Automotive Sensors Unit

AV-S

Engineering and Technical Teaching Equipment

www.edibon.com
PRODUCTS
20.- ELECTRONICS

INTRODUCTION

Automotive electronics is the branch of mechatronics focused on the electrical and electronic equipment installed in cars. The importance of electronic systems in cars has been increasing year by year till reaching one of the main parts of the automobiles today.

The electronic systems have replaced a lot of functions performed manually or by mechanical systems, like the fuel injection system, the control of emission gases, the safety system, the checking of the car liquids, the comfort system, the throttle control and a long etcetera.

The Automotive Sensors Unit, "AV-S", is composed of real sensors and components used in current automotive systems. The "AV-S" unit is provided with a different set of practical exercises, through which the student will understand how the sensors of the automotive field work.

The "AV-S" can work alone, but some sensors can also be connected to the Automotive Electronic Control Device Unit, "AV-ECD", to send real sensors measurements to an electronic control unit.

GENERAL DESCRIPTION

The Automotive Sensors Unit, "AV-S", provides a practical solution to familiarize the students with the sensors used in modern automotive systems.

The sensors included in the "AV-S" are focused on the measurements required for the engine management system, being the mass air flow sensor, the lambda sensor, different temperature sensor, oil pressure sensor, accelerator pedal position sensor, etc. but there are also other sensors for the stability system, the parking system, the lighting system and the safety system.

The "AV-S" unit is mounted on a metallic plate that can be used alone or assembled to the EDIBON workbenches.

All sensor circuits included in the unit are isolated to understand the function of the circuits separately. All connector points of the sensors circuits are accessible through 2 mm standard lab sockets.

SPECIFICATIONS

The "AV-S" unit is mounted in a metallic plate, which can be assembled in vertical position or used on the surface of a table.

The "AV-S" can work alone, but some sensors can also be connected to the Automotive Electronic Control Device Unit, "AV-ECD", to send real sensors measurements to an electronic control unit.

The sensors of the "AV-S" unit are communicated through digital signals, analog signals, PWM signals and the network protocol CAN bus.

Some sensors allow the simulation of failures in their components, which are inserted through toggle switches.

All circuits include standard 2 mm lab sockets, to access and analyze different circuit points.

The circuits included in the "AV-S" unit are divided in the following types:

- Engine management system:
  - Crankshaft inductive sensor (also called phase sensor).
  - Camshaft Hall sensor.
  - Manifold absolute pressure sensor.
  - Oxygen or Lambda sensor.
  - Accelerator pedal position sensor.
  - Knock sensor.
  - Mass air flow sensor.
  - Throttle-valve position sensor.
  - Coolant level switch
  - Four types of temperature sensors (NTC and PTC temperature sensor):
    - Intake air temperature sensor.
    - Coolant temperature sensor.
    - Outdoor temperature sensor.
- Steering system:
  - Steering angle sensor.
- Lighting system:
  - Light intensity sensor.
- Parking system:
  - Ultrasonic proximity sensor.
- Electronic Stability Programme:
  - Lateral acceleration sensor.
- Safety system:
  - Inertia switch

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Communication with CAN network protocol.
2.- Communication with digital or analog signals.
3.- Use of the inductive crankshaft sensor to measure the position (phase) of the crank.
4.- Use of the Hall Effect camshaft sensor to measure the rpm of the engine.
5.- Manifold absolute pressure sensor signal.
6.- Air quality sensor signal.
7.- Function of the inertia switch in the safety system.
8.- Understanding the Lambda sensor reading.
9.- Accelerator pedal position sensor signal.
10.-Calibration of an accelerator pedal position sensor signal.
11.-Understanding the knock sensor reading.
12.-Mass air flow sensor signal.
13.-Calibration of a throttle-valve potentiometer.
14.-Function of the coolant level switch.
15.-Differences between the intake air temperature sensor, refrigerant temperature sensor and outdoor temperature sensor.
16.-Function of the light intensity sensor signal.
17.-Calibration of an ultrasonic proximity sensor.
18.-Function of the lateral acceleration sensor signal in the electronic stability program, ESP.
19.-Understanding the steering angle sensor reading.
- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: single-phase, 220 V/50 Hz or 110 V/60 Hz.

RECOMMENDED ACCESSORIES (Not included)

- EDAS/VIS-0.25. EDIBON Data Acquisition System / Virtual Instrumentation System (250.000 samples per second).
- EDAS/VIS-1.25. EDIBON Data Acquisition System / Virtual Instrumentation System (1.250.000 samples per second).

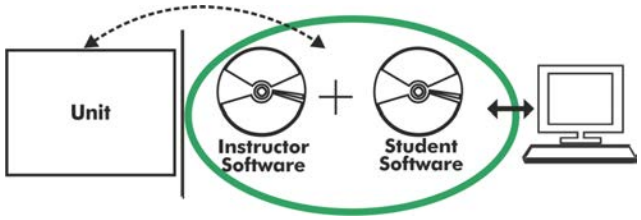
DIMENSIONS AND WEIGHTS

AV-S:

-Dimensions: 550 x 250 x 300 mm approx.
(21.65 x 9.84 x 11.81 inches approx.)

-Weight: 14 Kg approx.
(30 pounds approx.)

AV-S/ICAI. Interactive Computer Aided Instruction Software System:



With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF).** Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

Instructor Software

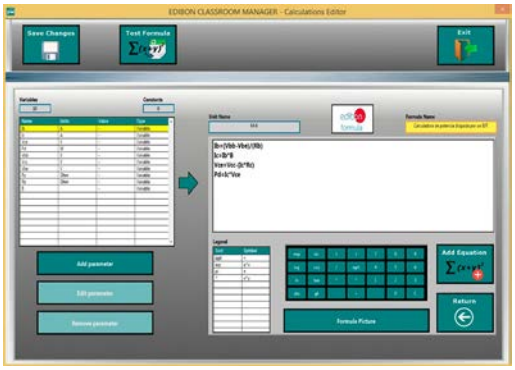
- ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

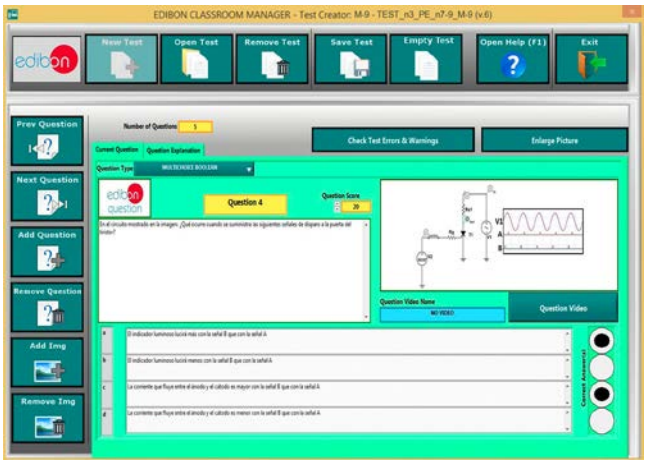
Innovative features:

- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation System Solver Engine.**
- **Updatable Contents.**
- **Report generation, User Progression Monitoring and Statistics.**

ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional

Student Software

- ESL-SOF. EDIBON Student Labsoft (Student Software).

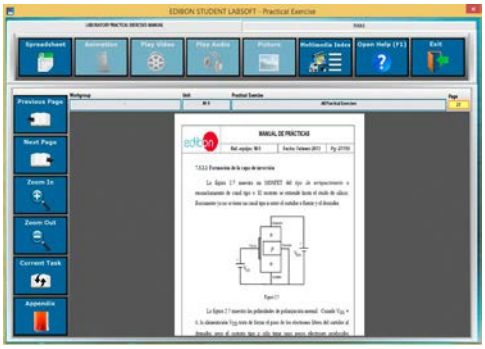
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

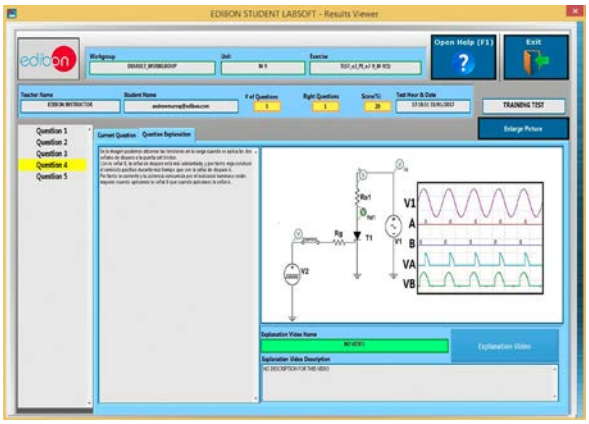
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge and progression.**
- **Test self-correction.**
- **Calculations computing and plotting.**
- **Equation System Solver Engine.**
- **User Monitoring Learning & Printable Reports.**
- **Multimedia-Supported auxiliary resources.**

ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

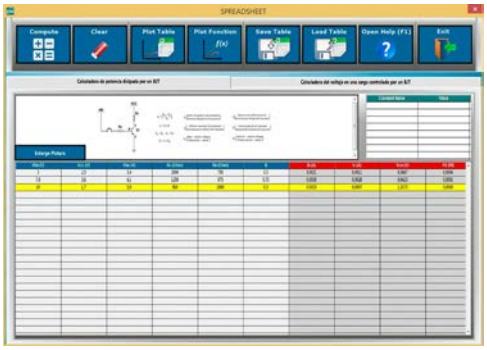
For more information see **ICAI** catalogue. Click on the following link:
www.edibon.com/en/files/expansion/ICAI/catalog



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

✱ Specifications subject to change without previous notice, due to the convenience of improvement of the product.

INTERNATIONAL

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REPRESENTATIVE: