



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228F

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	75.0	80.0	75.0	75.0	82.5	87.5	90.0	96.0
	kW	60	64	60	60	66	70	72	76.8
Efficiency at Class H (P.F.=0.8)	4/4%	89.0	89.1	89.1	89.0	89.1	89.3	89.5	89.3
	3/4%	89.8	89.9	89.9	89.9	90.0	90.2	90.4	90.2
	2/4%	89.3	89.4	89.4	89.3	89.4	89.6	89.8	89.6
Efficiency at Class H (P.F.=1.0)	4/4%	91.2	91.3	91.3	91.2	91.3	91.5	91.7	91.5
	3/4%	92.0	92.1	92.1	92.1	92.2	92.4	92.6	92.4
	2/4%	91.6	91.7	91.7	91.5	91.6	91.8	92.0	91.8

Reactance (%) at Class H

	Kcc	0.3323	0.3455	0.3963	0.2769	0.3019	0.3182	0.3379	0.3451
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.0097	2.8973	2.5234	3.6113	3.3124	3.1425	2.9596	2.8973
Quadrature axis synchronous reactance unsaturated	X _q	1.8611	1.7916	1.5604	2.2331	2.0483	1.9432	1.8301	1.7916
Direct axis transient reactance saturated	X' _d	0.1696	0.1633	0.1422	0.2035	0.1867	0.1771	0.1668	0.1633
Direct axis subtransient reactance saturated	X'' _d	0.1418	0.1365	0.1189	0.1701	0.1561	0.1481	0.1394	0.1365
Quadrature axis subtransient reactance saturated	X'' _q	0.1648	0.1586	0.1381	0.1977	0.1813	0.1720	0.1620	0.1586
Zero sequence reactance unsaturated	X ₀	0.0364	0.0350	0.0305	0.0436	0.0400	0.0380	0.0358	0.0350
Leakage reactance	X _L	0.0933	0.0898	0.0782	0.1119	0.1027	0.0974	0.0917	0.0898
Negative sequence reactance saturated	X ₂	0.1532	0.1475	0.1285	0.1838	0.1686	0.1600	0.1507	0.1475

Open circuit time constant (sec.)	T' _{do}	0.8990							
Short-circuit transient time constant (sec.)	T' _d	0.0470							
Subtransient time constant (sec.)	T'' _d	0.0080							
Armature time constant (sec.)	T _α	0.0128							
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	0.08937							
Rotor Winding Resistance (20°C)	ohm	0.6826							
Exciter Stator Resistance (20°C)	ohm	17.66							
Exciter Rotor Phase resistance	ohm	0.05509							
Cooling air requirement	m ³ /sec	0.235			0.282				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	1.01	0.96
Total Weight	286	301
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