

## LyoStar – SP Scientific

### INTRODUCTION

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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.

The LyoStar is an R&D and process development freeze-dryer that provides Type T thermocouple-controlled shelf temperature accuracy of +/- 0.5°C or better and vacuum control within 0.1% of set-point. Its robust 5.5 hp cascade refrigeration system enables shelf pull down from ambient to -40°C in less than 25 minutes, and the ultra-reliable scroll compressors feature just 3 moving parts.

### DETAILS

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LINK requires CSV exports for importing LyoStar data. If a Log File is generated upon LyoStar export, LINK will optionally import this data as well.

The following raw curve data may be imported, in addition to all available instrument/analysis settings and parameters calculated by the instrument software:

- Temperature vs. Time Elapsed (hours)
- Pressure vs. Time Elapsed (hours)

For successful CSV file data import, the LINK has been coded around the following criteria:

- CSV extension (else reject file)
- Col A - must find at least one row that leads with a semicolon (else reject file)
- Col A - after at least one row with a semicolon, must find "Date" or "Timestamp" (else reject file)
- If "Date", then Col B must be "Time" and Col C must lead with either "SPLYO." or "SPLYO:" (else reject file)
- If "Timestamp", then Col B must lead with either "SPLYO." or "SPLYO:" (else reject file)
- After stripping the "SPLYO" prefix, and stripping the suffix to the first dot, only a perfect match to one of the following will be imported:
  - CHAMBER\_CM
  - CHAMBER\_PIRANI
  - CONDENSER\_TEMPERATURE
  - CONDENSER\_VACUUM
  - ROUGH\_VACUUM
  - SHELF\_INLET
  - SHELF\_OUTLET
  - SHELF\_SP
  - TC\_AVG
  - VACUUM\_SP
  - CHAMBER\_CM\_FOAM
  - PRCM\_DIFF

For successful LOG file data import, the LINK has been coded around the following criteria:

- LOG extension (else reject file)
- Col A must have "Date/Time" (else reject file)
- Col A must then have a row with a numeric value, which signifies the start of data (else reject file)
- Only a perfect match to one of the following will be imported:
  - Process [H2O]
  - Refcell [H2O]
  - Velocity
  - Mass Flow
  - Mass Flow Scaling
  - Process Purge
  - RefCell Purge

Upon import, pressure is assumed to be in mTorr, and rough vacuum is assumed to be Torr and converted to mTorr

- Temperature is imported with no associated units as these differ depending on LyoStar export method
- Two LINKdb fields will automatically be created upon data import
  - Report Type
  - Measurement Type
- To overlay curves simultaneously, each curve will be imported into LINK as its own measurement (all sharing the same metadata). The dynamically created LINKdb field called "Measurement Type", will need to be added to the filter panel and a split applied. This will ensure that if the data is tied to a sample or cycle, the curves will not be averaged.

LINK supports the application of multiple LyoStar modules to be imported for the LyoStar instrument. These modules and their mandatory files for import include:

- LyoStar (TDLAS) - LOG or TXT, Header Info, A1 = LyoFlux
- LyoStar (FLIR) - CSV named SensorData, No Header, A1 = Timestamp
- LyoStar (RGA Quantum) - XLSX, Header Info, A1 = Atonarp Analyzed
- LyoStar (RGA V2000P) - TXT, Header Info, A1 = "Spectra International Data File"

Once importing LyoStar, LINK will automatically spit the data into their respective modules as to not average the results. Temperature inclusion/exclusion from 0-100°C is applied, with exclusion of the LyoStar FLIR module as the temperature values will be out of this range. Pressure data types data exclusion criteria for zero pressure. If a data set includes some zeros and some non-zeros, LINK will ignore the zero values and bringing in the rest of the pressure values.

Import Method options can be defined and calculated each measurement during import if it is first created/defined and then requested within an Import Method. The following is the default Lyostar-specific import method settings:

- Data Reduction Options: **Averaged Timepoints**
- Automated Metadata Extraction: **None**

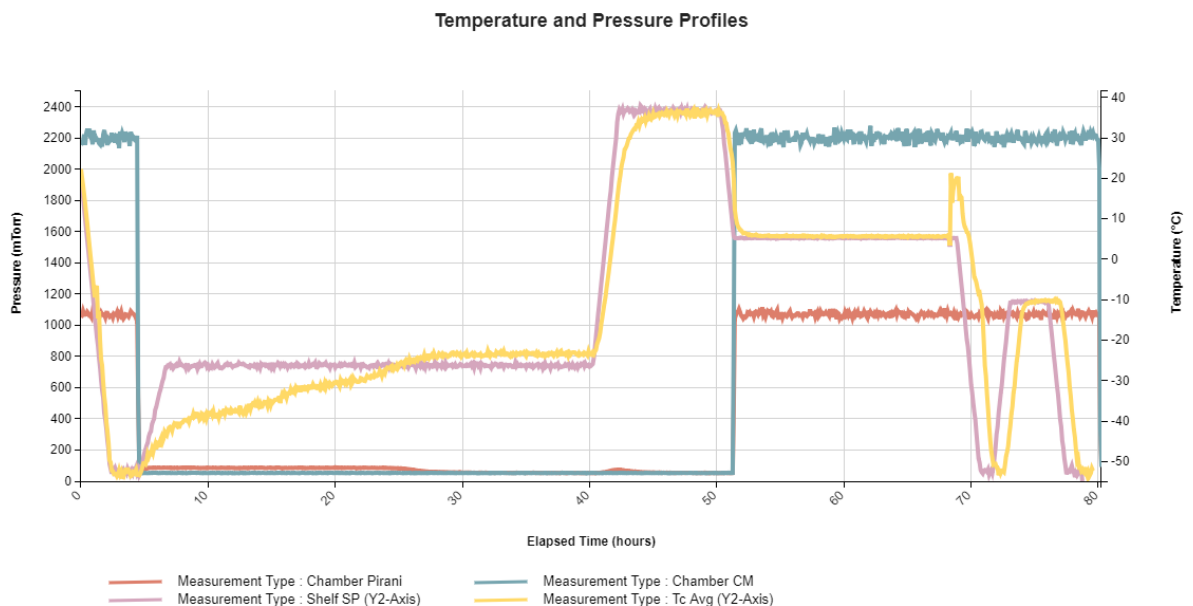
## Data Reduction

To reduce the number of data points per curve and improve dashboard rendering times, LINK offers various options for reducing the data residing in the LINK database. Any options applied will in no way impact the original data files.

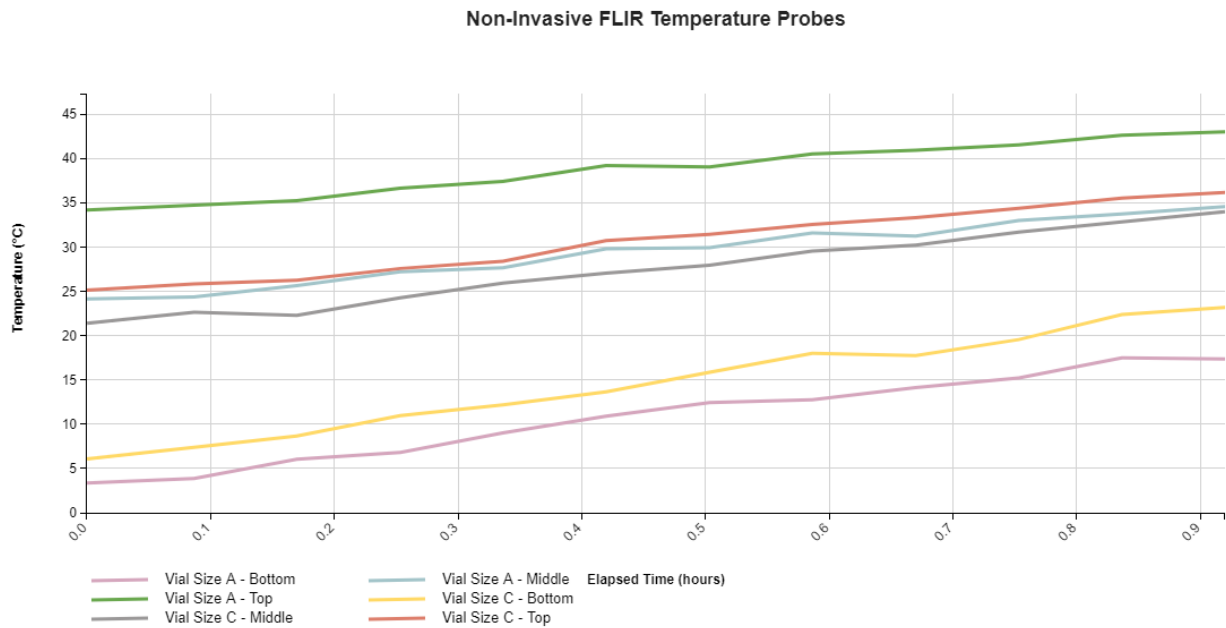
## EXAMPLES

Included below are sample dashboards from LyoStar measurement files:

1. Line Chart plotting raw data curves for Temperature & Pressure vs. Elapsed Time



2. Line Chart plotting raw data curves for Temperature vs Elapsed Time, specifically for temperature probes



3. Tabular Summary examples:

Measurement Summary Table – Measurement Results

LINK Record ID #	Sample Name	Measurement Type	Start Time	Analysis Date	Temperature (°C) (Elapsed Time (hours) >=.01) - AVG	Temperature (°C) (Elapsed Time (hours) >=1) - AVG
13	Sample B	Tc Avg	02/22/19 08:00:00	0019-02-22 08:00:00	-13313.05	-13407.95
21	Sample C	Chamber CM	02/22/19 08:00:00	0019-02-22 08:00:00	0.00	0.00
22	Sample C	Chamber Pirani	02/22/19 08:00:00	0019-02-22 08:00:00	0.00	0.00
28	Sample C	Shelf SP	02/22/19 08:00:00	0019-02-22 08:00:00	-11858.88	-11910.72
29	Sample C	Tc Avg	02/22/19 08:00:00	0019-02-22 08:00:00	-12709.34	-12798.88

**DASHBOARD DOWNLOAD**

Included below is a link to downloadable dashboards for LyoStar measurement files:  
<http://lumetics.com/dashboards/LyoStar/LyoStar.zip>

**CONTACT LUMETICS**

For direct assistance, please contact Lumetics LINK™ Support:

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