Z-Dis

Dissolution Monitor

Release 2.09
for Windows NT 4.0

Software - Manual

English

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Contents

1. Hardware and software system specification

The Z-Dis Dissolution Monitor Software is designed and compiled using exclusively National Instruments™ LabView™ development system (current release 4.01). The software is programmed under and designed for MS Windows NT 4.0. The software is not portable to other operating systems.

Being a Win NT 4.0 application, the Z-Dis Dissolution Monitor Software requires the following minimum hardware and software environment:

- IBM compatible Pentium™ 133 with at least 32 MB RAM (64 MB recommended)
- about 50 MB of free harddisk capacity
- SVGA graphics card
- Mouse

- MS Windows NT 4.0 (logged on to a NT network)
- NT graphics mode set to 1024 x 768 x 256 colors, small fonts (!)
- A suitable printer (Laserjet type) and a suitable storage device (harddisk) must be logged on to the network for remote protocol printout and data storage. The machine running Z-Dis must have access to the network printer and storage device.

- No Eco-PC (Power savings etc.) settings installed or activated (*)

  *Because **Z-DIS** is designed for long duration runs it is strongly recommended to uninstall or disable, respectively, any Eco-PC settings of your PC (the likes of e.g. processor shut-down if no input is made by mouse or keyboard etc.)*

- The ZYMARK automatic system must be properly connected to the I/O ports at the back of the ZEISS MCS spectrometer.

  For a pinout of the MCS 500 I/O ports see Supplement A.

2. Installation and INI files

Installation

This release is delivered complete with a standard installation routine.

To start the installation:

- insert disk 1 into the floppy drive of your PC
- run ZDISnnn.EXE from the Windows file manager

The software will now be installed, the required directories etc. will be automatically created. The default installation directory is **Z-Dis_Robotic_NT.**

A programm manager group will be created holding several program icons.

The software package includes two executables:

- **Disstest.EXE** is the Automatic Module to perform the dissolution runs and communicate with the ZYMARK robotic system. To start the automatic module double-click on the AUTOMATIC icon in the program manager group.

- **Manual.EXE** is the Manual Module to create parameter sets for the Automatic Module. To start the manual module double-click on the MANUAL icon in the program manager group.

You can also view and edit DISSTEST.INI (Z-DIS Initialisation file), DEFAULT.PAR (a set of default measurement parameters) and VERSION.TXT (info & release history) from the program manager group.

DISSTEST.INI

The initialisation file DISSTEST.INI holds essential information for the program execution. It has to be in the applications main directory. Both the automatic as well as the manual modules are referring to this INI file.
Example INI file:

```
[General]
Version=Version 2.01 NT
Language=1
Debug=1

[Files]
CurDataFile=\\Jeeves\Pfizer\Zymark\Data\Test.zrd
BackupDataFile=d:\Development\Projects\Z-Dis_Robotic_NT\TempReportFile.zrd
CurParaFile=d:\Development\Projects\Z-Dis_Robotic_NT\Parameters\default.PAR

[MCS500]
Simulation=yes
MCSType=MCS 551 UV
NrOfDevices=1
MUX=No

[Dissolution]
SimMode=2
RobotINI=d:\Development\Projects\Z-Dis_Robotic_NT\ZY.INI
StoreRawData=0

[DISSTEST]
FPFont="0" 16
BDFont="0" 16
postScriptLevel2=False
colorPrinting=False
IconFont="0" 16
simpleDiagramHelp=False
appFont="0" 13
useDefaultTimer=False
noBoxAroundName=True
```

Some of the parameters in DISSTEST.INI can be manually modified by the experienced user. In the following description these are marked by an (*).

[General]

Version=Version 2.01 NT	
Language=1	English
Debug=0	internal

[Files]

CurDataFile=		last used ZYMARK data log file
e.g.: = \\Jeeves\Pfizer\Zymark\Data\Test.zrd		
BackupDataFile=		Backup file for data storage in case of
e.g.: d:\Development\Projects\Z-Dis_Robotic_NT\TempReportFile.zrd		network failure
CurParaFile=		last used parameter file
e.g.: d:\Development\Projects\Z-Dis_Robotic_NT\Parameters\default.PAR		

[MCS500]

Simulation=no		**Spectrometer simulation mode (*)**
	no	no simulation, actual measurement
	results	spectrometer on-line: -> all port commands and measurements are carried out, but spectra will not be evaluated for concentration, color etc.; instead dummy values will be generated
	yes	no spectrometer(s) on/line, all spectra and eval's will be emulated
MCSType=MCS 551 UV		Type of Zeiss spectrometer used
NrOfDevices=1		Number of spectrometers in the pipeline
MUX=No		Shutter or Multiplexer device ?

[Dissolution]

SimMode=0		**ZYMARK system simulation mode (*)**
	0	robot on-line
	1	use manual DIO-Emulation
	2	automatic simulation mode
RobotINI=		path and name of the ZYMARK INI file
e.g.: = d:\Development\Projects\Z-Dis_Robotic_NT\ZY.INI		used for communication between ZEISS and ZYMARK programs.
StoreRawData=0	0/1	(*) specifies whether to store the raw spectral data of samples, background and standards. The files will be stored in ZEISS

	ASPECTplus data file format and can be re-evaluated any time using the ASPECTplus software.
[DISSTEST]	This section hold various settings for the correct screen display, fonts etc. Don´t change these items.

For a description of the ZEISS ASPECT plus data file format see Supplement D.

The INI file parameter [Dissolution] SimMode allows you to make use of an internal DIO simulation to manually trigger the single commands of a dissolution run. You will be prompted to confirm the next awaited command. Click on OK to confirm and continue.

Zy.INI

The communication between the Zymark Software System and the Zeiss Z-Dis software is performed using a common file, Zy.INI, into which essential information for the next run is written by the Zymark system. These data will be read by Z-Dis upon the “re-read Zy.ini“ command.

Example of Zy.INI

```
[Zymark]
ZeissPARFile=d:\Development\Projects\Z-Dis Robotic NT\Parameters\default.PAR
ARDReference=123456-sd45
BatchSize=6
StartingVessel=1
VesselVol=500
SamplePoints=3
DosageSize=500
StdConcentration1=1.0
StdConcentration2=1.0
StdContainer1=1
StdContainer2=2
MaxBackgroundAbs=0.1
SystemSuitability=1
Ratio=5
Ratio2=5
RSD=5
QPoint=80
QPointSP=3
DataFilePresent=1
DataFilePath=\\Jeeves\Pfizer\Zymark\Data\test.zrd
```

ZeissPARFile	(Net-) Location of the parameter file to be used by Z-Dis
ARDReference	ARD Ref number to be included in result output strings
BatchSize	6 vessels
StartingVessel	1 or 6
VesselVol	[ml]
SamplePoints	Number of sample points
DosageSize	[mg/ml]
StdConcentration1, StdConcentration2	Concentration of the standards to be measured
StdContainer1, StdContainer2	Container for standard solution 1 and 2
MaxBackgroundAbs	Maximum tolerated background absorbance
SystemSuitability	Perform system suitability run before the run ? (0/1)
Ratio, Ratio2, RSD	Tolerances for Std1/2 ratio, Std 2/1 ratio and SST standard measurement RSD
Qpoint, QPointSP	Qpoint, and Qpoint-sample point for graphical display
DataFilePresent	Data file ready ? (0/1)
DataFilePath	(Net-) Location of Data file

3. Data Storage and File system

The Results generated during a run are stored in the common data file specified in the ZY.INI. The structure and contents of the individual lines provided by Z-Dis and the Zymark system are specified in detail in the Zymark documentation.

See Document: **PFZ 09 Dissolution System File Interface**
Author Paul Savage, Zymark

Excerpt from example data file:

```
...
PARAMETER_FILE_ZEISS,d:\Development\Projects\Z-Dis Robotic NT\Parameters\default.PAR,400.00,NORMAL,5,30,1
BLANK,0,Fri Aug 15 14:06:03 1997,0
...
...
STD2,1,2,Fri Aug 15 14:06:03 1997,1.0000,0.2904
STD2,2,2,Fri Aug 15 14:06:03 1997,1.0000,0.2906
STD2,3,2,Fri Aug 15 14:06:03 1997,1.0000,0.2897
STD2,4,2,Fri Aug 15 14:06:03 1997,1.0000,0.2897
STD2,5,2,Fri Aug 15 14:06:04 1997,1.0000,0.2891
STD2,6,2,Fri Aug 15 14:06:04 1997,1.0000,0.2891
STD2,7,2,Fri Aug 15 14:06:04 1997,1.0000,0.2892
STD1,1,1,Fri Aug 15 14:06:04 1997,1.0000,0.2899
SYSTEM_SUITABILITY,100.18,PASS,0.29,0.001,PASS,123456-sd45
...
...
BACKGROUND,1,Fri Aug 15 14:06:05 1997,0.00828
BACKGROUND,2,Fri Aug 15 14:06:05 1997,0.04950
BACKGROUND,3,Fri Aug 15 14:06:05 1997,0.08753
BACKGROUND,4,Fri Aug 15 14:06:05 1997,0.12224
BACKGROUND,5,Fri Aug 15 14:06:05 1997,0.15470
BACKGROUND,6,Fri Aug 15 14:06:06 1997,0.18468

...
```

If the Option StoreRawData is activated (Disstest.ini) all acquired spectra, i.e. background, blank, standard and sample readings, are stored into the data directory specified in the ZY.INI. The spectra are stored in ASPECT plus native spectra file format.

For a description of the ZEISS ASPECT plus data file format see Supplement D.

The file names are generated automatically by the Z-Dis program and indicate the contents of the file according to the follwing table.

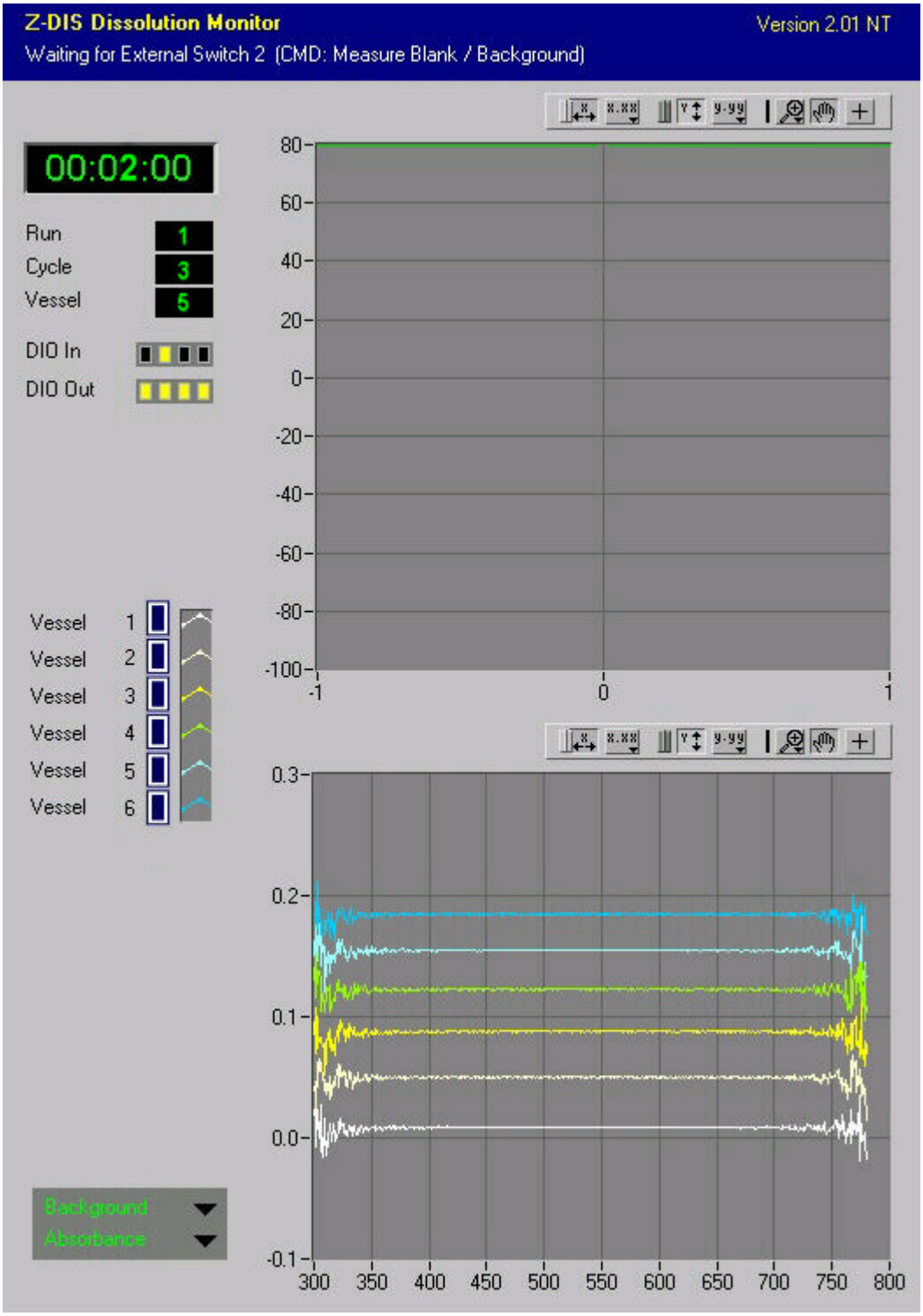
Stored raw data files

Filename	Contents
Yyyymmddrr Sample Vessel v.dat	[Samplepoints] Sample spectra
Yyyymmddrr Manual Mode Spectra.dat	Spectra generated in the manual mode
Yyyymmddrr Standard Spectra.dat	2 (or 8 in case of SST) Standard spectra
Yyyymmddrr Background Spectra.dat	6 Background spectra

[yy..year, mm .. month, dd .. day, vv .. vessel nr., rr .. run nr]

4. The Automatic Module

Since the Z-Dis software runs in tight cooperation with the Zymark software system, it occupies only one half of the operator's screen.



Short description of screen elements.

Dissolution Graph	displays the dissolution curves for any single or all of the dissolution vessels. The vessels to display can be specified in the checkbox array left of the dissolution graph.
Time	shows the current duration of the dissolution run.
Run	indicates the current run or method, resp.
Cycle	indicates the current cycle or sample point, resp.
Vessel	indicates the vessel that is currently being measured
DIO In / Out	show the current I/O port status (communication with ZYMARK robot)
Spectra Graph	Displays the current spectra obtained from the activated vessels. The upper selection box specifies whether ***Background, Standard*** or ***Sample*** spectra are displayed. The lower selection box specifies whether the spectra are displayed in ***Energy, .Absorbance*** or ***2nd deriv of Absorbance***.

All displays are continously updated while the dissolution run is performed.

The Z-Dis Software is started and closed down by the Zymark software system.
(A hidden function enables the F11 key to close down the Z-Dis Software)

The Automatic Module software awaits a well defined chain of commands from the ZYMARK robotic system. The structure of the command sequence is described in the following table.

ZYMARK command (DIO In)	ZEISS response (DIO Out)	**Automatic Module software**
		Reads initialisation parameters from ZDIS_MUX.INI, especially location of ZY.INI file and SIM mode
1	1, 4	Reads actualized ZY.INI, gets batch size, std conc. a.o. values, as well as ZEISS para file to use in this run; reads specified ZEISS para file, gets calibration wavelength etc.
2	1,2,4	Reads blank spectrum
3	1,3,4	System Suitability Test (optional): Read Std 1, compute and evaluate ratio, read 8 times Std 1 and compute and evaluate RSD.
3	1,3,4	Reads Std 2, computes preliminary calibration
2	1,2,4	Reads nn background spectra (nn.. nr. of vessels), checks absorbance at specified wavelength and stores background as reference for sample measurement. If one of the background absorbances exceeds MaxAllowedBackground the complete background cycle is to be repeated.
4	1,4	Starts the analysis timer
3	1,3,4	Reads nn * cc sample spectra (nr. of vessels * nr. of sample points). Each sample spectrum is corrected with the respective vessel´s background reading. The concentration is determined from the preliminary calibration and displayed in the dissolution graph.
2	1,2,4	Reads second blank spectrum
3	1,3,4	Read first standard spectrum, computes mean calibration.

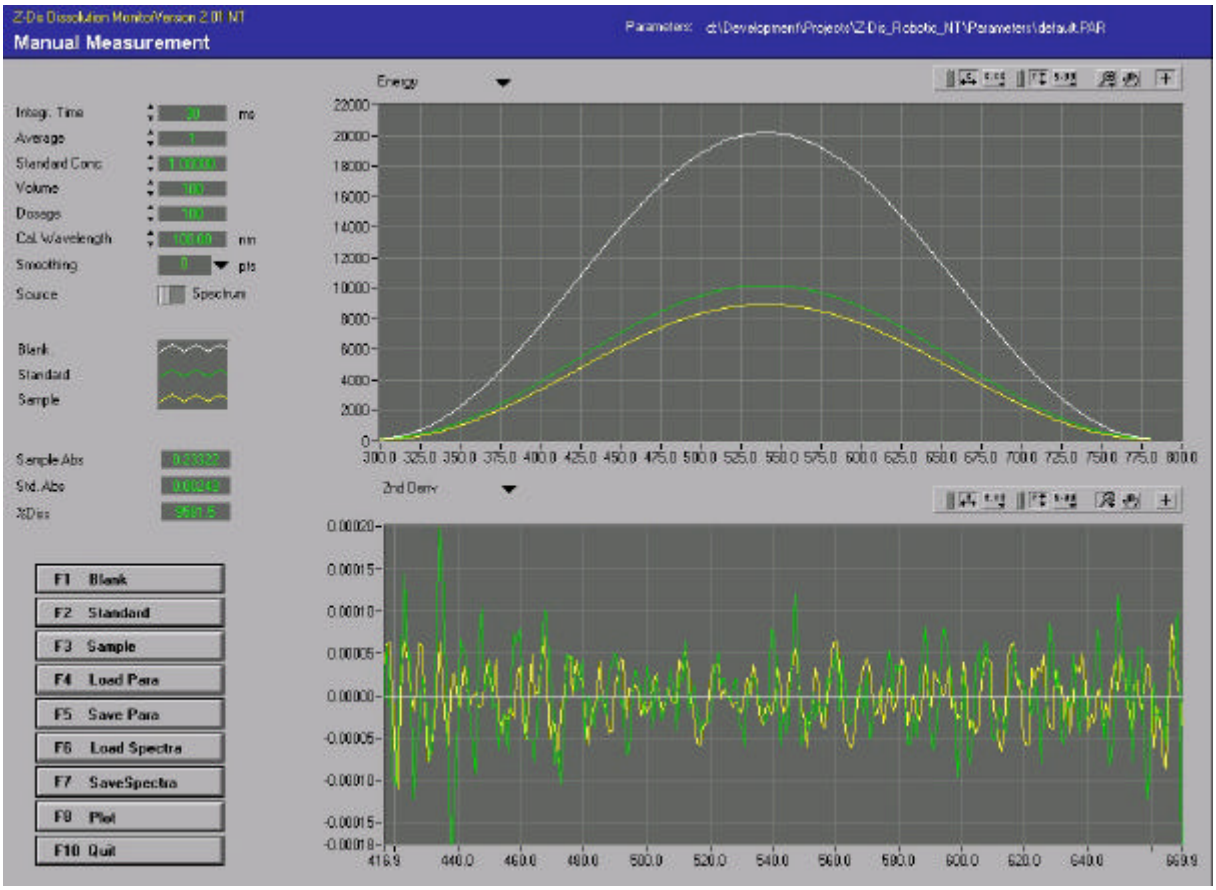
Now all the concentrations of the sample run are re-evaluated using the mean calibration. If RawDataStorage is ON, all collected spectra are stored in corresponding raw data files.

The whole sequence can now be repeated with the next method.

The results of the dissolution run will be added to the (remote drive) ZYMARK data log file during the run.

A more detailled description of the handshake communication between Zymark abd Zeiss programms can be found in the Zymark system documentation.

5. The Manual Module



The Manual Module is used to create and evaluate parameter files for the automated dissolution runs. It allows you to observe the complete spectra and their 2nd derivatives in order to find the best calibration wavelength, integration time and other settings for the special analytical problem.

The filename and path of the current parameter file are displayed in the Headline Bar of this window.

> *For a description of the graph manipulation handles (upper right of the graphs) see Supplement C.*

Integration time	Specifies the integration time of the MCS 500 diode array spectrometer.
Average	Specifies the number of spectra to be averaged by the spectrometer in each measurement.
Standard Conc.	Specifies the concentration of the standard that will be measured after activating the STANDARD button. The value is required to compute the concentration of a sample measurement.
Calibration wavelength	Specifies the wavelength at which to compute the calibration curve. The current calibration wavelength is indicated by a red line cursor in the graphs.
Smoothing	Determines the number of measuring points included in the smoothing algorithm for the computation of the 2nd derivative.
Source	Specifies whether the calibration curve is taken from the standard spectrum or from ist 2nd derivative
Sample Abs, Std Abs and % Dissolution	Results of a sample measurement as computed from the current settings and blank/std readings.
F1 Blank	Blank measurement. The obtained spectrum will be stored as blank (reference) for standard and sample measurements.
F2 Standard	Standard measurement. The standard spectrum and ist derivative will be displayed in yellow.
F3 Sample	Sample measurement. The obtained spectrum is blank-(reference-) corrected. The sample spectrum will be displayed. If a valid standard has been measured, the concentration is computed and displayed.
F4 Load Para	Allows the user to load a complete parameter set.

F5 Save Para	Allows the user to store the complete parameter set, i.e. calibration settings and spectrometer settings.
F6 Load Spectra	Allows the user to load a set of spectra.
F7 Save Spectra	Allows the user to store the current set of spectra.
F8 Plot	Plot current spectra and results.
F10 Quit	Quit Manual Module.
Spectra Graph 1 & 2	Displays measured blank, standard and sample spectra. The selection boxes specify whether the spectra are displayed in ***Energy, Absorbance*** or ***2nd deriv*** of Absorbance.

Z-Dis MUX parameter file format

A parameter file contains all neccessary parameters for a complete dissolution run, i.e.:
The parameter files are stored in plain ASCII (use notepad or any other ASCII viewer)

Example:

```
[GENERAL]
FileID=Z-Dis MUX Dissolution Monitor Parameter File
Time=21.11.1995/12:26:49
Origin=Dissolution Monitor  V 1.54
Note=

[Spectrometer]
IntegrationTime=25
Accumulation=20

[Evaluation]
Smooth=8
CalibWavelength= 400.00
UseDeriv=0
```

6. Release History

Release 2.09 NT released : 04.08.98 at Sandwich site	changes according to Zymark FAX 15.7.98 and comments by S.Lobley of Pfizer - std1, std2 & blank container read from ZY.INI correctly - std 2 8th reading now correctly numbered 8 in ZRD file - spectra file name now includes date & time to avoid overwriting in case of multiple system start at the same day - graph colors changed according to Win3.11 release - spectra stored with date time stamp in correct entry according to ASPECT file format spec - manual mode: graph plot now has correct scaling - std & sample reading indicators and conc indicator cleared upon blank or std measurement, resp. All changes carried out according to Software Modification Procedure and according Software Modification reports have been generated.
Release 2.08 NT released : 24.02.98 at Sandwich site	- started from 2.04 source code - fixes according to 2.05 redone - SST string carried over to subsequent runs - new calibration cluster (std 2 data separated into SST(single & 6x) and final meas.)
Release 2.07 NT (rejected) released : 10.02.98	- BF in IO and Shutter bit logic - updated firmware included (mcs501.btl of 1.9.97) - new INI entry IOFlag now allows logic swap independently from shutter / MUX example : [MCS500] Simulation=No MCSType=MCS 551 UV NrOfDevices=1 Dark=Shutter IOFlag=0
Release 2.06 NT (rejected) released : 04.02.98	changes according to fAX of 3.2.98 completed at Zeiss, replacement EXE file emailed to Zymark - BF in SST data transfer to following runs

Release 2.05 NT released : 28.11.97	changes according to fAX of 28.11.97 completed at Zeiss, only sent EXE file - added absolute value in RSD evaluation (BF in RSD pass/fail check) - changed ZY.ini entries to latest Zymark state, (BF in STD pass/fail check)
Release 2.04 NT released at : 3.11.97	changes according to fAX of 29.10.97 completed at Pfizer Sandwich - added [Directories] entry to INI file (spectra storage) - checked output lines according to Zymark specification Release 1.08 - BF in vessel nr display at begin of run - smaller fonts in Manual plot
Release 2.03 NT released at : 6.10.97	changes according to fAX of 25.09.97 Automatic: - All readings in std, backgr and sample report lines are now 7 decimal places - System suitablity data carried over from last SST, SST and Std calculation now correct - clear screen immediately after final reading, then wait for switch 1 - run number updated upon re-reading zy.ini Manual: - BF in save & load spectra - volume and dosage inputs removed, thus result is shown as conc. - all results now 7 dp, input 7dp as well - parameter default directory read from disstest ini General: - updated firmware file MCS501.BTL in use
Release 2.02 Released 02.09.97	All readings in std, backgr and sample report lines are now 6 decimal places QPoint line now is displayed as Q+5 Dissolution graphs start at (0,0), times rounded to half minute
Release 2.01 Released 22.08.97	BF in SST result line output

Release 2.00 Released 5.8.97	General: Re-designed for PFZ09 system 1024 x 768 half-screen layout to cooperate with Zymark software system Windows NT 4.0 Networking features for data storage, parameter read/write and result output Automatic: On-line spectrum display to display background, standard and sample spectra in energy, abs or 2nd deriv. Redesigned communication with Zymark system, result data written to common result file directly after being produced. Removed auto-print Manual: Spectra set load/save included Std abs, sample abs and % diss displayed Two spectra graphs can be individually configured to display energy, abs or 2nd deriv.
Release 1.54 released 20.6.96	General: -implemented/corrected ASPECT-equivalent 2nd deriv algorithm -absorbance spectra Standard/Sample are now interpolated to equidistant Lambdas -INI parameter wavelength range restriction now functionable Automatic: Background Absorbance now checked as |Background|<?|MaxAllowedAbs| Plot got new Axis Font Manual: Spectra display now shows absorbance Standard/Sample spectra 2nd deriv display now computed according to ASPECT
Release 1.53 released 13.5.96	Bug Fixed in 2-pages plot in case of 12 vessels (labels, data) removed measuring times from headline of sample measurement table in report file
Release 1.52 released 28.2.96	New installation routine

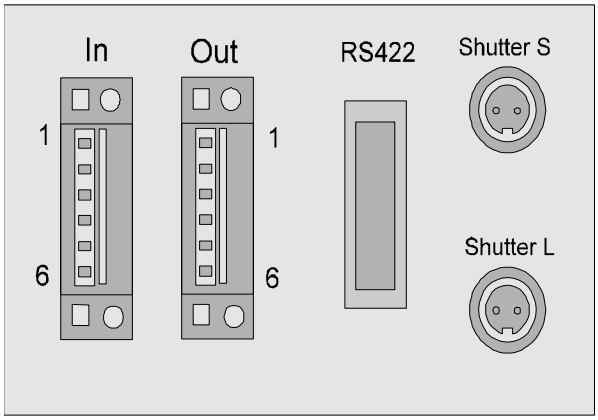
Release 1.51 released 28.2.96	Std Abs in record file is now 6 dec places for deviation method
Release 1.5 released 1/96	rearranged Output & Print sequence to avoid Application error (due to system overload)
Release 1.4 released 22.12.95	Manual Program: Current PAR file now actualized in ZDIS_MUX.INI Automatic Program: Added Error Message if PAR file is missing General: Included ASPECT plus type second deriv (Savitzky-Golay smooth, then SG9 deriv)
Release 1.3 released 20.12.95	Manual Program: conc reading of sample to 5 decimal places Quit button works (DEBUG=0 in ZDIS_MUX.INI !!) Automatic Program: Report plots (Diss. curves) separately for each bath Report plot fixed value range is now 110% Diss Mean %Diss in report is now down to 2 decimal places Bug fixed in 2nd deriv computation on Use2ndDeriv General: Shutter closes after InitDevice Fixed bug in ASPECT file storage (raw data) Created LabView Smooth/Deriv function, avoiding the SMODER.DLL call. Now no DLL foreign to LabView is called. New features: Plot of spectra, derivs, calibration curve and measuring parameters added Cmd Info to Status Bar Report plot includes additional (0,0) starting point Spectral range can be limited by means of new ZDIS_MUX.INI parameters MaxLambda, MinLambda ([Device])
Release 1.21 released 06.12.95	fixed bug in checkbox labelling set precision of std conc (manual) to 5 fixed bug in Read Float Numbers (confusion with English/ German Windows decimal

	separator character), affected reading of floats in INI files
	added Cmd Info to Robot Simulation Prompt Boxes
Release 1.2	changed dissolution graph checkbox array to 12
released 03.12.95	added extended report according to Pfizer
	added Dissolution plot
	implemented new driver (MUX Flag etc.)
	added new entry VesselVol to ZY.INI
	changed Concentration reading to %Dissolution
Release 1.1	Created on-site at ZYMARK, 18.-22.11.95
released 22.11.95	Complete rearrangement of software.
	Now two separate programs Manual & Automatic: DT_EXE.EXE, MANU_EXE.EXE
	Major changes in ZY.INI, ZDIS_MUX.INI etc. (see Manual R. 1.1)
Release 1.0	Test release, did not meet specification due to information losses
released 10.10.95	Sent to ZYMARK beginning of Nov 95

Supplements

Pinout of MCS 500 I/O ports

(MCS 500 Rear View)



Pin	In	Out
1	GND	GND
2	Dig IN 1	Dig OUT 1
3	Dig IN 2	Dig OUT 2
4	Dig IN 3	Dig OUT 3
5	Dig IN 4	Dig OUT 4
6	+ 5V	+ 5V

DIO connections

Connector	Pin	on (low)	off (high)
DIO Out	2	Ready	Busy
	3	Bl/Std OK	not OK
	4	Sample OK	not OK
	5	Hardware OK	not OK
DIO In	2	Read new ZY.INI	
	3	Read Bl/Std	
	4	Timer start	
	5	Read Sample	

Algorithm for smoothing and derivatives according to Savitzky-Golay

Smoothed spectra and their derivatives are computed according to the Savitzky-Golay algorithm. This fast numerical procedure provides the new data points using a set of predefined coefficients.

$$ynew_j = \frac{1}{(\Delta X)^{order\_of\_deriv}} * \frac{1}{koeff_{n+1}} * \sum_{i=1}^{n} (yold_{j+i-(n+1)/2} * koeff_i)$$

The spectra to be processed must be of equidistant. type, i.e. the x-data points must be evenly spaced by ΔX. The standard SG coefficients are computed for a ΔX of 1.

The coefficients have been computed according to R. Ludwig [see "Methoden der Fehler- und Ausgleichsrechnung"; VEB Deutscher Verlag der Wissenschaften, Berlin 1969].

Coefficients for smoothing, *using n points*

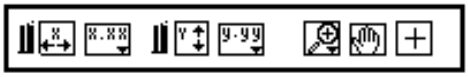
i	n=5	n=7	n=9	n=11	n=13	n=17	n=21	n=25
1	-3	-2	-21	-36	-11	-21	-171	-253
2	12	3	14	9	0	-6	-76	-138
3	17	6	39	44	9	7	9	-33
4	12	7	54	69	16	18	84	62
5	-3	6	59	84	21	27	149	147
6	35	3	54	89	24	34	204	222
7		-2	39	84	25	39	249	287
8		21	14	69	24	42	284	342
9			-21	44	21	43	309	387
10			231	9	16	42	324	422
11				-36	9	39	329	447
12				429	0	34	324	462
13					-11	27	309	467
14					143	18	284	462
15						7	249	447
16						-6	204	422
17						-21	149	387
18						323	84	342
19							9	287
20							-76	222
21							-171	147
22							3059	62
23								-33
24								-138
25								-253
26								5175

Coefficients for derivatives *(n=9)*

i	1st	2nd	3rd	4th
1	-4	28	-14	14
2	-3	7	7	-21
3	-2	-8	13	-11
4	-1	-17	9	9
5	0	-20	0	18
6	1	-17	-9	9
7	2	-8	-13	-11
8	3	7	-7	-21
9	4	28	14	14
10	60	462	198	143

The described algorithm is used in the ZEISS software to produce smoothed spectra and their derivatives.

Labview Graph Handles



The graph palette has controls for panning (scrolling the display area of a graph) and for zooming in and out of sections of the graph.

If you press the x **autoscale button**, LabVIEW autoscales the X data of the graph. If you press the y autoscale button, LabVIEW autoscales the Y data of the graph. If you want the graph to autoscale either of the scales continuously, click on the lock switch, shown at the left, to lock autoscaling on.

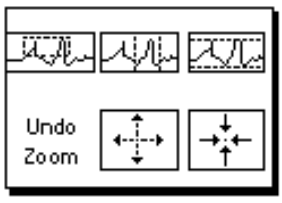
The **scale format buttons** give you run-time control over the format of the X and Y scale markers respectively.

You use the remaining three buttons to control the **operation mode** for the graph.

Normally, you are in **standard** operate mode, indicated by the plus or crosshatch. In operate mode, you can click in the graph to move cursors around.

If you press the **panning tool**, shown to the left, you switch to a mode in which you can scroll the visible data by clicking and dragging sections of the graph.

If you press the **zoom tool**, shown at the left, you can zoom in on a section of the graph by dragging a selection rectangle around that section. If you click on the zoom tool and hold for a moment, you get a pop-up menu you can use to choose some other methods of zooming. This menu is shown in the following illustration.



A description of each of these options follows.

Zoom by rectangle.

Zoom by rectangle, with zooming restricted to x data (the y scale remains unchanged.

Zoom by rectangle, with zooming restricted to y data (the z scale remains unchanged).

Undo last zoom. Resets the graph to its previous setting.

Zoom in about a point. If you hold down the mouse on a specific point, the graph continuously zooms in until you release the mouse button.

Zoom out about a point. If you hold down the mouse on a specific point, the graph continuously zooms out until you release the mouse button.

Note: For the last two modes, zoom in and zoom out about a point, shift clicking zooms in the other direction.

Zeiss ASPECT plus data file format

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General remarks

- The header of the data file is similar to a windows-INI-file. To read a data file it is necessary to interpret the sections GENERAL and DATA.
  Every entry has to start at the beginning of a line. The section keywords are enclosed in square brackets ('[' and ']') and immediately followed by a CR/LF.

- The keywords in the sections must befollowed immediately by an equal sign and then by the corresponding value of the respective keyword (in GENERAL section). In theDATA section the equal sign is to be followed immediately by a CR/LF. Here the first byte of the data has to stand on the beginning of the next line. After the last byte of data a CR/LF is to be appended.

- All data are 4-Byte IEEE float values. ASPECT will accept values in the range (-1.0 E15 .... 1.0 E15) only.

- The section GENERAL is always the first section in the data file.

- Several more sections and keywords are defined for internal use and may occur in the data files.

- The data file should be opened in binary mode.

Format

[GENERAL]

TITLE=	small note of up to 50 characters	
TYP=	0	old DOS-aspect format,
	1	old DOS-aspect format,
	2	old DOS-aspect format,
	3	old DOS-aspect format,
	4	current data file format
TIME=	date and time as a string in the format: dd.mm.yyyy/hh:mm:ss	
XUNITS=	unit of the abscissa values	
YUNITS=	unit of the ordinate values	
ZUNITS=	unit of the cycle values	
FIRSTX=	start value of measurement range as string	
LASTX=	end value of measurement range as string	
NPOINTS=	number of measurement values per cycle as string	
NCYCL=	number of cycles as string	

[DATA]

ZDATA=	cycle values in a field of float values (data type float). The size of the field (number of elements) is specified by keyword NCYCL. ZDATA is not necessarily included in the data file, even if the number of cycles is greater than 1 !
XDATA=	abscissa values in a field of float values. The size of the field is specified by keyword NPOINTS. The abscissa values are the same for all cycles.
YDATA=	measurement values in a field of float values. The size of the field is NPOINTS * NCYCL. The cycle values are stored in subsequent order (cycle 1, cycle 2, ...)