

Data Sheet

# EM-PME375-T200

Electric machine, permanent magnet external

## FEATURES

- Synchronous Reluctance assisted Permanent Magnet (SRPM) technology
- Extremely compact and robust structure
- Highest efficiency throughout the operation range on the market (~96 %)
- Liquid cooled with plain water or water/glycol mixture
- Low coolant flow required
- Allowed coolant temperature up to +65°C
- Up to IP65 enclosure class to maximize reliability
- Multiple mounting possibilities

## GENERATOR SPECIFIC FEATURES

- Standard SAE flange mounting to match the diesel engine connection
- Wide selection of speed ratings allowing the generator to be selected to customer specific applications with various voltage requirements
- Can be also used as starter motor for the ICE

## MOTOR SPECIFIC FEATURES

- Extended speed and torque capabilities compared to standard PM motors from Danfoss reluctance assisted permanent magnet motor technology
- Motor structure is designed to be able to produce high starting torque: EM-PME motor can produce instantly full torque to a non-rotating shaft
- Optimized speed range to meet the most common gear ratios used in heavy mobile machinery



## GENERAL

The machine is developed especially for demanding applications. The design of these machines makes them smaller, lighter and more efficient than conventional products on the market.

The machine is designed to be shorter than normal motors for applications where axial length is crucial parameter. The machine is designed to be connected directly to the ICE flywheel housing with part of the motor being inside the flywheel housing further shortening the length of the motor.

## TYPICAL APPLICATIONS

- Generator for diesel-electric/serial hybrid applications
- Traction/propulsion motor
- Generator/Motor for parallel hybrid applications

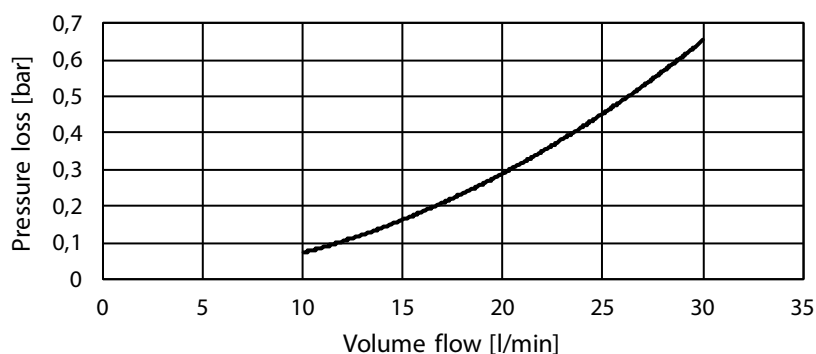
## SPECIFICATIONS

General electrical properties		Cooling method (IEC 60034-6)	IC 71 W
Nominal voltage (line to line)	500 V <sub>AC</sub>	Minimum cooling liquid flow	20 l/min
Voltage stress	IEC 60034-25, Curve A: Without filters for motors up to 500 V <sub>AC</sub>	Pressure loss	0.3 bar with 20 l/min (+25°C coolant)
Nominal efficiency	96 %	Cooling liquid temperature max	+65°C (Derating required if exceeded)
Pole pair number	10	Temperature rating	
Power supply	Inverter fed.	Insulation class (IEC 60034-1)	H (180°C)
Minimum inverter switching frequency	8 kHz	Temperature rise (IEC 60034-1)	85°C
Basic information		Maximum winding temperature	150°C
Machine type	Synchronous reluctance assisted permanent magnet	Nominal ambient temperature (IEC 60034-1)	65°C
Mounting direction	Can be used in any direction, see user guide for details.	Min. ambient temperature	-40°C
Mounting (IEC 60034-7)	IM 3001 (Flange)	Nominal altitude (IEC 60034-1)	1000 m
Standard Flange D-end (SAE J617)	SAE 3, transmission housing	Connections	
Standard Flange N-end	SAE 3, flywheel housing	Coolant connection	2 x G1/2 bores
Standard rotation direction	Clockwise (both directions possible)	HV cables	3 x 50 mm <sup>2</sup> max.
Protection class (IEC 60034-5)	Up to IP65	Cable direction	Cable direction radial with straight connector and towards N-end with standard angle connector
Duty type (IEC 60034-1)	S9	HV cable connector	3x AMPHENOL HVBI005R10AMHARD
Standard color	Dark grey RAL7024 powder coating	HV cable mating connector	3 x AMPHENOL HVBI-7-05R10-XFC-XXXX-FG/PC (straight plug) 3x AMPHENOL HVBI-9-05R10-XFC-XXXX-FG/PC (right angle plug) (check the exact codes form connector manufacturer)
Mechanical		HV cable	Recommended H+S Radox screened cable
Total weight	85 kg (no options)	LV connector	12 pin TE HDSCS
Moment of inertia	0.77 kgm <sup>2</sup>	LV connector type	TE 1-1564520-1
Rotating mass	27 kg	LV connector pin type	Gold plated
Dimensions		LV mating connector type	TE 1-1703639-1
Length (frame)	66 mm	LV mating connector pin type	TE 1241380-2 (Gold plated)
Diameter (frame)	451 mm	LV connector pin configuration	See Table below
Total length (frame + shaft)	215.6 mm		
Cooling			
Cooling liquid	Plain water with appropriate corrosive inhibitor (max. 50 % corrosive inhibitor)		
Cooling liquid corrosive inhibitor type	Ethylene glycol Glysantin G48 recommended		

PIN	Description
1	Resolver, RES_COSN
2	Resolver, RES_SINN
3	Resolver, EXCN
4	Temperature, PT100, windings
5	Temperature, PT100, windings
6	Temperature, PT100, windings
7	Resolver, RES_COSP
8	Resolver, RES_SINP
9	Resolver, EXCP
10	Temperature, PT100, windings GND
11	Temperature, PT100, windings GND
12	Temperature, PT100, windings GND

Table 1 Pin configuration of LV-connector

PRESSURE LOSS VS COOLANT FLOW



Picture 1 Pressure loss vs coolant flow

MOTORS

Type	Coolant temperature +65°C			Coolant temperature +40°C			Coolant temperature +40 / +65°C		
	Cont. Torque [Nm]	Cont. Power [kW]	Nom. Current [A]	Cont. Torque [Nm]	Cont. Power [kW]	Nom. Current [A]	Nom. speed [rpm]	Max. speed [rpm]	Peak torque [Nm]
EM-PME375-T200-1500	191	30	37.5	191	30	38	1500	3000	800
EM-PME375-T200-1800	180	36	45	210	40	53	1800	3600	800
EM-PME375-T200-2300	184	48	60	208	50	68	2300	4000	800
EM-PME375-T200-2600	172	50	63	200	54	73	2600	4000	800

(\* Peak torque achieved with one (350A) inverter

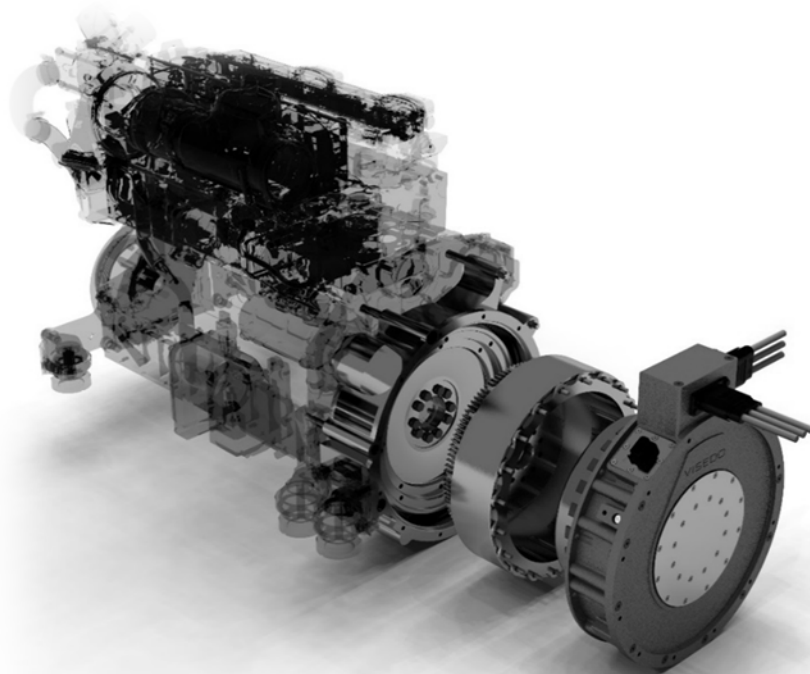
(\*\* Peak torque achieved with two (350A) inverter

GENERATORS

Type	Coolant temperature +65°C			Coolant temperature +40°C			Coolant temperature +40 / +65°C			
	Apparent power [kVA]	Cont. power [kW]	Nom. Current [A]	Apparent power [kVA]	Cont. Power [kW]	Nom. Current [A]	Nom. speed [rpm]	Nom. Freq. [Hz]	Power factor	Volt/ speed ratio [V/rpm]
EM-PME375-T200-1500	32	31	36.5	31	31	36	1575	262.5	0.99	0.367
EM-PME375-T200-1800	38	37	44	44	42	51	1890	315.0	0.96	0.298
EM-PME375-T200-2300	50	49	58	57	55	65	2415	402.5	0.96	0.229
EM-PME375-T200-2600	53	52	62	61	58	71	2739	456.5	0.95	0.206

(\*\*\* Back EMF for cold (20°C) generator

Integrated machine is commonly connected directly to the diesel engine flywheel housing. In such application, part of the motor is inside the diesel engine. Exploded view of this kind of application is shown below.



Picture 2 Integrated machine connected to diesel engine flywheel housing

PRODUCT CODE AND OPTIONS

Use product code including all needed options for ordering. Standard options do not need to be listed in the code as they are selected by default if a non-standard option is not selected. Standard options are indicated by a star (\*).

Product code	Description
EM-PME375-T200-1800	Standard unit with standard options
EM-PME375-T200-1800+RES1	Standard unit otherwise but with resolver angle sensor

Table 2 Product code examples

Variant	Code	Description	Additional information
High voltage connector	*	High voltage plug-in connectors for 50 mm <sup>2</sup> cables	One plug-in connector per phase for 50 mm <sup>2</sup> cable
	+HVC1	High voltage plug-in connectors for 35 mm <sup>2</sup> cables	One plug-in connector per phase for 35 mm <sup>2</sup> cable
Rotation sensor	*	None	No resolver
	+RES1	Resolver	In-built non contacting resolver, 5-pole pair

\*Standard option

Table 3 Option list

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