DIRECT DRIVE HIGH-EFFICIENCY SOLUTIONS





High-Speed Permanent Magnet Motors and Drives for Aeration Blowers – 0.5 to 1 MW

Efficient air supply is a key component in the aeration processes within wastewater treatment plants. A reliable and well managed supply of quality air is a critical requirement for the aeration diffuser systems, for both municipal and industrial wastewater treatment plants. This is to guarantee the continuity of process operations and clean, uncontaminated discharge into the environment.

Wastewater aeration blowers, which are responsible for the supply of quality and reliable air, are a huge consumer of energy. They are also the leading candidate for cost optimisation and efficiency improvement at the wastewater treatment plant. Careful consideration is required when designing blower technology, including the associated motor and drive components, as it is critical in reducing energy consumption at waste water treatment plants. In a typical biological wastewater treatment plant, the blower system will account for up to 70% of the energy usage.

TPS are experts in the design and manufacture of permanent-magnet motors and drives to suit different types of aeration blower systems. Our permanent magnet technology solutions provide a suite of benefits including improved efficiency, high reliability, reduced Total Cost of Ownership, compact & lightweight design and near silent operation.

Key Technical Features

- ✓ Fully integrated solution includes Motor, Drive, Cooling & Controls
- ✓ Nominal Speed: 16,314 rpm to 17,319 rpm
- ✓ Power: 516 kW to 1041 kW
- ✓ Rated Torque: 406 Nm to 950 Nm
- ✓ Permanent-Magnet Motor
- ✓ Fully packaged High Speed Variable Frequency Drive with switchgear, filters, control and cooling system
- ✓ Oil-free magnetic bearing
- ✓ Capable of supporting high mass impellor ~ 14kg

Key Benefits to Waste Water Treatment Plant Operators

- ✓ Direct-drive system eliminates need for gearbox, improving system reliability, efficiency and noise
- ✓ Variable Speed control with permanent magnet motor enables very high efficiencies, even at part load and speed
- ✓ Frictionless, oil-free bearings enabling exceptionally high motor efficiency
- ✓ Significantly reduced footprint with up to 70% smaller and 90% lighter motor than equivalent geared system
- ✓ Dedicated High Speed Variable Frequency Drive, optimised for target system efficiency and operation
- ✓ Optimised control configuration for motor phasing



Figure 1 – 500 kW Motor System



Figure 2 – 1 MW Motor System







Performance table

MOTOR SPECIFICATION			
	500 kW	1 MW	
Permanent Magnet	Surface mount 4 pole design, 6-phase	Surface mount 4 pole design, 12-phase	
Motor dimensions	913 mm (Length) x 759 mm (Width)	1080 mm (Length) x 759 mm (Width)	
	x 648 mm (Height)	x 648 mm (Height)	
Motor Mass	546 kg	687 kg	
Nominal speed	17,319 rpm	16,314 rpm	
Motor	Water cooling – 18 litre /min	Water cooling – 36 litre /min	
	Pressure – 2-4 Bar (<1Bar differential)	Pressure – 2-4 Bar (<1Bar differential)	
	Rotor air – 50 g/s	Rotor air – 100 g/s	
	Pressure – 50 mbar	Pressure – 50 mbar	
Motor Phases	6	12	
Nominal voltage	380 to 480 V (380V with optional auto-transformer)		
Over-speed capability	6%		
Efficiency	> 94% (at nominal speed and power)		
Control	Speed or Torque		
Safety functions	Overcurrent, Overvoltage, Over-speed, Over-temperature		
Insulation	Class H operated at Class F		
Coupling type	Hirth couplings at both ends		
Bearing type	Magnetic with double-acting thrust bearing		
Ingress Protection rating	IP 54		



VARIABLE FREQUENCY DRIVE (VFD)		
	500 kW	1 MW
Drive dimensions	2404 mm (L) x 779 mm (W) x 1644 mm (H)	4317 mm (L) x 779 mm (W) x 1644 mm (H)
Drive mass	1950 kg	3350 kg
Drive Power Rating	Ave ~ 287 kVA	Ave ~ 533 kVA
	Peak ~ 516 kVA	Peak ~ 1041 kVA
Drive Supply THDi	7 %	2 %
Drive	Water cooling – 36 litre/min,	Water cooling – 72 litre/min,
	Pressure – 2-4 bar (<1Bar differential)	Pressure – 2-4 bar (<1Bar differential)
Drive DC Link Voltage	650 V DC	
Drive Supply Power Factor	~ 0.95	
Drive Rated Motor Phase	Cyclic Operation	
Current	350 A	
Drive Overload Capability	1.05 x rated	
(% Sec)	1.03 X Tated	
Drive Efficiency	96 %	
Ambient Temperature	-20 to +40 °C	
Enclosure Ingress	IP 54	
Protection rating	IF J4	
Temperature	-40°C to +50°C	
Humidity	95% Relative Humidity	

Figure 3 – 500 kW Motor System cross-section layout

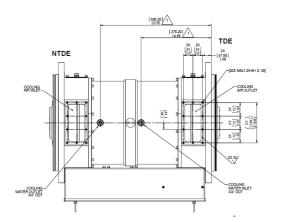
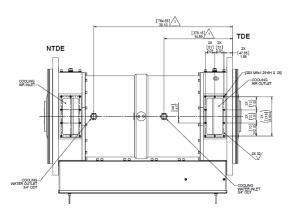


Figure 4 –1 MW Motor System cross-section layout



TPS have the experience and capability to manufacture bespoke high performance permanent-magnet motors and drives to meet your challenging requirements in the wastewater treatment industry. With a proven track record of creating best in class high-speed machines, TPS utilise the latest in magnetic bearing technology to deliver frictionless, oil free and low vibration operation.

We will be happy to discuss your project or enquiries further, please contact our marketing department at marketing@turbopowersystems.com to get in touch or ring us on +44 (0) 191 482 9288/9251/9278.





