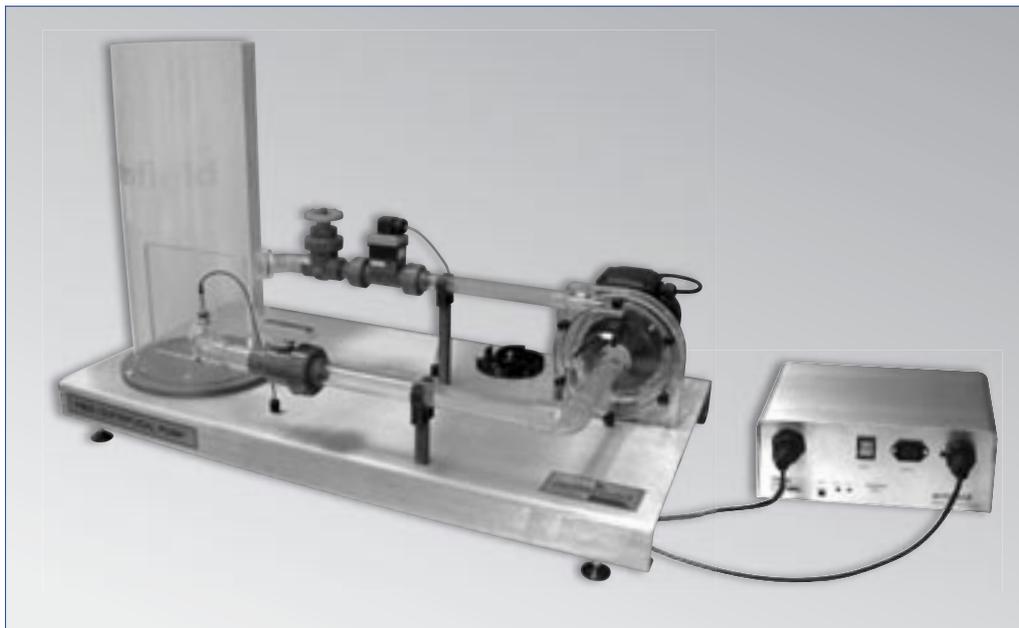




CENTRIFUGAL PUMP DEMONSTRATION UNIT



FM50
issue 1

FM50 Centrifugal Pump Demonstration Unit shown with the IFD7 Interface Unit accessory.

The centrifugal pump is the machine most commonly used to move liquids from one place to another. As such it is a particularly instructive unit with which to introduce students to the whole subject of rotodynamic fluid machines.

Discovering the relationship between head, flow, rotational speed and power provides a framework of general applicability. For example, matching the required duty point to the conditions of maximum energy efficiency may be explored as a creative student project.

INSTRUCTIONAL CAPABILITIES

- *Demonstration of a single-stage centrifugal water pump in operation.*
- *Measurement of inherent-speed pump performance, including production of characteristic curves:*
 - *pump total head*
 - *motor input power*
 - *impeller speed*
 - *overall total efficiency*
- *Introduction to pump speed laws.*
- *Investigation of impeller styles.*
- *Comparison of student calculations with computer results.*



DESCRIPTION

A motor driven centrifugal pump, mounted on a stainless steel plinth with a water reservoir and pipework for continuous circulation. The pump volute and the water reservoir are manufactured from clear acrylic for maximum visibility. Similarly the pipe runs are made from transparent pvc. Manually operated valves at the pump inlet and outlet allow control of the flow and also facilitate the study of suction effects.

The pump volute has been designed so that the impeller can be easily accessed and replaced without tools. The FM50 is delivered with two impellers, one with forward curved blades and one with backward curved blades, allowing the students to investigate the effects of impeller characteristics.

Electronic sensors measure the pump inlet pressure, the pump outlet pressure, the flow rate and the water temperature.



FM50 Centrifugal Pump

The pump speed is accurately controlled by an advanced electronic inverter within the IFD7 (an essential accessory). This inverter also calculates the torque produced at the motor drive shaft, allowing the power used by the pump to be derived. The IFD7 also provides the conditioning electronics for the sensors and allows their readings to be displayed on the computer software.

Connections to the IFD7 are a single multiway connector for the sensors and a connector for the pump motor drive.

The equipment is provided with advanced education and data logging software. See the software section of this datasheet for further details.

PERFORMANCE SPECIFICATION

Max flow rate:	1.6L/min typical
Max head:	9.0m
Max pump speed:	1800rpm
Motor power rating:	180W

SOFTWARE

Windows based software is supplied with the CAPTURE range of equipment offering a complete teaching package of coursework and laboratory investigation.



The familiar Windows environment allows the student to explore the principles of each machine quickly and easily, highlighting the difference between theoretical and practical measurements, thus providing a good understanding of the principles involved.

This software runs under Windows 98, 2000 or XP operating systems and has been designed for maximum flexibility and ease of use. Comprehensive 'Help' screens guide the student through both the theoretical background and the practical investigation of the machine under examination. Suggested laboratory investigations and further questions for the student to answer are included in the software, together with all the information required to set up and run the teaching exercises.

SOFTWARE CAPABILITIES

This software includes a range of functions and capabilities designed to make the operation of the equipment and processing of the results more straightforward, and also to enhance student understanding of the subjects being covered.

It includes:

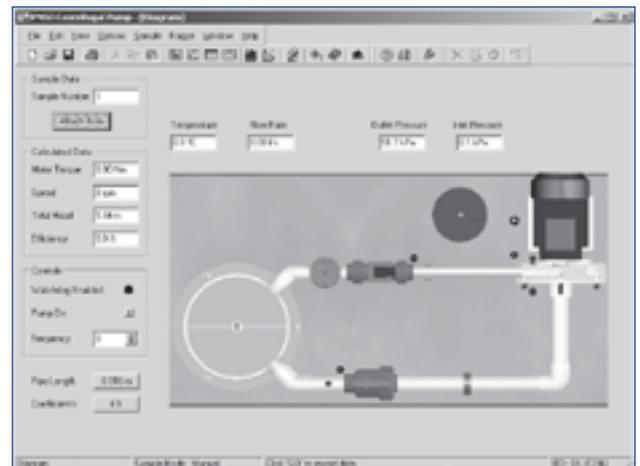
- *Diagrammatic representation of the equipment, complete with real time display of the various sensor outputs*
- *Presentation screens, giving an overview of the software, the equipment, the procedure and associated theory*
- *Detailed 'Help' facilities giving in depth guidance*
- *Automatic data logging of sensor values into a spreadsheet format*
- *Control over sampling intervals*
- *Student questions and answers, including a layered 'Hint' facility*
- *Processing of sampled values (this may be linked to the questions and answers to ensure student understanding)*
- *Sophisticated graph plotting facilities of both measured and calculated values, including comparisons taken under different conditions*
- *Export of data to Microsoft Excel or other spreadsheets*
- *Links to user defined word processor*
- *Calibration facility for sensors*
- *Real time bar graph display of sensor outputs*
- *Recent history graphical display*

TECHNICAL DETAILS

The analogue output data is digitised and transferred to a computer using the standard USB (Universal Serial Bus). This allows any standard modern Windows computer to be used, including notebooks, and does not require any internal access to the computer. The equipment is supplied complete with a USB lead for connection to the computer.

The FM50 interfaces to the computer using the IFD7 device and the USB port of the computer.

Also available is a software driver that allows the outputs to be read in other software programs, such as Labview.



Typical software screenshot of FM50 Mimic diagram

ORDERING SPECIFICATION

- *A small-scale centrifugal pump demonstration unit, comprising of a water reservoir, the pump, control valves and interconnecting pipework all mounted on a stainless steel base.*
- *Equipped with electronic measurement sensors for pump head pressure, suction, flow-rate and water temperature.*
- *Transparent pump volute for visibility*
- *Capable of being linked to a PC (not supplied) via the IFD7 interface console (available as an essential accessory).*
- *Supplied with software providing full instructions for setting up, operating, calibrating and performing the teaching exercises. Facilities are provided for logging, processing and displaying data graphically. Full theoretical back-up is included together with a student questions and answers session.*

ESSENTIAL EQUIPMENT

*Armfield IFD7 Interface Unit
PC with spare USB port*



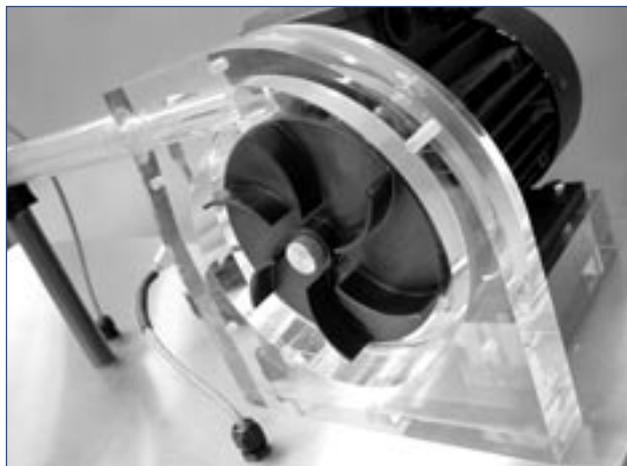
IFD7 Interface Console

OVERALL DIMENSIONS

*Height: 600mm
Length: 880mm
Width: 510mm*

SHIPPING SPECIFICATION

*Gross Weight: 50Kg
Volume: 0.65m³*



FM50 Centrifugal Pump with cover removed.

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