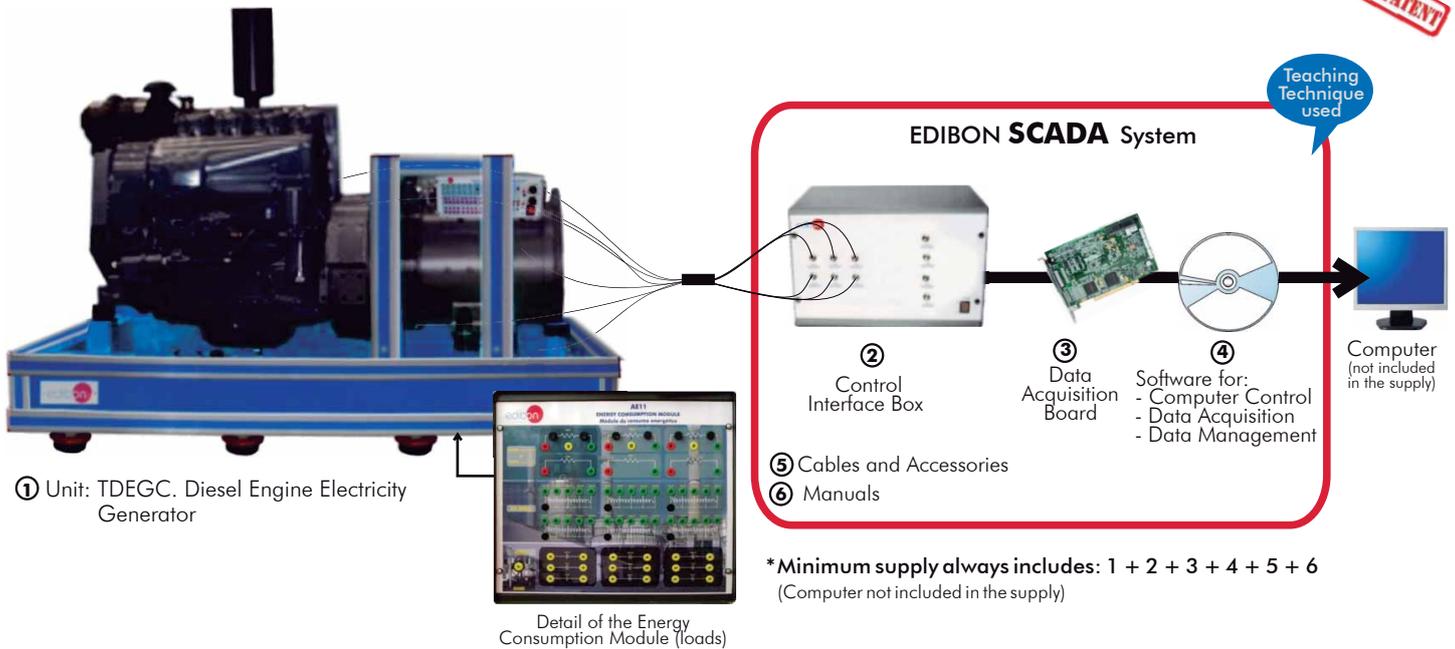


EDIBON PATENT



Key features:

- **Advanced Real-Time SCADA.**
- **Open Control + Multicontrol + Real-Time Control.**
- **Specialized EDIBON Control Software based on Labview.**
- **National Instruments Data Acquisition board (250 KS/s , kilo samples per second).**
- **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**
- **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**
- **Capable of doing applied research, real industrial simulation, training courses, etc.**
- **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**
- **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- **Designed and manufactured under several quality standards.**
- **Optional CAL software helps the user perform calculations and comprehend the results.**
- **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

**OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL**

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- Products
- Products range
- Units
- 9.-Thermodynamics & Thermotechnics

For more information about Key Features, click here:



GENERAL DESCRIPTION

The generating set is a unit which transforms the mechanical energy generated by endothermic engine into electric energy through an alternator. Is meant for industrial and professional use, powered by an endothermic engine; it is composed of various main parts such as: engine, alternator, electric and electronic controls, the fairing or a protective structure.

The assembling is made on a steel structure, on which are provided elastic support which must damp the vibrations and also eliminate sounds which would produce noise.

SPECIFICATIONS

Items supplied as standard

① TDEGC. Unit:

A.C. Generator:

Three-phase generation: 6.5 kVA (5.2 kW) / 400 V / 9.4 A. Frequency: 50 Hz. Power factor (cos Phi): 0.8.

Alternator: self-excited, self-regulated, with brush.

Type: Three-phase, synchronous. Insulating class: H.

Engine:

Type: 4-Stroke. Displacement: 406 cm³. Cylinders: 1. Output: 6.5 kW (8.8 HP). Speed: 3000 rpm. Fuel consumption: 245 g/kWh. Cooling system: air. Engine oil capacity: 1.6 l. Starter: electric. Fuel: diesel.

General specifications:

Battery: 12V - 38Ah. Fuel tank capacity: 23 l. Running time: 17.5 h. Protection: IP 23. Dimensions max.: 1020 x 645 x 930 approx.

Weight (dry): 194 Kg / 200Kg. approx. Noise level: 94 LWA (69 dB(A) - 7 m) 92 LWA (67 dB(A) - 7 m).

Output:

Declared powers at the following ambient conditions: temperature 20°C, relative humidity 30% altitude 100 m above sea level.

In an approximate way one reduces: of 1% every 100 m altitude and of 2.5% for every 5°C above 25°C.

Energy Consumption Module (loads) (AE11):

Metallic box (490 x 450 x 470 mm. approx.).

Variable resistive loads: 3 x [150 Ω (500 W)].

Fixed resistive loads: 3 x [150 Ω (500 W) + 150 Ω (500 W)].

Inductive loads: 6 x [0, 33, 78, 140, 193, 236 mH]. (2 A Max.).

Capacitive loads: 3 x [3 x 3.5 μF] + 3 x [3 x 7 μF] + 3 x [3 x 14 μF].

Ground connector.

SCADA System for Diesel Engine Generation Group:

Diesel Engine Set Supervision:

- | | | |
|------------------------|---|----------------------|
| - Generator voltages. | *- Battery voltage. | - Motor speed. |
| *- Main voltages. | *- Active, Reactive and Apparent power. | - Fuel level. |
| - Generator frequency. | *- Power factor. | - Motor temperature. |
| - Generator currents. | *- Counters. | |

Diesel Engine Set Control:

- | | | |
|-------------------------------|----------------------------------|------------------------------|
| - Automatic start/stop. | *- Manual Synchronization. | - Remote start/stop. |
| - Manual start/stop. | *- Automatic voltage regulation. | - Emergency stop. |
| *- Automatic synchronization. | - Manual voltage regulation. | - Automatic battery charger. |

Diesel Engine Set Protection:

- | | | |
|---------------------|--------------------|---|
| - Fuel low level. | *- Undervoltage. | *- Battery voltage fault. |
| - Oil low pressure. | *- Overcurrent. | *- Engine set start fault. |
| - High temperature. | *- Overfrequency. | - General magnetothermal and differential protection. |
| *- Overvoltage. | *- Underfrequency. | |

The parameters with " * " are evaluated only when this unit is integrated in APS12. Advanced Electrical Power System and Mechanical Power Plants Simulator.

Items supplied as standard (continuation)**② TDEGC/CIB. Control Interface Box :**

Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student.

All sensors, with their respective signals, are properly manipulated from -10V. to +10V computer output.

Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors.

Single cable between the control interface box and computer.

The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure.

Simultaneous visualization in the computer of all parameters involved in the process.

Calibration of the sensors involved in the process.

Real time curves representation about system responses.

Storage of all the process data and results in a file.

Graphic representation, in real time, of all the process/system responses.

All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer.

Shield and filtered signals to avoid external interferences.

Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Real time computer control for pumps, compressors, resistances, control valves, etc.

Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously.

Three safety levels, one mechanical in the unit, other electronic in the control interface and the third one in the control software.

③ DAB. Data Acquisition Board:

PCI Express Data acquisition board (National Instruments) to be placed in a computer slot. Bus Express PCI.

Analog input:

Number of **channels= 16** single-ended or 8 differential.

Resolution= 16 bits, 1 in 65536.

Sampling rate up to: 250 KS/s (Kilo samples per second).

Input range (V) = $\pm 10V$.

Data transfers=DMA, interrupts, programmed I/O.

Number of DMA channels=6.

Analog output:

Number of **channels=2**.

Resolution= 16 bits, 1 in 65536.

Maximum output rate up to: 900 KS/s.

Output range(V) = $\pm 10V$.

Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output:

Number of **channels=24 inputs/outputs**.

DO or DI Sample Clock frequency: 0 to 100 Mhz.

Timing: **Counter/timers=4**. Resolution: Counter/timers: 32 bits.

④ TDEGC/CCSOF. Computer Control+ Data Acquisition+ Data Management Software:

Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen.

Compatible with the industry standards.

Registration and visualization of all process variables in an automatic and simultaneous way.

Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.

Management, processing, comparison and storage of data. Sampling velocity up to 250 KS/s (kilo samples per second).

Calibration system for the sensors involved in the process.

It allows the registration of the alarms state and the graphic representation in real time.

Comparative analysis of the obtained data, after the process and modification of the conditions during the process.

Open software, allowing to the teacher to modify texts, instructions.

Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.

This unit allows the 30 students of the classroom to visualize simultaneously all results and manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

⑤ Cables and Accessories, for normal operation.**⑥ Manuals:**

This unit is **supplied with 8 manuals**: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

* References 1 to 6: TDEGC + TDEGC/CIB + DAB + TDEGC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.

Minimum configuration for normal operation includes:

- ① Unit: TDEGC. Diesel Engine Electricity Generator.
- ② TDEGC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ TDEGC/CCSOE. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

* **IMPORTANT:** Under **TDEGC** we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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REPRESENTATIVE: