

ePAC Progressive Cavity Pumping System

Designed for oilfield pumping applications, the ePAC goes beyond conventional variable frequency or speed drives, incorporating Flux Vector technology for precision control of both speed and torque allows for optimization of electric-driven artificial lift systems.

The critical challenge in optimizing wells with progressing cavity pumps (PCPs) - especially in heavy oil - is to match the rotational speed of the pump to the varying production capacity of the well. Conventional variable speed drives cannot deliver full torque at low speeds, resulting in inefficient production, and stalled wells. What is needed is infinitely variable speed control with constant torque throughout the speed range.

eP's VFD drive package provides precision control of both speed and torque. This means that, not only can you match the drive speed to well conditions, but you also will have the torque to turn a heavily loaded rod string. Torque control also means there's no need to oversize the drive relative to the motor. eP's VFD package has these unique features for PCPs:

Cost Saving Features

- Underspeed detection protects the system in case of a stall condition such as a stuck pump.
- Dual motor capability allows large PCPs to be operated by a single drive
- User torque limiting protects against rod string breakage



- Limits rod torque
- Reduces power consumption
- Minimizes equipment wear
- Maximum torque from 0 to base speed
- Maintains low fluid level without pumpoff
- Reduces backspin

Performance Features

- Auto restart after power loss or fault condition.
- Normal stop with deceleration time and DC hold allows rod string to unwind downhole, minimizing top side backspin
- Catch a spinning load feature
- Separate acceleration and run torque settings to manage sand or coal finds to surface, without jammed rotor or stator
- Built-in PID-loop control maximizes well production for any given inflow characteristic
- High casing gas pressure detection helps regulate well operation
- Differential pressure sensing of pump inlet and outlet pressure prevents pump overloading.
- Low torque detection indicates a rod break, belt failure, or plugged sand screen
- Breakaway torque detection identifies pump problems during starting
- Current foldback maximizes well production while protecting the motor against overheating

Interfaces

- Programmable speed readout displays polish rod rpm
- Local/remote speed control

Programmable Logic Controller

- PID Loop control
- Programmable readout displays actual torque at motor shaft

Protection

- Ground fault
- Motor phase-to-phase short circuit
- AC input overvoltage
- AC input undervoltage
- Instantaneous overcurrent
- Motor overload
- Heat sink overtemperature
- Power transistor fault
- Logic power undervoltage
- Motor runaway
- Memory malfunction
- Processor running fault

Specifications

Specifications Electrical

Input Supply

Voltage	230, 380, 460, or 575 Vac ($\pm 10\%$)
Frequency	47- to 63-Hz

Power Factor

Overall	1.00 displacement power factor 0.94 overall power factor at all speeds
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Output Rating

Voltage	Zero to input voltage, three-phase
Frequency	0- to 120-Hz flux vector control 0- to 300-Hz variable frequency control
Switching frequency	Programmable, 2- to 12-kHz
Overload current	Constant torque: 150% of rated for 1 minute, maximum of 200% rated
Variable torque	120% of rated for 1 minute, maximum of 140% to 160% of rated
Extended torque	110% of rated for 1 minute, maximum of 120% to 140% of rated

Conversion

Rectifier unit	6-diode, 3-phase (6-pulse) full wave bridge below 60-Hp Diode-SCR, 6-phase (12-pulse) full-wave bridge for 60-Hp and above
Inverter unit	6-IGBT, 4-quadrant, trap or sine wave output

Environmental

Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	5° to 158°F (-15° to 70°C)
Relative humidity	5% to 95%, noncondensing
Altitude	0- to 3,300-ft. (1,000 m) at full rating

Inputs and Outputs

Analog Inputs	Three 12 bit analog inputs (± 10 Vdc or 4 to 20 mA)
Analog Outputs	Two 12 bit analog outputs (± 10 Vdc and 4 to 20 mA)
Digital Inputs	12 digital inputs (requires sink of 1 mA to common)
Digital Outputs	Six digital outputs (open-collector drivers rated 24 Vdc @ 500 mA)

Serial Communications

Asynchronous port	EIA RS-232 and RS-422/485, isolated, 0.3- to 19.2-kbaud ANSI-x3.28-2.5-A4, Allen-Bradley DF1, and Modicon RTU protocols
Synchronous port	EIA RS-485 for high-speed master/slave networking



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