WEKASENSE® - Self-calibrating cryogenic flow measurement

Flow measurement is a standard task wherever fluids or gases pass through pipes in the course of technical application. A fundamentally different approach was used in the development of the cryogenic flow measurement system WEKASENSE®.

The methods of flow measurement used until now consisted of differential pressure, vortex, ultrasonic, Coriolis and thermal flow measurement, to give an overview. The existing methods reached their limits when it came to a precise determination of the flow rate wherever fluids close to absolute zero had to be measured. Conventional thermal flow meters or, calorimetric flow meters are based on the principle that they have to warm the respective medium, then measuring the flow speed by the cooling process, a method that poses difficulties when applied to flow measurement of cryogenic fluids.

The new thermal flow measurement WEKASENSE® is the result of research at the Karlsruhe Institute of Technology, abbreviated as KIT, and its significant unique selling point is its innovative capability of self calibration. The WEKASENSE® is capable to measure liquid Helium up to a flow rate of 12g/s. It consists of an external 19 inch rack electronic unit and a compact sensor that is integrated into the pipe‘s vacuum zone, connecting to the electronic unit by the intermediate stage of a vacuum feedthrough.

The new measurement method is based on recordings of independent measurement variables within a fluid‘s flow, which make it possible to establish two independent, yet corresponding, physically very precise relationships. Occurring systematic measurement errors can consequently be corrected by applying mathematical methods.

The notable differences when compared to conventional flow measurement are accuracy, low heat input and low drop of pressure which make the WEKA product especially advantageous for use in the flow measurement of cryogenic fluids.

WEKASENSE® is an adaptive, intelligent sensor that may be calibrated under any conditions, especially when using the saved values of an intrinsic calibration for increasingly accurate measurements during operation. Conventional flow measurement, on the other hand, does not allow for diagnosing uncertainties compared to existing data or system degradation. Since the WEKASENSE® is extremely precise a reduction of operating costs may be expected after installation since the system will work more efficiently.