

Zetasizer – Malvern Panalytical

Ultra, Pro, Nano, AT, WT

INTRODUCTION

The Lumetics LINK™ software platform scans network locations for new measurement data files, copies data directly to a centralized database, and provides a powerful user interface for rapid multi-measurement multi-technique data aggregation, visualization, analysis, and reporting. LINK employs a client/server-based architecture where the LINK server hardware is provided by the end user and resides on the end user's network. The LINK client is a portable web-based application that may be placed on any computer with network connectivity to the LINK server. For successful import, the LINK webserver requires read access to the folders where user data resides.

Instruments in the Zetasizer range are used to measure particle and molecular size from less than a nanometer to several microns using dynamic light scattering; zeta potential and electrophoretic mobility using electrophoretic light scattering; and molecular weight using static light scattering.

DETAILS

LINK can open files from two different types of Zetasizer software:

- ZS Xplorer (CSV export)
- Zetasizer Software (TXT export)

ZS Xplorer (CSV export)

LINK requires data files to be exported from the ZS XPLORESER software using output from a *Parameter Table* found in the *Analyze* section of the ZS Xplorer software.

To export data from the ZS Xplorer software, follow the below instructions for export:

- In the Analyze section, select a new or existing Report.
- In one of the Report sections, select *Parameter Table* from the dropdown
- The first three default options in the report are *Measurement Type*, *Measurement Start Date and time*, and *Sample Name*. These fields are mandatory in this order, for LINK to correctly detect the export as a compatible file type. See example screenshot of the Parameter Table below this section.
- Additional fields can be added to the table to report on whatever data is desired. Click on the gear icon beside the table to add fields. As noted above, ensure the first three fields in the table remain in the order as noted above.
- It is recommended to only add data that is desired rather than simply adding all available columns, as there are some duplicate column names that may result in unexpected field names in LINK (see note 1 below).
- Raw data can be exported into LINK if the following fields are added to the table:
 - For Intensity vs Size, add *Sizes* and *Particle Size Intensity Distribution* (see note 1,2 below)
 - For Volume vs Size, add *Sizes* and *Particle Size Volume Distribution (%)* (see note 1,2 below)
 - For Number vs Size, add *Sizes* and *Particle Size Number Distribution* (see note 1,2 below)
 - For Particle Concentration vs Size, add *Sizes* and *Distributed Particle Concentration (particles/ml)*
 - For Autocorrelation vs Delay Time, add *Correlation Lag Times* and *g2-1 correlation coefficients*
 - For Total Counts vs Zeta Potential (mV), add *Zeta Potentials* and *Zeta Potential Distribution Intensities (kcps)*
 - For Phase vs Time, add *Times* and *Phase Values (rad)* (see note 3 below)
- Once the table is configured as desired, select the measurement(s) to export, and ensure the data visible in the table is as expected for import into LINK
- Export by clicking the three dots icon, and selecting the Export to CSV icon (see image below)



NOTE 1: When adding columns to the *Parameter Table*, the same column name may exist in different sections. For example, Particle Size Intensity Distribution can be found in the *Size Analysis Result* section, and the *Unclassified Size Analysis Result*. If a user adds both columns to the table, the Parameter Table will include the full identifier to the data, e.g. *Size Analysis Result\Particle Size Intensity Distribution* and *Unclassified Size Analysis Result\Particle Size Intensity Distribution* will both show up in the *Parameter Table* as to ensure the column names are unique. The LINK software will bring the column names in as fields with the exact name as shown in the *Parameter Table*, so if the full identifier is not desired, please remove one of the columns.

NOTE 2: Please note that when requesting raw data such as *Particle Size Intensity Distribution* (or Number/Volume), the LINK software will only import the raw data found in the *Size Analysis Result* section and will ignore the *Unclassified Size Analysis Result* fields for raw data. LINK will either look for a column called (e.g.) *Particle Size Intensity Distribution* or (if the Unclassified data was also included), a column called *Size Analysis Result\Particle Size Intensity Distribution* for the Intensity vs Particle Diameter raw data in LINK.

NOTE 3: Data that has too many points may not be exported by the ZS Xplorer software. The data may be visible in the table, but after exporting the CSV file will contain a message like "Value is too long to export (over 32597 characters)". This can show up with Phase vs Time data as these data series can be long. In this case, this raw data will be unavailable in LINK.

Parameter Table example:

Measurement Type	Measurement Start Date...	Sample Name	Wall Zeta Potential (mV)	White Mangelndorf Zeta...	Zeta Deviation (mV)	Zeta Peaks
Zeta	2021-10-25 2:23:11 PM	LimG-1-44 citrate 5x dilu...	-0.3199		2.927	Peak 1: { Area = 100, Mean = -0.1615, Mode = 0.7399, StdDev = 2.927 }
Zeta	2021-10-25 2:47:59 PM	LimG-1-44 citrate no dilu...	-7.27		43.16	Peak 1: { Area = 3.441, Mean = -142.4, Mode = -141.9, StdDev = 2.415 } Peak 2

The CSV output file looks as in the below image after exporting. Note that the order of the first three columns is reversed from what is shown in the table itself. This is normal, and LINK will expect the CSV to be in the format below.

```

1 "Sample Name:", "Measurement Start Date And time", "Measurement Type", "Wall Zeta Potential (mV)", "White Mangelndorf Zeta Values", "Zeta Deviation (mV)", "Zeta Peaks",
2 "LimG-1-44 citrate 5x dilution", "2021-10-25 2:23:11 PM", "Zeta", "-0.3199", "", "2.927", "Peak 1: { Area = 100, Mean = -0.1615, Mode = 0.7399, StdDev = 2.927 }", "-0.15
3 "LimG-1-44 citrate no dilution", "2021-10-25 2:47:59 PM", "Zeta", "-7.27", "", "43.16", "Peak 1: { Area = 3.441, Mean = -142.4, Mode = -141.9, StdDev = 2.415 } Peak 2

```

Zetasizer Software (TXT export)

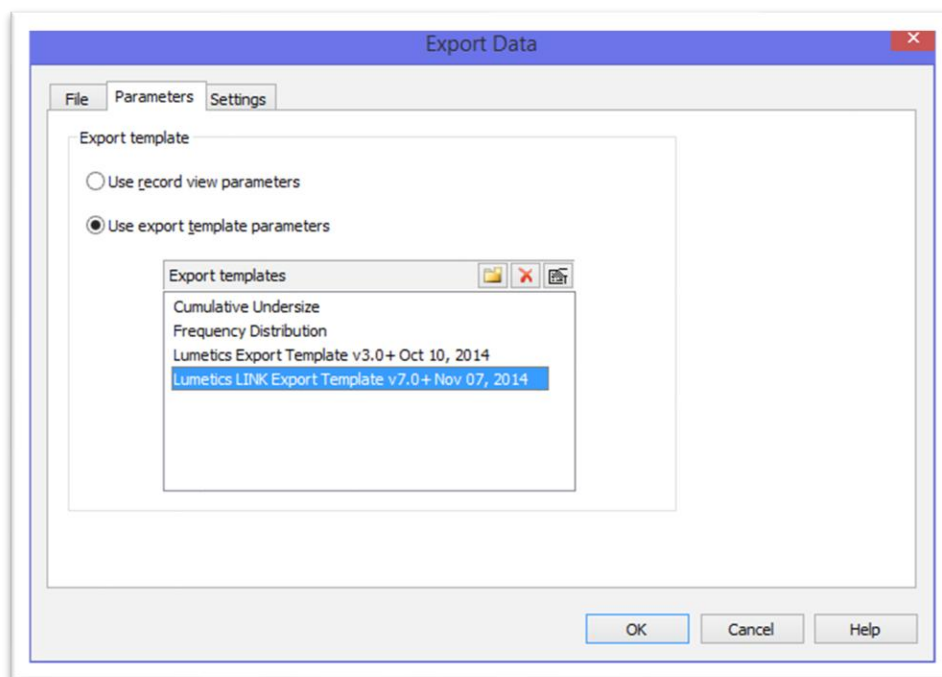
LINK requires the data files to be exported from the Zetasizer software using the Lumetecs LINK™ Zetasizer Export Template (EDF file). The export template can be downloaded from the Lumetecs website, or by clicking [here](#). Only “Size” and “Zeta” data types are currently supported. Each TXT export must only contain a single data type.

To apply the Lumetecs LINK™ Zetasizer Export Template, copy the template file to the computer running the Zetasizer software, and place in this folder: C:\Users\Public\Documents\Malvern Instruments\Zetasizer\Export Templates

To export data from the Zetasizer Software, follow the below instructions for export:

- In the File tab, select Export to File
- Export Selection Only, and Overwrite File.
- In the Parameters tab, select Use Export Template Parameters
- Select the Lumetecs LINK Export Template, and OK.





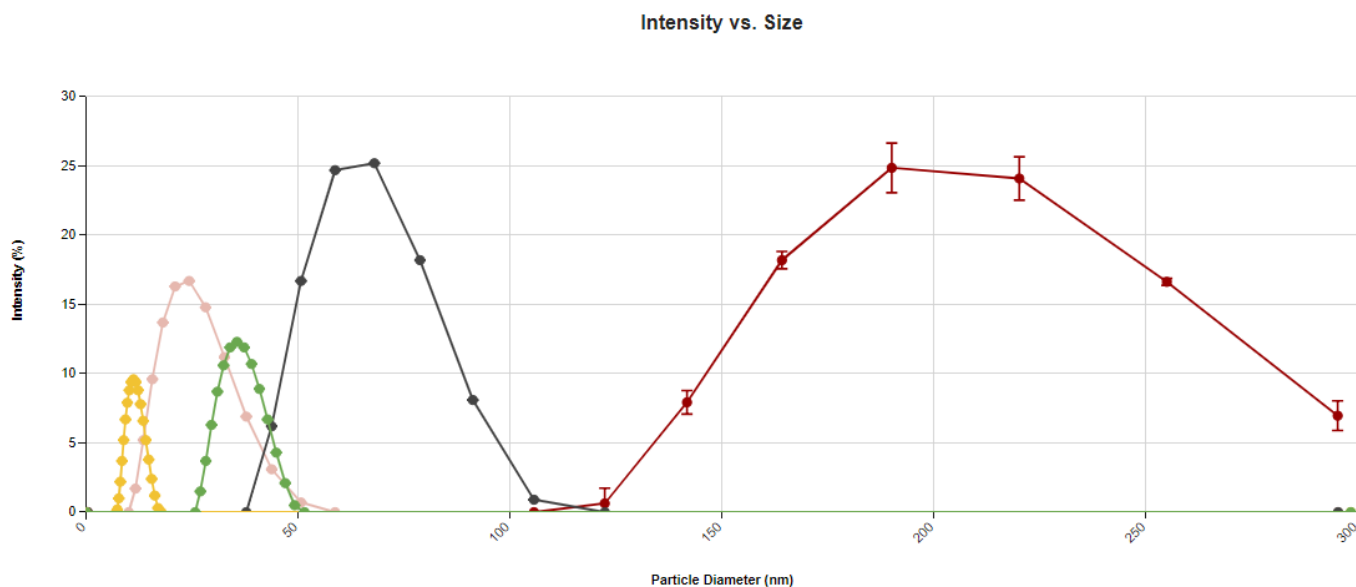
The Zetasizer TXT data file example is as follows:

1	Type	Sample Name	S/W Version	Serial Number	Measurement Date and Time	Record Number	Result	Origin	Viscosity (cP)	Temperature (°C)	Duration (s)	Size Runs	Measurement Position (nm)	Attenuator	Target Measurement	
2	Size	Lumetcs_Stress level 1	7.02	MAL1038535	3/20/2014 18:17 1	Edited 5.1178 25	8	20	4.65	0	160 80	0 0	7.02	3/24/2014 9:11 0.157	3 3 96 100 Complete	53.9 mattean6 Copied FALSE
3	Size	Lumetcs_Stress level 2	7.02	MAL1038535	3/20/2014 18:22 2	Edited 5.1178 25	8	20	4.65	0	160 80	0 0	7.02	3/24/2014 9:11 0.157	3 4 96 100 Complete	53.9 mattean6 Copied FALSE

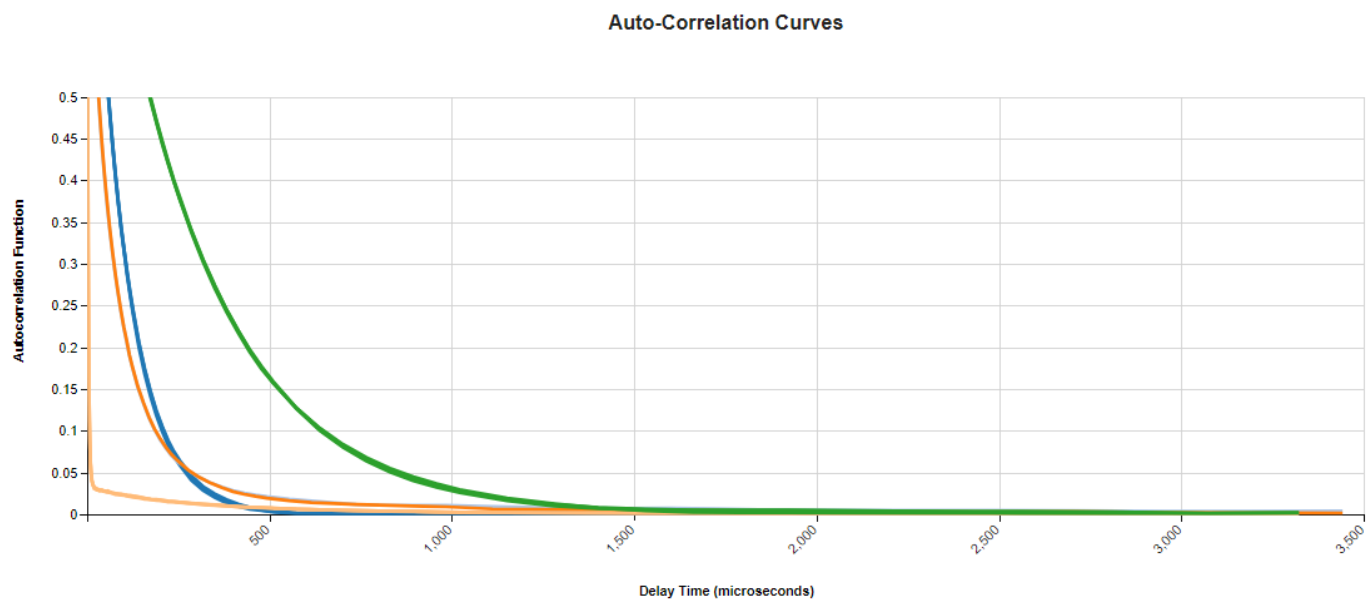
EXAMPLES

Included below are example dashboards from Zetasizer measurement files:

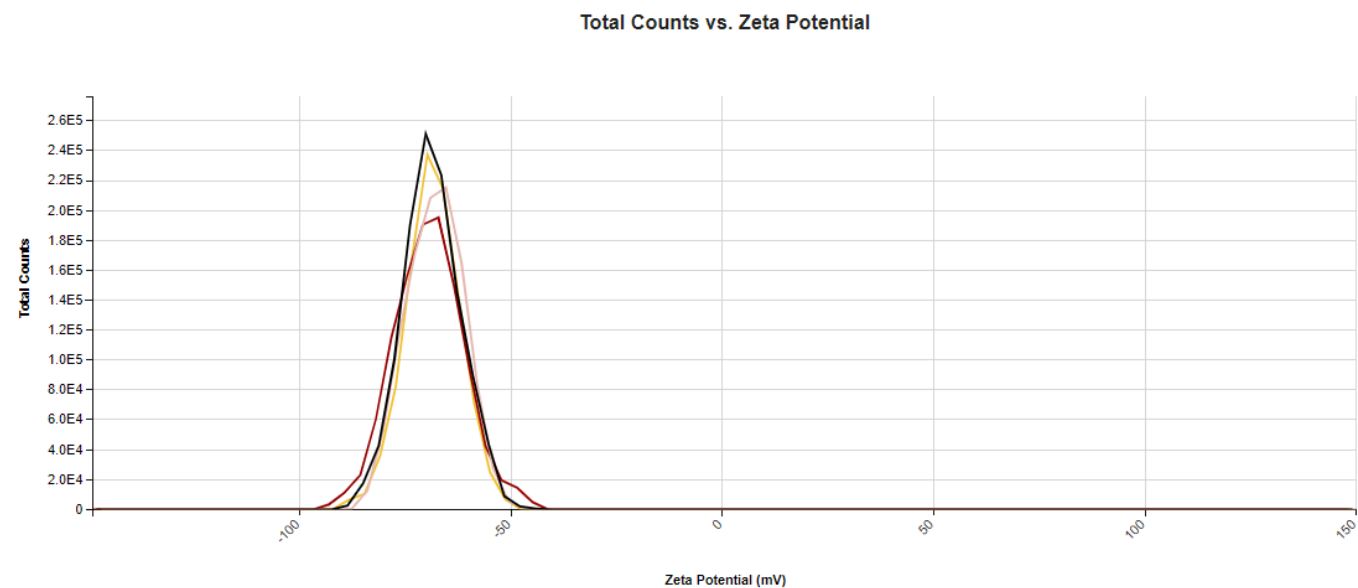
1. Line Chart plotting raw data curves for Intensity vs. Particle Size



2. Line Chart plotting raw data curves for Autocorrelation Function vs. Delay Time



3. Line Chart plotting raw data curves for Zeta Potential (mV)



4. Tabular Summary examples

Measurement Summary Table – Measurement Results

LINK Record ID #	Z-Average (d.nm) - AVG	Intensity Mean (d.nm) - AVG	Flow Rate - AVG	Injection Volume - AVG	Viscosity (cP) - AVG	Dilation - AVG	Diffusion Coefficient (μ^2/s) - AVG	Signal To Noise Ratio - AVG	Concentration (%) - AVG	Attenuation Factor - AVG
4	202.00	207.00	0.50	100	0.89	1.20	2.44	0.90	0.19	0.00
5	200.00	208.90	0.50	100	0.89	1.20	2.46	0.89	0.20	0.00
6	199.50	206.50	0.50	100	0.89	1.20	2.47	0.90	0.19	0.00
7	22.38	24.58	0.50	0	0.89	1.20	22.00	0.86	0.41	0.01
8	64.16	65.58	0.50	0	0.89	1.20	7.67	0.86	0.78	0.00
14	10.20	11.41	0.50	100	0.89	1.20	48.30	0.80	1.63	0.19
17	35.48	36.16	0.50	100	0.89	1.20	13.90	0.85	1.56	0.01

Measurement Summary Table – Instrument Settings

LINK Record ID #	InstrumentName	Cell Type	Cell Description	Duration (s) - AVG	Automatic Sampling Speed	Clean Step 1 Pump Speed (μL/s) - AVG	Auto Attenuate Enabled	Analysis Software Version	Analysis Model	Allow Correlation Only	Actual Transmission Factor - AVG
4	Zetasizer	PCS8501	Glass cuvette wi...	10	TRUE	10	TRUE	5.10 beta 1	General Purpose	FALSE	100
5	Zetasizer	PCS8501	Glass cuvette wi...	10	TRUE	10	TRUE	5.10 beta 1	General Purpose	FALSE	100
6	Zetasizer	PCS8501	Glass cuvette wi...	10	TRUE	10	TRUE	5.10 beta 1	General Purpose	FALSE	100
7	Zetasizer	DTS0012	Disposable sizin...	10	True	10	True	7	General Purpose	True	100
8	Zetasizer	DTS0012	Disposable sizin...	10	True	10	True	7	General Purpose	True	100
14	Zetasizer	DTS0012	Disposable sizin...	8	True	156	True	7	LCurve	True	100
17	Zetasizer	DTS0012	Disposable sizin...	8	True	156	True	7	LCurve	True	100

CONTACT LUMETICS

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