

## “Basics of Electrical Engineering – Direct Current”

### Course Goal

You will acquire the necessary knowledge to independently understand the relationships of direct current technology and to accomplish related tasks and perform calculations for simple circuits.

### Course Content

Basic concepts of electricity

- > Atoms and electrons
- > Electrical current
- > Electrical voltage
- > Electrical resistance, conductance
- > Design of a circuit
- > Calculation of conductor resistances

Laws of electrical circuits

- > Ohm's law
- > Connecting of resistors in series
- > Connection of resistors in parallel
- > Dropping resistors and shunt resistors (measurement range expansions)
- > Kirchhoff's laws
- > Mixed circuits
- > Load lines and diagrams

Work and power

- > Electrical work energy
- > Electrical power
- > Energy conversion
- > Efficiency

Voltage generation

- > Types and principle of voltage generation
- > Behaviour of voltage generators
- > Dynamic load line, internal resistance, no-load voltage, short-circuit current
- > Switching of voltage generators

Chemical effects of current

- > Electrolysis
- > Technical application of electrolysis
- > Galvanic elements – primary elements
- > Accumulators – secondary elements

#### Linear and non-linear resistors

- > General properties
- > Fixed resistors
- > Adjustable resistors
- > Temperature-dependence of resistors
- > Negative and positive temperature coefficient thermistors
- > Voltage-dependent resistors
- > Resistor design types

#### Magnetism

- > Manifestations of magnetism
- > Values and units of magnetism
- > Magnetic behaviour of materials
- > Force effects in the magnetic field
- > Induction processes

#### Coils

- > Inductivity
- > Coils in the direct current circuit
- > Connection of coils in series and in parallel
- > Coil design types

#### Electrical field and capacitors

- > Electrical field
- > Capacity
- > Capacitors
- > Capacitors in the direct current circuit
- > Connection of capacitors in series and in parallel
- > Capacitor design types

#### Electrical measurement technology

- > Basic concepts
- > Meters
- > Current measurement
- > Voltage measurement
- > Measurement range expansion
- > Resistance measurement
- > Power measurement
- > Universal measurement instruments

Practical exercises

- > Practical exercises (measurement exercises) on the various topics
- > Creation of measurement reports

Electrical accidents and their prevention

- > Causes of electrical accidents
- > Dangers of electrical current
- > Responding to electrical accidents
- > Protective measures to prevent electrical accidents

**Target Group / Prior Knowledge**

People who want to enter related professions in which knowledge of electricity and electrical circuits is required. The participants should be capable of understanding abstract and logical relationships. Good mathematical knowledge (lower secondary level or the module "Technical Calculation") are required.

**Course Length**

160 instructional units

**Course Price**

Available on request

**Course Location:**

Kapsch Partner Solutions GmbH, Johann-Hoffmann-Platz 9, 1120 Vienna or  
at customer site, by agreement

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