



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228H

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	95.0	100.0	95.0	95	104	110	115	120
	kW	76	80	76	76	83	88	92	96
Efficiency at Class H (P.F.=0.8)	4/4%	90.0	90.1	90.2	90.0	90.2	90.4	90.6	90.8
	3/4%	90.6	90.7	90.8	90.7	90.9	91.1	91.3	91.5
	2/4%	90.4	90.5	90.6	90.4	90.6	90.8	91.0	91.2
Efficiency at Class H (P.F.=1.0)	4/4%	92.0	92.1	92.2	92.0	92.2	92.4	92.6	92.8
	3/4%	92.7	92.8	92.9	92.7	92.9	93.1	93.3	93.5
	2/4%	92.5	92.6	92.7	92.4	92.6	92.8	93.0	93.2

Reactance (%) at Class H

	Kcc	0.3338	0.3514	0.3981	0.2782	0.3055	0.3221	0.3365	0.3514
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	2.9958	2.8460	2.5118	3.5946	3.2734	3.1045	2.9718	2.8460
Quadrature axis synchronous reactance unsaturated	X _q	1.7389	1.6520	1.4580	2.0866	1.9001	1.8021	1.7250	1.6520
Direct axis transient reactance saturated	X' _d	0.1863	0.1770	0.1562	0.2236	0.2036	0.1931	0.1848	0.1770
Direct axis subtransient reactance saturated	X'' _d	0.1589	0.1510	0.1333	0.1907	0.1737	0.1647	0.1577	0.1510
Quadrature axis subtransient reactance saturated	X'' _q	0.1789	0.1700	0.1500	0.2147	0.1955	0.1854	0.1775	0.1700
Zero sequence reactance unsaturated	X ₀	0.0347	0.0330	0.0291	0.0417	0.0380	0.0360	0.0345	0.0330
Leakage reactance	X _L	0.1074	0.1020	0.0900	0.1288	0.1173	0.1113	0.1065	0.1020
Negative sequence reactance saturated	X ₂	0.1689	0.1605	0.1417	0.2027	0.1846	0.1751	0.1676	0.1605

Open circuit time constant (sec.)	T' _{do}	1.0090							
Short-circuit transient time constant (sec.)	T' _d	0.0490							
Subtransient time constant (sec.)	T'' _d	0.0088							
Armature time constant (sec.)	T _α	0.0132							
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	0.06572							
Rotor Winding Resistance (20°C)	ohm	0.7577							
Exciter Stator Resistance (20°C)	ohm	17.66							
Exciter Rotor Phase resistance	ohm	0.05509							
Cooling air requirement	m ³ /sec	0.275			0.33				

Configuration	Single Bearing	Double Bearing
Type of Construction	B2 - SAE	IM B34
Inertia (J) [kgm ²]	1.13	1.08
Total Weight	314	329
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