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Reference Doc- PMAG0000-0100-S0014 MOLLER MPS specification (Approved document)
Date - 25-Feb-22

Lead times												Hi-potting of Chokes?		Improve reliability due to use of Film capacitors!		
	Topology	Max P rating per module (W)	Max I Ratings per Module	Max V rating per module	Switching Freq (Hz)	# of Parallel IGBT modules	IGBT rated Voltage (V)	IGBT size (mm/inches)	IGBT part# or Family	IGBT Power dissipation?	IGBT current sharing?	Choke Value; also what kind of cooling	DC Filter Capacitor Type	IGBT Driver	Diagnostic signal names and functions? Can we ask for more diagnostic signals if needed?	Cooling plate used (what flow?)
Per module Spec	Buck	83K	1200	93	10K	3	650	150x62x17/5.9x2.44 x0.67	The IGBT drivers are off-the-shelf from Power Integration – model 2SP0115T2Ax-06, data sheet provided (“2SP0115T2Ax-06.pdf”).				Ducati/AVX/Kemet/Electronicon film capacitors designed for DC-bus applications (low ESL and ESR). Specific and/or alternative manufacturer can be discussed during the detailed design phase. As example AVX series FFVS. Datasheet provided “FFVS.pdf”.	2SP0115T		Copper & Stainless steel in contact with water

OCEM Tech offer

Magnet Name	# of converters	Peak Current	Max Voltage (V)	Rated Power (kW)
US Torus		1290	93	84
DS Torus - 1		2676	48	90
DS Torus - 2		2928	50.4	103
DS Torus - 3		3882	68.4	185
DS Torus - 4		4020	269	751

1st to be recd in Q3 FY2022 (Nov/Dec 2022)

Main PS	FPGA with SOC	DSP	Control Electronics	Communication		
Control board	Xilinx's Zynq (used for Digital Output control algorithms)	T.I. (for high resolution PWM generation)	Co developed with CAENels	Ethernet either TCP-IP or UDP	Embedded Linux OS with EPICS driver on board the PS	VISUAL PS software
Main PS	ADC	Other ADC	I/O			PS for Active DCCT
Carrier board	2x24-bit @ 100Ksps for I & V (also temperature stabilized)	16-bit @ 100Ksps for (DC-link, temperature & Aux analog readings)	I/O signals	Interlocks and status signals	Future expansion connector	Low noise +/- 15V

DCCT

Ramp Rates?

Mechanical

Internal Flow meters?

Free wheeling diodes?

Shielding?

Before critical component buy

Stored energy cal

0-Flux (Danisense/LEM)

Configurable?

How cables are routed? Busbar or braided cables (Shielding)

If yes, are they interlocked?

How is this done? Are you using diode from the buck converter

How PWM signal goes to individual module from control board

Should we get datasheets of critical component order?

Interlock scheme/schematics :

1. The NGPS manuals show (4) software configurable interlocks, but we also have hardware interlocks in proposal.
2. How does the software configurable vs hardware interlock functionally differ ? (Especially as it scales across multiple modules)
3. Preference for water flow meters over switches to monitor build up across different circuits

Controller/Interface :

1. How is priority given to remote interfaces(web ASCII, IOC, SFP)?
2. Can we configure safe shutdown in case of loss of communication from preferred interface?
3. How will the 100ksps 24bitadc and 16bitadc signals be made available?
4. Do we have ability to configure all necessary parameters in case of controller failure, IE one spare controller can operate any of the 5 power supplies.

LCW Line

1. Pressure testing
2. Required to meet the ASME/B13.3 and 13.9 as applicable. Any qualifications or requirements.
3. Attachment II - Water Cooling Hardware & Considerations
4. LCW Line Inlet to be from underneath the MPS with AC and DC (input/Output) from the top)

Enclosure compliance

1. IP20 compliance to be discussed as mentioned, how you intend to comply with NEMA12?
- Ans 1. We can offer an IPx2 cabinet that is protected against direct sprays of water up to 15" from the vertical. This is equivalent to NEMA12. (To be discussed for compliancy)
2. Are the transformers for the input UL or CE rated?
- Ans 2. The transformers will be designed according to the IEC standards by a company that is compliant with the UL transformers manufacturing methods and materials. The UL materials list of the insulation system of the transformer will be provided.
3. Explicitly the final foot print and height for all MPS

General

An Export Control Classification Number (ECCN) to identify items for export control purposes.