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C2Po2A-04 [22]: Control and Commissioning of a Subcooled Helium Cryogenic Testing Platform with Cold Compressors

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The subcooled helium cryogenic testing platform with cold compressors has been operated successfully in the end of 2018 at the Institute of Plasma Physics, Chinese Academy of Sciences (CASIPP). It is the first subcooled helium cryogenic system based on the cryogenic decompression technique in China, which has been designed and constructed over two years by our own team. The subcooled helium cryogenic testing platform was designed to provide the 4.5K supercritical helium for the helium forced-flow cooling with one helium circulating pump, and provide the 3K subcooled helium with two cold compressors in series. It consists of one 2.5kW@4.5K helium refrigerator and one distribution valve box where the helium circulating pump and the cold compressors installed on it. This paper will present the process control flow of the distribution system and the design parameters of two cold compressors. During the commissioning, the startup and stop control flow of the two cold compressors have been determined. And their automatic control was performed within the stable operation area in the performance map. The testing result shows the lowest temperature and pressure of the saturated helium bath, and indicates the subcooled helium system has an equivalent refrigeration power of 700W@3K. The commissioning experience will help the reconstruction of the subcooled helium system for EAST Tokamak in future to enhance the cryogenic stability in higher magnetic field.

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