

## Data Sheet

# EM-PME375-T150

## 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 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 also be 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. It is 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 a 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	
Nominal voltage (line-to-line)	500 V <sub>AC</sub>
Voltage stress	IEC 60034-25:2009, Curve A: Without filters for motors up to 500 V <sub>AC</sub>
Nominal efficiency	96 %
Pole pair number	10
Power supply	Inverter fed
Minimum inverter switching frequency	8 kHz
Maximum phase-to-phase peak-to-peak voltage without du/dt	1.5 kV
Maximum voltage rise time without du/dt	8 kV/μs

Basic information	
Machine type	Synchronous reluctance assisted permanent magnet
Mounting direction	Can be used in any direction (see user guide for details)
Mounting (IEC 60034-7)	IM 3001 (flange)
Standard flange D-end (SAE J617)	SAE 3 transmission housing
Standard flange N-end (SAE J617)	SAE 3 flywheel housing
Standard rotation direction	Clockwise (both directions possible)
Protection class	Up to IP65
Duty type (IEC 60034-1)	S9
Standard color	Dark grey RAL7024

Mechanical	
Total weight	75 kg (no options)
Moment of inertia	0.63 kgm <sup>2</sup>
Rotating mass	23 kg

Dimensions	
Length (frame)	66 mm
Diameter (frame)	451 mm
Total length (frame + shaft)	195.6 mm

Cooling	
Cooling liquid	Plain water with appropriate corrosive inhibitor (max. 50 % corrosive inhibitor)
Cooling liquid corrosive inhibitor type	Ethylene glycol (Glysantin G48 recommended)
Cooling method (IEC 60034-6)	IC 71 W
Minimum cooling liquid flow	20 l/min
Pressure loss	0.3 bar with 20 l/min (+25°C coolant)
Minimum cooling liquid temperature	-20°C
Maximum cooling liquid temperature	+65°C (derating required if exceeded)

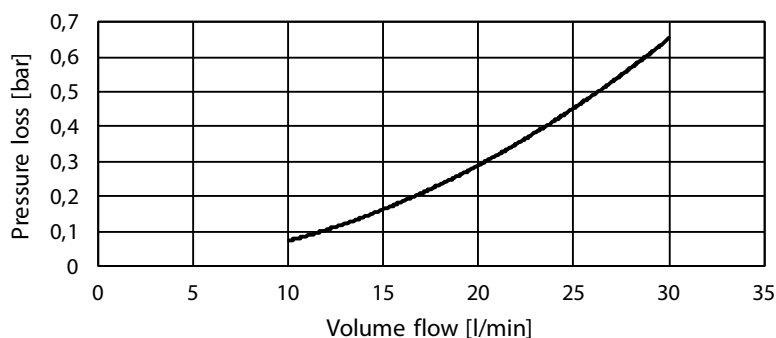
Temperature rating	
Insulation class (IEC 60034-1)	H (+180°C)
Temperature rise (IEC 60034-1)	+85°C
Maximum winding temperature	+150°C
Nominal ambient temperature (IEC 60034-1)	+65°C
Min. ambient temperature	-40°C
Nominal altitude (IEC 60034-1)	1000 m

Connections	
Coolant connection	2 x G1/2 bores (see dimension drawing for details)
HV cables	3 x 50 mm <sup>2</sup> max.
HV cable recommended type	HUBER+SUHNER Radox Elastomer S, screened, single core, automotive cable (FHLR4GC13X) <a href="http://www.hubersuhner.com">www.hubersuhner.com</a>
Cable direction	Cable direction radial with straight connector and towards N-end with standard angle connector
HV cable connector	3 x AMPHENOL HVBI005R10AMHARD <a href="https://www.amphenolpcd.com">https://www.amphenolpcd.com</a>
HV mating connector type	3 x AMPHENOL HVBI-7-05R10-XFC-XXXX-FG/PC (straight plug) 3 x AMPHENOL HVBI-9-05R10-XFC-XXXX-FG/PC (right angle plug) (check the exact codes with the connector manufacturer)
LV connector	12 pin TE HDSCS <a href="https://www.te.com">https://www.te.com</a>
LV connector type	TE 1-1564520-1
LV connector pin type	Gold plated
LV mating connector type	TE 1-1703639-1
LV mating connector pin type	TE 1241380-2 (gold plated)
LV connector pin configuration	See table below

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] (b)	Peak torque [Nm] (a)
EM-PME375-T150-1500	160	25	33	191	30	40	1500	3000	600
EM-PME375-T150-1800	167	31	40	179	33	45	1800	3600	600
EM-PME375-T150-2600	147	40	50	164	45	60	2600	4000	600

(a) Peak torque achieved with one 350A inverter

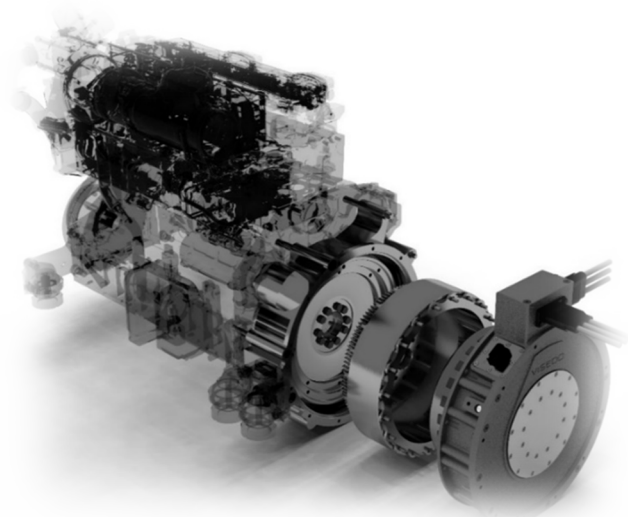
(b) Mechanical maximum speed

## 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 <sub>AC</sub> /rpm] (c)
EM-PME375-T150-1500	27	26	32	33	32	39	1575	263	0.99	0.340
EM-PME375-T150-1800	34	33	39	38	36	44	1890	315	0.97	0.291
EM-PME375-T150-2600	42	41	49	50	48	59	2730	455	0.99	0.194

(c) 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.



## PRODUCT CODE AND OPTIONS

Use product code including all needed options for ordering. Standard options are not given with 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-T150-1500	Standard unit with standard options
EM-PME375-T150-1500+RES1	Standard unit otherwise but with resolver angle sensor

Table 2 Product code examples

Variant	Code	Description	Additional information
Rotation sensor	*	None	No resolver
	+RES1	Resolver	Inbuilt non-contacting resolver, 5-pole pair

(\* Standard option)

Table 3 Option list

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