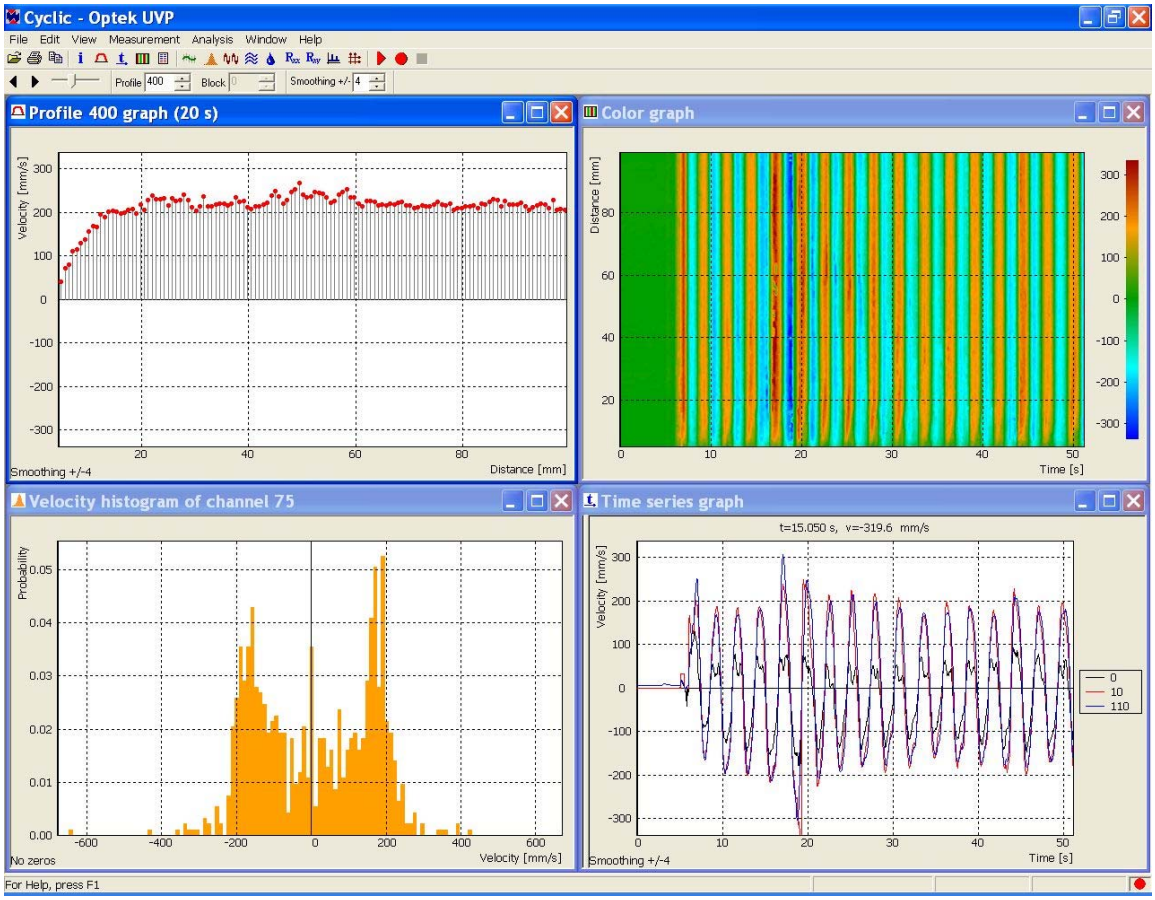
SOFTWARE Version 3

FOR UVP-DUO MONITOR



Data file showing *Profile Graph*, *Color Graph, Velocity Histogram* and *Time Series* of a piston flow

Major features of software Version 3

- Remote control of UVP-DUO from host computer through LAN
- Data acquisition and analysis in a single core program
- Turbulent statistics: RMS, skewness, kurtosis, histograms, power spectrum
- Integrated 2D flow mapping module including transducer grid editor
- Wizard-style measurement parameter set-up
- Direct export to Word, Excel, Tecplot and more
- Complete file format with measurement and parameters data in a single file
- Standard Win32 interface

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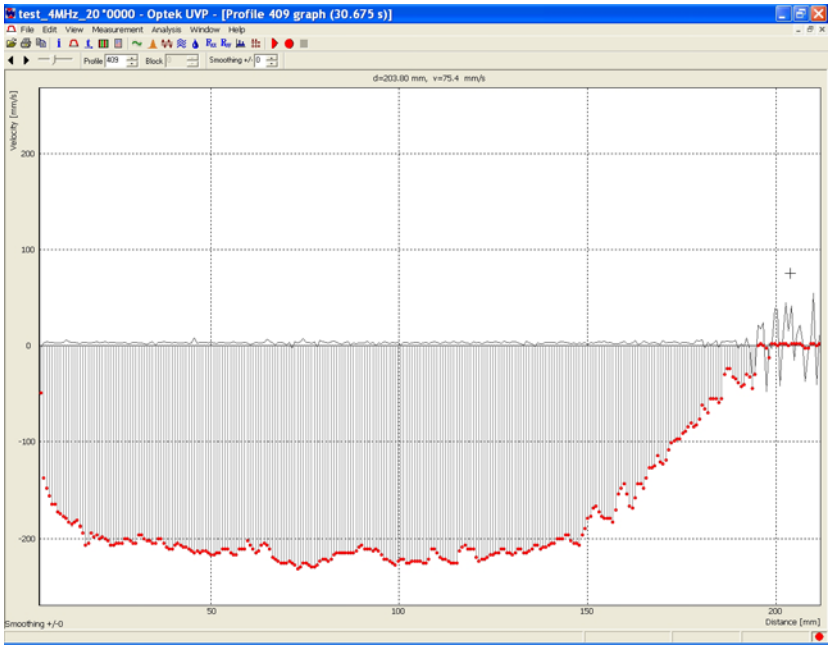
Concept

A new software package - version 3 - has been developed for our latest instrument generation UVP-DUO**.**
It has been programmed with Win32 standards, including both real-time data acquisition and post-processed analysis in a single core program. It is a powerful and stable software capable of handling large quantity of data through a standard Ethernet LAN as delivered by UVP-DUO instrument. It operates from the former MS Windows 98 up to the latest Windows 7 operating systems.
The use of the whole program is very intuitive and follows standard guidelines for interface design. Great care has been taken to make version 3 as user-friendly as possible.
Software version 3 is available optionally for our former UVP-XW instrument users.
An **ActiveX library** software package based on software version 3 functionalities is available optionally for users who wish to build up a custom-made acquisition software.

Real-time data acquisition

A wizard-style dialog allows for easy setting of UVP parameters, checking settings consistency and suggesting suitable ranges when required, using visual aids for some specific data.
Parameters are recorded in each UVP file header, then to retrieve the settings of any UVP measurement one simply opens any data file to load the corresponding parameters.
The velocity calculation from the Doppler-shift detection is being made real-time by the Digital Signal Processor inside the UVP instrument.
As a result UVP software version 3 can **display real-time velocity profiles** while storing the corresponding data.
All data displays have context-sensitive options that can be modified by right mouse button click; cursor coordinates are continuously displayed; display zooming and moving is possible at any time, and any specific data point displays can be called by selection directly on the graph.
Raw echo amplitude is displayed real-time in parallel with velocity profiles on the same distance scale.
It is very useful for correlating the raw echographic information with calculated velocity, showing signal quality and checking possible strong static reflection that could spoil the velocity determination. In some specific cases it can display flow boundaries like walls, obstacles, etc...
Time series from a single velocity channel at a fixed distance can be monitored real-time.
Sets of time series from various channels can be displayed in parallel, moreover a smoothing filter can be applied real-time without losing the original velocity data.



Instantaneous velocity profile of a channel flow with gravel bed

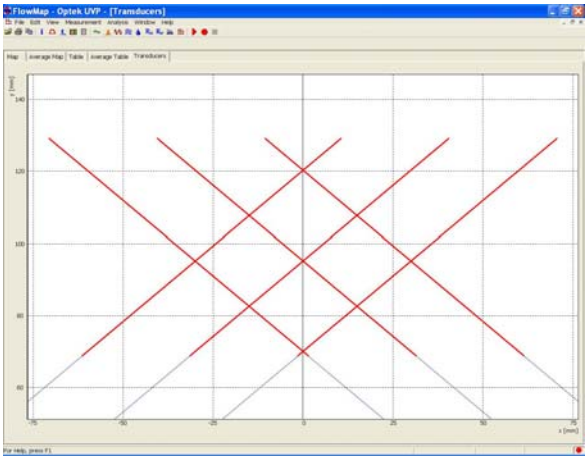
Analysis functions in Version 3

- **Measurement information** window displays all measurement parameters and Multiplexer table
- **Profile graph** window shows measured velocity profile and raw echo amplitude
- **Time series graph** window draws time history of all selected profile channels
- **Colour graph** window shows colour-coded space-time representation of the complete data set
- **Profile table** lists velocity values of each channel in the selected profile
- **Average and statistics graph** window shows profile average, RMS, variance, skewness, kurtosis graphs, plus a recap table with all values, including a validation success rate. Useful for turbulence analysis in the flow structure.
- **Velocity histogram** window graphs the velocity probability distribution
- **Period enhancement (time)** window depicts phase-averaged periodic flow in time domain
- **Period enhancement (profile)** window depicts phase-averaged periodic flow in space domain
- **Flow rate (parallel or circular)** window graphs through-flow through circular or rectangular channel
- **Auto-correlation** window displays flow periodicities in time domain
- **Cross-correlation** window shows flow relations between different spatial points
- **Power spectrum** window displays frequency distribution of turbulent energy in the flow for each velocity channel
- **Flow mapping** window allows for editing of a transducer map, displays a flow map for each data block, an average map for all blocks and corresponding data tables.

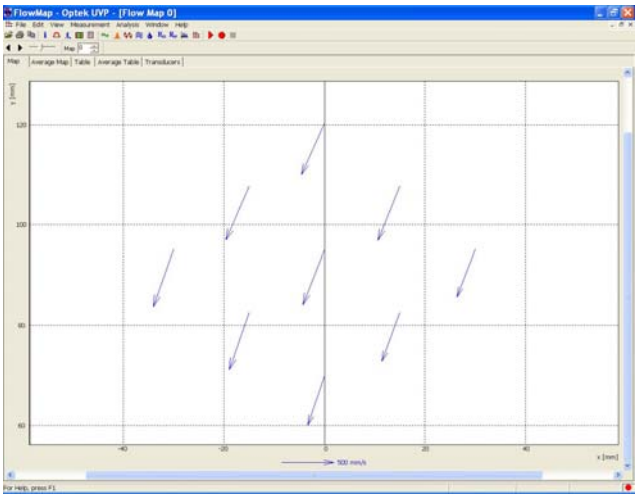
2D Flow mapping program module

Version 3 offers all 2D flow mapping functions as follows:

- **Editing of flow map table.** Editing of transducer co-ordinates is straightforward, using Cartesian co-ordinates and azimuth of ultrasonic axis plus visual aid.
- **Setting up of flow mapping parameters,** number of samples and measurement repetitions, valid mapping length for each transducer, least acceptable crossing angle of ultrasonic axes.
- **Flow mapping measurement.** During test measurement, it is possible to monitor any individual transducer output.
- **Flow mapping results evaluation.** Immediately after measurement completion, both graphics results (drawing of a flow field) and numeric results (data table) are available for analysis.
- **Saving of results.** No special saving of results is necessary, since all flow mapping data and parameters are automatically saved within a single data file for future processing.
- **Printing of flow maps.** Flow maps can be previewed, printed, copied to Clipboard and pasted to others applications.
- **Export to external programs.** It is possible to export flow-mapping results into third-party programs, either as text or Tecplot files.



Measuring grid with 6 transducers



Corresponding 2D flow map

To enhance your data analysis experience

- **Unlimited number of customer template files** let you store any of your measurement configuration and parameters and use it again with new measurement.
- **Average and median smoothing of profiles and channels** removes ripple and smoothes noisy profiles.
- **Hot cursor** shows co-ordinates of any selected graph point, in any graph.
- **Complete file format stores all measurement data in a single file.** No more searching for lost configuration files or comments.
- **Unlimited record length** makes very long measurements a snap.
- **Fast reading of long files.** Memory mapping reads immediately the file part of interest.
- **File information preview in *Open file* dialog.** Invaluable feature for fast browsing through files.
- **All former UVP file formats are fully supported.** No problem reading old
- UVP files and converting them to the latest file format.
- **Unlimited editable comments to all data files.** Your measurement and review comments can be attached to the data file.
- **Data block handling** lets you realise data block average and statistics.
- **Improved multi-transducer date handling** enables easy single-transducer data separation and export.
- **Multiplexer table saved within data file.** Complete measurement data are saved in a single file.
- **Window configuration saving** opens window configuration exactly as you have closed it.
- **Wizard-style measurement parameters and time set-up dialog** automatically checks all parameters.
- **Icons and pop-up menus handle most options.** Very intuitive program handling does not need any lengthy learning.
- **Context-sensitive menus** including specific options for each active display.
- **Full Clipboard support** allows easy copying and pasting data tables and graphics into external applications.
- **Direct copying to Word and Excel** makes report writing or external calculations fast and easy.
- **Multiple zooming and inverse zooming of all graphics by mouse selection** focus on any details you need.
- **Velocity display scaling** lets you adapt your maximum measured velocity range to your graph full scale, enhancing display clarity and contrast.
- **Profile graph axis scaling in mm or channel number** for practical spatial positioning.
- **Time series graph axis scaling in seconds or profile number** for useful time references.
- **Printing function of all graphics windows and tables,** including print preview.
- **Clipboard copying of all graphics as bitmap or vector file.** Select the type you prefer for external application.
- **Export of all results as *txt* or *csv* files** makes your results completely open for any application.
- **Export of all results as Tecplot files** lets you produce report-quality graphics.
- **Selection of un-smoothed or smoothed data export** gives you useful data export option.