

## JT-60SA POWER SUPPLY SYSTEM

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JT-60SA is a joint international research and development project involving Japan and Europe, with the scope to support ITER operation, and is to be built in Naka, Japan, using infrastructure and as much as possible subsystems of the existing JT-60U experiment. It is a "super, advanced" (SA) tokamak with superconducting coils (SM) to study advanced modes of plasma operation. SM system includes Toroidal and Poloidal Field Coils (TFC and PFC respectively). In addition to these, there are also normal conducting coils: 2 Fast Plasma Control Coils (FPCC), a number of Resistive Wall Mode Control Coils and the Error Field Correction Coils. TFC is composed by 18 coils grouped in three sections interconnected through three quench protection circuits (QPC), Fig.1a. QPC are designed and grounded to limit the voltage across/to ground each TFC section at to 2.8 kV/1.4kV, respectively, at the TFC nominal current (25.7 kA). QPC is realised through hybrid (mechanical+static) breaker units. In addition one pyrobreaker unit is installed in each QPC acting as a back-up. Each PFC PS system includes (Fig.1b) : a 12 pulses/4 quadrant thyristor converter (PS), a Switching Network Units or Booster PS to generate plasma breakdown and a QPC unit. To re-use existing transformers, each converter is composed by two units in parallel each one using back-to-back thyristor on each branch (Fig.2). Each SNU is composed by a hybrid switch able to interrupt a dc current up to 20kA and to commutate it into a set of adjustable resistors in order to generate a voltage step of 5kV. PFC QPCs have similar hybrid scheme as TFC QPC but operating up to 20kA and 4.2kV. The paper will show the main features of the entire system and of the main components enlightening the new peculiar aspects of the related design.

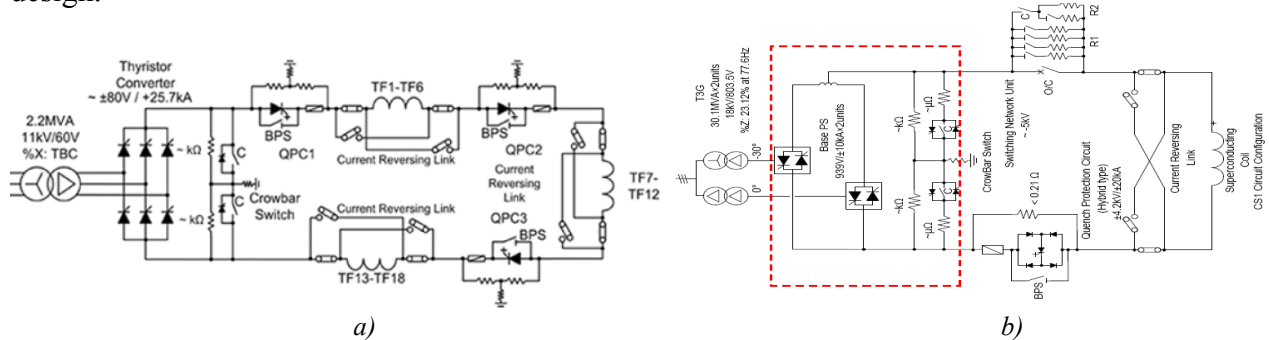


Figure 1a,b: Power Supply Scheme for the JT-60SA TFC and PFC (CS1 PS as shown as an example)

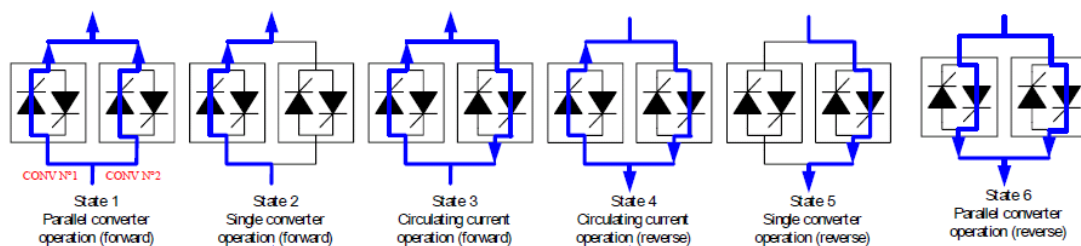


Figure 2: Inverting current sequence in the back-to-back thyristor converter