KUDU PCP Manager
Well optimization unit

APPLICATIONS
- Progressing cavity pump (PCP) installations in
  - heavy, medium, and light oil wells
  - water wells
  - coalbed methane and conventional gas wells (for dewatering)
  - high-water-cut and high-sand-cut environments
  - highly corrosive wells
  - thermal applications
  - horizontal, deviated, and vertical wells

BENEFITS
- Maximizes oil and gas production
- Improves equipment uptime and run life
- Reduces failure frequency and therefore workovers
- Minimizes trips to the wellsite by enabling remote monitoring and control

FEATURES
- Stand-alone NEMA Type 4–rated enclosure
- Touchscreen display
- Five operational modes
- Capability for radio, cellular, and satellite communication
- Warnings and alarms
- Surface and downhole equipment protection settings

The KUDU PCP Manager® well optimization unit is a stand-alone controller that can be used with hydraulic PCP power units or with variable frequency drives (VFDs). This automation solution provides control and visibility of the PCP system in the well and maximizes production by improving uptime through pumping equipment protection. The unit monitors and analyzes critical data, enhancing understanding of the pumping system, improving efficiency, and extending run life.

Five operational modes are available to meet production requirements:
- speed control
- production optimization
- target production
- bottomhole pressure
- dynamic liquid level

Production optimization
The advanced production optimization mode uses surface flow measurement and proprietary algorithms to periodically adjust pumping speed to match well inflow.

A patented algorithm is used to determine pump slippage. Subsequently, the speed is slowly ramped up to a pump-off condition and well inflow is determined from the measured outflow and the calculated slippage. The operating speed is adjusted as per a customer-defined schedule to achieve the desired outflow and maintain a steady fluid level over the pump.

Improved reliability
The KUDU PCP Manager unit improves uptime and reliability through pump protection settings, monitoring devices, and proprietary algorithms, including

- rod torque limits
- pump parameter limits
  - minimum pump efficiency
  - minimum cavity fillage
  - flow rate limits
  - intake and discharge pressure and temperature limits
  - vibration limits
- surface drive protection settings
  - rpm difference
  - long start
  - power loss timer
  - backspin timer
  - desanding control
  - stuck-pump management
  - casing, tubing, and line pressure and temperature limits.

Control features usually slow or shut down the pump when one or more set point limits are exceeded. In some cases, they run specialty routines to minimize downtime or regain operation.
### KUDU PCP Manager

**User-friendly design**
Operators can program and calibrate the KUDU PCP Manager unit, as well as access and display current or historical data and trends, without using a computer. More than 90 days of operating data and alarm history are stored and retrieved via a USB port and Modbus® or DNP3 protocols.

Equipped with a full-color touchscreen display, the unit integrates sophisticated industry-leading technology with a user-friendly interface. It provides maximum production control and PCP system uptime through reliability, prevention, and quick-recovery routines.

To maximize functionality, the unit is recommended for use with a KUDU VFD. It is also available as part of an integrated KUDU Advanced VFD package.

**Real-time monitoring**
Connecting the unit to a SCADA host enables technical experts to diagnose problems remotely and in real time and operators to respond quickly to changing well conditions.

### KUDU PCP Manager Unit Advantages

<table>
<thead>
<tr>
<th>Feature</th>
<th>VFD with KUDU PCP Manager Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft start</td>
<td>Yes</td>
</tr>
<tr>
<td>Torque limiting</td>
<td>Yes</td>
</tr>
<tr>
<td>Autorestart capability</td>
<td>Yes</td>
</tr>
<tr>
<td>Manual speed control</td>
<td>Yes</td>
</tr>
<tr>
<td>Backspin timers</td>
<td>Yes</td>
</tr>
<tr>
<td>PRESCO-SWITCH™ bypass timers</td>
<td>Yes</td>
</tr>
<tr>
<td>Data logging with 8-GB Secure Digital (SD) card</td>
<td>Yes</td>
</tr>
<tr>
<td>Real-time trending</td>
<td>Yes</td>
</tr>
<tr>
<td>Rod speed and rod torque display</td>
<td>Yes</td>
</tr>
<tr>
<td>RS485/RS232 and Modbus TCP/IP communication</td>
<td>Yes</td>
</tr>
<tr>
<td>15 well-protection settings</td>
<td>Yes</td>
</tr>
<tr>
<td>Stuck-pump routine</td>
<td>Yes</td>
</tr>
<tr>
<td>Desanding†</td>
<td>Yes</td>
</tr>
<tr>
<td>Bottomhole pressure (BHP) control‡</td>
<td>Yes</td>
</tr>
<tr>
<td>Dynamic liquid level (DLL) control§</td>
<td>Yes</td>
</tr>
<tr>
<td>Production optimization control††</td>
<td>Yes</td>
</tr>
<tr>
<td>Production target control††</td>
<td>Yes</td>
</tr>
<tr>
<td>Cold weather package to extend use to −13 degF [−25 degC]</td>
<td>Optional</td>
</tr>
<tr>
<td>Cellular package for remote communication</td>
<td>Optional</td>
</tr>
<tr>
<td>Backspin control without power</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**Communications**

- **Serial port COM3**: RS-232 port, 8-pin modular RJ45 jack, full or half duplex with RTS/CTS control and operator interface power control

**Serial protocols**: DNP3 slave, DNP3 master, IEC60870-5-101 slave, IEC60870-5-103 master, Modbus RTU slave, Modbus RTU master, DF1

**Touchscreen Interface**

- **Display type**: Thin-film-transistor (TFT) color LCD
- **Display size**: 5.7 in
- **Resolution**: 320 × 240 pixels (QVGA)
- **Touchpanel service life**: 1 million taps or more
- **USB interface**: USB 2.0 (Type A)
- **Local storage**: SD card slot (maximum 32-GB SD/SDHC Class 10 card)

### Enclosure Specifications

- **Nominal height**: 17 in (430 mm)
- **Nominal width**: 13 in (330 mm)
- **Nominal depth**: 8 in (200 mm)
- **Enclosure mounting**: Wall mounted
- **Standards**: IEC 62208
- **IP degree of protection**: IP66 IEC 60529
- **IK degree of protection**: IK10 IEC 62262
- **Fire resistance**: 1,760 degF [960 degC] IEC 62208
- **Ambient storage temperature**: 14 to 122 degF [−10 to 50 degC]

---

†Requires surface flowmeter or downhole instrumentation
‡Requires downhole instrumentation
§Requires surface pressure sensor and downhole instrumentation
††Requires surface flowmeter