

INSTRUCT PCP Controller

Artificial Lift Controller

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 3R or 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 INSTRUCT PCP Controller is a stand-alone product that can be used with variable speed drives (VSDs).

This automation solution provides control and visibility of the PCP system and maximizes production by improving uptime through pumping equipment protection. The unit monitors and analyzes critical data, enhancing understanding of the pumping system, maximizing production 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.



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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 pumpoff 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 INSTRUCT PCP Controller 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

User-friendly design

Operators can program and calibrate the INSTRUCT PCP Controller, 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.

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

†Requires surface flowmeter or downhole instrumentation

‡Requires downhole instrumentation

§Requires surface pressure sensor and downhole instrumentation

**Requires surface flowmeter

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 NEMA Type 4
IP degree of protection	IP66 IEC 60529
IK degree of protection	IK10 IEC 62262
Fire resistance	1,760 degF [960 degC] IEC 62208
Ambient operating temperature	14 to 122 degF [-10 to 50 degC]

To maximize functionality, the unit is recommended for use with an INSTRUCT PCP VSD P30.

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.

INSTRUCT PCP Controller Specifications	
Processors	CPU: 32-bit ARM7 microcontroller, 32-MHz clock, integrated watchdog timer Microcontroller coprocessor, 20-MHz clock
Memory	16-MB flash ROM, 4-MB CMOS RAM, 4-KB EEPROM
Nonvolatile RAM	CMOS SRAM with lithium battery retains contents for 2 years with no power
Event logging capacity	20,000 events
Maximum database points	1,000 typical
I/O	
Analog inputs	Eight: 0–20/4–20 mA, 0–5/0–10 V, software configurable
Analog outputs	Two: 0–20/4–20 mA
Digital I/O	16 digital inputs: 12/24 V, 48 V, 115/125 V, 240 V 10 relay outputs: dry contact or DC solid-state Dry contact rating: 3 A, 30 VDC or 240 VAC (resistive) DC solid-state rating: 3 A, 60 VDC
Counter inputs	One: 0–10 Hz or 0–5 kHz (dry contact) Two: 0–10 kHz (turbine or dry contact)
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)