



FILM and DROPWISE CONDENSATION UNIT

H911



Year 1
study

Features

- Specially developed water cooled condenser presents an almost isothermal surface to the steam.
- Bench top, compact and portable unit requiring only a 3 kW electrical supply, cooling water and a drain.
- Self-contained – incorporates its own steam generator and air extraction system.
- Stabilises very quickly – many different conditions may be investigated in a normal laboratory period.
- Heat fluxes approaching 106w M-2 are possible.
- Thermocouple attachment technique allows measurement of mean surface temperature without interfering with the surface properties.
- Optional Computerised Data Acquisition Upgrade.

Description

The Hilton Film & Dropwise Condensation Unit has been specifically designed for student use and to provide visual and quantitative results related to heat transfer during condensation. The unit is self-contained, having its own steam generator and air extraction system as well as condensers' to provide filmwise and dropwise condensation. Steam

generation and both types of condensation take place in the same thick walled glass cylinder with metal cover plates. The lower cover houses an electric heating element, a thermocouple to measure the saturation temperature of the H₂O and a combined filling and draining valve from 0.4kW to 3kW by a manual triac control. The upper cover housed two water cooled copper condensers, one of which is gold plated to promote dropwise condensation, and the other is in its natural state to give filmwise condensation. The cover is also fitted with a pressure relief valve and has connection to a pressure gauge, a pressure switch and to an air extraction system. Considerable effort has been devoted to the design of the condensers, so that, although water cooled, there is little variation of the surface temperature and also that the mean metal temperature is obtained without the use of external thermocouples. The water flow rate through the condenser is measured by flow meters which are fitted with control valves. A water jet vacuum pump is used intermittently to draw air (plus a certain amount of steam) from the chamber. Before entering the pump, the mixture is allowed to cool slightly so that some of the steam condenses. The condensate is removed by a separator and turned to the chamber, while the saturated air passes to the vacuum pump. A multi-point electronic thermometer indicates all important temperatures and the rate of heat transfer is calculated from the water flow rate and its temperature rise.

Related Laws/Applications

- Daltons Law
- Building Services
- Chemical Engineering
- Energy Transfer and Conservation
- Marine Engineering
- Mechanical Engineering
- Nuclear Engineering
- Plant and Process Engineering

Learning capabilities

- Visual observation of Filmwise and Dropwise condensation, and of nucleate boiling.
- Measurement of heat flux and surface heat transfer coefficient in both filmwise and dropwise condensation at pressures up to atmospheric.
- Investigation of the saturation pressure/temperature relationship for H₂O between about 20°C and 100°C.
- Demonstration and investigation of the effect of air in condensers.
- Demonstration of Daltons Law.

Technical Specification

- ABS Panel
- Thick walled Glass Cylinder Steam Chamber
- Two water cooled Condensers: Ø12.7 x 90(L) mm
- Heating Element: 3kW with Thermal Protection
- Heater control: Triac, 0.4 to 3.0kW
- Pressure Gauge: Ø100mm, 100 to 100kN/m² gauge
- Flow meters
- Pressure Relief valve: 20kN/m² gauge discharge setting
- Pressure Switch setting 10kN/m² gauge

What's in the Box?

- 1 x H911
- 1 x Transformer (115V only)
- 1 x 1m Drain/filling pipe
- 1 x 3m Reinforced PVC tube
- 1 x Polishing cloth
- Instruction manual
- Packing list
- Test sheet
- 1 x Power lead

You might also like

- H102K which forms part of the H102 Heat Exchange study area
- <https://www.p-a-hilton.co.uk/products/heat-transfer/film-and-dropwise-condensation>

Weights & Dimensions

- Weight: 30 kg
- Length: 710mm
- Width: 240mm
- Height: 710mm

Essential Services

- 3kW 220/240 Volts, Single Phase, 50 HZ (with earth/ground)
- 3kW 110/120 Volts, Single Phase, 60 HZ (with earth/ground)
- Cold water: 1. Continuous: 300 litre per hour, at 25 m head minimum
2. Intermittent 1000 litre per hour

Ordering information

To order this product, please call PA Hilton quoting the following codes:
H911/230 - Film and Dropwise Condensation Unit
H911/115 - Film and Dropwise Condensation Unit
H911/230/HC - Film and Dropwise Condensation Unit Computer Linked
H911/115/HC - Film and Dropwise Condensation Unit Computer Linked

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COUNTRY OF ORIGIN - UK WARRANTY PERIOD - 5 YEARS