PLEUGER

Part of
FLACKS GROUP

PMM Submersible Motors

Ranges 6” - 8”

50 Hz

Permanent-Magnet-Technology
for Highest Efficiencies up to 95%

PLEUGER. Reliable. Always.

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About PLEUGER

PLEUGER is an international manufacturer and supplier of submersible motors, pumps, thrusters and plunger pumps and related services with manufacturing and engineering in Hamburg, Germany. Renowned worldwide across the energy, mining, water, industrial processing and the oil & gas industries for absolute reliability and outstanding longevity, our products are designed, engineered and manufactured to solve some of the toughest applications in the most challenging and harshest environments. With over 90 years experience we are experts in electric submersible motors and pumps for various applications in the Water and General Industry, including Mining and Oil & Gas market sector. With German engineering know-how and many years of industry experience, PLEUGER meets the demands of customers worldwide for performance, durability, energy efficiency and total cost of ownership.

PLEUGER CRAFTSMANSHIP

PLEUGER stands for true craftsmanship, combining vision, precision and attention to detail.

From our unique manufacturing processes for stators, to our unrivalled winding capabilities for submersible motors, each element is part of our journey to absolute perfection.

Nothing is more important to us than the reliability and durability of our products.

DESIGN & ENGINEERING

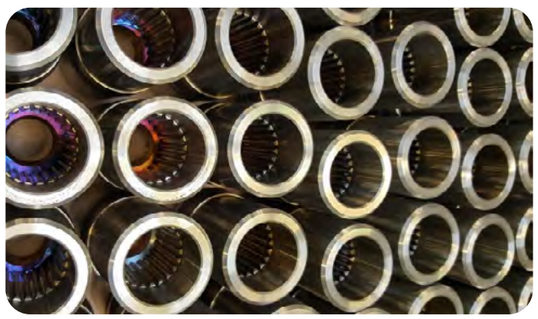
PLEUGER believes in total reliability and the very best quality. We achieve this through precision design and engineering. Proven throughout our decades of experience in consulting, engineering and manufacturing for the most demanding applications around the world.

We offer you the best fit for your submersible pump solution. Engineered for performance. Built to last.

TECHNOLOGIES

Our design engineers, production engineers and data analysts are always investigating how new technologies, materials and approaches can enhance what we do, to maximise performance and reliability and minimize energy consumption.

PLEUGER submersible pump units keep critical systems running across the world in energy, drinking water, industrial processes, dewatering and geothermal heating applications.



PLEUGER SUBMERSIBLE PUMPS

Best-in-class submersible pumps built for reliability and performance.

PLEUGER Submersible Motors — Made in Germany

As a manufacturer of world-class submersible motors, every PLEUGER product is designed, engineered and manufactured to the highest standards for efficiency, corrosion protection, and an extended power range.

PLEUGER PMM Motors

- 6" to 8"
- Synchronous motor
- Power output: 4.0 to 165 kW (5.36 to 221 HP), 200 kW (268 HP) on request
- Operating speed: 2100 to 3600 rpm (max 3800 rpm)
- 4 pole design
- Driven by Variable Frequency Drive (VFD)
- VFD input voltage 400 to 500 V / 70 to 120 Hz
- 25+ design life time
- Rewindable design

Significant Savings in Energy Costs

High-performance pumps PL06/08 with increased efficiency of up to 85% (average η opt > 83%) available

Designed for increased performance and reduced life-cycle costs.

International Design Standards

Design Standards: ANSI / ASTM / DIN / ISO / Hydraulic Institute / CE / API 610

Hydraulic Standards: ANSI/HI / EN ISO / API610 / NFPA20

Electrical Standards: NEMA / IEC / IEEE

Certifications: DNV GL / ABS / CSA / ATEX/ NSF61

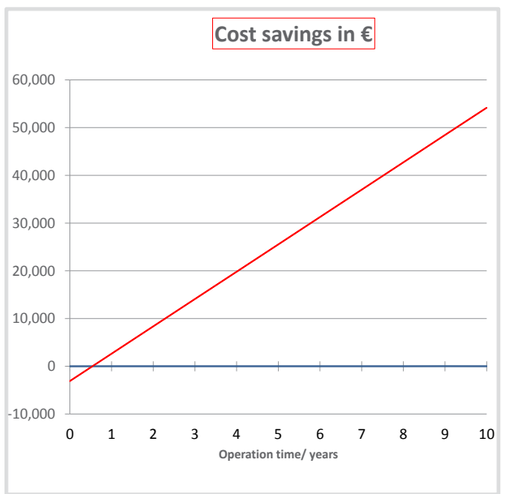
Approvals: ISO 9001

Made in Germany

Amortisation calculation - Example

Asynchronous vs. Synchronous motor

Operating conditions	Asynchronous	Synchronous
Operating time / a [h]	6,000	6,000
Electrical Power costs/ kWh [€]	0.15	0.15
Performance of the pump at the operating point [kW]	38.7	36.0
Characteristics / Consumption		
Motor type	*M8-480-2*	*PMM6-600-4*
Flow rate [m³/h]	71.0	70.0
Head [m]	153.0	153.0
(eta) hydraulic [%]	77.0	81.8
(eta) motor [%]	85.5	93.0
(eta) total [%]	66.2	76.1
$P_{on\ motor}$ [kW]	44.7	38.3
Electrical power consumption per year [kWh]	268,200	230,023
Electricity costs / year[€]	40,230	34,503
Investments		
Frequency converter [€]		
Motor and hydraulic [€]	4,296	7,390
Total system [€]	4,296	7,390
Return-On-Investment		
Electricity cost savings / year [€]		5,727
Amortisation time in years		0.5



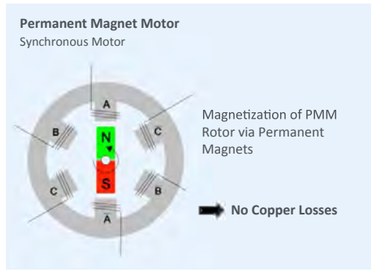
PLEUGER PMM Motors

Our engineers and analysts are always investigating how new technologies, materials and approaches can enhance what we do, to maximise performance and reliability and minimize energy consumption.

PLEUGER PMM motors are rewindable, synchronous electric motors with significant Increase of Motor Efficiency (up to 95%) and Power Output.

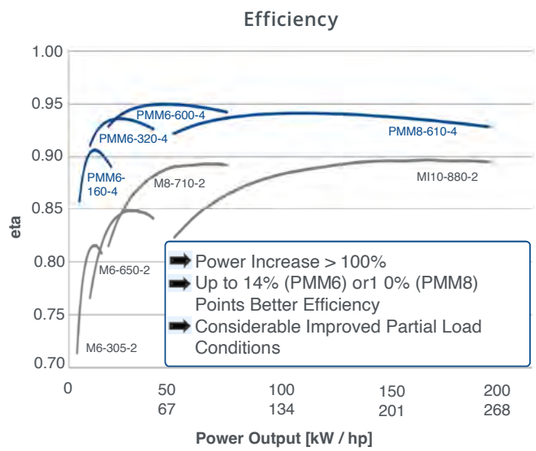
Available from 4 kW (5.4 HP) to 165 kW (to 221 HP), 200 kW (268 HP) on request with efficiencies up to 94%

- Designed to minimize life cycle costs
- Design based on the reliable PLEUGER asynchronous / induction motor
- Available as standard customized solution
- Operated via variable frequency drive (VFD) ensures most efficient operation
- PLEUGER offers the complete system of pump, motor and VFD



Advantages and Benefits

- Up to 14 percent points better efficiency than asynchronous motors
- Increased power output of more than 100% in comparison to asynchronous motors of the same size
- motors allow smaller unit sizes with reduced installation and storage costs
- Wide efficiency curves drastically reduce number of motor sizes and simplify storage
- No special VFD required; standard VFDs from various manufacturers can be used
- No sinus filter or du/dt filter required, reduce investment and energy cost



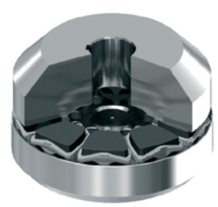
Thrust Bearings

PLEUGER motors are equipped with heavy duty motor axial thrust bearings made of high-performance polymers for highest axial thrust loads ensuring extraordinary lifetime and maximum reliability.

- Developed by PLEUGER Industries
- Benchmark in submersible motor technology
- In operation since 2013
- Custom Polymer Material
- Heavy-duty design, up to 300kN axial thrust
- Ensures extraordinary lifetime of motor

Advantages

- Tilting pads made of proprietary synthetic material
- Rotating runner made of Stainless Steel
- Increase of lifetime
- Maintenance free
- Allowed axial thrust increased by 100% (up to 300kN)
- Lower absorbed power by 20%



- Increased wear resistance by using new polymers
- Improved dry run capabilities
- Increased water hammer resistance
- Lower starting torque
- Bi-directional operation
- High temperature resistance
- No contamination based on carbon wear

PLEUGER. Reliable. Always.

PLEUGER Standard and PMM Motors

Flat- or round cable

Space-saving cable design. Certified for drinking water applications.

NEMA or IEC flange connection

Universal connector to standard hydraulics.

Motor housing

Cast housing designed for reliability, corrosion resistance, strength and durability.

Induction Motor: Squirrel Cage Rotor for Asynchronous Motor or Permanent Magnet Motor: Rotor equipped with Permanent Magnets for Synchronous Motor

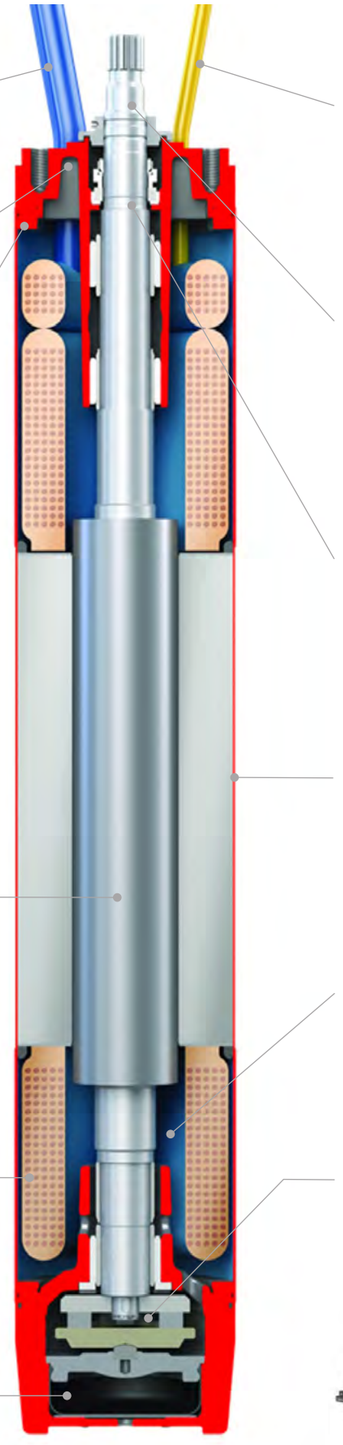
- Up to 14 % points higher motor efficiency compared to asynchronous motors, through reduction in copper loss
- Hermetically sealed rotor ensures protection of magnets against corrosion and mechanical damage
- Up to 200 kW (268 HP) available

Rewindable winding

Ease of maintenance and cost saving. PE-HD insulation. PE2/ PE2+PA insulation for optimized winding lifetime on request.

Breather diaphragm

Liquid pressure compensation to extend the service life of the mechanical seal and O-ring.



Signal Cable (Optional)

Used with temperature sensor PT100
For monitoring motor temperature.

Motor Shaft End

Standard duplex stainless steel for best combination of corrosion resistance, mechanical strength and stiffness. Special materials available upon request.

Mechanical Seal

High-grade SIC/SIC/Viton® as standard ensures wear resistance and ultra-low maintenance requirements.

Stator Tube

Standard 316 stainless steel construction for excellent corrosion resistance over the service life. Special materials available on request.

Motor Filling

Prefilled and tested with water/ glycol mixture, or potable water on request.

Thrust Bearing

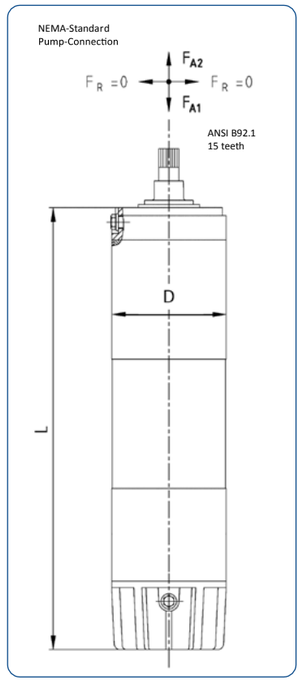
Heavy-duty, custom polymer to ensure ultra-low maintenance and maximum reliability

Specifications

- Driven by VFD
- VFD input voltage: 400 - 500 V
- Operating frequency: 70 - 120 Hz
- Operating Speed: 2100 - 3600 rpm; max. 3800 rpm
- Motor Flange: NEMA
- Protection: IP68
- Installation: horizontal/vertical
- Motor Lead: PMM6 = 3m (9.8 ft); PMM8 = 7m (23 ft.)
- Operating ambient temp: -15°C to 50°C (5°F to 122°F)
- Cooling velocity: 0,2 m/s @ 20°C (0.66ft/s @68°F) or 0.5 m/s @ 30°C (11.6 ft/s @ 86°F)
- Starts per hour: PMM6 = 20; PMM8 = 10

Construction Materials

- Casted Housing materials: Cast Iron, Bronze, 316 Stainless Steel, Super Duplex Stainless Steel
- Shaft End: Duplex Stainless Steel (Standard), Super Duplex Stainless Steel
- Rubbers: NBR
- Mechanical Seal: SIC/SIC/Viton
- Stator Tube: 316 Stainless Steel, SMO
- Fasteners: 316 Stainless Steel, Super Duplex Stainless Steel
- Diaphragm: NBR



Technical Data

Motor Type	Power Output * kW (HP)	Current * A	Efficiency * %	Cos Phi *	Length, L mm (inch)	Diameter, D mm (inch)	Weight kg (lb)	Maximum Permissible Thrust kN (lbf) F_{A1}	Maximum Permissible Thrust kN (lbf) F_{A2}
PMM6-160-4	4.0 (5.4)	8.2	87.0%	0.995	696 (27.40)	144 (5.669)	46 (101)	27.5 (6182)	6 (1349)
	5.5 (7.4)	11.0	89.0%	0.990					
	9.2 (12.3)	17.9	91.0%	0.975					
	11.0 (14.3)	21.5	91.5%	0.965					
	13.0 (17.4)	25.5	91.0%	0.955					
	15.0 (20.1)	29.0	91.0%	0.940					
PMM6-320-4	15.0 (20.1)	28.5	92.5%	0.990	856 (33.70)	144 (5.669)	64 (141)	27.5 (6182)	6 (1349)
	18.5 (24.8)	35.0	93.0%	0.985					
	22.0 (29.5)	41.5	93.5%	0.975					
	26.0 (34.9)	48.5	93.5%	0.970					
	30.0 (40.2)	57.0	93.0%	0.960					
	33.0 (44.3)	63.0	93.0%	0.950					
	37.0 (49.6)	71.0	92.5%	0.935					
	40.0 (53.6)	77.0	92.5%	0.925					
PMM6-600-4	40.0 (53.6)	79.0	94.5%	0.980	1136 (44.72)	144 (5.669)	101 (223)	27.5 (6182)	6 (1349)
	46.0 (61.7)	92.0	94.5%	0.970					
	50.0 (67.1)	100.0	94.5%	0.965					
	55.0 (73.8)	110.0	94.5%	0.960					
	60.0 (80.5)	121.0	94.5%	0.950					
	68.0 (91.2)	137.0	94.5%	0.935					
	75.0 (100.6)	153.0	94.0%	0.920					
PMM8-610-4	75.0 (100.6)	140.0	93.5%	0.985	1438 (56.61)	186 (7.323)	179 (395)	80.0 (17985)	12.5 (2810)
	83.0 (111.3)	153.0	94.0%	0.985					
	90.0 (120.7)	166.0	94.0%	0.985					
	110.0 (147.5)	205.0	94.0%	0.975					
	140.0 (187.7)	260.0	94.0%	0.960					
	165.0 (221.0)	285.0	93.0%	0.940					
	**								

* at 120 Hz and 3600 rpm, at Service Factor 1.0, ** up to 200.0 (268) on request

WORLDWIDE SALES, SERVICE AND SUPPORT

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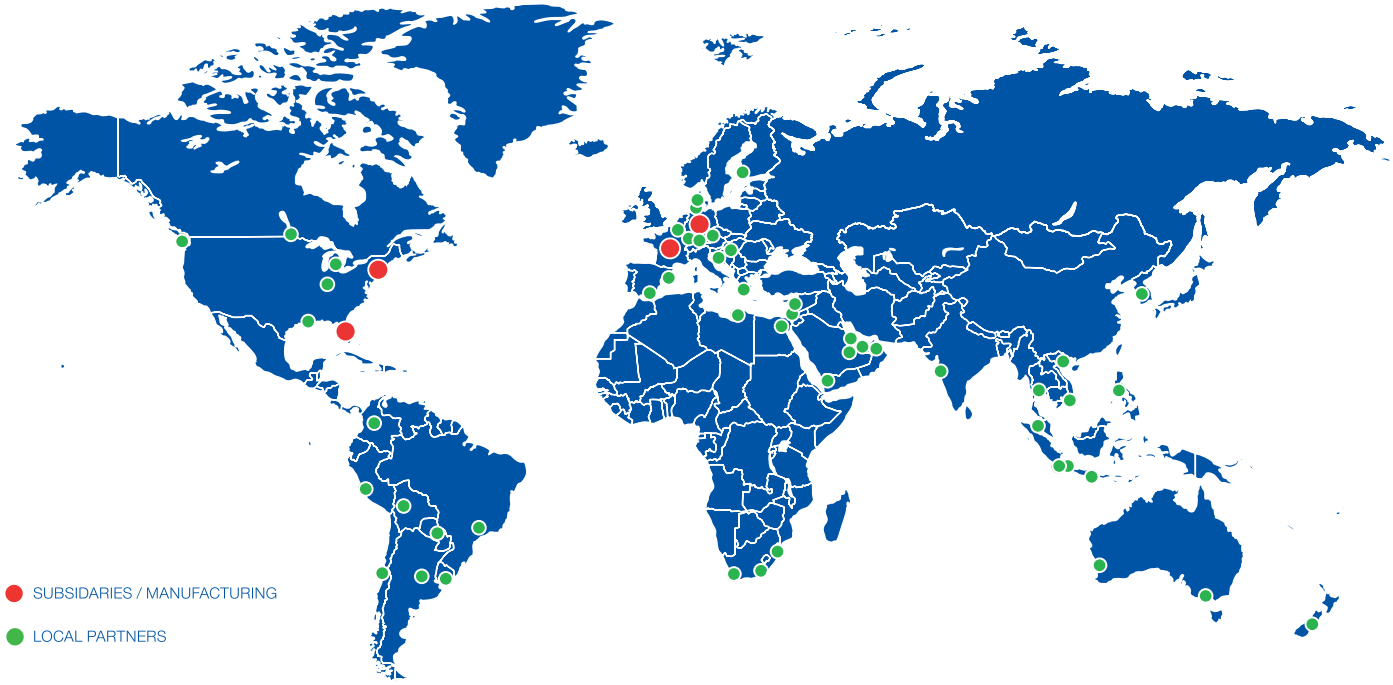

THE RELIABILITY EXPERTS

PLEUGER designs, manufactures and services submersible motors, pumps, thrusters and plunger pumps. Renowned worldwide for absolute reliability and outstanding longevity throughout the energy, mining, water, industrial processing and oil & gas industries.

Our products perform in some of the most challenging and harshest of environments. PLEUGER engineers find solutions to some of the toughest challenges and are trusted across the globe as the reliability experts.

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