nearly **20%** of the energy used by electric motors worldwide

**Pumping Systems**

Reducing the speed of a pump motor by **20%** results in a **49%** savings in energy.

**10%** results in a **21%** savings in energy.

**20%** results in a **49%** savings in energy.

**Variable Frequency Drives...**

- control the speed of the motor
- varying the frequency of the power source
- controlling the amount of current drawn by the motor

*Electric motors love this*
What about Water Hammer?

Valve Closed  
Water Still

Valve Open  
Water Moving

Valve Closed  
Water Hammer

0-3450 rpm’s = 0.4 seconds

400 gpm through 400’ of 6” pipe

A sudden stop or start of that flow creates a Water Hammer of approximately 375 psi

0-3450 rpm’s = 2.0 seconds

400 gpm through 400’ of 6” pipe

A “soft” stop or start of that flow reduces the Water Hammer to 386 psi
Variable Frequency Drives...

Value

- Energy reduction by as much as 65%
- Extended life
  - Motor
  - Mechanical seals
  - Bearings
  - No Water Hammer

Variable Frequency Drives...

PRICE

IS WHAT YOU PAY

VALUE

IS WHAT YOU GET

Variable Frequency Drives...

Wiring a VFD

(Like a Control Box)

- TERMINAL BLOCK

Variable Frequency Drives...

Programming a VFD

- hp and max amps of motor
- Hz based on matched or mis-matched PMA
- Enter passcode "optional"

(in approximately 90 seconds)

Variable Frequency Drives...

ONBOARD DIAGNOSTICS and
PROTECTION

Will detect “underload” (Dry Well)
Will detect "underload" (Dry Well)
Will detect "Dead Head" (pump running against a closed discharge)
Will detect "Locked Rotor" (bound pump)

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Will detect "Dead Head" (pump running against a closed discharge)
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Will detect "Under Voltage (low line voltage)
Will detect "Short Circuit" (motor, cables, wire insulation)

Will detect "Broken Wire" (Red, Yellow, Black)
Will detect "over heating" (excessive heating of drive)
ONBOARD DIAGNOSTICS and PROTECTION

Will detect "underload" (Dry Well)
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Will detect "Broken Wire" (Red, Yellow, Black)
Will detect "over heating" (excessive heating of drive)
Will detect "Broken Pipe"

in all situations the drive will...

- ramp motor speed down
- Shut down, then re-check to see if condition still exists
- Shut down and go into hard fault w/ fault displayed

ONBOARD DIAGNOSTICS and PROTECTION

# 8
0:00:01
Broken Pipe

ONBOARD DIAGNOSTICS and PROTECTION

# 9
0:00:01
External Trip

ONBOARD DIAGNOSTICS and PROTECTION

Easy

Installation & wiring
Programming
To understand various faults

Control your VFD from anywhere in the world

- Alerts sent via text or email
- System status
- Comprehensive run history
- Fault activity
- Remote access to programming

why does any of this matter?
PEOPLE PAY WHEN THE VALUE IS HIGHER THAN THE PRICE
CREATE A VALUE PRICE WILL FOLLOW

Variable Frequency Drives...

Using Rubber Bands to teach Selling Value

Features & Benefits
- Constant Pressure

Value & Protection
- Energy Reduction
- Extended life
- No Water Hammer
- Dry Well
- Dead Head
- Locked Rotor
- Under Voltage
- Short Circuit
- Open Leg
- Over Heat
- Broken
- Externally Trip

Selling Value & Protection