

HEAL SYSTEM™ INITIAL START-UP

For Electric Submersible Pumps

PURPOSE To initiate ESP start-up and operation with the HEAL System.

BEFORE YOU BEGIN

- Check continuity and confirm sensors are functioning on VSD.
- Ensure back pressure control valve is on tubing.
- Check ESP rotation is correct.

<p>STEP 1</p>	<p>COMMISSIONING</p> <p>Conduct on site safety meeting.</p> <p>Record all surface pressures (casing and tubing).</p> <p>Record bottomhole pressure off VSD (once powered up).</p> <p>Review chemical program, if applicable.</p> <p>Review and check all alarms.</p> <p>Proceed to Step 2.</p>	<p>STEP 2</p>	<p>START-UP</p> <p>Confirm tubing and casing are open and surface equipment is ready.</p> <p>Start up VSD at lowest frequency possible to lift fluids (35-45 Hz).</p> <p>Ensure VSD is transmitting real time data with vendor's data retrieval software.</p> <p>Monitor Pump Intake Pressure (PIP) and motor temperature. Do not draw down below pre-determined pressure.</p> <p>Maintain lowest possible surface casing pressure.</p> <p>Proceed to Step 3.</p>
<p>STEP 3</p>	<p>OBSERVE</p> <p>Observe for positive pressure on the annulus. Positive pressure indicates that the SRS is functioning.</p> <p>Observe ESP motor temperature, amperage, Hz and downhole pressure.</p> <p>Record any evidence of solids or fines.</p> <p>Once pressures and rates have stabilized, proceed to Step 4.</p>	<p>STEP 4</p>	<p>OPTIMIZE</p> <p>Avoid over-pumping by gradually increasing pump rate 1-3 Hz every 2-3 days to a maximum of 65 Hz for induction motor, or 90 Hz for a permanent magnet motor, and >100 psi.</p> <p>Optimize HEAL System™ performance with ESP bottomhole pressure off VSD and test rates.</p> <p>Increase the ESP speed with the VSD (PIP staying >100 psi).</p> <p>If gas interference occurs, either reduce speed or increase casing pressure according to the critical lifting rate graph. (See troubleshooting)</p>



TROUBLESHOOTING

Bottomhole pump not functioning...

...may indicate a lack of inflow, excessive gas interference, or fluid level below the pump.

Shoot a fluid level bottom hole pressure sensor.

If the fluid level is above the pump, refer to pump manufacturer's maintenance and troubleshooting guide.

If fluid is below the pump, wait for the fluid level to reach the pump, or immediately contact Production Plus for the Gas-assist Start-up procedure.

The time it takes for fluid level to reach the pump is dependent upon the characteristics of the well and can vary.

When fluid level is achieved;

Return to Step 1.

Critical lifting rate

If gas interference occurs, demonstrated by erratic PIP, voltage and motor temperature, slowly increase the casing pressure until the gas interference subsides. Use the plot as an approximation of the pump inlet pressure required for various combinations of casing weight and shroud size.

