



# THREE-PHASE SYNCHRONOUS GENERATOR

**TCU228B**

## 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	<b>400</b>	415	380	416	440	460	480
Voltage ( YY Connection ) - Parallel Star	V	190	<b>200</b>	208	190	208	220	230	240
Voltage ( Δ Connection ) - Series Delta	V	220	<b>230</b>	240	220	240	254	266	277
Voltage ( ΔΔ Connection ) - Parallel Delta	V	110	<b>115</b>	120	110	120	127	133	138
Rated power at Class H (125 °C) temperature rise	kVA	47.5	<b>50.0</b>	48.0	47.5	52.0	55.0	57.5	60.0
	kW	38	<b>40</b>	38.4	38	41.6	44	46	48
Efficiency at Class H (P.F.=0.8)	4/4%	87.0	<b>87.1</b>	87.2	86.9	87.0	87.2	87.4	87.6
	3/4%	88.2	<b>88.3</b>	88.4	88.2	88.3	88.5	88.7	88.9
	2/4%	87.7	<b>87.8</b>	87.9	87.6	87.7	87.9	88.1	88.3
Efficiency at Class H (P.F.=1.0)	4/4%	90.2	<b>90.3</b>	90.4	90.3	90.4	90.6	90.8	91
	3/4%	91.4	<b>91.5</b>	91.6	91.6	91.7	91.9	92.1	92.3
	2/4%	90.9	<b>91</b>	91.1	91.1	91.2	91.4	91.6	91.8

#### Reactance (%) at Class H

Short-circuit ratio	Kcc	0.3200	<b>0.3360</b>	0.3770	0.2660	0.2910	0.3080	0.3220	0.3360
Direct axis synchronous reactance unsaturated	Xd	3.1326	<b>2.9760</b>	2.6542	3.7588	3.4312	3.2463	3.1076	2.9760
Quadrature axis synchronous reactance unsaturated	Xq	1.8926	<b>1.7980</b>	1.6036	2.2710	2.0730	1.9613	1.8775	1.7980
Direct axis transient reactance saturated	X'd	0.2821	<b>0.2680</b>	0.2390	0.3385	0.3090	0.2923	0.2798	0.2680
Direct axis subtransient reactance saturated	X''d	0.2505	<b>0.2380</b>	0.2123	0.3006	0.2744	0.2596	0.2485	0.2380
Quadrature axis subtransient reactance saturated	X''q	0.2611	<b>0.2480</b>	0.2212	0.3132	0.2859	0.2705	0.2590	0.2480
Zero sequence reactance unsaturated	X0	0.0453	<b>0.0430</b>	0.0383	0.0543	0.0496	0.0469	0.0449	0.0430
Leakage reactance	X <sub>L</sub>	0.1937	<b>0.1840</b>	0.1641	0.2324	0.2121	0.2007	0.1921	0.1840
Negative sequence reactance saturated	X2	0.2568	<b>0.2440</b>	0.2176	0.3082	0.2813	0.2662	0.2548	0.2440

Open circuit time constant (sec.)	T'do	0.7940							
Short-circuit transient time constant (sec.)	T'd	0.0370							
Subtransient time constant (sec.)	T''d	0.0092							
Armature time constant (sec.)	T <sub>α</sub>	0.0112							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	2.1			2				
Full load excitation voltage	uc(V)	44			42				
Stator Winding Resistance (20°C)	ohm	0.2062							
Rotor Winding Resistance (20°C)	ohm	0.5598							
Exciter Stator Resistance (20°C)	ohm	15.5							
Exciter Rotor Phase resistance	ohm	0.05036							
Cooling air requirement	m <sup>3</sup> /sec	0.211			0.253				

Configuration	Single Bearing	Double Bearing
Type of Construction	<b>B2 - SAE</b>	<b>IM B34</b>
Inertia (J) [kgm <sup>2</sup> ]	0.796	0.744
Total Weight	230	245
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