

# ZEiTECS Shuttle

## Rigless ESP replacement system

### APPLICATIONS

- Standard ESP wells with 7-in casing or larger

### BENEFITS

- Reduces production deferment
- Decreases operating costs
- Shortens ESP intervention time
- Reduces HSE exposure
- Eliminates disruptions to operations
- Keeps rigs on the drilling sequence
- Extends economic viability of well
- Increases ultimate recovery

### FEATURES

- Rigless ESP retrieval with wireline, coiled tubing, or sucker rods
- Plug-and-play design with patented motor connector and docking station
- Retrievable gauge for reservoir and ESP monitoring
- Ability to accommodate multiple hydraulic control lines
- Throughbore access below the docking station

The ZEiTECS Shuttle\* rigless ESP replacement system is a downhole electrical wet-connector technology that allows standard ESPs to be shuttled through tubing on wireline, coiled tubing, or sucker rods without a rig or a hoist. The ability to economically and conveniently replace ESPs without a rig minimizes production deferment, operating costs, disruption to operations, and HSE exposure and risks.

### A new method of ESP replacement

The ZEiTECS Shuttle system consists of two main assemblies: a retrievable ESP assembly, and semipermanent completion components, including a docking station. The docking station houses three electrical wet connectors to supply power to a standard three-phase AC induction motor or a permanent magnet motor. A landing surface bears the weight of the retrievable string and counteracts the reactive forces generated by the ESP. An offset throughbore allows reservoir access.

The standard ESP assembly includes a pump, protector, motor, and optional gauge, and is run in a conventional orientation with the motor on the bottom. The motor connector is deployed at the base of the retrievable ESP string and uses an alignment spear to automatically orient the connectors with the docking station.

A seal assembly at the top of the retrievable string incorporates two cup-type packers to prevent recirculation between the pump intake and discharge. The seal assembly incorporates slips to transfer the pressure-generated thrust to the tubing to prevent undue compression of the ESP. An automatic bypass feature drains the tubing on system retrieval.

### Shuttle installation procedure

The ZEiTECS Shuttle system is initially installed during a rig-supported workover as follows:

- The docking station is run to a shallow depth on jointed tubing with cable banded or clamped to the outside.
- The retrievable ESP string with motor connector is assembled, lowered into the tubing, and landed in the docking station.
- The complete ZEiTECS Shuttle system is lowered to pump setting depth.



*ZEiTECS Shuttle system's motor connector with three electrical wet connectors.*

Ideally, a production packer is installed below the docking station so that all annular components (including the ESP cable) are protected from pressure and temperature fluctuations and from corrosive gas and liquids.

### Rigless ESP retrieval and replacement

To retrieve the ESP, a GS pulling tool is lowered on wireline, coiled tubing, or sucker rods and latched into the string, which is then unplugged from the docking station and pulled to surface through the tubing. After service or replacement, the retrievable ESP string is redeployed by the same means. The motor connector automatically connects to the docking station and the running tool is retrieved, enabling production to resume. The whole operation may be completed within hours.

### ESP system optimization

Rigless ESP deployment technologies increase the average production profile and extend the economic life of wells. Because there is no time wasted waiting on a rig, operators may benefit from

- deploying sacrificial test ESPs to clean up wells and measure reservoir productivity before upgrading to a system optimized for well conditions
- replacing ESPs before failure at minimal cost to maintain efficiency and optimize production
- implementing a preventive maintenance program to reduce unplanned ESP failures.

# ZEiTECS Shuttle

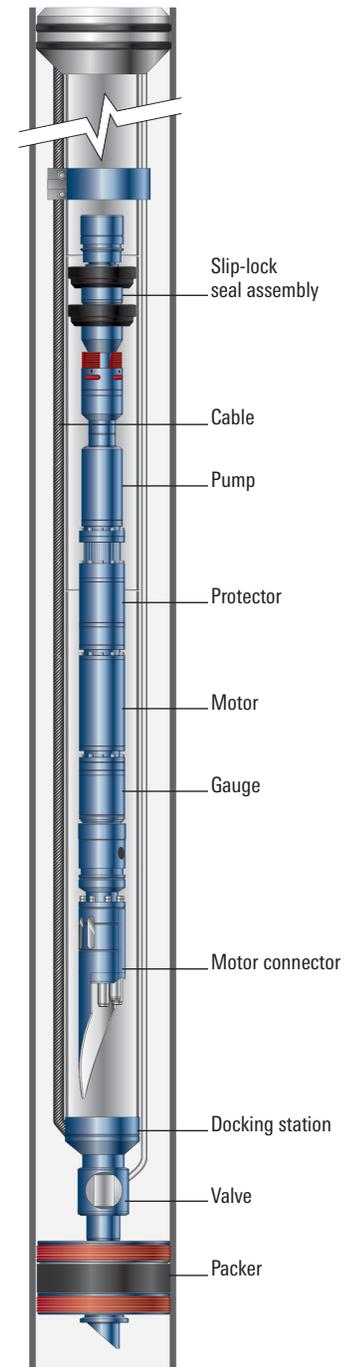
## ZEiTECS Shuttle System Specifications

	450	550	700
ESP size	338/375 series	400/450/456 series	513/538/540/562 series
Min. casing size, in [mm]	7 [177.80]	7.625 [193.68]	9.625 [244.48]
Max. casing weight, lbm/ft [kg/m] <sup>§</sup>	42.7 [63.54]	45.3 [67.41]	53.5 [79.62]
Min. tubing OD, in [mm]	4.5 [114.30]	5.5 [139.70]	7 [177.80]
Max. tubing weight, lbm/ft [kg/m] <sup>§</sup>	12.6 [18.75]	17.0 [25.30]	29.0 [43.16]
Throughbore diameter of docking station, in [mm]	2.12 [53.85] <sup>†</sup>	2.99 [75.95] <sup>†</sup>	1.69 [42.93]
Max. OD			
Docking station, in [mm]	5.542 [140.77]	6.210 [141.22]	8.390 [213.11]
Retrievable ESP string, in [mm]	3.823 [97.10]	4.767 [121.11]	6.055 [153.80]
Flexible seal assembly, in [mm]	4.120 [104.19]	5.010 [127.25]	6.330 [160.78]
Landing nipple, in [cm]	N/A	N/A	7.395 [18.78]

<sup>§</sup>Only applicable at min. casing size

<sup>†</sup>Rigid tool passage, in, [mm]: 2.55 [64.77]

<sup>‡</sup>Rigid tool passage, in, [mm]: 1.93 [49.02]



*ZEiTECS Shuttle rigless ESP replacement system.*

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