

Eccentric Shifting Module

Maximizing ESP annular clearance and system design options

Applications

- Conventional and unconventional wells
- ESPs in 5.5 in., 20# (or lighter) casing needing higher horsepower PMM (up to 368 hp)

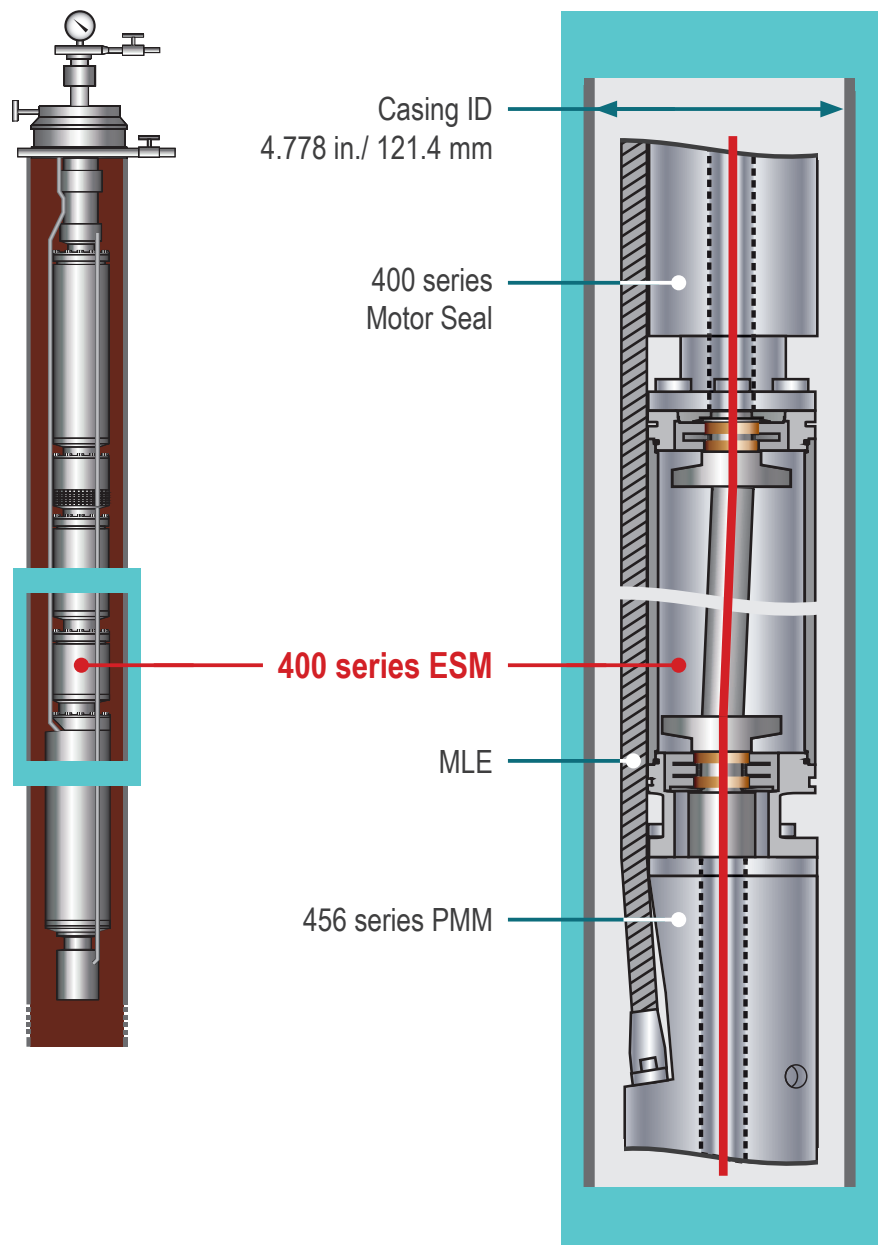
Benefits

- Enables higher lift and horsepower ESP designs in heavy wall casing
- Reduces sticking risk during installation and pulling
- Increased clearance reduces the risk of equipment damage during installation

Features

- INCONEL® shaft
- Centerline shaft axis shifting away from motor pothead

The Eccentric Shifting Module (ESM) is another ESP system innovation by Borets that expands ESP design options in previously restrictive casing sizes. Installed in the ESP string between the seal and motor, the ESM axially offsets the seal and pump assembly while preserving a robust shaft mechanical linkage with the motor. This centerline axial offset in the equipment connected above the motor provides greater clearance for the MLE cable while reducing overall string running outside diameter (OD).



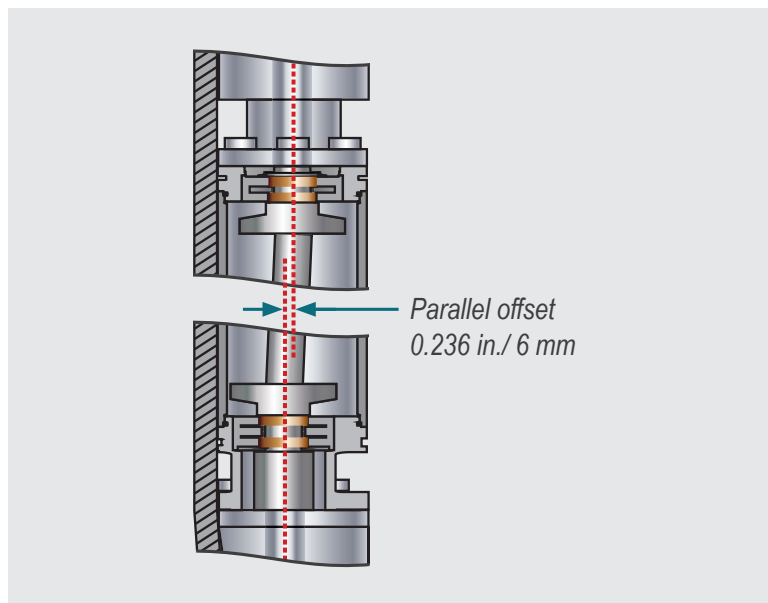
The typical MLE, installed with a conventional ESP string comprising 456 series motor, normally yields an overall running OD that exceeds the drift inside diameter (ID) in a 5.5 in., 20 # casing. As a consequence of reduced annular clearance, ESP applications requiring higher flow and horsepower designs available with 456 series equipment may not be achievable in this casing size, or come with high risk for becoming stuck during installation or pull. The Eccentric Shifting Module eliminates clearance risk and enables the full range of ESP systems with 456 series motors in 5.5 in., 20# casing applications.

The ESM design establishes an offset between the vertical axes of the seal-pump-tubing assembly and the motor through pinion carriers with spherical outer surfaces mounted on either end of a common shaft. Equipment string weight works with the engineered design to help dampen vibration common with offset rotating equipment. Vibration testing conducted in Borets R&D facilities show that string vibration with ESM is maintained below limits specified in API RP 11S8.

The Borets Eccentric Shifting Module has been installed and successfully operated in more than 300 wells in Russia and several more wells in the US Permian Basin.

400 series ESM Technical Specifications

Length	5.03 ft (1.533 m)
Weight	103.6 lb (47.1 kg)
Max. OD	4.29 in. (109 mm)
Max. speed	4,200 rpm
Max. torque	536 lbf (726.7 N-m)
Max. power @ 3,600 rpm	368 hp (274 kW)
Max. operating temperature	392 °F (200 °C)
Max. vibration	0.397 in./s (10.00 mm/s)



ESP String with ESM Installed Vibration Test Results (3,300 rpm)

