

Application Note

High Resolution Off-line Liquid Monitoring for Broad Particle Size Distribution

Introduction

Particle Measuring Systems' dual particle counter system allows a user to measure particles in most liquids quickly and efficiently within the range of 0.2 to 125.0 microns. The system provides up to 30 user-selectable sizing channels, allowing a very complete analysis of the particle size distribution and simultaneous measurement of various customer quality assurance standards.

The PMS system incorporates two LiQuilaz[®] volumetric spectrometers combined with the LS-200 Syringe Sampler. This dual spectrometer system is compatible with the most corrosive liquids and provides meaningful statistical data through a combination of the large sample volume and spectrometer class resolution. The two LiQuilaz[®] spectrometers detect particles suspended in liquid between 0.2 and 125.0 microns. The first instrument that samples the liquid is a LiQuilaz[®] S02, which measures particles ranging from 0.2 to 2.0 microns. The second unit, the LiQuilaz[®] E20P, detects particulates ranging from 2.0 to 125.0 microns. By combining these two spectrometers, the user has up to 30 user-selectable channels for collecting information on the sample's particle size distribution. This application note describes setting these units up in a side-by-side configuration.

The last two components of the system are the LS-200 Syringe Sampler and Facility Net software. The syringe sampler draws the liquid sample through both LiQuilaz[®] units while being controlled by Facility Net. In addition to controlling the sampler, Facility Net also allows the user to define the sample parameters while gathering and displaying relevant information on the particle size distribution.

Configuration

The setup required for this instrument is easy and has been outlined below for reference. Before setting up the instrument, verify that the following equipment and accessories have been provided.

PMS Equipment

1. LiQuilaz[®] SO2 calibrated at 20 ml/min
 - a. LiQuilaz[®] E20P
 - Calibrated for use in the Facility Net software package
 - Calibrated at 20 ml/min
2. LS-200 or LS-50 syringe sampler
3. Facility Net software

Cables (additional - must be purchased separately)

- 1, RS485 ribbon connector cable (AE1865) to daisychain the LiQuilaz[®] E20 & SO2 sensors

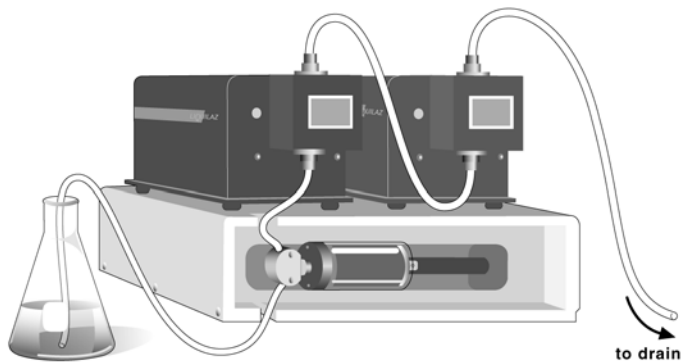
Tubing (additional - must be purchased separately)

- (1) 16" 3 mm tubing flared (custom)
- (2) 3mm Kel-F ferrules (MP6131)
- (2) Tubing screws for 3mm tubing (MP8332)

Setup

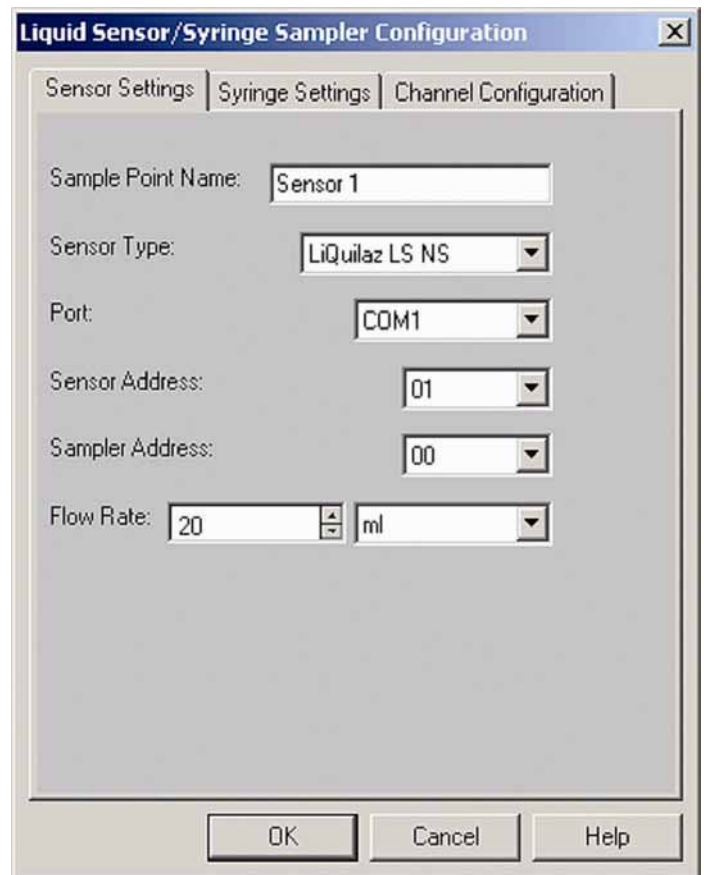
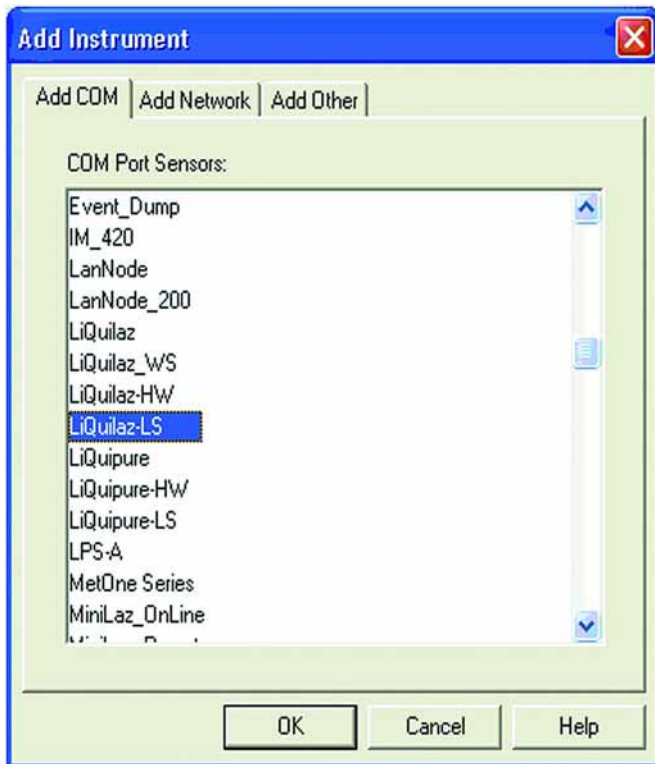
Tubing

1. Install 3mm Teflon tubing between the two LiQuilaz[®] sensors. The tube should come from the top of the LiQuilaz[®] S02 and connect to the bottom of the LiQuilaz[®] E20.
2. Set the two sensors side by side, as shown in the figure below.
3. Connect the sample input, discharge, and 16" connecting tubing to the LS-200. LS-200



Communications and Power

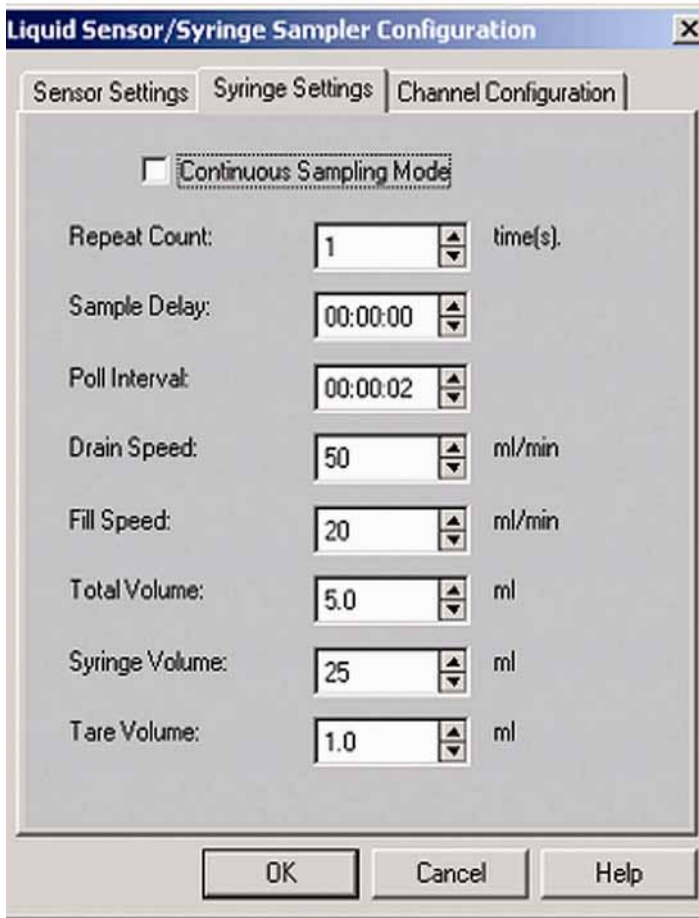
1. Connect the power cords to the LiQuilaz[®] S02, LiQuilaz[®] E20, and LS-200. Connect the LiQuilaz[®] S02 power into one of the LS-200 external power source outlets. The power cords for the LS-200 and the LiQuilaz[®] E20 are provided and plugged into standard wall outlets.
2. Connect the serial cable from the LS-200 RS232 port to the computer's COM port.
3. Connect cable PMS CD139 from the LS-200 'Sensor Data Input' port into the LiQuilaz[®] S02 'RS485 Out' port.
4. Connect cable AE1865 from the LiQuilaz[®] S02 'RS485 In' port to the LiQuilaz[®] E20 'RS485 In' port.
5. Connect power to the Magnetic Stirrer from the remaining LS-200 'External Power' port.



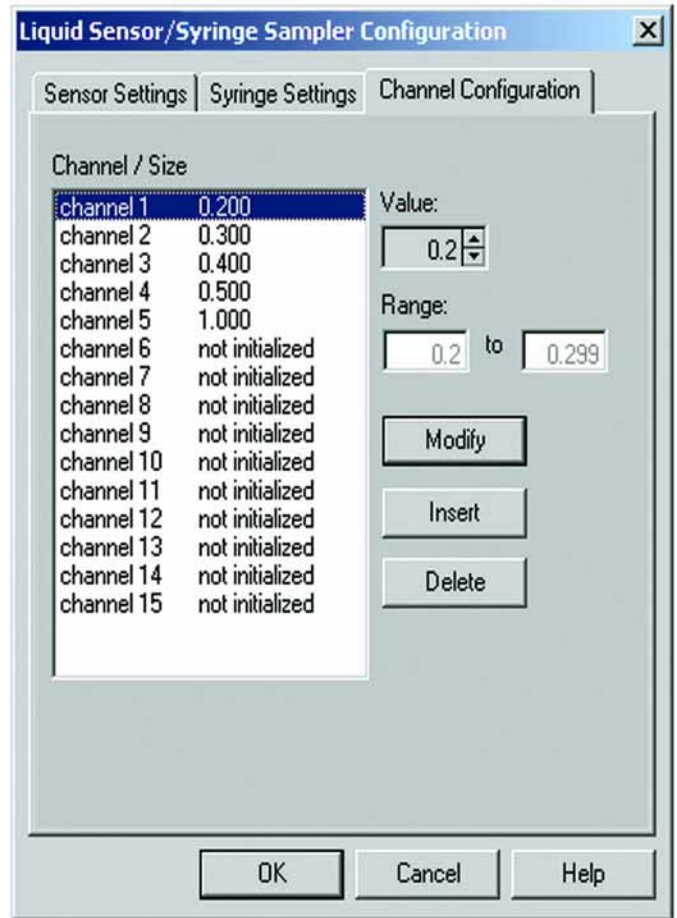
5. A 'Liquid Sensor Syringe Sampler Configuration' menu will appear. Enter information for the following:
 - a. Sampler Name
 - b. Sensor Type (Enter LiQuilaz LS NS)
 - c. Com Port
 - d. Sensor Address (default is 1)
 - e. Sampler Address (default is 0)
 - f. Set flow rate to 20 ml/mn

Software

1. Open Facility Net software.
2. Go to the main tool bar and select 'Configure' followed by 'Instruments'.
3. A menu will appear named 'Instrument Configuration'. Select Add.
4. From the Add Instrument menu, select 'LiQuilaz-LS'.



6. Select “Syringe Settings” tab
 - a. Set the Syringe Volume to match the Syringe size
 - b. Set the Total Volume and Tare Volume as desired
 - c. Set Fill Speed to 20 ml/mn
 - d. Set Drain Speed (max is 200 ml/mn)
 - e. Set other values as appropriate (see Facility Net Operations manual for more details)



7. Select “Channel Configuration” tab and enter appropriate channel values

Warning: Failure to accurately set the channel size will result in a communication conflict between the sensor and Facility Net

8. Select ‘Add’. From the Add Instrument menu, select LiQuilaz-HW.
9. A ‘LiQuilaz Sampler Setting’ menu will appear. Enter information for the following:
 - a. Sampler Name
 - b. Sensor Type (Enter LiQuilaz HW NS)
 - c. Com Port
 - d. Sensor Address (set to 2)
 - e. Sampler Address (default is 0)
 - f. Set flow rate to 20 ml/mn
10. Select “Syringe Settings” tab
 - a. Set as appropriate (see Facility Net Operations manual for more details)
 - b. Set the Syringe Volume to match the Syringe Size
 - c. Set the Total volume and Tare volume as desired
 - d. Set Fill speed to 20 ml/mn

- e. Set Drain Speed (max is 200 ml/mn)
11. Select “Channel Configuration” tab and enter appropriate channel values

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| Warning: Failure to accurately set the channel size will result in a communication conflict between the sensor and Facility Net |
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12. Next the Cavro syringe needs to be installed. For new LS-200 samplers, the sampler will automatically move the syringe drive to a point for installing the Cavro syringe when the power is on and the communication cables are not attached to the sensors or computer.
13. After installing the syringe, run several samples of DI water through the system to begin cleanup before sampling product.
14. Once the system reaches an acceptable particle level, the system will be ready for use.

A more detailed explanation of Facility Net software’s features can be found within the Facility Net Operations Manual.

Conclusion

There are numerous applications for the dual sensor sampling system because of its ability to sample many different types of liquids at different levels of contamination. This system is ideal for test labs that need to gather information on many different types of products found in the Pharmaceutical, Data Storage, Parts Cleaning, Semiconductor, Hydraulic, Cosmetic, and Food and Beverage industries.

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