



State of Idaho

DEPARTMENT OF WATER RESOURCES

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DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

February 25, 2005

MOUNTAIN VIEW HOMEOWNERS ASSOC
PO BOX 743
MIDDLETON ID 83644

RE: Water Right 63-12275

Dear Water Right Holder:

The Department of Water Resources has received your notice stating that you installed a variable frequency drive on your well pump to eliminate your practice of diverting water in excess of your actual water needs. Thank you for taking this measure to protect Idaho's valuable ground water. By taking only what you need, you are not only complying with the laws governing water use, you are also helping to ensure the availability of water for Idaho's future and probably saving energy costs as well.

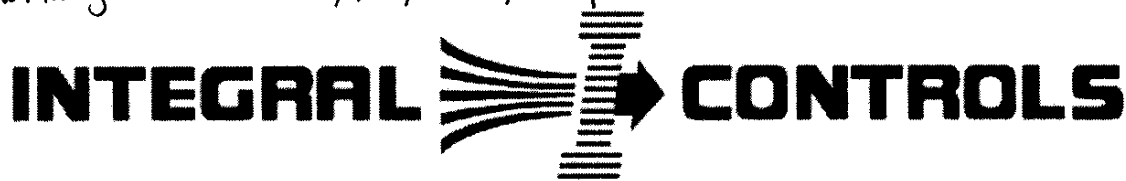
If you have any questions, please contact me at 208-287-4947.

Sincerely,

A handwritten signature in black ink that reads 'Shelley W. Keen'. The signature is written in a cursive, flowing style.

Shelley W. Keen

Water Rights Supervisor



The VFD – Variable Frequency Drive + Integral Controls Pump Station. Cruise Control for your Pump!

1. **Variable Speed Capability.**

With a VFD it is possible vary the speed of any standard, off the shelf three phase motor from full off to full on RPM. This feature along with the Integral Controls Pump Station (ICPS) control unit allows a pump to run at whatever speed needed to deliver the desired flow rate and/or pressure. At partial pump capacity there's no "slam on/slam off" operation and no over-pressure conditions as may be the case with constant speed pumps. When started the motor smoothly "ramps up" and quickly "zeros in" on the target pressure. Up to four (4) alternate target pressures can be selected "on the fly" when higher or lower pressures are needed.

One example using alternate pressures is a golf course/housing development water system that would run at a target pressure of 50-60 PSI to service the relatively low volume water needs of the surrounding houses. A signal from the sprinkler controller selects a target pressure of 100 PSI to provide adequate pressure for the golf course sprinklers to be maintained only when they turn on for a few hours at night. When the sprinkler cycle is complete the pressure returns to the normal 50-60 PSI target pressure.

This selectable target pressure feature is very helpful for systems where water drains out of the lines after the pump has stopped. Air then gets into the lines and restarting a conventional pump "across the line" at full speed generates extremely high (and sometimes destructive) pressures. With the ICPS control system the pump can started at a very low pressure and after a time sufficient to fill the lines automatically switch to the higher pressure for normal operation.

2. **Single phase to three phase conversion.**

VFD's provide single phase to three phase conversion as a part of the speed control process and it expected that VFD's will obsolete phase converters in the not-too-distant future. To use single phase power simply connect the voltage source wires to the L1 and L2 terminals on the VFD. To use three phase power connect the input voltage wires to L1, L2 and L3. The output (load) voltage is always three phase regardless of the input voltage source.

3. **Significant cost/electrical equipment savings using a VFD with single phase power.**

Using a VFD makes it possible to use three phase equipment with single phase power considerable savings can be realized when using deep well submersible pumps:

- A. The single phase submersible pump control box with start and run capacitors and switchover equipment is eliminated and a starter/contactors is not needed.
- B. The three phase output from single phase voltage allows smaller wire sizes over long runs. For example a 900 foot deep 5 HP submersible pump using single phase power would require #2 copper wire. For three phase operation from a VFD #6 wire can be used – a savings of nearly \$2.00 per foot in wire alone (\$1800.00)! The full load amperage for the 5 HP pump is reduced from 23.0 amps with the single phase system to 16.6 amps with the three phase system.
- C. Three phase motors are typically more widely available and less expensive than their equivalent single-phase counterparts.

4. **Significant cost/equipment savings using a VFD for nearly any pump.**
The VFD replaces the pump panel and monitors nearly 100 electrical parameters. All that's needed is a circuit breaker or set of fuses so the power can be shut off. With VFD operation there's no need for pressure reducing or pressure relief valves, numerous bladder tanks and a large pump house big enough to contain all of that equipment. The "ramp up" and "ramp down" speed can be adjusted to eliminate any surges and a small bladder tank will adequately service even a very large water system since the bladder tank is needed only for cushion, not for storage. Varying the speed of the pump adjusts for variances in water flow.
5. **More cost savings: "Hybrid" VFD + on-off pump capability.**
The ICPS control unit is capable managing one VFD and up to four (4) on-off pumps to get the net effect of VFD operation at a small fraction of the cost of an all-VFD system. Typically a small HP VFD (read: low cost) is used to perform most of the pumping chores while the on-off pumps smoothly "cut in" and "cut out" as needed to maintain the desired pressure and flow rate.
6. **Significant cost/power savings with VFD controlled partial-speed operation.**
With an electric motor the power required increases at a cube of the shaft speed. That means if the motor speed (motor RPM) is reduced by 20% the power requirements are reduced over 50%. To put it another way if the motor is operated at 80% of full speed the motor requires only 1/2 of the electric power (wattage) it would need at full speed.
Valve regulated systems run the pump motor at full speed and then, if the pressure is too high for a given flow rate "burn off" unneeded energy using friction provided by the pressure regulating valve (PRV). Any pressure rise upstream of the PRV represents wasted electrical energy. Conversely A VFD controlled system simply doesn't put the energy into the motor in the first place. VFD power usage compared to constant speed valve regulated operation can be up to 40% less depending on flow requirements and other factors.
For more detailed information on how power usage is calculated please see our application note: Power Requirements: Valve regulation vs. Speed regulation.
7. **Power Usage monitoring capability**
Some VFD's offer power (kilowatt hour) consumption monitoring. This total can be reset to zero so the VFD can log just how much power the pump motor uses. Simply multiply the kilowatt-hour consumption figure by the power rate (cents per kilowatt hour) to determine the pump power cost since the meter was last reset.
8. **VFD's are readily available for most every application.**
VFD's are available from ½ HP to 250 HP and with voltage ranges from 10 to 575 volts and all will accept single phase input power. That covers most every conventional pumping application.
9. **Significant cost savings Period.**
Like most electronic equipment nowadays (computers, VCR's etc.) the cost is going down, not up. The ICPS control unit also provides low pressure safety shutoff protection and all components "plug in" to make upgrades or modifications quick and easy.

For more information: Integral Controls 5475 Hawley Road, The Dalles, OR. 97058
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<http://www.integralcontrols.com>