Schlumberger

KUDU PCP

Positive displacement pump with a helical rotor spinning inside a fixed stator

APPLICATIONS

- Heavy, medium, and light oil wells
- Dewatering of coalbed methane and conventional gas wells
- High-water-cut and sand-cut environments
- Highly corrosive wells
- Thermal applications
- Horizontal, slant, and directional wells
- Water source wells

BENEFITS

- Produces in high-viscosity and high-sand-concentration fluids
- Tolerates high percentage of free gas
- Resists abrasion
- Generates low levels of noise
- Reduces lifting cost
- Provides the highest overall efficiency among all artificial lift methods

FEATURES

- Smaller footprint than other forms of artificial lift systems
- High-capacity and high-head lift pumps
- Low internal shear rates to limit fluid emulsification through agitation
- No valves or reciprocating parts to clog, wear, or create gas lock
- Elastomers resistant to most crudes
- Various tag sub intakes
- Wide range of geometries
- Standard rotors with paddles to improve sand handling
- Standard EUE and NUE stator connections machined directly onto the stator tube
- All-metal PCP using special metallurgy to resist wear and maximize run life
- Proprietary KUDU Tough Coat* corrosion- and abrasion-resistant rotor coating
- EVEN WALL® uniform-elastomer PCP to ensure uniform elastomer thickness in the PCP stator
- Easy to install and operate
- Low maintenance required

The KUDU PCP is a positive displacement pump with a single helical rotor, which rotates inside a double internal helical elastomer-lined stator. The stator is run into the well on the bottom of the production tubing, while the rotor is connected to the end of the drive string. The rotor turns eccentrically in the stator, forming cavities from the intake at the bottom of the pump to the discharge at the top of the pump.

The PCP delivers a constant flow that is proportional to the size of the cavity and rotational speed of the rotor. Rotation of the rodstring at surface is powered by a hydraulic or electric drive system, which causes the rotor to spin within the fixed stator, resulting in fluid production at surface.

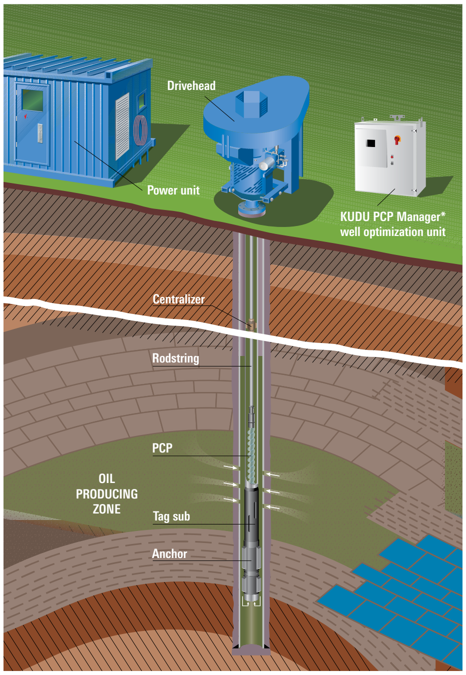
Schlumberger also offers a high-temperature system, featuring an all-metal PCP capable of withstanding the extreme downhole conditions of thermal recovery.

Elastomers

Proprietary elastomers provide significant improvements in bond strength, tear strength, abrasion resistance, gas and water resistance, and temperature ratings, expanding the use of PCPs to additional environments. Elastomers are primarily made of nitrile, a copolymer of butadiene, and acrylonitrile. In addition, a fluorocarbon elastomer for greater resistance to aromatics and H_2S is available.

Rotors

The rotor is the moving component of a PCP and is held from the surface by the drive string, which is typically a conventional or continuous sucker rod. The amount or degree of interference fit is critical to the efficiency and life expectancy of the pump. Interference fit is changed by choosing a different rotor minor diameter.



KUDU PCP system components.

EVEN WALL PCP

EVEN WALL uniform-elastomer PCP provides a uniform elastomer thickness, resulting in an even temperature distribution under swell conditions. Because the elastomer swells evenly, it enables a more consistent fit between the rotor and stator, ultimately improving pump performance.

KUDU Tough Coat Rotor Coating

KUDU Tough Coat rotor coating is a spray metal coating applied to PCP rotors. Rotors with this coating have significantly improved corrosion resistance compared with typical chrome rotors, resulting in longer rotor life, increased production efficiency, and lower operating costs.

ISO 15136-1 Elastomer Requirements[†]	KUDU PCP
Material certification	Yes
Elastomer hardness testing	Yes
Elastomer bond testing	Yes
Stator phasing alignment	Yes
Documentation	Yes

[†] ISO compliance ensures that manufacturers adhere to a strict process resulting in products that are of high quality and meet specification requirements.

KUDU PCP

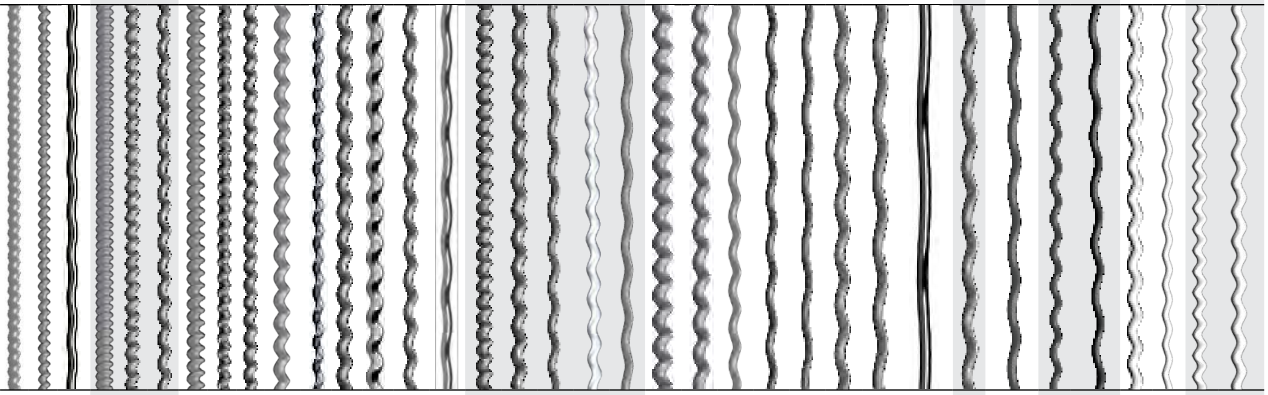
KUDU Elastomer Relative Specifications

Elastomer†	KUDU Reference	Hardness Shore A	Max. Temperature, degF [degC]	Sand Resistance	H_2S Resistance	CO_2 Resistance	Aromatics	Hydrolosis	Explosive Decompression
High nitrile soft	HNS	55	176 [80]	8	6	5	3	7	6
High nitrile hard	HNH	68	248 [120]	6	7	7	7	5	8
Hydrogenated high nitrile hard	HHNH	80	284 [140]	5	7	8	8	8	8
Fluorocarbon hard	FKMH	78	194 [90]	2	8	6	9	9	5

Note: Elastomers are rated from 1 to 10, with 5 being average, 7 being good, and 10 being excellent. Maximum recommended pump speed is 300 rpm for FKMH.

†Not all elastomers are available for every pump model. Please contact a Schlumberger representative about elastomer and pump combinations to ensure the optimal elastomer selection.

Rotor Selection Guide

m^3/d at 100 rpm	3	6	16	4	13	22	8	12	15	24	30†	32	33	40	63	23	42	56	75	76	36	45	60	80	98†	100	120	175	122	160	150	200	98	135	158	200
bbl/d at 100 rpm	19	38	101	25	82	138	50	75	94	151	189	201	208	252	396	145	264	352	472	478	226	283	377	503	616	629	755	1,101	767	1,006	944	1,258	616	849	994	1,258
Rotor options																																				
Series, in [mm]	2.375 [60] EUE pin			2.875 [73] EUE pin			3.5 [89] EUE pin									3.5 [89] EUE box					4 [102] NUE pin								4.5 [144] NUE pin	4.5 [144] EUE pin	5 [127] casing short pin		5.5 [140] casing long pin		6.625 [168] BTC ‡	

Notes: All technical specifications are deemed accurate, but situations may arise where additional information may be required. Please contact a Schlumberger representative for a technical consultation.
Rotor images are not to scale.

†Available with EVEN WALL PCP

‡Buttress thread casing

Ability to Coil Past Rotor with 0.75-in Coiled Tubing

Series, in [mm]	Model	Crest to Crest Diameter, in [mm]	Tubing Size: 2.875 [73] Tubing Weight: 6.5 lbm/ft [9.67 kg/m] Drift ID: 2.35 [59.61]	Tubing Size: 3.5 [88.9] Tubing Weight: 9.3 lbm/ft [13.84 kg/m] Drift ID: 2.99 [72.82]	Tubing Size: 4.5 [114.3] Tubing Weight: 12.75 lbm/ft [18.97 kg/m] Drift ID: 3.96 [97.36]
2.375 [60] EUE pin	3 K	1.41 [35.92]	Yes	Yes	Yes
	6 K	1.33 [33.78]	Yes	Yes	Yes
	16 K	1.46 [37.20]	Yes	Yes	Yes
2.875 [73] EUE pin	4 K	1.73 [44.00]	No	Yes	Yes
	13 K	1.78 [45.21]	No	Yes	Yes
	22 K	1.70 [43.18]	No	Yes	Yes
3.5 [89] EUE pin	8 K	1.99 [50.6]	No	Yes	Yes
	12 K	1.99 [50.67]	No	Yes	Yes
	15 K	1.86 [47.37]	No	Yes	Yes
	24 K	2.01 [51.1]	No	Yes	Yes
	30 K	1.95 [49.58]	No	Yes	Yes
	32 K	2.01 [51.29]	No	Yes	Yes
	33 K	55.88 [2.20]	No	No	Yes
	40 K	2.01 [51.08]	No	Yes	Yes
	63 K	2.03 [51.44]	No	Yes	Yes
3.5 [89] EUE box	23 K	2.22 [56.46]	No	No	Yes
	42 K	2.20 [55.80]	No	No	Yes
	56 K	2.18 [55.40]	No	No	Yes
	75 K	2.56 [65.02]	No	No	Yes
	76 K	2.18 [55.30]	No	No	Yes
4 [102] NUE pin	36 K	2.32 [58.90]	No	No	Yes
	45 K	2.29 [58.27]	No	No	Yes
	60 K	2.32 [58.80]	No	No	Yes
	80 K	2.27 [57.70]	No	No	Yes
	98 K	EW 2.21 [56.12]	No	No	Yes
	100 K	2.31 [58.76]	No	No	Yes
	120 K	2.30 [58.29]	No	No	Yes
	175 K	2.26 [57.48]	No	No	Yes
4.5 [114] NUE pin	122 K	2.45 [62.2]	No	No	Yes
4.5 [114] EUE pin	160 K	2.67 [67.82]	No	No	Yes
5 [127] casing short pin	150 K	2.96 [75.21]	No	No	Yes
	200 K	2.96 [75.21]	No	No	Yes
5.5 [140] casing long pin	98 K	2.83 [71.96]	No	No	Yes
	135 K	2.80 [71.07]	No	No	Yes
6.625 BTC[†]	158 K	3.75 [95.25]	No	No	Yes
	200 K	3.75 [95.25]	No	No	Yes

[†] Buttress thread casing

KUDU PCP

KUDU PCP Specifications

Series, in [mm]	Model	Pump Nominal Capacity at 100 rpm at Zero Head, bbl/d [m^3/d]	Pump Lift Rating, ft [m]	Stator Ouside Diameter, in [mm]	Stator Length, ft [m]
2.375 [60] EUE pin	3 K 600	20 [3]	1,969 [600]	2.795 [71]	2.94 [0.90]
	3 K 1200	20 [3]	3,937 [1,200]	2.795 [71]	5.91 [1.80]
	3 K 2400	20 [3]	7,874 [2,400]	2.795 [71]	11.81 [3.60]
	6 K 650	36 [6]	2,133 [650]	2.795 [71]	4.28 [1.31]
	6 K 1300	36 [6]	4,265 [1,300]	2.795 [71]	8.56 [2.61]
	6 K 1650	36 [6]	5,413 [1,650]	2.795 [71]	10.70 [3.26]
	6 K 2000	36 [6]	6,562 [2,000]	2.795 [71]	12.84 [3.92]
	6 K 2600	36 [6]	8,530 [2,600]	2.795 [71]	17.13 [5.22]
	6 K 3300	36 [6]	10,827 [3,300]	2.795 [71]	21.42 [6.53]
	16 K 1200	107 [16]	3,937 [1,200]	2.795 [71]	17.73 [5.40]
	16 K 1600	107 [16]	5,249 [1,600]	2.795 [71]	23.64 [7.21]
	16 K 2000	107 [16]	6,562 [2,000]	2.795 [71]	29.53 [9.00]
	31 K 600	202 [31]	1,969 [600]	2.677 [68]	15.05 [4.59]
	31 K 1200	202 [31]	3,937 [1,200]	2.677 [68]	30.09 [9.17]
	55 K 600	375 [55]	1,969 [600]	2.677 [68]	23.79 [7.25]
	55 K 960	375 [55]	3,150 [960]	2.677 [68]	38.02 [11.59]
2.875 [73] EUE pin	4 K 900	27 [4]	2,953 [900]	3.150 [80]	2.95 [0.90]
	4 K 1800	27 [4]	5,906 [1,800]	3.150 [80]	5.91 [1.80]
	4 K 2700	27 [4]	8,858 [2,700]	3.150 [80]	8.86 [2.70]
	4 K 3600	27 [4]	11,811 [3,600]	3.150 [80]	11.81 [3.60]
	13 K 650	85 [13]	2,133 [650]	3.150 [80]	5.71 [1.74]
	13 K 1300	85 [13]	4,265 [1,300]	3.150 [80]	11.42 [3.48]
	13 K 1650	85 [13]	5,413 [1,650]	3.150 [80]	14.27 [4.35]
	13 K 2000	85 [13]	6,562 [2,000]	3.150 [80]	17.13 [5.22]
	13 K 2600	85 [13]	8,530 [2,600]	3.150 [80]	22.85 [6.97]
	13 K 3300	85 [13]	10,827 [3,300]	3.150 [80]	28.54 [8.70]
	22 K 600	138 [22]	1,969 [600]	3.150 [80]	8.56 [2.61]
	22 K 1200	138 [22]	3,937 [1,200]	3.150 [80]	17.14 [5.22]
	22 K 1500	138 [22]	4,921 [1,500]	3.150 [80]	21.39 [6.52]
	22 K 1800	138 [22]	5,906 [1,800]	3.150 [80]	25.69 [7.83]
3.5 [89] EUE pin	8 K 900	51 [8]	2,953 [900]	3.780 [96]	5.13 [1.57]
	8 K 1400	51 [8]	4,593 [1,400]	3.780 [96]	7.70 [2.35]
	8 K 1800	51 [8]	5,906 [1,800]	3.780 [96]	10.27 [3.13]
	8 K 2300	51 [8]	7,546 [2,300]	3.780 [96]	12.85 [3.92]
	8 K 2700	51 [8]	8,858 [2,700]	3.780 [96]	15.40 [4.70]
	8 K 3600	51 [8]	11,811 [3,600]	3.780 [96]	20.54 [6.26]
	12 K 900	80 [12]	2,953 [900]	3.780 [96]	6.68 [2.04]
	12 K 1500	81 [12]	4,921 [1,500]	3.780 [96]	11.09 [3.38]
	12 K 1800	80 [12]	5,906 [1,800]	3.780 [96]	13.36 [4.07]
	12 K 2600	80 [12]	8,530 [2,600]	3.780 [96]	19.29 [5.88]
	15 K 700	101 [15]	2,297 [700]	3.780 [96]	6.56 [2.00]
	15 K 1400	101 [15]	4,593 [1,400]	3.780 [96]	13.12 [4.00]
	15 K 1850	101 [15]	6,070 [1,850]	3.780 [96]	17.51 [5.34]
	15 K 2100	101 [15]	6,890 [2,100]	3.780 [96]	19.68 [6.00]

KUDU PCP

Series, in [mm]	Model	Pump Nominal Capacity at 100 rpm at Zero Head, bbl/d [m³/d]	Pump Lift Rating, ft [m]	Stator Ouside Diameter, in [mm]	Stator Length, ft [m]
3.5 [89] EUE pin	15 K 2800	101 [15]	9,186 [2,800]	3.780 [96]	26.26 [8.00]
	15 K 3600	101 [15]	11,811 [3,600]	3.780 [96]	32.81 [10.00]
	24 K 1300	158 [24]	4,265 [1,300]	3.780 [96]	13.35 [4.07]
	24 K 1500	158 [24]	4,921 [1,500]	3.780 [96]	15.55 [4.74]
	24 K 2000	158 [24]	6,562 [2,000]	3.780 [96]	20.01 [6.10]
	24 K 2600	158 [24]	8,530 [2,600]	3.780 [96]	26.71 [8.14]
	30 K 900 EW	194 [30]	2,953 [900]	3.780 [96]	7.41 [2.26]
	30 K 1800 EW	194 [30]	5,906 [1,800]	3.780 [96]	14.83 [4.52]
	30 K 2700 EW	194 [30]	8,858 [2,700]	3.780 [96]	22.24 [6.78]
	32 K 750	209 [32]	2,461 [750]	3.780 [96]	9.02 [2.75]
	32 K 1200	209 [32]	3,937 [1,200]	3.780 [96]	13.53 [4.13]
	32 K 1500	209 [32]	4,921 [1,500]	3.780 [96]	18.04 [5.50]
	32 K 2200	209 [32]	7,218 [2,200]	3.780 [96]	27.07 [8.25]
	33 K 1200	209 [33]	3,937 [1,200]	4.252 [108]	12.47 [3.80]
	33 K 1500	209 [33]	4,921 [1,500]	4.252 [108]	12.47 [3.80]
	33 K 1800	209 [33]	5,906 [1,800]	4.252 [108]	18.70 [5.70]
	33 K 2400	209 [33]	7,874 [2,400]	4.252 [108]	24.93 [7.60]
	40 K 600	248 [40]	2,953 [600]	3.780 [96]	9.02 [2.75]
	40 K 1200	248 [40]	3,937 [1,200]	3.780 [96]	18.04 [5.50]
	40 K 1500	248 [40]	4,921 [1,500]	3.780 [96]	22.56 [6.88]
	40 K 1800	248 [40]	5,906 [1,800]	3.780 [96]	27.07 [8.25]
	40 K 2400	248 [40]	7,874 [2,400]	3.780 [96]	36.09 [11.00]
	63 K 800	412 [63]	2,625 [800]	3.780 [96]	18.04 [5.50]
	63 K 1200	412 [63]	3,937 [1,200]	3.780 [96]	27.07 [8.25]
	63 K 1600	412 [63]	5,249 [1,600]	3.780 [96]	36.09 [11.00]
3.5 [89] EUE box	23 K 600	146 [23]	1,969 [600]	4.252 [108]	4.51 [1.38]
	23 K 1200	146 [23]	3,937 [1,200]	4.252 [108]	9.02 [2.75]
	23 K 1500	146 [23]	4,922 [1,500]	4.252 [108]	11.28 [3.44]
	23 K 1800	146 [23]	5,906 [1,800]	4.252 [108]	13.52 [4.12]
	23 K 2400	146 [23]	7,874 [2,400]	4.252 [108]	18.04 [5.50]
	23 K 3600	146 [23]	11,811 [3,600]	4.252 [108]	27.07 [8.25]
	42 K 1200	267 [42]	3,937 [1,200]	4.252 [108]	15.91 [4.85]
	42 K 1500	267 [42]	4,922 [1,500]	4.252 [108]	19.89 [6.06]
	42 K 1800	267 [42]	5,906 [1,800]	4.252 [108]	23.85 [7.27]
	42 K 2400	267 [42]	7,874 [2,400]	4.252 [108]	31.82 [9.70]
	56 K 900	352 [56]	2,953 [900]	4.252 [108]	15.91 [4.85]
	56 K 1200	352 [56]	3,937 [1,200]	4.252 [108]	21.16 [6.45]
	56 K 1350	352 [56]	4,429 [1,350]	4.252 [108]	23.87 [7.28]
	56 K 1800	352 [56]	5,906 [1,800]	4.252 [108]	31.82 [9.70]
	75 K 800	472 [75]	2,625 [800]	4.488 [114]	15.08 [4.60]
	75 K 1500	472 [75]	4,921 [1,500]	4.488 [114]	29.50 [8.99]
	76 K 600	480 [76]	1,969 [600]	4.252 [108]	14.44 [4.40]
	76 K 900	480 [76]	2,953 [900]	4.252 [108]	21.65 [6.60]
	76 K 1200	480 [76]	3,937 [1,200]	4.252 [108]	28.87 [8.80]
	76 K 1500	480 [76]	4,921 [1,500]	4.252 [108]	36.09 [11.00]
	76 K 1800	480 [76]	5,906 [1,800]	4.252 [108]	43.31 [13.20]

KUDU PCP

Series, in [mm]	Model	Pump Nominal Capacity at 100 rpm at Zero Head, bbl/d [m^3/d]	Pump Lift Rating, ft [m]	Stator Ouside Diameter, in [mm]	Stator Length, ft [m]
4.0 [102] NUE pin	36 K 1000	238 [36]	3,281 [1,000]	4.252 [108]	9.45 [2.88]
	36 K 1500	238 [36]	4,921 [1,500]	4.252 [108]	14.17 [4.32]
	36 K 2000	238 [36]	6,562 [2,000]	4.252 [108]	18.90 [5.76]
	45 K 1200	284 [45]	3,937 [1,200]	4.252 [108]	14.17 [4.32]
	45 K 1600	284 [45]	5,249 [1,600]	4.252 [108]	18.90 [5.76]
	45 K 2000	284 [45]	6,562 [2,000]	4.252 [108]	23.62 [7.20]
	45 K 2400	284 [45]	7,874 [2,400]	4.252 [108]	28.36 [8.64]
	60 K 600	382 [60]	1,969 [600]	4.252 [108]	9.45 [2.88]
	60 K 1200	382 [60]	3,937 [1,200]	4.252 [108]	18.90 [5.76]
	60 K 1500	382 [60]	4,921 [1,500]	4.252 [108]	23.62 [7.20]
	60 K 1800	382 [60]	5,906 [1,800]	4.252 [108]	28.35 [8.64]
	60 K 2400	382 [60]	7,874 [2,400]	4.252 [108]	37.79 [11.52]
	80 K 450	504 [80]	1,476 [450]	4.252 [108]	9.45 [2.88]
	80 K 900	504 [80]	2,953 [900]	4.252 [108]	18.90 [5.76]
	80 K 1350	504 [80]	4,429 [1,350]	4.252 [108]	28.35 [8.64]
	80 K 1800	504 [80]	5,906 [1,800]	4.252 [108]	37.79 [11.52]
	98 K 600 EW	619 [98]	1,969 [600]	4.252 [108]	12.80 [3.90]
	98 K 1200 EW	619 [98]	3,937 [1,200]	4.252 [108]	25.59 [7.80]
	98 K 1800 EW	619 [98]	5,906 [1,800]	4.252 [108]	38.39 [11.70]
	100 K 400	617 [100]	1,312 [400]	4.252 [108]	9.45 [2.88]
	100 K 800	617 [100]	2,625 [800]	4.252 [108]	18.90 [5.76]
	100 K 1000	617 [100]	3,281 [1,000]	4.252 [108]	23.62 [7.20]
	100 K 1200	617 [100]	3,937 [1,200]	4.252 [108]	28.35 [8.64]
	100 K 1600	617 [100]	5,249 [1,600]	4.252 [108]	37.79 [11.52]
	120 K 600	806 [120]	1,969 [600]	4.252 [108]	18.90 [5.76]
	120 K 750	806 [120]	2,461 [750]	4.252 [108]	23.62 [7.20]
	120 K 900	806 [120]	2,953 [900]	4.252 [108]	28.35 [8.64]
	120 K 1200	806 [120]	3,937 [1,200]	4.252 [108]	37.79 [11.52]
	120 K 1500	806 [120]	4,921 [1,500]	4.252 [108]	47.28 [14.41]
	175 K 400	1,091 [175]	1,312 [400]	4.252 [108]	18.90 [5.76]
	175 K 600	1,091 [175]	1,969 [600]	4.252 [108]	28.35 [8.64]
	175 K 800	1,091 [175]	2,625 [800]	4.252 [108]	37.79 [11.52]
	175 K 1000	1,091 [175]	3,281 [1,000]	4.252 [108]	47.24 [14.40]
4.5 [114] NUE pin	122 K 600	767 [122]	1,969 [600]	4.528 [115]	16.73 [5.10]
	122 K 900	767 [122]	2,953 [900]	4.528 [115]	25.10 [7.65]
	122 K 1200	767 [122]	3,937 [1,200]	4.528 [115]	33.46 [10.20]
	122 K 1500	767 [122]	4,921 [1,500]	4.528 [115]	41.83 [12.75]
	122 K 1800	767 [122]	5,906 [1,800]	4.528 [115]	50.20 [15.30]
4.5 [114] EUE box	98 K 800	613 [98]	2,625 [800]	5.500 [139.7]	13.83 [4.22]
	98 K 1600	613 [98]	5,249 [1,600]	5.500 [139.7]	27.00 [8.23]
4.5 [114] EUE pin	135 K 750	853 [135]	2,461 [750]	5.000 [127]	19.42 [5.92]
	135 K 1500	853 [135]	4,921 [1,500]	5.000 [127]	38.09 [11.61]
	160 K 600	990 [160]	1,969 [600]	5.000 [127]	19.03 [5.80]
	160 K 900	990 [160]	2,953 [900]	5.000 [127]	28.54 [8.70]
	160 K 1200	990 [160]	3,937 [1,200]	5.000 [127]	38.06 [11.60]

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KUDU PCP

Series, in [mm]	Model	Pump Nominal Capacity at 100 rpm at Zero Head, bbl/d [m^3/d]	Pump Lift Rating, ft [m]	Stator Ouside Diameter, in [mm]	Stator Length, ft [m]
5.0 [127] casing short pin	150 K 800	953 [150]	2,625 [800]	5.433 [138]	18.57 [5.66]
	150 K 1200	953 [150]	3,937 [1,200]	5.433 [138]	27.85 [8.49]
	150 K 1600	953 [150]	5,249 [1,600]	5.433 [138]	37.14 [11.32]
	200 K 860	1,362 [200]	2,822 [860]	5.433 [138]	27.85 [8.49]
	200 K 1150	1,362 [200]	3,773 [1,150]	5.433 [138]	37.14 [11.32]
6.625 [168] BTC†	158 K 800	1,024 [158]	2,625 [800]	6.750 [171.45]	16.00 [4.88]
	158 K 1600	1,024 [158]	5,249 [1,600]	6.750 [171.45]	31.33 [9.55]
	200 K 800	1,297 [200]	2,625 [800]	6.750 [171.45]	21.17 [6.45]
	200 K 1600	1,297 [200]	5,249 [1,600]	6.750 [171.45]	37.58 [11.46]

Note: KUDU Tough Coat rotor coating and Top Tag* accurate rotor placement device are available for selected models. Please contact a Schlumberger representative for specific product offerings in your region.

†Buttress thread casing

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