

# Permanent Magnet Motors

## Powering the TerraGenix\* Rugged Duty Water Management

Better efficiency, improved reliability, lower ESP operating costs

Applications	Features
Mine Dewatering	<ul style="list-style-type: none"> <li>Designed to work with 400, 538 &amp; 675 series pumps</li> <li>Wide operating speed range: 500 – 4,200 rpm</li> <li>Motor efficiency up to 93%</li> <li>High power factor (very close to 1)</li> <li>No rotor slip</li> <li>Locked rotor bearing design</li> </ul>
Benefits	
Lower ESP operating expense through reduced power consumption	
Reduced equipment string length for <ul style="list-style-type: none"> <li>Deeper pump setting depths</li> <li>Improved wellbore access through doglegs</li> </ul>	

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. All Levare PMMs come as single section motors.

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.

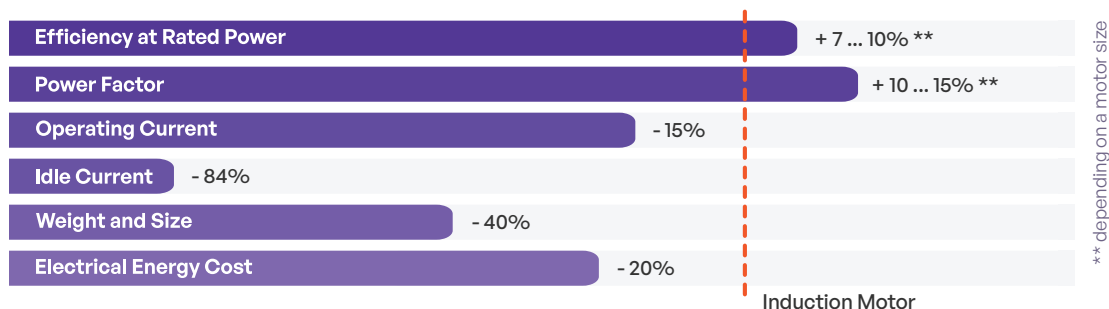
As the global leader in PMM technology development and experience, Levare first introduced PMM technology in 2006 and has since deployed more than 22,000 PMMs worldwide.

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



### PMM vs. IM Advantages

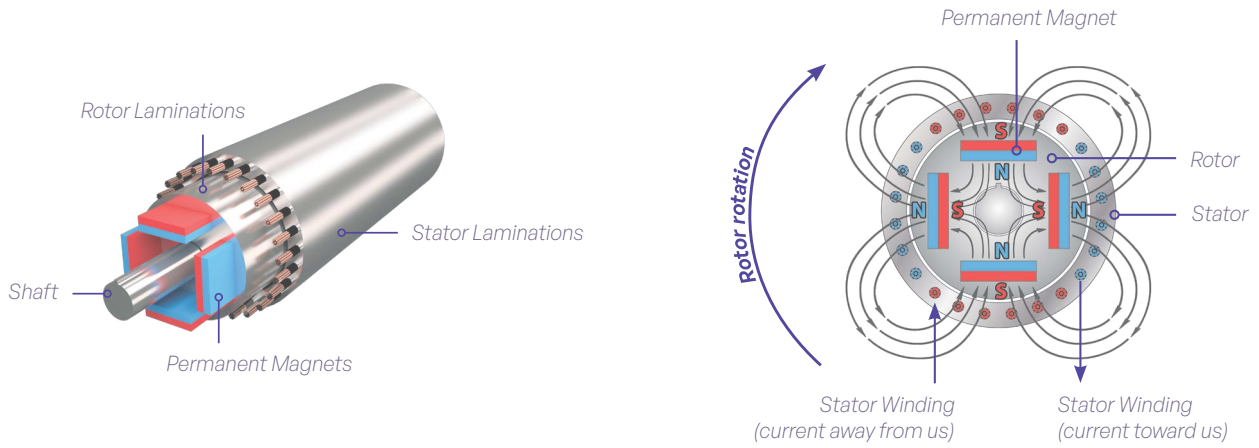
Results of field test comparisons of PMM to IM performance conducted by Levare and lab testing conducted by five major operators are summarized in the graphic. The tests confirmed the superior performance of PMMs.



\* mark of Levare International

## 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

		HP	25	50	100	500	1000	1500
Operating Range 500 - 4,200 rpm	456 Series		40	[Bar from 50 to 400]			400	
	562 Series				100	[Bar from 100 to 980]		980