Geotech VFD for Redi-Flo2®

Installation and Operation Manual

Rev 07/14/2016 Part # 11201299

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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.

In order to ensure your Environmental Pump Variable Frequency Drive has a long service life and operates properly, adhere to the following cautions and read this manual before use.

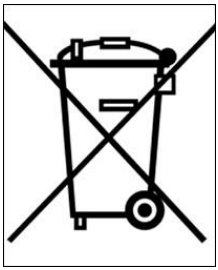
WARNING

This equipment contains voltages that may be as great as 1000 volts! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.

- **Disconnect from power source when not in use.**
- **Power input source must be within +/- 10% of ratings.**
- **Avoid spraying fluid directly at equipment.**
- **Never submerge equipment.**
- **Avoid pulling on wires to unplug equipment wiring.**
- **To prevent equipment damage, avoid dropping it.**

WARNING

Do not operate this equipment if it has visible signs of significant physical damage other than normal wear and tear.



Notice for consumers in Europe:

This symbol indicates that this product is to be collected separately.

The following applies only to users in European countries:

- This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.
- For more information, contact the seller or the local authorities in charge of waste management.

Section 1: System Description

Function and Theory

The Geotech Variable Frequency Drive (VFD) is designed to operate and protect the Redi-Flo2® pump. With the turn of a knob, an operator can precisely control the discharge flow rate from the pump from 8GPM (30 LPM) to 100 milliliters per minute, to depths down to 280ft (85 m).

System Components / Special Features

Your Geotech VFD system should contain the following components:

1. Variable Frequency Drive in robust carry case with watertight cable seals mounting bracket.
2. Power cable with standard NEMA 5-15P plug (115V supply model) **OR** open-wire pigtail cable (230V supply model).

Two models available
Choice of 115V or 230V single phase input voltage units

Enclosure
The Geotech VFD NEMA 4 enclosure is designed for outdoor duty and is resistant to damage as a result of incidental exposure to rain.

UL Approvals
The Geotech VFD is UL Listed to U.S. and Canadian electrical safety standards.

Torque Boost
The Geotech VFD is equipped with a torque boost (voltage boost) feature to aid in start-up under severe conditions.

Optimized Volts/Frequency (V/HZ) Pattern
The Geotech VFD V/Hz pattern is specially optimized to allow the most efficient operation of Redi-Flo2®.

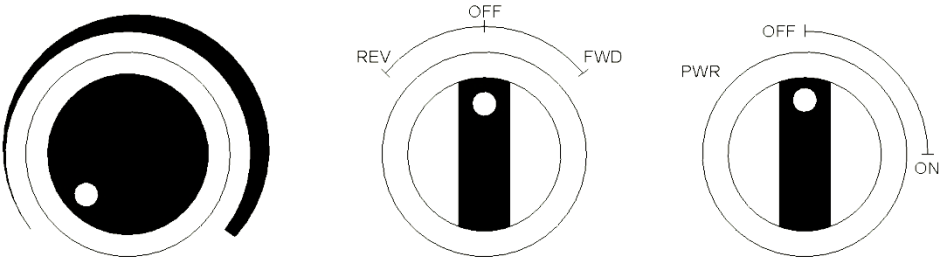
To operate the system you will also need:

1. Redi-Flo (MP1) pump and motor lead.
2. A discharge hose to connect to the pump.
3. An electrical plug to connect the VFD power cord to your portable generator may be needed if the supplied plug is not compatible with your generator or in the case of a 230V supply model.
4. Safety cable and hardware for lowering and lifting the pump.
5. An extension pump cable may be needed depending on your pump cable configuration.

Section 2: System Operation

Quick Start Guide

1. Fully submerge RF2 in the water to be pumped.
2. Connect the motor lead to the VFD.
3. If using a generator, start the generator and allow sufficient time for it to warm up.
4. Ensure VFD knobs are in the following positions:



(From left to right)
The top, middle, bottom knobs on VFD interface, all shown in the "OFF" position

5. Plug VFD into generator or utility power supply; ensure incoming power is compatible with unit's configured power.

WARNING

Incorrect wiring on the 115V or 230V terminal will damage the drive, double check that power source voltage matches VFD voltage.

6. Turn the bottom "PWR" knob to the "ON" position. Be sure NOT to press down on the lockout button while turning. Knob may be resistant to turning on new VFDs. "STOP" will be shown on the display.
7. Turn the middle knob to the "FWD" position. "Hz 0.0" will be shown on the display.
8. To begin pumping, use the top knob to increase or decrease speed.
9. Use the ⌥ (Navigate) button to toggle speed in Hz and current in Amps.
10. When powering down, return all knobs to positions shown in step #4.
11. Unplug the VFD from the generator BEFORE removing the motor lead from the VFD or turning off the generator.

Section 3: System Installation

Reverse Rotation Test
Connect the motor lead to the Geotech VFD and test the rotation of the pump. Submerge the pump in water, start it at its slowest speed and make sure the pump shaft is turning counterclockwise (when viewed from the top).

Attaching the Pump to the Pipe
When connecting piping to the pump, a back-up wrench should be used. After the first section of pipe has been attached to the pump, the safety cable should be connected to the pump (see pump manual for details. Do not clamp to the pump. When raising the pump, be careful not to place bending stress on the pump by picking it up by the pump end only. It is recommended that a safety cable be attached to the pump (using special brackets and cables, sold separately) anytime plastic pipe or flexible tubing is used. A check valve may also be added to Redi-Flo2® pumps to prevent fluid from flowing back into the pump after it is turned off (backflow prevention). Always check to ensure joints are fastened securely. The use of a torque arrestor is not required when using the Geotech VFD.

Lowering the Pump into the Well
Make sure the electrical motor leads are not cut or damaged in any way when the pump is being lowered into the well. Do not use the motor leads to support the weight of the pump. To protect against surface water entering the well and contaminating the well, the well should be finished off utilizing a locally approved well seal.
The motor lead should be secured to the discharge pipe at frequent intervals to prevent sagging, looping and possible motor lead damage. Teflon® wire ties are recommended for environmental applications.

IMPORTANT
Plastic pipe and tubing tend to stretch under load. This stretching must be taken into account when securing the motor lead to the riser pipe or tubing. Leave three to four inches of slack between clipped points. This tendency to stretch will also affect the calculation of the pump setting depth. When plastic pipe or tubing is used, it is recommended that a safety cable be attached to the pump to raise and lower it.
Redi-Flo2® pumps can be fitted with a safety cable bracket (Geotech part # 81201003).

Section 4: Operating Conditions

To ensure the Redi-Flo Variable Performance Pumping system operates properly, follow these guidelines:

• The Redi-Flo2® pump must be installed vertically with the discharge end pointed upwards.

• The electrical voltage supply to the Geotech VFD must always be within + or - 10% of the specified power supply

• For best performance when operating on a generator, 115V generators should be set at 120V without load
and 230V generators should be set at 240V without load. Use a separate meter to set voltage; do not rely on built-in meters found on generators.

• The pump and motor must always be completely submerged in fluid to ensure lubrication and cooling of the motor.

• The temperature of the fluid being pumped should be according to the technical specifications shown in the motor specifications.

• The installation depth of the pump should always be at least three feet below the maximum drawdown level of the well.

• Redi-Flo2® pump is not recommended for well development or pumping fluid containing abrasives.

• Redi-Flo2® pump is not recommended for continuous operation applications.

• The warranty of the Redi-Flo2® pumps will be void if other than the Geotech VFD is used or if corrosive fluids are pumped.

• The service life of dedicated Redi-Flo2® pumps may be compromised if the ambient water quality exceeds one or more of the following values:

pH<5, DO>2 ppm, H2S>1 ppm, CL->500 ppm, TDS>1000 ppm

Adherence to Environmental Regulations

When handling and operating the Redi-Flo2® Pump system, all environmental regulations concerning the handling of hazardous materials must be observed. When the pump is taken out of operation, great care should be taken to ensure that the pump contains no hazardous materials that might cause injury to human health or to the environment.

Purging a Well

If the pump is used to purge a well, start the pump at minimum speed and gradually increase to desired speed. Redi-Flo2® products are not recommended for well development.

Generator Usage

Minimum generator size	
For generators with voltage regulation	2000 watts at 115/230VAC, single phase
For generators without voltage regulation	5000 watts at 115/230VAC, single phase
Recommended for optimal performance	3000 watts at 115/230VAC, single phase with voltage regulation

Section 5: System Maintenance

Per use maintenance:

1. Inspect extension cord for cuts, broken housings or connector pins.
2. Ensure VFD is securely mounted and inspect for cracks, dirt or other damage.

General maintenance:
Clean VFD enclosure and case 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.

Section 6: System Troubleshooting

Fault Code Messages

Fault Code	Description	Corrective Action
STOP	Drive is READY and in a stopped condition. The motor is not energized. No enable signal is present to start the drive	
F0001	Instantaneous Over current on the drive output. Excess load or shock load on the motor.	**Fault occurs immediately on drive enable or run command:** Check the output wiring connections to the motor and the motor for short circuits phase to phase and phase to earth. **Fault occurs during motor starting:** Check the motor is free to rotate and there are no mechanical blockages. If the motor has a brake fitted, check the brake is releasing correctly. Check for the correct star-delta motor wiring. **Fault occurs when motor operating at constant speed:** Investigate overload or malfunction.
F0002	Over voltage on DC bus	Check the supply voltage is within the allowed tolerance for the drive.
F0003	Heatsink over temperature	The drive is too hot. Check the ambient temperature around the drive is within the drive specification. Ensure sufficient cooling air is free to circulate around the drive. Increase the panel ventilation if required. Ensure sufficient cooling air can enter the drive, and that the bottom entry and top exit vents are not blocked or obstructed.
F0004	Hardware Over Current	Check the wiring to motor and the motor for phase to phase and phase to earth short circuits. Disconnect the motor and motor cable and retest. If the drive trips with no motor connected, it must be replaced and the system fully checked and retested before a replacement unit is installed.
F0006	Under voltage on DC bus	The incoming supply voltage is too low. This trip occurs routinely when power is removed from the drive. If it occurs during running, check the incoming power supply voltage and all components in the power feed line to the drive.
F0009	Motor thermal overload protection trip. The drive has tripped after delivering >100% of value in *9906* for a period of time to prevent damage to the motor.	Check for correct Star or Delta wiring configuration. Check to see when the decimal points are flashing (which indicates the output current > parameter ***9906*** value) and decrease motor load. Check the total motor cable length is within the drive specification. Check the load mechanically to ensure it is free, and that no jams, blockages or other mechanical faults exist
F0018	Faulty thermistor on heatsink.	Refer to your local Geotech representative
F0021	Internal drive Fault	Refer to your local Geotech representative
FAULTY	Internal drive Fault	Refer to your local Geotech representative
SPI N-F	Spin start failed	Spin start function failed to detect the motor speed.
U-T	Under temperature	Trip occurs when ambient temperature is less than -10°C. The temperature must be raised over -10°C in order to start the drive.

Section 7: System Specifications

Electrical	
Input (115V model)	115V(+/-10%)/1PH/48-62Hz/23A
Input (230V model)	230V(+/-10%)/1PH/48-62Hz/23A
Output	1.1kW/400Hz/220V/3PH/5.5A
Acceleration Time (preset)	0 to 400Hz, 5 seconds
Deceleration Time (preset)	0 to 400Hz, 5 seconds
Recommended Input Protection (115V)	Fuse, 600V, 35A, Fast Acting, UL Class CC or J
Recommended Input Protection (230V)	Fuse, 600V, 25A, Fast Acting, UL Class CC or J
Power Cord	18AWG, 300V, 6ft
Minimum/Maximum Frequency	1Hz/400Hz

Dimensions and Weight	
Dimensions (L x W x D):	
Protective Case	19.2” x 15.2” x 9.0” (49 x 39 x 23cm)
VFD Only	10.12” x 7.40” x 7.34” (26 x 19 x 19cm)
Weight :	
VFD, Cords and Case	19.2lbs (8.7kg)
VFD Only	9.26lbs (4.2kg)

Operations Conditions	
Ambient Temperature	-10 - 40degC (14 - 104degF)

Storage Conditions	
Ambient Temperature	-40 - 60degC (-40 - 140degF)
Maximum Humidity	95%, non-condensing

Protective Case Construction	
Case	Lightweight, Strong HPX® Resin

Options	
Models:	120V Input
	230V Input

Section 8: Parts and Accessories

Parts Number	Part Description
81200053	VFD, RF2, 120V, GEOTECH WITH CASE
INCLUDES	
51200191	VFD,RF2,120V,GEOTECH, NO CASE
51200188	CASE,VFD,RF2
81200055	VFD, RF2, 230V, GEOTECH WITH CASE
INCLUDES	
51200193	VFD,RF2,230V,GEOTECH, NO CASE
51200188	CASE,VFD,RF2

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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