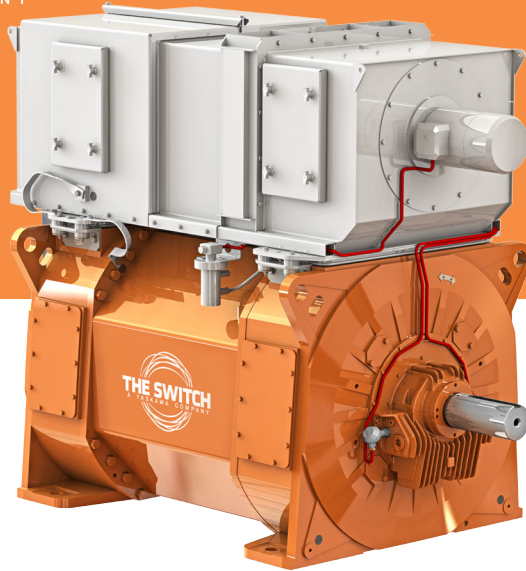




PMM 450 1.6 MW

0 – 2000 rpm



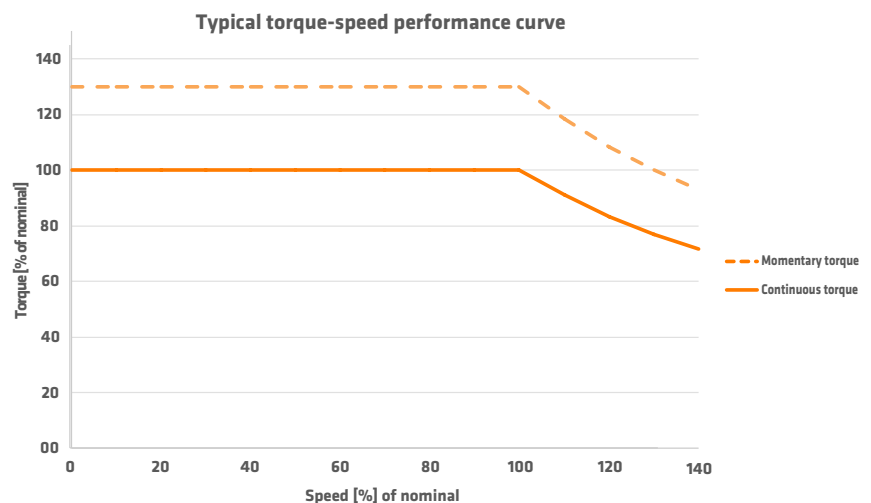
Built for a wide range of rugged marine applications

The Switch PMM is a brushless permanent magnet synchronous machine designed and built according to international standards such as IEC. It can be delivered with various certificates issued by worldwide classification societies, including LR, BV and DNV. The machine is designed for a wide range of marine applications. It can be used either as a generator, for instance, a shaft generator, or as a motor, for example, for the main propulsion.

The Switch PMM can be tailored to meet every customer's special requirements with regards to speed range, cooling, voltage and other specifications. Excellent scalability in axial length results in the widest possible torque range. The production facility for these machines is certified according to ISO 9001 international quality standard.

Operational range

The machine is designed to meet specific operational speed range requirements.



Technical data

	Frame 450-4	Frame 450-5	Frame 450-6	Frame 450-7
Max. continuous torque [kNm]	3.5	4.4	5.3	6.2
Shaft height [mm]	1000			
Speed range [rpm]	1500			
Output power at 1500 rpm [kW] ¹	530	670	810	950
Current at 1500 rpm [A] ²	470	580	710	840
Cos (φ)	0.85			
Efficiency at 1500 rpm [%]	96.8	97	97.2	97.4
Max. momentary torque [% of nominal]	150			
Machine weight [t]	2.45	2.65	2.85	3.05
Rotor weight [t]	0.39	0.45	0.51	0.57
Rotor inertia [kgm ²]	9.7	11.6	13.6	15.6
Protection class ³	IP54			
Cooling type	IC8A6W7 (H)			
Number of poles	4			
Nominal voltage [V] ⁴	690			
Max. ambient temperature [°C]	40			
Max. cooling liquid temperature [°C]	50			
Insulation class ⁵	F			
Thermal class	H			
Cooling fan power, max. [kW]	1.75	1.75	1.75	1.75
Cooling liquid flow rate, max. [m ³ /h] ⁶	2.1	2.5	2.8	3.2

¹Generator mode ²Nominal voltage 690 V ³Higher class optional ⁴Medium voltage optional ⁵H-class optional ⁶For most powerful version

Features	Main benefits	Features
Excitation with Neodymium magnets	<ul style="list-style-type: none"> - Excellent efficiency, especially at part loads - Brushless, no slip rings needed, no wearing parts - No external exciters needed - No automatic voltage regulator (AVR) needed - Low rotor weight and inertia - In generator mode, possible to start from blackout - Very low vibration levels 	Control with frequency converter
Redundancy	<ul style="list-style-type: none"> - At part loads, possibility to use one drive/winding system to increase efficiency and reduce fuel use 	Form-wound, mica-insulated winding impregnated with global VPI
Protection class IP54	<ul style="list-style-type: none"> - Closed system, no external particles or dirt can enter the machine 	Flexible design Bearing/shaft connection

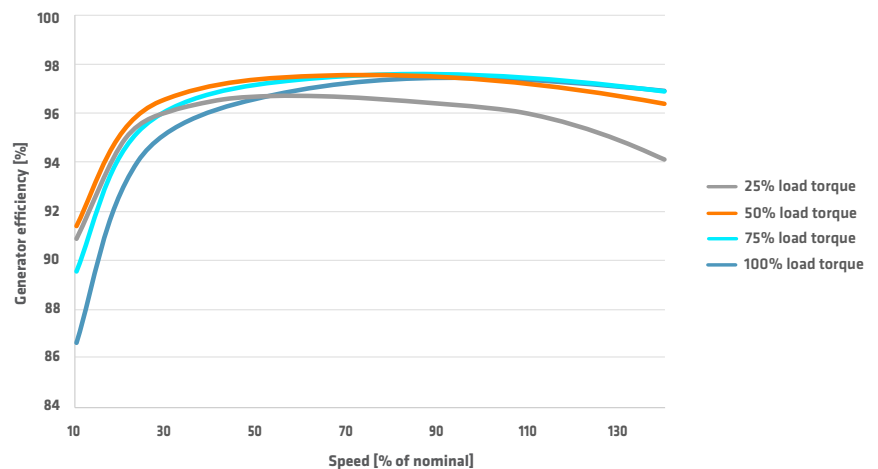
Frame 450-7	Frame 450-8	Frame 450-9	Frame 450-10	Frame 450-11	Frame 450-12
6.1	7	7.9	8.8	9.6	10.5
450					
0 ... 2000					
930	1070	1210	1350	1470	1610
820	940	1070	1190	1290	1420
0.95					
97.3	97.3	97.4	97.4	97.5	97.5
130					
3.05	3.25	3.45	3.65	3.85	4.05
0.57	0.63	0.69	0.75	0.81	0.87
15.6	17.5	19.5	21.5	23.5	25.4
IP54					
Forced air-cooling with external air-to-liquid heat-exchanger)					
6					
450/500/690					
45					
38					
F					
B					
1.75	3.5	3.5	3.5	3.5	3.5
3.2	3.6	3.9	4.3	4.6	5.0

Main benefits

- Variable speed operation, decouples the machine rotation speed from grid's voltage and frequency
- Maximized system efficiency
- In shaft generator applications, both PTI and PTO modes available
- Full torque available starting from zero speed
- Momentary overloading for clearing ice loads, foreign parts on propeller or other
- Best possible protection against mechanical vibrations, chemical corrosion and electrical surges
- Proven technology
- Easily scalable up to medium voltages
- Modular design allows customization
- Adjustable mechanical interfaces
- Complete machine includes shaft and bearings

Typical efficiencies of The Switch PMM at various speeds and load levels

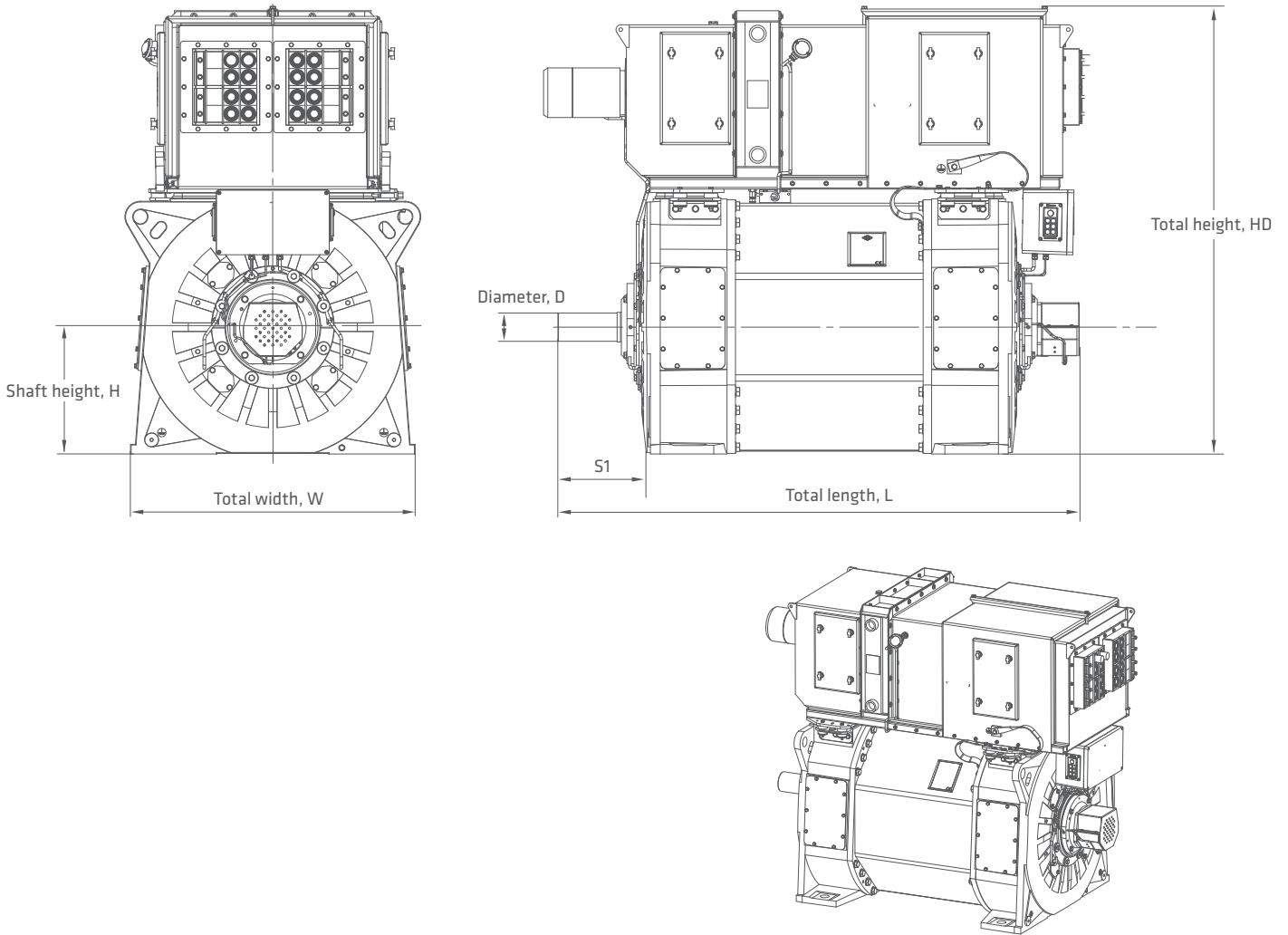
This chart illustrates typical efficiencies vs speed at different loading levels, which also takes the external cooling fan power consumption into account.



Exact efficiency value depends on the nominal speed of the application.

Technical drawings

Interface dimensions can be tailored according to customer specifications.



Machine dimensions	w	L	HD	H	S1	D
Frame 450-4	1010	1508	1588	450	328	100 m6
Frame 450-5		1568				
Frame 450-6		1628				
Frame 450-7		1688				
Frame 450-8		1748				
Frame 450-9		1808				
Frame 450-10		1868				
Frame 450-11		1928				
Frame 450-12		1988				
Frame 450-13		2048				
Frame 450-14		2108				
Frame 450-15	2168					