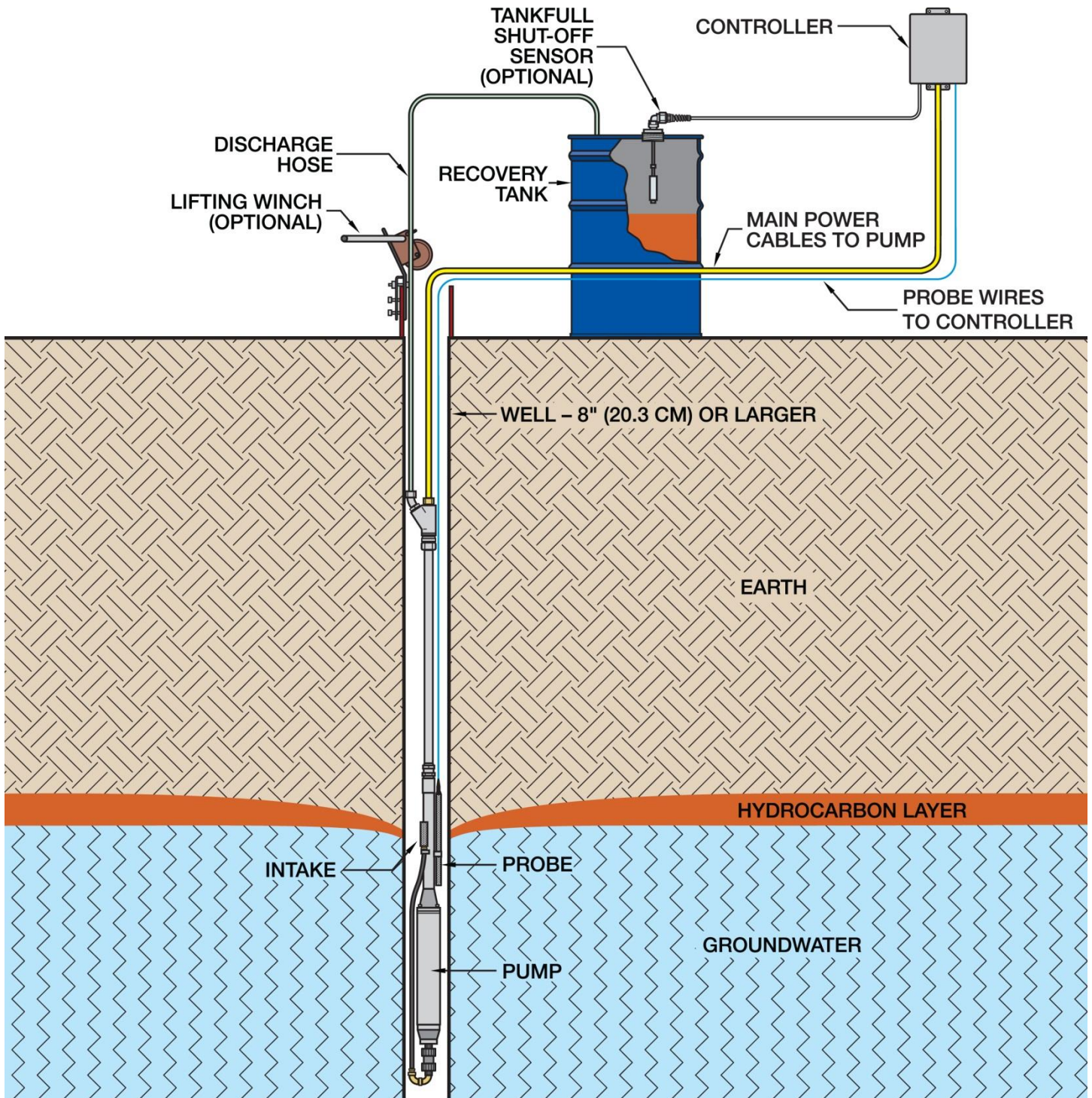


Figure 1-2a: Example of HVPSCAV system without pump.

System Components

High Volume Probe Scavenger Product Pump

The HVPSCAV product pump assembly (Figure 1-3) consists of a submersible gasoline pump, 1/3 HP, that operates on 230VAC Single Phase power. The base unit consists of a down well pump assembly that includes a product pump with 100' (30.5 m) of gasoline resistant power cable with an XP start box that contains a capacitor and fuses. 15' (4.6 m) of FEP/stainless steel flexible discharge hose is also included along with a product/water probe, intake hose and strainer.



When a GECM is installed, the components for the XP start box are removed and installed within the GECM.

The pump has a capacity of up to 12 gpm (45 lpm) (with a maximum head capability of 80' (24.6 m). See Figure 1-4 for an example of the product pump's performance curve based on test data with Geotech's plumbing arrangement.

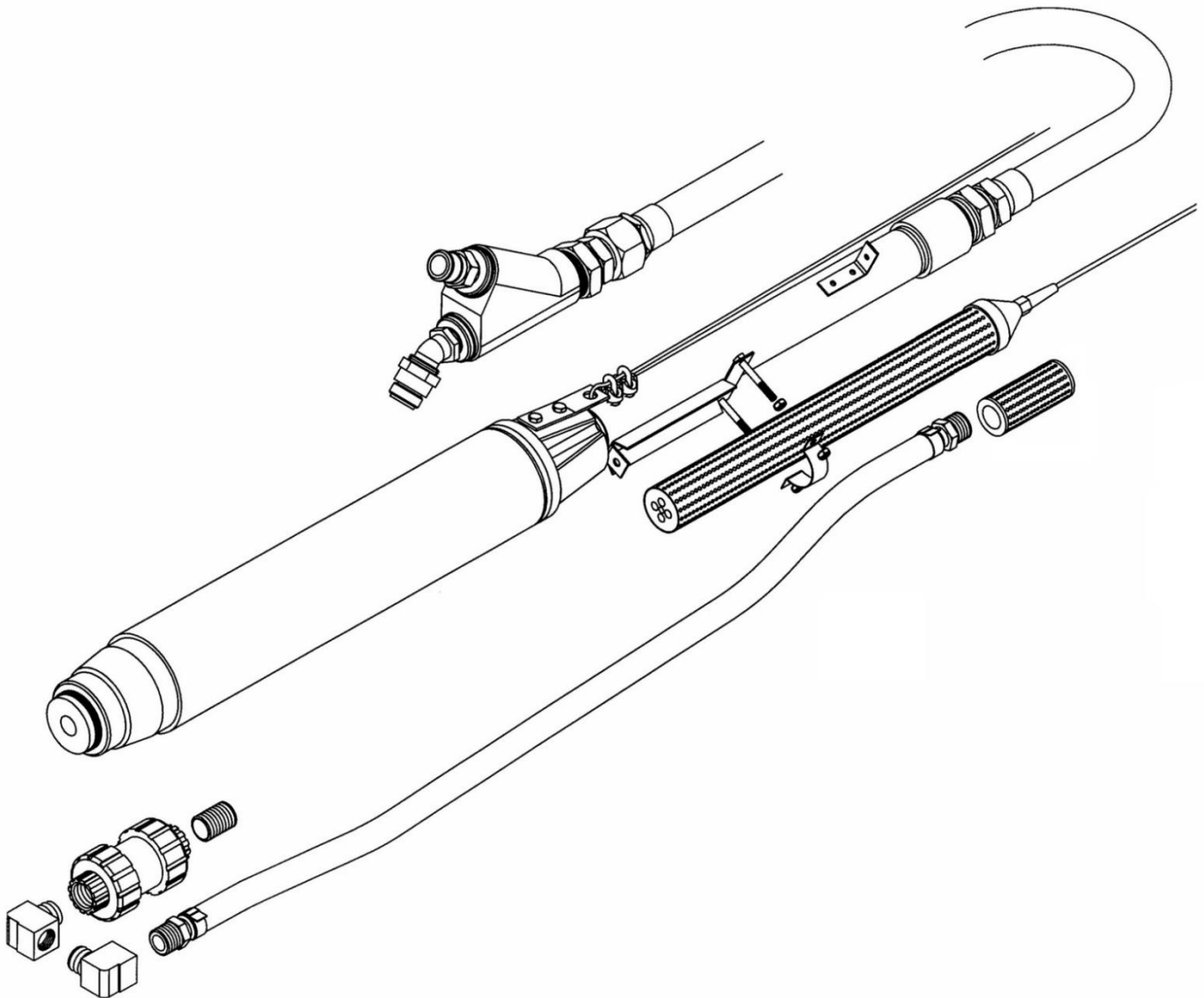
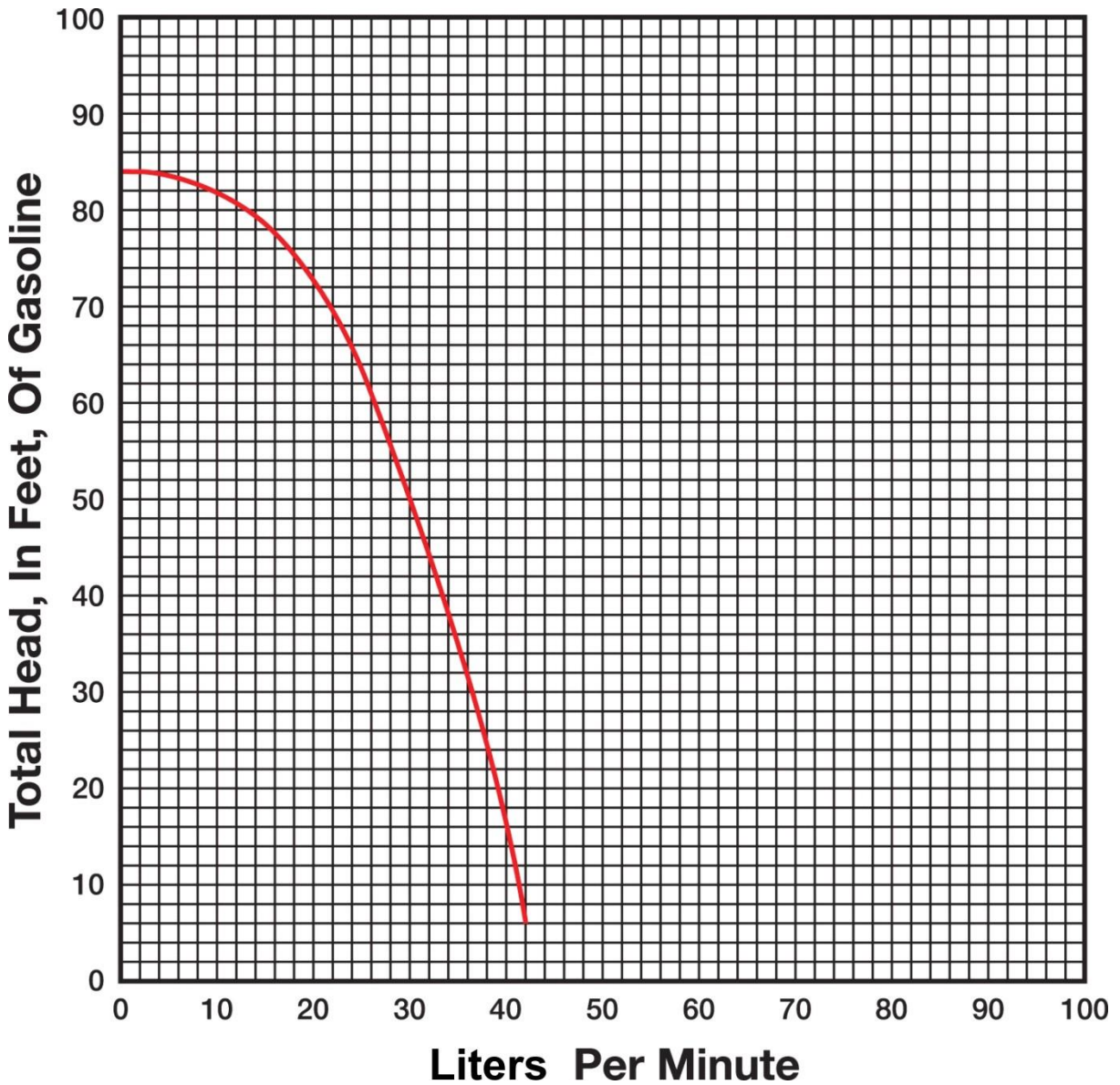


Figure 1-3: Breakout diagram of the HVPSCAV product pump assembly.



**GEOTECH PERFORMANCE TEST DATA
W/STANDARD PLUMBING ARRANGEMENT**

HORSE POWER

1/3 HP

MAXIMUM FLOW

12 GPM/45 LPM

MAXIMUM HEAD

81 FT/24.6 M

Figure 1-4: 1/3 HP Product Pump

Optional Components

Water Pump (optional)

The HVPSCAV can be deployed with a separate water pump in the same recovery well. If the HVPSCAV is to be deployed with a separate water pump, Geotech recommends a minimum well diameter of at least 10" (25.4 cm). A set of HI and LO water sensors are located on the product/water probe (see Figures 1-6 and 2-2). These sensors indicate the water level during installation and operation.

When the water level becomes too high, a signal is sent to the control panel to turn on the water pump. The water pump will automatically lower the water level, creating a cone of depression in the well and shut off when the water float reaches the lower sensor. This function keeps the opening on the intake of the HVPSCAV as close to the product layer as possible. However, it may be necessary to re-adjust the HVPSCAV position within the well also.

Water pumps are available with both 2-wire or 3-wire motors and range in power from 1/2 to 20 horsepower. Two-wire motors are available in single phase only, up to 1.5 HP, and feature built in start components and thermal overload protection. Three-wire motors can be Single Phase or 3-Phase. Single Phase three-wire motors include built-in thermal overload protection and require an external start box. 3-Phase, deep well submersible pump motors, which require an external start component, can come with either an external start box or designated motor starter (installed within the GECM).

Start boxes and motor starters are supplied by Geotech as an option. Most motor/pump scenarios, including multiple pumps, can be controlled by one GECM with the appropriate motor starter(s) installed. Refer to *Appendix A – Submersible Water Pumps* for a list of water pumps available from Geotech. The following diagram contains an example of a standard water pump assembly with start box. A control panel is required when used in conjunction with a probe.

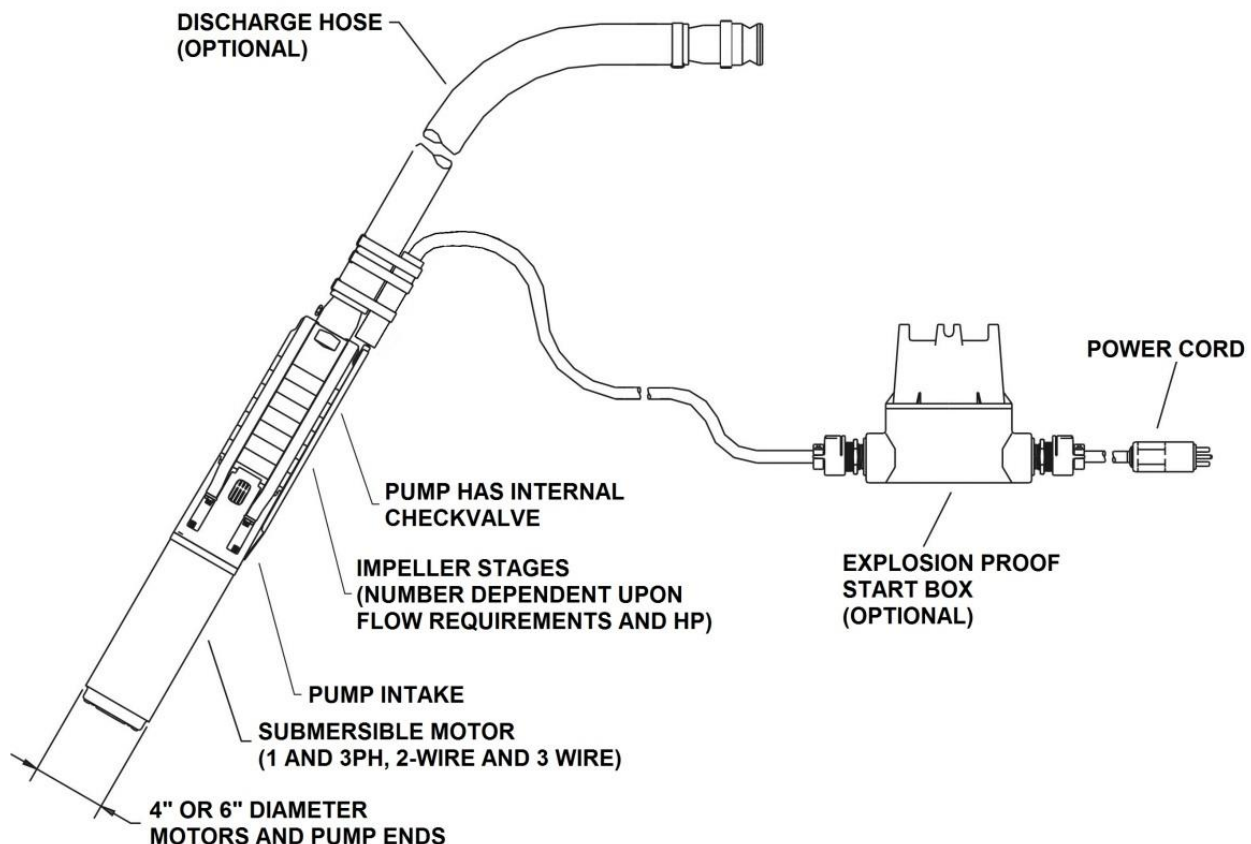


Figure 1-5: Standard Water Pump Assembly (no control panel).

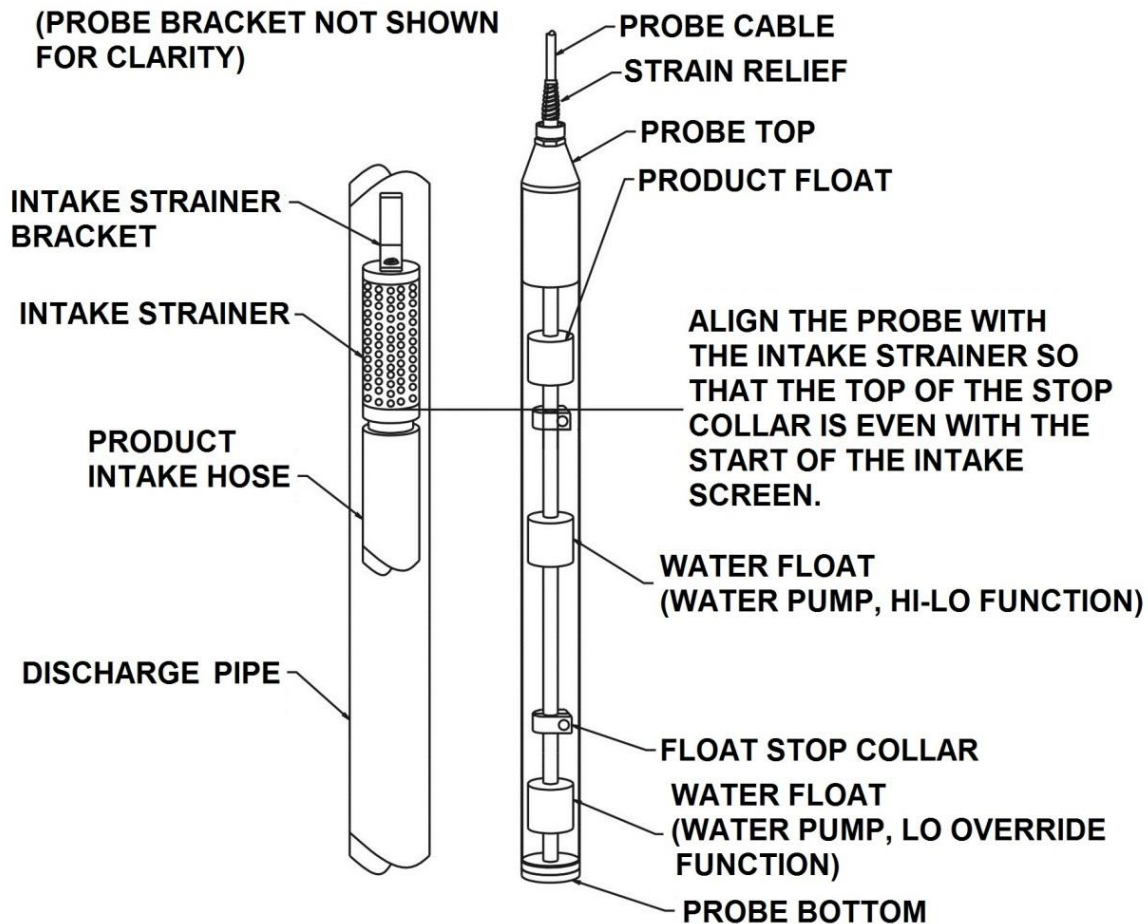
Down well Probes

The product and water pumps cycle on and off in response to signals sent to the control panel by a level sensing probe. Figure 1-6 shows an example of a standard product/water probe which can be used with a HVPSCAV and separate water pump.

The probe, when properly attached to the HVPSCAV (see Figure 1-6), uses float actuated switches to assure that the product pump delivers hydrocarbon only. The Product float must be suspended in hydrocarbon for the product pump to run. Once the Product float reaches the upper switch, the product pump will turn on until the float magnet falls back below the switch. This assures that the product pump only runs when sufficient hydrocarbons are present in the well. The next float (HI/LO Water) is buoyant in water only and disables the product pump when it reaches the Water High switch. This prevents the product pump from running if the hydrocarbon/water interface in the well rises to the level of the intake strainer.



The top of the stop collar that is just below the Product Float must be placed right at the start of the intake screen to maximize product intake from the water surface. All probe wiring is rated Intrinsically Safe for Class 1, Div. 1, Group D hazardous locations.



**PROBE INTAKE STRAINER ALIGNMENT
WITH OPTIONAL PRODUCT/WATER PROBE**

Figure 1-6: Example of Product/Water Probe in relation to the HVPSCAV Intake Strainer.

HVPSCAV Probes for Diverse Environments

For well environments that could cause premature wear, Geotech can provide upgraded probe assemblies for use with the HVPSCAV. The optional product/water probe can be replaced with either a density actuated product probe or density actuated water probe. The two probes are manufactured with PTFE parts, PTFE coated cables, and stainless steel floats. Discuss the possible need for modifications to your HVPSCAV system with your Geotech Sales Representative.

Density Actuated Product Probe (optional)

The density actuated product probe uses float actuated switches to assure that the product pump delivers hydrocarbons only. The top (HI Product) float must be suspended in hydrocarbon for the product pump to run. This assures that the product pump runs only when sufficient hydrocarbons are present in the well. The other float (HI Water) is buoyant in water only and disables the product pump when it reaches the top of its travel. This prevents the product pump from running if the hydrocarbon/water interface in the well rises to the level of the product pump intake.

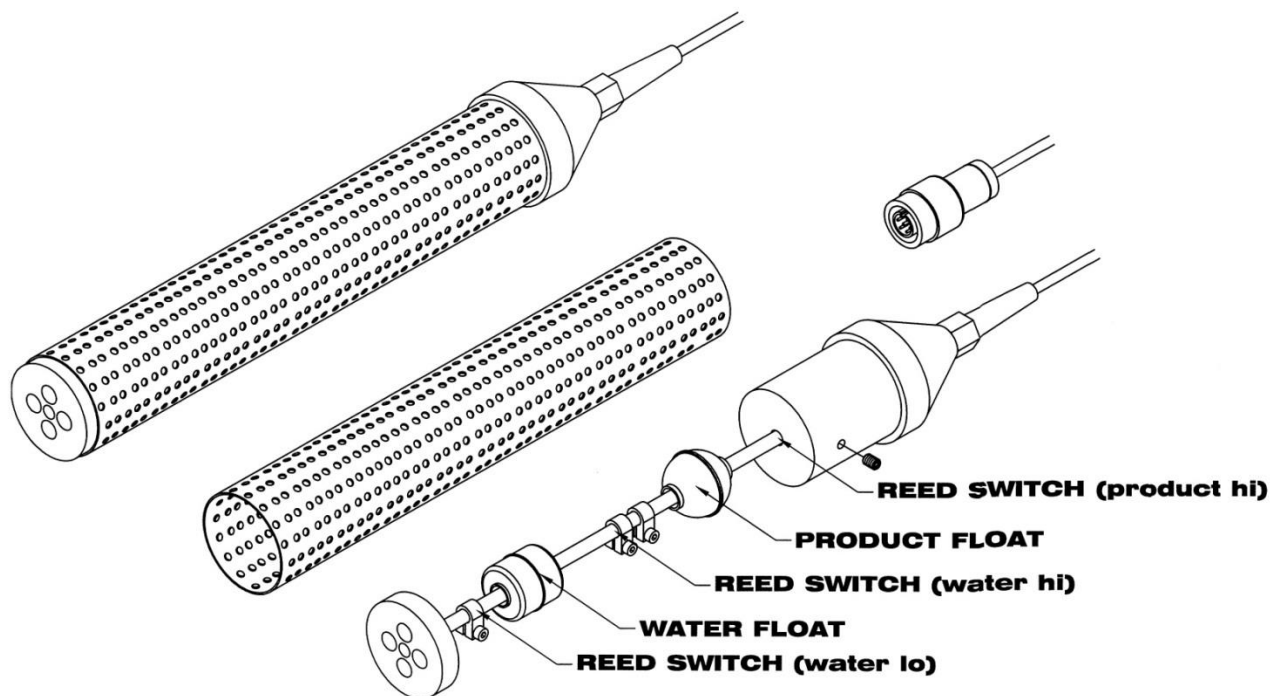


Figure 1-7: Large Diameter Density Product Probe



The top of the stop collar that is just below the Product Float must be placed right at the start of the intake screen to maximize product intake from the water surface.

Density Actuated Water Probe (optional)

The density actuated water probe uses float actuated switches to assure that the water pump delivers water only. Both floats on the water probe are buoyant only in water. The water pump turns on when the top (water HI/LO) float reaches the top of its travel. The pump continues to run until the float falls to the bottom of its travel. If a fault occurs and the pump continues to run, a second (LO OVERRIDE) float will fall and shut off the water pump. This probe can also be used with the HVPSCAV when it is used to pump water instead of hydrocarbons.

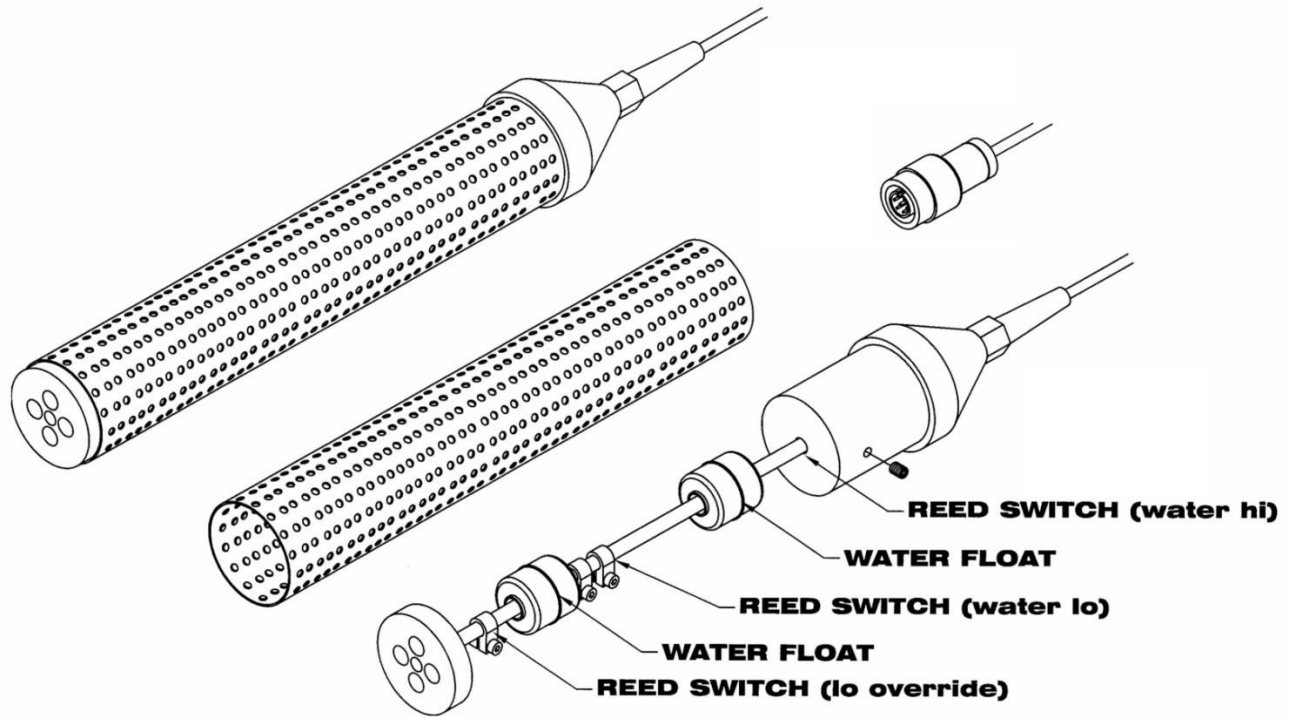


Figure 1-8: Large Diameter Density Water Probe

Tankfull Probe (optional)

The Tankfull probe is used to shut down the product pump if the product recovery tank becomes full. The Tankfull probe is a float actuated level sensor that is installed in the top of the recovery tank. An 8-pin connector can be added for use with a GECM Control Panel or other control panel. When used with a control panel, the HVPSCAV system will shut down whenever the Tankfull probe is disconnected or the line is cut.

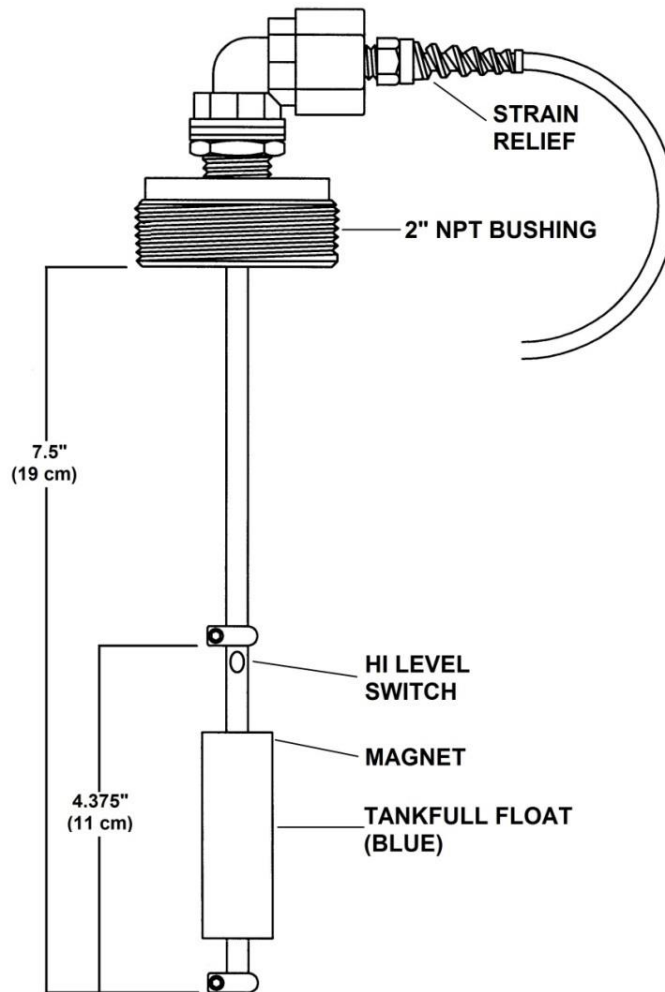


Figure 1-9: Tankfull Probe

Discharge Hoses

The HVPSCAV is equipped with a 3/4" Kamlok fitting on the discharge. Optional 3/4" product discharge hose is available in custom lengths. Discharge hoses for the optional water pump is also optional. Water pump hose length and size is specified by the pump size and customer requirements. Also available for use with your system is a selection of optional accessories including discharge valves and flow meters. Some of these can be found listed in *Section 9: Replacement Parts and System Accessories*. Contact Geotech for more information on system options and accessories.

Additional Accessories

A variety of options and accessories are available to the HVPSCAV system, including globe valves and flow meters. Refer to the section on System Accessories for a list of parts provided to the HVPSCAV system.

Section 2: System Installation



The HVPSCAV must be installed, operated and maintained according to the procedures described in this manual. Failure to follow these procedures or to observe warnings and cautions included in this manual may result in personal injury and will void the warranty.

- Do not deploy the HVPSCAV or water pump until the well has been developed by qualified personnel. Excessive silt and grit can damage the pumps and degrade performance.
- Never run the HVPSCAV or water pump dry for more than 5 seconds at a time.
- If using a water pump, position the intake no closer than 1' (30 cm) from the bottom of the well.

Inspection

Inspect all equipment upon arrival. Check the contents of the packages. If any items are missing or damaged, make note of this on the shipping papers and immediately notify Geotech Environmental Equipment at 800-833-7958 or 303-320-4764.

Unpack the System

In preparation for installation, remove the HVPSCAV from its shipping crate. If you have ordered the optional product/water probe, it will already be attached to the pump assembly as shown in Figure 1-1. Confirm that the probe is securely mounted and positioned so that the top of the stop collar that is just below the Product Float is positioned right at the start of the intake screen (see Figure 1-6).

System Wiring



All wiring must be carried out by a qualified electrician and be in accordance with government codes. Conduit runs must conform to Article 501-5 of the latest revision of the National Electrical Code (NEC).



Field Wiring Diagrams come with all Geotech GECM Control Panels.

Connect the Product Pump

The product pump is to be wired directly to a GECM or other customer supplied control panel, or it can be plug directly into an appropriate XP receptacle. Figure 2-1 contains a wiring diagram for the HVPSCAV product pump. A control panel is required to operate the pump when used in conjunction with a product/water probe, a Tankfull probe, or water pump.

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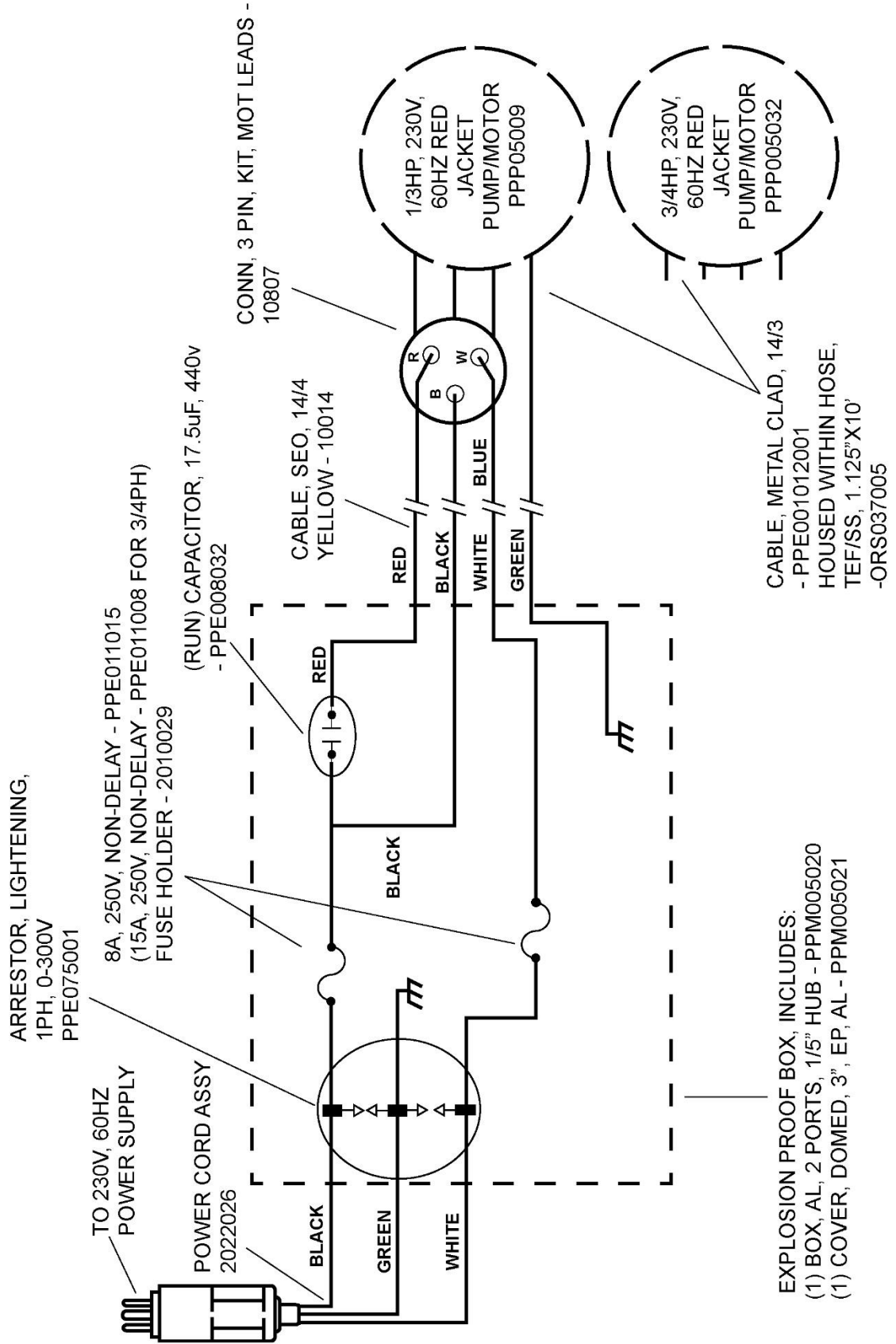


Figure 2-1: HVPSCAV Wiring Diagram (no control panel).

Attach Probe(s)

Probes can be supplied with 8-pin Amphenol connectors that allow quick connection to an optional GECM or other control panel. When a connector is not installed refer to the wiring diagram in Figure 2-2 or to the following wiring schematic for Geotech's three most common probes. Run the probe cable leads to a wellhead junction box and then on to the control panel. All probe wiring is rated Intrinsically Safe for Class 1, Div. 1, Group D hazardous locations.

Small Diameter Probe (standard - mounted to the HVPSCAV)

Float/function	Wires	Status
Product	Blue/Red	Normally Open (NO)
Water High	Blue/White	NO
Water Low	Blue/Black	Normally Closed (NC) (held open by float)
Water Override	Green/Orange ground (or casing)	NC (held open by float)

Large Diameter Density Actuated Product Probe (mounted to the HVPSCAV)

Float/function	Wires	Status
Product	Green/Orange	NO
Water High	Blue & Yellow/White	NO
Water Low	Blue & Yellow/Black	NC (held open by float)
Water Present (continuity function)	Blue & Yellow/ ground (or casing)	

Large Diameter Density Actuated Water Probe (shipped separately)

Float/function	Wires	Status
Water High	Blue & Yellow/White	NO
Water Low	Blue & Yellow/Black	NC
Water Override	Green/Orange	NC
Water Present (continuity function)	Blue & Yellow/ ground (or casing)	

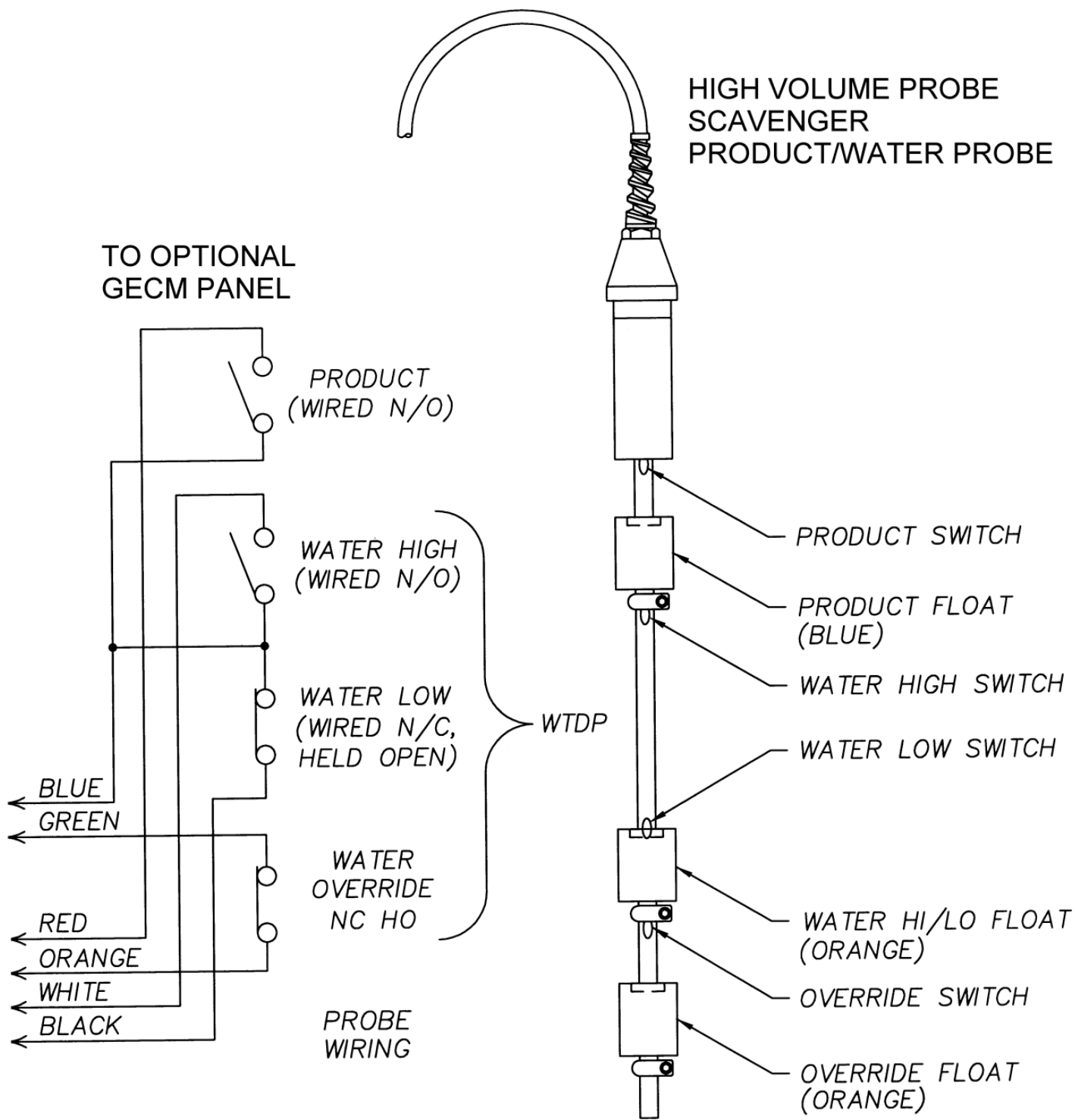


Figure 2-2: Wiring Diagram for a Standard Product/Water Probe.

Attach Tankfull Probe (optional)

The Tankfull probe can be supplied with 8-pin Amphenol connector that allows quick connection to a GECM or other control panel. When a connector is not installed refer to the wiring diagram in Figure 2-3. Connect the Tankfull Probe to the control panel after attaching it to the product recovery tank.

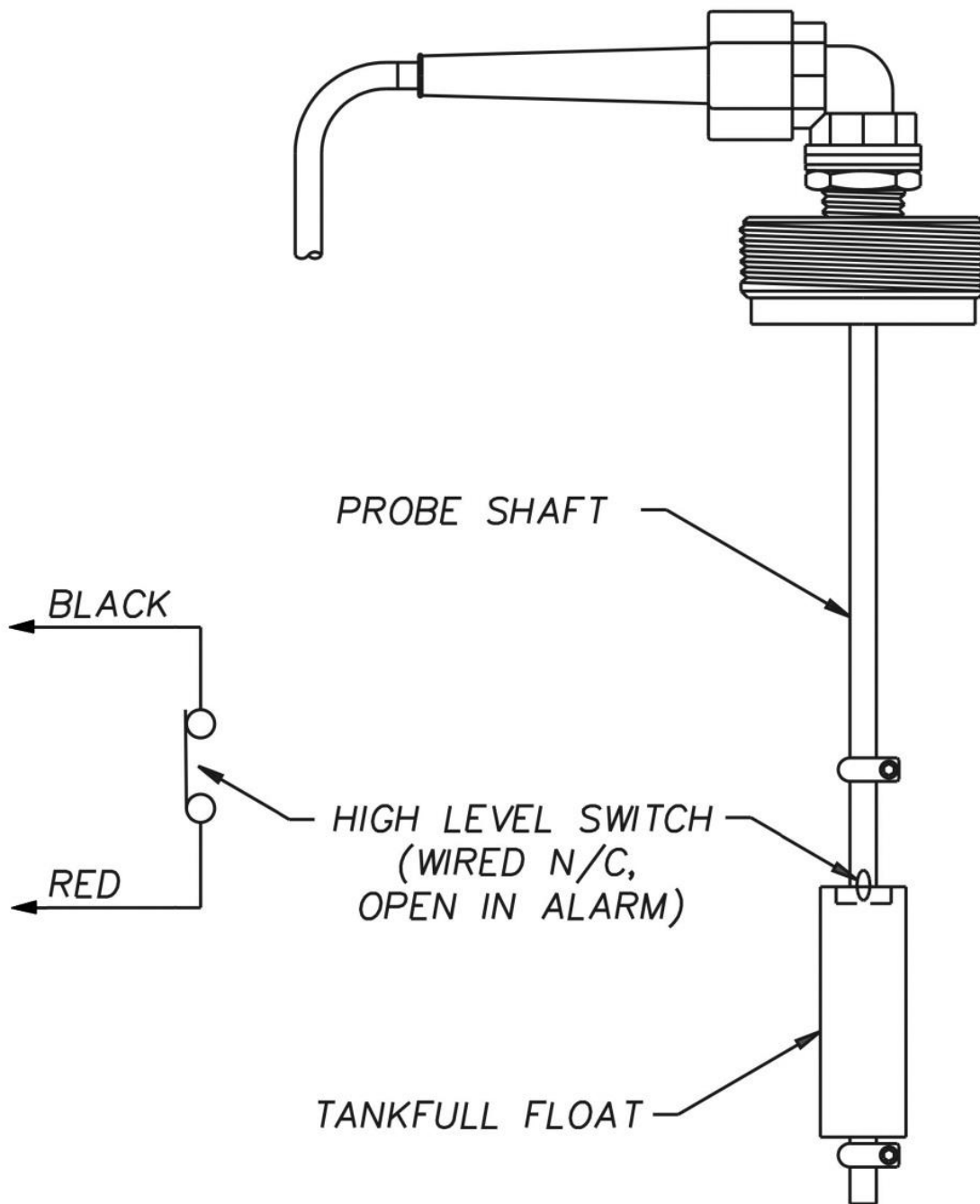


Figure 2-3: Tankfull Probe Wire Diagram (without connector)

System Deployment

1. Attach a product discharge hose to the seal off connector on the SS braided hose coming from the HVPSCAV. Run the hose to a product recovery tank.
2. If you have a water pump, attach the water pump discharge hose to the water pump outlet. Connect the other end of the discharge hose to suitable piping or to a proper discharge point. Check local regulations.
3. Attach the winch cable to the lifting harness that is attached to the upper end of the braided stainless steel (SS) hose then carefully lower the HVPSCAV assembly into the well.



Except for the length of braided SS discharge hose, under no condition should a HVPSCAV system be suspended down the well by either its power cord or connected discharge hose.

4. If supplied, start the water pump. Run the water pump until a stable “cone of depression” in the water table has been established, then position the HVPSCAV.
5. Adjust the position of the HVPSCAV assembly in the well until the product intake is submerged in hydrocarbon.



When the HVPSCAV assembly passes through the hydrocarbon/water interface, fluid displacement will artificially raise the level of the interface in the well. This condition can persist for up to 48 hours depending upon the permeability of the earth surrounding the well. Readjustment of the HVPSCAV may be required.

Section 3: System Operation

System Startup (The following procedure assumes the presence of both a product and water pumps.)

1. Open the water pump discharge valve completely by turning it counterclockwise.
2. Turn the water pump control switch to AUTO. The water pump should start and begin cycling on and off as the water level rises and falls in the well.
3. With the water pump running on AUTO, establish a pumping level and reduce the rate of cycling by adjusting the water pump discharge valve. Ideally, the water pump should be valved to approach continuous operation without going below the minimum flow rate recommended by the pump manufacturer, and maintaining the desired level of drawdown.
4. Adjust the position of the product pump assembly as described in *Section 2: System Installation*.
5. Start the product pump by turning the switch on the control panel to AUTO. The product pump will run so long as there is sufficient hydrocarbon in the well that causes the product probe top float to rise.

System Operation

The product pump will cycle on and off as the product float rises and falls. The product pump will continue to run when sufficient hydrocarbon is present unless the water-sensing float on the product probe rises to the top of its travel. This will cause the product pump to shut down until the water level falls, causing the water sensing float to fall to the bottom of its travel.

The water pump will cycle on and off as the water level rises and falls in the well. Under normal operation, as the water level rises and shuts down the product pump, this will also cause the water pump to run and lower the water level. Once the water level has been lowered, the product pump is allowed to run again so long as there is sufficient hydrocarbon present in the well.

Once the product recovery tank becomes full, the optional Tankfull probe will prevent the product pump from running. However, the water pump will continue to cycle on and off.

Section 4: System Maintenance

Clean Intake Strainer

The product intake strainer can be easily disconnected from the pump assembly for cleaning. This should be done periodically to ensure that the product pump will not run dry. Time elapsed between cleanings will depend upon well conditions. The intake is located at the end of the intake hose and is held in place on the pump inlet piping by a screw and bracket. To clean the intake, remove the screw, this allows the user access to the entire intake screen for cleaning and removing any debris. Reattach after cleaning as the bracket holds the intake screen in proper alignment with the product probe for proper system performance. With proper servicing, cleaning the intake assembly should substantially increase the life of the pump.

Clean Probes

It is essential that the product and water probes be cleaned on a regular basis. This includes cleaning the probe shafts and floats using Phosphate free detergent, warm water and a soft brush. The required frequency of cleanings again is site specific and must be determined by the user. Failure to clean the probes will result in fouling that could cause system malfunction.

Since the HCPSCAV assembly must be removed from the well to perform maintenance on the intake strainer, such occasions should be used to carry out a general inspection of the entire assembly. Look for any hose cuts or leaks and verify that there is no damage to the check valve.

Water Pump Maintenance

The following is a schedule of water pump maintenance.

Water Table Depression Pump System Frequency of Maintenance Tasks / Quarterly Calendar												
Task	Week											
	1	2	3	4	5	6	7	8	9	10	11	12
Check flow rate to ensure minimum cycling frequency	•	•	•	•	•	•	•	•	•	•	•	•
Remove cover from probe and clean floats/conductivity sensors	•	•	•	•	•	•	•	•	•	•	•	•
Check start box for moisture accumulation		•		•		•		•		•		•
Take current draw readings and compare with motor specification				•				•				•
Inspect hoses and wires for cracks, cuts, and abrasions												•

Section 5: System Troubleshooting



These procedures are meant to be carried out by personnel qualified to work on electrical circuitry. If in doubt, obtain the services of a qualified electrician.

Getting Help

- Read the entire manual and become thoroughly familiar with all system components before initiating any of the following troubleshooting procedures.
- If the troubleshooting procedures in this section indicate a component failure, prepare a written list of all problems encountered while operating the equipment, then call Geotech Environmental Equipment for assistance.

Service Locations

Geotech Field Service personnel are trained on all aspects of the equipment and are dedicated to helping you maximize the efficiency and cost effectiveness of your HVPSCAV system. For technical support, call our Geotech Service office.

Geotech Environmental Equipment, Inc.

2650 East 40th Avenue

Denver, CO 80205

Toll Free Phone: (800) 833-7958

Commercial Phone: (303) 320-4764

Fax: (303) 322-7242

www.geotechenv.com

Troubleshooting Procedures

In the process of troubleshooting, it may be necessary to open the GECM control panel. In such cases, always disconnect the power before proceeding. Avoid shorting any power to the PCB or PCB cover. Since all probe wiring is rated Intrinsically Safe, probe connectors may be disconnected from their receptacles without disconnecting the power.

Troubleshooting the HVPSCAV is primarily a matter of checking the function of the intake strainer and the probes. The GECM is designed to be maintenance free. The water pump/motor is factory sealed with no field replaceable parts. Before proceeding with this section, refer to the troubleshooting section of your GECM User Manual.

Possible malfunctions are listed as follows:

HVPSCAV Product Pump

Problem: Product pump does not run.

Solution:

1. Check the (2) fuses in the pump start box with an ohmmeter. If they show an open connection, they need to be replaced.
2. Check the capacitor, does it have burn marks? Check the capacitor with the ohmmeter. A good capacitor will read a short (closed) connection at first and then gradually an open connection. A defective capacitor will show an open at all times.
3. Check the winding resistance to the pump/motor by disconnecting the wires from the capacitor and fuses see Figure 7 for the winding resistance values. If there is an open connection, the problem could either be with the pump/motor or with the pump start cable. To determine the source of the open connection, remove the pump by unscrewing the four Allen Bolts that hold the discharge head to the pump (disconnect the intake from the bracket as well). Gently pull off the pump; carefully remove the pump head gasket as set aside. Check the pump start cable with an ohmmeter from the wires (black, red, and white) in the start box to the 3 pins on the pump connector in the discharge head. If any of the 3 leads show an open connection to all of the pins, then the problem is in the start cable. Also, check the ground from the green wire to the pump discharge head body. If there are no open connections, then the pump/motor is most likely defective. Call Geotech for assistance, the pump/motor cannot be repaired in the field.

Problem: Product pump runs but does not deliver product.

Cause:

1. Clogged intake strainer.
2. Discharge valve closed.
3. The pump is plugged into a 115 VAC power source.

Solution:

1. Remove the pump assembly from the well and clean the intake strainer.
2. Confirm that the valve is open.
3. The pump runs on 230 VAC single-phase power, 115 VAC will cause the motor to spin but not push product to the surface.

Problem: Product pump runs on HAND but not AUTO.

Cause: The most likely source of the trouble in the AUTO mode is a probe circuit failure or a problem in the control panel.

Solution:

1. Check to make sure the probe 8-pin connector (optional) is securely attached to the control panel
2. Using an ohmmeter, the probe can be tested by manually lifting the floats.

Product Probe Switches

Probe Cable Connections

Switch Status

Pins E to H

Top float at the bottom of its travel is normally open, closes when the float is lifted up to the top of its travel.

Pins B to D

Bottom float at the bottom of its travel is normally open, closes when the float is lifted up.

Pins A to D

Bottom float at the bottom of its travel is normally open, closes when the float is lifted up to the top of its travel.

Problem: Water pump runs on HAND but not AUTO.

Cause: The most likely source of the trouble in the AUTO mode is a probe circuit failure or a problem in the control panel.

Solution:

1. Check to make sure the probe 8-pin connector (optional) is securely attached to the control panel.
2. Using an ohmmeter, the probe can be tested by manually lifting the floats.

Problem: Water pump running but no water delivered.

Cause:

1. Discharge valve closed.
2. Discharge hose kinked or blocked.
3. Pump motor running backwards (3 phase motors only).
4. Debris clogging intake to pump.
5. Cut wire.

Solution:

1. Open valve.
2. Locate blockage and clear.
3. Reverse any two legs at the connection between the pump power cord and the control panel.
4. Pull unit and inspect all wiring.

Water Probe Switches

Probe Cable Connections

Switch Status

Pins B to D

Top float at the bottom of its travel is normally open, closes when the float is lifted up.

Pins A to D

Top float at the bottom of its travel is normally open, closes when the float is lifted up to the top of its travel.

Pins E to H

Bottom float at the bottom of its travel is normally closed, opens when the float is lifted up to the top of its travel.

Tankfull Probe



The following applies to control panels with a Tankfull receptacle. As a safety measure, systems with an integrated Tankfull probe will shut down when the probe is disconnected or the cable is cut.

A – B

Normally Closed connection. Simulates that the Tankfull float is down. Pump will run. Removing the A – B jumper connection will simulate a Tankfull float up. Shuts pump off.

One common problem with the Tankfull probe not working is the float being installed upside down after cleaning.

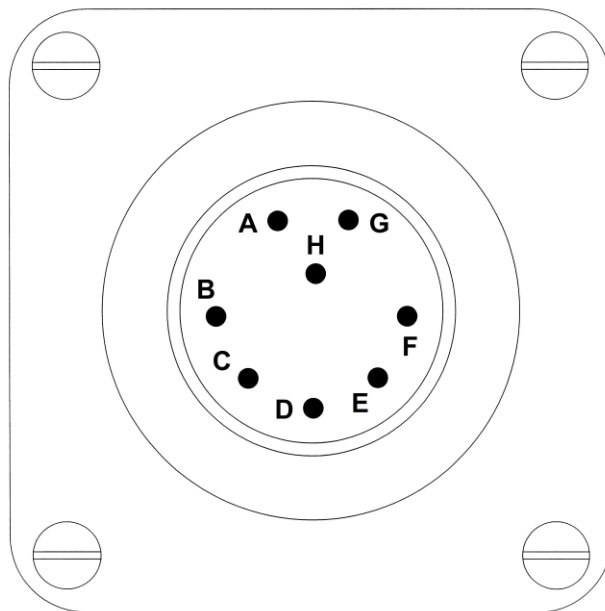


Figure 5-1: 8-pin Tankfull Probe Receptacle.

Section 6: System Specifications

Applications:	8" (20.3 cm) or larger recovery wells
Recovery Rate:	Up to 12 GPM (45 LPM)
Horse Power:	1/3 HP
Maximum Head:	81' (24.6 m)
Dimensions:	6" ID x 170" L (152.4 mm x 4318 mm)
Weight:	85 lbs. (38.6 kg)
Power Requirements:	230 VAC 50/60 Hz
Oil/Water Separation:	Density Sensor distinguishes hydrocarbons from water

Options

- Lifting Winch
- NEMA 4 or NEMA 7 Controls
- Tankfull Shut-Off
- 2" Density Actuated Product Probe w/Stainless Steel Floats
- 2" Density Actuated Water Probe w/Stainless Steel Floats

Section 7: System Schematic

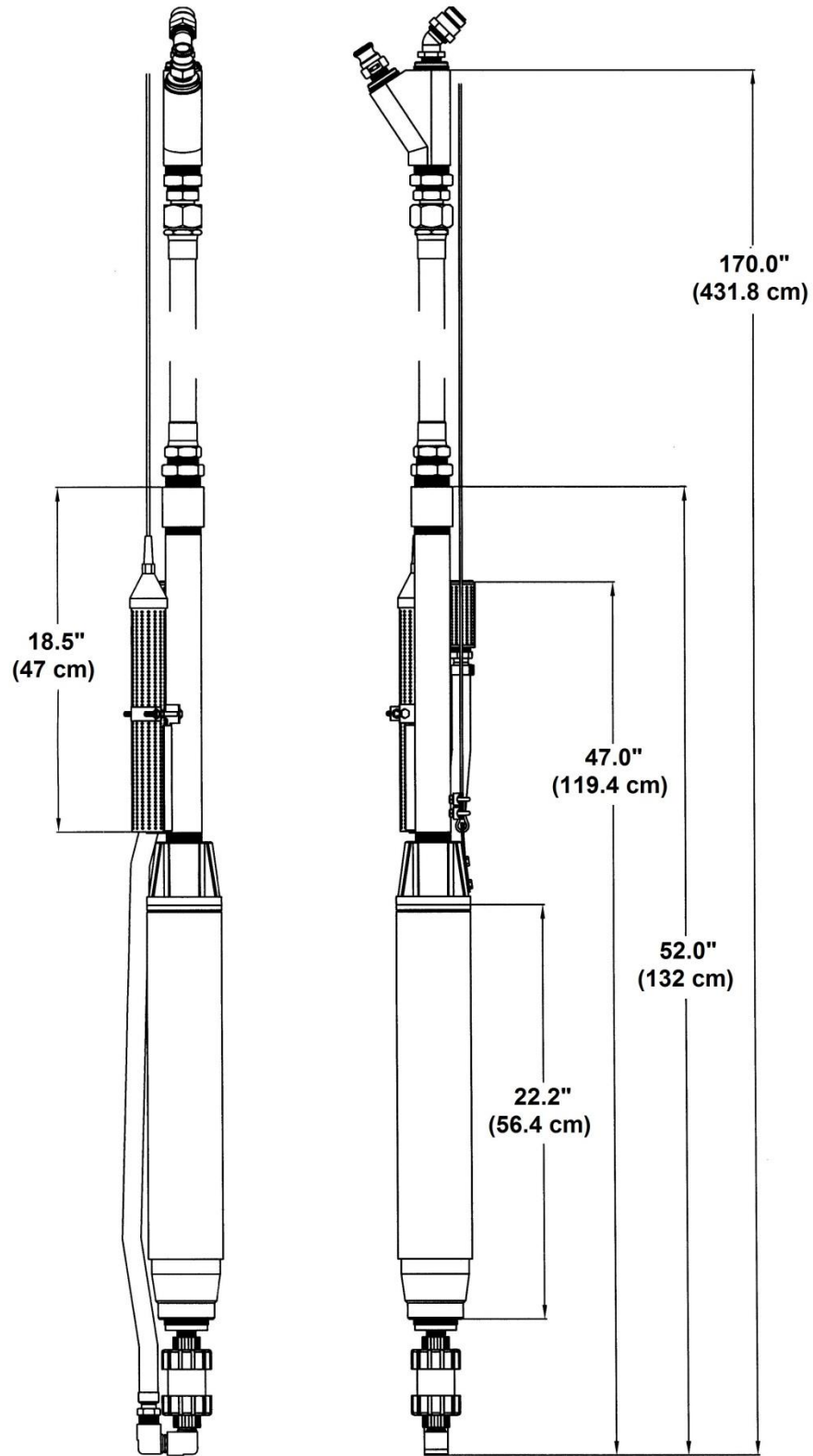


Figure 7-1: HVPSCAV Pump Dimensions

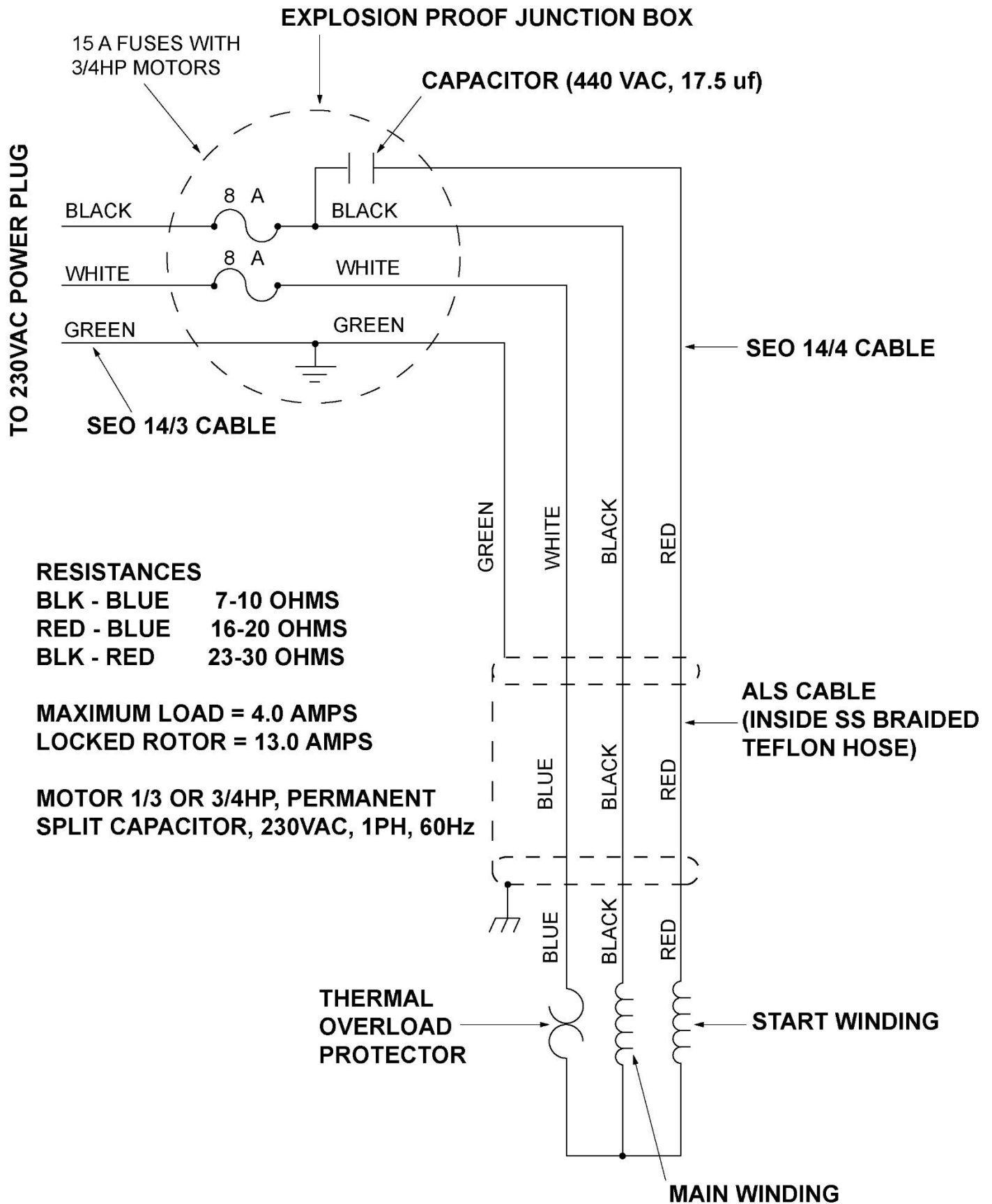


Figure 7-2: HVPSCAV Pump Schematic

Section 8: Winch Assembly and Operation

Winch assemblies are available for the High Volume Probe Scavenger system. Mount the winch on the well casing as shown in Figure 9. Attach the winch cable to the lift cable on the unit. Carefully lower the unit into the well and suspend at the desired level.

The cable on a standard winch has a rated breaking strength of 2000 lb. (907 kg) using the recommended design ratio of 1 to 5. The rated break strength gives a maximum hanging weight of 400 lb. (181 kg).

Because each application is different, it is impossible for Geotech to anticipate the exact hanging weight of your system. Hanging weight is the sum of pump weight, the weight of all discharge piping, and the weight of any water inside the piping. Although it is unlikely that you will exceed the 400 lb. (181 kg) maximum, Geotech highly recommends that you take the time to calculate the hanging weight of your system before deployment.

Use the following procedure to calculate hanging weight.

1. Weigh your pump assembly, including the intake and any attached probes.
2. The weight of the discharge piping can be calculated by weighing a sample length and multiplying by the number of feet suspended in the well. For example, 1.5" ID rubber hose weighs approximately 1 lb. (.45 kg) per foot (.3 m). Therefore, 100' (30 m) of this hose will weigh 100 lbs. (45 kg).
3. The weight of the water in the discharge piping can be estimated by calculating the volume of water in the piping and then converting the volume to weight as follows:

Volume in gallons

$$\text{Volume (in}^3\text{)} = \pi \times [\text{inside radius of pipe (in)}]^2 \times [\text{length of pipe (in)}]$$

$$\text{Gallons} = 0.00433 \times \text{Volume (in}^3\text{)}$$

$$1 \text{ Gallon (water)} = 8.325 \text{ lbs}$$

$$\text{Weight of Water (lbs)} = 8.325 \times \text{Gallons}$$

Volume in liters

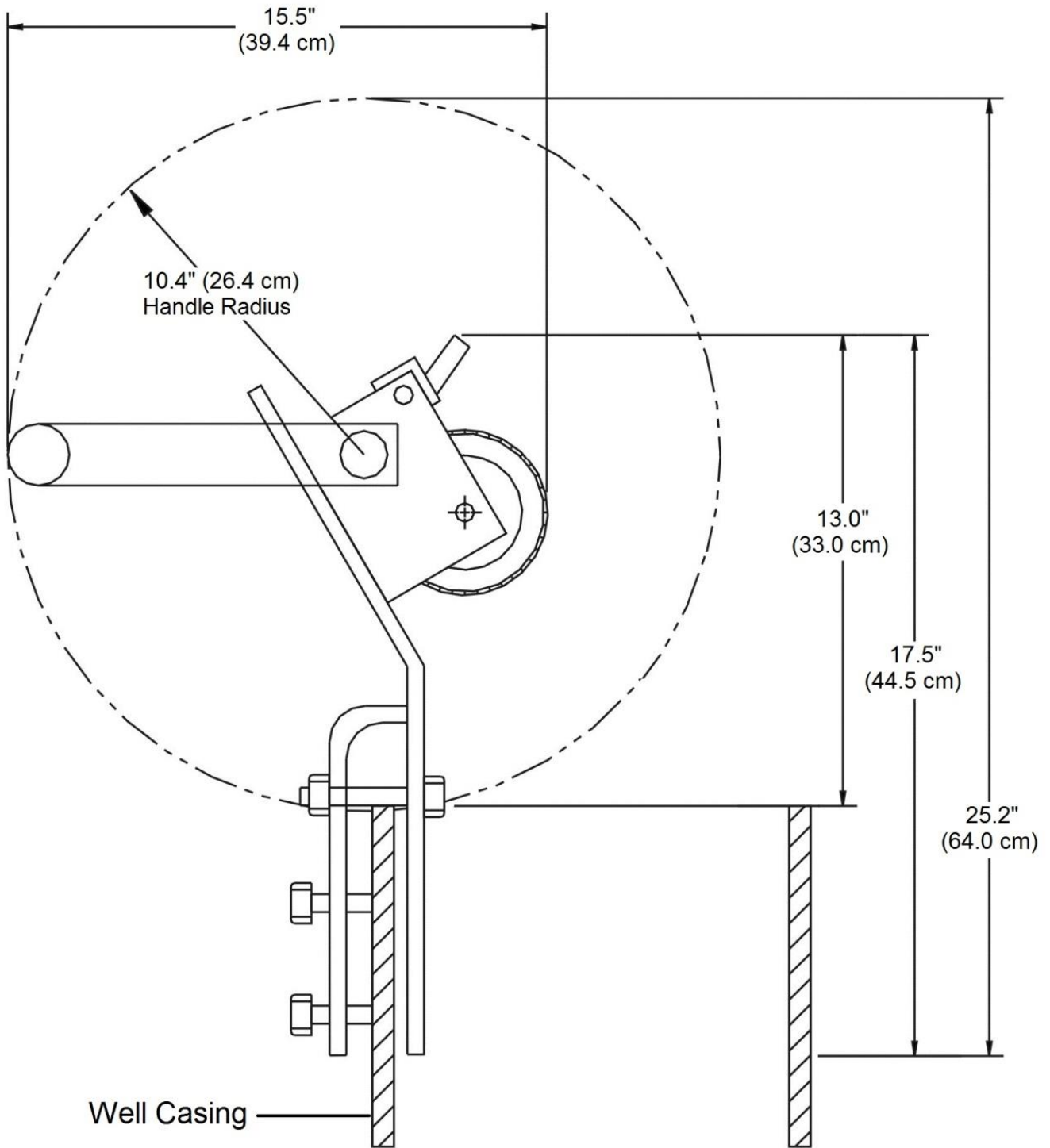
$$\text{Volume (cm}^3\text{)} = \pi \times [\text{inside radius of pipe (cm)}]^2 \times [\text{length of pipe (cm)}]$$

$$\text{Liters} = 0.001 \times \text{Volume (cm}^3\text{)}$$

$$1 \text{ Liter (water)} = 1 \text{ kg}$$

$$\text{Weight of Water (kg)} = \text{Total number Liters}$$

4. Find the sum of the pump weight, piping weight, and water weight. This sum will provide a close approximation of the total hanging weight. If the total hanging weight approaches or exceeds 400 lbs. (181 kg), then contact Geotech to discuss an optional winch cable with an increased break strength rating.



Note: Winch is 9" (22.9 cm) wide with handle attached.

Figure 8-1: Standard winch assembly attached to well head

Section 9: Replacement Parts and System Accessories

Part Description	Part number
Control Panel Option for HV PSCAV (includes TF)	
GECEM, 230V, HV PROBE SCAVENGER PRODUCT ONLY	86110020
GECEM,230V, HV PROBE SCAVENGER DUAL PUMP WTDP	86110021
High Volume SCAV Product Pump Downwell (Includes Start Box)	
PUMP/HOSE/ST BOX,1/3HP	2022018
PUMP/HOSE/ST BX,220V,50HZ	2023002
PROBE ASSY,SD,100' PRODUCT PROBE	2390072
PROBE, PROBE SCAV PRODUCT PROBE	56030008
Options	
PROBE ASSY,SD,100' OPTIONAL WATER PROBE	2390057
JUNCTION BOX, SIGNAL	2390065
JUNCTION BOX, XP	2390066
ASSY, WINCH, STD DUTY 17FT 1000 LB MAX	2020005
ASSY,WINCH,HEAVY DUTY,110FT 2500LB MAX	2030001
HOSE, GAS, .75" DIA, 150 PSI PRODUCT DISCHARGE	PPP001023
QDISC, BRS, .75M X .75" BARB PRODUCT DISCHARGE FTG	PPP007003
QDISC, BRS, .75" F X .75" BARB PRODUCT DISCHARGE FTG	PPP004002
TELEMETRY MODULE, GECEM/SIPPER	86200003
Replacement Parts	
HOSE & START CAB ASSY:83'	2020109
PUMP 1/3HP, 230V, 60HZ	PPP005009
UMP PUMP MOTOR 3/4HP, 220V, 50HZ	PPP005032
CAP, 17.5UF, 440V	PPP008032
FUSE HOLDER ASSEMBLY	2010029
FUSE, 8A, 250V, NON-DELAY	PPE011015
HOSE ASSY, 3" HOSE, INTAKE	2020023
CHECK VALVE ASSEMBLY, PVC	2010088
Accessories	
POWER RECEPTACLE ASSY, 230V, EP	1022903
TANKFULL PROBE, 25', NO CONN	2390073
TANKFULL PROBE W/ CONNECTOR	56020009
PROBE ASSY, SD, 100'	2390072
PROBE, DENS, WATER, W/ PTFE	56120001
PROBE, DENS, PRODUCT, W/ TEF	56120002
PROBE, SM DIA., DENS, 100'	56120007
MANUAL, PS, HIGH VOLUME	26030001
MANUAL, GECEM	16110163
¾ HP:	
PUMP,3/4HP,230V,50HZ,SST	2023002
CAP,17.5uF,440V	PPP005032
FUSE HOLDER ASSEMBLY	PPE008032
FUSE,15A,250V,NON DLY,ABC	2010029
CHECK VALVE ASSEMBLY,PVC	PPE011008
	2010088

Appendix A – Submersible Water Pumps

Refer to the installation and operation manuals included with your pump and motor. The following pages will include cable and motor specifications as well as start box schematics.

Two or Three Wire Cable, 60 Hz (Service Entrance to Motor – Maximum Length in Feet)

Motor Rating		AWG Copper Wire Size												
Volts	HP	14	12	10	8	6	4	3	2	1	0	00	000	0000
115	1/3	130	210	340	540	840	1300	1610	1960	2390	2910	3540	4210	5060
	1/2	100	160	250	390	620	960	1190	1460	1780	2160	2630	3140	3770
230	1/3	550	880	1390	2190	3400	5250	6520	7960	9690	11770			
	1/2	400	650	1020	1610	2510	3880	4810	5880	7170	8720			
	3/4	300	480	760	1200	1870	2890	3580	4370	5330	6470	7870		
	1	250	400	630	990	1540	2380	2960	3610	4410	5360	6520		
	1 1/2	190	310	480	770	1200	1870	2320	2850	3500	4280	5240		
	2	150	250	390	620	970	1530	1910	2360	2930	3620	4480		
	3	120*	190	300	470	750	1190	1490	1850	2320	2890	3610		
	5	0	0	180*	280	450	710	890	1110	1390	1740	2170	2680	
	7 1/2	0	0	0	200*	310	490	610	750	930	1140	1410	1720	
	10	0	0	0	0	250*	390	490	600	750	930	1160	1430	1760
	15	0	0	0	0	170*	270*	340	430	530	660	820	1020	1260

Lengths without the asterisk (*) meet the U.S. National Electrical Code ampacity for either individual conductors or jacketed 140°F (60°C) cable. Lengths marked * meet the NEC ampacity only for individual conductor 140°F (60°C) cable in free air or water, not in conduit. If cable rated other than 140°F (60°C) is used lengths remain unchanged, but the minimum size acceptable for each rating must be based on the NEC Table column for that temperature cable.



Flat molded cable is considered jacketed cable.

Maximum lengths shown maintain motor voltage at 95% of service entrance voltage, running at maximum nameplate amperes. If service entrance voltage will be at least motor nameplate voltage under normal load conditions, 50% additional length is permissible for all sizes. This table is based on copper wire. If aluminum wire is to be used, it must be two sizes larger.

Example: If the table calls for 12AWG copper wire, 10AWG aluminum wire would be required.

The portion of the total cable length which is between the supply and single phase control box with line contactor should not exceed 25% of the total maximum allowable, to ensure reliable contactor operation. Single Phase control boxes without line contactors may be connected at any point in the total cable length.

Lengths represent a 5% voltage drop. If 3% is required, multiply by .6 for maximum feet. Contact manufacturer for 167°F (75°C) or 194°F (90°C) cable lengths.



The portion of the total cable between the service entrance and a 3Ø motor starter should not exceed 25% of the total maximum length to assure reliable started operation.



Use of smaller than recommended cable voids warranty, can cause failure of the motor to start and operate properly, and may cause cable overheating.

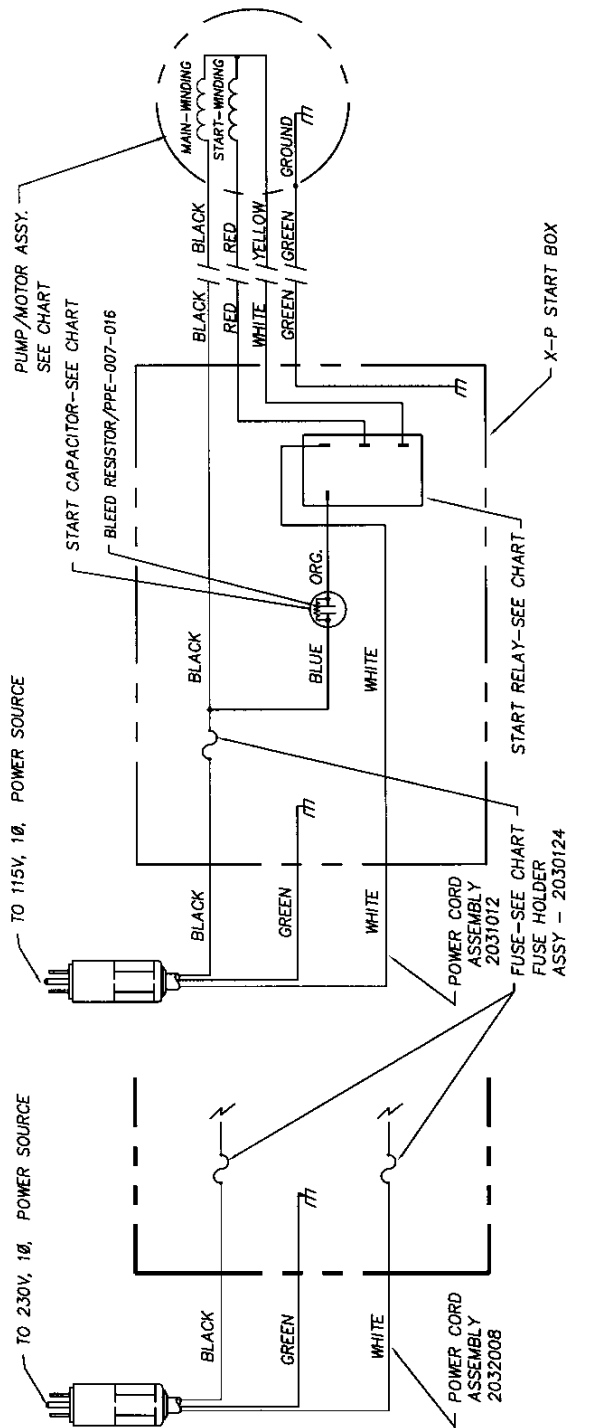
Three Phase Cable, 60 Hz (Service Entrance to Motor – Maximum Length in Feet)

Motor Rating		AWG Copper Wire Size													MCM Copper Wire Size						
Volts	HP	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500		
200V 60 Hz Three Phase Three Wire	1/2	710	1140	1800	2840	4420															
	3/4	510	810	1280	2030	3160															
	1	430	690	1080	1710	2670	4140	5140													
	1 1/2	310	500	790	1260	1960	3050	3780													
	2	240	390	610	970	1520	2360	2940	3610	4430	5420										
	3	180	290	470	740	1160	1810	2250	2760	3390	4130										
	5	110*	170	280	440	690	1080	1350	1660	2040	2490	3050	3670	4440	5030						
	7 1/2	0	0	200	310	490	770	960	1180	1450	1770	2170	2600	3150	3560						
	10	0	0	0	230*	370	570	720	880	1090	1330	1640	1970	2390	2720	3100	3480	3800	4420		
	15	0	0	0	160*	250*	390	490	600	740	910	1110	1340	1630	1850	2100	2350	2570	2980		
	20	0	0	0	0	190*	300*	380	460	570	700	860	1050	1270	1440	1650	1850	2020	2360		
	25	0	0	0	0	0	240*	300*	370*	460	570	700	840	1030	1170	1330	1500	1640	1900		
	30	0	0	0	0	0	0	250*	310*	380*	470	580	700	850	970	1110	1250	1360	1590		
230V 60 Hz Three Phase Three Wire	1/2	930	1490	2350	3700	5760	8910														
	3/4	670	1080	1700	2580	4190	6490	8060	9860												
	1	560	910	1430	2260	3520	5460	6980	8290												
	1 1/2	420	670	1060	1670	2610	4050	5030	6160	7530	9170										
	2	320	510	810	1280	2010	3130	3890	4770	5860	7170	8780									
	3	240	390	620	990	1540	2400	2980	3660	4480	5470	6690	8020	9680							
	5	140*	230	370	590	920	1430	1790	2190	2690	3290	4030	4850	5870	6650	7560	8460	9220			
	7 1/2	0	160*	260	420	650	1020	1270	1560	1920	2340	2870	3440	4160	4710	5340	5970	6500	7510		
	10	0	0	190*	310	490	760	950	1170	1440	1760	2160	2610	3160	3590	4100	4600	5020	5840		
	15	0	0	0	210*	330	520	650	800	980	1200	1470	1780	2150	2440	2780	3110	3400	3640		
	20	0	0	0	0	250*	400	500	610	760	930	1140	1380	1680	1910	2180	2450	2680	3120		
	25	0	0	0	0	0	320*	400	500	610	750	920	1120	1360	1540	1760	1980	2160	2520		
	30	0	0	0	0	0	260*	330*	410*	510	620	760	930	1130	1280	1470	1650	1800	2110		
460V 60 Hz Three Phase Three Wire	1/2	3770	6020	9460																	
	3/4	2730	4350	6850																	
	1	2300	3670	5770	9070																
	1 1/2	1700	2710	4240	6730																
	2	1300	2070	3240	5150	8050															
	3	1000	1600	2520	3970	6200															
	5	590	950	1500	2360	3700	5750														
	7 1/2	420	680	1070	1690	2640	4100	5100	6260	7680											
	10	310	500	790	1250	1960	3050	3800	4680	5750	7050										
	15	0	340*	540	850	1340	2090	2600	3200	3930	4810	5900	7110								
	20	0	0	410*	650	1030	1610	2000	2470	3040	3730	4580	5530								
	25	0	0	0	530*	830	1300	1620	1990	2450	3010	3700	4470	5430							
	30	0	0	0	430*	680	1070	1330	1640	2030	2490	3060	3700	4500	5130	5860					
40	0	0	0	0	500*	490	980	1210	1490	1830	2250	2710	3290	3730	4250						
50	0	0	0	0	0	640*	800	980	1210	1480	1810	2190	2650	3010	3420	3830	4180	4850			
60	0	0	0	0	0	540*	670*	830*	1020	1250	1540	1850	2240	2540	2890	3240	3540	4100			
75	0	0	0	0	0	0	0	680*	840*	1030	1260	1520	1850	2100	2400	2700	2950	3440			
100	0	0	0	0	0	0	0	0	620*	760*	940*	1130	1380	1560	1790	2010	2190	2550			
125	0	0	0	0	0	0	0	0	0	0	740*	890*	1000*	1220	1390	1560	1700	1960			
150	0	0	0	0	0	0	0	0	0	0	0	760*	920*	1050*	1190*	1340	1460	1690			
175	0	0	0	0	0	0	0	0	0	0	0	0	810*	930*	1060*	1190*	1300	1510			
200	0	0	0	0	0	0	0	0	0	0	0	0	0	810*	920*	1030*	1130*	1310			

Three Phase Cable, 60 Hz (Service Entrance to Motor – Maximum Length in Feet) (continued)

Motor Rating		AWG Copper Wire Size													MCM Copper Wire Size						
Volts	HP	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500		
460V 60 Hz Three Phase Three Wire	1/2	3770	6020	9460																	
	3/4	2730	4350	6850																	
	1	2300	3670	5770	9070																
	1 1/2	1700	2710	4240	6730																
	2	1300	2070	3240	5150	8050															
	3	1000	1600	2520	3970	6200															
	5	590	950	1500	2360	3700	5750														
	7 1/2	420	680	1070	1690	2640	4100	5100	6260	7680											
	10	310	500	790	1250	1960	3050	3800	4680	5750	7050										
	15	0	340*	540	850	1340	2090	2600	3200	3930	4810	5900	7110								
	20	0	0	410*	650	1030	1610	2000	2470	3040	3730	4580	5530								
	25	0	0	0	530*	830	1300	1620	1990	2450	3010	3700	4470	5430							
	30	0	0	0	430*	680	1070	1330	1640	2030	2490	3060	3700	4500	5130	5860					
	40	0	0	0	0	500*	490	980	1210	1490	1830	2250	2710	3290	3730	4250					
	50	0	0	0	0	0	640*	800	980	1210	1480	1810	2190	2650	3010	3420	3830	4180	4850		
	60	0	0	0	0	0	540*	670*	830*	1020	1250	1540	1850	2240	2540	2890	3240	3540	4100		
	75	0	0	0	0	0	0	0	680*	840*	1030	1260	1520	1850	2100	2400	2700	2950	3440		
	100	0	0	0	0	0	0	0	0	620*	760*	940*	1130	1380	1560	1790	2010	2190	2550		
	125	0	0	0	0	0	0	0	0	0	0	740*	890*	1000*	1220	1390	1560	1700	1960		
	150	0	0	0	0	0	0	0	0	0	0	760*	920*	1050*	1250*	1460*	1630	1780	2070		
175	0	0	0	0	0	0	0	0	0	0	0	810*	930*	1060*	1190*	1300	1510				
200	0	0	0	0	0	0	0	0	0	0	0	0	810*	920*	1030*	1130*	1310				
575V 60 Hz Three Phase Three Wire	1/2	5900	9410																		
	3/4	4270	6810																		
	1	3630	5800	9120																	
	1 1/2	2620	4180	6580																	
	2	2030	3250	5110	8060																
	3	1580	2530	3980	6270																
	5	920	1480	2330	3680	5750															
	7 1/2	660	1060	1680	2650	4150															
	10	490	750	1240	1950	3060	4770	5940													
	15	330*	530	850	1340	2090	3260	4060													
	20	0	410*	650	1030	1610	2520	3140	3860	4760	5830										
	25	0	0	520*	830	1300	2030	2530	3110	3840	4710										
	30	0	0	430*	680	1070	1670	2080	2560	3160	3880	4770	5780	7030	8000						
	40	0	0	0	500*	790	1240	1540	1900	2330	2860	3510	4230	5140	5830						
	50	0	0	0	0	640*	1000	1250	1540	1890	2310	2840	3420	4140	4700	5340	5990	6530	7580		
	60	0	0	0	0	0	850*	1060	1300	1600	1960	2400	2890	3500	3970	4520	5070	5530	6410		
	75	0	0	0	0	0	690*	860*	1060*	1310	1600	1970	2380	2890	3290	3750	4220	4610	5370		
	100	0	0	0	0	0	0	0	790*	970*	1190*	1460	1770	2150	2440	2790	3140	3430	3990		
	125	0	0	0	0	0	0	0	770*	950*	1160*	1400	1690	1920	2180	2440	2650	3070			
	150	0	0	0	0	0	0	0	0	800*	990*	1190*	1440	1630	1860	2080	2270	2640			
175	0	0	0	0	0	0	0	0	870*	1050*	1270*	1450*	1650	1860	2030	2360					
200	0	0	0	0	0	0	0	0	920*	1110*	1260*	1440*	1620	1760	2050						
460V-60 Hz Three Phase Six Wire	150	0	0	0	0	0	0	510*	630*	770*	950	1140	1380	1570	1790	2000	2180	2530			
	175	0	0	0	0	0	0	0	550*	680*	830*	1000	1220	1390	1580	1780	1950	2270			
	200	0	0	0	0	0	0	0	0	590*	730*	880*	1070	1210	1380	1550	1690	1970			
575V-60 Hz Three Phase Six Wire	150	0	0	0	0	0	650*	800*	990*	1210	1480	1780	2160	2450	2790	3120	3410	3950			
	175	0	0	0	0	0	0	0	700*	860*	1060	1300	1570	1910	2170	2480	2780	3040	3540		
	200	0	0	0	0	0	0	0	760*	930*	1140	1370	1670	1890	2160	2420	2640	3070			

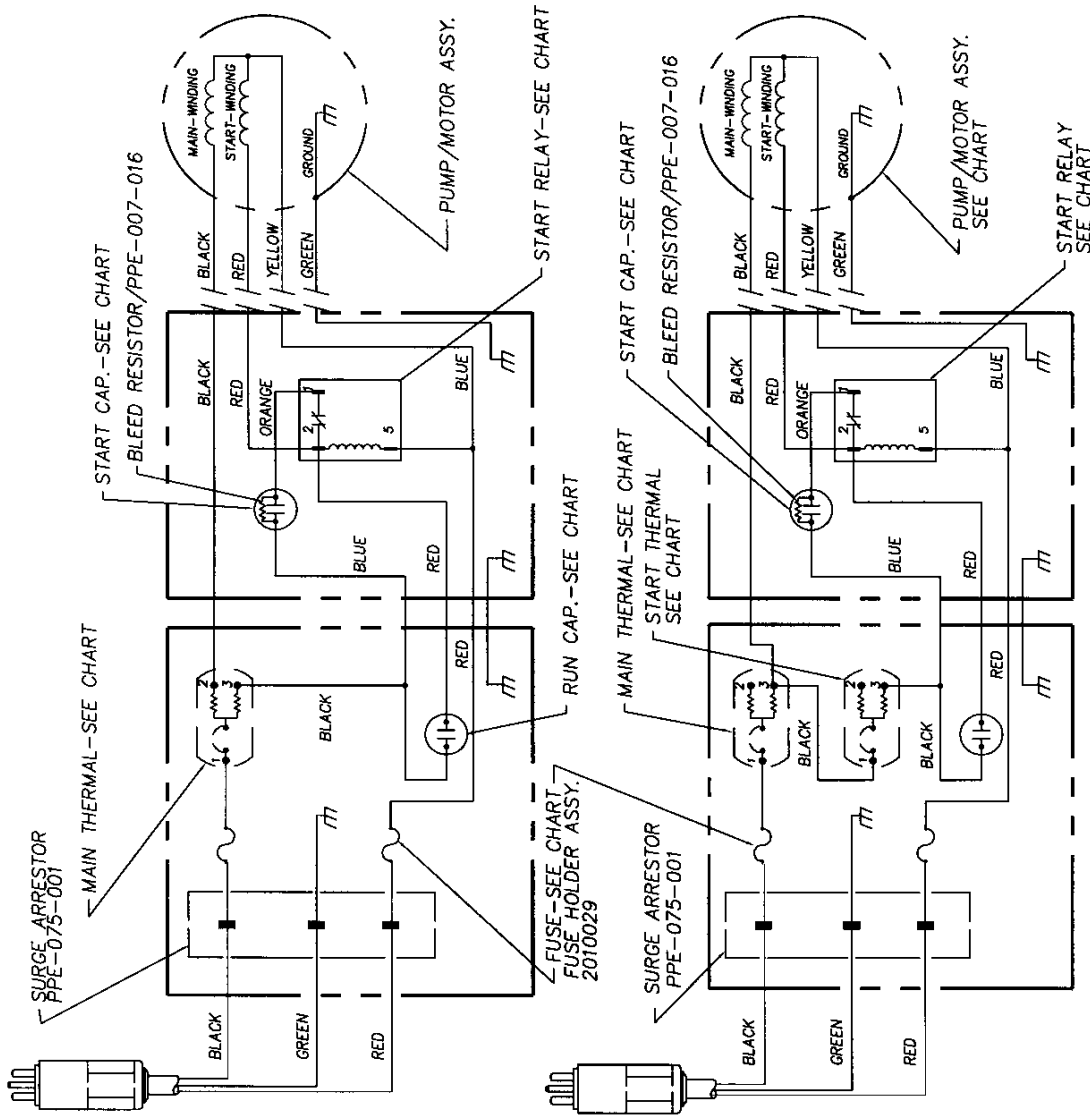
REF. DWGS	CE-31	CE-24	CE-6	CE-36	REF. DWG CE-11	REF. DWG CE-13
1/3HP ASSEMBLIES	115VAC	230VAC	115VAC	230VAC	3/4HP, 230VAC ASSEMBLY	1HP, 230VAC ASSEMBLY
RESISTANCES AT MOTOR					RESISTANCES AT MOTOR	RESISTANCES AT MOTOR
BLACK to YELLOW	1.5-1.9 ohm	6.0-7.4 ohm	1.0-1.3 ohm	4.2-5.2 ohm	BLACK to YELLOW	2.2-2.8 ohm
RED to YELLOW	5.7-7.1 ohm	23.4-28.6ohm	3.8-4.7 ohm	15.5-19.6 ohm	RED to YELLOW	9.5-11.7 ohm
CURRENT AT MOTOR					CURRENT AT MOTOR	CURRENT AT MOTOR
RUNNING CURRENT	7.0 AMP	3.5 AMP	9.6 AMP	4.8 AMP	RUNNING CURRENT	8.0 AMP
LOCK ROTOR CURRENT	32.8 AMP	16.4 AMP	46.0 AMP	23.1 AMP	LOCK ROTOR CURRENT	42.0 AMP



START BOX SCHEMATICS FOR 60HZ DEEP WELL SUBMERSIBLE WATER PUMPS

ASSEMBLY #	PUMP/MOTOR	START CAPACITOR	START RELAY	FUSE SIZE
2031037	1/3HP, 115V, 60HZ, 1PH.	159-191uF, 115VAC	SOLID STATE, 1/3HP, 115V	ABC 25 AMP
	PPE-018-062	PPE-008-064	PPE-014-097	PPE-011-012
2032059	1/3HP, 230V, 60HZ, 1PH.	43-53uF, 230VAC	SOLID STATE, 1/3HP, 230V	ABC 15 AMP
	PPE-018-039	PPE-008-051	PPE-014-098	PPE-011-008
2031035	1/2HP, 115V, 60HZ, 1PH.	250-300uF, 115VAC	SOLID STATE, 1/2HP, 115V	ABC 30 AMP
	PPE-018-016	PPE-008-036	PPE-014-099	PPE-011-001
2032106	1/2HP, 230V, 60HZ, 1PH.	59-71uF, 230VAC	SOLID STATE, 1/2HP, 230V	ABC 15 AMP
	PPE-018-061	PPE-008-047	PPE-014-100	PPE-011-008
2032010	3/4HP, 230V, 60HZ, 1PH.	86-103uF, 230VAC	SOLID STATE, 3/4HP, 230V	ABC 20 AMP
	PPE-018-014	PPE-008-025	PPE-014-101	PPE-011-014
2032053	1HP, 230V, 60HZ, 1PH.	105-126uF, 230VAC	SOLID STATE, 1HP, 230V	ABC 25 AMP
	PPE-018-015	PPE-008-009	PPE-014-102	PPE-011-012

Figure A-1: Start Box Schematics for 60Hz Deep Well Submersible Water Pumps



1.5 HP SCHEMATIC
REF. DRAWING: CE-12

1.5HP, 230VAC ASSEMBLY	
RESISTANCES AT MOTOR	
BLACK to YELLOW	1.5-1.9 ohm
RED to YELLOW	6.2-8.5 ohm
CURRENT AT MOTOR	
RUNNING CURRENT	9.1 AMP
LOCK ROTOR CURRENT	52.0 AMP

2 HP SCHEMATIC
REF. DRAWING: CE-5

2HP, 230VAC ASSEMBLY	
RESISTANCES AT MOTOR	
BLACK to YELLOW	1.6-2.3 ohm
RED to YELLOW	5.2-7.1 ohm
CURRENT AT MOTOR	
RUNNING CURRENT	10.0 AMP
LOCK ROTOR CURRENT	51.0 AMP

START BOX SCHEMATICS FOR 60Hz DEEP WELL SUBMERSIBLE WATER PUMPS

ASSEMBLY #	PUMP/MOTOR	START CAP.	RUN CAP.	START RELAY	FUSE SIZE	THERMALS
2032057	1.5 HP, 230V, 60Hz, 1PH.	105-126UF, 220VAC	10UF, 370VAC	MECH., 230V, 60Hz	ABC 30 AMP	MAIN:PPE-066-001
	PPE-018-043	PPE-008-009	PPE-008-023	PPE-014-104	PPE-011-011	START: NONE
2032022	2HP, 230V, 60Hz, 1PH.	104-126UF, 220VAC	20UF, 370 VAC	MECH., 230V, 60Hz	ABC 30 AMP	MAIN:PPE-066-011
	PPE-018-023	PPE-008-113	PPE-008-044	PPE-014-104	PPE-011-001	START:PPE-066-010

Appendix B - Decontamination Procedures

Some common decontamination solutions are listed below along with the contaminants they are effective against:

<u>Solution</u>	<u>Effective Against</u>
Water polar	Short-chain hydrocarbons, inorganic compounds, salts, some organic acids, other compounds.
Dilute Acids	Basic (caustic or alkaline) compounds, amines, hydrazines.
Dilute Bases	Acidic compounds, phenols thiols, some nitro- and sulfonic compounds.
Organic solvents	Non-polar compounds (such as some organic compounds)

The use of organic solvents is not recommended because:

- 1) Organic solvents can permeate and/or degrade the protective clothing and
- 2) They are generally toxic and may result in unnecessary employee exposure to hazardous chemicals.

When in doubt, use a dish washing liquid detergent. As a decontamination solution, it is readily available, is the safest of all the above, and is usually strong enough if used generously. The use of steam can also be effective for decontamination. A water-laser (pressurized water) is exceptionally valuable.

The following substances are noted for their particular efficiency in removing certain contaminants or for decontaminating certain types of equipment.

<u>Solution</u>	<u>Effective Against</u>
Penetone	PCB Contamination (since penetone may also remove paint, it is a good idea to spot-test before use)
Phosphate free detergent	Contaminated pumps
Ivory liquid	Oils
Diluted HTH	Cyanides
Radiac	Low-level radioactivity
Isopropanol	Biological agents (should not be used on rubber products since it will break down rubber)
Hexane its	Certain types of lab or sampling equipment (use of hexane is discouraged due to flammability and toxicity)
Zep	General Purpose cleaning
Phosphate free detergent	General Purpose cleaning

Decontamination Solutions to Avoid

Some decontamination solutions should be avoided because of their toxicity, flammability, or harmful effects to the environment.

Halogenated hydrocarbons, such as carbon tetrachloride, should not be used because of their toxicity, possible incompatibility, and some because of their flammability.

Organic decontamination solutions should not be used on personal protective equipment (PPE) because they may degrade the rubber or other materials comprising the PPE.

Mercurials are sometimes used for sterilization. They should be avoided because of their toxicity.

Chemical leaching, polymerization, and halogen stripping should be avoided because of possible complications during decontamination.

Sand-blasting, a method of physical removal, should be avoided because the sand used on the contaminated object usually needs to be disposed of as hazardous waste, a very costly proposition. In addition, sand-blasting exposes personnel to silica, a carcinogen.

Freon is known to be particularly effective for the cleansing of PCB's but its effect on the ozone layer is extremely harmful. Its use is discouraged.

Strong acids or bases should not be used when cleaning metals and gaskets or tools or other equipment because of the possibility of corrosion.

Disposal of Decontamination Solutions and Waste Water

All solutions and water used for decontamination must be collected. If lab analysis indicates that the water and/or solutions exceed allowable contamination levels, they must be treated as hazardous waste. Alternatively, the solutions and water may be treated on-site to lower the contamination levels and render them non-hazardous.

Containers such as 55-gallon drums should be available for storage of wastes.

Spent decontamination solutions can be collected by using heavy-duty plastic sheets, visqueen sheets, kiddie pools, or if needed, a larger containment basin. The decontamination of equipment must be performed on the sheets or in the basins. They could be placed on a slight angle so that the spent decontamination solutions drain into a collection basin or drum.

Recommended Supplies for Decontamination of Personnel, Clothing and Equipment

The list below contains recommendations for supplies that would be on hand for the decontamination of personnel, clothing and equipment. Depending on the site activities, not all of these items may be needed. Alternatively, some additional items not listed here may be required.

- Drop cloths of plastic or other suitable material, such as visqueen, for heavily contaminated equipment.
- Disposal collection containers, such as drums or suitably lined trash cans for disposable clothing and heavily contaminated personal protective clothing or equipment to be discarded.
- Lined box with adsorbent for wiping or rinsing off gross contaminants and liquid contaminants.

- Wash tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Rinse tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system)
- Wash solutions selected to wash off and reduce the hazards associated with the contaminated wash and rinse solutions.
- Rinse solution (usually water) to remove contaminants and contaminated wash solutions
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Storage containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate method for containing and collecting contaminated wash and rinse water spilled during decontamination.
- Shower facilities for full body wash or at a minimum, personal wash sinks (with drains connected to a collection tank or appropriate treatment system).
- Soap or wash solution, washcloths and towels.
- Clean clothing and personal item storage lockers and/or closets.

DOCUMENT REVISIONS		
EDCF#	DESCRIPTION	REV/DATE
-	Previous Release	10/8/2017
2045	Updated Figure 2-1 and 7-2. Minor style edits and changes. – StellaR	10/18/2017
PROJECT #1658	Parts number list update. Updated formatting. Additional minor edits - StellaR	9/24/2018

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR
SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

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