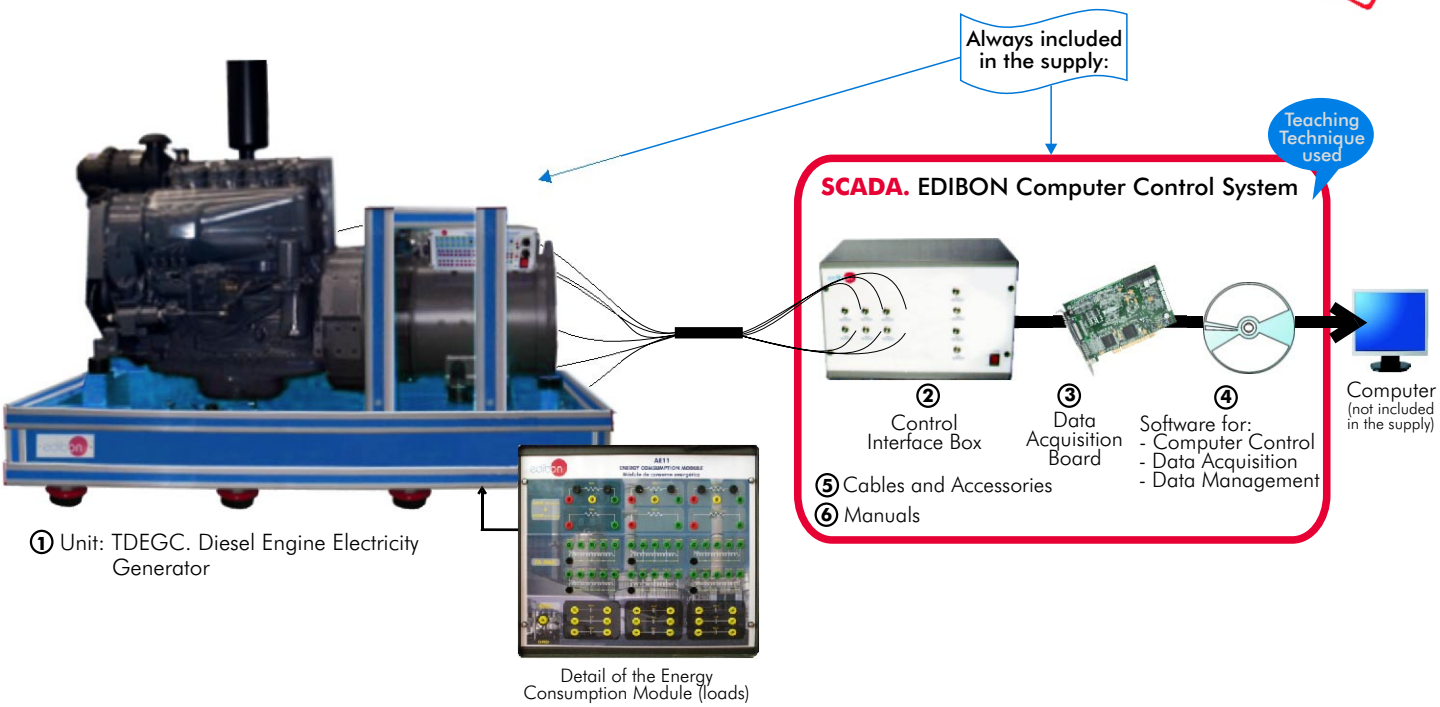
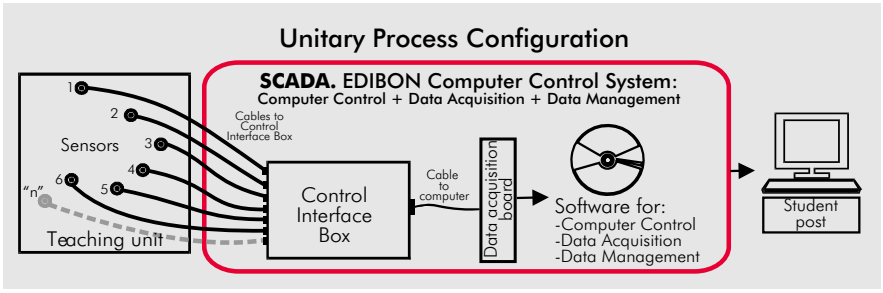
edibon
Technical Teaching Equipment

Computer Controlled
Diesel Engine Electricity Generator
TDEGC

EDIBON PATENT



OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL



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Products
Products range
Units
9.-Thermodynamics & Thermotechnics

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.

ISO:9001-2000 Certificate of Approval. Reg. No. E204034

European Union Certificate

Certificates ISO 14001: 2004 and **ECO-Management and Audit Scheme**
(environmental management)

Worlddidac Quality Charter Certificate
Worlddidac Member

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 cm^3. 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):

This module offer:

Three-phase and Single-phase resistances, inductances and capacitors.
Metallic box (490 x 450 x 470 mm. approx.).
3 Variable resistive laads (150 Ω). 500W (2 A max.).
3 Fixed resistive loads (150 Ω). 500W (2 A max.).
6 Inductive loads (0, 33, 78, 140, 193 and 236 mH).
3 Capacitive loads (3.5 μF).
3 Capacitive loads (7 μF).
3 Capacitive loads (14 μF).
Ground connection.

SCADA System for Diesel Engine Generation Group:

Diesel Engine Set Supervision:

- Generator Voltages.
- ∗ - Main Voltages.
- Generator frequency.
- Generator currents.
- ∗ - Battery Voltage.
- ∗ - Active, Reactive and Apparent power.
- ∗ - Power factor.
- ∗ - Counters.
- Motor speed.
- Fuel level.
- Motor temperature.

Diesel Engine Set Control:

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

Diesel Engine Set Protection:

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

The parameters with "∗" are evaluated only when this unit is integrated in APSS12. Advanced Power Plant Simulator.

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.

Simultaneously visualization in the computer of all parameters involved in the process. Calibration of all 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 placed in only one computer screen.

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 time and in a real time , of parameters involved in the process simultaneously.

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

③ DAB. Data Acquisition Board:

PCI Data acquisition board (National Instruments) to be placed in a computer slot. Bus 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)=±10V. Data transfers=DMA, interrupts, programmed I/0. Number of DMA channels=6.

Analog output: Number of **channels=2**. **Resolution=16 bits**, 1 in 65536. Maximum output rate up to: 833 KS/s.
Output range(V)=±10V. Data transfers=DMA, interrupts, programmed I/0.

Digital Input/Output: Number of **channels=24 inputs/outputs**. D0 or DI Sample Clock frequency: 0 to 1 Mhz.

Timing: **Counter/timers=2**. 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 simultaneously 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 250,000 data per second guaranteed. Student calibration system for all 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 at different work levels.

This unit allows that the 30 students of the classroom can visualize simultaneously all results and manipulation of the unit, during the process, by using a projector.

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.

ORDER INFORMATION

Items supplied as standard

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/CCSOF. 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.

edibon INTERNATIONAL

C/ Del Agua, 14. Polígono San José de Valderas. 28918 LEGANES. (Madrid). SPAIN.
Phone: 34-91-6199363 FAX: 34-91-6198647
E-mail: edibon@edibon.com WEB site: www.edibon.com

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REPRESENTATIVE: