DURATEC Analysentechnik GmbH

HAMILTON Microlab® Partner

Liquid Station – Automated Sample Preparation

Scope

With the help of DURATEC´s Liquid Station you are able to easily and automatically perform dilutions and fillings. This system will help you to save time and costs and furthermore avoid mistakes. Core components are the 2-Syringe-Diluter together with the sample station which can be controlled by a user-friendly software to perform dilutions, standard additions, dilution series as well as fillings quickly and with a maximum of precision.
Sample preparation can also be implemented with a half-automatic Liquid Handling System by using the 2-Syringe-Diluter Microlab 600 (Hamilton) without the sample station component.

Optimal application fields for the Liquid Station are typically AAS, ICP, HPLC and photometric analytics, covering divisions like quality control, routine analysis, environmental analysis or R&D.

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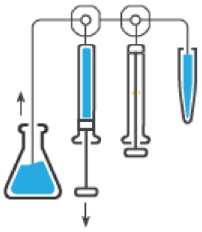
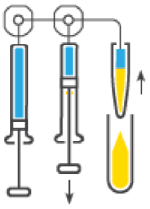
Function – Basic Principles

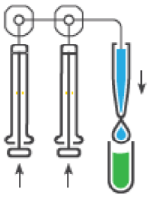
Dual Syringe Dilution



Fill with diluent from the reservoir

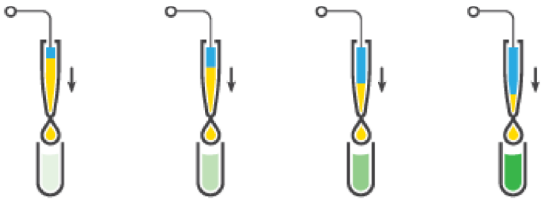


Aspirate sample into sample tube



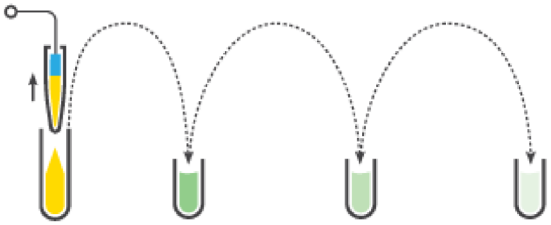
Dispense sample and diluent into target vial

Dilution Series



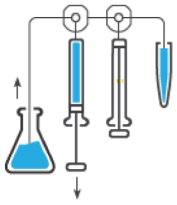
1/10 1/25 1/50 1/100

Serial Dilution

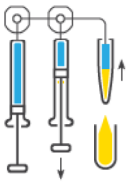


Sample 1/10 1/100 1/1000

Dilution with Standard Addition

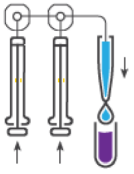


Fill with diluent from the reservoir



Aspirate into the sample tube

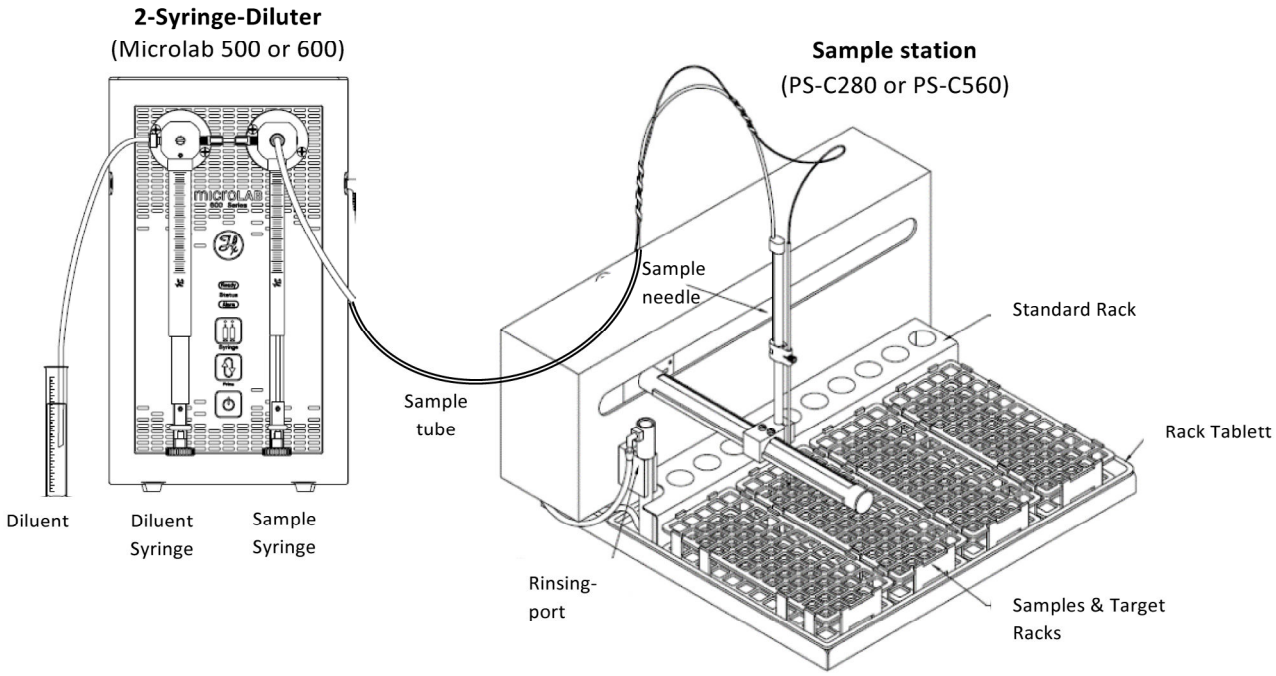
Aspirate standard into sample tube



Dispense sample, standard and diluent into target vial

Function - Operation

Liquid Station Hardware



The DURATEC Liquid Station is composed of a 2-Syringe-Diluter together with a sample station both connected via a sample tube. Diluent fills the whole fluid path from fill tubing of the diluent to the sample needle. Suitable racks with sample vials and racks with empty target and dilution vials are located on the sample station.

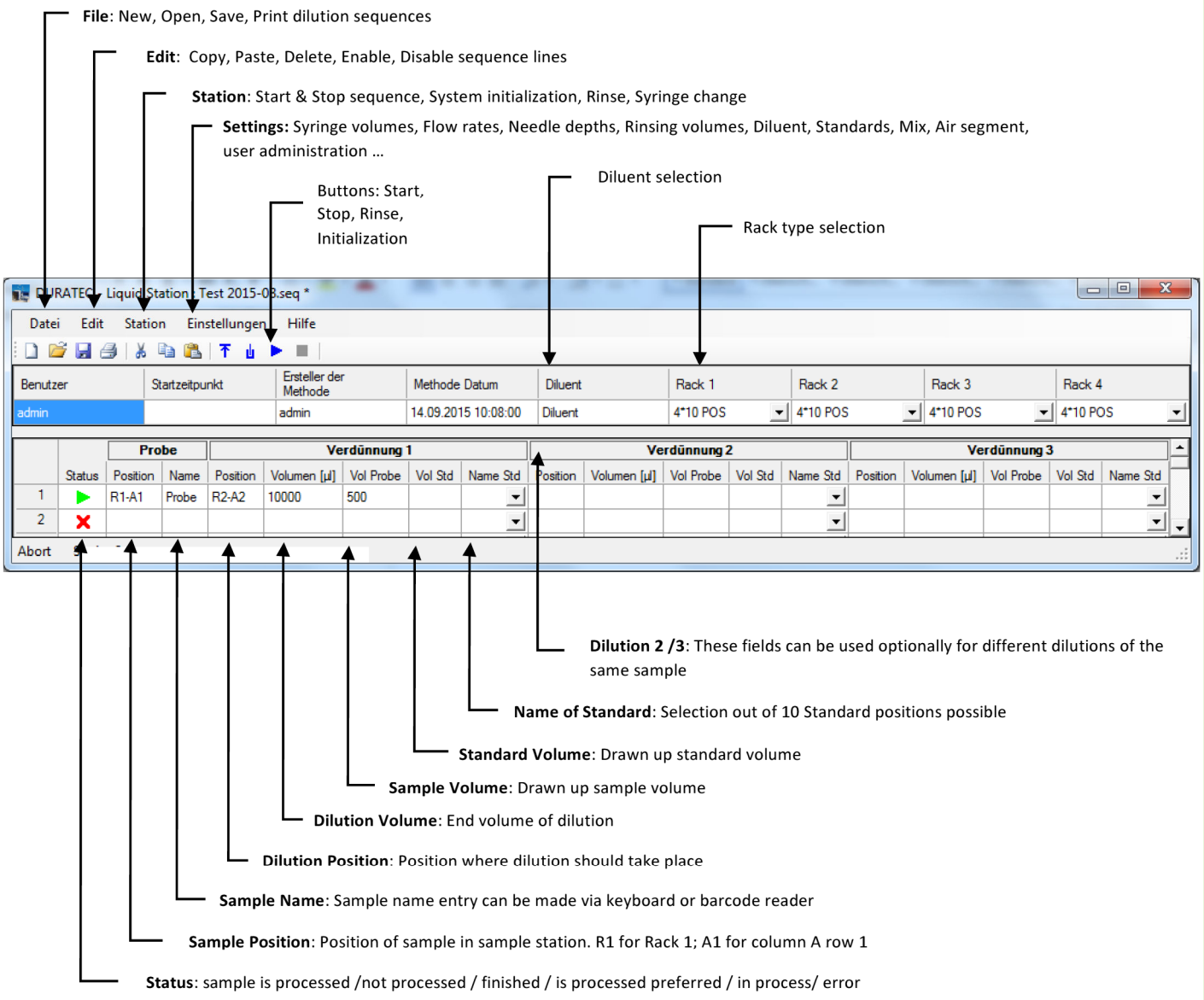
In the software by means of a sequence table you can manage different dilutions via the pick-up vial (sample) and the target vial (dilution). The respective sequence table can be saved and later loaded again for a new dilution approach. After starting the sequence the dilutions are performed automatically. Following steps will run:

1. Initial rinsing of fluid path with diluent (volume selectable)
2. Respective volume of diluent is drawn up into diluent Syringe (speed selectable)
3. Sample needle runs to sample position and plunges into sample (needle depth selectable)
4. Sample is drawn up into sample tube via sample needle (speed selectable)
5. Sample needle runs to dilution position and plunges into dilution vial (needle depth selectable)
6. Diluent syringe and sample syringe dispense diluent and sample into dilution vial (speed selectable)
7. Optionally, the dilution can be mixed in the dilution vial due to pick-up and dispensing (mix volume and cycles selectable)
8. Sample needle moves to rinsing port and is rinsed with diluent from the in- and outside (volume selectable)
9. Steps 2.-8. are repeated until complete dilution sequence is performed

Dilutions can be performed from one in another as well as in the same rack.
Multiple dilutions of the same sample with various dilution factors can also be realized.
Within one sequence different dilutions with varying end volumes can be executed.

Function - Software

Liquid Station Software



The Liquid Station is controlled by a Windows software. This software can be installed on PCs, Laptops and Netbooks running with Windows 7 and higher. Syringe diluter and sample station are connected over 2 USB ports.
The software has an user-friendly surface and an intuitional menu navigation. Every end user is able to easily and comfortably create and execute dilution sequences.

Dilution sequences can be saved and loaded again with various settings and parameters and therefore a new creation is not required. If not all samples are located in the sample rack, it is possible to mark them as “not to process”.

Functions

Dilute	Classical dilutions are the main application performed with the Liquid Station. Depending on the syringe configurations (10 µl – 50ml syringes) the possible dilution factors are ranging from 1:1 to 1:50.000. In order to achieve a precise dilution, the smallest dispensing volume should not be smaller than 1/10th of the syringe volume.
Dilution series	The same sample can be diluted multiple times by applying different factors. Additionally, dilution series of calibration standards can be prepared.
Serial dilutions	In cases where the syringe configuration does not fit to the required dilution directly, it is also possible to serial dilute with the help of intermediate dilution.
Dilute & standard addition	There are 10 positions for standards available on the Liquid Station. This option can provide you the possibility of adding a standard to the dilution (e.g. as internal standard). Before the sample is drawn up, a defined volume of standard is drawn into the sample needle (optionally over multiport valve).
Fillings	The Liquid Station can also be your assistant for fillings. If the sample volume is set 0, the system will fill the appropriate diluent volume (sequence table) into the according vial.
Mixing	The first mixture step occurs by dispensing sample and dilution medium into the empty target vial. If you prefer a more sufficient mixture the sample can be additionally mixed with the sample needle by repetitive aspiration and dispensing a smaller partial volume.
Air segment	The definition of air segments helps to avoid the mixture of sample (standard) and diluent already in the sample tube.
Drop withdrawal	After the sample needle drove out of the vial, possibly there is a drop hanging on the needle tip. By choosing a withdrawal volume you can draw back this drop into the needle.
Rinse needle	To avoid contamination in two sample vials, the sample needle is rinsed from the in- and outside due to the overflow rinsing port between two dilution steps.

Functions/Options

Setting syringe speed	Drawing and dispensing speed for syringes can be set separately for each rack and be saved in the sequence file. For viscous fluids the drawing speed can be reduced or the emitting speed can be raised to achieve a more efficient mixing.
Setting needle depth	The sample needle depth can be set separately for each rack and be saved in the sequence file. For samples with sediment this configuration is valuable to avoid absorption of the sediment.
User concept	Various operators with different user rights can be created with the help of the user concept. This ensures that dilution methods (sample sequences) are only executed and will not be modified by unauthorized persons.
Documentation	After sequence completion you are able to print the sequence table for the documentation. This printout covers important data like operator, date & time, dilution parameters, sample name and status.
Selection of various diluents (optional)	With a multiport selection valve up to 8 different diluents can be connected.
Selection of various standards (optional)	A multiport selection valve allows up to 6 different standards to be places in separate sample loop.
Inclusion of customer-specific racks (optional)	If sample or dilution vials do not fit in standard racks or the rack of the analytical instrument should be used there is the possibility that racks are linked via rack adapters. In this case appropriate dimensions of the rack are required.
Inclusion of diluter Microlab 500 (optional)	In case that a syringe-diluter of the Microlab series 500 is already integrated in the laboratory, it is possible to link it to the hard- and software of the Liquid Station via a special adapter kit.
Inclusion of several syringe diluters (optional)	For complex dilution tasks or for wider dilution ranges there is the possibility to link two 2-Syringe-Diluters to the Liquid Station.
Bubble detection (optional)	Bubbles in tubings can be detected via an optical sensor and furthermore be documented in the sample sequence.

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