Permanent Magnet Motors

Better efficiency, improved reliability, lower ESP operating costs

Applications

Artificial lift using

- Electric submersible centrifugal pumps
- Electric submersible progressing cavity pumps

Benefits

Lower ESP operating expense through reduced power consumption

Reduced equipment string length for

- Deeper pump setting depths
- Improved wellbore access through doglegs

Features

Available in 319, 406, 456, 512, and 562 series sizes

Wide operating speed range:

- Low-speed PMM: 100 – 1,500 rpm
- Standard-speed PMM: 500 – 4,200 rpm
- High-speed PMM: 3,000 – 6,000 rpm

Motor efficiency up to:

- Low-speed PMM – 83%
- Standard-speed PMM – 93%
- High-speed PMM – 93%

High power factor (very close to 1)

No rotor slip

Locked rotor bearing design

The proven technology of permanent magnet motors (PMMs) has shown to reduce operating expenses attributable to ESP power consumption up to 20% or more. PMMs also experience lower heat rise than an equivalent horsepower (HP) induction motor (IM) contributing to improved reliability and longer run life. The higher HP rotor density means PMMs are also significantly shorter than an IM equivalent, which enables deeper pump setting depths as well as facilitating better clearance through severe doglegs or tortuous well paths.

Levare PMM performance is optimized using a proprietary vector control algorithm in the surface variable speed drive (VSD). Key motor performance characteristics – determined under a controlled lab tuning process – are uploaded to the control algorithm enabling the VSD to optimize motor power consumption and control stability uniformly across the full spectrum of motor load variation.

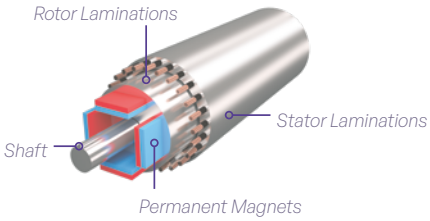
Levare has the industry's largest portfolio of proven PMMs across a range of series size and ranging from low-speed (100 rpm) to high-speed (6,000 rpm) in support of standard (PMM-ESP), high-speed (Slimline) and low-speed (PMM-PCP) applications. All Levare PMMs come as single section motors.

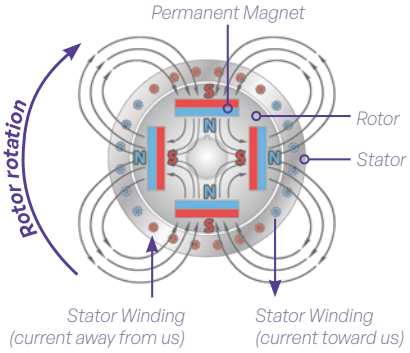
As the global leader in PMM technology development and experience, Levare deployed thousands PMM in Oil&Gas, Geothermal and Water production in US and worldwide.

Maximum run life of Levare PMM exceeds 2,900 days.

PMM Operating Principle

Permanent magnets made of sintered hard-magnetic materials are incorporated into the design of the PMM rotor. It is the rotor flux produced by these magnets that interacts with the stator magnetic field to produce motor torque. Power consumption and heat rise are both reduced since no current is induced in the PMM rotor.



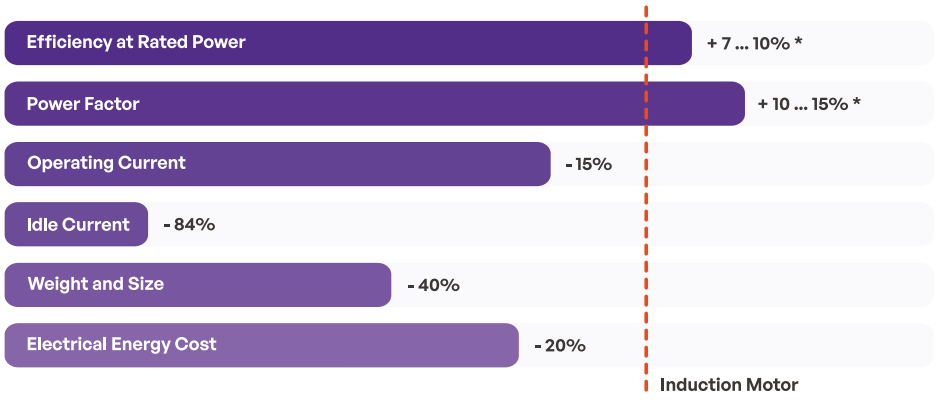


Available PMM Sizes and Horsepower Range

PMM vs. IM Advantages

Results of field test comparisons of PMM to IM performance conducted by Levare and lab testing conducted by five major operators are summarized in the graphic.

The tests confirmed the superior performance of PMMs, including better efficiency, higher power factor, and 15% average energy savings.



* depending on a motor size

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