



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228N

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	150.0	160.0	155.0	150	165	175	185	190.0
	kW	120	128	124	120	132	140	148	152
Efficiency at Class H (P.F.=0.8)	4/4%	92.1	92.2	92.2	91.5	91.6	91.7	91.9	92.1
	3/4%	92.7	92.8	92.8	92.2	92.3	92.4	92.6	92.8
	2/4%	92.3	92.4	92.4	91.8	91.9	92.0	92.2	92.4
Efficiency at Class H (P.F.=1.0)	4/4%	93.9	94	94.0	93.4	93.5	93.6	93.8	94
	3/4%	94.5	94.6	94.6	94.1	94.2	94.3	94.5	94.7
	2/4%	94.1	94.2	94.2	93.7	93.8	93.9	94.1	94.3

Reactance (%) at Class H

	Kcc	0.3341	0.3640	0.3857	0.2785	0.3036	0.3200	0.3306	0.3508
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	2.9927	2.7440	2.5929	3.5910	3.2937	3.1248	3.0247	2.8510
Quadrature axis synchronous reactance unsaturated	X _q	1.6153	1.5300	1.3995	1.9382	1.7778	1.6866	1.6326	1.5388
Direct axis transient reactance saturated	X' _d	0.1454	0.1380	0.1260	0.1745	0.1601	0.1518	0.1470	0.1385
Direct axis subtransient reactance saturated	X'' _d	0.1215	0.1150	0.1053	0.1458	0.1338	0.1269	0.1228	0.1158
Quadrature axis subtransient reactance saturated	X'' _q	0.1444	0.1370	0.1251	0.1733	0.1589	0.1508	0.1459	0.1376
Zero sequence reactance unsaturated	X ₀	0.0291	0.0280	0.0252	0.0349	0.0320	0.0304	0.0294	0.0277
Leakage reactance	X _L	0.0748	0.0710	0.0648	0.0897	0.0823	0.0781	0.0756	0.0713
Negative sequence reactance saturated	X ₂	0.1330	0.1270	0.1152	0.1595	0.1463	0.1388	0.1344	0.1267

Open circuit time constant (sec.)	T' _{do}	1.3350							
Short-circuit transient time constant (sec.)	T' _d	0.0520							
Subtransient time constant (sec.)	T'' _d	0.0116							
Armature time constant (sec.)	T _α	0.0162							
No load excitation current	io(A)	0.45			0.45				
Full load excitation current	ic(A)	1.5			1.4				
Full load excitation voltage	uc(V)	58			54				
Stator Winding Resistance (20°C)	ohm	0.02605							
Rotor Winding Resistance (20°C)	ohm	1.112							
Exciter Stator Resistance (20°C)	ohm	21.12							
Exciter Rotor Phase resistance	ohm	0.04657							
Cooling air requirement	m ³ /sec	0.352			0.422				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	1.78	1.73
Total Weight	485	489
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