Types of Water Systems

- Elevated Storage, (water towers)
- Hydropneumatic
- Flat Storage
- Constant Pressure Systems
  - Constant Pressure Valve
  - Variable Speed
Water
Tower
Not like this
Water Tower Styles
Elevated Storage

- Very simple system
- Normally has a water tower in the system
- Common for Municipal System
- Provides storage for peak flows, like fire, periods of high demand
- Provides relatively constant pressure
- Typically has SCADA system to monitor operation
Hydropneumatic Systems

- Typically has a pressure tank to reduce the number of pump starts
- There is normally a 20 psi pressure differential from pump start to stop
Hydropneumatic Systems

- Very little storage for system with captive air tanks
- Tank sizing is critical for long pump life
Flat Storage

- Kind of a hybrid of the elevated system and the Hydropnuematic
- Large storage is provided by tank on ground
- Stored water is pressurized by a pump to the water system
- There may be a 20 psi differential unless a VFD is used on the pump
- Common in large municipal system for peaking or smaller systems with low capacity source
Constant Pressure Systems

- Two Main Types
  - Pressure Regulating Valve
  - Variable Speed

- Smaller Pressure Tank Required
- Reduced Cycling of Pump
Pressure Regulating Valve

- Uses a pressure regulating (pressure reducing) valve with a bypass
- Simple mechanical system
- Maintains a constant pressure above a preset flow
- Provides a minimum flow to fill pressure tank and turn off pump
Pressure Regulating Valve

• Uses Standard Pump and Motor
• Uses standard pressure switch and controls
• Pipe between Pump and Valve must be designed to withstand shut off head of pump
• Shut off head minus the system pressure must be less than valves rated pressure differential
Constant Pressure Valves
Variable Speed Pumps

- Pump speed is varied to maintain the pressure at the required demand.
- Pressure Feedback is Needed
  - Pressure Transducer
  - Pressure Sensor
- Soft Starts
- Generally Requires Three Phase Motors
Variable Speed Pumps

- Some Systems use Proprietary Motors and or Pumps
- Different Sizes of Pumps can be used for the same Task
- Can be any type, Generally centrifugal
Variable Speed Drives

SubDrive System

- Pressure Tank
- Pressure Sensor
- Power Supply
- Pump
- Motor
Variable Speed Curves

VFD Control (PSI)

Berkeley B6EXPBL 15.5" Trim 125 HP / 1800 RPM

Data Label values are BHP

System

60hz

55hz

50hz

45hz

40hz

35hz

30hz

67

90

92

117

120

Variable Speed Curves

Gallons Per Minute

Head in PSI
Other Uses for VFD’s

- Water Level Control
- Water Temperature Control
- Soft Starts, reduced demand charges
- Convert Single Phase Power to Three Phase Power so large Pumps can be Operated Where Only Single Phase is Available
Typical Installations
Another Way of Constant Pressure

- Install Hydropnuematic system
- Set Pressure Switch cycle above the highest pressure desired.
- Install Pressure Reducing Valve at Desired Pressure
- Pressure will remain constant, except for slight pressure drop as flow increases
Conclusions

- Constant Pressure Systems produce the water needed at a more constant pressure than Hydropneumatic Systems.
- They require smaller pressure tanks.
- This results in less expensive and easier installations.
- Constant Pressure systems if properly installed reduce water hammer.
Conclusions

- If properly installed, Constant Pressure Systems extend pump and motor life
- VFD’s greatest benefits result in systems with dynamic head characteristics
Good Sites For More Info

- [http://www.pumped101.com](http://www.pumped101.com)
- [http://www.cyclesstopvalves.com](http://www.cyclesstopvalves.com)