



LINE-COMMUTATED POWER CONVERTER

DATA SHEET OF POWER SECTION - CLASS3

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## 1. POWER CONVERTER DATA SHEET – CLASS3

GENERAL CHARACTERISTICS / AMBIENT CONDITIONS	
Standards	IEC 60146-1-1 IEC 60146-2
Access	Front/Rear
Installation	indoor
Enclosure / Ingress protection	IP00
Operating temperature range	5°C – 40°C (41°F – 104°F)
Storage temperature range (without coolant)	-20°C – 65°C (-4°F – 149°F)
Storage temperature range (with coolant)	5°C – 65°C (41°F – 149°F)
Humidity	5% – 95% without condensation
Altitude	<1000 m / <3280 ft
Efficiency	>98%
Losses (rms)	61,5 kW
Aux. power (thyristor firing units)	24Vdc (120W)
Insulation: DC to ground	10 kV
INPUT DATA	
Voltage	3AC 2700 V (+/-10%)
Frequency	45 ... 63 Hz
OUTPUT DATA	
Voltage <sup>(*1)</sup>	DC 0 – 4009 V
Rated Current (continuous operation)	DC 8750 A
COOLING	
Cooling system <sup>(*2)</sup>	Water cooled (deionized water) (cooling water provided by additional cooling unit)
Water flow <sup>(*3)</sup>	72 l/min (19 gal/min)
max. inlet temperature	40°C (104 °F)
Water pressure	<6bar (< 87 psi)
DIMENSIONS WEIGHTS	
Width / Height / Depth	2200mm (7.22ft) / 2528mm (8.29ft) / 541mm (1.77ft)
Weight	767 kg (1691 lbs)
RECTIFIER STACK	
Semiconductor	Thyristor
Type	T1851N70
Number of thyristors per branch / total	4 / 24
Voltage safety factor	1,67
Current safety factor - based on load cycle for special application within project TOKAMAK SPARC	2,28
Protection	fuseless <sup>(*5)</sup>
Temperature monitoring	Temp. measurement per thyristor

(\*1) @no load / @110% grid voltage

(\*2) deionized water – required conductivity &lt;2µs/cm

(\*3) two parallel cooling branches → 2x54l (2x14,2 gal/min) - for details see drawing D0103960

(\*5) no fuses in the required frame size available for the voltage range of CLASS3. Protection of rectifier must be done by upstream circuit breaker on transformer primary side. However, timing of fault clearing by circuit breaker could be insufficient to avoid damage of rectifier in a WC scenario.

## CLASS II (GE INTERNAL NON-CRITICAL)

Ref : B6C\_CL3-402.03

Revision : 003

Date : 2024-09-23

Page : 2/3

Project : LINE-COMMUTATED POWER CONVERTER

Document: DATA SHEET OF POWER SECTION - CLASS3

File : PowerConverter-B6C\_CL3-DataSheet-402.03.docx

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THYRISTOR FIRING	
Firing device	<div>Tiny TAE (one per thyristor)<ul style="list-style-type: none"><li>- fibre optic communication with IMP-panel <sup>(*4)</sup></li><li>- generation of firing impulse</li><li>- temperature measurement</li><li>- voltage measurement</li><li>- bin. input for fuse monitoring</li></ul></div>

(\*4) additional IMP panel needed for data transmission between Power Converter (power section) and control equipment  
(see drawing IMP-panel\_GA-210.01)

Power section CLASS3 is available as “forward” and “reverse” type.

“forward”→ DC+ at the top busbar

“reverse”→ DC+ at the bottom busbar

Construction of “forward” and “reverse” type is mirror-imaged, for easy configuration of antiparallel rectifier system.

For details see drawing D0103960.