Test task for circuit design skills
(version 1.2)

Note: in circuit design tasks no design with ECADs is required. Sketches in pencil or visio-like diagrams are enough.

- List and shortly describe DC voltage converter types you know.

- Suggest a solution for connecting a discrete NPN inductive sensor to an MCU. Sensor is installed outside of the electronic unit.

- Suggest a solution for a bidirectional drive suitable for a 48V 500W DC motor. Solution must be complete, i.e. include critical components selection, as well as calculations or mechanical design nuances if required by solution.

- Suggest a solution for connecting a ***ratiometric bidirectional*** analog sensor to MCU (you can refer to SS94A1 as an example).
  Note: ratiometric means that zero readings correspond to some voltage which depends on the powering voltage (normally Vcc/2). Bidirectional means that output voltage can change both ways (increase or decrease) depending on the “sign” of measured analog value.