

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 _{AC} |
| Voltage stress | IEC 60034-25, Curve A: Without filters for motors up to 500 V _{AC} |
| 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 | 75 kg (no options) |
| Moment of inertia | 0.63 kgm ² |
| 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) |

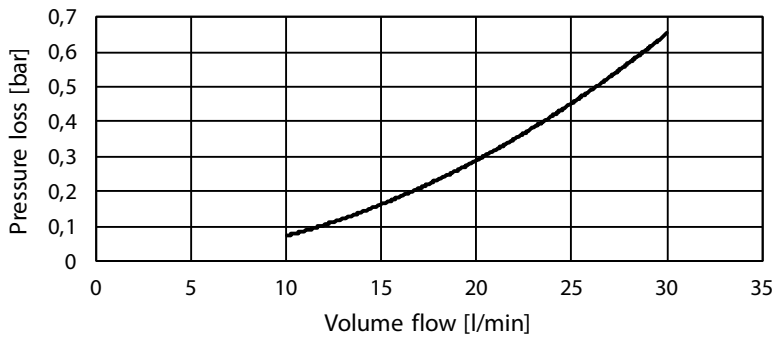
| Temperature rating | |
|---|------------|
| Insulation class (IEC 60034-1) | H (+180°C) |
| Temperature rise (IEC 60034-1) | +85°C |
| Maximum winding temperature | +150°C |
| Nominal ambient temperature (IEC 60034-1) | +65°C |
| Min. ambient temperature | -40°C |
| Nominal altitude (IEC 60034-1) |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

| Connections | |
|--------------------------------|--|
| Coolant connection | 2 x G1/2 bores (see dimension drawing for details) |
| HV cables | 3 x 50 mm ² max. |
| HV cable recommended type | HUBER+SUHNER Radox Elastomer S, screened, single core, automotive cable (FHLR4GC13X) www.hubersuhner.com |
| Cable direction | Cable direction radial with straight connector and towards N-end with standard angle connector |
| HV cable connector | 3 x AMPHENOL HVBI005R10AMHARD https://www.amphenolpcd.com |
| 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 https://www.te.com |
| 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-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 |

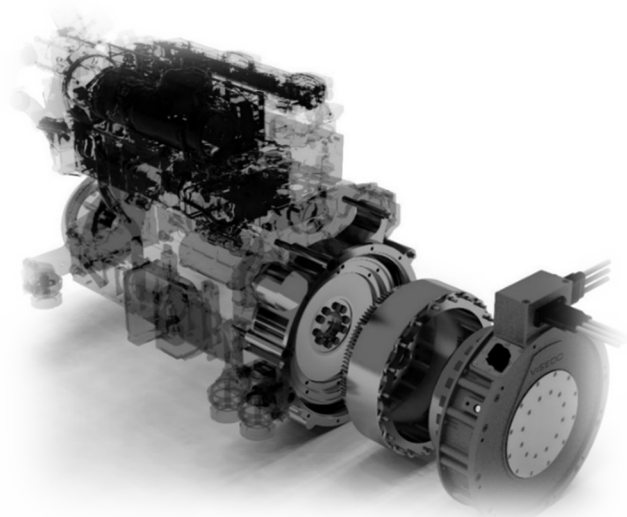
(*) Peak torque achieved with one 350A inverter
(**) Mechanical maximum speed

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 _{AC} /rpm] (*) |
| 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 |

(*) 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 |
|------------------------|-------|---|--|
| High voltage connector | * | High voltage plug-in connectors for 50 mm ² cables | One plug-in connector per phase for 50 mm ² cable |
| | +HVC1 | High voltage plug-in connectors for 35 mm ² cables | One plug-in connector per phase for 35 mm ² 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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