



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228D

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	65.0	70.0	65.0	65.0	72.5	77.5	80.0	84.0
	kW	52	56	52	52	58	62	64	67.2
Efficiency at Class H (P.F.=0.8)	4/4%	88.5	88.6	88.7	88.4	88.5	88.8	89.0	89.1
	3/4%	89.3	89.4	89.5	89.3	89.4	89.7	89.9	90
	2/4%	88.8	88.9	89.0	88.7	88.8	89.1	89.3	89.4
Efficiency at Class H (P.F.=1.0)	4/4%	90.7	90.8	90.9	90.6	90.7	91.0	91.2	91.3
	3/4%	91.5	91.6	91.7	91.5	91.6	91.9	92.1	92.2
	2/4%	91.1	91.2	91.3	90.9	91.0	91.3	91.5	91.6

Reactance (%) at Class H

	Kcc	0.3289	0.3440	0.3923	0.2741	0.2947	0.3082	0.3261	0.3384
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.0404	2.9550	2.5492	3.6481	3.3930	3.2443	3.0665	2.9550
Quadrature axis synchronous reactance unsaturated	X _q	1.6863	1.6390	1.4139	2.0234	1.8819	1.7995	1.7008	1.6390
Direct axis transient reactance saturated	X' _d	0.2109	0.2050	0.1768	0.2531	0.2354	0.2251	0.2127	0.2050
Direct axis subtransient reactance saturated	X'' _d	0.1831	0.1780	0.1536	0.2198	0.2044	0.1954	0.1847	0.1780
Quadrature axis subtransient reactance saturated	X'' _q	0.1965	0.1910	0.1648	0.2358	0.2193	0.2097	0.1982	0.1910
Zero sequence reactance unsaturated	X ₀	0.0360	0.0350	0.0302	0.0432	0.0402	0.0384	0.0363	0.0350
Leakage reactance	X _L	0.1317	0.1280	0.1104	0.1580	0.1470	0.1405	0.1328	0.1280
Negative sequence reactance saturated	X ₂	0.1893	0.1840	0.1587	0.2272	0.2113	0.2020	0.1909	0.1840

Open circuit time constant (sec.)	T' _{do}	0.9980							
Short-circuit transient time constant (sec.)	T' _d	0.0547							
Subtransient time constant (sec.)	T'' _d	0.0081							
Armature time constant (sec.)	T _α	0.0116							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	2.2			2.1				
Full load excitation voltage	uc(V)	46			44				
Stator Winding Resistance (20°C)	ohm	0.121							
Rotor Winding Resistance (20°C)	ohm	0.6303							
Exciter Stator Resistance (20°C)	ohm	15.93							
Exciter Rotor Phase resistance	ohm	0.05036							
Cooling air requirement	m ³ /sec	0.22			0.264				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	0.903	0.85
Total Weight	257	272
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