



THREE-PHASE SYNCHRONOUS GENERATOR

TCU228L

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	132.5	140	135	132.5	145	155	160	168
	kW	106	112	108	106	116	124	128	134
Efficiency at Class H (P.F.=0.8)	4/4%	91.6	91.7	91.8	91.2	91.3	91.5	91.7	91.9
	3/4%	92.3	92.4	92.5	92.0	92.1	92.3	92.5	92.7
	2/4%	92.0	92.1	92.2	91.5	91.6	91.8	92.0	92.2
Efficiency at Class H (P.F.=1.0)	4/4%	93.4	93.5	93.6	93.0	93.1	93.3	93.5	93.7
	3/4%	94.1	94.2	94.3	93.7	93.8	94.0	94.2	94.4
	2/4%	93.9	94	94.1	93.3	93.4	93.6	93.8	94

Reactance (%) at Class H

	Kcc	0.3144	0.3300	0.3680	0.2620	0.2871	0.3003	0.3177	0.3307
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X _d	3.1806	3.0330	2.7171	3.8164	3.4825	3.3300	3.1474	3.0240
Quadrature axis synchronous reactance unsaturated	X _q	1.6747	1.5970	1.4307	2.0095	1.8337	1.7534	1.6572	1.5922
Direct axis transient reactance saturated	X' _d	0.1552	0.1480	0.1326	0.1862	0.1699	0.1625	0.1536	0.1476
Direct axis subtransient reactance saturated	X'' _d	0.1300	0.1240	0.1111	0.1560	0.1424	0.1361	0.1287	0.1236
Quadrature axis subtransient reactance saturated	X'' _q	0.1531	0.1460	0.1308	0.1837	0.1676	0.1603	0.1515	0.1456
Zero sequence reactance unsaturated	X ₀	0.0304	0.0290	0.0260	0.0365	0.0333	0.0318	0.0301	0.0289
Leakage reactance	X _L	0.0807	0.0770	0.0690	0.0969	0.0884	0.0845	0.0799	0.0768
Negative sequence reactance saturated	X ₂	0.1416	0.1350	0.1209	0.1699	0.1550	0.1482	0.1401	0.1346

Open circuit time constant (sec.)	T' _{do}	1.2870							
Short-circuit transient time constant (sec.)	T' _d	0.0510							
Subtransient time constant (sec.)	T'' _d	0.0112							
Armature time constant (sec.)	T _α	0.0170							
No load excitation current	io(A)	0.45			0.45				
Full load excitation current	ic(A)	1.7			1.6				
Full load excitation voltage	uc(V)	49			47				
Stator Winding Resistance (20°C)	ohm	0.03599							
Rotor Winding Resistance (20°C)	ohm	0.9419							
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]	1.5	1.45
Total Weight	413	427
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