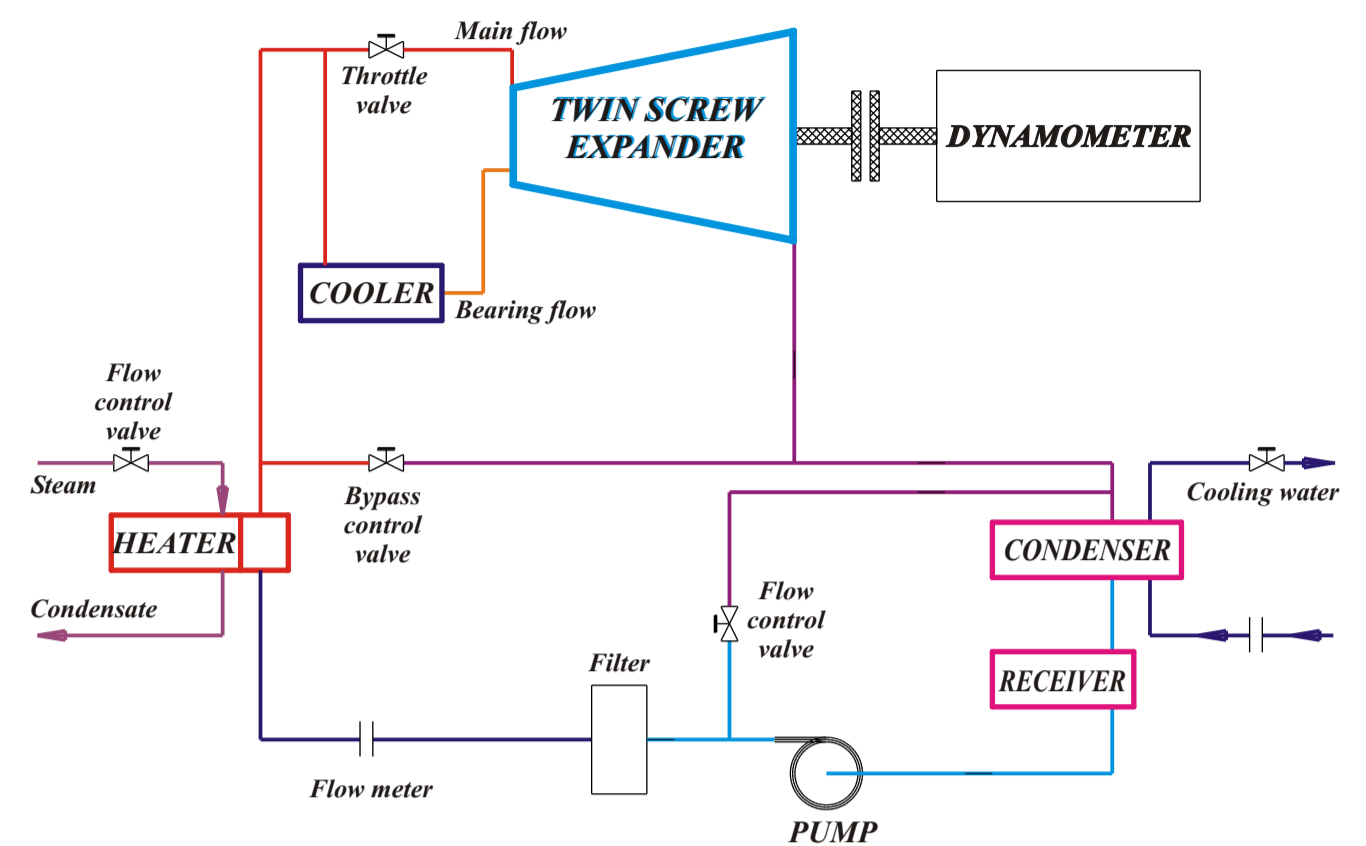


TWO-PHASE EXPANDER (SPHERE) TEST RIG

This test rig is the largest in the laboratory and was constructed in its original form in 1984 with funding from both the private and public sectors.

The aim was to use it to prove the concept that a twin screw expander is suitable for two-phase expansion of organic fluids operating in a close cycle for the recovery of power from geothermally heated water. The rig was given the acronym **SPHERE** (Single Phase Heat Efficient Recovery of Energy).



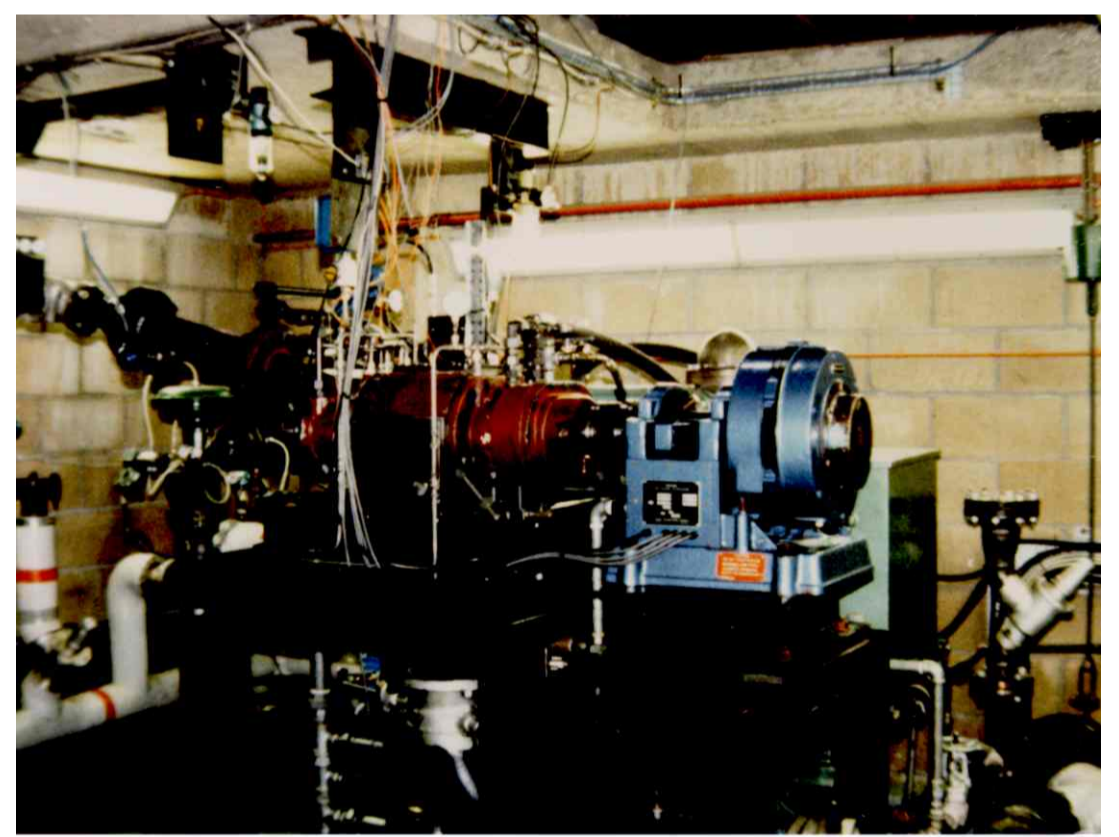
The working fluid selected for this was Refrigerant 113. A major portion of the test rig is the arrangement of heat exchangers and pumps which are located in the underfloor area below this test cell.

Since its original construction it has been modified many times and a total of six builds of twin screw machine of varying design and one sliding vane expander have been tested on it. Total development money spent on it is now well over £1.5 million.



The first expanders tested were designed and built with timing gears, internal seals and oil lubricated bearings.

The latest ones have no timing gears and sealing system and are lubricated only by the working fluid.



There are two parallel loops now installed, one for the conventional expander which drives an eddy current dynamometer, the other for the new EXPRESSOR.

Since 1996 the main emphasis of the development programme has been on the use of screw expanders to replace throttle valves in large chiller units and the work has been funded by Carrier Corporation of Syracuse, NY, USA.

