Schlumberger

Permanent Magnet Motor Surface Drive System

Maximize safety and energy efficiency of progressing cavity pumps (PCPs)

Temperature:
–40 to 55 degC [–40 to 131 degF]

Where it is used

Oil and gas wells that use surface-drive progressing cavity pump (PCP) systems for artificial lift

How it improves wells

- Enhances safety and simplifies maintenance with fewer exposed moving parts and with no belts or sheaves
- Saves energy by incorporating permanent magnet motor (PMM) technology with up to 96% efficiency as compared with traditional induction motors with only 85% efficiency
- Delivers power factor up to 0.94 to eliminate power spikes on startup
- Reduces mechanical energy transfer loss, even at low speed and nonrated loading, by eliminating belts, pulleys, and gears
- Maximizes production by monitoring well conditions and making speed changes
- Improves operations safety with backspin braking protections, which also enable safer stops and starts in midbackspin to restart production more rapidly
- Enables low-temperature operation for Atmosphères Explosives (ATEX) certification
- Extends service life of sucker rods and polished rods by enabling "soft starts" and "soft stops" that reduce mechanical shock
- Reduces noise below 50 dB

Direct-drive permanent magnet motor for progressing cavity pumps.

How it works

The system comprises a direct-drive permanent magnet motor that provides the driving force for a PCP; a control system that enables starting, stopping, and full forward and backward management of the motor; a clamp to transmit the power from the motor shaft to the polished rod, sucker rod, and rotor of the PCP; and a braking resistor cabinet that dissipates the kinetic backspin energy as heat.

What it replaces

Standard 3-phase asynchronous induction motor and conventional PCP drive head

What else I should know

The system is operated by either basic control panel or multifunction KUDU Pump Manager* well optimization unit. The control panel can be outfitted to display the input current from an independent ampere meter and the speed by revolution meter.

Control System Specifications

Model	22-380	45-380	55-480	90-480	110-480
Rated power, kW [hp]	22 [30]	45 [60]	55 [74]	90 [120]	110 [148]
Rated voltage, V AC	380 to 480	380 to 480	380 to 480	380 to 480	380 to 480
Rated frequency, Hz	50 or 60	50 or 60	50 or 60	50 or 60	50 or 60
Certification	c-CSA-us†	c-CSA-us†	c-CSA-us†	c-CSA-us†	c-CSA-us†
Operating temperature, degC [degF]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]
Length × width × height, mm [in]	600 × 600 × 2,030 [23.6 × 23.6 × 80]	803 × 803 × 1,784 [31.6 × 31.6 × 70.2]	803 × 803 × 1,784 [31.6 × 31.6 × 70.2]	1,200 × 500 × 1,900 [47.2 × 19.7 × 74.8]	1,200 × 500 × 1,900 [47.2 × 19.7 × 74.8]

† Optional ATEX certification

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Permanent Magnet Motor Specifications					
Motor model	**22-380**	**45-360**	**55-500**	**85-500**	**112-500**
Rated power, kW [hp]	22 [30]	45 [60]	55 [74]	85 [114]	112 [150]
Rated speed, rpm	360	360	500	500	500
Rated voltage, V AC	380 or 460	380 or 460	380 or 460	380 or 460	380 or 460
Rated frequency at maximum speed, Hz	36	90	83.33	83.33	83.33
Rated torque, N.m [lbf.ft]	584 [431]	1,194 [880]	1,051 [775]	1,624 [1,198]	2,139 [1,578]
Overload torque for 60 s, N.m [lbf.ft]	876 [646]	2,388 [1,761]	1,577 [1,163]	2,436 [1,797]	3,209 [2,367]
Efficiency without output reactor, %	93.4	96.4	96.4	96.4	96.5
Efficiency with output reactor, %	93.6	96.7	96.6	96.6	96.7
Power factor without output reactor	0.940	0.930	0.930	0.940	0.941
Power factor with output reactor	0.941	0.931	0.931	0.941	0.942
Motor pole	6 pairs	15 pairs	10 pairs	10 pairs	10 pairs
Protection grade	IP54†	IP54†	IP54†	IP54†	IP54†
Insulation class	H, 180 degC	H, 180 degC	H, 180 degC	H, 180 degC	H, 180 degC
Cooling method	IC410 (without a fan)	IC410 (without a fan)	IC410 (without a fan)	IC410 (without a fan)	IC410 (without a fan)
Noise level, dBa	<80	<68	<80	<80	<80
Height × diameter, mm [in]	1,157 × 485 [45.6 × 19.1]	1,242 × 630 [48.9 × 24.8]	1,075 × 725 [42.3 × 28.5]	1,075 × 725 [42.3 × 28.5]	1,075 × 725 [42.3 × 28.5]
Weight, kg [lbm]	570 [1,257]	830 [1,830]	1,050 [2,315]	1,120 [2,469]	1,360 [2,998]
Operating temperature, degC [degF]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]	–40 to 55 [–40 to 131]
Thermal class	T4	T4	c-CSA-us, Class 1 Div. 2 and Zone 2‡	c-CSA-us, Class 1 Div. 2 and Zone 2‡	c-CSA-us, Class 1 Div. 2 and Zone 2‡
Axial loading capacity, T	9.3	20.5	9.3 or 13.7	9.3, 13.7, or 22.8	9.3, 13.7, or 22.8

† Protected against dust and water splashing
‡ Optional ATEX Ex n

Variable Frequency Drive (VFD) and Braking Resistor Cabinet Specifications						
Model	**22-480**	**45-480**	**55-480**	**85-480**	**90-480**	**110-480**
Combination cabinet (VFD and braking resistor) width × depth × height,† mm [in]	600 × 600 × 2,030 [23.6 × 23.6 × 80]	800 × 800 × 1,784 [31.5 × 31.5 × 70.2]	800 × 800 × 1,784 [31.5 × 31.5 × 70.2]	1,000 × 800 × 2,480 [39.4 × 31.5 × 97.6]	na‡	na
Combination cabinet weight, kg [lbm]	200 [441]	280 [617]	280 [617]	280 [617]	na	na
VFD cabinet width × depth × height,† mm [in]	na	na	na	na	1,300 × 600 × 2,000 [51.2 × 23.6 × 78.8]	1,300 × 600 × 2,000 [51.2 × 23.6 × 78.8]
VFD cabinet weight, kg [lbm]	na	na	na	na	240 [750]	345 [761]
Brake cabinet width × depth × height,† mm [in]	na	na	na	na	1,200 × 1,000 × 2,000 [47.3 × 39.4 × 78.8]	1,200 × 1,000 × 2,000 [47.3 × 39.4 × 78.8]
Brake cabinet weight, kg [lbm]	na	na	na	na	340 [750]	365 [805]
Cooling	Forced air	Forced air	Forced air	Forced air	Forced air	Forced air
Mounting	Pad or floor	Pad or floor	Pad or floor	Pad or floor	Pad or floor	Pad or floor
Color	Tan or off-white	Tan or off-white	Tan or off-white	Tan or off-white	Tan or off-white	Tan or off-white

† Without lifting rings
‡ Not available

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