



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228C

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-1	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	60.0	62.5	60.0	60.0	65.0	68.8	72.5	75.0
	kW	48	50	48	48	52	55	58	60
Efficiency at Class H (P.F.=0.8)	4/4%	88.2	88.3	88.4	88.0	88.1	88.4	88.6	88.8
	3/4%	88.9	89	89.1	88.8	88.9	89.2	89.4	89.6
	2/4%	88.4	88.5	88.6	88.2	88.3	88.6	88.8	89
Efficiency at Class H (P.F.=1.0)	4/4%	90.4	90.5	90.6	90.2	90.3	90.6	90.8	91
	3/4%	91.1	91.2	91.3	91.0	91.1	91.4	91.6	91.8
	2/4%	90.6	90.7	90.8	90.5	90.6	90.9	91.1	91.3

Reactance (%) at Class H

	Kcc	0.3241	0.3450	0.3865	0.2701	0.2990	0.3160	0.3273	0.3447
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.0858	2.9010	2.5873	3.7027	3.3447	3.1645	3.0556	2.9010
Quadrature axis synchronous reactance unsaturated	X _q	1.7998	1.6920	1.5090	2.1596	1.9508	1.8457	1.7822	1.6920
Direct axis transient reactance saturated	X' _d	0.1787	0.1680	0.1498	0.2144	0.1937	0.1833	0.1770	0.1680
Direct axis subtransient reactance saturated	X'' _d	0.1510	0.1420	0.1266	0.1812	0.1637	0.1549	0.1496	0.1420
Quadrature axis subtransient reactance saturated	X'' _q	0.1723	0.1620	0.1445	0.2068	0.1868	0.1767	0.1706	0.1620
Zero sequence reactance unsaturated	X ₀	0.0372	0.0350	0.0312	0.0447	0.0404	0.0382	0.0369	0.0350
Leakage reactance	X _L	0.1042	0.0980	0.0874	0.1251	0.1130	0.1069	0.1032	0.0980
Negative sequence reactance saturated	X ₂	0.1617	0.1520	0.1356	0.1940	0.1752	0.1658	0.1601	0.1520

Open circuit time constant (sec.)	T' _{do}	0.7940							
Short-circuit transient time constant (sec.)	T' _d	0.0370							
Subtransient time constant (sec.)	T'' _d	0.0092							
Armature time constant (sec.)	T _α	0.0112							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	2.1			2				
Full load excitation voltage	uc(V)	44			42				
Stator Winding Resistance (20°C)	ohm	0.1465							
Rotor Winding Resistance (20°C)	ohm	0.6076							
Exciter Stator Resistance (20°C)	ohm	15.93							
Exciter Rotor Phase resistance	ohm	0.05036							
Cooling air requirement	m ³ /sec	0.211			0.253				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	0.809	0.756
Total Weight	248	263
Drive end bearing / Lubrication	Not supply	6315 C3-2Z / Prelubricated - sealed for life
Non-drive end bearing / Lubrication	6310 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