Wireless Plunger Lift Communication

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FreeWave Technologies
Why wireless I/O

- Faster installation
- Less Expensive
- Less Repair
- No Trenching
- No Conduit
- Allows equipment to be redeployed
Wireless I/O is a mechanism by which analog (4-20mA, 1-5VDC, etc.), discrete and other raw signals are transmitted via radio to and from a central processing device.

Specifically, the gas well data transmitted includes level, pressure, flow, temperature, plunger arrival, alarms and signals generated to

Actuate final control elements, such as valves.
What are the advantages of using wireless communications?

- Today, wireless technologies have come a long way and whether it is a licensed or unlicensed frequency, wireless works and works well.
- No cables to bury or connect.
- No chance of cables being damaged from natural or unnatural events.
- Fewer communications failures with radios than with wired solutions.
What are the advantages of using wireless communications?

- No down time because of network traffic.
- Standalone system. No infrastructure needed for two radios to communicate to each other.
- Low power consumption, can work from solar/battery in areas where electricity is not available.
- Choice: Install wireless now or when cables fail.
Traditional wired gas field installation.

Step 1: Install Wellhead Equipment
Step 2: Install Production Equipment
Step 3: Pipe it all together
Step 4: I need data?
Step 5: Wire it all together
Step 6: Dig up cables every 5 years for repair

Wireless gas field installation

Flow Temperature
Plunger Arrival
Tubing Pressure
Casing Pressure

Flow Temperature
Plunger Arrival
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Expedite your automation

- **Trenching and Wire Typical Costs**
  - $16.00 to $20.00 per foot
- **Typical Distances**
  - 100 to 500 Feet
- **Site installation savings**
  - $4,000.00 per location
  - Install time: 10 man hrs.
- **Wireless I/O Cost**
  - Hardware: $1,000.00
  - Install time: ~ 1 man hr.
How many inputs do I have?

Modbus Application

- 6 Digital Inputs
- 2 Digital Outputs
- 4 Analog inputs
- Controllable sensor power (VSNS)
- Pulse counting DI’s allow detection of 20 msec. pulses and count to 25Hz
- Voltage and temperature monitoring
- Active Modbus data port allows extension by adding external devices
How do I deploy it at the well head?

- **Casing Pressure**  AI-1
- **Tubing Pressure**  AI-2
- **Plunger Arrival**  DI-1
- **Open Valve**  DO-1
- **Close Valve**  DO-2
Power requirements of wireless I/O

- 6 Milliamps
- 6 Polls per second
- 7 1/2 Amp hr Battery
  Provides 14 Days of Autonomy
- 5 Watt Solar Panel
  Recharges System
- Radio Supplies Power to Transducers
I/O Kit specifications

- 5 watt, 12v solar panel
- 5 amp charge controller
- 12v, 7 amp/hr battery
- Weatherproof NEMA-4 enclosure
- All necessary mounting hardware and wiring & Easy to use instructions
Where else can I use it

- Tank Levels
- Water Meter
- Flow Line
- Dehydrator Temperature
- Separator Pressure
- Flare Stack monitor
- Valve Control
- Pressure Vessel
- Shut Down ESD

- RS-485 or Analog In
- Analog or Pulse counting
- Analog In
- Analog In
- Analog In
- Analog In
- Digital In
- Digital Out
- Analog In
- Digital Out
Multiple tanks one radio

- Case Study
- 4 Condensate Tanks
- 1 Pit Level
- The 4 condensate tanks are on a RS-485 bus and the pit level is an 4-20 analog input, all are talking to 1 Modbus Slave I/O radio

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Non-Modbus wireless I/O

- Up to 4 Slaves as long as Master IO Count was not exceeded
- No Repeaters
Modbus solution requires two radios

- One radio is the Modbus Master
- One Radio is the Slave to the Polling Host and can be used as a Slave/Repeater
- Two RF Pig tails
- 2 Surge Protectors
- 2 Mounting brackets
Modbus I/O advantages

• Up to 246 slaves wells talking back to one master

• Each slave has up to:
  – 4 Analog inputs
  – 2 Analog outputs
  – 6 Digital Inputs
  – 2 Digital outputs
Safety advantages

- Communication Alarms and Fail Safe actions
  - No system is completely immune to signal loss.
  - Communication alarms inform user the link is lost.
  - In the event of a communication failure, the I/O slave will control outputs based on the pre-programmed fail-safe default.
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