Weatherford®

Insertable Progressing Cavity Pumping Systems

Progressing the art of pumping

Install, retrieve, and replace progressing cavity pumps—with no need to pull production tubing

Replace the pump, keep the tubing intact, and get back to business faster

When you're pulling out all the stops to enhance production, wear and tear go with the territory. Over the life of the well, eventual equipment failures—and subsequent interventions—are part of the cost of doing business. So you build them into your budget, and you plan ahead. Every step of the way, Weatherford is here to help you make it happen effectively and efficiently.

Downhole and across the globe—a **proven** track record

With more than
700 installations in **11 countries**
to date, Weatherford insertable progressing cavity pump (I-PCP) technology gives you a proven technological advantage and far-reaching global capabilities.

Make pump-retrieval interventions as painless as possible

Weatherford insertable progressing cavity pump (I-PCP) systems use the rod string to install and remove the I-PCP unit from the well. This eliminates the need to pull and rerun the production tubing, which greatly reduces the downtime and cost associated with the following interventions:

- Replacing a failed I-PCP unit with a new one
- Changing the PCP size or geometry to calibrate the system
- Retrieving the I-PCP unit to perform a downhole service operation
- Switching to a different artificial-lift technology in response to changing well dynamics

Smart design, big advantages

The I-PCP is installed downhole by first installing a tubing string with a corresponding pump-seating nipple (PSN). Once the tubing is installed, the I-PCP assembly is run downhole on conventional rods or continuous rod, until it seats in the PSN. For wells not equipped with a PSN in the tubing, our Flexisert™ I-PCP anchor provides an innovative and reliable retrofit to enable I-PCP operation.

Once the I-PCP is seated downhole, an integrated no-turn tool prevents back off of pump components. Downhole monitoring equipment can remain in place during pump servicing. The PSN and seating rings are located at the top of the assembly, reducing the chance of sand packing in the annular space between the pump and the tubing. And, to save time and reduce costs, the I-PCP assembly can be set and retrieved using a flushby rig.

I-PCP Applications

Weatherford I-PCP technology delivers exceptional results in the following applications:

- Heavy, medium, or light oil
- Coalbed methane gas wells
- Onshore rod-pump conversions
- Onshore gas-lift conversions
- Offshore gas-lift conversions
- Mature reservoirs
- PCP interventions that would normally require pulling the production tubing

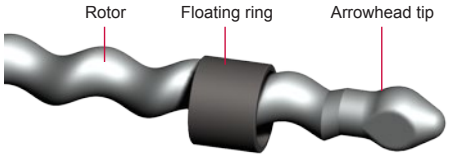
The largest available selection of I-PCP equipment—only from Weatherford

To ensure you find the optimum solution for your specific well characteristics and operating conditions, Weatherford offers the patented Arrowhead® I-PCP, Cloverleaf™ I-PCP, and the Flexisert™ I-PCP anchor.

Arrowhead I-PCP

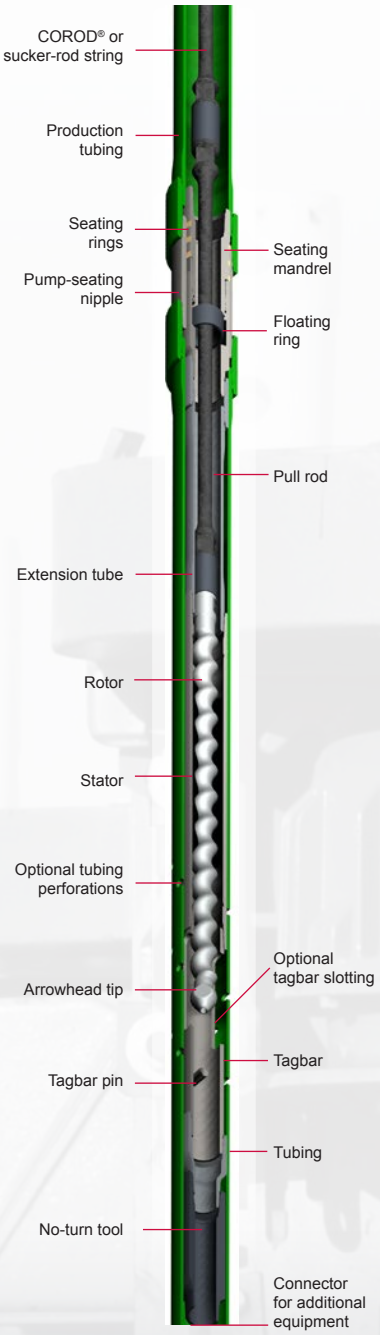
The *Arrowhead* I-PCP uses patented technology to make insertable PCPs a practical and compact solution.

- The rotor features a unique, arrowhead-shaped tip, which mates with a floating ring to create a no-go seat at the top of the insert assembly.
  - – When the arrowhead tip and the floating ring meet, the entire assembly can be removed from the well.
- A shorter extension tube makes this assembly easier to handle and install, while improving the ability to flush sand and debris from the pump and intake.
- When a flush is required, the arrowhead tip is positioned in an extension tube, between the stator and the floating ring. At this point, the rest of the rotor is temporarily extended into the production tubing.
  - – Once the rotor is extended, fluid can be flushed around the rotor and through the stator.
- Downhole monitoring equipment can remain in place during pump servicing.
- Available for 2 7/8-, 3 1/2-, 4 1/2- and 5 1/2-in. tubing.



***Arrowhead* I-PCP design**

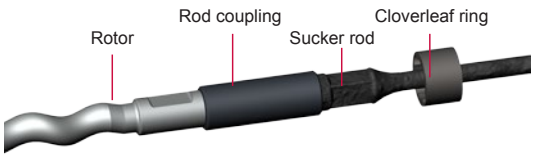
***ARROWHEAD* I-PCP DESIGN**



Cloverleaf™ I-PCP

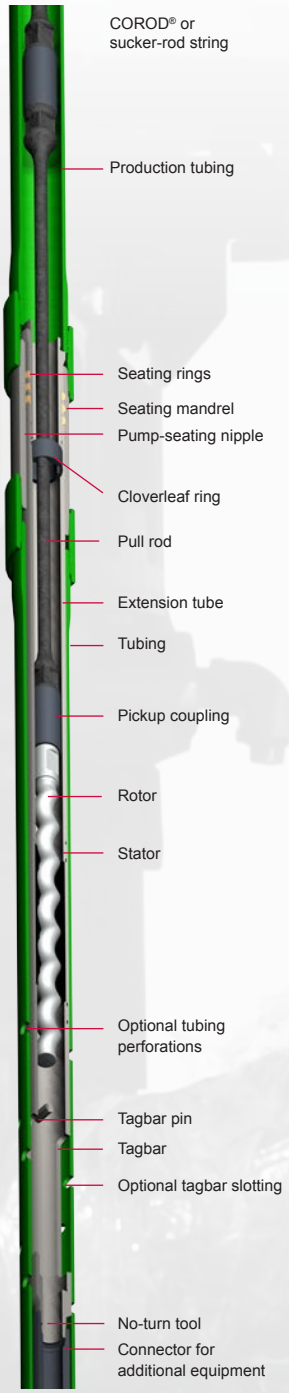
The Weatherford *Cloverleaf* I-PCP features a simple and robust design.

- This I-PCP assembly is removed by a rod coupling on the top of the rotor and a cloverleaf-shaped ring, which acts as a no-go seat at the top of the insert assembly.
  - When the rod coupling and the cloverleaf ring meet, the pump can be pulled from the seating nipple and brought to surface.
- The *Cloverleaf* I-PCP is available in flushable and nonflushable configurations.
  - The flushable configuration features a corresponding extension tube, approximately equal to the length of the rotor, which temporarily houses the rotor to enable fluid flow.
- Downhole monitoring equipment can remain in place during pump servicing.



Cloverleaf design

FLUSHABLE *CLOVERLEAF* I-PCP DESIGN



Flexisert™ I-PCP Anchor

In wells not equipped with PSNs, the Weatherford *Flexisert* I-PCP anchor enables insertable PCPs to be installed, operated, and removed with ease.

- Pump-setting depth, pump volume, and lift can be changed without having to pull the tubing string.
- The anchor creates a seal between the pump intake and high-pressure discharge.
- The anchor prevents rotation and axial movement, and it does not require separate no-turn tool or torque anchor.
- Downhole monitoring equipment can remain in place during pump servicing.
- The *Flexisert* I-PCP anchor provides an effective solution when a PSN is installed, but the PSN specifications are unknown or the PSN is in the wrong location.

Configuration		
Tubing configuration (lb/ft, *kg/m*)	2-7/8 in. EUE and NUE 6.50 *9.67*	3-1/2 in. EUE and NUE 9.30 *13.84*
Tubing nominal ID/drift (in.,*mm*)	2.441/2.347 *62.001/59.614*	2.992/2.867 *75.997/72.822*
Critical Dimensions		
Assembly length (in., *mm*)	47 *1,194*	50 *1,270*
Maximum tool pump adapter/cone OD (in., *mm*)	2.290 *58.166*	2.750 *69.850*
Pump adapter head threads	1 1/4-in. NPT box	1.900-in. EUE box
Uncompressed slip/spring assembly OD (in., *mm*)	3.006 *76.352*	3.469 *88.113*
Minimum mandrel flow ID (in., *mm*)	1.12 *28.45*	1.50 *38.10*
Bottom retainer coupling threads	1 1/4-in. NPT 11.5 TPI box	API 1.900-in. EUE 10 RD box
Operating Specifications		
Minimum tubing ID—drifts up to 12-in. length (in., *mm*)	2.310 *58.674*	2.795 *70.993*
Maximum tubing ID (in., *mm*)	2.630 *66.802*	TBD
Maximum operating torque (ft-lbf, *N•m*)	470 *637*	700 *949*
Maximum differential pump pressure (psi, *MPa*)	3,500 *24*	3,500 *24*
Maximum downward anchoring resistance* (lb, *kg*)	16,400 *7,438*	24,600 *11,158*
Maximum upward anchoring resistance** (lb, *kg*)	4,680 *2,123*	7,030 *3,189*
Maximum elastomer working temperature (°F, °C)	250 *121*	250 *121*
Installation/Removal Specifications		
Minimum downhole seating force to set anchor (lb, *kg*)	5,000 *2,268*	7,500 *3,402*
Downhole pull force range to shear anchor (lb, *kg*)	5,000 to 6,000 *2,268 to 2,722*	7,000 to 8,400 *3,175 to 3,810*

*Based on maximum pump differential pressure of 3,500 psi.
**Based on maximum negative pump differential pressure of 1,000 psi.

I-PCP Technical Specifications

2 7/8-in. Y and AY Insertable Inside of 2 7/8-in. EUE × 6.50 lb/ft / 9.67 kg/m or Lighter Tubing (2.325-in. PSN ID)

PC Pump Series (Imperial, *Metric*)	Displacement (B/D/100 at rpm, *m^3/d at 100 rpm*)	Lift Capacity (ft, *m*)	Stator Top Connection	Stator Bottom Connection	Length (in., *m*)	Rod	
						Connection	Maximum Operating Torque (ft-lbf, *N•m*)
6-4100 Y *1-1200 Y*	6 *1*	4,100 *1,200*	API 1.9864-14 H1 pin	1 1/4-in. NPT pin	196 *4.98*	3/4-in. API pin	300 *407*
24-4100 Y *4-1200 Y*	24 *4*	4,100 *1,200*	API 1.9864-14 H1 pin	1 1/4-in. NPT pin	273 *6.93*	5/8-in. API pin[1]	300 *407*
38-3200 XL AY *6-1000 XL AY*	38 *6*	3,200 *1,000*	API 1.9864-14 H1 pin	1 1/4-in. NPT pin	197 *5.00*	5/8-in. API pin[1]	300 *407*
38-6500 XL AY *6-2000 XL AY*		6,500 *2,000*			301 *7.65*		
69-2100 XL AY *11-600 XL AY*	69 *11*	2,100 *600*	API 1.9864-14 H1 pin	1 1/4-in. NPT pin	193 *4.90*	5/8-in. API pin[1]	300 *407*
69-4100 XL AY *11-1200 XL AY*		4,100 *1,200*			293 *7.44*		
69-5100 XL AY *11-1500 XL AY*		5,100 *1,500*			343 *8.71*		
69-6000 XL AY *11-1800 XL AY*		6,000 *1,800*			393 *9.98*		
113-5100 XL AY *18-1500 XL AY*	113 *18*	5,100 *1,500*	API 1.9864-14 H1 pin	1 1/4-in. NPT pin	483 *12.27*	5/8-in. API pin[1]	300 *407*
113-6000 XL AY *18-1800 XL AY*		6,000 *1,800*			561 *14.25*		

Y Cloverleaf™ insert lengths specified for standard-length tagbars only. AY Arrowhead® insert: XL is the minimum rotor length. [1] 5/8-in. API polished rod pin requires polished rod coupling.

3 1/2-in. AY Insertable Inside of 3 1/2-in. EUE × 9.30 lb/ft / 13.84 kg/m or Lighter Tubing (2.830-in. PSN ID)

PC Pump Series (Imperial, *Metric*)	Displacement (B/D/100 at rpm, *m^3/d at 100 rpm*)	Lift Capacity (ft, *m*)	Stator Top Connection	Stator Bottom Connection	Length (in., *m*)	Rod	
						Connection	Maximum Operating Torque (ft-lbf, *N•m*)
45-3200 XL AY *7-1000 XL AY*	45 *7*	3,200 *1,000*	2 3/8-in. EUE box	1.900-in. EUE pin	197 *5.00*	7/8-in. API PR pin with 1-in. API box x-over	1,000 *1,356*
45-4100 XL AY *7-1200 XL AY*		4,100 *1,200*			214 *5.44*		
45-4600 XL AY *7-1400 XL AY*		4,600 *1,400*			232 *5.89*		
45-5200 XL AY *7-1600 XL AY*		5,200 *1,600*			266 *6.76*		
45-6000 XL AY *7-1800 XL AY*		6,000 *1,800*			278 *7.06*		
60-2800 XL AY *10-800 XL AY*	60 *10*	2,800 *800*	2 3/8-in. EUE box	1.900-in. EUE pin	310 *7.87*	7/8-in. API PR pin with 1-in. API box x-over	1,000 *1,356*
60-4100 XL AY *10-1200 XL AY*		4,100 *1,200*			202 *5.13*		
60-5200 XL AY *10-1600 XL AY*		5,200 *1,600*			238 *6.05*		
88-2100 XL AY *14-600 XL AY*	88 *14*	2,100 *600*	2 3/8-in. EUE box	1.900-in. EUE pin	166 *4.22*	7/8-in. API PR pin with 1-in. API box x-over	1,000 *1,356*
88-4100 XL AY *14-1200 XL AY*		4,100 *1,200*			238 *6.05*		
88-6000 XL AY *14-1800 XL AY*		2,100 *600*			166 *4.22*		
110-3200 XL AY *17-1000 XL AY*	110 *17*	4,100 *1,200*	2 3/8-in. EUE box	1.900-in. EUE pin	247 *6.27*	7/8-in. API PR pin with 1-in. API box x-over	1,000 *1,356*
110-4100 XL AY *17-1250 XL AY*		4,100 *1,250*			285 *7.24*		
110-5100 XL AY *17-1500 XL AY*		5,100 *1,500*			323 *8.20*		
110-5700 XL AY *17-1750 XL AY*		5,700 *1,750*			361 *9.17*		
189-4100 XL AY *30-1200 XL AY*	189 *30*	4,100 1,200	2 3/8-in. EUE box	1.900-in. EUE pin	400 *10.16*	7/8-in. API PR pin with 1-in. API box x-over	1,000 *1,356*
189-5100 XL AY *30-1500 XL AY*		5,100 *1,500*			476 *12.09*		
189-6000 XL AY *30-1800 XL AY*		6,000 *1,800*			553 *14.05*		

AY *Arrowhead* insert: XL is the minimum rotor length.

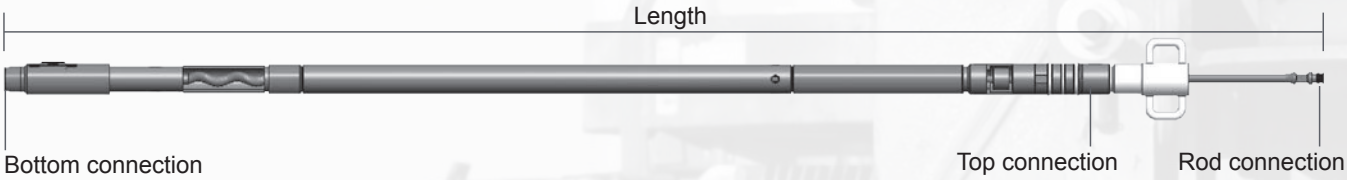
I-PCP Technical Specifications

4 1/2-in. AY Insertable Inside of 4 1/2-in. EUE × 12.75 lb/ft / 18.97 kg/m or 4 1/2-in. LTC / STC × 12.60 lb/ft / 18.75 kg/m or Lighter Tubing (3.810-in. PSN ID)							
PC Pump Series (Imperial, *Metric*)	**Displacement** (B/D at 100 rpm, *m^3/d at 100 rpm*)	**Lift Capacity** (ft, *m*)	**Top Connection**	**Stator Bottom Connection**	**Length** (in., *m*)	**Rod**	
						Connection[1]	**Maximum Operating Torque**[2] (ft-lbf, *N•m*)
60-3100 XL AY *10-900 XL AY*	60 *10*	3,100 *900*	2 7/8-in. EUE box	2 7/8-in. EUE pin	217 *5.51*	7/8-in. SR pin	1,000 *1,356*
60-4100 XL AY *10-1200 XL AY*		4,100 *1,200*			240 *6.10*		
60-5200 XL AY *10-1600 XL AY*		5,200 *1,600*			270 *6.86*		
60-4100 XL AYU *10-1200 AYU*	60 *10*	4,100 *1,200*	2 7/8-in. EUE box	2 7/8-in. EUE pin	175 *4.45*	7/8-in. SR pin	1,000 *1,356*
95-4600 XL AYU *15-1400 XL AY*	95 *15*	4,600 *1,400*	2 7/8-in. EUE box	2 7/8-in. EUE pin	284 *7.21*	7/8-in. SR pin	1,000 *1,356*
95-6000 XL AY *15-1800 XL AY*		6,000 *1,800*			328 *8.33*		
95-4600 XL AYU *15-1400 XL AYU*	95 *15*	4,600 *1,400*	2 7/8-in. EUE box	2 7/8-in. EUE pin	210 *5.33*	7/8-in. SR pin	1,000 *1,356*
140-3100 XL AY *22-900 XL AY*	140 *22*	3,100 *900*	2 7/8-in. EUE box	2 7/8-in. EUE pin	225 *5.72*	7/8-in. SR pin	1,000 *1,356*
140-4100 XL AY *22-1200 XL AY*		4,100 *1,200*			267 *6.78*		
140-5100 XL AY *22-1500 XL AY*		5,100 *1,500*			309 *7.85*		
200-2100 XL AY *32-600 XL AY*	10 *10*	2,100 *5,100*	2 7/8-in. EUE box	2 7/8-in. EUE pin	233 *5.92*	7/8-in. SR pin	1,000 *1,356*
200-3100 XL AY *32-900 XL AY*	200 *32*	3,100 *900*			301 *7.65*		
200-4100 XL AY *32-1200 XL AY*		4,100 *1,200*			368 *9.35*		
200-5200 XL AY *32-1600 XL AY*		5,200 *1,600*			441 *11.20*		
200-6000 XL AY *32-1800 XL AY*		6,000 *1,800*			503 *12.78*		
350-2100 XL AY *56-600 XL AY*	350 *56*	2,100 *600*	2 7/8-in. EUE box	2 7/8-in. EUE pin	279 *7.09*	7/8-in. SR pin	1,000 *1,356*
350-2800 XL AY *56-800 XL AY*		2,800 *800*			332 *8.43*		
350-5100 XL AY *56-1500 XL AY*		5,100 *1,500*			536 *13.61*		
520-2100 XL AY *83-600 XL AY*	520 *83*	2,100 *600*	2 7/8-in. EUE box	2 7/8-in. EUE pin	358 *9.09*	7/8-in. SR pin	1,000 *1,356*
520-3500 XL AY *83-1050 XL AY*		3,500 *1,050*			526 *13.36*		
750-2750 XL AY *120-775 XL AY*	750 *120*	2,750 *775*	2 7/8-in. EUE box	2 7/8-in. EUE pin	574 *14.58*	7/8-in. SR pin	1,000 *1,356*

AY Arrowhead® insert: XL is the minimum for rotor length.

[1] Modified API11B pin

[2] Maximum input torque requires use of a high-strength coupling.



I-PCP Technical Specifications

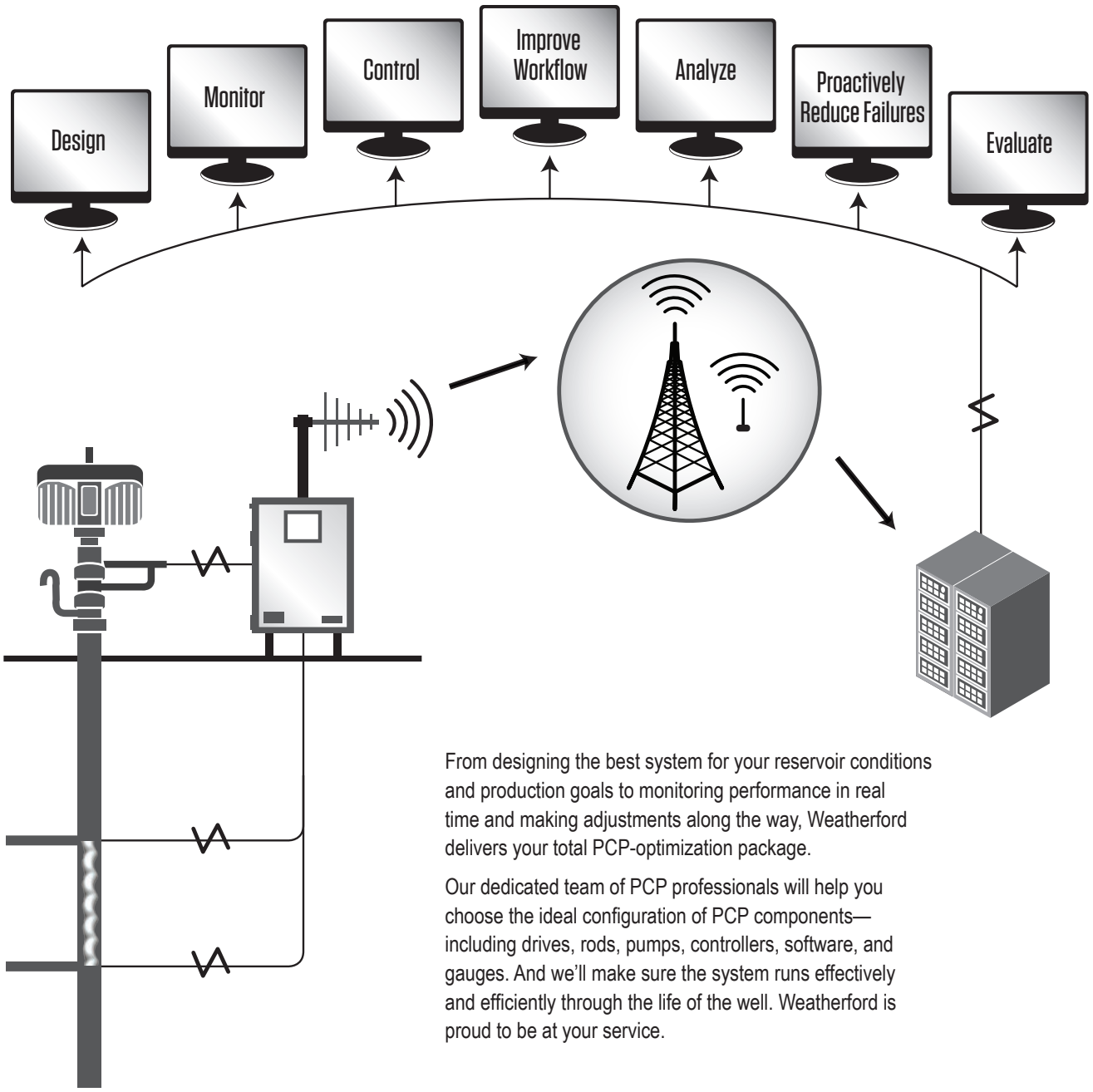
5 1/2-in. AY Insertable Inside of 5 1/2-in. LTC and STC × 17.00 lb/ft / 25.29 kg/m or Lighter Tubing (4.625-in. PSN ID)							
PC Pump Series (Imperial, *Metric*)	**Displacement** (B/D at 100 rpm, *m^3/d at 100 rpm*)	**Lift Capacity** (ft, *m*)	**Stator Top Connection**	**Stator Bottom Connection**	**Length** (in., *m*)	**Rod**	
						Connection[1]	**Maximum Operating Torque**[2] (ft-lbf, *N•m*)
220-5100 XL AY *35-1500 XL AY*	220 *35*	5,100 *1,500*	3 1/2-in. EUE box	3 1/2-in. EUE pin	325 *8.26*	1 1/8-in. SR pin	2,500 *3,390*
327-4100 XL AY *52-1200 XL AY*	327 *52*	4,100 *1,200*	3 1/2-in. EUE box	3 1/2-in. EUE pin	325 *8.26*	1 1/8-in. SR pin	2,500 *3,390*
500-4100 XL AY *80-1200 XL AY*	500 *80*	4,100 *1,200*	3 1/2-in. EUE box	3 1/2-in. EUE pin	429 *10.90*	1 1/8-in. SR pin	2,500 *3,390*
500-4600 XL AY *80-1400 XL AY*		4,600 *1,400*			481 *12.22*		
500-5200 XL AY *80-1600 XL AY*		5,200 *1,600*			540 *13.72*		
500-6000 XL AY *80-1800 XL AY*		6,000 *1,800*			590 *14.99*		
660-1400 XL AYU *105-400 XL AYU*	660 *105*	1,400 *400*	3 1/2-in. EUE box	3 1/2-in. EUE pin	219 *5.56*	1-in. SR pin	1,500 *2,034*
660-2800 XL AYU *105-800 XL AYU*		2,800 *800*			331 *8.41*		
660-4100 XL AYU *105-1200 XL AYU*		4,100 *1,200*			443 *11.25*		
710-2100 XL AY *113-600 XL AY*	710 *113*	2,100 *600*	3 1/2-in. EUE box	3 1/2-in. EUE pin	320 *8.13*	1 1/8-in. SR pin	2,500 *3,390*
710-4100 XL AY *113-1200 XL AY*		4,100 *1,200*			522 *13.26*		
1000-1400 XL AY *160-400 XL AY*	1,000 *160*	1,400 *400*	3 1/2-in. EUE box	3 1/2-in. EUE pin	325 *8.26*	1 1/8-in. SR pin	2,500 *3,390*
1000-3200 XL AY *160-1000 XL AY*		3,200 *1,000*			639 *16.23*		

AY *Arrowhead* insert: XL is the minimum rotor length.

[1] Modified APO11B pin

[2] Maximum input torque requires use of a high-strength coupling.

Your single source for complete PCP optimization



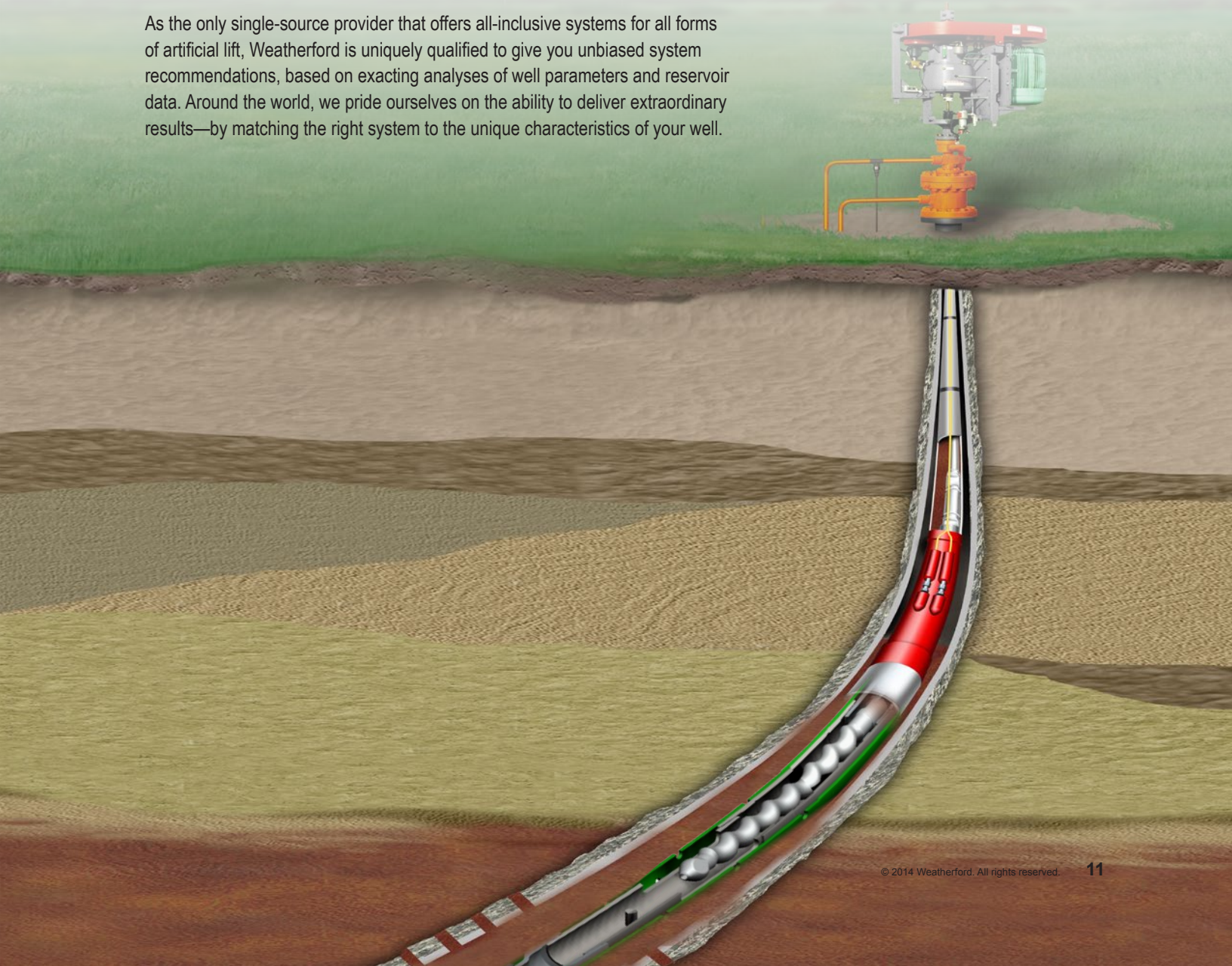
From designing the best system for your reservoir conditions and production goals to monitoring performance in real time and making adjustments along the way, Weatherford delivers your total PCP-optimization package.

Our dedicated team of PCP professionals will help you choose the ideal configuration of PCP components—including drives, rods, pumps, controllers, software, and gauges. And we'll make sure the system runs effectively and efficiently through the life of the well. Weatherford is proud to be at your service.

Beginning to end, hemisphere to hemisphere, Weatherford gives you the advantage

I-PCP technology is just one of many offerings from our comprehensive artificial-lift portofolio.Designed as a complete system of products and services to optimize artificial-lift production, our solutions include appraisal, system selection, design, monitoring, analysis, and adjustment.

As the only single-source provider that offers all-inclusive systems for all forms of artificial lift, Weatherford is uniquely qualified to give you unbiased system recommendations, based on exacting analyses of well parameters and reservoir data. Around the world, we pride ourselves on the ability to deliver extraordinary results—by matching the right system to the unique characteristics of your well.



Discover how the Weatherford line of I-PCP products can give you the power to replace the pump, keep the tubing intact, and get back to business faster. Speak to your Weatherford representative, or contact us at **PO-Info@weatherford.com.**

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