Mini-Review on CLIQ Units

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Agenda

1. Scope and objectives of the review	Félix Rodríguez Mateos	10’
2. Introduction to the CLIQ protection method	Emmanuele Ravaioli	15’
3. General aspects of the design, choice of components and safety issues	Knud Dahlerup-Petersen	15’
4. Details of the design	Joaquim Mourao	30’
5. Integration and implementation	Mathieu Favre	15’
6. Discussion and questions from the panel	All	30’

Scope of the review

- Several units of CLIQ power supplies have been manufactured by the MSC Group over the last months (years) and used at CERN for testing of different magnets in SM18
  - We **do not** pretend to conduct a review on the "ad-hoc" design of those units, which has given good results so far
  - This previous design has given the needed flexibility to optimize parameters as capacity, voltage/current, frequency and dumping time constant
- There is now a request to the MPE Group to produce 3 units, 2 of which will be sent to FNAL by the end of May. The third one will serve as spare
  - This review focuses only on the design of these latter units keeping an eye on future developments

Near future plan for protecting magnets with CLIQ

LHC-high luminosity upgrade

- QXF is the inner triplet large quadrupole strings of magnets either side of the ATLAS and CMS.
  - Model testing in Fermi-lab (Two units plus spare)
  - Model testing in CERN (Two units plus spare)
  - First long magnet prototype test in BNL (Two units plus spare)
  - Production of 32 + spares units for LHC-HL, assuming two units per magnet.

Courtesy Glyn Kirby

Longer term possibilities for use in LHC-HL upgrade

- CERN
  - Orbit correctors for LHC-HL: Twin aperture independently powered dipole
  - MQY for LHC-HL with pushed performance for the upgrade. Currently being tested in SM 18 at CERN.
    - Each magnet would need 4 units
  - LHC: Main dipole is being tested at CERN in SM18 in the following months in view for rapid repair of LHC systems

- Outside CERN
  - KEK Japan: D1, LHC-HL Single aperture standalone dipoles requiring 4 units + spares
  - CEA France: Q4 Twin aperture quadrupoles ~ 16 units + spares
  - GSI: they are investigating for use with their magnet systems

- Further future
  - 16 Tesla hybrid FCC models
    - block design & cos-theta design could benefit from CLIQ
    - CCT design (canted cosine theta) may rely on CLIQ; LBNL have requested two units for future testing of their 16 Tesla CCT magnet.

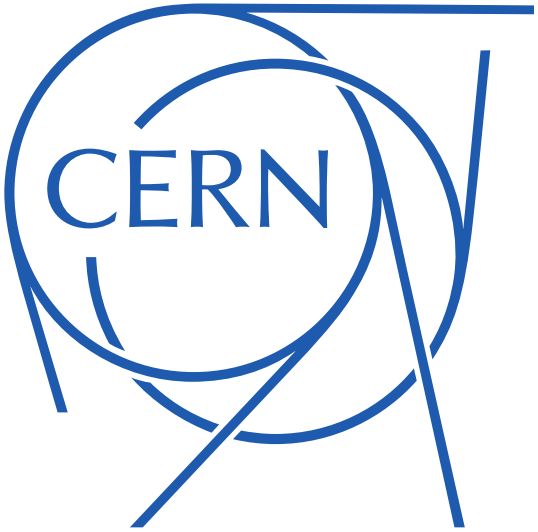
Information from Glyn Kirby

Objectives

- Validation of the concept
- Coherence of the choices with respect to the established functionalities
- Correctness with integration and implementation according to the electrical standards applicable
- Safety aspects

Panel

- Jean-Paul Burnet, TE/EPC
- Alexander Erokhin, TE/MPE
- José Carlos Gascón, DGS-SEE-XP
- Christian Giloux, TE/MSC
- Andrzej Siemko, TE/MPE (ex-officio)
- Yves Thurel, TE/EPC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