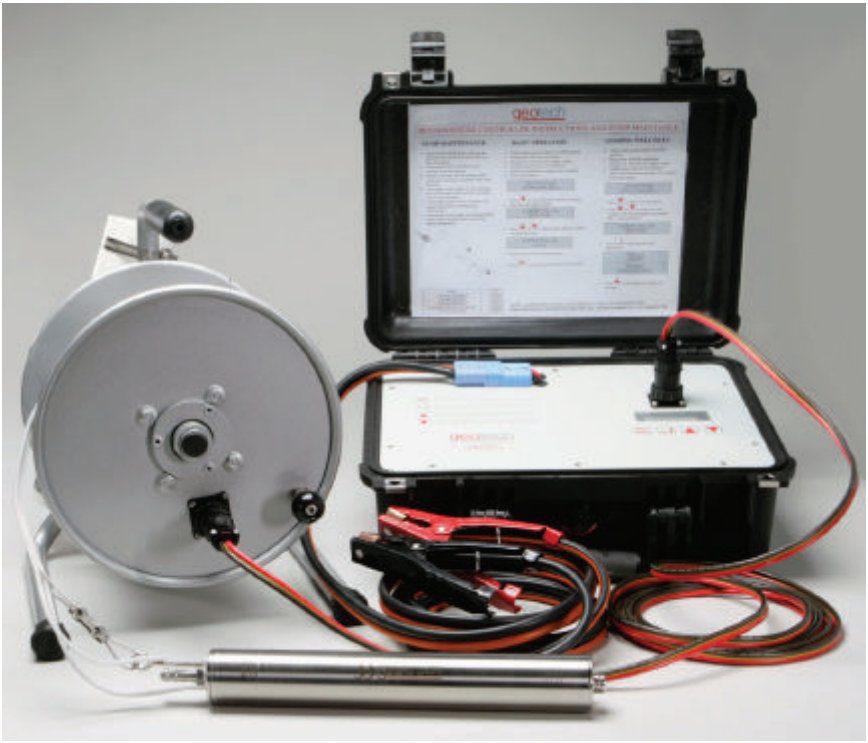
geotech

Buck Booster
and
SS Geosub

Installation and Operation Manual



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DOCUMENTATION CONVENTIONS

This manual 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.

In order to ensure that your Buck Booster Controller has a long service life and operates properly, adhere to the cautions below and read this manual before use.

- Controller power input source must not exceed maximum ratings.
- Input power leads must not be reversed.
- Never submerge controller.
- Avoid pulling on wires to unplug controller wiring.
- Avoid using controller with obvious physical damage.
- To prevent controller damage, avoid dropping controller.
- Do not connect positive output to ground or any other voltage source.
- The unit is potentially capable of overpowering pumps. Do not exceed maximum voltage per pump cable length chart. This does not apply to SS GEOSUB (See Chapter 6: System Specifications).
- It is recommended by Geotech that if this unit is powered by an automotive battery located under the hood, that it only be operated when the engine is running. Operating this unit at full power will quickly discharge a battery to an extent that it will not be capable of starting an engine.
- Removing power without observing minimum reset off time may result in improper control reset. Minimum reset off time has elapsed when display goes blank.

Chapter 1: System Description

Buck Booster Function and Theory

The Buck Booster Controller is a unique control for operating down well sampling pumps.

The Buck Booster is designed to provide the voltage and current requirements of the SS GEOSUB pump. In addition the Buck Booster can overcome line loss when driving 12V pumps.

Geotech's Buck Booster controller has been designed and manufactured to provide a long and trouble free service life during harsh field operation. In general, the display will indicate any fault conditions that can be remedied in the field.

Typically, 12V pumps are powered by a 12V battery. However, due to line losses in the cable to the pump, the 12V pump seldom gets 12V. Line losses vary with length and gauge of cable (See Chapter 6: System Specifications). The Buck Booster Controller was developed to make up for these line losses by boosting the battery supply voltage. This allows users to get full efficiency out of their 12V pumps. When a user's needs include low flow sampling, the Buck Booster steps up with Ultra Fine resolution adjustment and high visibility output display. The flow adjustment makes it easy for the user to adjust flow rate of Geotech's SS GEOSUB. The controller also includes a user settable dry run protection feature.

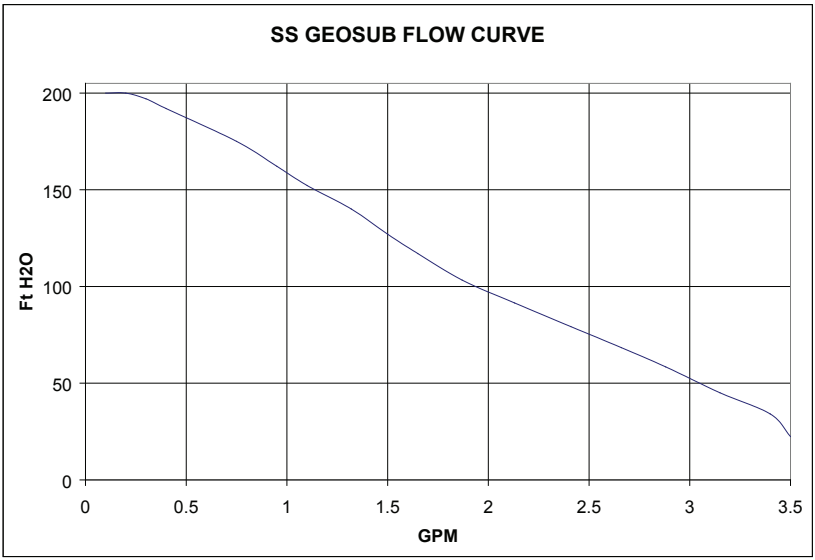
Features

- Boosts 12V DC battery power up to 30 Volt / 14 AMP/ 420 Watt output
- Electronic current limiting and short circuit protection.
- 16 x 2 line alphanumeric wide temperature range vacuum fluorescent display.
- 10' 6 AWG input power cable, heavy duty battery clamps
- Continuously adjustable output voltage (0 to full power)

Pump function and theory

The Geotech SS Geosub environmental pump is a fully submersible pump designed specifically for use in ground water sampling. All wetted parts are made from high quality inert materials so sample integrity is not affected during sampling. The SS Geosub flow rate can be adjusted to change from well purge flow rates to low flow sampling. See included graphs for flow rates and operating depths. Pump depth and flow are model dependant. For best low flow sampling results use the information below.

Pump charts



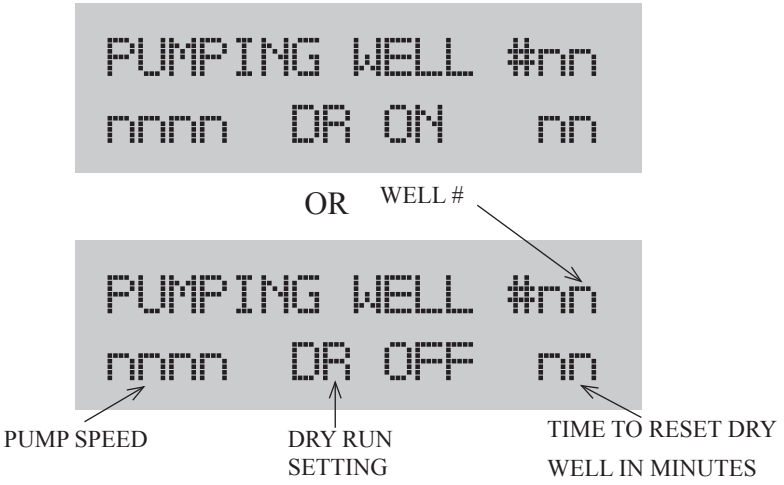
Dry Run Feature Operation and Theory

The dry run pump protection feature operates by measuring the output current level and comparing it to a user enterable set point. Many factors can influence the pump current draw, including head pressure, length of tubing and length of cable. Under all conditions, one thing remains the same: While pumping water, the pump draws higher current from the controller than when it is out of water and running dry regardless of other variables.

Dry Run is intended for use in situations where flow rates are above .1 GPM. Results using DRY RUN with lower flow rate are unreliable.

Pump Speed Control Operation and Theory

Pump speed control is achieved by pressing the up or down button during run time. The number can be adjusted from 0 to 3000 in increments of 5. The adjustments can be made one at a time by pressing a button once or can be changed rapidly by holding a button down continuously. This number is representative of the output voltage. Under some circumstances the internal current limiting may limit the output power before full voltage is reached. This is most likely to occur at high flow and/or short cable lengths. The SS Geosub requires a minimum voltage to operate. If the output is reduced below this point the pump will shut down and an error message will show on the display. This point will vary based on pump conditions, but will typically be around 1000. This fault condition is most obvious when a system has: high flow, low pressure and long cable. The Geotech disposable pumps do not have this minimum voltage requirement



Chapter 2: System Installation

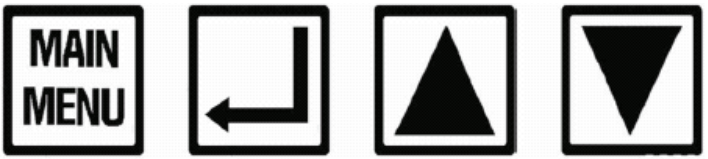
Caution:
Buck Booster controller installation should be performed only by qualified persons. Reading this manual is essential to operating this equipment safely. If after reading this manual you are still unsure about the operation of this equipment, contact Geotech for further information and training.

Caution:
The Buck Booster controller has been designed for use with Geotech's Electrical Submersible Pumps ONLY. The controller must be operated in a dry location. (See CHAPTER 5: SYSTEM TROUBLE SHOOTING for common fault conditions and suggestions on how to correct common issues.)

If status display shows MAIN MENU proceed to CHAPTER 3: SYSTEM OPERATION. If display is blank, shows fault or error condition, proceed to CHAPTER 5: SYSTEM TROUBLESHOOTING.

Chapter 3: System Operation

Key Pad Description:



The 

button will return you to the MAIN MENU from anywhere in the program.

The  button is used to confirm selections and advance to the next section of the program.

The  arrow is used to start the pump, raise the speed of the speed of the pump, and adjust settings in the program.

The  arrow is used to lower pump speed and adjust other settings of the program.

Basic Operation

- Attach red and black handled cables to terminals on 12VDC power source.
- Wait for initialization sequence to complete.
- Press ▲ to start the pump at default settings.

```
UP    START PUMP
DOWN  LOAD WELL
```

- Wait for pump start up sequence to complete.

```
PUMPING WELL #nn
PUMP START UP
```

- Press ▲ or ▼ to adjust pump speed to achieve desired flow rate.

```
PUMPING WELL #nn
nnnn  DR ON   nn
```

OR

- Pump water at desired pump speed.

```
PUMPING WELL #nn
nnnn  DR OFF  nn
```

- Press MAIN MENU to stop pump and return to the MAIN MENU.

Dry Run and Save Instructions

- Attach red and black handled cables to terminals on 12VDC power source.
- Wait for initialization sequence to complete.
- Choose from MAIN MENU:
- Press ▲ to start the pump at default settings.

```
PUMPING WELL #nn
PUMP START UP
```

- Wait for pump start up sequence to complete.

```
PUMPING WELL #nn
PUMP START UP
```

- Press ▲ or ▼ to adjust pump speed to desired point.

```
PUMPING WELL #nn
nnnn  DR ON   nn
```

OR

```
PUMPING WELL #nn
nnnn  DR OFF  nn
```

- Press ↵ to toggle Dry (DR) Run on or off.
- Hold down ↵ button for 3 seconds to enter Dry Run reset time change menu and well save menu.

- Press ▲ and ▼ buttons to change reset from dry run time from 0 to 60 minutes.

```
ENTER DR RESET
nn MIN(S)
```

- Press ↵ to advance to well # write menu.
- Press ▲ and ▼ buttons to choose the well # you would like to save new parameters in. Up to 80 unique wells can be saved.

```
SAVE  ENTRIES IN
 WELL  #nn?
```

- Press ↵ to save new parameters that can be recalled under the selected well number at a later time.

```
OVERWRITE
WELL# nn ?
```

- Confirm overwrite by pressing the ↵ button. Cancel overwrite by pressing the MAIN MENU button.
- Observe desired settings are displayed in the runtime menu.

Loading Saved Well

- Attach red and black handled cables to terminals on 12VDC power source.
- Wait for initialization sequence to complete.

```
PUMPING WELL #nn
PUMP START UP
```

- Choose from MAIN MENU:
- Press ▼ to enter well load menu.

```
UP    START PUMP
DOWN   LOAD WELL
```

- Press ▲ or ▼ to select the well number and pre-set the parameters you would like to start pumping from.

```
CHOOSE WELL #nn
nnnn  DR OFF nn
```

- Press ↵ to load selected well parameters.

```
WELL #nn
LOADED
```

- Press ▲ to start pump at loaded well settings.

```
UP    START PUMP
DOWN   LOAD WELL
```

LOADING WELL #0 WILL LOAD DEFAULT START-UP CONFIGURATION.

Preset well settings

- Attach red and black handled cables to terminals on 12VDC power source.
- Wait for initialization sequence to complete.
- Choose from MAIN MENU:
- Press ↵ to go to well setup menus.
- Press ▲ or ▲ to select the speed setting you would like to start pumping at.

- Press ↵

```
SET SPEED
nnn
```

- Press ▲ or ▼ to select how long the controller waits to start pumping again after dry run protection has been activated.

```
NEW RESET TIME
nn MIN(S)
```

- Press ↵

```
NEW RESET TIME
nn MIN(S)
```

- Press ▲ or ▼ to select the well number to save these parameters in.

```
SAVE  ENTRIES IN
WELL  #n
```

- Press ↵ You will now be returned to the MAIN MENU screen. From here you can press the ▲ button to begin pumping at the settings just entered.

Display Descriptions

- MAIN MENU. Press ▲ button to start the pump. Press the ▼ button to load saved data based on well number.

```
UP    START PUMP
DOWN   LOAD WELL
```

- This message is shown after pressing the up button from the MAIN MENU. You can press MAIN MENU to stop the pump and return to the MAIN MENU.

```
PUMPING WELL #nn
PUMP START UP
```

- This message is shown after pressing the ▼ button in the MAIN MENU. You can use the ▲ and ▼ buttons to scroll through the well numbers from 0 to 80. The bottom line shows the parameters specific to the well number shown. Press ↵ to load the chosen well parameters.

```
CHOOSE WELL #nn
nnnn  DR OFF nn
```

- This message is shown after pressing ↵ to choose to load well # nn information.

```
WELL #nn
LOADED
```

- This is the run time message shown during normal operation. Press ▲ or ▼ to adjust pump speed to desired set point. Press ↵ to change: Dry Run on or off. Hold ↵ for 3 seconds to change reset dry run time, and well # to save parameters. Press MAIN MENU to stop pumping and return to Main Menu. See page 6 for description of numbers.

```
PUMPING WELL #nn
nnnn  DR ON   nn
```

OR

```
PUMPING WELL #nn
nnnn  DR OFF  nn
```

- This message is shown if during soft start no pump is detected. There are various reasons for this to happen. Check to see if the connector is secure and that the cable is not broken. Press MAIN MENU

```
NO PUMP DETECTED
ATTACH PUMP
```

- This message is shown during runtime if the pump speed set point is raised to a point that overloads the output. The controller will automatically detect when max output has been reached and prevent the user from increasing the output further.

```
PUMPING WELL #nn
 !AT MAX POWER!
```

- This message is shown during set-up menus for adjusting the time the controller waits to reset after a dry run fault has been detected.

```
ENTER DR RESET
nn MIN(S)
```

- This message displays when an entry has been changed but not saved to controllers memory for recall.

```
ENTRIES NOT!
SAVED!!!!!!
```

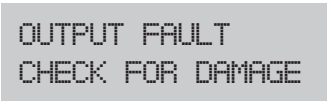
- This message is shown when the pump is no longer submerged in water during normal run time operation mm:ss indicates the time left in minutes: seconds before pumping is restarted. If the pump is still not submerged the controller will restart the counter and return to this message. Press ▲ to manually override the Dry Run counter and return to normal run time opertion.

```
DRY RUN ALARM
PUMPING IN nn:nn
```

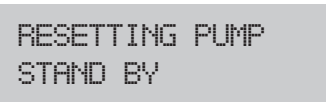
- This message is shown if the Dry Run counter has been manual overridden.

```
HANG ON WE'RE
RESETTING
```

- This message is shown when there is a short circuit fault on the controller output. Check the cable and pump carefully for any damage that may have occurred.



- This message is shown when the operator has chosen to exit any runtime menu and is returning to the Main Menu.



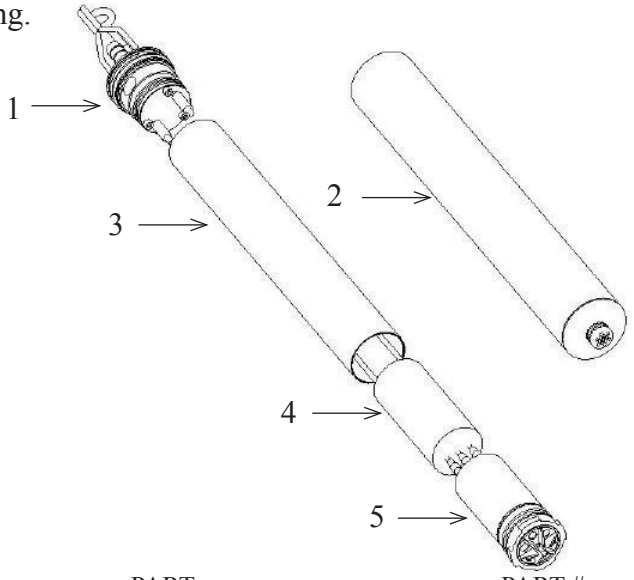
- This menu lets you choose which # to save new parameters in.

- This menu asks you to confirm your choice to overwrite information currently stored in well # nn

Chapter 4: System Maintenance

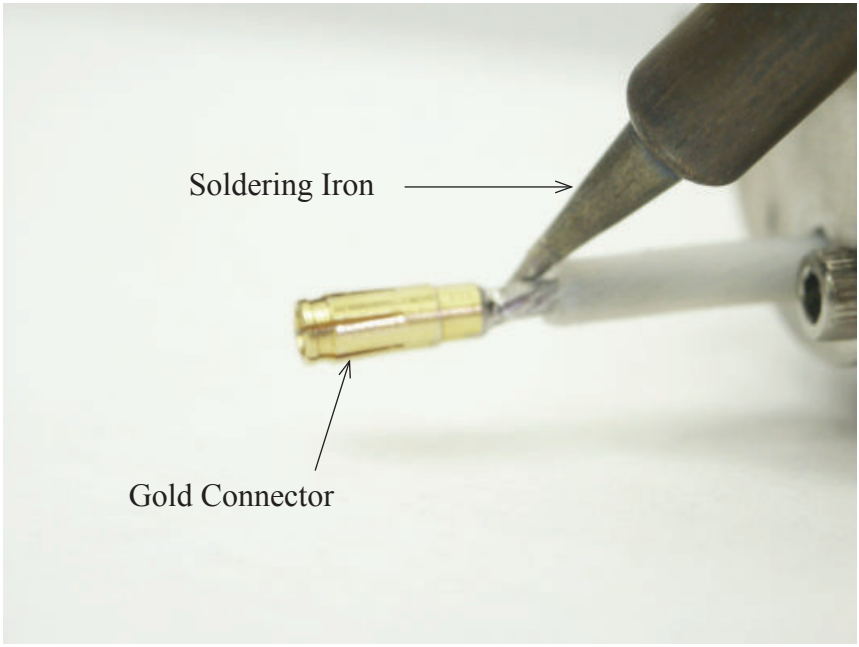
Controller:
Clean the controller as needed with mild soap and water on a cloth. Do not use abrasive cleaners or solvents. Do not spray with water or any other liquid or pressured solvents.

Pump:
Clean the pump between sampling events using Alconox detergent and water. Cleaning the pump between uses is important to keep the impeller from getting stuck in place, making it impossible to pump water. Fine grits and particulate matter can cause threads and tight fitting parts to become extremely difficult to disassemble if left to dry in the pump after use. The pump can be disassembled completely for decontamination and cleaning.

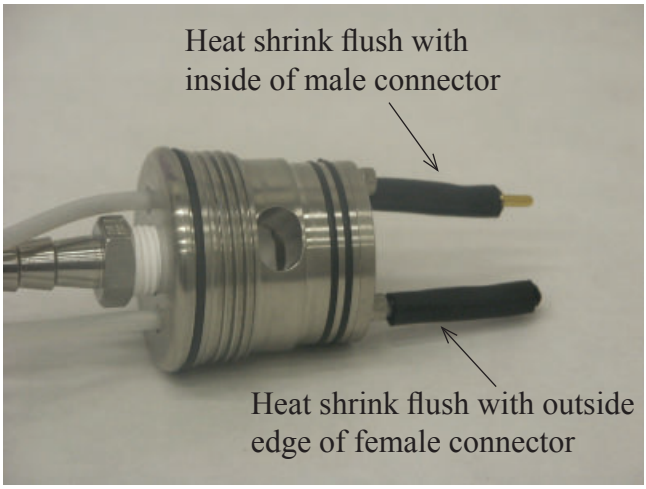


PART	PART #
1. TOP CAP ASSEMBLY	21200076
2. OUTER HOUSING WELDMENT	21200122
3. INNER HOUSING	21200072
4. CONTROL MODULE	51200083
5. MOTOR ASSEMBLY	51200089
6. BUCK BOOSTER	81200010

From time to time it may become necessary to replace the gold connectors on the down well cable end. This can be done by simply cutting the tip of the individual conductors off. Strip and tin the end of the cables, then solder new connectors on. Male connectors go onto the red striped conductor and female go on the unmarked conductor. When stripping the individual conductors start by stripping approximately 3/8” from the end with 12 AWG wire strippers. Then strip the very last 1/8” of exposed wire with 14 AWG wire strippers. This removes the out most strands and allows the wire to fit into the solder cups on the connectors. Use the remaining 1/4” of exposed wire to transfer heat for soldering the connector without getting solder on the outside of the connector solder cup diameter.



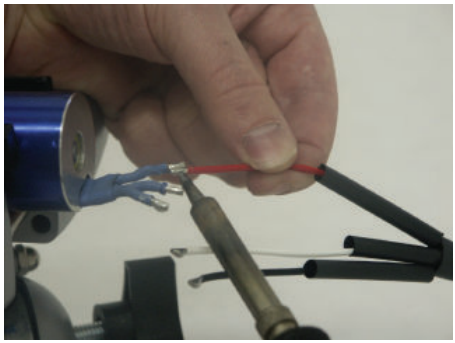
After connectors are attached, cover joints and connectors with heat shrink. Notice heat shrink is flush with outer edge of female connector and flush with inner edge of male connector.



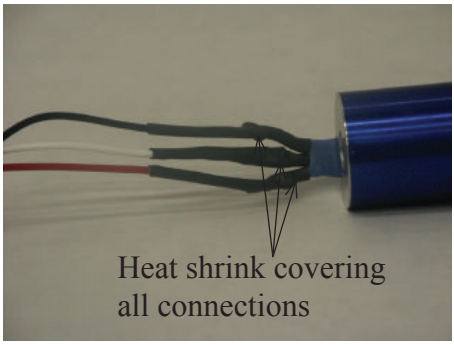
From time to time it may become necessary to replace your Geosub control module. This can be done by removing existing heat shrink between the control module and motor assembly. When removing heat shrink, be careful to not damage the insulation on any wires. Disconnect the control module for the top cap and motor assembly.

Replacing your control module

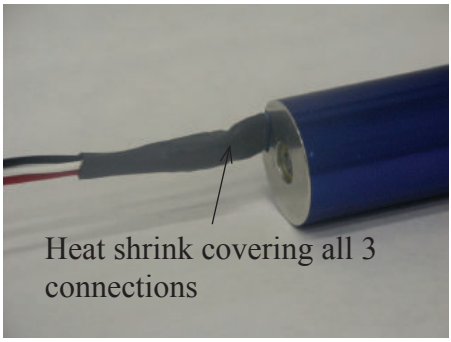
Connect the control module to the top cap using the male and female gold connectors making sure heat shrink covers all connections. Continue to solder the control module to the motor assembly. Heat shrink must be in position before the connections are made. Make sure that the connections are correct. If any two wires are swapped, the motor will run in the wrong direction. With the motor wires facing you they should be positioned on the bottom of the motor. The red wire is connected on the right. The white wire is in the center and the black wire is on the left.



After all connections are soldered, apply heat shrink to cover all connections.



After all connections are covered, apply a second layer of heat shrink to cover all 3 connections.



Replace motor assembly and control module into the inner housing. Reconnect the top cap to the control module using the gold connectors. Slide the inner assembly in to the outer housing then tighten the top cap to the outer housing. Your Geosub is now ready for operation.

Chapter 5: System Troubleshooting

DO NOT OPERATE THIS CONTROLLER IF IT HAS BEEN DAMAGED, BROKEN, SMASHED OR EXCESSIVELY WORN. BROKEN COMPONENTS POSE A SEVERE THREAT TO THE SAFETY OF THE OPERATOR AND HIS OR HER ENVIRONMENT. CONTACT GEOTECH FOR ANY SERVICE OR REPAIR NEEDS.

Problem: The display is not showing anything:
Solution: Verify the input power is correct and at the correct voltage. If unsure of this have a qualified electrician verify main power source.

Problem: Menu screen is showing
Solution: This message indicates the 12V DC source is below operating level. If using a battery only try recharging the battery. If using a vehicle alternator make sure connections are secure and vehicle is running.

Geotech's Buck Booster controller has been designed and manufactured to provide a long and trouble-free life during harsh field operation. In general, the display will indicate any fault conditions that can occur in the field.

There are no user servicable parts on the buck booster. All service work must be done by Geotech. See AC manual for additional SS Geosub specific trouble shooting.

Chapter 6: System Specifications

Controller specifications

Model: Buck Booster

Input Power:	11-15 volts @ 40 amps
Output Voltage, Max:	30 volts
Output current @ max voltage:	14 amps
Short circuit duration:	Indefinite
Short circuit output current;	14 amps
Fuse:	50 amp MIDI type
Operating Temp:	-20°C (-4°F) to 60°C (140°F) (run only at reduced duty cycle if ambient > 40°C/104°F)
Weight:	15.4 lbs.
Size:	16” L x 12.5” W x 7” H

Pump specifications

Electric

Full Load Rating ..... 2/3 HP

Maximum Amp Draw……..... 35 amps

Overload .....…...incorporated into controller

Pipe Connection

Discharge Port .....1/4" Female NPT (includes 3/8” Barb)

Operating Conditions

Minimum Ambient Fluid Temperature.....34°F (1°C)

Maximum Ambient Fluid Temperature .....80°F (28°C)

Dimensions & Weight (Pump & Motor)

Dimensions of pump ..... 12.2” L X 1.75” OD

Net Weight of pump w/o lead…….....…….. 3.9 lbs

Weight of small Georeel and 100 feet of 12 AWG with safety cable.....18.3 lbs

Weight of small Georeel and 150 feet of 12 AWG with safety cable.....21.6 lbs

Weight of small Georeel and 200 feet of 12 AWG with safety cable.....24.9 lbs

Max Buck Booster output to pump guidelines.

Use the following guide along with your 12V pump specifications to determine the maximum Buck Booster output. Voltage column 1 shows Buck Booster output values for 12.5 V at the pump. Voltage column 2 shows Buck Booster output values for 14 V at the pump.

12 AWG Cable	Buck Booster Output	
length [ft]	Voltage 1 12.5	Voltage 2 14.0
25	13.5	15.0
50	14.4	15.9
75	15.2	16.7
100	16.0	17.5
125	16.8	18.3
150	17.6	19.1
175	18.4	19.9
200	19.2	20.7

Chapter 7: Replacement Parts List

Part Description	Part Number
Buck Booster controller	81200010
DC Power Cables	51200053
Manual	11200538
Extension Cable	51200085
Gold connector set with heat shrink	11200754
Motor assembly with heat shrink	51200089
Outer housing weldment	51200186
Inner housing	21200072
Top cap	21200076
Compression plate	21200121
Compression plate screws	12070039
O-ring kit	51200088
Control module	51200083
Check Valve	81200033
Motor lead with intergraded safety cable	21200103
100’ Georeel and SSGeosub	81400101
150’ Georeel and SSGeosub	81400102
200’ Georeel and SSGeosub	81400103

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 1-800-833-7958 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:

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 equipment for a fee, which will be applied to the repair order invoice.

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