



THREE-PHASE SYNCHRONOUS GENERATOR

TCU168D

Datasheet For 4 Poles - 50Hz @ 1500rpm / 60Hz @ 1800rpm

| | | | | | |
|---------------------|------------|------------------|---------------|---|-------------------|
| Ambient Temperature | 40 °C | Excitation | Brushless | Short Circuit Current Capacity (with PMG) | ≥300% |
| Temperature Rise | 125 °C | Winding Pitch | 2 / 3 | Method of Cooling | IC01 |
| Service Duty | Continuous | Power Factor | 0.8 | Direction of Rotation | Counter-clockwise |
| Phase | 3 | Insulation Class | Class H | Maximum Over-speed | 2250 rpm |
| Pole | 4 | Waveform : TIF | <50 | Degree of Protection | IP21 |
| Voltage Regulation | +/- 0.5% | Waveform : THF | <2% | Radio interference | Class B Group 1 |
| AVR Model | ETC-A1 | Altitude | ≤1000 m.a.s.l | Total Harmonic Content | < 3% - At no load |

Electrical and Mechanical Characteristic

| Frequency | Hz | 50 | | | 60 | | | | |
|--|------|------|-------------|------|------|------|------|------|------|
| | | 1500 | | | 1800 | | | | |
| Round per minute | rpm | | | | | | | | |
| Voltage (Y Connection) - Series Star | V | 380 | 400 | 415 | 380 | 416 | 440 | 460 | 480 |
| Voltage (YY Connection) - Parallel Star | V | 190 | 200 | 208 | 190 | 208 | 220 | 230 | 240 |
| Voltage (Δ Connection) - Series Delta | V | 220 | 230 | 240 | 220 | 240 | 254 | 266 | 277 |
| Voltage (ΔΔ Connection) - Parallel Delta | V | 110 | 115 | 120 | 110 | 120 | 127 | 133 | 138 |
| Rated power at Class H (125 °C) temperature rise | kVA | 15.0 | 16.3 | 15.6 | 15.0 | 16.9 | 17.5 | 18.8 | 20.0 |
| | kW | 12 | 13 | 12.5 | 12 | 13.5 | 14 | 15 | 16 |
| Efficiency at Class H (P.F.=0.8) | 4/4% | 81.5 | 81.8 | 81.9 | 81.1 | 81.2 | 81.4 | 81.6 | 81.8 |
| | 3/4% | 82.7 | 83 | 83.1 | 82.8 | 82.9 | 83.1 | 83.3 | 83.5 |
| | 2/4% | 82.5 | 82.8 | 82.9 | 82.4 | 82.5 | 82.7 | 82.9 | 83.1 |
| Efficiency at Class H (P.F.=1.0) | 4/4% | 85.0 | 85.3 | 85.4 | 85.4 | 85.5 | 85.7 | 85.9 | 86.1 |
| | 3/4% | 86.5 | 86.8 | 86.9 | 87.3 | 87.4 | 87.6 | 87.8 | 88 |
| | 2/4% | 86.2 | 86.5 | 86.6 | 86.9 | 87.0 | 87.2 | 87.4 | 87.6 |

Reactance (%) at Class H

| | Kcc | 0.3940 | 0.4030 | 0.4510 | 0.3300 | 0.3500 | 0.3770 | 0.3840 | 0.3930 |
|---|------------------|--------|---------------|--------|--------|--------|--------|--------|--------|
| Short-circuit ratio | | | | | | | | | |
| Direct axis synchronous reactance unsaturated | X _d | 2.5405 | 2.4839 | 2.2188 | 3.0484 | 2.8596 | 2.6527 | 2.6024 | 2.5476 |
| Quadrature axis synchronous reactance unsaturated | X _q | 1.5062 | 1.4726 | 1.3155 | 1.8073 | 1.6954 | 1.5727 | 1.5429 | 1.5104 |
| Direct axis transient reactance saturated | X' _d | 0.1484 | 0.1451 | 0.1297 | 0.1781 | 0.1671 | 0.1550 | 0.1521 | 0.1489 |
| Direct axis subtransient reactance saturated | X'' _d | 0.1424 | 0.1392 | 0.1244 | 0.1709 | 0.1603 | 0.1487 | 0.1459 | 0.1428 |
| Quadrature axis subtransient reactance saturated | X'' _q | 0.1786 | 0.1746 | 0.1560 | 0.2143 | 0.2011 | 0.1865 | 0.1830 | 0.1791 |
| Zero sequence reactance unsaturated | X ₀ | 0.0447 | 0.0437 | 0.0390 | 0.0536 | 0.0503 | 0.0466 | 0.0457 | 0.0448 |
| Leakage reactance | X _L | 0.1147 | 0.1121 | 0.1001 | 0.1376 | 0.1291 | 0.1197 | 0.1174 | 0.1150 |
| Negative sequence reactance saturated | X ₂ | 0.1605 | 0.1569 | 0.1402 | 0.1926 | 0.1807 | 0.1676 | 0.1644 | 0.1610 |

| | | | | | | | | | |
|--|---------------------|-------|--|--|---------|--|--|--|--|
| Open circuit time constant (sec.) | T' _{do} | | | | 0.3110 | | | | |
| Short-circuit transient time constant (sec.) | T' _d | | | | 0.0160 | | | | |
| Subtransient time constant (sec.) | T'' _d | | | | 0.0090 | | | | |
| Armature time constant (sec.) | T _α | | | | 0.0068 | | | | |
| No load excitation current | io(A) | 0.5 | | | 0.5 | | | | |
| Full load excitation current | ic(A) | 1.8 | | | 1.7 | | | | |
| Full load excitation voltage | uc(V) | 45 | | | 44 | | | | |
| Stator Winding Resistance (20°C) | ohm | | | | 0.7675 | | | | |
| Rotor Winding Resistance (20°C) | ohm | | | | 0.5779 | | | | |
| Exciter Stator Resistance (20°C) | ohm | | | | 21.6 | | | | |
| Exciter Rotor Phase resistance | ohm | | | | 0.04131 | | | | |
| Cooling air requirement | m ³ /sec | 0.071 | | | 0.09 | | | | |

| Configuration | Single Bearing | Double Bearing |
|-------------------------------------|--|--|
| Type of Construction | B2 - SAE | IM B34 |
| Inertia (J) [kgm ²] | 0.115 | 0.135 |
| Total Weight | 110 | 113 |
| Drive end bearing / Lubrication | Not supply | 6309 C3-2Z / Prelubricated - sealed for life |
| Non-drive end bearing / Lubrication | 6306 C3-2Z / Prelubricated - sealed for life | |
| Recovery time - sec. | 0.5 | |
| Stator winding | DOUBLE LAYER CONCENTRIC | |
| Number of Terminal | 12 | |
| Rotor | with damping cage | |
| Overload | 110% rated load for 1 hour | |

STANDARD COMPLIANCE - IEC 60034-1; CEI 2-3; BS 4999-5000; VDE 0530; NF 51-100,111; OVE M-10, NEMA MG 1.22.

Data and Technical Specification are subject to change in order to update or improve the products, without prior notice