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Our story is founded on a simple truth: Life Requires Energy.

We’re focused on unlocking energy with highly engineered products and technologies used to drill for and produce oil and gas efficiently and safely around the world. Our products include a full range of equipment essential to efficient functioning throughout the lifecycle of the wellsite—from drilling to completion to production.

Our products consist of artificial lift equipment and solutions, including rod pumping systems, electric submersible pump systems, progressive cavity pumps and drive systems, plunger lift, gas lift, and hydraulic lift, as well as polycrystalline diamond cutters and bearings for drilling. We provide a full automation offering consisting of equipment, software, and IIoT solutions for downhole monitoring, wellsite productivity enhancement, and asset integrity management. We have operations in eight countries and employ more than 3,100 associates globally.

Whatever your production challenge is, Apergy Artificial Lift has a solution. Our Artificial Lift experts work with you to understand your short-term challenges and long-term goals. We fine tune the right lift solution, drawing from our complete portfolio of Artificial Lift technologies, application expertise, and in-depth analytical tools. For every stage of the field’s operating life, we will help meet our customers production goals quickly, safely, and most cost effectively.

**Vision Statement**

Our vision is to improve the lives of our customers, employees, shareholders, and those in our communities. Working toward that vision—through our actions, our products, and our commitments—is why we get out of bed in the morning. Unlocking Energy is the economic engine that will support us as we improve lives and achieve relevance in the marketplace.

**Core Values**

We have no interest in being just an ordinary company. We’re committed to creating a positive culture that improves lives. Our goal is to make Apergy a customer’s collaborative partner and a rewarding place to work. We strive to maintain a unique culture that values and encourages honesty, unity, respect, hard work, friendship, and an entrepreneurial spirit.
Utilizing the well’s own energy to cost-effectively remove liquids.

Plunger lift is one of the most economical ways to achieve maximum deliquification, particularly in marginal and aging wells. It uses only the well’s own energy to effectively lift and remove accumulated liquids.

Our plunger lift products are thoroughly tested, manufactured to the highest standards, and backed by our decades of experience in the field.

Benefits of Plunger Lift:
- Increased production with minimal cost
- Quick and easy implementation
- Low capital and operating expenses
- Unrivaled expertise, service, training, and line out assistance
- Largest selection of custom-engineered equipment addressing the full range of well conditions
- Highest quality manufacturing processes and materials

Plunger Lift is Ideal for:
- Removing accumulated liquids in gas wells, allowing them to produce
- Wells with low bottom hole pressures or higher gas-to-liquid ratios
- Wells with liquid production of roughly 130 barrels per day or less
- Unloading a well when gas velocity is at, or near, critical flow rate
- Controlling paraffin and hydrate buildup

Plunger Lift Economics:
Requiring low capital investment and minimal operating expense, plunger lift provides an excellent return on investment, producing production gains that can offset the cost of the system in as little as a few weeks and almost always within a few months.

The investment in a PCS Ferguson Plunger Lift system typically runs between $2,500 and $10,000. A plunger lift system could increase production by 100 Mcf/day or more.

DAYS TO PAY OFF PLUNGER LIFT SYSTEM*
Example Production Increase of 50 Mcf/Day

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<tr>
<th>Gas Prices (Dollars/Mcf)</th>
<th>$2.00</th>
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<td>30</td>
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</table>

*Assumes average system cost of $4,500
Surface equipment overview.

The PCS Ferguson Plunger Lift system is operated at the surface using an electronic controller. The controller can be utilized to provide both current and historic data about tubing and casing pressures, shut-in and sales times, plunger travel times and flow rates. Based on these readings, the operator determines the time needed for the plunger to reach the bottom and/or the pressure needed for the plunger to lift the liquids to the surface. The operator uses the controller to activate the motor valve to open or close based on the time or pressure determination.

When the motor valve is closed, the flow of gas stops. The well is now shut in and starts to build energy. The plunger, which resides at the surface in the lubricator, falls down the tubing through the gas and liquid. As the plunger falls to the bottom of the well, liquids gather in a column above it. When the motor valve is re-opened, the plunger, which acts as a swab, rises back up to the surface, lifting and removing the liquid column.

An arrival sensor on the lubricator communicates to the controller that the plunger has arrived. The controller then activates a delay or after-flow. Since the tubing is free of liquids, the lack of back pressure allows the well to produce at maximum flow. The operator determines how long to after-flow based on how quickly fluids accumulate during this flow time. At the end of this period, the well is shut in again, and the plunger cycle repeats.

PCS Ferguson Plunger Lift surface equipment includes the lubricator, catcher, controller, motor valve and arrival sensor.

**LUBRICATOR:**
Cushions the impact of the arriving plunger and allows safe access to the plunger for maintenance or replacement.

**CATCHER:**
Catches and holds the plunger in the lubricator so that the plunger can be safely removed.

**CONTROLLER:**
Opens and closes the motor valve based on time, pressure or flow rate. Provides data to help optimize production.

**SOLAR PANEL:**
Provides a continuous and rechargeable power source to the controller batteries.

**MOTOR VALVE:**
A pneumatic diaphragm-activated valve that starts and stops production based on input sent by the controller.

**DRIP POT:**
Reduces downtime by preventing condensate, water and other contaminants from clogging the controller or the valves.

**ARRIVAL SENSOR:**
Senses the plunger’s arrival and reports arrivals to the controller.
Lubricators

**IDEAL FOR**

Protecting operators and equipment by cushioning the plunger upon arrival.
A lubricator cushions the continual impact of the plunger each time it reaches the well’s surface. It also allows access to the plunger for easy inspection, removal or replacement.

**How a Lubricator Works**

The lubricator is the primary piece of surface equipment in the plunger lift system. As the plunger travels upward through the well, it surfaces in the lubricator and is held above the bottom flow outlet.

To replace or inspect the plunger, an operator closes the catcher, which then grabs and holds the plunger on its next arrival. Once the plunger has arrived and the well head is depressurized, the operator removes the lubricator cap to retrieve the plunger.

PCS Ferguson lubricators are backed by more than 30 years of development to ensure maximum durability, safety and efficiency. PCS Ferguson recommends running plungers at speeds between 500-1,000 ft/min. However, our lubricators can withstand arrival speeds up to 3,000 ft/min.

**Safer and More Advanced than Competitors’ Products**

- All lubricator designs are engineered in-house and stamped by a Professional Engineer
- Rigorous quality control and testing of each part
- Designed and manufactured to API 6A standards
- Material 100% traced from mill to field
- Patented PCS Ferguson Poly-Spring™ maintains optimal impact absorption through a range of impact speeds (up to 3,000 ft/min.)
- Optional long length cap improves safety and allows easier access to the plunger
PCS Ferguson is the leader in designing customized lubricators to meet your specifications and well head configurations. Tell us about your unique challenges, and we can engineer specialized lubricators to meet your needs.

**Advantages**
- Improves well site safety for operators and equipment
- Can withstand breakage from potentially fast-rising plungers
- More durable and efficient than competitive products
- Can be easily customized based on your well specifications

**Specs / Materials**
- Standard tubing: ST52.3
- Other materials: 1018 or A105
- Rated for 3,000 PSIG working pressure. Hydrostatically tested to 6,000 PSIG
- Speed rating: Sizes up to 2 7/8": 3,000 ft/min (arrivals over 3,000 ft/min are not recommended)
- Standard temperature rating: 0° to 150° F ( -18° to 66° C )
- Comes standard with manual catcher (as shown)
- Auto catcher option available
- PSL1 and PSL2 available

**Low Temperature / Sour Specs / Materials**
- Low temperature/sour materials: 4130 quench and tempered / L80
- Low temperature/sour rating: -50° to 180° F ( -45° to 82° C )
- NACE MR0175
- To API 6A standards
- PSL1 and PSL2 available

**Product Styles**
- Single or double outlet
- Cap type: Standard, Bowen, or Bypass
- Flanged or threaded
- Standard or low temperature/sour

**Product Styles**

**Lubricator with Bypass Cap**
Our lubricator with bypass cap is designed to work with all flow-thru and bypass plungers. The innovative spring design can withstand maximum impact, extending the life of the plunger.
Lubricator/Catcher Combination

The flow-tee profile is designed to allow flow passage even when the plunger is in the lubricator. This combo has been designed to accept both the shorter Mini-Flex style or longer Duo-Flex style plungers. Proven design makes it both safe and serviceable.

Features
The one-piece construction of the catcher nipple and flow tee makes the installation simpler by eliminating an additional construction. This unit also includes a sensor housing, retractable catcher, shock spring, and striker block.

- Easy to install
- Sensor house available
- Pressure tested
- Available in a variety of sizes
- Available in special materials for severe service

Call your PCS Ferguson sales and service representative to learn about the custom configurations available to meet your needs!
Arrival Sensors

These plug-in sensors securely attach to the machined pocket of Ferguson Beauregard lubricators, for optimal plunger detection. Clamp-on sensors attach to any lubricator and feature a sensitivity adjustment to fine-tune plunger detection.

Features

PCS Ferguson’s arrival sensors offer an engineered custom design compatible with harsh well site realities. These three-wire sensors provide superior accuracy and repeatability.

- Inductive sensing technology
- Accurate, repeatable results
- 3-wire
- Class 1, Div 1 requires the sensor to be connected to an appropriate intrinsically safe barrier
- Low power consumption
- Pulls signal line “low” when plunger is detected
- 3-15 Vdc

<table>
<thead>
<tr>
<th>Part #</th>
<th>Sensitivity</th>
<th>Cable Length</th>
<th>CSA Certification*</th>
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<td>Class 1, Div 1</td>
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<td>MSO00D35A</td>
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<td>Class 1, Div 1 &amp; 2</td>
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<td>Extra Sensitivity</td>
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<td>Class 1, Div 1</td>
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<tr>
<td>MSO00D35X</td>
<td>Extra Sensitivity</td>
<td>19 ft 7 in</td>
<td>Class 1, Div 1 &amp; 2</td>
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</tbody>
</table>

*Division 1 installation requires appropriate intrinsically safe barrier or use with our LiquiLift or AutoCycle controllers.

Wiring Schematic

- Red – Positive
- Black – Negative
- White – Signal
- Un-shielded – Ground
Accurate Arrival Detection

The 3DSO® is the first arrival sensor with a microprocessor that continually calibrates to the well, providing the intelligence to eliminate false arrival reports. The 3-D technology detects the plunger using three coils in three axes (X, Y, and Z) to penetrate through the lubricator and sense the plunger’s arrival.

Maximizes Production and Efficiency

By accurately sensing the plunger’s arrival every time, the 3DSO allows for optimal plunger lift operations. Because it continually self-calibrates, it offers virtually maintenance-free operation, eliminating operator intervention and production downtime.

On-site Adjustments

Sensitivity Potentiometer. Adjust the sensitivity of the plunger arrival sensor from a range of 20% to 100%.

Pulse Length Potentiometer. Adjust the pulse length range from 2 to 30 seconds, as required by some Electronic Flow Meters (EFMs).

Enclosure

Rugged aluminum housing for protection against harsh weather conditions

Housing is equipped with NPT ½” female connection for wiring flexibility

Electrical components are potted to prevent moisture penetration

Power

Operating voltage 5 to 28 volts (current consumption approximately 1mA)

Temperature Rating: Operating temperature range of -40° to 85° C (185° F)

CSA Class 1, Div 1, Group C & D
Pneumatic Auto Catcher

The Auto Catcher is an optional upgrade to the standard catcher. It is mounted on the lubricator to catch an arriving plunger. The Auto Catcher grabs the plunger securely to eliminate flow restriction. It also eliminates plunger bobbing, reducing wear on the plunger and lubricator. The Auto Catcher is highly recommended when using flow-thru plungers in low liquid environments when you want to control the number of trips.

Plunger Plucker

The Plunger Plucker improves the safety and ease of removing a plunger for replacement or maintenance. It allows field personnel to safely retrieve a plunger that is being held in the catcher of the lubricator. You can mechanically expand or contract the outer diameter of the Plunger Plucker as needed to prevent the plunger from dropping on the gate valve. This ensures better protection for both field personnel and well head equipment.
PCS Ferguson 8000 Series® Controllers

The PCS Ferguson 8000 Series® is available in three Class 1, Div 2 controller configurations to address your particular site management needs: the PCS Ferguson 8200™, PCS Ferguson 8400™, and PCS Ferguson 8800™.

PCS Ferguson 8200™

The PCS Ferguson 8200 Controller functions as a remote device when integrated with the PCS Ferguson 8400 or PCS Ferguson 8800 master controllers as part of the Well Site SCADA system.

PCS Ferguson 8400™

The PCS Ferguson 8400 Controller serves as part of a Well Site SCADA system. It can be used as a Single-Well and Multi-Well Plunger Lift Master, and a Gas Lift Slave. The 8400 controls tank level applications and features optional Bluetooth® support for configuration, control, and view of well status from your mobile device.

PCS Ferguson 8600™

The PCS Ferguson 8600 controller functions as a brushless or brushed motor controller. It can be used as a single well plunger lift controller or a well-head controller in a Multi-Well Plunger lift scenario to provide the best controller of a plunger lift well while managing chemical injection. The hardware allows for control of two pumps to maximize control and cost with one piece of hardware.

PCS Ferguson 8800™

The PCS Ferguson 8800 Site Manager is our most robust offering for pad site management. With Auto Lift configuration, it will run plunger lift and gas lift simultaneously. Building upon the 8400 Controller, the 8800 Site Manager also adds ISaGRAF® logic controls. You gain PLC functionality and the ability to develop custom applications for your unique site requirements.

Easy Setup and Configuration

Configure your site, fine tune optimization and production, and troubleshoot and correct problems faster and more efficiently with WellVision®. Whether you’re at the office or the well site, WellVision gives you access to real-time and historical data. With important information at your fingertips, you can quickly and efficiently recognize trends or address production issues.

For smaller operations, WellVision offers real-time remote well diagnostics, automated data downloads, graphical analysis of well performance, easy to use reporting capabilities, and remote connectivity options.
## PCS Ferguson 8000 Series Applications and Features

<table>
<thead>
<tr>
<th>Application</th>
<th>PCS Ferguson 8800™ Controller</th>
<th>PCS Ferguson 8600™ Controller</th>
<th>PCS Ferguson 8400™ Controller</th>
<th>PCS Ferguson 8200™ Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Lift Manager</td>
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<td></td>
<td></td>
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<tr>
<td>Multi-Well Master</td>
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<td>✓</td>
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<tr>
<td>Single-Well Plunger Lift Controller</td>
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<tr>
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<tr>
<td>Gas Lift Remote Device</td>
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<td>Remote I/O Device</td>
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<tr>
<td>Rockwell® ISaGRAF® availability</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Tank Level Monitoring</td>
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<tr>
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<table>
<thead>
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<th>Feature</th>
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<th>PCS Ferguson 8400™ Controller</th>
<th>PCS Ferguson 8200™ Controller</th>
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Rockwell ISaGRAF is highly scalable and flexible software, ideal for programming customized alarm features for well site equipment like compressors, separators, dehydrators, EFMs, production fluid tanks, and more. It is available as an option on the PCS Ferguson 8800 controller.
The LiquiLift™ III features menu-driven operations making it easy to operate. The menu structure includes the ability to operate a well under a number of conditions. The LiquiLift III is also highly flexible. It can be used as:

- A single, dual, or triple valve plunger lift controller
- A gas-lift controller with either one or two valves
- An intermitter for a simple timing application
- A 4-valve pig-lift controller

Housed in an all-steel enclosure and utilizing DC voltage with a rechargeable battery and solar panel, this controller can be remotely mounted at a wellhead in the most extreme environmental conditions. Its modular construction allows ease of replacement and upgrades.

**Specifications**

- 25-key membrane switch with 4x20 LCD display
- Field wiring connections via pluggable terminal blocks

**Pneumatic Output**

- One pneumatic magnetically latching solenoid valve included
- 40 psi maximum input pressure

**Ratings**

- Class 1 Division 1 Group D hazardous locations by CSA

**Operating Temperature Range**

- -40°C to +60°C
- 20°C to +60°C for LCD display

**Power Characteristics**

**Power Supply**

- 4 alkaline D-Cell batteries in 6-volt configuration
- Optional 1-watt solar panel with 6-volt rechargeable gel cell battery rated 4.5 Amp Hour (Ah)
- Temperature compensated battery charging

**Quiescent Mode Current**

- 500 microamps or 0.500 milliamps (during sleep cycle)

**Valve Open or Close Pulse**

- Typically 0.8 amps for ¼ second

**Keypad/LCD Active**

- 3.5 milliamps until next sleep cycle
The AutoCycle™ controller, with its multiple valve and control mode options, is excellent for all plunger lift applications. With the AutoCycle algorithm monitoring the plunger velocity, the controller automatically changes its own operating cycles should the plunger begin to travel outside an acceptable range. This monitoring takes place every cycle, 24 hours a day, 7 days a week.

The AutoCycle controller is ideal for use with conventional plunger lift, but also offers additional control modes including gas assist plunger lift, annular flow and plunger enhanced chamber lift (PECL) control capabilities. It can be used effectively in plunger lift wells with packers or wells that have fluctuating line pressure.

### Specifications

- **25-key membrane switch with 4x20 LCD display**
- **Field wiring connections via pluggable terminal blocks**

#### Pneumatic Output

- One pneumatic magnetically latching solenoid valve included
- 40 psi maximum input pressure

#### Ratings

- Class 1 Division 1 Group D hazardous locations by CSA

#### Operating Temperature Range

- -40°C to + 60°C
- -20°C to + 60°C for LCD display

#### Power Characteristics

**Power Supply**

- 1-watt solar panel with 6-volt rechargeable gel cell battery rated 4.5 Ah
- Temperature compensated battery charging

**Quiescent Mode Current**

- 500 microamps or 0.500 milliamps (during sleep cycle)

**Valve Open or Close Pulse**

- Typically 0.8 amps for ¼ second

**Keypad/LCD Active**

- 3.5 milliamps until next sleep cycle
The AutoCycle™ iC is a seamless wellhead management solution providing reliable control, real-time data, and convenient communications. The AutoCycle iC offers upgrade scalability, meaning you can begin with a standalone feature set and when ready, quickly and easily upgrade to any level of functionality and control you desire. The AutoCycle iC provides two-way text messaging connectivity with any SMS text-enabled cell phone. You can:

- Check current status
- Change operating parameters
- Receive scheduled messages
- Notification of alarm events

The AutoCycle iC brings wellhead management together in one simple solution. You no longer need a full SCADA set-up to get full-level communications with your wells. With the AutoCycle iC, you have total control, command and the communications you need.

**Monitoring and Control Options**

- Plunger lift control
- Tank level monitoring
- Pressure monitoring
- Temperature monitoring

**Interface Options**

- Local PC access for setup and operations
- Cellular via SMS Text and email
- Onsite with full function keypad and display

Apergy
## Specifications

### Memory
- 512K application code size
- 512K random access memory
- 1 Micro-SD (2GB max) card slot memory expansion

### Pneumatic Output
- One pneumatic magnetically latching solenoid valve included
- 40 psi maximum input pressure

### Operating Temperature Range
- -40°C to + 60°C
- -20°C to + 60°C for LCD display

### I/O
- 3 analog inputs (0-5 Volt) can be configurable to digital signal input
- 1 discrete input typically for magnetic shut off plunger sensor
- 4x20 character LCD and keypad
- 4 discrete high current outputs for actuation of up to 2 latch valves

### Communications
- 1 serial port RS-232 connection
- 1 TTL 3.3V serial connection
- USB Local Operator Interface (LOI)
- Optional cellular modem to enable remote monitoring and control with SMS messaging

### Power Characteristics

#### Power Supply
- 6 Volt or 12 Volt DC selectable power source
  - 6V 1W solar panel options with no communications
  - 12V 10W solar panel with a 12V 12 Ah rechargeable gel cell battery rated for use in Class 1, Div 2
  - Temperature compensated battery charging

#### Solar Charger Input
- 12 Volt, 10 Watt max

#### Quiescent Mode Current
- Approximately 8 milliamps (during sleep cycle)

#### Valve Open or Close Pulse
- Typically 0.8 amps for ¼ second

#### Keypad/LCD active
- 3.5 milliamps until next sleep cycle
PCS 1000® Controller

The PCS 1000® Controller is an economical, single-valve, time-based controller that’s ideal for intermitting a well’s sales time. The PCS 1000 is easy-to-use and has been proven in over two decades of field-testing and service.

**Applications**
- Wells with stable production levels
- Unloading liquids from gas wells

**Features**
- Battery status
- Arrival Sensor On/Off
- Delay/sales time
- Plunger and valve counts
- Safety shut-ins (high line pressure, high tank levels)
- CSA-approved version available

PCS 1000J® Controller

The PCS 1000J® Controller is a time-based controller that offers the same features as a PCS 1000 Controller with the addition of useful functions like mandatory shut-in, plunger trip history reports, and well synchronization.

**Applications**
- Wells with stable production levels
- Wells with consistent line pressure

**Features**
- All features of the PCS 1000 Controller
- Plunger trip history reports
- Mandatory shut-in
- Total open time
- Well synchronization
- CSA-approved version is available
**PCS 3000® Controller**

The PCS 3000® Controller is a self-managing controller that delivers real-time data on a well's casing, tubing and line pressures. It uses this pressure data—as opposed to historical information or time-based settings—to make automatic adjustments to improve well production.

### Applications
- Wells with fluctuating sales line pressure
- Wells with high sales line pressure
- Remote location single wells
- Wells with packers

### Features
- All features of the PCS 1000 and PCS 2000*
- Improved operator efficiency
- Better performance and productivity than is possible with time-based control
- Displays real-time well pressures
- History reports: plunger trips, total open-close time, valve count, plunger travel speed, battery status
- CSA-approved version available
- Pantented casing dip shut-in
- Tubing or casing over line control

*PCS Ferguson also offers the PCS 2000® Controller, combining the features of a PCS 1000 Controller with a B-Valve option and fast trip safety shut-in feature.*
PCS High-Low® Controller

The PCS High-Low® Controller monitors well pressure and opens or closes the motor valve based on high and low pressure spikes from downstream or upstream. It’s an eco-friendly ‘no bleed’ controller that is more flexible and reliable than a continuous bleed bourdon-tube type controller. It offers optional safety shut-in features.

**Applications**
- Separator high-low control
- Compressor by-pass control
- Safety On-Off control

**Features**
- Economical safety control
- Programmable deadband
- ‘No-bleed’ controls
- Three modes:
  - Close High / Close Low
  - Open High / Close Low
  - Close High / Open Low

PCS High-Low Timer® Controller

The PCS High-Low Timer™ Controller is a time-based controller (similar to the PCS 1000) with the added safety features of the PCS High-Low Controller. It allows the operator to manage production using time-based calculations, while also protecting surface equipment and preventing environmental damage in the event of overpressure or loss of pressure.

**Applications**
- Time controlled wells where additional pressure safety measures are desired

**Features**
- Economical solution for combining time control with pressure safety control
- History reports: valve counts, total open/close times, battery status
- Most of the features of the PCS 1000 combined with the features of the PCS High-Low
Downhole equipment overview.

The PCS Ferguson Plunger Lift downhole equipment includes the plunger and bottom hole bumper spring. The plunger travels down the tubing, landing at the bottom hole bumper spring, which cushions its arrival. It then travels up the tubing, lifting and removing liquids and solids as it surfaces.

**PLUNGER:**
A traveling durable ‘piston’ that acts as an interface between the high pressure gas and liquids. It creates a seal to the tubing wall, allowing it to contain and lift liquids to the surface. It can also keep tubing clean by removing sand, salt, coal fines, paraffin and scale.

**BOTTOM HOLE BUMPER SPRING:**
Sits down hole at the seating nipple. Protects the plunger, tubing and seating nipple upon plunger impact. A ball and seat check can be added to trap liquids in the tubing.
Plunger Application Guide

PCS Ferguson designs plungers for a variety of well conditions. Use to the chart below when determining the best plunger for your specific well conditions.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
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<td></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pad Plungers

IDEAL FOR

Increasing production in wells with low volume or tubing deviations. We recommend a Pad Plunger for most typical plunger lift installations. It creates a consistent seal in the tubing by overcoming deviations in the tubing’s size and shape.

How it Works
A Pad Plunger has one to three spring-loaded pad sections. Upon contact with the tubing wall, the pads expand or contract to compensate for tubing irregularities and imperfections. This allows the plunger to maintain a tight, consistent seal against the tubing wall in order to reduce or eliminate liquid fallback. This patented design is highly durable and long-lasting.

Applications
- Low volume and marginal wells
- Low pressure wells
- Wells with tubing irregularities
- Wells producing below critical flow rates
- Wells that produce light oil, condensate, or water

Features
- API standard fishneck
- Friction-type seal
- 4140 steel or stainless steel (other materials available)
- Choose one, two, or three pads per plunger (standard or long)
- Flow-thru (bypass) option available for select 2 3/8" and 2 7/8" sizes
- Viton® option available for select 1 1/2" and 2 3/8" sizes

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Closed O.D.</th>
<th>Open O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2&quot;</td>
<td>1.460&quot;</td>
<td>1.595&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 1/8&quot;</td>
<td>1.600&quot;</td>
<td>1.700&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 3/8&quot;</td>
<td>1.875&quot;</td>
<td>2.020&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.345&quot;</td>
<td>2.500&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 7/8&quot; (optional)</td>
<td>2.210&quot;</td>
<td>2.350&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>3 1/4&quot;</td>
<td>2.570&quot;</td>
<td>2.700&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>3 1/2&quot; (optional)</td>
<td>2.775&quot;</td>
<td>2.920&quot;</td>
<td>1 3/16&quot;</td>
</tr>
</tbody>
</table>
Mini-Flex

The workhorse of plungers: it is small, lightweight, and simple to use.

Features
With eight interlocking stainless steel pads, the Mini-Flex creates an efficient seal.
- “Flex” design
- Efficient and simple
- Versatile and attractively priced

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing Size</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>2 3/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
</tr>
</tbody>
</table>

Duo-Flex

Able to travel with less pressure and with less gas slippage, the Duo-Flex is often used with an internal bypass, allowing it to fall faster in liquids.

Features
Two sets of Mini-flex seals offer greater sealing capability. Available with bypass and in special materials where CO2 or H2S is present.
- “Flex” design
- Superior seal for weaker wells
- Available with or without a bypass system

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing Size</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>2 3/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
</tr>
<tr>
<td>3”</td>
</tr>
</tbody>
</table>
The Beau-Flex Plunger is effective in weaker wells where plunger performance is marginal or where plungers have not previously proven successful. It is often successful in wells where there is insufficient gas pressure to operate other plungers.

**Features**
Its advanced seal system eliminates gas slippage.

- Excellent sealing characteristics
- Maintains its “flex” design
- Available in a variety of O.D.’s

### Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Closed O.D.</th>
<th>Open O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ¾”</td>
<td>1.500”</td>
<td>1.640”</td>
<td>1 ⅞”</td>
</tr>
<tr>
<td>2 ⅞”</td>
<td>1.625”</td>
<td>1.775”</td>
<td>1 ⅞”</td>
</tr>
<tr>
<td>2 ⅛”</td>
<td>1.875”</td>
<td>2.025”</td>
<td>1 ⅞”</td>
</tr>
<tr>
<td>2 ⅜”</td>
<td>2.325”</td>
<td>2.490”</td>
<td>1 ⅞”</td>
</tr>
</tbody>
</table>

The Dura-Flex Plunger is ideal for weaker wells where plunger performance is marginal or wells with tubing irregularities.

**Features**
Dura-Flex Plunger has a ribbed sealing feature behind the pads so they can spin or rotate to better conform to tubing irregularities.

- Ribbed sealing feature behind pads for superior sealing characteristics
- Fewer components for a more reliable design
- Pads free to spin or rotate as needed to conform to tubing irregularities
- Advanced seal system

### Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Closed O.D.</th>
<th>Open O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ⅜”</td>
<td>1.875”</td>
<td>2.025”</td>
<td>1 ⅞”</td>
</tr>
<tr>
<td>2 ⅝”</td>
<td>2.325”</td>
<td>2.490”</td>
<td>1 ⅞”</td>
</tr>
</tbody>
</table>
Brush Plungers

**How it Works**
A Brush Plunger’s middle section is covered with a flexible nylon brush that allows the plunger to travel in the tubing despite foreign materials. The brush effectively brushes off sand, salt and coal fines that accumulate inside the tubing. The diameter of the brush is slightly larger than the plunger body, so it creates an effective seal by adapting to deviations in the tubing.

**Applications**
- Low pressure wells
- Wells with tubing irregularities
- Wells that produce salt, sand, or coal fines
- Wells that require high seal efficiency

**Features**
- Nylon sealing available
- Available with fishing neck on each end
- 4140 steel mandrel
- Nylon spiral-bound brush section
- Viton option available for select 2 3/8” and 2 7/8” sizes

**Sizes**

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Min O.D.</th>
<th>Max O.D.</th>
<th>Fishneck Size</th>
</tr>
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<tbody>
<tr>
<td>1 1/4”</td>
<td>1.275”</td>
<td>1.280”</td>
<td>7/32”</td>
</tr>
<tr>
<td>1 1/2”</td>
<td>1.438”</td>
<td>1.536”</td>
<td>1 3/4”</td>
</tr>
<tr>
<td>2 3/8”</td>
<td>1.500”</td>
<td>1.677”</td>
<td>1 1/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
<td>1.875”</td>
<td>1.935”</td>
<td>1 3/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
<td>2.250”</td>
<td>2.367”</td>
<td>1 1/4”</td>
</tr>
<tr>
<td>3 1/2”</td>
<td>2.750”</td>
<td>2.900”</td>
<td>1 3/4”</td>
</tr>
</tbody>
</table>

Removing sand, salt, and coal fines.
If a well is producing sand, salt and coal fines, we suggest trying a Brush Plunger since it provides an effective seal for marginal wells.

**IDEAL FOR**
Brush Plungers

**Sizes**

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Min O.D.</th>
<th>Max O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/4”</td>
<td>1.275”</td>
<td>1.280”</td>
<td>7/32”</td>
</tr>
<tr>
<td>1 1/2”</td>
<td>1.438”</td>
<td>1.536”</td>
<td>1 3/4”</td>
</tr>
<tr>
<td>2 3/8”</td>
<td>1.500”</td>
<td>1.677”</td>
<td>1 1/8”</td>
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<tr>
<td>2 7/8”</td>
<td>1.875”</td>
<td>1.935”</td>
<td>1 3/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
<td>2.250”</td>
<td>2.367”</td>
<td>1 1/4”</td>
</tr>
<tr>
<td>3 1/2”</td>
<td>2.750”</td>
<td>2.900”</td>
<td>1 3/4”</td>
</tr>
</tbody>
</table>
### Sand Plungers

**How it Works**
A Sand Plunger is a self-cleaning plunger that allows gas to flow through the plunger, cleaning sand out of the plunger grooves. This enables it to travel effectively without becoming stuck in the tubing or lubricator.

**Applications**
- Wells that produce sand, salt, or coal fines
- Wells that have experienced other plungers getting stuck

**Features**
- 4140 or stainless steel
- API standard fishing neck
- Optional spiral

### Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Standard O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/16&quot;</td>
<td>1.630&quot;</td>
<td>1 3/16&quot;</td>
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<td>2.877&quot;</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td>2 3/4&quot; (optional)</td>
<td>1.900&quot;</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.335&quot;</td>
<td>1 3/8&quot;</td>
</tr>
</tbody>
</table>

Plunger operation despite sand, salt, and coal fines.
If a well is producing sand, salt, and coal fines and standard plungers have gotten stuck, our Sand Plunger might be your best option. It can travel in the well tubing when other plungers get slowed or stopped.
Solid Plungers

**How it Works**
A Solid Plunger has an economical and durable one-piece design. A heavy plunger with grooves, it can cut through paraffin, sand or salt to enable faster fall times. The grooves are also designed to trap and remove gas in wells with high gas volumes.

**Applications**
- Wells with high gas volume
- Wells that produce paraffin, scale, or salt

**Features**
- 4140 or stainless steel
- API standard fishing neck
- Flow-thru (by-pass) option available for select 2 3/8” and 3 1/2” sizes

**Product Styles**
- Standard
- Texas-style (long)

**Sizes**

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Standard O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/4&quot;</td>
<td>1.275&quot;</td>
<td>3/8&quot;</td>
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</tr>
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<td>5/32&quot;</td>
</tr>
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<td>7/32&quot;</td>
</tr>
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<td>1 3/32&quot;</td>
</tr>
<tr>
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<td>1.877&quot;</td>
<td>1 5/32&quot;</td>
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<td>3/16&quot;</td>
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<tr>
<td>2 7/16&quot;</td>
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<td>2.625&quot;, 2.860&quot;</td>
<td>3/16&quot;</td>
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Bar Stock Cleanout

Features
The Barstock Cleanout Plunger features deep external grooves to trap gas and create a better seal. Rounded edges on the grooves allow the plunger to pass through tight spots that might hang up plungers with sharp edges.

- One-piece solid design
- Slightly smaller O.D. than conventional bar stock
- Shorter to better accommodate tight spots
- Minimal wear tendencies
- Economical and low maintenance

<table>
<thead>
<tr>
<th>Sizes</th>
<th>Tubing Size</th>
<th>Ring Standard O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 1/2&quot;</td>
<td>1.470&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td></td>
<td>2 1/16&quot;</td>
<td>1.610&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td></td>
<td>2 3/8&quot;</td>
<td>1.870&quot;</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td></td>
<td>2 7/8&quot;</td>
<td>2.330&quot;</td>
<td>1 3/8&quot;</td>
</tr>
</tbody>
</table>
**How it Works**

A Shock Absorber Plunger has a built-in bumper spring, allowing it to run directly off the seating nipple or standing valve. The durable Viton bumper spring will maintain its elasticity over time. It allows more flow by reducing downhole restrictions. This can decrease costs for chemical treatments and wirelines. You can choose a plunger with expandable pads or with a nylon brush section.

**Applications**

- Wells with scale build up
- Wells with only a seating nipple or standing valve
- 

**Features**

- 4140 steel or stainless steel mandrel and pad segments
- API standard fishing neck
- Nylon spiral-bound brush section (optional)

**Product Styles**

- Single and dual pad (long pad optional)
- Triple pad
- Brush

---

**IDEAL FOR**

**Allowing more flow by eliminating downhole equipment restrictions.** If a well's production is restricted by downhole equipment, pressure can drop and scale can build up. Our Shock Absorber Plunger eliminates downhole restrictions and improves flow.

---

**Sizes**

<table>
<thead>
<tr>
<th>Sizes (Pad Shock Absorber)</th>
<th>Sizes (Brush Shock Absorber)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing Size</td>
<td>Closed O.D.</td>
</tr>
<tr>
<td>2 3/4&quot;</td>
<td>1.875&quot;</td>
</tr>
</tbody>
</table>
Scale Knocker Plunger

How it Works
A Scale Knocker Plunger is a variation of the Shock Absorber Plunger. It has an additional ‘stinger’ that penetrates the seating nipple on contact to remove scale before it can build up. This plunger can be run daily or as needed for scale removal. Its usage can reduce chemical treatment and wireline expenses.

Applications
- Wells with scale build up in the seating nipple

Features
- 4140 steel or stainless steel
- API standard fishing neck
- Viton style

Product Styles
- Standard
- Brush

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Standard O.D.</th>
<th>Fishing Neck</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ⅜”</td>
<td>1.900”</td>
<td>1 ⅞”</td>
</tr>
</tbody>
</table>

Removing scale from the seating nipple to improve production.
If a well’s production is restricted by severe scale build up in the seating nipple, we suggest our Scale Knocker Plunger. It removes scale to maintain or improve production.

SPG-238-SNDSKL
Scale Knocker Plunger
How it Works
A Flow-Thru Plunger opens and closes an adjustable bypass valve, enabling it to fall against flow so that the well can continue production as the plunger works. This plunger makes more trips with faster fall times, delivering continuous fluid removal with little or no shut-in time. It often helps wells achieve a significant increase in daily production.

Applications
• Flowing wells
• High gas or liquid volume
• Wells in the beginning stages of liquid loading

Features
• 4140 or stainless steel
• For normal well head configurations
• Economical one piece design
• Optional lubricator is available for all flow-thru and bypass plungers

Product Styles
• Padded sleeve bypass
• Center bypass
• Ring friction bypass

Sizes
<table>
<thead>
<tr>
<th>Tubing Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
</tr>
</tbody>
</table>

Reducing shut-in time due to high gas and liquids.
If you have a high volume gas and liquid well that requires too much shut-in time for standard plungers, our Flow-Thru Plungers can reduce or even eliminate shut-in times.
Super Flow

Features
The Super Flow utilizes standard lubricator/catcher assembly and standard downhole equipment.
- One-piece design for simple operations
- Able to control fall speed by adjusting flow ports
- External grooves create “turbulent” seal
- Allows for continuous flow if desired

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>1.890&quot;</td>
<td>1 7/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.330&quot;</td>
<td>1 7/8&quot;</td>
</tr>
</tbody>
</table>

Continuous Flow Bar Stock

Features
The Continuous Flow Bar Stock Plunger features a steel mandrel with grooves machined on the outer surface to create a “turbulent” seal.
- Continuous flow characteristics
- Unique valve design

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>1.890&quot;</td>
<td>1 7/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.340&quot;</td>
<td>1 7/8&quot;</td>
</tr>
</tbody>
</table>
**Continuous Flow Beau-Flex**

**Features**

The Continuous Flow Beau-Flex Plunger contains eight interlocking stainless steel pads and features a unique, newly designed valve and seal system.

- Unique valve design
- Delivers maximum efficiency
- Maintains its “flex” design

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing Size</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>2 3/8”</td>
</tr>
<tr>
<td>2 7/8”</td>
</tr>
</tbody>
</table>

**Uni-Flow**

**Features**

The Uni-Flow delivers the benefits of a ball and sleeve plunger in a one-piece flow-thru design. By containing the ball in a sealed cage, the Uni-Flow delivers exceptional performance while eliminating dry runs and damaged equipment.

- 4140 or stainless steel
- For normal well head configurations
- Economical one piece design
- Optional lubricator available

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing Size</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>2 3/8”</td>
</tr>
</tbody>
</table>
**Liquid Aeration Plungers (LAP)**

**How it Works**
Our unique, patented HV Lift™ technology allows the LAP to fall quickly to the well bottom. As it travels upward, gas is transferred up through the plunger, causing a turbulent aeration (or bubbling effect) in the liquid slug above the plunger. This advanced liquid aeration process makes it possible for the plunger to lift and remove the liquid load more efficiently and at higher velocity.

Nylon screws are included with the Spiral Bar Stock LAP to allow you to easily adjust the LAP’s fall speeds, preventing damage to the plunger and bottom hole bumper spring.

**Applications**
- Wells that can recover quickly
- Wells that produce high accumulations of liquids
- Wells that produce heavy liquids

**Features**
- 4140 or stainless steel
- API standard fishing neck
- For normal well head configurations

**Product Styles**
- Single pad
- Bar stock

---

**Sizes**

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Min O.D.</th>
<th>Max O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>1.875&quot;</td>
<td>2.020&quot;</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.345&quot;</td>
<td>2.500&quot;</td>
<td>1 7/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot; (optional)</td>
<td>2.210&quot;</td>
<td>2.350&quot;</td>
<td>1 3/8&quot;</td>
</tr>
</tbody>
</table>
First Responder Plunger

Just as the name implies, the First Responder is the first choice in the well’s life cycle. It can reduce or even eliminate shut-in times, while maximizing production. This plunger makes more trips with faster fall times, delivering continuous fluid removal. And it often helps wells achieve a significant increase in daily production.

How it Works
The ball and sleeve are held in the lubricator by the separator rod and latch. When the latch opens, the combination of the differential pressure and the rod hold the sleeve, while the ball falls towards the bottom of the well. When the differential pressure decreases, the sleeve begins to follow.

When the sleeve reaches the bottom hole bumper spring, it joins the ball and forms a seal. Pressure builds, causing the ball and sleeve to travel together while lifting fluid to the surface. When the plunger reaches the lubricator, the separator rod extends through the sleeve, knocking the ball down the tubing and the cycle repeats.
Applications
- Flowing wells
- High gas or liquid volume
- Wells in the beginning stages of liquid loading

Advantages
- Controlled fall speeds reduce wireline expenses
- Little or no shut-in time allows optimal production
- Multiple configurations accommodate a wide range of production rates

Sleeve Specs
- 4140 steel
- API standard fishing neck
- 6", 9", and 12" lengths available
- Ball retention option available

Ball Material Options
- Zirconia
- Stainless Steel
- Cobalt
- Tungsten Carbide

<table>
<thead>
<tr>
<th>Rate (Mcf/d)</th>
<th>Ball Recommendation</th>
<th>Sleeve Recommendation</th>
<th>Ascending Rate (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 &gt;</td>
<td>1-3/8&quot; Zirconia</td>
<td>6&quot; Sleeve</td>
<td>600 - 700</td>
</tr>
<tr>
<td>400 - 600</td>
<td>1-3/8&quot; Stainless Steel</td>
<td>9&quot; Sleeve</td>
<td>800 - 900</td>
</tr>
<tr>
<td>600 - 800</td>
<td>1-3/8&quot; Cobalt</td>
<td>9&quot; Sleeve</td>
<td>1000 - 1100</td>
</tr>
<tr>
<td>800 - 1000</td>
<td>1-3/8&quot; Tungsten Carbide</td>
<td>9&quot; Sleeve</td>
<td>1100 - 1200</td>
</tr>
<tr>
<td>1000 &lt;</td>
<td>1-3/8&quot; Tungsten Carbide</td>
<td>12&quot; Sleeve</td>
<td>1100 - 1200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate (Mcf/d)</th>
<th>Ball Recommendation</th>
<th>Sleeve Recommendation</th>
<th>Ascending Rate (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 &gt;</td>
<td>1-11/6&quot; Zirconia</td>
<td>6&quot; Sleeve</td>
<td>500 - 600</td>
</tr>
<tr>
<td>600 - 900</td>
<td>1-11/6&quot; Stainless Steel</td>
<td>9&quot; Sleeve</td>
<td>800 - 1000</td>
</tr>
<tr>
<td>900 - 1200</td>
<td>1-11/6&quot; Cobalt</td>
<td>9&quot; Sleeve</td>
<td>1000 - 1300</td>
</tr>
<tr>
<td>1200 - 1600</td>
<td>1-11/6&quot; Tungsten Carbide</td>
<td>12&quot; Sleeve</td>
<td>1350 +</td>
</tr>
</tbody>
</table>

*Based on 150 line pressure. All wells are different. Results will vary.*
The Smart Plunger® is one of the simplest yet most accurate and economical well performance diagnostic tools. Evaluate temperature, pressure, and fall and arrival times with ease!

With Smart Plunger, you gain a virtual downhole picture of the well, providing new insight for analysis and opportunities for optimization. You can easily and cost-effectively conduct common well tests and perform well diagnostics with no special training, no need for a wireline rig and minimal interruption to production.

The Smart Plunger delivers useful data to help you evaluate reservoir conditions and well productivity. Nearly all personnel can use Smart Plunger, which saves time and money when compared to wireline or acoustic meter technology and training costs. Simply drop it in the well like a standard plunger. A great do-it-yourself option!

On the outside, the Smart Plunger looks like a conventional plunger. But take a look inside and you’ll find at its core a sophisticated temperature and pressure data logger. The brains of the Smart Plunger, this data logger gathers and records valuable information from the wellbore for later retrieval and evaluation.

There are two types of Smart Plunger: Traveling and Stationary.
Traveling Smart Plunger
The Traveling Smart Plunger works like a traditional plunger, collecting data as it moves up and down the tubing.

Use the Traveling Smart Plunger to:
• Calculate plunger fall speeds and arrival times to optimize plunger operations
• Conduct build-up tests, allowing you to determine well flow capacity, permeability thickness, skin effect, and other useful downhole information
• Detect holes in the tubing string without killing the well or hiring a wireline unit

Stationary Smart Plunger
The Stationary Smart Plunger is delivered to the bottom of the tubing by a drop-off plunger tool, where it resides and collects data as long as you like. At the end of the testing period, the Smart Plunger is easily retrieved using a plunger retrieval tool.

Use the Stationary Smart Plunger to:
• Conduct draw-down testing
• Detect communication from adjacent wells
• Analyze well performance and forecast production

Whether using the Smart Plunger in a stationary or travelling mode, data retrieval is quick and easy. The user-friendly software retrieves the collected data and translates it into a variety of graphs and reports that give you a visual depiction of the well downhole. With this information at your fingertips, you can easily analyze and interpret valuable production and reservoir information.

Features
• Up to 15,000 psi
• Up to 300° F
• Over 1,200,000 sample points; 1 sample per second minimum
• USB or serial interface

Product Styles
• Dual pad
• Optional bar stock
Multi-Stage Plunger Tools

**How it Works**
The multi-stage tool is placed by wireline down the well tubing above a plunger lift installation. A second plunger is then installed on top of the tool. A spring built into the bottom of the tool absorbs the impact of the ascending bottom plunger. A free-floating spring on top of the tool absorbs the impact of the descending top plunger.

During the first cycle, the bottom plunger carries fluids up to the multi-stage tool. The tool holds the fluids until the top plunger falls down and lands at the tool to retrieve and lift these fluids. As the top plunger falls toward the tool, the bottom plunger simultaneously falls back to the bottom.

**Applications**
- Wells with low gas/high liquid volumes
- Low volume or marginal wells
- Well types: packer, slim hole, liner, open hole, tapered string

**Features**
- 4140 steel or stainless steel
- API standard fishing neck
- Bypass dump for easy removal
- Standing valve with ball and seat

**Sizes**

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Weight</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/16&quot;</td>
<td>3.25 #/ft</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 3/8&quot;</td>
<td>4.7 #/ft</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>6.5, 7.90, 8.70 #/ft</td>
<td>1 3/8&quot;</td>
</tr>
</tbody>
</table>

**Ideal for**
Lifting liquids in tough well conditions.
If a well with low gas and high liquids is unable to lift liquids to the surface, the Multi-Stage Tool delivers results. It utilizes more of a well’s own energy to help marginal wells lift liquids and increase productivity.
**Two-Stage Plunger Tools**

**Features**

The Two-stage Plunger Tool features an innovative pressure-relieving standing valve that incorporates a liquid load balancing spring. This allows it to transfer the liquid load from the lower plunger to the upper plunger with minimal liquid fallback.

- Reduces shut-in times
- Maximizes lift gas efficiency
- Unique standing valve design
- Easily installed via wireline

<table>
<thead>
<tr>
<th>Sizes</th>
<th>Weight</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>21.8 lbs</td>
<td>1 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>43.5 lbs</td>
<td>1 3/8&quot;</td>
</tr>
</tbody>
</table>

Two-Stage Tool Downhole Equipment
Bottom Hole Springs

How it Works

The Bottom Hole Bumper Spring sits at the end of the tubing string above the seating nipple. It absorbs the impact of the plunger when it lands at the bottom to prevent damage to the seating nipple and tubing. It minimizes downhole restrictions which often yields increased production. A Bottom Hole Bumper Spring is dropped from the surface or installed by wireline. If needed, a ball and seat can be added to retain liquid in the tubing.

Applications

- Wells with a seating nipple and/or plunger lift system
- Wells with low liquids

Features

- Big hole for flow is 1 ¼"
- API standard fishing neck
- 4140 steel or stainless steel
- Ball and seat can be added
- 2 or 3 cup API standing valve

Product Styles

- Free floater
- Self dump
- Conventional
- Downhole stops for Viton plungers

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>No-Go O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 7/16&quot;</td>
<td>1.515&quot;</td>
<td>1 3/16&quot;</td>
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<tr>
<td>2 3/8&quot;</td>
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<td>1 3/16&quot;</td>
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<tr>
<td>2 7/8&quot;</td>
<td>1.900&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>2 1/4&quot;</td>
<td>2.341&quot;</td>
<td>1 3/16&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
<td>2.842&quot;</td>
<td>1 3/4&quot;</td>
</tr>
</tbody>
</table>
Collar Stop Bumper Spring

Features
Installed inside the tubing string in tubing that is “collared,” the Collar Stop is set in the collar gap between the ends of two pieces of tubing via wireline. Permanently attached, the spring cannot travel up behind the plunger.

- May be installed at any collar gap
- Spring force calculated to withstand plunger impact
- Convenient one-piece assembly
- Easily installed and retrieved via wireline

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Min O.D.</th>
<th>Max O.D.</th>
<th>Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>1.750&quot;</td>
<td>2.322&quot;</td>
<td>1 5/16&quot;</td>
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<tr>
<td>2 7/8&quot;</td>
<td>2.215&quot;</td>
<td>2.645&quot;</td>
<td>1 5/16&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
<td>2.864&quot;</td>
<td>3.411&quot;</td>
<td>1 5/16&quot;</td>
</tr>
</tbody>
</table>

Collet Latch Bumper Spring

Features
The collet latch can be latched to any standard fishing neck. Normally used when a specific stop is required or a down hole device is already in the well.

- Reduces shut-in times
- Spring force calculated to withstand plunger impact
- API standard fishing neck
- Slotted and ported for maximum flow
- Easily installed and retrieved via wireline

Sizes

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Standard O.D.</th>
<th>Collet Fishneck Size</th>
<th>Spring Fishneck Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 3/8&quot;</td>
<td>1.960&quot;</td>
<td>1 5/16&quot;</td>
<td>1 5/16&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
<td>2.300&quot;</td>
<td>1 9/16&quot;</td>
<td>1 5/16&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
<td>2.688&quot;</td>
<td>2 5/16&quot;</td>
<td>1 5/16&quot;</td>
</tr>
</tbody>
</table>
Standing Valve Combo Bumper Spring

Features
By combining the spring and the standing valve, this combo is easier, quicker, and less expensive to install and retrieve. May be used as a standing valve (with ball and seat added) or the standing valve cage (without ball and seat) may be used as a convenient hold down.

- Spring force calculated to withstand plunger impact
- Convenient one-piece assembly
- Can be installed via wireline
- Installed in any API seating nipple
- Available with or without a ball and seat

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tubing Size</strong></td>
</tr>
<tr>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>2 1/4&quot;</td>
</tr>
<tr>
<td>2 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
</tr>
</tbody>
</table>

Tubing Stop Combo Bumper Spring

Features
Installed inside the tubing, via wireline, when no seating nipple is available. The single assembly is easier, faster and less expensive to install than the two pieces separately.

- Spring force calculated to withstand plunger impact
- Convenient one-piece assembly
- Can be installed via wireline
- May be installed anyplace within the tubing string

<table>
<thead>
<tr>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tubing Size</strong></td>
</tr>
<tr>
<td>2 3/8&quot;</td>
</tr>
<tr>
<td>2 7/8&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
</tr>
</tbody>
</table>
Partner with the best team in the business.

Apergy offers a comprehensive line of artificial lift equipment, accessories, and services strategically designed to drive the operational excellence of each of our customers.

- Decades of experience recommending and servicing lift systems to accommodate changing well conditions
- Unrivaled expertise in plunger lift, gas lift, hydraulic lift, well control, and well unloading
- The best performing, highest quality, and safest products designed, engineered, and manufactured in-house
- Experienced and responsive field support staff with extensive local knowledge
- The highest commitment to the protection and safety of our employees, our customers, and the environment
- Comprehensive customer training and product support

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- Vernal ............................................... 435.789.2031

**Wyoming**
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Notes