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## 5P23 - Measurements on Combined 12.5/17.5 kV Prototype Inductive Adder for the CLIC DR Kickers

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The CLIC study is investigating the technical feasibility of an electron-positron collider with high luminosity and a nominal centre-of-mass energy of 3 TeV. The pre-damping rings and damping rings (DRs) will produce ultra-low emittance beam with high bunch charge. To avoid beam emittance increase, the DR kicker systems must provide extremely stable field pulses during injection and extraction of bunches. The DR extraction kicker system consists of a stripline kicker and two pulse modulators. The present specification for the modulators calls for pulses with 160 ns or 900 ns flat-top duration of nominally  $\pm 12.5$  kV and 305 A, with ripple of not more than  $\pm 0.02\%$  ( $\pm 2.5$  V). In addition, there is a proposal to use the same modulators and striplines for dumping the beam, with  $\pm 17.5$  kV stripline pulse voltage. An inductive adder is a very promising approach to meeting the CLIC DR extraction kicker specifications because analogue modulation methods can be applied to adjust the shape of the flat-top of the output waveform. Two full-scale, 12.5 kV, 20-layer, prototype inductive adder have been designed, built and tested at CERN. One of these has also been tested with eight additional layers, to facilitate two operation modes: 12.5 kV pulses for extraction kicker operation and 17.5 kV for dump kicker operation. An automated control system for droop and ripple compensation, based on Labview software, has been designed and implemented for the prototype modulators. The results of laboratory tests of full-scale prototypes, during normal operation and with typical fault scenarios, are presented. The paper also includes comparisons of results from different measurement techniques of fast, up to two microseconds duration, high-voltage pulses and an analysis of the limits of these techniques.

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