



## High-Speed Permanent Magnet (PM) Motor with Variable Frequency Drive (VFD) for HVAC&R

**Refrigeration tonnage: 60RT to 750RT – Motor power range: 37 kW to 550 kW**

Within the past few decades, there has been a growing concern among business and building owners when it comes to energy costs and carbon emissions. Moreover, there is an increasing need for Heating, Ventilation, Air-Conditioning and Refrigeration (HVAC&R) manufacturers to comply with EU Regulations for energy efficiency and CO<sub>2</sub> emissions. This has determined HVAC&R businesses to focus more and more on energy-saving technologies and on lowering their carbon footprint. PM Motor and VFD technologies have gained ground in different industrial applications, including HVAC&R, due to their ability to achieve significant reductions in energy consumption and enhanced efficiency.

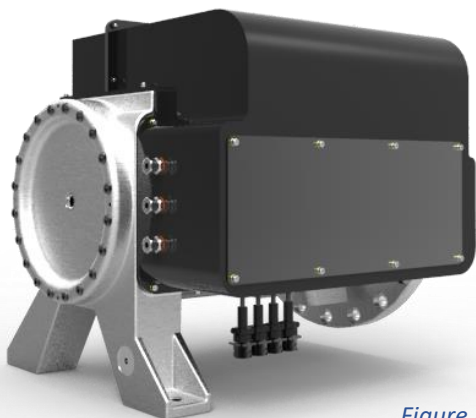
TPS have developed a series of bespoke High-Speed Permanent Magnet (HSPM) motors & with both standalone and integrated Variable Frequency Drives (VFD), for inclusion with Air Conditioning Compressors of different chiller capacities. TPS' PM technology solutions provide a suite of benefits including improved efficiency, compact & lightweight design and increased reliability to reduce Total Cost of Ownership. TPS is your one-stop shop for motor, converter and control system integrator.

### Key Technical Features

- ✓ Nominal Cooling Capacity – 60 T to 750 T
- ✓ Standalone PM motor & VFD with Integrated packages available
- ✓ Rated Speed: 10,290 rpm to 32,550 rpm
- ✓ Motor Rated Power: 37 kW to 550 kW
- ✓ Rated Torque: 11 Nm to 375 Nm
- ✓ Permanent-Magnet Motor technology
- ✓ Designed for optimum part load performance
- ✓ Direct coupling to HVAC&R compressor
- ✓ Oil-free active magnetic bearings
- ✓ Motor and VFD cooled using low GWP refrigerant

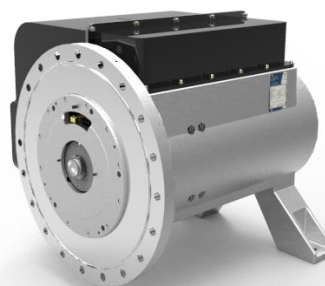
### Key Benefits to Heating, Ventilation & Air Conditioning systems

- ✓ Low energy costs due to high efficiency
- ✓ Flexibility - Standalone or integrated motor-drive systems
- ✓ Space saving - Significantly reduced footprint due to innovative design: direct-drive system eliminates need for gearing in the compressor drive train and improves system reliability
- ✓ High-performance solution with optimum design to suit customers' needs
- ✓ Reduced audible noise due to frictionless operation.
- ✓ Best choice of control topology – current source or voltage source inverters for best system performance
- ✓ Low supply harmonic option available
- ✓ Contaminant free, hermetically sealed motor for long lifetime
- ✓ Low lifecycle cost and reduced maintenance

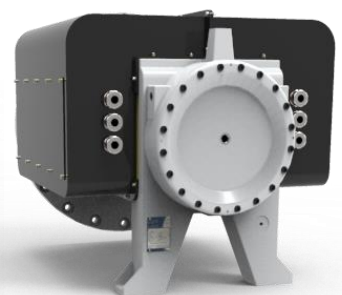


*Figure A*

*Figures A, B, C:  
Motor with  
integrated VFD*



*Figure B*



*Figure C*

## Performance table

	Motor with integrated VFD			Standalone motor and VFD	
<i>Motor specification</i>	Example Var. 1	Example Var. 2	Example Var. 3	Example Var. 1	Example Var. 2
Voltage	Able to Operate at both 380V and 480V supply voltage			Able to Operate at both 380V and 480V supply voltage	
Nominal Cooling Capacity	60RT - 100RT	150RT - 250RT	300RT - 600RT	450 – 550 RT	650 - 750 RT
Motor and Bearing type	Permanent magnet motor with active magnetic bearing with thrust and radial control			PM motor with active magnetic bearing with thrust and radial control	
Motor Phases	3-phase	3-phase	6-phase	3-phase	6-phase
Rated Power	37 - 61 kW	90 - 149 kW	179 - 355 kW	350 - 450 kW	475 - 550 kW
Machine rated speed	32,550 - 25,200 rpm	20,628 - 15,976 rpm	14,595 - 10,290 rpm	14,000 – 18,000 rpm	14,000 – 18,000 rpm
Overspeed Rating	39,060 rpm	24,755 rpm	17,514 rpm	10%	10%
Rated Torque	11 - 23 Nm	42 - 89 Nm	117 - 329 Nm	Up to 300 Nm	Up to 375 Nm
Motor Efficiency at rated load	95.6%	97.0%	97.2%	97.6 %	98 %
Cooling	Low GWP refrigerant			Low GWP refrigerant	
Motor dimensions (mm)	730 x 642 x 679 mm (L x H x W)	770 x 642 x 679 mm (L x H x W)	905 x 860 x 850 mm (L x H x W)	Available upon request	
Motor weight	317 kg	333 kg	619 kg		
Insulation	Class H (180°C)			Class H (180°C)	
<i>Variable Frequency Drive (VFD)</i>	Example Var. 1	Example Var. 2	Example Var. 3	Example Var. 1	Example Var. 2
Drive Rated Power	64 kW	156 kW	186 kW - 365 kW	361 - 464 kW	490 - 567 kW
Supply Power Factor	Standard > 0.91			Standard > 0.91	
Drive Overload Capability (% Sec)	110% - 1 minute 125% - 3 seconds			110% - 1 minute 125% - 3 seconds	
VFD Efficiency at rated load	97.9%	97.8%	98.2%	96%	96%
Drive dimensions (mm)	VFD integrated with motor – no additional space required, making it compact			Available upon request	
Drive weight (kg)					
Control	Speed, Voltage or Current			Speed, Voltage or Current	
Safety functions	Overcurrent, Overvoltage, Over-speed, Over-temperature			Overcurrent, Overvoltage, Over-speed, Over-temperature	
Drive Supply THDi	Standard - 40% Maximum			Standard - 40% Maximum	
Temperature	-20°C to +60°C			0°C to +45°C	
Relative Humidity	95% Non-condensing			95% Non-condensing	

TPS' range of PM motors and VFDs designed for HVAC&R applications are built to meet UL & EN standards requirements.

With a proven pedigree in the development of high speed PM electrical machines and integrated drives to meet your challenging requirements in the HVAC&R 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](mailto:marketing@turbopowersystems.com) to get in touch or ring us on +44 (0) 191 482 9288/9251/9278.



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