



# THREE-PHASE SYNCHRONOUS GENERATOR

## TCU188C

### 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	23.8	<b>25.0</b>	24.0	23.8	26.0	27.5	29.0	30.0
	kW	19	<b>20</b>	19.2	19	20.8	22	23.2	24
Efficiency at Class H (P.F.=0.8)	4/4%	84.3	<b>84.4</b>	84.5	83.9	84.1	84.3	84.5	84.7
	3/4%	85.5	<b>85.6</b>	85.7	85.2	85.4	85.6	85.8	86
	2/4%	84.8	<b>84.9</b>	85.0	84.5	84.7	84.9	85.1	85.3
Efficiency at Class H (P.F.=1.0)	4/4%	87.5	<b>87.6</b>	87.7	87.3	87.5	87.7	87.9	88.1
	3/4%	88.8	<b>88.9</b>	89.0	88.7	88.9	89.1	89.3	89.5
	2/4%	88.1	<b>88.2</b>	88.3	88.0	88.2	88.4	88.6	88.8

#### Reactance (%) at Class H

	Kcc	0.37	<b>0.39</b>	0.437	0.309	0.338	0.357	0.37	0.39
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X <sub>d</sub>	2.7011	<b>2.5660</b>	2.2885	3.2410	2.9585	2.7991	2.7027	2.5660
Quadrature axis synchronous reactance unsaturated	X <sub>q</sub>	1.4147	<b>1.3440</b>	1.1987	1.6975	1.5496	1.4661	1.4156	1.3440
Direct axis transient reactance saturated	X' <sub>d</sub>	0.2137	<b>0.2030</b>	0.1810	0.2564	0.2341	0.2214	0.2138	0.2030
Direct axis subtransient reactance saturated	X'' <sub>d</sub>	0.1926	<b>0.1830</b>	0.1632	0.2311	0.2110	0.1996	0.1928	0.1830
Quadrature axis subtransient reactance saturated	X'' <sub>q</sub>	0.2253	<b>0.2140</b>	0.1909	0.2703	0.2467	0.2334	0.2254	0.2140
Zero sequence reactance unsaturated	X <sub>0</sub>	0.0463	<b>0.0440</b>	0.0392	0.0556	0.0507	0.0480	0.0463	0.0440
Leakage reactance	X <sub>L</sub>	0.1305	<b>0.1240</b>	0.1106	0.1566	0.1430	0.1353	0.1306	0.1240
Negative sequence reactance saturated	X <sub>2</sub>	0.2095	<b>0.1990</b>	0.1775	0.2513	0.2294	0.2171	0.2096	0.1990

Open circuit time constant (sec.)	T' <sub>do</sub>	0.4250							
Short-circuit transient time constant (sec.)	T' <sub>d</sub>	0.0290							
Subtransient time constant (sec.)	T'' <sub>d</sub>	0.0053							
Armature time constant (sec.)	T <sub>α</sub>	0.0106							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	1.8			1.7				
Full load excitation voltage	uc(V)	31			30				
Stator Winding Resistance (20°C)	ohm	0.288							
Rotor Winding Resistance (20°C)	ohm	0.6856							
Exciter Stator Resistance (20°C)	ohm	16.51							
Exciter Rotor Phase resistance	ohm	0.07234							
Cooling air requirement	m <sup>3</sup> /sec	0.107			0.128				

Configuration	Single Bearing	Double Bearing
Type of Construction	<b>B2 - SAE</b>	<b>IM B34</b>
Inertia (J) [kgm <sup>2</sup> ]	0.161	0.183
Total Weight	138	143
Drive end bearing / Lubrication	Not supply	6309 C3-2Z / Prelubricated - sealed for life
Non-drive end bearing / Lubrication	6306 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