

TH 135 COMPACT STEAM TURBINE POWER PLANT, 0.5 kW



Photograph includes optional equipment

GENERAL DESCRIPTION:

The unit is designed to simulate modern steam power plant. Main components consist of a feed water system, a small industrial boiler, a steam turbine, a generator and lamp load, a condenser with a condensate tank and a pump, and a cooling tower. Accessories such as fuel tank, fuel flow meter, feed water meter, and a stack are also included. Instruments are provided for measurement of pressures, temperatures, output voltage and currents.

Instruction manual is also included.

EXPERIMENT CAPABILITIES:

- Measurement of feed water and fuel flow rates.
- Boiler efficiency, turbine generator efficiency, and overall power plant efficiency.
- Condenser heat transfer efficiency.
- Cooling tower efficiency.

TECHNICAL DATA:

The boiler set consists of:

A • Boiler Unit:

- Type : Vertical, water tube
- Rated heat output : Approx. 63 kW (53,900 kcal/h)
- Equivalent evaporation : Approx. 100 kg/h steam
- Maximum working pressure : 10 kg/cm² (0.98 MPa)
- Measuring instruments : Pressure gauge for steam outlet
: Temperature sensors for feed water, boiler outlet and exhaust stack.
(including ambient temperature)
- Safety devices : Safety valve
: Level gauge and switch at boiler
: Low level alarm
- Boiler accessories : Steam separator
: Stack, 2 x 2.4 m stainless steel with elbows
- Burner:
 - Type : Forced draft, pressure atomized
 - Control : On-Off
 - Fuel : Diesel or kerosene (LPG is available as an option.)
- Fuel system : Stainless steel fuel tank, fuel strainer and fuel meter
- Feed water system:
 - Resin filter for public water.
 - Soft water tank. : stainless steel
 - Water meter for steam rate monitoring
- Power supply : 380 V, 3 Ph, 50Hz. Other power supply is available on request.

B . Steam Turbine

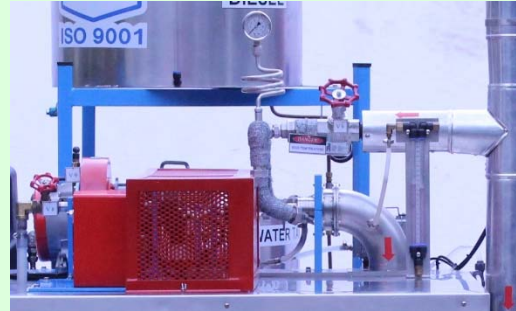
- Type : Single stage, twin nozzle impulse turbine
- Maximum electrical output : Approx. 0.3 kW

Measuring instruments:

- Speed sensor for turbine
- Temperature sensors for steam inlet and outlet
- Pressure gauge for steam inlet
- Water manometer for turbine outlet

C . Generator and Lamp Load

- Voltage : 220V, 1 Ph, 50 Hz.
- Load lamps : 1 set.
- Measuring instruments
 - Generator speed digital display
 - Voltage and current digital display

**D . Condenser and Cooling Tower**

- TH 101-013 Condenser

Description

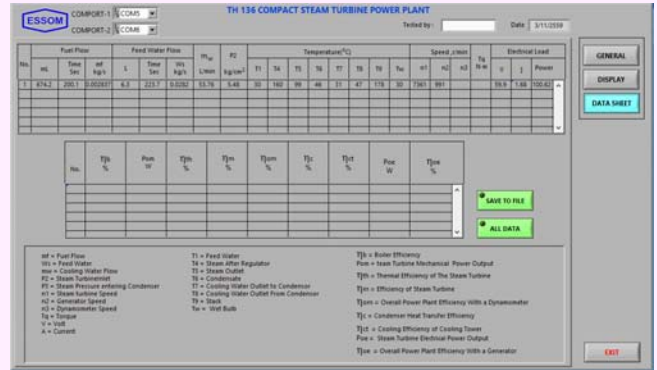
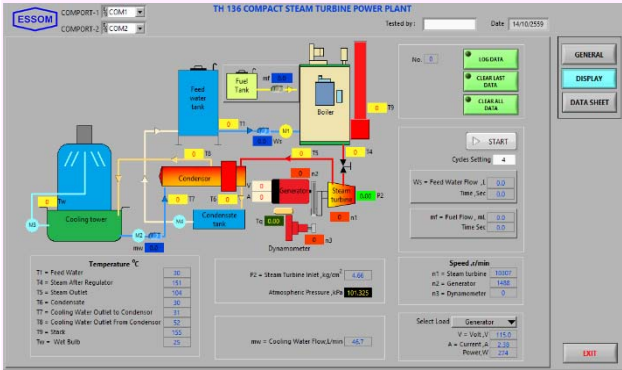
The unit allows a study of heat transfer in a heat exchanger as well as recover condensate for reuse.

- Type : Steam tube
 - Accessories and instruments
 - : Cooling water pump
 - : Water meter.
 - : Condensate tank. : Stainless steel
 - : Temperature sensors for condensate, cooling water inlet and outlet
 - : Strainer
 - TH 135-014 Cooling Tower
- Description
- This is an educational unit for recovering of condenser cooling water as well as studying of cooling tower efficiency

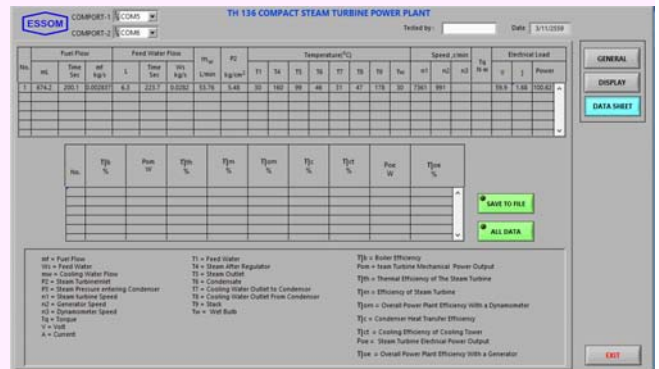
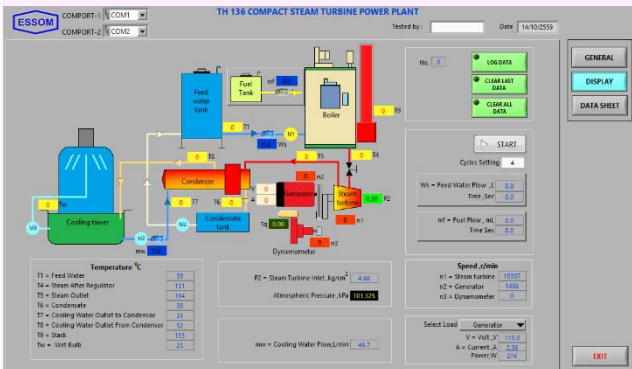
E . Software for data display and analysis by computer (separately supplied).**OPTIONAL EQUIPMENT**

- TH 101-021 Sand filter for water with suspended materials
- TH 101-022 Carbon filter for water with odour or rust
- TH 101-031 Pressure sensor
- TH 101-032 Fuel flow totalizer
- TH 101-033 Feed water flow totalizer
- TH 101-035 Cooling water flow sensor
- Portable pH meter
- TH 135-005EBA Electric boiler instead of diesel boiler.

- TH 135-015 Water Brake Dynamometer (HD110S)
The dynamometer is connected to the turbine for measurement of mechanical output. Speed and torque sensors and indicators are provided.
- TH 135-020 Electric Super Heater
Description
The unit provides superheated steam for other use such as for a steam turbine. Saturated steam from the boiler is further heated in the electric super heater. Instruments are provided for Measurement of temperature and pressure. The test is to be carried out at low steam rate and compare thermal efficiency for saturated and superheated steam.
- TH 135-050 Computer Interface
Sensors with computer interface unit for key data acquisition instead of analog data measuring instruments.



- TH 135-060 Computer Control
This comprises:
 - Turbine inlet steam throttle control.
 - Additional sensors include pressure for boiler and turbine inlet, fuel flow instead of fuel meter, water flow instead of feed and condenser cooling water meters.
 - Computer interface unit for pressure , temperature , fuel flow , water flow , speed, voltage and current.
 - Additional software for control by computer (separately supplied).
- Other optional equipment, please contact manufacturer (essom@essom.com)



Shipping dimension and weight

: One 20 ft. container