DRIVES

Development and Research on Innovative Vocational Education Skills

SENSOR FUSION EXPERT

SFE.U1.E3 IMPORTANT ELECTRICAL COMPONENTS

Electronics and Electricity Principles

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LEARNING OBJECTIVES

The student is able to …

SFE.U1.E2.PC1	The student knows the functioning of the different measuring devices.
SFE.U1.E2.PC2	The student is able to critically select and use the appropriate measuring device to measure a specific electrical quantity.

MESURING DEVICES

In electronics, to be able to measure the components and check the circuits, it is necessary to have knowledge of equipment for this purpose.

In this module what is intended is to demonstrate which are the most common equipment and how they work.

ELECTRICAL COMPONENTS

Here are the most important ones that we'll see later

- Multimeter
- Oscilloscope

MULTIMETER

The Multimeter

- Composed of two cables, one red and one black, and serves to measure electronic quantities;
- There is a selector switch, to determine what you want to measure;
- As a rule, it is used to measure volts amperes and ohms;
- It is used to measure Direct Current and Alternating Current;
- It is also used to measure the continuity test (to test diodes for example).
    - It usually hums when continuity is successfully achieved.

MULTIMETER

The Multimeter

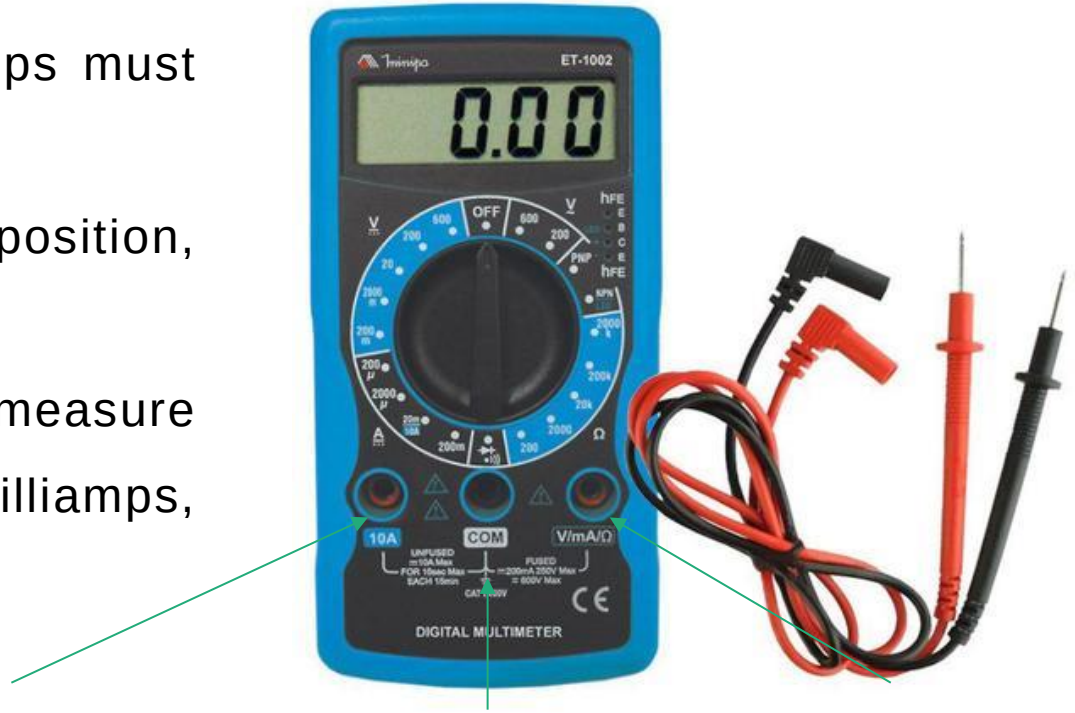
- Amperage and resistance can be measured.
- Other more advanced multimeters may have more units of measure, but the principles will always be the same.

Amperage

Resistor (Ohms)

The Multimeter

- Depending on what we want to measure, the clamps must be inserted in the correct positions.
- As a rule, black is always placed in the ground position, which in this case is the middle hole.
- Here we also have on the left side the position to measure current and on the right side to measure Volts, Milliamps, and Ohms.
- The position of the holes may vary:
  - Depending on the brand of multimeter.



Multimeter - Direct Current and Alternating Current

- A multimeter has several units of measure.
- But when talking about alternating current and direct current, these modes must be selected in the multimeter, depending on what we want to measure.

Direct Current

Alternating Current

MULTIMETER

Multimeter - Direct Current and Alternating Current

- Regarding the selection of measurement units, the maximum power to be measured must be selected.
- For example, if we are talking about Alternating Current, which the maximum is 220v here in Europe, 600v should be selected, in the case of the multimeter shown here.
- If it is 12V Direct Current, 20V should be selected.

Alternating Current

MULTIMETER

Multimetro – Corrente Continua e Corrente Alternada

- Let's imagine that we want to measure a stack.
- The current to be selected will be the continuous current.
- Depending on the battery voltage, the approximate maximum volts marked on the multimeter should be selected.
- Example: a 1.5V battery in the multimeter shown in the image should be selected the value of 20V.

Direct Current

OSCILOSCOPE

The Oscilloscope

- Relatively different from the multimeter, the oscilloscope is more complex to handle.
- It aims to:
  - Analyze the waveform of an electrical signal
  - Analyze frequency, average and effective voltage, among others

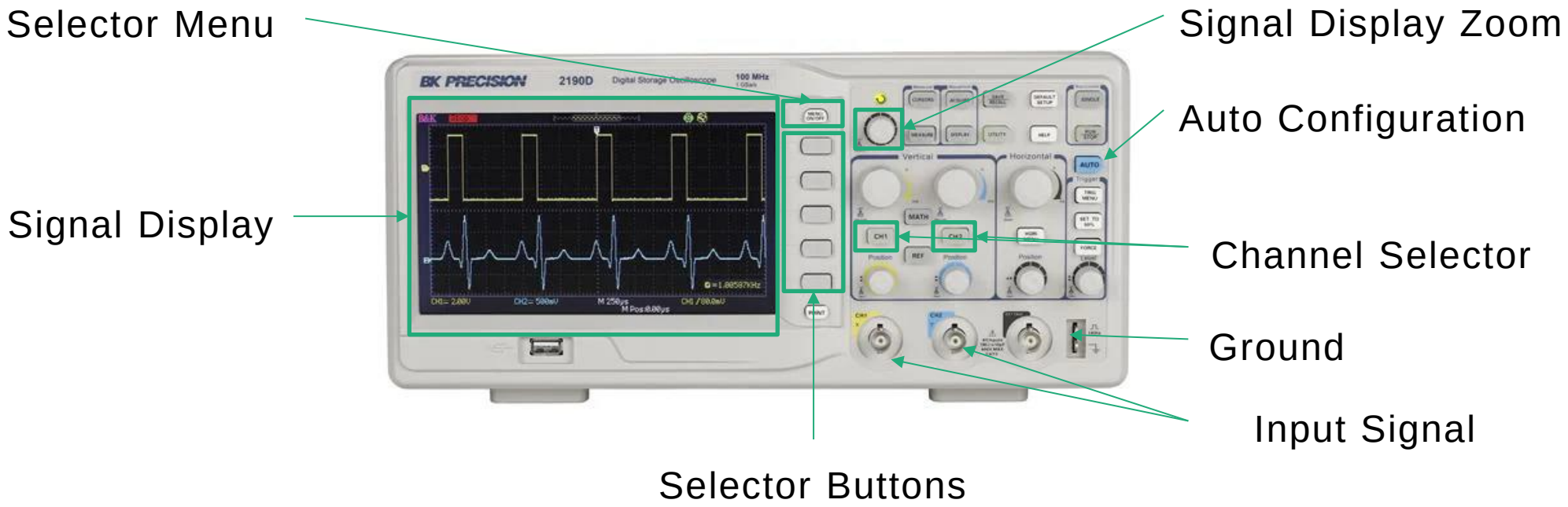
OSCILOSCOPE

The Oscilloscope

- By default, all oscilloscopes feature two input channels;
- These channels are intended to receive the data read from the electrical signals;
- To perform this reading, there are test leads, similar to the multimeter clamps, which are connected to these zones.

Oscilloscope Features

- Let's identify some oscilloscope features:



OSCILOSCOPE

How to use the oscilloscope if you are a beginner:

- In order to make it easier for beginners to use, what we recommend to do in the oscilloscope is:
  - Place the source or circuit to be analyzed connected to the probes.
  - Select the Auto Configuration button to automatically configure the oscilloscope according to what you want to analyze.

ALL IN ONE

Multimeter + Oscilloscope

- With technological evolution, it is now possible to obtain a multimeter and an oscilloscope in the same equipment.
- Sometimes they can bring fewer functions than individual equipment.

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DRIVES

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Thank you for your attention

DRIVES project is project under **The Blueprint for Sectoral Cooperation on Skills in Automotive Sector**, as part of New Skills Agenda.

The aim of the Blueprint is **to support an overall sectoral strategy and to develop concrete actions to address short and medium term skills needs.**

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