# Software Update Notification

## Dispersion Technology and Light Scattering Products, (Autosizer, Lo-C, Zetamaster, Zetasizer)

| Product | PartNo./Version |
|---|---|
| PCS for Windows | PSW0001/1.51 |
| MPT-1 Autotitrator | PSW0058/1.01 |
| COR3140 Correlator | PFW 0004/2.1 |

*Dispersion Technology and Light Scattering Products (Autosizer, Lo-C, Zetamaster, Zetasizer)*
*version 1.51 DTS Application Software for use with (English) Microsoft Windows version 3.1,*
*Windows for Workgroups version 3.11, Windows95, Windows98 and WindowsNT 4.0*

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# 1. Scope

This document is the software update notification for the PCS/DTS software suite (PSS0001) it contains:

| | | |
|---|---|---|
| DTS/PCS software | PSW0001/1.51 | (Previously 1.41) |
| MPT-1 Autotitrator software | PSW0058/1.01 | (Previously 1.00) |
| COR3140 Correlator firmware | PFW0004/2.1 | (Previously 2.00) |
| macro program | cellpos.pcm | |

Version 1.51 implements four SCR's. The most important improvements are to the sizing analysis algorithms and implementation of a new zeta potential measurement mode as standard called M3 (Mixed mode measurement).
Some files on the CD refer to French and Japanese versions of the software. These are not provided on this CD.

Summary of changes

| Product | Part no/Ver | Previous version | Change summary |
|---|---|---|---|
| DTS/PCS software | PSW0001/1.51 | 1.41 | 4 changes under SCR's 1107, 1108, 1120, 1122 |
| MPT-1 Autotitrator | PSW0058/1.01 | 1.0 | Minor changes to improve usability and improve pH readback |
| COR3140 Correlator firmware | PFW0004/2.1 | 2.00 | The default measurement position in the cell is changed from 17% to 50% |

See the relevant section for details of these changes.
These products are now released on a single CDROM

# 2. Introduction

## 2.1    New features

Version 1.51 contains two of the biggest changes in analysis and measurement methods of recent versions.

**Zeta potential**
A new method of measuring zeta potential, which requires a new cell type is introduced. This is called the M3 measurement technique, for which a patent has been applied for, and has the following advantages:

Simpler user interaction with choices now automated:
Automatic setting of the sign of zeta
250Hz/1000Hz selection requirement removed
Access to a higher resolution mode
Reduced sensitivity to cell alignment
Reduced sensitivity to cell contamination
See section 3.6.1 for more details

**Size**
The sizing algorithms have been revised:
Contin. NNLS and Automatic should give acceptable results without having to use the 'Advanced' parameters.
See section 3.6.2 for more details

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Version 1.51 replaces version 1.41 and supports all current DTS/PCS instruments as well as all systems that use the 7032 correlator running under the Windows 3.1, 3.11 and Windows95 operating systems.

Version 1.51 Compatibility

The WindowsNT version of the DTS/PCS software is compatible with any instrument that uses the 7132 correlator and the Zetamaster and Zetasizer 2000 which both use the 70128 internal correlator.

The WindowsNT version is **not** compatible with **any** instrument using the **7032** correlator. It is also **not** compatible with the PCS7 or PCS8 temperature control and photomultiplier supplies for the 4600 and 4700. Compatibility with NT requires use of a 7132 correlator and a PCS0078 power supply unit.

The new Autotitrator  (DTS5900) is **not** supported on **any** of the Microsoft Windows 3.xx operating system platforms.

## 2.2     System compatibility

This release can be run on the following instruments, provided all other requirements are met or exceeded.

| Model and Part Number | Product Name and Description | Correlator | Comments |
|---|---|---|---|
| LOC5011 | Lo-C, 90 deg. Single angle size | 7032 or 7132 | see minimum computer requirements **7032 NOT SUPPORTED under WindowsNT** |
| 4700PS | Autosizer 4700 Spectrometer with manual goniometer and PCS8 | 7032 or 7132 | see minimum computer requirements **NOT SUPPORTED under WindowsNT** |
| PCS5000 (240V, 50Hz) PCS5004 (110V, 60Hz) | Autosizer 4700PS Spectrometer with motorised goniometer, PCS7, PCS8, 7032 CN correlator | 7032 or 7132 | see minimum computer requirements **NOT SUPPORTED under WindowsNT** |
| PCS5001 (240V, 50Hz) PCS5002 (110V, 60Hz) | Autosizer 4700PS Spectrometer with motorised goniometer, PCS7, PCS8, 7032 CE correlator | 7032 or 7132 | see minimum computer requirements **NOT SUPPORTED under WindowsNT** |
| PCS5101 (240V, 50Hz) PCS5102 (110V, 60Hz) | Autosizer 4700 Spectrometer with motorised goniometer, PCS7 and PCS8 | 7032 or 7132 | see minimum computer requirements **NOT SUPPORTED under WindowsNT** |
| PCS5201 (240V, 50Hz) PCS5202 (110V, 60Hz) | Autosizer 4700 Spectrometer with motorised goniometer and PCS0078 | 7132 | see minimum computer requirements |
| ZEM5000 | Zetamaster, zeta potential measurement | Internal 70128 | see minimum computer requirements |
| ZEM5002 | Zetamaster S, 90 deg. Single angle size and zeta potential measurement | Internal 70128 | see minimum computer requirements |
| ZET5004 | Zetasizer 4, multi-angle size and zeta potential measurement | 7032 or 7132 | see minimum computer requirements **7032 NOT SUPPORTED under WindowsNT** |
| ZET5005 | Zetasizer 4S, multi-angle size | 7032 or 7132 | see minimum computer |

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| | measurement | | requirements **7032 NOT SUPPORTED under WindowsNT** |
|---|---|---|---|

| DTS5100 | Zetasizer 1000, 90 deg. Single angle size | 7132 | see minimum computer requirements |
|---|---|---|---|
| DTS5101 | Zetasizer 1000 HS, 90 deg. Single angle size | 7132 | see minimum computer requirements |
| DTS5104 | Zetasizer 1000 HS, 90 deg. Single angle size with 532nm laser (50mW) | 7132 | see minimum computer requirements |
| DTS5200 | Zetasizer 2000, zeta potential measurement | Internal 70128 | see minimum computer requirements |
| DTS5300 | Zetasizer 3000, 90 deg. Dual angle size and zeta potential measurement | 7132 | see minimum computer requirements |
| DTS5301 | Zetasizer 3000 HS, 90 deg. Dual angle size and zeta potential measurement | 7132 | see minimum computer requirements |
| DTS5304 | Zetasizer 3000 HS, 90 deg. Dual angle size and zeta potential measurement with 532nm laser (50mW) | 7132 | see minimum computer requirements |
| DTS5400 | Zetasizer 4000, multi-angle size measurement | 7132 | see minimum computer requirements |
| DTS5500 | Zetasizer 5000, multi-angle size and zeta potential measurement | 7132 | see minimum computer requirements |
| DTS5900 | Multi Purpose Titrator | 7132 | see minimum computer requirements **NOT SUPPORTED under Windows 3.xx** |

## 2.2.1   Compatibility comments

| | System or function | Comment |
|---|---|---|
| **1.** | Mettler Titrator | The Mettler titrator is not supported by the M3 method. This unit uses macro's which are not compatible with the M3 method, and will give the wrong result. |
| **2.** | Existing macro's | Macro's that use discrete commands for measurement, rather than the high level command 'Measure sequence' will not be compatible with M3, and will give the wrong result. |
| **3.** | Start zeta optics, then start correlator manually | This will do a measurement , but the result calculated will be wrong. |

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# 3. PCS - Functional Features

## 3.1    Table 1 - Additions

| Malvern Software Change Request Number (SCR) | Description | Comments |
|---|---|---|
| 1122 | Introduce two new functions; Zeta SetCellArray index, value Value = Zeta GetCellArray index Where the first value of the index is one. | Introduced purely to implement the M3 measurement method. |
| | Addition of cellpos.pcm macro to the release CD | This enables easy conversion of the software to use the M3 method when updating existing systems |

## 3.2    Table 2 - Deletions

There are no deletions.

## 3.3    Table 3 - Changes

| Malvern Software Change Request Number (SCR) | Description | Comments |
|---|---|---|
| 1107 | Implement M3 or 'Mixed mode measurement'. This allows measurement at the centre of the cell with potential improvements in resolution, while minimising cell alignment requirements | This method requires the use of a special cell which can be distinguished by a /M3 after the serial number. |
| 1108 | Modification to Contin, NNLS and Automatic algorithms to improve results without user intervention | Reanalysing existing data will give different results. |
| 1120 | The default display type is now the 'Raw data' rather than a gaussian fit to each peak in the data | The original display can be reset by deselecting 'Raw data' for the zeta potential preferences dialog. This is most easily accessed by right clicking under the zeta potential graph. |

## 3.4    Table 4 - Bug Fixes

No bug fixes have been implemented

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## 3.5    Table 5 - Known Bugs

The following is a list of known bugs (to date) in this and previous releases of software. The bug is generic to all versions of applicable DTS/PCS products unless the entry states otherwise.

| Malvern Software Change Request Number (SCR) | Description | Comments |
|---|---|---|
| | During any one operating session of the Malvern application software, data files can be opened and closed a maximum number of 58 times before an error occurs. This is due to a Microsoft Windows memory limitation in the way files are currently accessed, and has only been reported during internal testing at Malvern. It is unlikely to be a limitation in normal customer use. | Limitation in current version, but extremely unlikely to cause any user problems. |
| 1144 | If there is any interaction with the software during a measurement which uses the M3 technique, a wrong result can be displayed for that measurement. | This is most likely to occur during a repeat series of measurements. It should be very obvious that the result calculated following the program interruption is very different to the other results |

## 3.6    Operational Notes

### 3.6.1   Mixed mode measurement

This is a new measurement method that allows measurement at the centre of a capillary cell by suppressing electroosmosis. It uses a technique called FFR (Fast field reversal) in a novel way that preserves or improves measurement resolution while simultaneously removing the requirement for precise cell alignment. This novel method is the subject of a patent application.

The default measurement now consists of three phases; measurement of the mobility using FFR, measurement of the zero field width and measurement using the normal 250Hz measurement settings.

In essence the FFR measurement gives the true mobility and the standard method gives information on zeta potential or mobility distribution. The FFR method is also used to make sure the phase of the modulator is set correctly for the 250Hz measurement.

This method is implemented by using the 'GO' icon as usual.

There are two changes associated with this method. The first can be seen on the 'Measurement sequence' dialog used for setting up the number of measurements etc. The 'Sign of zeta' section is deleted and replaced with a message showing 'Default settings'. The sign settings are now automatically set.
The second change is available under the 'Options' section of this dialog. A 'High resolution' option is now available. Selecting this option changes the measurement mode indication from 'Default settings' to 'High resolution'.
This setting has two effects, the correlator sample time is increased to 800 microseconds, which increases resolution, and the measurement time is increased significantly to give better quality data.
Once high resolution is selected using the 'GO' icon is all that required for a measurement.
The high resolution setting can be saved in the configuration file.

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The high resolution mode can separate two modes with zeta potentials of 15mV difference, or tri-modals with 15mV between each of the modes.

Note that when measuring in high resolution mode the width measured may be higher as a wider range of frequencies is being measured.

### 3.6.2   Sizing algorithm changes

The way Contin, NNLS and Automatic works has changed to incorporate experience in analysing good and indifferent quality data.
In general this means that there will be fewer 'kicks' at the front and back ends of the distribution, and the proportions of peaks analysed in mixtures should be more reliable.

It is worth reiterating that Contin produces a number of solutions. These can be viewed under *'File' 'Contin records'* after an analysis has been done The Contin analysis itself chooses a conservative solution which is generally reliable for broad monomodal solutions. The 'Automatic' analysis chooses a less smoothed Contin result that enables the analysis to separate the modes of a mixture more easily.
However, if the sample is known to consist of a mixture of monomodal samples, NNLS is the method to choose.

The multimodal analysis is preserved only for compatibility with older systems that this method is habitually used with.

### 3.6.3   Zeta potential display change

As a result of customer feedback, the default display has been changed to what was called the 'Raw' display. This will show extra detail such as shoulders that are smoothed out in the previous type of display. This display type was always available, but is now the default and allows a user to decide whether the new features represent useful information.
One effect of this is that if a measurement is done of a mixture that is not quite resolved, the new display shows a constant width peak with a shoulder that may change slightly between measurements. The previous display may tend to pick out separate peaks in one measurement, but not in another, giving an apparent variable result with different numbers of peaks in each case.
The mean value of the zeta potential and mobility is not affected, nor is the calculation of the peaks displayed in the table.
The previous display type can be used by simply right clicking under the graph and deselecting the 'Raw' checkbox.

### 3.6.4   MPT-1 changes

The changes are due to customer feedback and are relatively minor.
A stir checkbox has been added under the prime button on the 'Sample' tab. This allows the sample to be stirred to give a correct reading of pH for example.
This does not have to be deselected when starting a measurement.
The check for suitable titrant concentration or presence of a salt, for example for a conductivity titration, is only done after the 'Start' button is pressed.
This saves the errors being displayed as the changes are being made.

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## 3.7     Updating existing systems

A distinction must be made between updating a system to use version 1.51 and measure zeta potential at the stationary layer, and updating to enable use of the M3 method.
Use of the new sizing algorithms requires no hardware or firmware change.

The cell position indicated in the measurement parameters dialog indicates to the software which method will be used.
If it reads 17%, the standard method of measurement at the stationary layer will be done and it is assumed that the standard ZEM0165 capillary is fitted.
If it reads 50% the new M3 method will be done and it is assumed the M3 cell (PCS0100) is fitted.

### 3.7.1   Updating an existing system to use the M3 method

To update an existing system to use the M3 method, Version 1.51 software and an M3 cell (P/N PCS0100) must be installed and a macro program called cellpos.pcm must be run. This is available in the standard PCS directory which is available after the software has been installed.
To run the macro, go to the menu item *'Control', 'Run program',* highlight the cellpos.pcm macro program, and then select 'Run'. There will be a series of 3 messages informing the operator of the current and new cell positions, select 'OK' in each case. This will be followed by a request to save the configuration in an .ini file. The currently used .ini file is displayed, select 'OK'.
When this has been done, the cell position in the measurement parameters dialog will read 50%. Details of the software changes for this method are in the latest Software reference manual (MAN0160 Issue 2)

### 3.7.2   Updating an existing system to use Version 1.51 and measure using the traditional stationary layer method

To update an existing system to use version 1.51 software, and use the existing method of zeta potential at the stationary layer, the software is installed as described in section 5 and the standard quartz capillary (ZEM0165) used.
The cell position in the measurement parameters dialog will read 17%.

## 3.8     Product format

The customer will receive one CD-ROM with the entire DTS product software suite on. The disk is labelled PSS0001.Issue 2.
If required, floppy disk sets can be generated. For details see contents.txt on the CD-ROM.

# 4. Minimum computer requirements

## 4.1     Operation with computer connected to optics unit

IBM PC-AT compatible, Pentium 166MHz processor, 32MByte RAM, 30 Mbytes free disk space, one free full length 16 bit ISA type slot, one free RS232C communications port, 3.5" disk drive, CD-ROM drive.
Windows 3.1, 3.11, 95, 98, or NT4 (sp4 or later) installed. 800*600 resolution 256 colour monitor (2 Mbytes video card)
**Note**:     1. A laptop computer without a free ISA slot is not suitable,
          2. Use with a titrator or autosampler requires two free RS232C communication ports
          3. The MPT-1 autotitrator is not compatible with Windows 3.1 and 3.11 operating systems.

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## 4.2 Operation with stand alone computer system

For data re-analysis, result printing etc., the software can be installed on a stand alone PC. The computer requirements are as above except that an ISA slot and a communications port is not required.

**Note**: In this case a notebook computer can be used.

# 5. PCS Software Installation Notes

## 5.1 Installing over a previously installed version

Before installing the new application software version, it is recommended that if the existing version is installed in the default directory \PCS and \PCS\BMP, then these are copied into a new directory, e.g. \PCSOLD and \PCSOLD\BMP.

This ensures that any customisation of the existing system, saved into the configuration (.ini) files, is preserved. Any changes required can then be made by comparing the new installation with the customised installation in the \PCSOLD directory.

## 5.2 Existing data

Data in the installation directory will not be affected by the installation procedure.

All data collected using a Windows™ version of PCS/DTS software is compatible with version 1.5 and can be displayed, edited and re-analysed.

## 5.3 Installation from CD ROM

Follow the instructions in the 'Contents.txt' file on the CD ROM.

## 5.4 Installation from floppy disk set

To create a floppy disk from CD ROM, follow the instructions in the 'Contents.txt' file on the CD ROM. Then follow the instructions below.

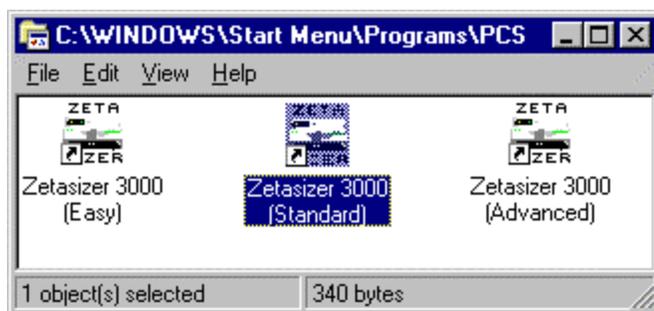## 5.5 Floppy disk Installation with Windows 3.1, 3.11, Windows95 and Windows98 operating systems

Insert the diskette labelled DTS/PCS v1.51, Disk 1 of 1, for Windows 3.1, 3.11 & Windows '95 & '98, PSW0001/1.5 Disk 1 of 3 into the A: drive on your computer.
In Windows 3.1, 3.11 type A:\setup into the File Run dialog in program manager and press enter.
In Windows 95 & 98 type A:\setup into the Run dialog of the start menu and press enter.

Follow the Install wizard selecting the directory and system type as required. Choose the default C:\pcs. Choosing a different directory will require a modification of the Contin.pif file.

The installation should produce three icons in a PCS group, the actual icons installed will depend on the system selected:

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The default directory structure produced should be:

| | |
|---|---|
| C:\PCS | Malvern application software |
| C:\PCS\BMP | Icon bitmaps |

## 5.6    Floppy disk installation with WindowsNT 4.0 operating systems

The setup program will automatically detect NT systems and install the appropriate driver. You should log on to the Windows NT workstation in Administrator mode.

Note that the uninstall facility cannot remove the driver. The driver may be completely uninstalled by stopping it from the Devices control panel applet, deleting the single driver file correla.sys from the Windows NT System32\Drivers directory, and deleting the registry key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Correla using the Registry Editor tool.

### 5.6.1   Re-install WindowsNT service pack 4 (or later)

Microsoft specify that "if you change or add new software or hardware components to your system after you have installed service pack 4, then you'll need to install service pack 4 again." (See 3.2 Adding New Components to the System, Windows NT4.0 Service Pack 4 Readme.text file.) Since this is what has just been done, you should perform this step now. Re-install your service pack accepting the defaults.

### 5.6.2   Checking that the correlator (7132) driver has installed correctly

Reboot the computer, and re-log on.
From the Devices control panel applet, check that the driver "correla.sys" is present in the list of resident drivers.
Start the PCS Windows software, and load the corrtest.pcm macro.
Run the macro and check that all tests pass.

## 6. Customer deliverables

### 6.1.1   User Manual

This comprises two sections, the software reference guide and a Basic user's programming guide. If the software is supplied as part of a complete new system the manual is incorporated as part of the users manual.

### 6.1.2   Application Software

The software is contained on one CD-ROM. The installed software requires about 3Mbytes of hard disk space.

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## 7. New Autotitrator DTS5900 – MPT-1 Application Software.

This is the release information for the MPT-1 (Multi Purpose Titrator) software, version 1.00. The software is designed to be used in conjunction with DTS/PCS software v1.41B1 or higher, and with an instrument from the Zetasizer 1000, 2000 or 3000 series ONLY.

### 7.1    MPT-1 Functional Features

This software allows the user to measure Zeta Potential, Size and Intensity (or combinations of these) as a function of pH, Conductivity or Additive concentration
Functions are also supplied to calibrate the pH and conductivity measuring systems, prime and flush the hydraulic system, dispense fluids, save measurement records and print measurement reports.
This software is for use with Windows 95, Windows98 or Windows NT4.0sp3 and above only.

**This software will not work on Windows 3.1x**.

### 7.2    Table 1 – Additions

| SCR Number | Details | Comment |
|---|---|---|
| 1057 | Requirement to stir sample without starting a titration | Stir checkbox added to 'Sample' tab |

### 7.3    Table 2 - Deletions
None

### 7.4    Table 3 – Changes

Implement the following SCRs:

| SCR Number | Details | Comment |
|---|---|---|
| 1007 | 'Basic error' when using Flush and Measure icons | Corrected |
| 1015 | It is possible to specify an invalid filename in the 'Save Results' box. | Check path and filename for 16bit compatibilty. Warn user when starting titration |
| 1020 | Coffee Mate Top titrates in the wrong direction | Change settings in TOP file |
| 1088 | pH reading affected by zeta measurement field | 15 second delay added between end of measurement and pH reading |
| 1109 | Too many warning dialog boxes during configuration | Warnings new only generated at start of titration |

### 7.5    Distribution Media
One CD-ROM

## 8. MPT-1 Autotitrator Software installation notes

**DTS/PCS version 1.41b1 or greater must be installed before this software is installed. This is handled automatically if both PCS and Autotitrator software are selected when installing from CD-ROM.**

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## 8.1    Installation from CD ROM

The CD will auto-play in most systems. If it doesn't, run Setup .exe from the root directory of the CD.

For more information follow the instructions in the 'Contents.txt' file on the CD ROM.

## 8.2    Installation from floppy disk set

To create a floppy disk from CD ROM, follow the instructions in the 'Contents.txt' file on the CD ROM. Then place disk 1 in the floppy drive and run setup by selecting Run… from the Start Menu and typing "a:\setup" in the box.

Follow the instructions on screen. When confirmation of the path to the PCS software is asked for, this must be the path to PCSv1.41B1 or greater.

# 9. COR3140 Firmware

## 9.1    Changes

| Malvern Software Change Request Number (SCR) | Description | Comments |
|---|---|---|
| 1129 | This changes the default cell position to 50%. Updating a system with this firmware will not change the cell position in the cell array. See section 6.5 for details on updating | Implemented |

## 9.2    Installation from CD ROM

1.  Ensure the Zetasizer is powered-up and connected via the RS-232 cable to the PC.

2.  From Explorer or File Manager open the following directory on the CD-ROM:

    \Firmware\V2.1

3.  Run the UPDATE.EXE program by double-clicking on it.

4.  On the dialog that appears, click on the [ **Send** ] button. The firmware update will commence. This takes about 20 minutes.

5.  On terminating, you will be prompted by a message box stating that the board has programmed successfully.

## 9.3    Installation from floppy disk set

To create a floppy disk from CD ROM, copy the contents of the V2.1 folder identified above to a floppy disk. Insert the disk in Drive A: of the system PC and follow the instructions above.