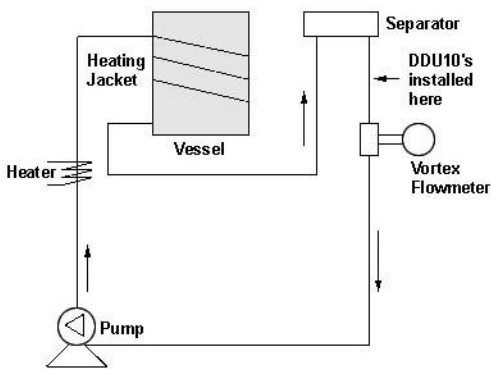


**Flow Measurement of Mineral Oil**

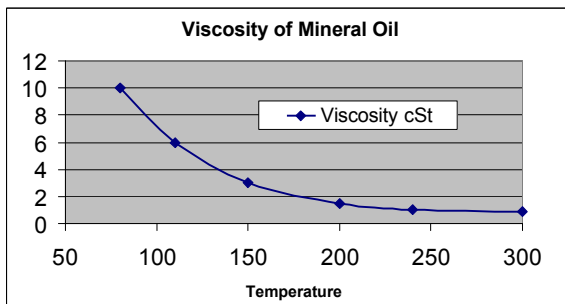


**Description of the Application**

To heat a tank, mineral oil is heated and circulated with the help of a circulation pump over a heating coil in the vessel to heat the boiler of the tank. This is the usual method to heat tanks or an entire pipework (e.g. in case of steam applications). The cooled oil passes an air separator and is subsequently re-fed into the circulation.

The flow-pipe temperature is app. 200 °C – 300 °C, the return-flow temperature between 10 °C and 100 °C.

To monitor the system, vortex flow-measuring devices were integrated into the return flow.



As the viscosity of the oil strongly increases at low temperatures (Reynolds number 4000, viscosity 20 cSt), measurements with vortex devices became rather unstable below 40 °C; and at an oil temperature between 10 °C and 30 °C, the vortex measuring devices did no longer react at all.

**The Solution**

On a trial basis, a Prosonic Flow DMU 93 ultrasonic flow-measuring device was installed in the return flow. Once the pump was started, return-flow temperature stabilized at 15 °C. The ultrasonic flow measurement confirmed the flow expected by the client. Due to this successful test, the client decided to upgrade two measuring points with Prosonic Flow DMU 93.

The client was moreover able to handle the installation and initial operations without support by Endress+Hauser. Both systems have since been operating perfectly. In fact, the client now considers purchasing an additional ultrasonic measuring device, in spite of the higher price.

## **The Advantages**

As the Prosonic Flow clamp on measuring process does not affect the system, it is ideally suited to upgrade an installation or for temporary measurements. The measuring device does not influence existing conditions (e.g.: no pressure loss) and, therefore, does not affect the process as such.

Prosonic Flow clamp on flow-measuring devices are suitable for all types of oil applications with a low degree of viscosity. The viscosity does not influence the functionality of the ultrasonic flow measurement, however may affect its linearity.

## **Special Information**

Applications with oils need only take a few points into account. To achieve a good linearity of the ultrasonic flow-measuring device, the Reynolds number has to be between 5000 and 1000. In addition, conditions of use which tend to lead to foaming or cavitation will have to be avoided. In closed-circuit installations, the tank volume has to be sufficiently large to allow the gas enclosed in the oil sufficient time to escape.

## **Questions?**

The Ultrasonic Product Management at E+H Flowtec AG will be pleased to answer any questions you may have.