



# THREE-PHASE SYNCHRONOUS GENERATOR

**TCU188E**

## 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-A1	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	38.0	<b>40.0</b>	38.0	38.0	41.5	44.0	46.0	48.0
	kW	30.4	<b>32</b>	30.4	30.4	33.2	35.2	36.8	38.4
Efficiency at Class H (P.F.=0.8)	4/4%	86.9	<b>87</b>	87.1	86.8	86.9	87.1	87.3	87.5
	3/4%	88.2	<b>88.3</b>	88.4	88.1	88.2	88.4	88.6	88.8
	2/4%	87.6	<b>87.7</b>	87.8	87.5	87.6	87.8	88.0	88.2
Efficiency at Class H (P.F.=1.0)	4/4%	90.1	<b>90.2</b>	90.3	90.2	90.3	90.5	90.7	90.9
	3/4%	91.4	<b>91.5</b>	91.6	91.5	91.6	91.8	92.0	92.2
	2/4%	90.9	<b>91</b>	91.1	91.0	91.1	91.3	91.5	91.7

#### Reactance (%) at Class H

	Kcc	0.3575	<b>0.3760</b>	0.4264	0.2980	0.3272	0.3450	0.3604	0.3764
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X <sub>d</sub>	2.7968	<b>2.6570</b>	2.3450	3.3559	3.0560	2.8983	2.7745	2.6570
Quadrature axis synchronous reactance unsaturated	X <sub>q</sub>	1.4432	<b>1.3710</b>	1.2100	1.7316	1.5769	1.4955	1.4316	1.3710
Direct axis transient reactance saturated	X' <sub>d</sub>	0.1916	<b>0.1820</b>	0.1606	0.2299	0.2093	0.1985	0.1900	0.1820
Direct axis subtransient reactance saturated	X'' <sub>d</sub>	0.1695	<b>0.1610</b>	0.1421	0.2034	0.1852	0.1756	0.1681	0.1610
Quadrature axis subtransient reactance saturated	X'' <sub>q</sub>	0.2084	<b>0.1980</b>	0.1747	0.2501	0.2277	0.2160	0.2068	0.1980
Zero sequence reactance unsaturated	X <sub>0</sub>	0.0442	<b>0.0420</b>	0.0371	0.0530	0.0483	0.0458	0.0439	0.0420
Leakage reactance	X <sub>L</sub>	0.1074	<b>0.1020</b>	0.0900	0.1288	0.1173	0.1113	0.1065	0.1020
Negative sequence reactance saturated	X <sub>2</sub>	0.1889	<b>0.1795</b>	0.1584	0.2267	0.2065	0.1958	0.1874	0.1795

Open circuit time constant (sec.)	T' <sub>do</sub>	0.5230							
Short-circuit transient time constant (sec.)	T' <sub>d</sub>	0.0310							
Subtransient time constant (sec.)	T'' <sub>d</sub>	0.0067							
Armature time constant (sec.)	T <sub>α</sub>	0.0127							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	2			1.9				
Full load excitation voltage	uc(V)	38			36				
Stator Winding Resistance (20°C)	ohm	0.1457							
Rotor Winding Resistance (20°C)	ohm	0.9429							
Exciter Stator Resistance (20°C)	ohm	17.14							
Exciter Rotor Phase resistance	ohm	0.07475							
Cooling air requirement	m <sup>3</sup> /sec	0.139			0.167				

Configuration	Single Bearing	Double Bearing
Type of Construction	<b>B2 - SAE</b>	<b>IM B34</b>
Inertia (J) [kgm <sup>2</sup> ]	0.307	0.301
Total Weight	196	205
Drive end bearing / Lubrication	Not supply	6212 C3-2Z / Prelubricated - sealed for life
Non-drive end bearing / Lubrication	6308 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