

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 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 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, 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

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	85 kg (no options)
Moment of inertia	0.77 kgm <sup>2</sup>
Rotating mass	27 kg

Dimensions	
Length (frame)	66 mm
Diameter (frame)	451 mm
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)
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)

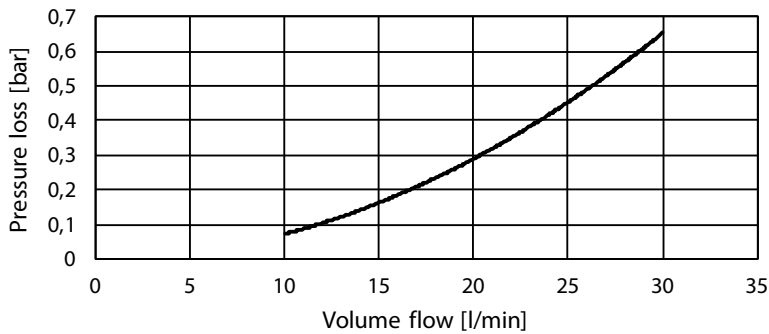
Temperature rating	
Insulation class (IEC 60034-1)	H (+180°C)
Temperature rise (IEC 60034-1)	+85°C
Maximum winding temperature	+150°C
Nominal ambient temperature (IEC 60034-1)	+65°C
Min. ambient temperature	-40°C
Nominal altitude (IEC 60034-1)	1000 m

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] (**)	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

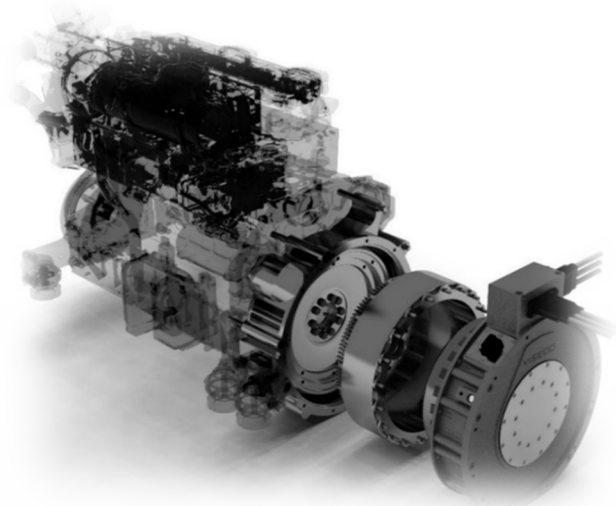
(\*\*) Mechanical maximum speed

### 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] (*)
EM-PME375-T200-1500	32	31	36.5	31	31	36	1575	262.5	0.99	0.345
EM-PME375-T200-1800	38	37	44	44	42	51	1890	315.0	0.96	0.283
EM-PME375-T200-2300	50	49	58	57	55	65	2415	402.5	0.96	0.216
EM-PME375-T200-2600	53	52	62	61	58	71	2739	456.5	0.95	0.194

(\*) 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-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

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.