



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228J

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	107.5	112.5	107.5	107.5	117	125	127.5	135
	kW	86	90	86	86	93.6	100	102	108
Efficiency at Class H (P.F.=0.8)	4/4%	90.2	90.3	90.4	90.4	90.5	90.7	90.9	91.1
	3/4%	91.1	91.2	91.3	91.3	91.4	91.6	91.8	92
	2/4%	90.7	90.8	90.9	90.9	91.0	91.2	91.4	91.6
Efficiency at Class H (P.F.=1.0)	4/4%	92.2	92.3	92.4	92.4	92.5	92.7	92.9	93.1
	3/4%	93.1	93.2	93.3	93.2	93.3	93.5	93.7	93.9
	2/4%	92.8	92.9	93.0	92.8	92.9	93.1	93.3	93.5

Reactance (%) at Class H

	Kcc	0.3200	0.3754	0.3760	0.2630	0.2890	0.3030	0.3240	0.3340
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.1732	2.6640	2.6605	3.8075	3.4554	3.3022	3.0841	2.9970
Quadrature axis synchronous reactance unsaturated	X _q	1.8942	1.5902	1.5881	2.2728	2.0626	1.9712	1.8410	1.7890
Direct axis transient reactance saturated	X' _d	0.2043	0.1716	0.1713	0.2452	0.2225	0.2127	0.1986	0.1930
Direct axis subtransient reactance saturated	X'' _d	0.1747	0.1467	0.1465	0.2096	0.1902	0.1818	0.1698	0.1650
Quadrature axis subtransient reactance saturated	X'' _q	0.1959	0.1644	0.1642	0.2350	0.2133	0.2038	0.1904	0.1850
Zero sequence reactance unsaturated	X ₀	0.0371	0.0311	0.0311	0.0445	0.0404	0.0386	0.0360	0.0350
Leakage reactance	X _L	0.1186	0.0996	0.0994	0.1423	0.1291	0.1234	0.1153	0.1120
Negative sequence reactance saturated	X ₂	0.1853	0.1556	0.1554	0.2223	0.2018	0.1928	0.1801	0.1750

Open circuit time constant (sec.)	T' _{do}	1.0530							
Short-circuit transient time constant (sec.)	T' _d	0.0490							
Subtransient time constant (sec.)	T'' _d	0.0092							
Armature time constant (sec.)	T _α	0.0125							
No load excitation current	io(A)	0.45			0.45				
Full load excitation current	ic(A)	1.9			1.8				
Full load excitation voltage	uc(V)	45			43				
Stator Winding Resistance (20°C)	ohm	0.05503							
Rotor Winding Resistance (20°C)	ohm	0.7872							
Exciter Stator Resistance (20°C)	ohm	17.66							
Exciter Rotor Phase resistance	ohm	0.05509							
Cooling air requirement	m ³ /sec	0.296			0.33				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	1.22	1.16
Total Weight	337	350
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