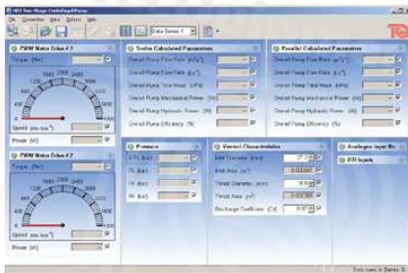


# H83

## Two-Stage (Series and Parallel) Pumps

**For a comprehensive range of investigations into the operation and characteristics of a single centrifugal pump, and two centrifugal pumps in both series and parallel**



Screenshot of the optional VDAS® software



Test set shown with all instrumentation options and VDAS®

- Self-contained, mobile two-stage centrifugal pump test set for a range of tests and demonstrations
- Pumps have a transparent 'window' to allow students to see clearly their impellers, the water flow and cavitation
- Pumps can be tested individually, in series and in parallel, with independent speed control
- Shows how to use a Venturi meter and differential pressure measurement to find flow rate
- Optional stroboscope allows students to see clearly the effects of cavitation around a pump impeller
- Motor Drives have digital displays of pump speed, torque and calculated true 'shaft' power
- Choice of easy-to-read analogue instrumentation and optional digital instrumentation (or both) for pressure measurement
- Works with TecEquipment's Versatile Data Acquisition System (VDAS®)

- TecEquipment Ltd, Bonsall Street, Long Eaton, Nottingham NG10 2AN, UK
- **T** +44 115 972 2611 • **F** +44 115 973 1520 • **E** info@tecquipment.com • **W** www.tecquipment.com
- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd



# H83

## Two-Stage (Series and Parallel) Pumps

### Description

A compact, mobile and fully self-contained centrifugal pump test set, that allows students to find the characteristics of centrifugal pumps working alone or in series or parallel. It also allows students to see (and hear) cavitation and understand the use of a Venturi meter and differential pressure measurement to find flow rate.

Two bearing-mounted motors drive each pump independently. The pumps draw water from the integral reservoir. The water travels through strainers and a series of valves to be delivered to a Venturi meter. The water then returns to the reservoir for re-use, keeping water use to a minimum. The pumps each have a transparent 'window' so students can see the impeller turning and how the water vapour bubbles form in the pump at cavitation. The optional stroboscope makes the effect easier to see.



Instrument and control modules fit into a frame above and behind the pumps. Each pump has an electronic Motor Drive to control its speed, a load cell to measure torque and a sensor to measure pump speed. A display on each Motor Drive shows speed and torque and automatically calculates and displays true 'shaft' power.

The differential pressure across the Venturi gives flow rate. Each pump has its own inlet valve. A two-way valve in the system allows the pumps to work alone, in parallel or in series.

TecEquipment offer a choice of analogue and digital instruments to display the inlet pressure, delivery pressure and differential pressure across the Venturi. The Analogue Pressure Display (AP2) is the most cost-effective method, but the Digital Pressure Display (DP1) increases ease of measurement, and allows connection to TecEquipment's frame-mounted Versatile Data Acquisition System (VDAS-F, available separately).

Alternatively, the equipment can also use both analogue and digital instrumentation at the same time, allowing students to compare the different pressure measurement methods.

### Standard Features

- Supplied with comprehensive user guide
- Two-year warranty
- Made in accordance with the latest European Union directives

### Experiments

Comprehensive demonstrations and investigations into a centrifugal pump including:

- Centrifugal pump performance and characteristics, typically head versus flow and efficiency versus flow
- Non-dimensional performance characteristics
- Flow measurement using a Venturi tube
- Demonstration of cavitation
- Operation of centrifugal pumps in series
- Operation of centrifugal pumps in parallel

### Essential Ancillaries

#### Either:

- Analogue Pressure Display (AP2) **or**
- Digital Pressure Display (DP1) **or**
- Analogue Pressure Display (AP2) **and** Digital Pressure Display (DP1)

### Recommended Ancillaries

- Versatile Data Acquisition System – frame-mounting version (VDAS-F)
- Stroboscope (ST1)

### Essential Services

#### Electrical supply:

- Two 230 V, 50 Hz, 13 A, phase-neutral electrical outlets
- or**
- Two 220 V, 60 Hz, 13 A, phase-phase electrical outlets

#### Floor space needed:

- Solid, level floor
- Allow at least 4 m x 2 m for safe and effective use of the equipment

- TecEquipment Ltd, Bonsall Street, Long Eaton, Nottingham NG10 2AN, UK
- **T** +44 115 972 2611 • **F** +44 115 973 1520 • **E** info@tecquipment.com • **W** www.tecquipment.com
- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd

# H83

## Two-Stage (Series and Parallel) Pumps

### Operating Conditions

*Operating environment:*

Laboratory environment

*Storage temperature range:*

-25°C to +55°C (when packed for transport)

*Operating temperature range:*

+5°C to +40°C

*Operating relative humidity range:*

30% to 95% (non-condensing)

### Specification

*Dimensions:*

Nett: Length 1700 mm x depth 600 mm x height 1600 mm

Packed: 2 m<sup>3</sup>

*Weight:*

Nett: 160 kg

Packed: 300 kg

*Maximum Flow Rates (each pump):*

Approximately 2 L.s<sup>-1</sup>

*Maximum Total Head (each pump):*

Approximately 120 kPa

*Maximum pump speeds:*

3000 rev.min<sup>-1</sup>

- TecEquipment Ltd, Bonsall Street, Long Eaton, Nottingham NG10 2AN, UK
- **T** +44 115 972 2611 • **F** +44 115 973 1520 • **E** info@tecequipment.com • **W** www.tecequipment.com
- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd