



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228E

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	70	75	72.5	70	77.5	82.5	86.3	90
	kW	56	60	58	56	62	66	69	72
Efficiency at Class H (P.F.=0.8)	4/4%	88.9	89	89.0	88.8	89.0	89.2	89.4	89.5
	3/4%	89.7	89.8	89.8	89.7	89.9	90.1	90.3	90.4
	2/4%	89.2	89.3	89.3	89.1	89.3	89.5	89.7	89.8
Efficiency at Class H (P.F.=1.0)	4/4%	91.1	91.2	91.2	91.0	91.2	91.4	91.6	91.7
	3/4%	91.9	92	92.0	91.9	92.1	92.3	92.5	92.6
	2/4%	91.5	91.6	91.6	91.3	91.5	91.7	91.9	92

Reactance (%) at Class H

	Kcc	0.3248	0.3390	0.3740	0.2707	0.2932	0.3079	0.3217	0.3359
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.0787	2.9770	2.6735	3.6941	3.4104	3.2474	3.1086	2.9770
Quadrature axis synchronous reactance unsaturated	X _q	1.8284	1.7680	1.5878	2.1939	2.0254	1.9286	1.8462	1.7680
Direct axis transient reactance saturated	X' _d	0.1737	0.1680	0.1509	0.2085	0.1925	0.1833	0.1754	0.1680
Direct axis subtransient reactance saturated	X'' _d	0.1469	0.1420	0.1275	0.1762	0.1627	0.1549	0.1483	0.1420
Quadrature axis subtransient reactance saturated	X'' _q	0.1686	0.1630	0.1464	0.2023	0.1867	0.1778	0.1702	0.1630
Zero sequence reactance unsaturated	X ₀	0.0372	0.0360	0.0323	0.0447	0.0412	0.0393	0.0376	0.0360
Leakage reactance	X _L	0.0982	0.0950	0.0853	0.1179	0.1088	0.1036	0.0992	0.0950
Negative sequence reactance saturated	X ₂	0.1572	0.1520	0.1365	0.1886	0.1741	0.1658	0.1587	0.1520

Open circuit time constant (sec.)	T' _{do}	0.7990							
Short-circuit transient time constant (sec.)	T' _d	0.0364							
Subtransient time constant (sec.)	T'' _d	0.0092							
Armature time constant (sec.)	T _α	0.0124							
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	0.1012							
Rotor Winding Resistance (20°C)	ohm	0.6644							
Exciter Stator Resistance (20°C)	ohm	15.93							
Exciter Rotor Phase resistance	ohm	0.05036							
Cooling air requirement	m ³ /sec	0.222			0.266				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	0.958	0.906
Total Weight	269	284
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