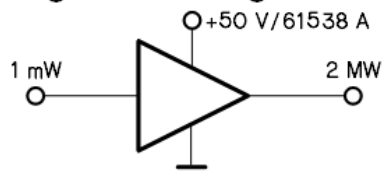


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Radio Frequency RF Power Stations (RFPS) at ESS: Installation and Initial operating experience

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The European Spallation Source (ESS) will be the world's most powerful pulsed neutron source by the end of the decade, which will accelerate a beam of protons with a beam current 62.5 mA to 2 GeV. The beam pulse width is 2.86 ms long and pulse repetition frequency is 14 Hz. The acceleration will be provided by 155 cavities, out of which 97 % of the cavities are superconducting.

The first section of the ESS superconducting linac is the Spoke linac. The spoke linac increases the beam energy from 90 MeV to 216 MeV using the 26 superconducting Spoke cavities resonant at 352 MHz, situated in 13 cryomodules. The maximum power requirement for the spoke RF power station is 400kW. Outputs of two tetrode TH595A based amplifiers are combined to achieve 400kW output. The two tetrodes are powered by a single anode power supply to increase the system reliability and to achieve the cost reduction. In the event of arc in the tetrode, a single series switch will be used to protect the two tetrodes.

The present paper discusses the choice of the tetrode technology and high level design of the tetrode based RF Power Station (RFPS)[1]. The RFPS are delivered by Elettra as a part of Italian in-kind contribution towards the construction of ESS. The detailed design of RFPS is done by ESS and Elettra[2]. At present, 24 RFPS are delivered to ESS. Out of these, 8 RFPS are installed and 6 RFPS are commissioned at ESS. Four RFPS are under soak testing in order to understand the possible issues regarding life-time and operation. The present paper also discusses the initial operational experience of RFPS, some issues and their mitigation.

References:

1. R.A.Yogi et. al., '352 MHz Source and Plans for Full Power Testing of Prototype Spoke Cryomodule', presented during SLHiPP-2012 meeting, 3-4 May 2012, Catania, Italy.
2. Cristina Pasotti, '400 kW - 352 MHz Radio Frequency Power Station Technical Specification', E-ST ESS RF TSD 002, 2017 (confidential document).

Primary authors: MARTINS, Carlos (European Spallation Source ERIC); MARTINS, Carlos (European Spallation Source); KUMAR, Manish; BERGSTROM, Matthew (ESS); SADEGHZADEH, Mohammadhadi; YOGI, Rutambhara

Presenter: YOGI, Rutambhara

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