

Automatic Preparation of Laboratory Solutions and Delivery of Chemical Reagents



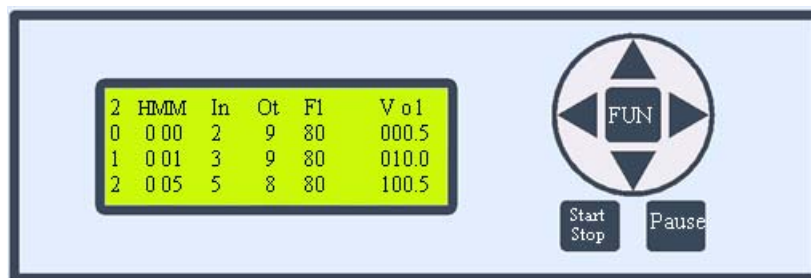
A small and versatile liquid handling device

LC-07 consists of a syringe pump and a stream selection valve. It can deliver liquids from one location to another accurately and automatically. With the built-in program, LC-07 can be used to make a set of standard solutions or deliver chemical reagents to a chemical reactor according to pre set time.

Its operation involves only 7 buttons. Like other instruments from PromoChrom, the operation of LC-07 is simple and very user friendly. Users can command the use of the device quickly by referring to the user manual. A routine operation procedures only involves 3 steps:

- 1) place the containers
- 2) Select the method
- 3) Press the "Start" button

The device will complete the work automatically.



LC-07 uses built-in methods to achieve automatic liquid delivery. The meaning of the method is straight forward (refer to the above picture). Each step in a method can set timing, intake port, output port, pump flow rate and volume. Up to 16 steps can be set in a method.

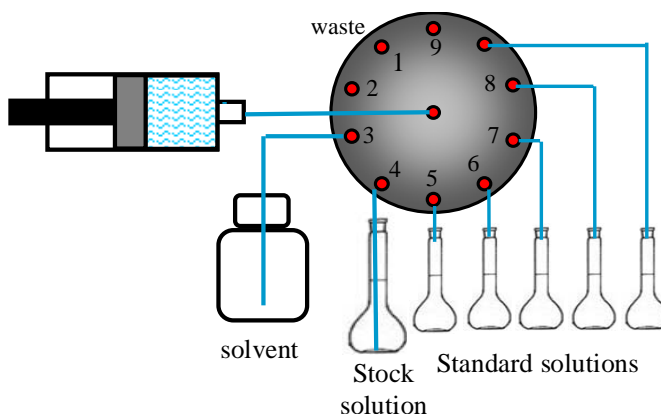
The device use most inert material for solvent contact parts (Teflon, 316 stainless steel, and Pyrex glass). They are compatible to most aggressive solvents.

Automatic preparation of standard solutions

Making standard solutions is a routine work for an analytical laboratory. Its accuracy decides the quality of the analytical data. It is time consuming and need skillful personnel. A LC-07 can fulfill the tasks automatically.

The following example demonstrates how to make a series of 5 standard solutions from a 100 ug/mL stock solution. The concentration of the 5 standard solutions is 1, 2, 5, 10, and 20 ug/mL. The volume of the 5 solutions is 50 mL.

1) Set up the device as following



2) Build a method as shown in the following table (only necessary for the first time)

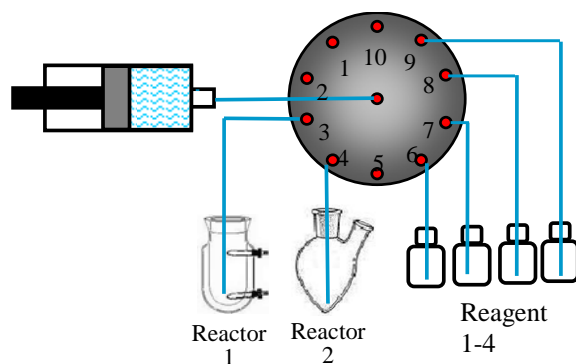
| | HMM | In | Ot | Fl | Vol | Remarks |
|----|-----|----|----|----|------|--|
| 0 | 000 | 4 | 1 | 50 | 1 | Fill the tubing between valve and stock solution |
| 1 | 000 | 3 | 1 | 50 | 5 | Fill the tubing between valve and solvent |
| 2 | 000 | 4 | 5 | 50 | 10 | Add stock solution for 20 ug/mL standard |
| 3 | 000 | 3 | 5 | 50 | 40 | Add solvent for 20 ug/mL standard to make 50 mL |
| 4 | 000 | 4 | 6 | 50 | 5 | Add stock solution for 10 ug/mL standard |
| 5 | 000 | 3 | 6 | 50 | 45 | Add solvent for 10 ug/mL standard to make 50 mL |
| 6 | 000 | 4 | 7 | 50 | 2.5 | Add stock solution for 5 ug/mL standard |
| 7 | 000 | 3 | 7 | 50 | 47.5 | Add solvent for 5 ug/mL standard to make 50 mL |
| 8 | 000 | 4 | 8 | 50 | 1 | Add stock solution for 2 ug/mL standard |
| 9 | 000 | 3 | 8 | 50 | 49 | Add solvent for ug/mL standard to make 50 mL |
| 10 | 000 | 4 | 9 | 50 | 0.5 | Add stock solution for 1 ug/mL standard |
| 11 | 000 | 3 | 9 | 50 | 49.5 | Add solvent for 1 ug/mL standard to make 50 mL |

3) Press “Start” button. The device will complete all the preparation work in around 10 minutes.

Addition of reagents to a chemical reactor

Timing and speed of adding reagents to a chemical reactor are critical to the yield of a chemical reaction. These two factors can be controlled automatically using a LC-07.

Sometimes a multi step synthesis need to change the conditions drastically. For example, a synthesis need to be carried out at -5°C for first reaction and then change temperature to over 100°C for the second reaction. This change may be achieved automatically also using a LC-07 and two reactors. Below is a demonstration of the setting, which involves addition of 4 reagents and two reaction stages. The reactor 1 is maintained at low temperature and reactor 2 is maintained at high temperature.



| | HMM | In | Ot | Fl | Vol | Remarks |
|---|-----|----|----|----|-----|--|
| 0 | 001 | 6 | 3 | 2 | 10 | At 1 min, add 10 mL reagent 1 to reactor 1 at 2 mL/min |
| 1 | 020 | 7 | 3 | 1 | 20 | At 20 min, add 20 mL reagent 2 to reactor 1 at 1 mL/min |
| 2 | 105 | 3 | 4 | 50 | 80 | At 1 hr 5 min, transfer reactant from reactor 1 to reactor 2 |
| 3 | 110 | 8 | 4 | 2 | 20 | At 1 hr 10 min, add 20 mL reagent 3 to reactor 2 |
| 4 | 110 | 9 | 4 | 1 | 20 | Immediately after the above step, add 20 mL reagent 4 to reactor 2 |
| 5 | 930 | 4 | 3 | 50 | 120 | At 9 hr 30 min, transfer reactant from reactor 2 to reactor 1 to terminate reaction. |

With the above setting and method a long term reaction can be carried out overnight without human attendance. For a more complex synthesis, two or more LC-07 may be used.

Other applications

LC-07 is a continuous syringe pump with automatic multi solvent selection. It can be used in any application they involves a syringe pump. Among the examples are working as infusion pump for a LC-MS (flow rate can go down to 0.1 mL/min), elution of a chromatographic column, semi automated solid phase extraction, and regeneration of used SPE columns.

Specifications

| | |
|----------------------------------|--|
| Number of valve ports | 10 or 18 |
| Delivery volume (mL) | 0.5~5000 |
| Flow rate (mL/min) | 0.1~90 |
| Delivery reproducibility (C.V.%) | < 0.5 |
| Delivery accuracy (%) | < 1 |
| Maximum output pressure (Bar) | 6 |
| Wetting materials | Teflon, 316 stainless steel, and Pyrex glass |
| Control | Built-in micro controller with keypad entry |
| Power consumption (Watt) | < 12 |
| Weight (Kg) | 2.5 |
| Dimension (cm) | 16.5 x 22x 26 |

Order information

| Part number | Description | Reference price (US\$) |
|-------------|--|------------------------|
| LC-07-01 | Include a LC-07 mainframe with 10-port valve, 24 volt power supply, and user manual. | |
| LC-07-02 | Include a LC-07 mainframe with 18-port valve, 24 volt power supply, and user manual. | |



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