Course Process Control (NMBU)

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Solutions to problems in lesson INS1

Solution to Problem 1

A Pt100 element, because it is (much) more accurate in this range. The temperature drift is also less.

Solution to Problem 2

Oil has density approximately 800 kg/m^3. The level is

$$\underline{\underline{h}} = \frac{p}{\rho g} - h_0 = \frac{0.1 \cdot 100000 \text{ N/m}^2}{800 \text{ kg/m}^3 \cdot 9.8 \text{ kgm/s}^2} - 0.5 \text{ m} = \underline{\underline{0.77 \text{ m}}} \qquad (1)$$

Solution to Problem 3

Below are a number of measurement principles for level, pressure and flow, although you were asks only about two:

- **Level**:
  - Buoyancy
  - Radioation
  - Weight
- **Pressure**:
  - Bourdon pipe
  - Manometer
  - Piezo-electrical
- **Flow (liquid)**:
  - Electromagnetic
  - Doppler effect
  - Turbine (in the pipe)
  - Coriolis