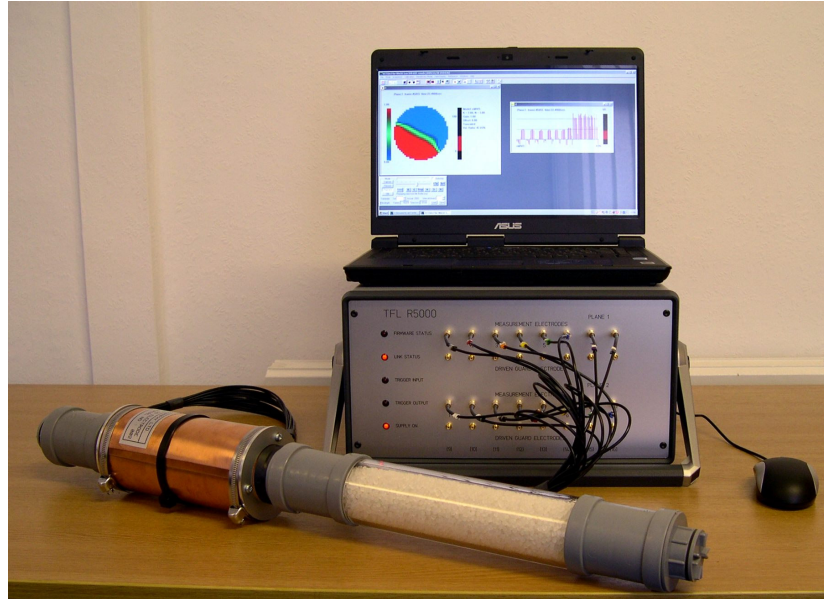# TOMOFLOW TFLR5000 ECT AND TWO-PHASE FLOW ANALYSIS MEASUREMENT SYSTEM

The **TFLR5000** is a high-speed Tomographic imaging system and Flow Anayser. It can be used for imaging, analysing and measuring the distribution and flows of mixtures of 2 non-conducting materials and is based on the use of Electrical Capacitance Tomography (ECT). Data can be captured at rates up to 5000 image frames per second.

The measurement system is software-configurable and can operate with up to 16 electrodes in a single measurement plane (for operation as an ECT system) and up to 8 electrodes in each of 2 separate measurement planes when operated as a flow analysis system. It is also possible to use different measurement protocols (for example by exciting 2 or more electrodes simultaneously).

The **TFL5000** is intended for use with a range of multi-electrode capacitance sensors containing sets of driven guard electrodes and can image either the pure capacitive (loss-free) component of the sensor contents or the conductive (lossy) component. In some applications, the information from these 2 measurement modes allows the moisture content of the material and its distribution inside the sensor to be measured.

A comprehensive suite of software for calibration, imaging and flow anaysis is available for use with the **TFLR5000**. This software can be provided with the instrument. Alternatively, users can write their own control and analysis software.

An optional set of standard multi-electrode capacitance sensors and suggested laboratory experiments can also be supplied with the **TFLR5000** to demonstrate the basic principles of the measurement technology.

These include:

Basic imaging of one or more solid objects, the use of enhanced algorithms to improve image quality, the use of frame averaging to reduce image noise and the effect of changing the measurement channel protocol timing parameters.

Voidage measurement and the effects of different concentration models on the measurement accuracy.

Imaging a fluidised bed and measurement of voidage.

Flow measurement and analysis using cross-correlation in gravity flows.

SOFTWARE

The following software is available for use with the **TFLR5000**:

ECT32v3: System control, image display and data capture software for use as an ECT system.
Makemap: Sensitivity map generation software
Plot3d: 3-D image plotting software
C/Ktool: Sensor characteristics, advanced calibration and linearising file generation software
BCPTool: Data file conversion software
MatECT: This set of Matlab utilities is also available for users who have access to Matlab.
Sensor Toolkit: System control, capacitance measurement and data capture software for flow measurement applications.
Flowan: Flow analysis and measurement software.

TFLR5000 OUTLINE SPECIFICATION

The **TFLR5000** instrument contains 16 identical measurement channels and 16 identical driven guard circuirts. The instrument can operate as a single-plane ECT system with a maximum of 16 electrodes, or as a twin-plane ECT and Flow Analysis system with up to 8 electrodes in each plane.The inter-electrode capacitances are measured using square wave excitation at (software selectable) frequencies in the range: 1 to 10MHz.

The Maximum frame capture rate is 5000 fps at an excitation frequency of 10 MHz and a typical measurement noise level at 500 fps is 0.02fF rms. The measurement noise level can be further improved by averaging measurement frames at the expense of the image frame data rate.

The maximum velocity which can be measured is typically better than 20m/S using a suitable twin-plane capacitance sensor.

A comprehensive set of instruction manuals and application notes is supplied with each set of equipment.

For further information, please visit the PTL website www.tomography.com or contact us by email (enquiries@tomography.com).

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