

Modular-Lab PharmTracer

Application
Note

For vial dispensing with a closed fluid path

Abstract

The laboratory equipment Modular-Lab PharmTracer has been specifically designed to allow versatile and efficient routine production of different tracers without cross-contamination concerns under GMP requirements. This specific and small Modular-Lab PharmTracer setup can be used for vial dispensing (up to 6 vials + one vial for quality control) or the production of [^{18}F]NaF, [^{11}C]Choline and [^{11}C]Methionine from [^{11}C]Methyl Iodide.

With the Modular-Lab PharmTracer dispensing system the dosing of the product aseptically into vials in a Class C/ Class 10,000 environment can be also done now with a closed and sterile fluid path provided by the dispensing cassettes. The cassettes are assembled under GMP-compliant clean room conditions, sterilized with gamma-radiation and double vacuum-packed. All consumables used are chemical resistant and have been tested for their suitability with the specific syntheses. All materials are free of animal derived ingredients. A shelf life of 12 months can be guaranteed. Due to the cassettes one-time use no cleaning, drying or sanitation routines are necessary. Cassettes for dispensing have a complete closed fluid path. All components as vials, sterile filters, spikes, etc. are included and only one connection to the stock vial or the synthesizer has to be done. Our dispensing cassettes can also be manufactured in small batches according to our user requirements (specific vials, filter, etc.). The dispenser is available as a 'stand-alone' device.

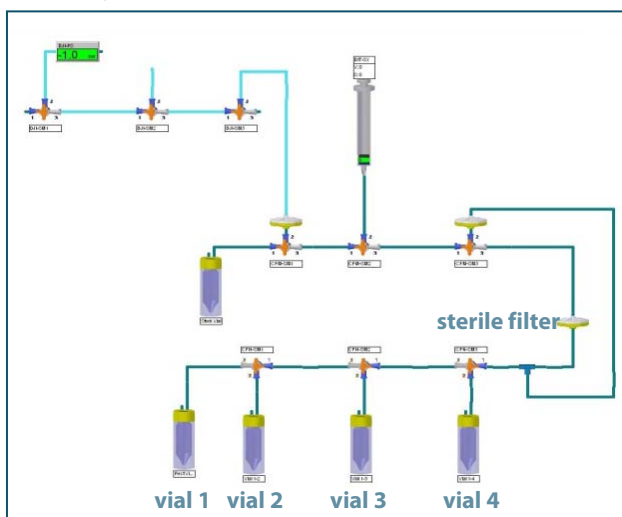
As an add-on, modules or the dispensing cassettes can be mounted into any Modular-Lab PharmTracer synthesis system and make it useable as a dispenser.

The dispenser consists of the Syringe Module (SYM), a 2-fold Modular-Lab PharmTracer Module (SLM-2) (add-on system) and a control unit and PC (for 'stand-alone' device). For extension of dispensing from 4 into 6 vials an additional module SLM-1 can be added. With one extra SLM-1 module the system can be extended to perform an automated cassette pressure and sterile filter integrity test. Dilution of the activity and measurement of volume of active solution can be done. With a small activity detector - that can be freely placed - and with a detector shielding module (DSM) the activity of the stock solution is measured, a defined volume removed and measured again to give the input for the volume calculation. The detector has a wide range of measurement and can be calibrated for a defined isotope and setup.

Methods

From a stock vial water was dispensed to 3 or 6 vials. The syringe drew a volume of 10 ml from the stock vial.

The syringe pushes then water through the complete setup all the way to vial 1 (see figure below):



This volume is the dead volume of the system. After the dead volume is filled a defined volume can be dispensed into the vials 2 to 4 (or 7 with additional SLM-1). In our tests 1 ml was dispensed into vial 2, 2 ml into vial 3 and 3 ml into vial 4. The vials were weighed with a calibrated laboratory scale before and after filling. Three different setups of the cassette were tested. Test 1 without sterile filter, test 2 with sterile filter vented (Milipore Filter 0.22 μm , Millex GS) and test 3 with a sterile filter non-vented (Milipore Filter 0.22 μm , Millex GV).

The results of 10 times dispensing per vial and test are shown in following table:

Test 1 No filter	Vol. input	Avg. vol. dispensed	Stdv. ml	Stdv. %
Vial 2	1 ml	0.999 ml	0.008	0.8
Vial 3	2 ml	1.996 ml	0.009	0.5
Vial 4	3 ml	2.973 ml	0.015	0.5
Test 2 Vented filter	Vol. input	Avg. vol. dispensed	Stdv. ml	Stdv. %
Vial 2	1 ml	0.9922	0.014	1.4
Vial 3	2 ml	1.9917	0.024	1.2
Vial 4	3 ml	2.9705	0.008	0.3
Test 3 Non-vented filter	Vol. input	Avg. vol. dispensed	Stdv. ml	Stdv. %
Vial 2	1 ml	1.0068	0.002	0.2
Vial 3	2 ml	1.9939	0.013	0.7
Vial 4	3 ml	2.9715	0.013	0.4

The dispensing was highly reproducible with good accuracy. All volumes were dispensed with deviations of less than 2 %. The filters (counter pressure) did not affect the dispensing. For the setup with 7 vials no differences in the results could be seen. The dead volume and activity left in the syringe were dispensed into vial 1. This volume can be used as a retention sample or for quality control, but also a reuse is possible. Losses of activity in the complete cassette (without filter) were found in a test with a [^{68}Ga]DOTA-TATE solution to be less than 1 %. The non-vented sterile filter showed retention of 1.7 ± 1.1 % of the activity.

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Key Features

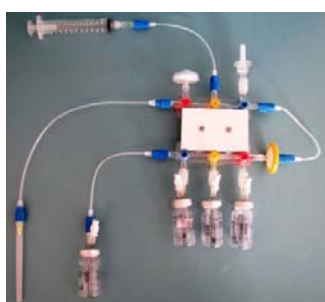
- Fully automated accurate dispensing process, no user intervention necessary
- Sterile, disposable cassettes with a complete closed fluid path for full compliance to GMP standards
- Customized cassettes with your vials, filters etc. available also in small batches (> 20 pcs.)
- Transfer of liquids only by syringe, no pumps or pressured gas for transfer needed
- Implemented cassette pressure test and sterile filter integrity test available
- Pre-validated processes for standardized and reproducible dispensing
- Low cost dispenser as add-on to Modular-Lab synthesizer (same software, PLC, PC)
- Traceability of the complete process, including documentation of all process parameters and functions
- Other applications can be performed on the same system (i.e. production of [¹⁸F]NaF, ¹¹C-tracers from [¹¹C]Methyl Iodide only by changing the cassettes and application program)

Technical Data

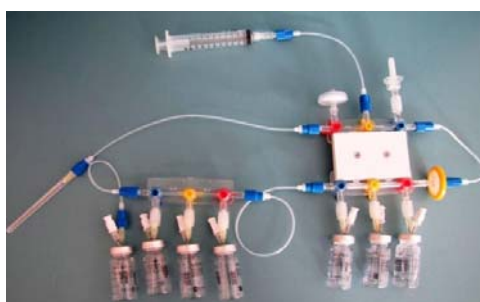
Module Characteristics	
Dimensions of the system	260 x 390 x 430 mm (incl. SLM-1 for pressure test)
2-fold Modular-Lab PharmTracer Module (SLM-2)	Dimensions: 130 x 198 x 191mm; Weight: 2.7 kg
Syringe Module (SYM)	Dimensions: 130 x 184 x 270 mm; Weight: 3.8 kg Responsible for liquid transport
Optional: 1-fold Modular-Lab PharmTracer Module (SLM-1)	Dimensions: 130 x 155 x 113 mm; Weight: 1.7 kg As extension for pressure and sterile filter integrity test and/or if dispensing of more than 3 vials is requested (dispensing of up to 6 vials + 1 vial for quality control possible)
Pressure	Max. 2 bar
Main Unit	
Power supply	Electrical Cabinet (EC) / Power Interface Module (PIM): 115 V ~ 60 Hz or 230 V ~ 50 Hz
Power consumption (electrical cabinet)	EC: Standard 480 W, 2 x bus 1,050 W, extension to 2,100 W possible PIM: Standard 180 W; Type of external power supply depends on the setup
Environment temperature	+10 °C to +40 °C
Environment humidity	Max. 70 % rel.
Unit Control	
Software	Modular-Lab Software / Modular-Lab SoftPLC
Interfaces	Ethernet /USB

All dimensions are in the format (W x D x H) and include handles.

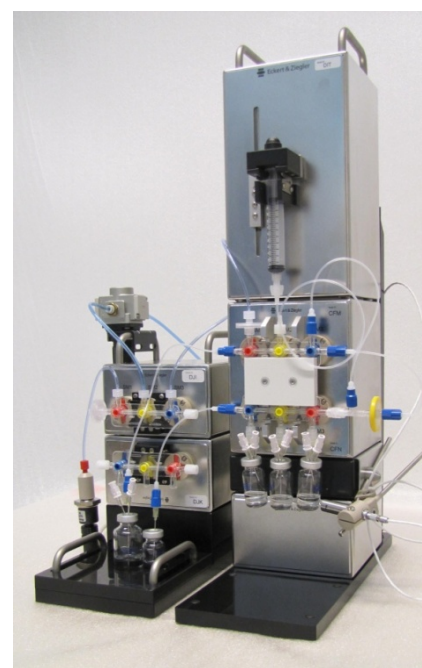
Before delivery all components are being tested in-house. If requested, a performance qualification of the complete system will be provided on-site. Extensive documentation will be provided upon request.



Cassette for dispensing of 3 vials



Cassette for dispensing of 6 vials



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