A new nuclear demagnetization system coupled to a powerful dilution refrigerator and a vector magnet was successfully built and operated. Our aim was to construct a versatile, modular cryostat, with a large experimental space providing an excellent platform for various types of ultralow temperature measurements. A powerful dilution unit allows us to cool the mixing chamber down to 3 mK and to precool a massive copper (~90 mol) nuclear stage in a field of 9 T to 8 mK in 100 h. After demagnetization the lowest temperature of the copper stage measured by a Pt thermometer was 50.9 µK in a field of 20 mT. The cryostat is integrated with a 8 T - 4 T vector magnet system. Furthermore it is equipped with several semi-rigid coaxial lines (SC-219/50-C-TU-L) to the still plate extending to the mixing chamber with semi-rigid superconducting coaxial lines (SC-160/50-NbTi-NbTi) for microwave frequencies up to 65 GHz. The refrigerator is provided with a 50 mm central clear shot tube allowing the insertion of a top-loading probe to carry out measurements inside the vector magnet bore in a reasonably short time of about 4 hours. The system will be used to study the quantum critical behavior of heavy fermion compounds.

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