

**STEAM POWER PLANT (5kW, 10kW, 20kW)****EXPERIMENTAL CAPABILITY**

- Operation of a complete power plant
- Thermal efficiencies
- Heat Balance and Energy utilisation
- Power generation
- Fuel consumption

**FEATURES**

- Self-contained complete teaching facility
- Low cost
- Easy installation
- Built to British Safety Standards
- Comprehensive instrumentation

**INTRODUCTION**

Cussons Steam Laboratory Equipment has been designed to provide a comprehensive range of products for teaching the technology of steam plant in thermodynamics courses. All items reflect modern practices and their design incorporates safety features to minimise any risk in operation. The equipment has been designed to provide a comprehensive facility for the complete investigation of a steam power plant. The features incorporated and power ratings chosen constitute an excellent representation of industrial practice within the limitations of an educational laboratory.

**DESCRIPTION**

Cussons Steam Power Plants have been designed to provide a comprehensive facility for the complete investigation of a steam power plant. The features incorporated and power ratings chosen constitute an excellent representation of industrial practice within the limitations of an educational laboratory.

The equipment is offered in the form of three schemes of 5, 10 and 20 kW rating respectively. Each scheme comprises a full range of separate but compatible units enabling the complete installation to be tailored to suit individual customers' requirements.

A basic laboratory scheme would comprise a boiler and turbine/condenser. In addition the complementary items; Separating and Throttling Calorimeters, Superheater, Tanks, Blowdown Tank, Water Treatment, Interconnecting Pipework and Lab. Design, Steam Pipework Lagging, and Installation & Commissioning may be supplied as required.



In the majority of cases water treatment will be required, and unless a suitable volume of cooling water is available, a cooling tower will also be required. Both these items are available if required.

Further optional items such as additional boiler and superheater instrumentation, flue gas analysers etc. though not strictly essential to the plant operation, considerably improve the versatility, and hence teaching potential, of the equipment.

The boilers used are vertical firetube type designed for simple operation and maintenance. The boiler may be supplied for oil or gas firing, suitable for 35 second fuel oil or natural or manufactured gases. Water feed and steam pressure control are fully automatic with low water level alarm and lock out, and interlocked air, ignition, and flame failure sequence burner control. The flue outlet is fitted with a condensate trap and flue gas diverter. Flue ducting is available as an optional extra.



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Similarly, superheaters may be oil or gas fired and incorporate fully automatic control with steam coil over temperature and flame failure detectors.

Additional instrumentation is available for both boiler and superheater to enable complete performance analysis.

The turbine units are single stage impulse type with D.C. dynamometer, overhead control unit, constant speed governor, condenser and condensate system. The units are compact in design requiring a minimum of floor space, and do not require special foundation arrangements.

The boiler/steam turbine power plant may be used to supply steam for the full set of the steam bench experiments.

The versatility of the plant may be further improved by the addition of any or all of the following experimental units:

- Heat exchanger – the heating medium may be steam or internally generated hot water with air or cold water cooling. The unit is fully instrumented and may be used for 4 or 8 passes with parallel or contra flow.
- Steam engine – a horizontal single cylinder reciprocating engine complete with Meyer valve gear, governor and Prony brake dynamometer.
- Boiler Control Demonstration Unit – a transparent plastic model boiler clearly showing the various control sensing units, and complete with water feed pump and control system, and electronically simulated boiler pressure and burner control.

The facilities can be tailored to suit your requirements and Cussons engineers can plan, design, erect and commission the complete installation.

A complete list of the scheme items and optional equipment is shown overleaf.







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### STEAM POWER PLANT

	SCHEME 5	SCHEME 10	SCHEME 20
Basic Scheme:			
Steam Boiler (oil fired)	P7600	P7620	P7640
Steam Turbine/Condenser	P7614	P7634	P7654

### Complementary items to the above schemes:

Separating and Throttling Calorimeter	P7660	Common to all schemes	
Superheater (oil fired)	P7603	P7623	P7643
Tanks (oil fired system)	P7601	P7621	P7641
Blowdown Tank	P7612	P7632	P7652
Water Treatment Set	P7613	P7633	P7653

### Optional Equipment:

Boiler Flue	P7610	P7630	P7650
Superheater Flue	P7611	P7631	P7651
Additional Boiler Instrumentation (oil system)	P7602	P7622	P7642
Additional Superheater Instrumentation (oil system)	P7604	P7624	P7644
Cooling Tower	P7615	P7635	P7655
Flue Gas Analysis Unit	P7661	Common to all schemes	
Steam Engine	P7664	Common to all schemes	
Steam Benches	P7670-P7683	Common to all schemes	

Interconnecting Pipework & Laboratory Design	P7616	P7636	P7656
Steam Pipework Lagging	P7617	P7637	P7657
Installation	P7618	P7638	P7658
Commissioning	P7619	P7639	P7659

### Alternative Gas Fired Equipment:

Steam Boiler	P7605	P7625	P7645
Tanks (gas fired system)	P7606	P7626	P7646
Additional Boiler Instrumentation (gas system)	P7607	P7627	P7647
Superheater	P7608	P7628	P7648
Additional Superheater Instrumentation (gas system)	P7609	P7629	P7649



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