



# THREE-PHASE SYNCHRONOUS GENERATOR

## TCU188DS

### 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	35.0	<b>37.5</b>	36.0	35.0	39.0	40.0	42.5	45.0
	kW	28	<b>30</b>	28.8	28	31.2	32	34	36
Efficiency at Class H (P.F.=0.8)	4/4%	86.1	<b>86.2</b>	86.3	86.4	86.6	86.8	87.1	87.3
	3/4%	87.4	<b>87.5</b>	87.6	87.8	88.0	88.2	88.5	88.7
	2/4%	86.7	<b>86.8</b>	86.9	87.1	87.3	87.5	87.8	88
Efficiency at Class H (P.F.=1.0)	4/4%	89.3	<b>89.4</b>	89.5	89.8	90.0	90.2	90.5	90.7
	3/4%	90.7	<b>90.8</b>	90.9	91.3	91.5	91.7	92.0	92.2
	2/4%	90.0	<b>90.1</b>	90.2	90.6	90.8	91.0	91.3	91.5

#### Reactance (%) at Class H

	Kcc	0.3250	<b>0.3360</b>	0.3770	0.2710	0.2910	0.3180	0.3260	0.3360
Short-circuit ratio									
Direct axis synchronous reactance unsaturated	X <sub>d</sub>	3.0797	<b>2.9780</b>	2.6559	3.6954	3.4335	3.1501	3.0646	2.9780
Quadrature axis synchronous reactance unsaturated	X <sub>q</sub>	1.5947	<b>1.5420</b>	1.3752	1.9135	1.7779	1.6311	1.5868	1.5420
Direct axis transient reactance saturated	X' <sub>d</sub>	0.2234	<b>0.2160</b>	0.1926	0.2680	0.2490	0.2285	0.2223	0.2160
Direct axis subtransient reactance saturated	X'' <sub>d</sub>	0.1996	<b>0.1930</b>	0.1721	0.2395	0.2225	0.2042	0.1986	0.1930
Quadrature axis subtransient reactance saturated	X'' <sub>q</sub>	0.2399	<b>0.2320</b>	0.2069	0.2879	0.2675	0.2454	0.2387	0.2320
Zero sequence reactance unsaturated	X <sub>0</sub>	0.0496	<b>0.0480</b>	0.0428	0.0596	0.0553	0.0508	0.0494	0.0480
Leakage reactance	X <sub>L</sub>	0.1303	<b>0.1260</b>	0.1124	0.1564	0.1453	0.1333	0.1297	0.1260
Negative sequence reactance saturated	X <sub>2</sub>	0.2192	<b>0.2120</b>	0.1891	0.2631	0.2444	0.2242	0.2182	0.2120

Open circuit time constant (sec.)	T' <sub>do</sub>	0.4750							
Short-circuit transient time constant (sec.)	T' <sub>d</sub>	0.0300							
Subtransient time constant (sec.)	T'' <sub>d</sub>	0.0060							
Armature time constant (sec.)	T <sub>α</sub>	0.0115							
No load excitation current	io(A)	0.5			0.5				
Full load excitation current	ic(A)	1.9			1.8				
Full load excitation voltage	uc(V)	37			35				
Stator Winding Resistance (20°C)	ohm	0.1997							
Rotor Winding Resistance (20°C)	ohm	0.8445							
Exciter Stator Resistance (20°C)	ohm	16.51							
Exciter Rotor Phase resistance	ohm	0.07234							
Cooling air requirement	m <sup>3</sup> /sec	0.119			0.143				

Configuration	Single Bearing	Double Bearing
Type of Construction	<b>B2 - SAE</b>	<b>IM B34</b>
Inertia (J) [kgm <sup>2</sup> ]	0.29	0.284
Total Weight	174	179
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