



# AUTOSAMPLER **ASAM G40**



## Instruction manual

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## 0. Introduction

Autosampler ASAM G40 is destined for multiple injection of liquid samples into gas chromatograph CHROM G10 made by Labio a.s., Prague, Czech Republic. It can be used in connection with other manufacturer chromatographs too. It allows injection upto 40 samples and (in connection for example with Dataapex Clarity chromatostation) both sequential record and evaluation of chromatograms.

### 0.1 Technical parameters:

Sample quantity:	1 - 40
Sample volume:	0,4 – 1,5 ml
Injected volume:	0,5 $\mu$ l – 5 $\mu$ l
Minimal interval between injections:	3 min
Vials:	Chromacol, 2-SVWST-CP
Voltage, input:	230 V, 65 W
Weight:	10 kg

### 1 Description of ASAM G40 function:

Autosampler consists of electronic block in single case with two line alphanumeric display and a keyboard staying besides the chromatograph, from carousel part placed usually on the upper panel of a chromatograph.



Fig. 1: Back side of the unit

Electronic block of ASAM G40 is connected (see back side of el. unit on Fig. 1) via 5 pin type connector to Chrom G10 chromatograph unit in order to allow to start a analysis cycle. It is connected by a multewire cable with 25 pin PC connector to a carousel unit. Net socket is on the left side of the case together with main switch and a fuse.

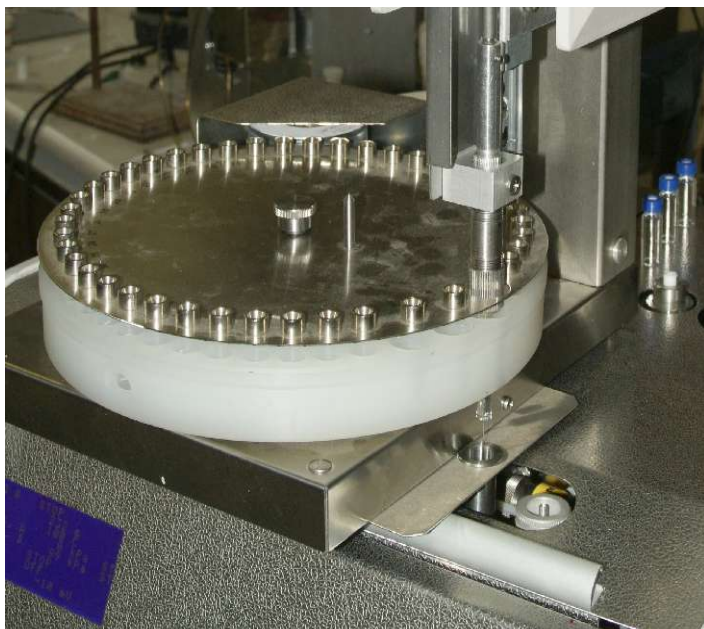
Sample injection is made by standard syringe Hamilton type 701 with total volume 10  $\mu$ l, which is situated on vertically moved arm of carousel tower. The arm movement is provided by the step motor. Next step motor is used to provide the syringe piston movement using a toothed rod for. Vials with samples are located in plastic made carousel which is moved by third step motors. The magazine (see Fig. 2) is equipped with 40 positions for vials and 2 positions for (i) solvent for washing reservoir and (ii) waste liquid reservoirs. Reservoirs are made of PTFE and equipped with rubber septums to avoid liquid evaporation. A free hole in carousel is used to

move the syringe down to an injection port.

As the injection port on chromatograph is used a standard septum injector. An upper cooler is replaced by a special nut with a conus to lead syringw needle.



**Fig. 2. Carousel part on the chromatograph**



**Fig. 3 Injection port under the carousel**

The syringe is moved down to permeate the needle to the reservoir through a membrane. Solvent is sucked to the full syringe volume and syringe is moved up. The magazine rotates to the waste position, syringe is going down again and the solvent is flushed to the waste reservoir.

Syringe is located just above the injection port. The syringe can be removed when syringe and piston fixing nuts are removed (see Fig. 4). All vials for the autosampler are standard style, they are equipped with a cap and under the cap is inserted a silicon rubber/PTFE membrane. The plastic carousel with vials is covered by a ring made of stainless steel sheet with the same diameter as the carousel. The ring has holes with pressed metal cones on the same place vials are in the magazine. It is to conduct injection needle inside the vial cap properly.

The function of autosampler starts with magazine movement to the position of washing reservoir with solvent under the syringe position.

**Attention: the carousel part movement starts already in a moment when ASAM G40 is switched on in order to make an autotest of the system.**

When injection process is started, the sampler starts with syringe washing and then rotates the magazine to the position of first vial. Syringe is moved down to deep the needle inside the vial. Full syringe volume is then sucked and flushed 2 times. Then the prescribed volume is filled into the syringe and it is moved up. The magazine is again rotated to bring the thruing hole under the syringe.

The syringe is moved down to the deepest position and the volume is injected into injection port of the chromatograph. The syringe is lifted to upper position immediately. The magazine movement to the position of washing starts again. The syringe is filled with solvent again. The magazine rotates to the waste position and the solvent is flushed to the waste vial.

The autosampler is ready to start next injection process.

## 2. Description of installation on Chrom G10

1. Installation of ASAM G40 to the Chrom G10 chromatograph is easy. The carousel is put on the top panel of the instrument (see Fig. 3) and the thruing hole is positioned just onto injection port using a bottom tube under carousel basis. The connection of a line between chromatograph and the electronic box has to be done then, following by the connection of electronic box to the carousel. All instruments have to be switched off during this procedure.

2. Central bolt on the carousel is released and plastic magazine with covering lid is removed and filled with vials. Solvent reservoir is filled. Magazine is assembled back to the position.



3. The side covering sheet on the carousel tower is removed and a syringe is then inserted in. A fixing bolt of syringe tube is released. The syringe tube is screwed out of an aluminium block. Bottom nut of the tube is removed and the syringe is inserted in. The whole is put back. A piston nut is inserted on the piston and screwed to a piston vertical rod. The sampler is switched on and bottom piston position is controlled. In case the piston does not deep enough the syringe, syringe tube is screwed a bit up. In proper position, tube is fixed by a fixing bolt.

5. The chromatograph is then switched on. Taking care to give out all objects which can prevent the autosampler movement, the autosampler is switched on too. The system use the start routine to check all positions and movements of the unit and washing syringe. Then stops in the start position.

6. The ASAM G40 is programmed according manual (see Section 3). Time of analysis is selected to be longer than time of chromatograph program.

7. The chromatograph is checked to be preprogrammed rightly and in „READY“ state. The system is started by the

START button on the autosampler. Operator has to follow all operations of autosampler during first run to be ready to switch it off when not expected event occurs.

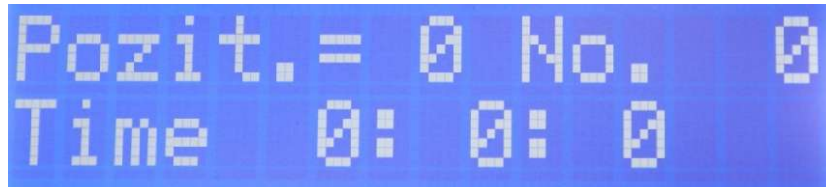


**Fig. 4  
Syringe  
connection**

### **3 Description of autosampler programming:**

ASAM G40 is programmed in order to set washing parameters, injecting volume (to a loop) and to select either sequential or random approach to vials. Finally of course a time of particular analysis is selected. Programming is done by a twoline alphanumeric display and eight buttons keyboard. There are horizontal and vertical arrows on the keyboard used either to list in menu (vertical) or changed values (horizontal). There is an ENTER button confirming each programmed value.

When switched on the following message is shown on the ASAM G40 display:



Pozit.= 0 No. 0  
Time 0: 0: 0

Listing in the menu next screen appears, where position time is selected. This is in fact time of analysis increased for small reserve:



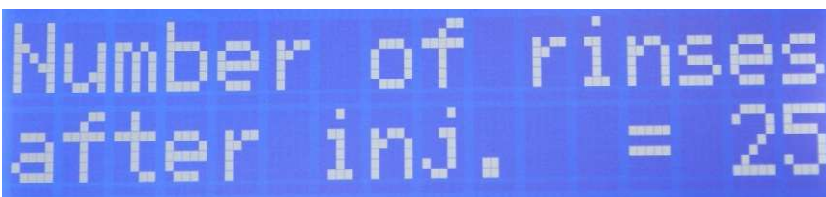
Position time =  
9:59:30

Next screen defines number of rinses with solvent before injection. Usually 2-3 rinses is enough.



Number of rinses  
before inj. = 25

The same situation is with after injection rinses:



Number of rinses  
after inj. = 25

Injection volume on the autosampler ASAM G40 screen is in fact not an injection volume. It is the volume which is injected into loop injector loop. It has to be relatively high in order to flush previous sample from connecting capillary. 80 % (400 ul) is usually enough.



Inject. volume =  
84 %

On ASAM G40 you can select either random, or sequential access to vials.



Random acces



For select  
Push SHIFT



Sequent. acces

In case of random access is necessary to define all positions which will be used in a row:



Seq. no = 2  
Position = 36

In case of sequential access only last position has to be selected:



Last pos.  
10

When all programming work is done and everything is ready with autosampler and datastation, injection sequence can start using a START button on the keyboard. In case chromatograph itself is not ready for injection next screen appears:

```

Pozit. = 0 No. 0
Wait for READY

```

If chromatograph is ready to start its program, following screen is appeared:

```

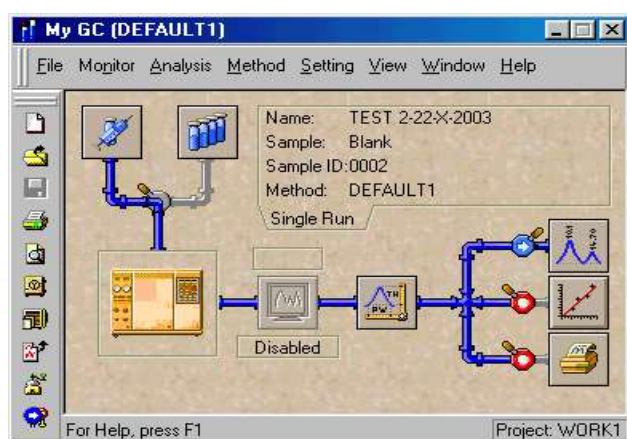
Akt. Pozit. = 1
Time 0: 1:17

```

#### 4 Use of Clarity chromatostation with ASAM G40 autosampler:

Chromatostation Clarity, can (in SEQUENCE mode) automatically evaluated analyses made with autosampler. The cooperation with ASAM G40 autosampler run with Clarity in the mode of „passive sequetion“, when integrator run is started by GC unit. For such purposes chromatostation has to be connected to the chromatograph by the starting cable (jack on the left back side of the chromatograph). It is necessary to specify evaluating method and to define calibrating file and fill sequence table before start to work. There are specified codes which are given to the sequence of chromatograms.

#### 4.1. Analyses of samples using autosampler ASAM G40 and chromatostation



It is necessary to develop calibration file for the type of analysis which will be run. The method of the preparing of calibrating file is the same as for single analysis (see Clarity manual).

Before starting analyses with Clarity and autosampler, the chromatostation instructions has to be modified. The modification starts with the basic screen opening sequence window when clicking on the icon in left top corner of the screen.

Sequential file is opened in dialog window **Open Sequence**. The sequential table is appeared. The table has to be filled. **Sv** is

the number of starting position (=1), **Ev** is number of the last position. **IV** specifies number of injections from one vial (=1). Then the row **Sample ID** and **Sample is filled** (specification of samples which is used in the protocol). Next are **Sample Amount**, **ISTD Amount** (internal standard amount), **Sample Dilut(ion)**, **Inj. Volume** and finally **File Name**. File name presents the name of individual analysis (one row). The symbol % can be used to introduce serial number starting with 1.

The row **Std** is defined as **No** (sequence without calibration change). Row **Lvl** is empty. **Method Name** means the method file name which will be used. **Report Style** means the file name where the printing details are saved.

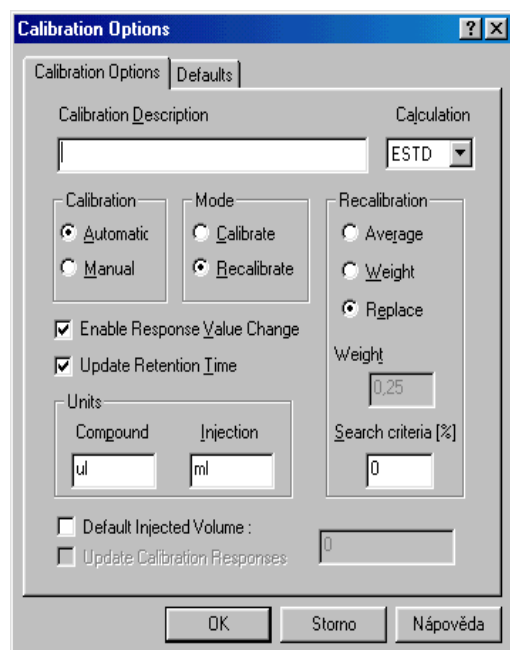
**Caution :** In case the row **Std** is filled like „Yes“ and in row **Lvl** in given some number, the station automatically makes the recalibration and calibration data are replaced. Results have no sense then.

It is necessary to click on **Sequence icon**, to start sequential analyses and in the sequential window to activate the button **Run**. In the row **State** in bottom part of the window appears the message **Waiting**. It means that computer is waiting on the start of the chromatograph with autosampler.

Starting analyses (pressing **START** button in working mode), the fully automatic process begins. System takes samples from vials, gives the file name for the analysis, the separation and its monitoring proceeds, primarily file is named, the curve is recorded and integrated and concentrations are calculated using calibration file. Results are sent to the printer.

In the row **Vial No**: in the bottom part of sequential window is displayed actual position number during the process.

Sequential analyses can proceed with continual recalibration in CSW. On first positions in the magazine must be inserted vials with standards when recalibration is accepted. The same quantity of standards with the same concentrations and the same order as in original calibration has to be used.



Sequential table (opening the window before) is to be filled. In rows **Std** is used „Yes“ and in rows **Lvl** a number if calibration level is written.

The windows **Calibration** is then open and prepared calibration file is opened. In **Calibration** window a window **Calibration Options** is then opened .

The option **Calibration Automatic** is selected. Next option is **Enable Response Value Change**. **Recalibrate** is selected as the mode. Type of **Recalibration** is specified. The option **Replace** is selected when old values are to be replaced. **Average** makes the old and new values average and **Weight** means that new values are added to old ones in the ratio which has to be specified.

Then **Calibration** window is closed, and **Sequence** opened. RUN button is activated and the sequence of analyses started by the GC unit.

Standards are first evaluated now and new results are used to evaluate concentrations in analysed samples.



### **3. Manufacture and maintenance service**

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