What Exactly is "Variable Frequency Drive"

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Many water operators may have heard the term "VFD" or maybe even operated a facility that has a VFD, but not really sure what the term means.

A Variable Frequency Drive (VFD), also known as a Variable Speed Drive (VSD), is a type of motor controller that drives an electric motor by varying the frequency and voltage supplied to the motor. This allows the motor to operate at different speeds, providing a more efficient and controlled way to operate pumps. They are particularly well suited when a pump needs to supply varying flow rates and pressures such as booster pump stations or backwashing a filter.

VFDs use power electronics to convert the incoming AC power to DC power and then invert it back to AC power at a variable frequency. This variable frequency allows the motor to operate at different speeds. VFDs first came on the market in the 1960s and 70s, but those early versions were very large, expensive and not reliable. Since then there has been tremendous improvements in the power electronics and microprocessors which have made them much more reliable and more affordable. Replacing the traditional fixed speed motor with a VFD can be up to 50% more efficient. VFDs also have the advantage in that they can reduce water hammer by slowly ramping up and down the shaft speed upon starting/stopping a pump. This in turn reduces the wear and tear on the pump thus extending the life of the equipment and appurtenances.

If you are interested in learning more about VFDs you can sign up for MWWAs "Get Up to Speed With VFDS" training being held on April 8th on Zoom. [Insert Registration Link Here]

1. What is the primary advantage of using a VFD in booster pump station?
    a. Reduced maintenance costs
    b. Increase water pressure
    c. Energy savings
    d. Simplified operation
    e. All of the above

2. True or False? VFDs can reduce or eliminate the need for throttling valves.
    a. True
    b. False

3. Which of the following is a potential drawback of using VFDs in a booster pump station?
    a. They are always more expensive to install than fixed-speed drives.
    b. The can generate harmonics that may interfere with other electronics in the room
    c. The cannot be used with existing pumps
    d. The require specialized operators with advanced electrical engineering degrees.

4. What is an important consideration when selecting a VFD for a water pumping application?
    a. Proper sizing of the VFD for the particular motor and application
    b. The color of the VFD enclosure
    c. Whether the VFD has a built in transmitter

d. The proximity to the coffee machine

5. If an engineering study shows that replacing an existing fixed drive motor with a VFD will result in an electrical cost savings of 17% what would the average future monthly bill be if the average current monthly bill is $473.00 ?
    a. $80.41
    b. $392.59
    c. $456.00
    d. $553.41

Solution:

17% of $473 = 0.17 X 473 = $80.41

$473 – $80.41 = $392.59