



THREE-PHASE SYNCHRONOUS GENERATOR

TCU168A

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 | 8.0 | 8.5 | 8.1 | 8.0 | 8.8 | 9.3 | 9.8 | 10.0 |
| | kW | 6.4 | 6.8 | 6.5 | 6.4 | 7 | 7.4 | 7.8 | 8 |
| Efficiency at Class H (P.F.=0.8) | 4/4% | 76.2 | 76.6 | 76.8 | 75.7 | 75.8 | 76.0 | 76.2 | 76.4 |
| | 3/4% | 77.5 | 77.9 | 78.1 | 77.2 | 77.3 | 77.5 | 77.7 | 77.9 |
| | 2/4% | 76.9 | 77.3 | 77.5 | 76.7 | 76.8 | 77.0 | 77.2 | 77.4 |
| Efficiency at Class H (P.F.=1.0) | 4/4% | 79.7 | 80.1 | 80.3 | 79.6 | 79.7 | 79.9 | 80.1 | 80.3 |
| | 3/4% | 81.1 | 81.5 | 81.7 | 81.2 | 81.3 | 81.5 | 81.7 | 81.9 |
| | 2/4% | 80.9 | 81.3 | 81.5 | 81.1 | 81.2 | 81.4 | 81.6 | 81.8 |

Reactance (%) at Class H

| | Kcc | 0.4600 | 0.4800 | 0.5400 | 0.3800 | 0.4200 | 0.4400 | 0.4600 | 0.4900 |
|---|------------------|--------|---------------|--------|--------|--------|--------|--------|--------|
| Short-circuit ratio | | | | | | | | | |
| Direct axis synchronous reactance unsaturated | X _d | 2.1733 | 2.0840 | 1.8506 | 2.6077 | 2.3783 | 2.2489 | 2.1705 | 2.0431 |
| Quadrature axis synchronous reactance unsaturated | X _q | 1.3132 | 1.2593 | 1.1183 | 1.5758 | 1.4371 | 1.3590 | 1.3116 | 1.2346 |
| Direct axis transient reactance saturated | X' _d | 0.1614 | 0.1548 | 0.1374 | 0.1937 | 0.1766 | 0.1670 | 0.1612 | 0.1517 |
| Direct axis subtransient reactance saturated | X'' _d | 0.1548 | 0.1484 | 0.1318 | 0.1857 | 0.1694 | 0.1601 | 0.1546 | 0.1455 |
| Quadrature axis subtransient reactance saturated | X'' _q | 0.1802 | 0.1728 | 0.1534 | 0.2162 | 0.1972 | 0.1865 | 0.1800 | 0.1694 |
| Zero sequence reactance unsaturated | X ₀ | 0.0409 | 0.0392 | 0.0348 | 0.0491 | 0.0448 | 0.0423 | 0.0408 | 0.0385 |
| Leakage reactance | X _L | 0.1293 | 0.1240 | 0.1101 | 0.1552 | 0.1415 | 0.1338 | 0.1292 | 0.1216 |
| Negative sequence reactance saturated | X ₂ | 0.1675 | 0.1606 | 0.1426 | 0.2009 | 0.1833 | 0.1733 | 0.1673 | 0.1574 |

| | | | | | | | | | |
|--|---------------------|-------|--|---------|--|------|--|--|--|
| Open circuit time constant (sec.) | T' _{do} | | | 0.2370 | | | | | |
| Short-circuit transient time constant (sec.) | T' _d | | | 0.0146 | | | | | |
| Subtransient time constant (sec.) | T'' _d | | | 0.0069 | | | | | |
| Armature time constant (sec.) | T _α | | | 0.0060 | | | | | |
| No load excitation current | io(A) | 0.6 | | | | 0.5 | | | |
| Full load excitation current | ic(A) | 1.3 | | | | 1.3 | | | |
| Full load excitation voltage | uc(V) | 33 | | | | 33 | | | |
| Stator Winding Resistance (20°C) | ohm | | | 1.926 | | | | | |
| Rotor Winding Resistance (20°C) | ohm | | | 0.4775 | | | | | |
| 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] | 0.094 | 0.106 |
| Total Weight | 88 | 91 |
| 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