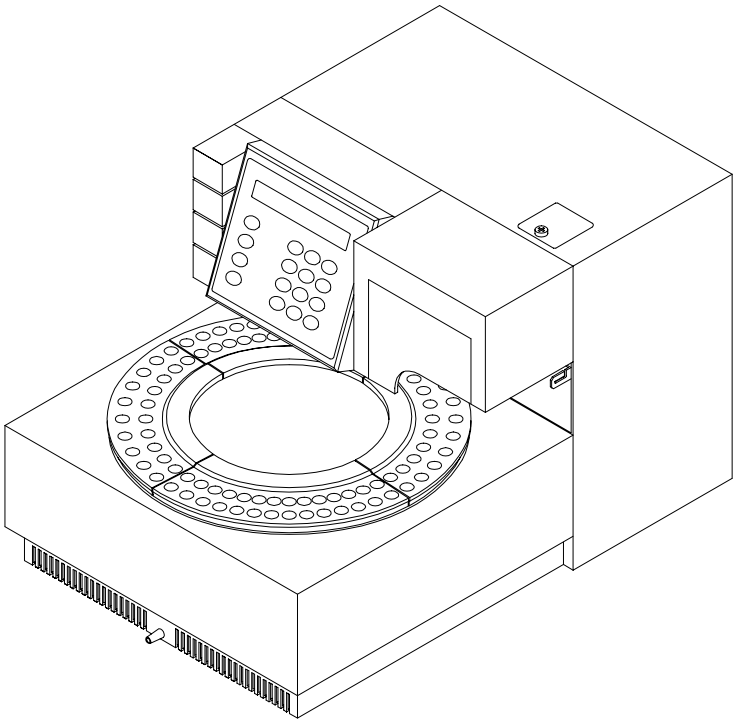
BASIC MARATHON SERVICE MANUAL

Version 1.0, September 1995

Part no. 0060.100



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APPENDIX A CHEMICAL RESITANCE OF KALREZ

DRAWINGS

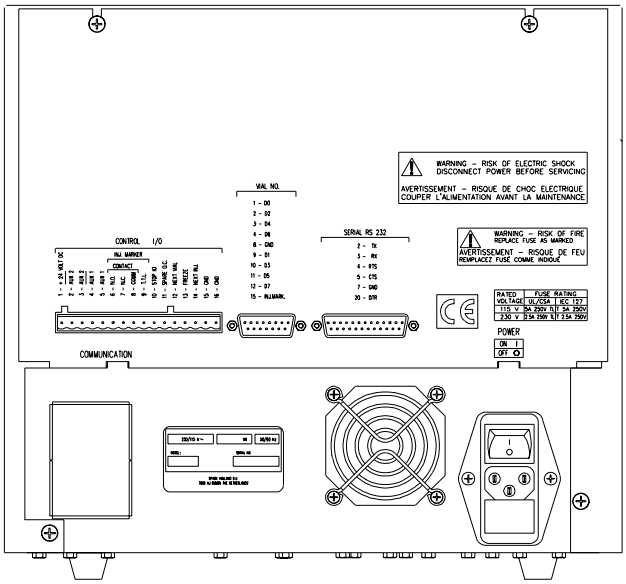
INJECTOR VALVE ASSY	71.0816.301
DIGITAL DISPENSER	71.0816.302
NEEDLE ARM ASSY 816	71.0816.308
KEYBOARDHOUSE BASIC	71.0816.320
TRAY-NEEDLE SUB ASSY (SET OF 3 PAGES)	71.0816.400
DISPENSER / VALVE FRAME 816	71.0816.401
MAINS INLET	71.0816.410
REARPANEL 816	71.0816.601
BASIC CABINET	71.0816.900

SCHEMATICS

WIRING DIAGRAM BASIC Till serial number 0816.4.3.60	31.0816.900	Revision:1
WIRING DIAGRAM BASIC From serial number 0816.5.1.01	31.0816.900	Revision:4
CONTROL I/O BOARD BASIC Till serial number 0816.4.3.60	31.0816.601	Revision:1
CONTROL I/O BOARD BASIC From serial number 0816.5.1.01	31.0816.601	Revision:3

1 PROGRAMMING CHART

2 CONNECTIONS



Rearpanel of the Basic Marathon till serial number 0816.4.3.60

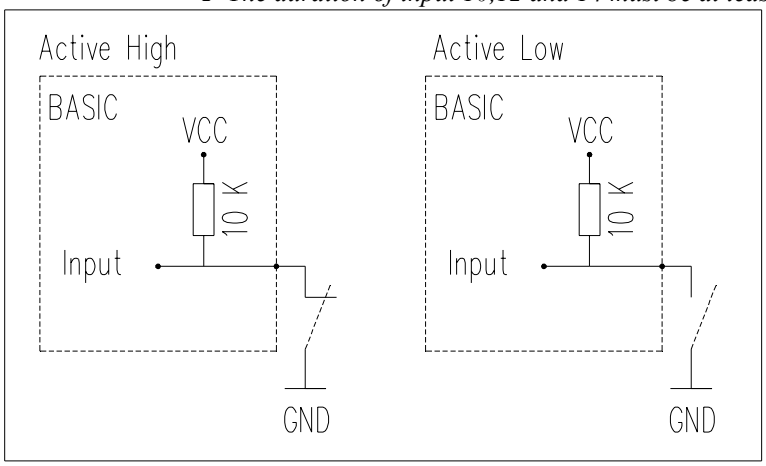
2.1 Connector strip J 16 Control I/O

PIN N0	Description
1	+ 24 Volts DC
2	Auxiliary Output 2 Inverted
3	Auxiliary Output 2
4	Auxiliary Output 1 Inverted
5	Auxiliary Output 1
6	Inject Marker Output (N.O. contact)
7	Inject Marker Output (N.C. contact)
8	Inject Marker Common (For the N.O and N.C. contacts) *The Inject Marker contacts are closed/open during 1 sec. starting at the moment of injection !*
9	Inject Marker output (TTL, active low)
10	Stop I/O (TTL pulled up) *The Stop I/O output is low when Marathon is ready. The output is high during processing (When forced low Marathon stops)*
11	Spare Output (Not Used)
12	Next Vial Input (TTL, active low, pulled up) *The Next Vial Input triggers a next vial to be processed when the Marathon is in the **REMOTE CONTROL** mode.*
13	Freeze (TTL, active low, pulled up) *As long as the Freeze input is low, the analysis time is stopped.*

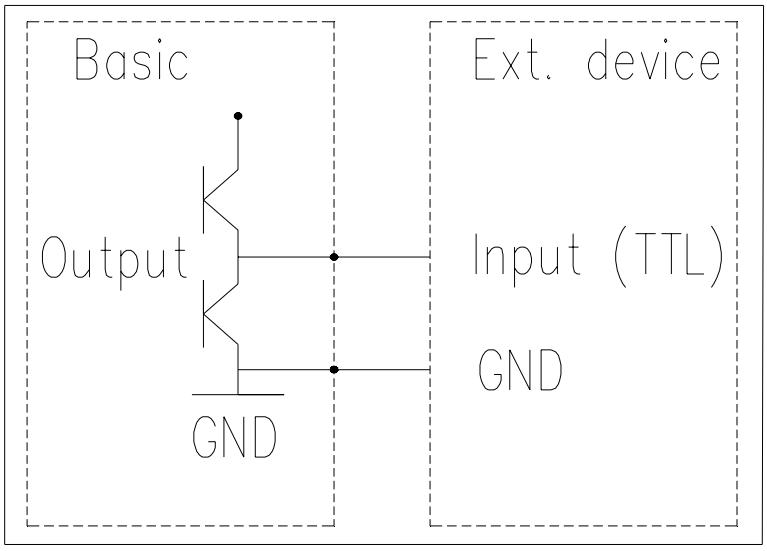
14 Next Injection input (TTL, active low, pulled up)
The Next Injection Input triggers a next injection when Marathon is in the ***REMOTE CONTROL*** *mode. Can be used as a start input (also when Marathon is not in* ***REMOTE CONTROL*** *mode)*

15 Ground
16 Ground

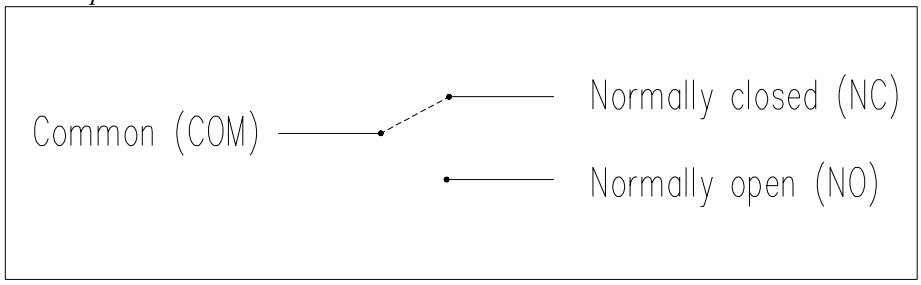
NOTE: ➔ *The auxiliaries are open collector outputs, max. 250 mA, 28 Volts.*
➔ *The duration of input 10,12 and 14 must be at least 20 mSec.*



TTL Input

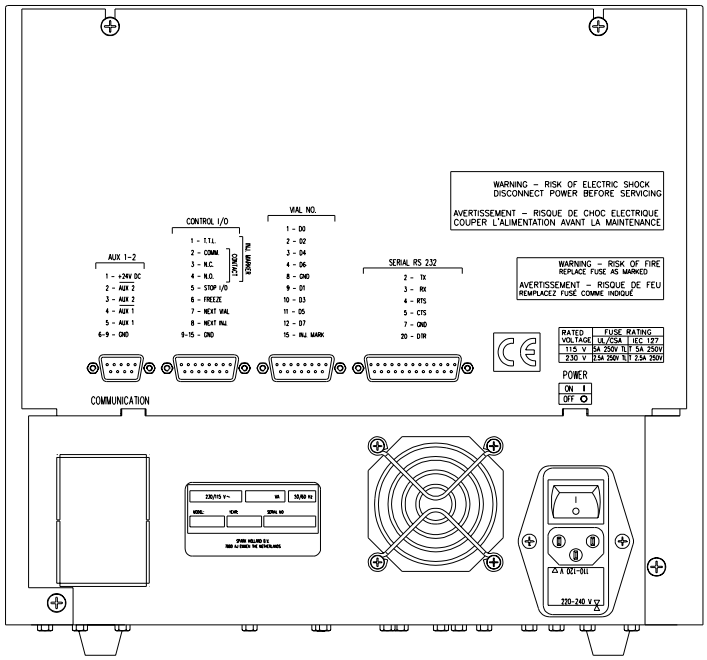


TTL Output



Contact closures outputs

In order to meet IEC 1010 regulations connector strip J16 is divided into two sub D-connectors (J16 and J24) The pin description from Serial Number 816 5.1.01 is now:



New rearpanel of the Basic Marathon from serial number 0816.5.1.01

NOTE: A new control I/O Board can still be placed in a previous model rearpanel, only a screening label must be placed over the previous screening.

2.2 J16 D-Connector (Female) Aux.1-2

PIN NO	DESCRIPTION
1	+ 24 Volts DC
2	Auxiliary Output 2 Inverted
3	Auxiliary Output 2
4	Auxiliary Output 1 Inverted
5	Auxiliary Output 1
6-9	Ground

2.3 J24 D-Connector (Male) Control I/O

PIN NO.	DESCRIPTION
1	Inject Marker output (TTL, active low)
2	Inject Marker Common (For the N.O and N.C. contacts)
3	Inject Marker Output (N.C. contact)
4	Inject Marker Output (N.O. contact) *The Inject Marker contacts are closed/open during 1 sec. starting at the moment of injection !*
5	Stop I/O (TTL pulled up) *The Stop I/O output is low when Marathon is ready. The output is high during processing (When forced low Marathon stops)*
6	Freeze (TTL, active low, pulled up) *As long as the Freeze input is low, the analysis time is stopped.*
7	Next Vial Input (TTL, active low, pulled up) *The Next Vial Input triggers a next vial to be processed when the Marathon is in the **REMOTE CONTROL** mode.*
8	Next Injection input (TTL, active low, pulled up) *The Next Injection Input triggers a next injection when Marathon is in the **REMOTE CONTROL** mode. Can be used as a start input (also when Marathon is not in **REMOTE CONTROL** mode)*
9-15	Ground

2.4 Connector J 14 (Female) VIAL NUMBER OUTPUT

8-bit BCD coded VIAL NUMBER OUTPUT (True logic, TTL) representing vial numbers 1-96; active when corresponding vial is processed.

PIN NO	DESCRIPTION
1	Bit **D0** units 1
2	Bit **D2** units 4
3	Bit **D4** units x 10
4	Bit **D6** units x 40
8	Ground
9	Bit **D1** units 2
10	Bit **D3** units 8
11	Bit **D5** units x 20
12	Bit **D7** units x 80
15	Inject Marker (TTL, active low)

Examples of BCD VIAL NUMBER OUTPUT

BCD	D7	D6	D5	D4	D3	D2	D1	D0	VIAL NUMBER
	80	40	20	10	8	4	2	1	
OUTPUT	1	0	0	1	0	1	1	0	96
OUTPUT	0	1	0	1	1	0	0	1	59
OUTPUT	0	0	0	1	0	0	0	0	10

2.5 Connector J12 RS 232 Serial Interface

The Basic Marathon can be controlled by a PC using the RS 232 interface and the "SPARKLINK" Application software from Spark Holland (optional). Refer to the "SPARKLINK" manual (part no.: 0060.101) for operating instructions

J12 D-Connector (Female) Serial Interface

PIN NO	DESCRIPTION
1	Shield
2	Tx
3	Rx
4	RTS
5	CTS
7	GND
20	DTR

3 SERVICE MODE

The software of the Basic Marathon is provided with a service mode. In the service mode it is possible to control all the outputs and mechanical movements.

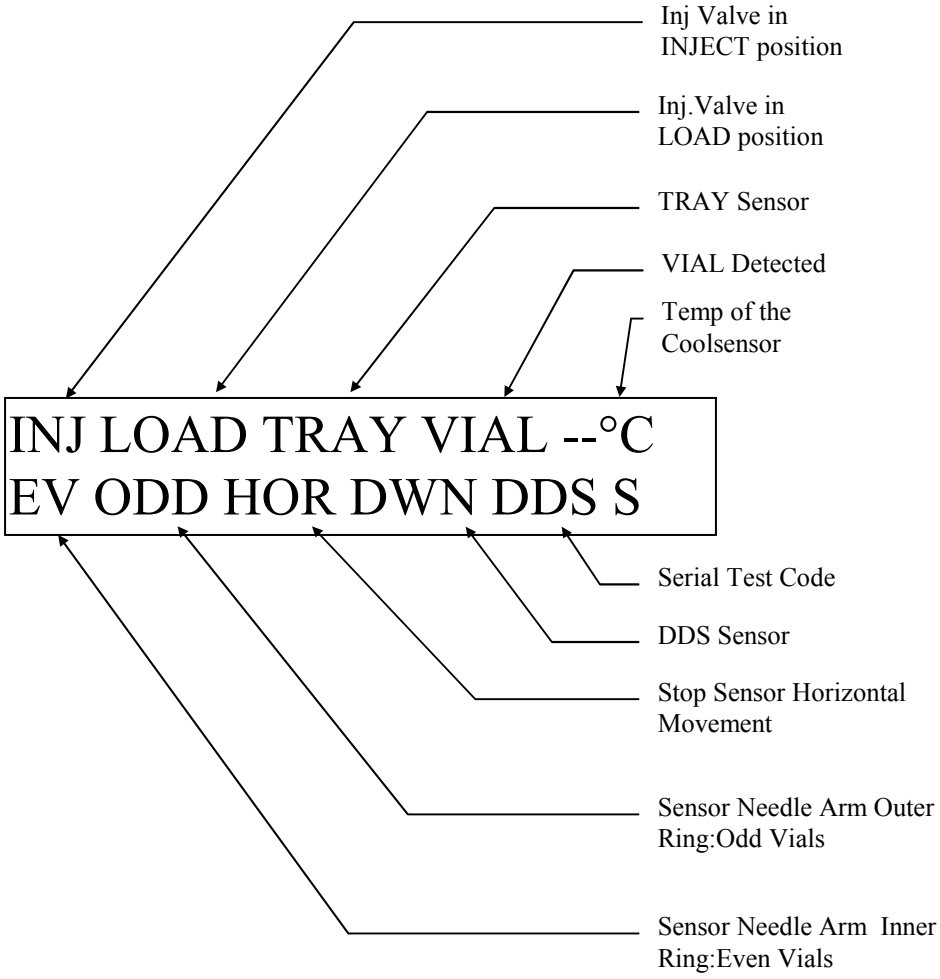
Since the service mode is only to be used by an qualified service engineer, it is protected by a code.

To access the service mode; turn off the power and switch the instrument on while holding the "***CL***" key down. The display will show:

```
SERVICE MODE  -- °C
PRESS F0 TO EXIT
```

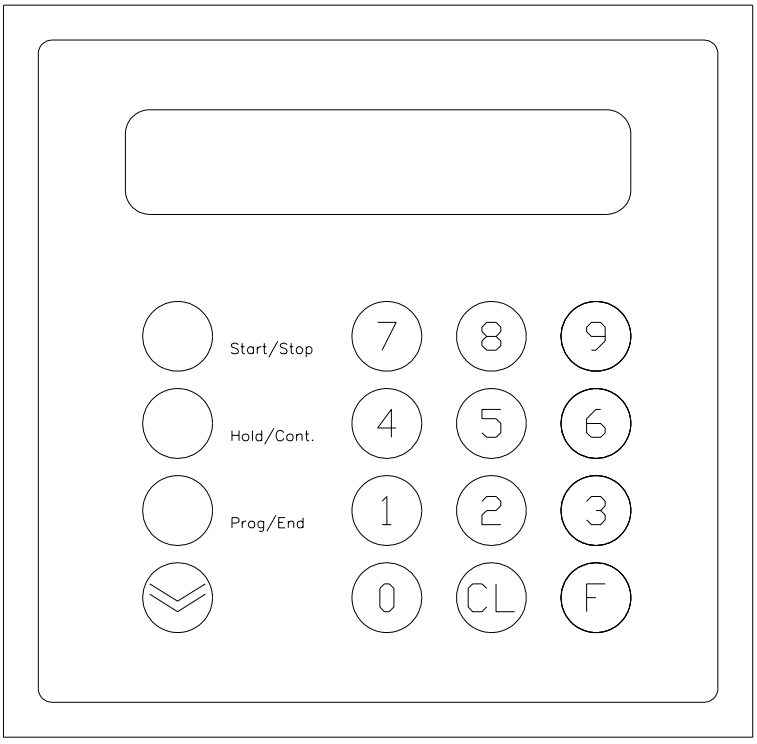
To access the control mode enter the service code *73*

The Marathon will now display the following screen.



3.1 HOW TO USE THE SERVICE KEYS

KEY	FUNCTION
CL	Start the service mode
START/STOP	Needle up
HOLD/CONT	Needle down (only in correct tray position)
PROG/END	Needle left (only in needle up position)
⩔	Needle right (only in needle up position)
1	Tray makes one step
2	Tray makes one step and the needle moves down.
3	The needle moves down and up in every second position of the tray
0	To STOP function 3
4	Dispenser ON
5	Dispenser OFF
9	Compressor ON (Overhead vial pressure 0.5 bar)
6	Compressor OFF
7	Injection valve in LOAD position.
8	Injection valve in INJECT position



NOTE: To exit the service mode turn the main power OFF

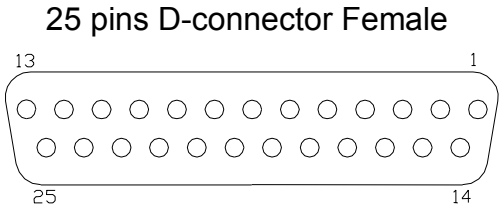
3.2 SERIAL MODE HARDWARE TEST

In the service mode it is also possible to check the proper function of the serial port.

To check the communication port a short circuit should be made between pin number 2 and 3 on the RS 232 connector.
The autosampler will sent out data via the TXD and receives the same data back via the RXD, it compare the send and received data.

Remove all remote connectors and power up the autosampler in the service mode.

The layout of the connector is as follows:



Pressing the “CL” key, in the service mode, will result in a B followed by an ! on the right corner of the display.

When the communication is not established, a ? is displayed.

Initial service mode screen:

```
INJ LOAD TRAY VIAL --°C
EV ODD HOR DWN DDS S
```

After pressing the “CL” key:

```
INJ LOAD TRAY VIAL --°C
EV ODD HOR DWN DDS B
```

When the communication is established:

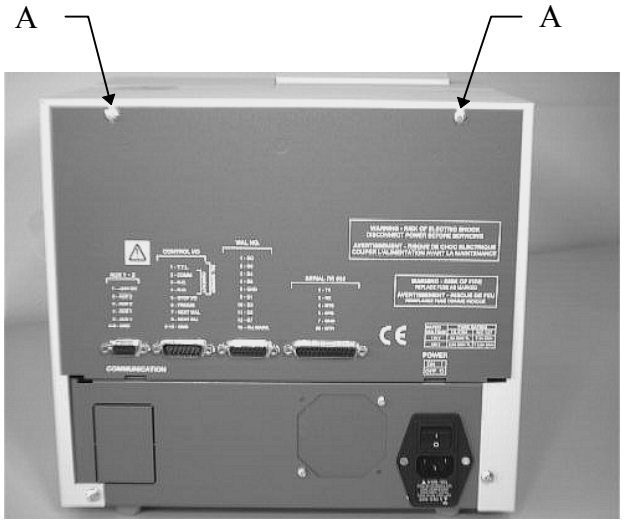
```
INJ LOAD TRAY VIAL --°C
EV ODD HOR DWN DDS !
```

4 DISASSEMBLING

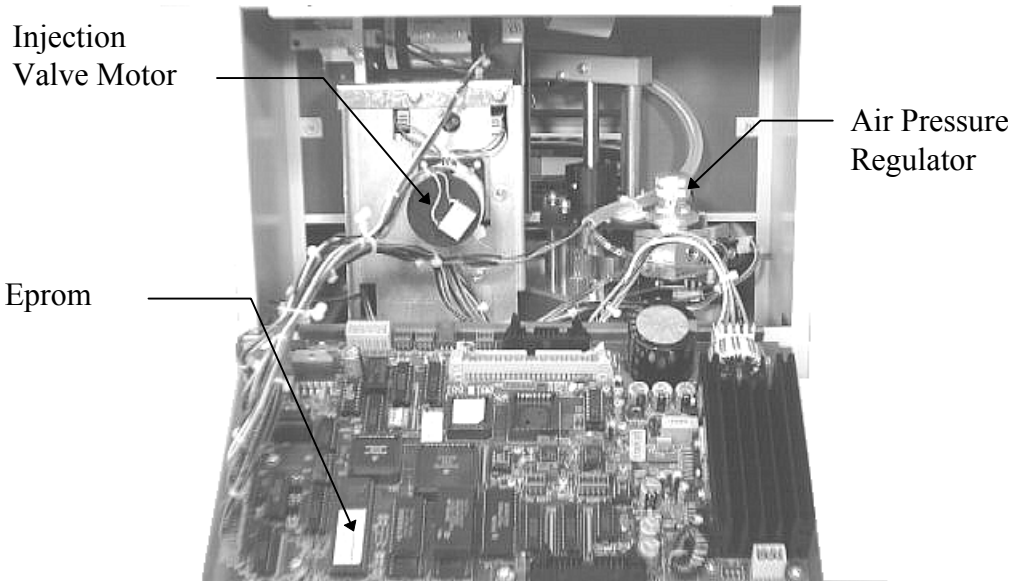
4.1 REARPANEL

To open the rear panel proceed as follows:

- Remove the two screw marked A
- Remove the keyboard/display flatcable from the control I/O Board.

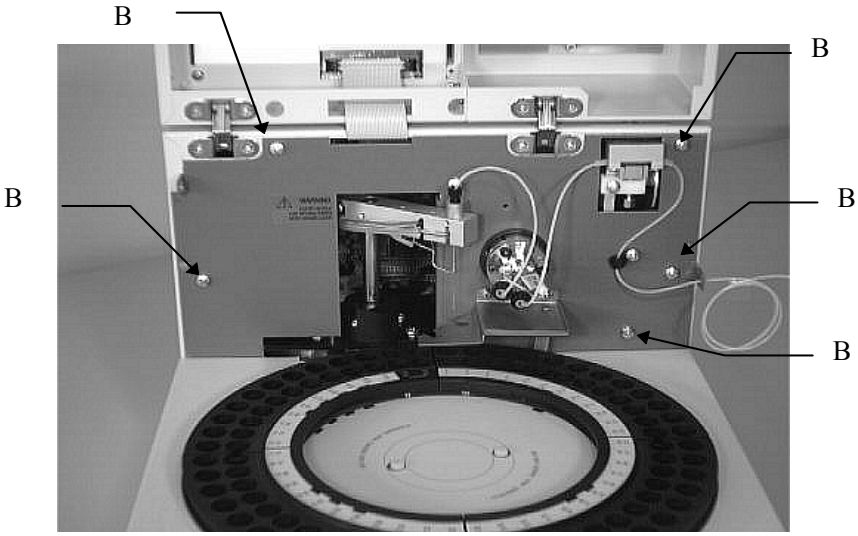


The picture below shows the Basic Marathon with open rear side



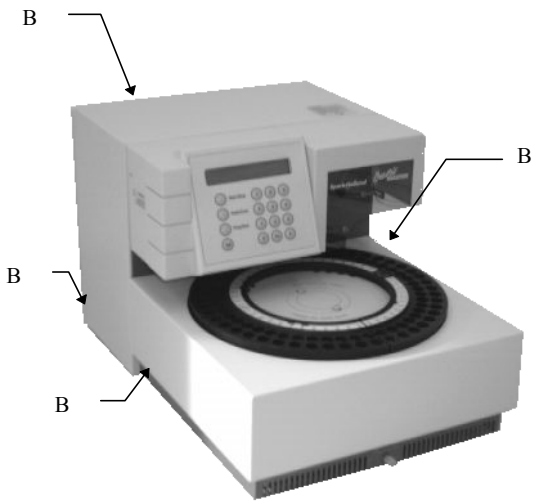
4.2 TOP COVER

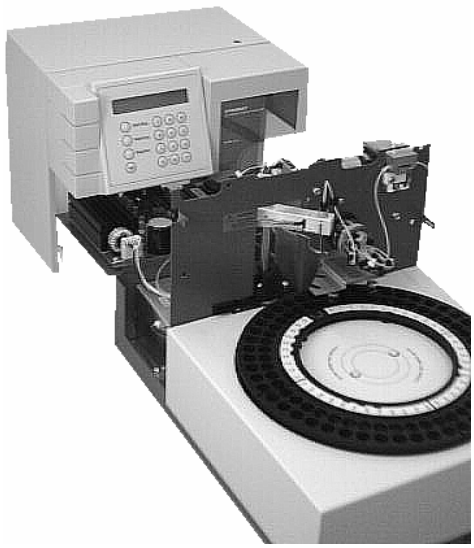
- ***Remove the cassette block and his screw***



- Open the keyboard/display.
- Remove all the screws Marked B
- Lift the top cover and Keyboard display house up and place them behind the Basic. See figure below.

In this position the Basic Marathon is still complete operational.

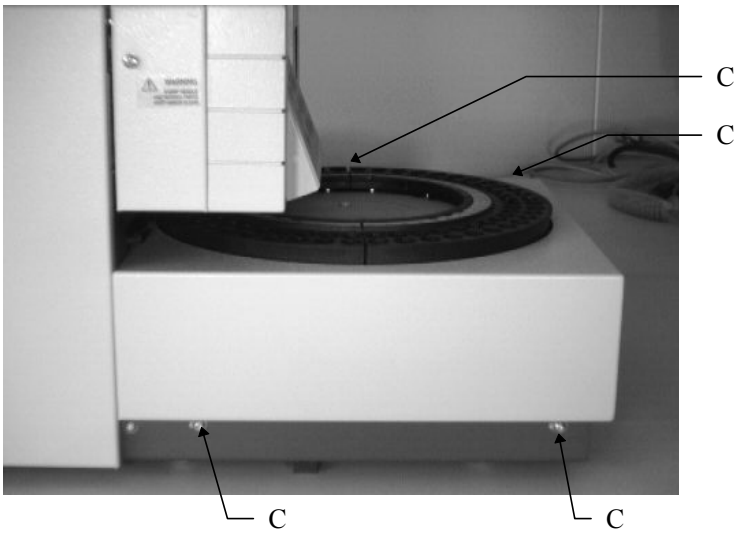




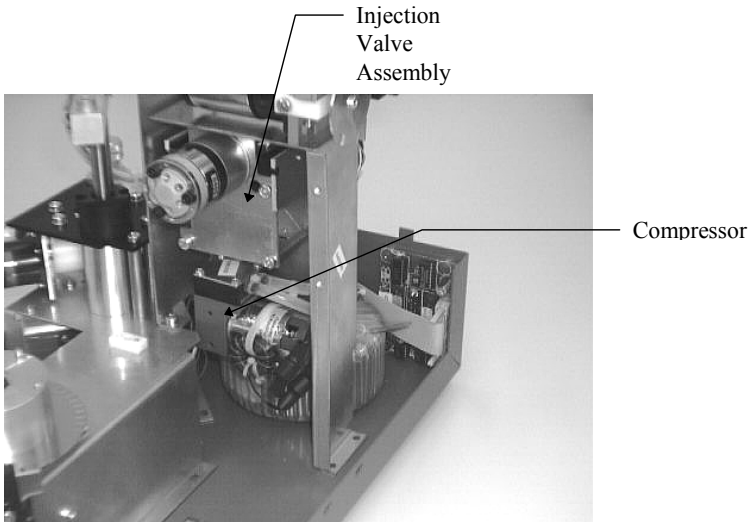
4.3 TRAY COVER

For disassembling the Tray cover it is necessary to remove the following items:

- Remove the vial stripper/injection valve drain (located under the injection valve).
- Remove the 4 tray segments and the white tray support screw; located inside the leaking bath under the needle arm (only in non-cool versions).
- Remove the 4 screws marked C (two on each side) and lift the tray cover up at the front.



NOTE: Make sure the drain connection is made after reassembling of the tray cover.



Basic Marathon with removed topcover and traycover.

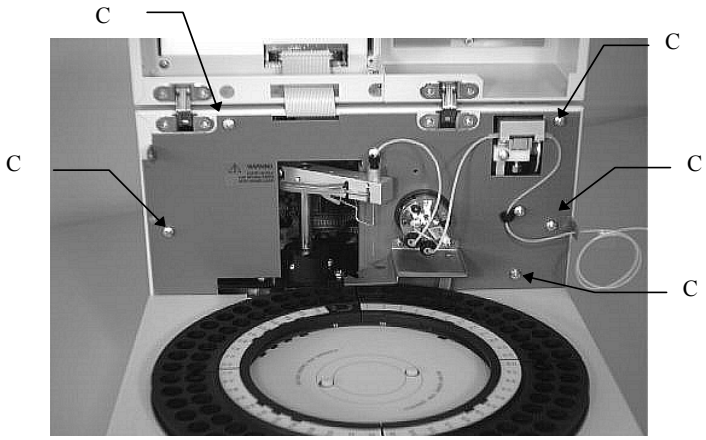
5 INJECTION VALVE

The Basic Marathon is equipped with a full electrical driven injection valve.
The switching time is < 100 msec.

5.1Injection valve assembly replacement

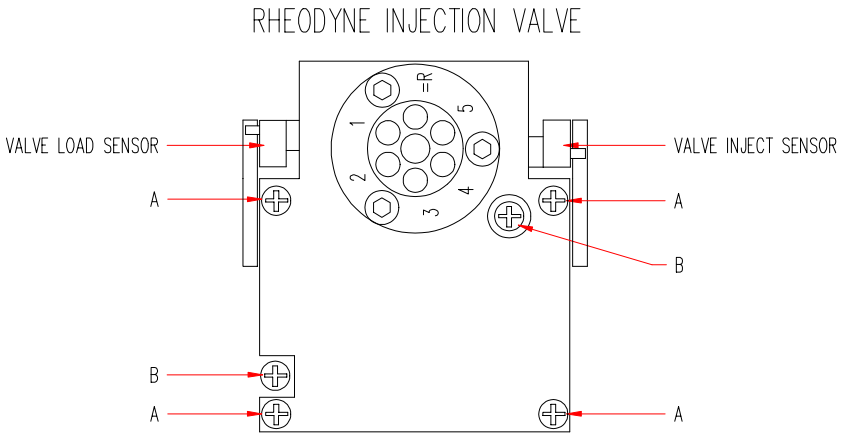
For Disassembling/Replacing the entire injection valve proceed as follows:

- Turn mains power off
- Open rear panel and remove connector J15 of the control I/O Board.
- Disconnect both connectors of the optical sensors (mark one of the connectors).
- Open keyboard/display house
- Disconnect plumbing from the injection valve
- Remove from the front panel the screws marked C
- Remove the front panel



- Remove the 2 screws of the injection valve assembly marked B

The entire injection valve assembly can now be removed



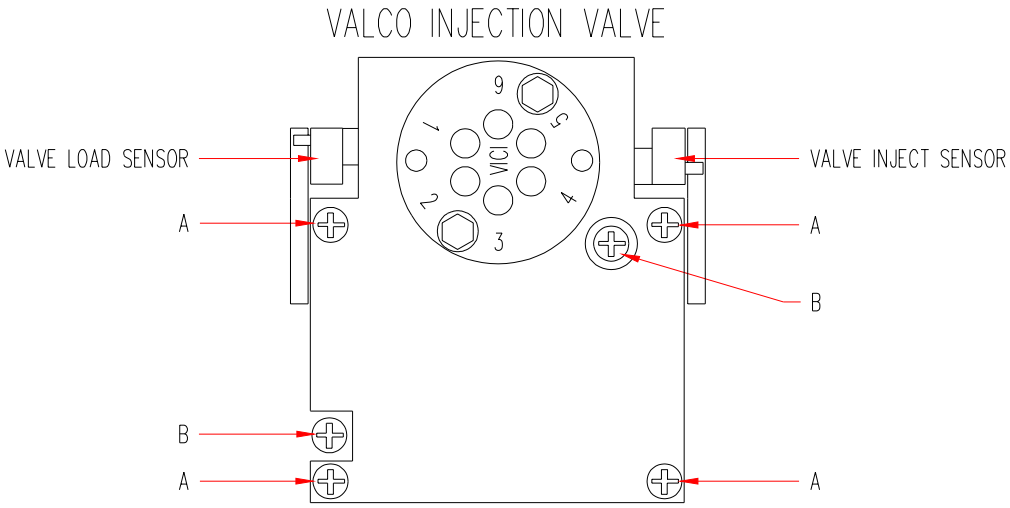
For more detailed information see drawing 71.0816.301

5.2 Injection valve replacement

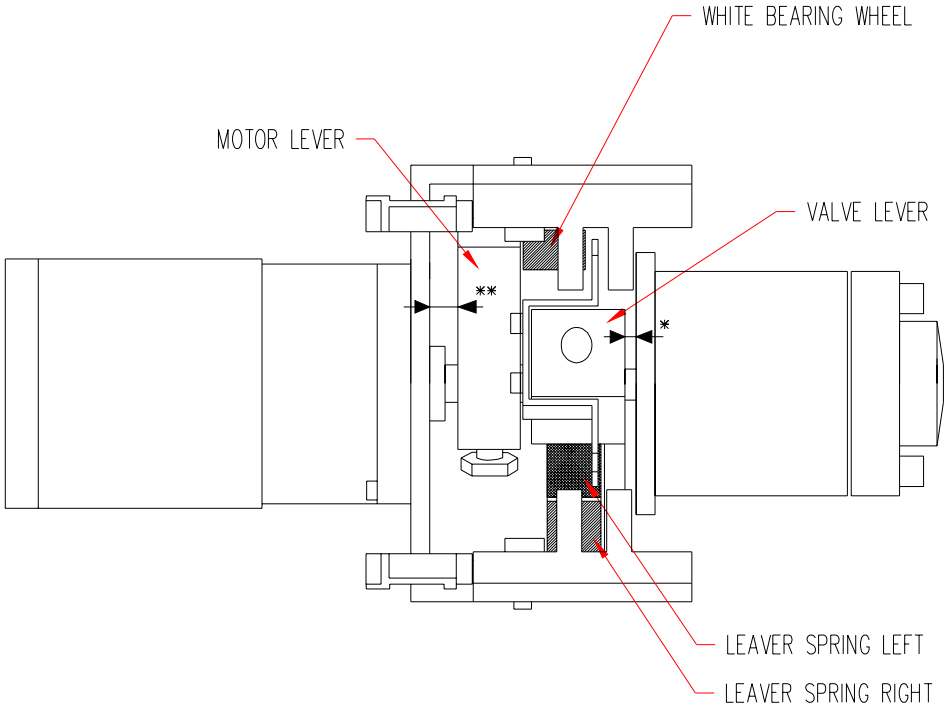
For Disassembling/Replacing the injection valve proceeds as follows:

- Turn mains power off
- Open keyboard/display
- Disconnect plumbing from the injection valve
- Remove the front panel
- Remove the 4 screws marked A
- Remove the injection valve and mounting plate
- Remove the valve lever from the injection valve

The injection valve can now be replaced.



For more detailed information see drawing: 71.0816.301



* Adjust the valve lever on the valve as far as possible to the right, without touching the mounting plate.
** Adjust the motor lever on the motor, so that the bearing wheel is free of the valve lever.

Notes for reassembling:

- Make sure the detector strap is in-line with the optical sensors.
- Place the injection valve manually in the inject position (detector strap is inside of the inject sensor.
- Turn the motor leaver in the position with the white bearing down (Out of the leaver springs!)
- Switch the injection valve manually to check if there are any mechanical obstructions.

5.3 Port Connections of the Injection Valve

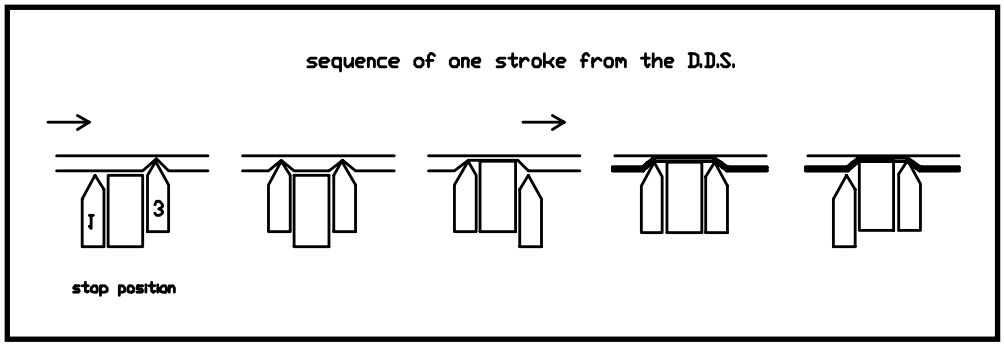
Port Number	Description
1	Loop
2	Needle → Valve tubing
3	Dispenser tubing
4	Loop
5	HPLC Pump
6	Column

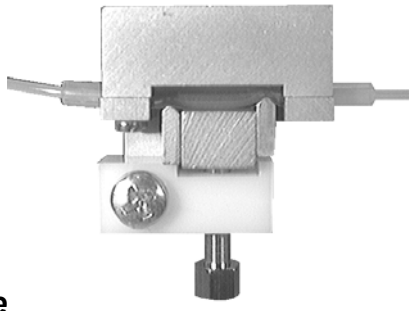
6 DIGITAL DISPENSER SYSTEM (DDS)

6.1 Working principle:

The DDS is a miniature "finger" pump. The operating principle is shown in fig. below.

Fingers 1 and 3 act as inlet and outlet pinch valves. Finger 2 provides the fluid displacement. The stroke of finger 2 is factory adjusted to provide 2 µL per stroke.





6.2 DDS Cassette

The DDS cassette is built up out different types of tubing. The most important one is the KALREZ tubing. This black piece of tubing is protected by a silicon sleeve.

For the chemical resistance of KALREZ refer to appendix A.

6.3 Adjusting and calibrating the DDS.

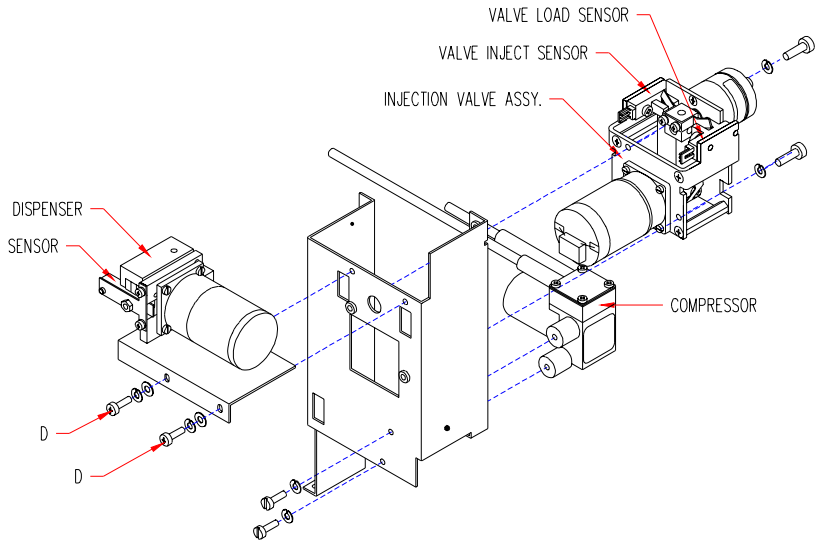
To perform adjustments on the DDS it is necessary to place the dispenser out of the Basic Marathon.

For calibration of the volume per stroke it is not necessary to remove the dispenser.

Before making adjustments and calibrations on the dispenser, check the cassette tubing for damages

6.3.1 DDS cassette block.

- Remove the cassette from the dispenser.
- Open the rear panel (see “Disassembling”)
- Remove the complete dispenser by loosing the 2 screws marked D for the dispenser plate

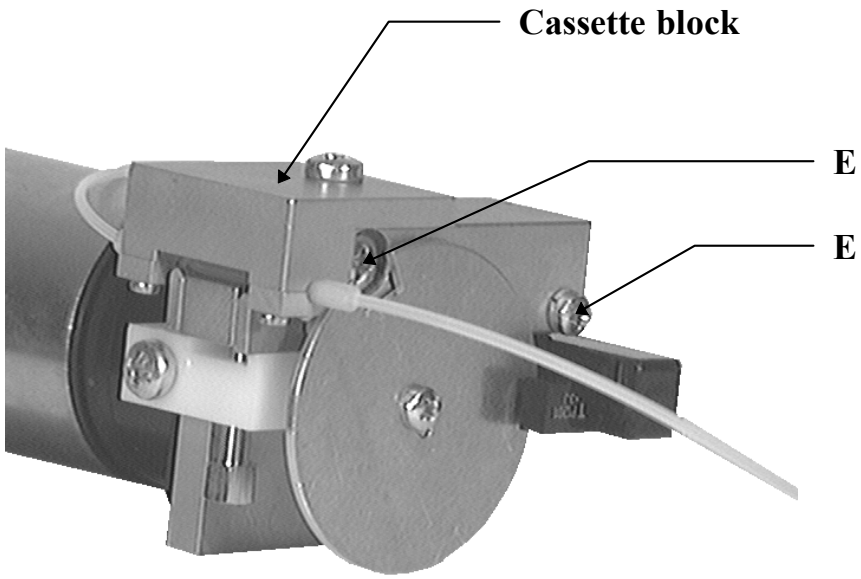


- Place the dispenser on the top cover and reinstall the cassette.
- To check the correct closing of the inlet and outlet finger proceed as follows:
- Power up the Marathon in the service mode
- Place an empty capped vial in the tray.
- Rotate the tray (key ”1”) until the vial is below the needle.
- Move the needle down (key “Hold/Cont”). Switch vial pressure on (key “9”).
- Place the end of the waste tubing in a vial with water.
- Turn the DDS by hand using rotation counter plate as a grip.

If there are any air bubbles the cassette block needs adjustment.

6.3.2 Adjusting the DDS cassette block:

- Set the Marathon up as described in the previous section.
- Loosen the two marked screws E
- Press the cassette carefully down until the air flow in the waste outlet stops



- Tighten up the screws and check if it is still possible to turn the disc clockwise without any obstructions.
- Check for correct closure on every position of the disc.

6.3.3 DDS calibration:

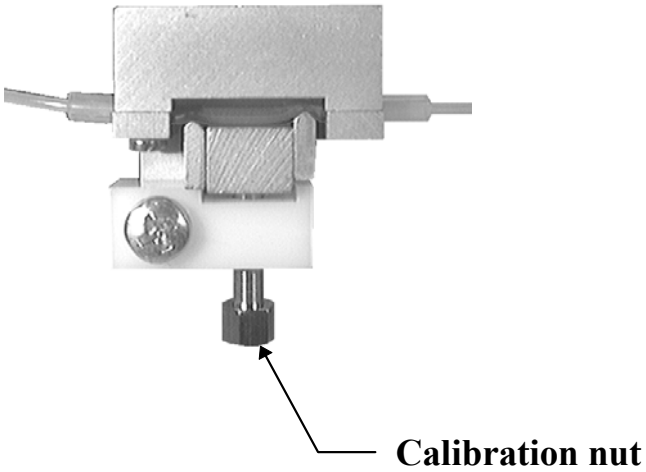
The best way to check and adjust the volume per stroke is to use a 100 µL volumetric pipette or a 100 µL syringe.

- Connect the pipette to the waste outlet of the DDS.
- Power up the Marathon in the service mode
- Place a filled capped vial in the tray.

  Advance the tray (key "1") until the vial is under the needle.
- Move the needle down (key "Hold/Cont.").
- Switch the vial pressure on (key "9").
- Start the DDS (key "4").
- Introduce an air bubble in the pipette and check the steps.

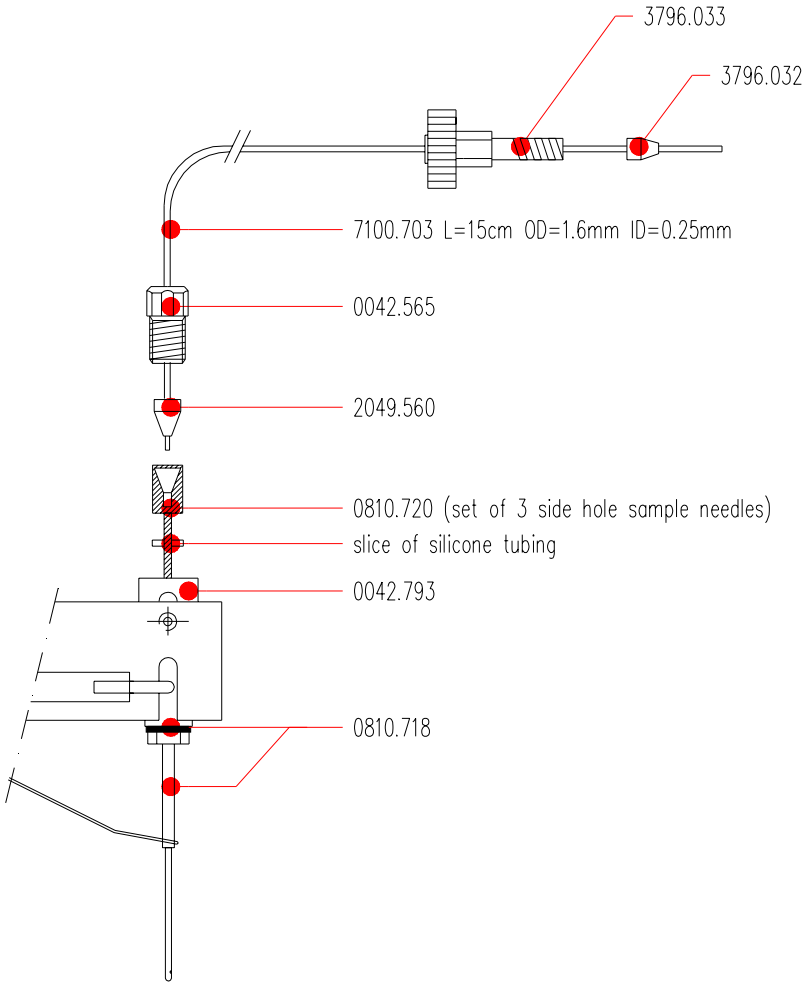
Each stroke should be 2 µL

Turn calibration nut clockwise to decrease the stroke volume and counter-clockwise to increase the stroke volume



7 NEEDLE

Needle connection:

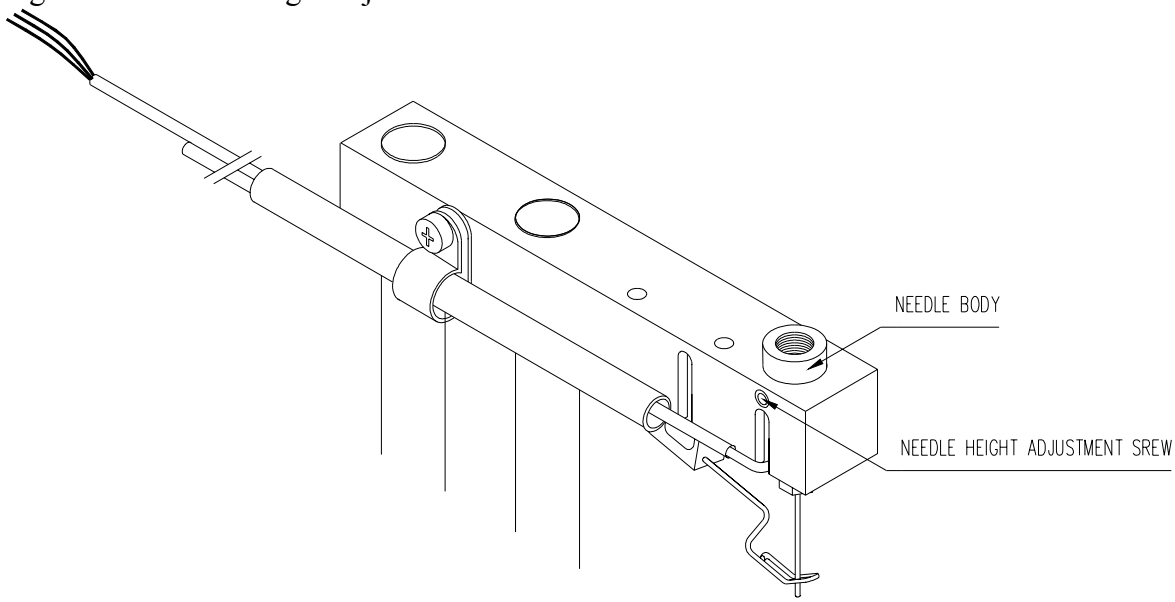


* To achieve a low dead volume connection between needle and tubing, make sure that the end of the tubing is straight.

Partnumber	Description
0042.565	Nut
0042.793	Needle body
0810.718	Air needle (including seal)
0810.720	Set of 3 sample needles (including slice of silicone tubing)
2049.560	Teflon ferrule
3796.032	Rheodyne reflex ferrule
3796.033	Rheodyne reflex nut
7100.703	Teflon tubing OD=1.6mm / ID=0.25mm

7.1 NEEDLE HEIGHT ADJUSTMENT

- Power up the Marathon in the Service Mode
- Place an uncapped vial in the tray
- Advance the tray (key "1") until the vial is under the needle.
- Loosen the needle height adjustment screw on the left side of the needle arm, and set the needle body as high as possible
- Tighten the needle height adjustment screw.

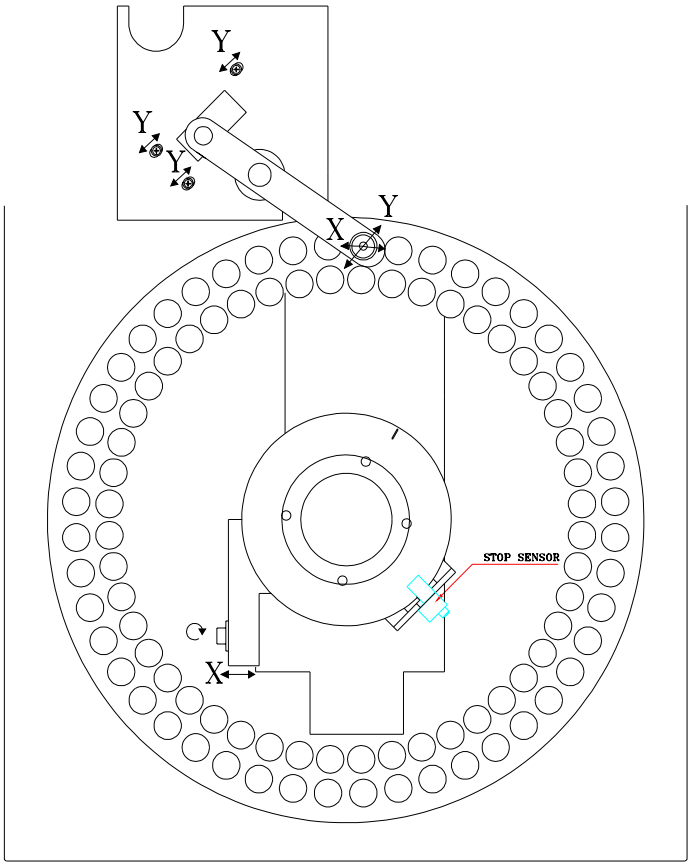


- Move the needle arm down (key "Hold/Cont").
- Loosen the needle height adjustment screw
- Lift the needle body until the tip of the needle is about 1 mm above the bottom of the vial.
- Tighten the needle height adjustment screw.
- Leave the Service Mode(Power off).

NOTE: Make sure to use the same type of vials, that is normally used in the lab.

7.2 NEEDLE PENETRATION ADJUSTMENTS:

The needle penetration point can be adjusted in two directions. Left ↔ Right and Front ↑↓to Back



Left ↔ Right adjustment

For left right “Y”penetration adjustment it is necessary to remove the top cover.

(See section:”Dissasembling the Top Cover”)

- fill the tray’s with a couple of uncapped vials.
- Power up the Basic Marathon in the service mode (see section:”Service Mode”)
- Rotate the tray until, a vial is under the needle arm. (key: ”1”).

  (The tray will make on step and stop at a correct position)
- Move the needle arm down (Key:“Hold/Cont”).
- To adjust the left ↔ right position, loosen the screws marked Y and position the needle into the vial centre.
- Tighten the screws and check in the next vials the correct penetration point.

Front ↑↓to Back

For Front ↑↓to Back "X"penetration adjustment it is necessary to remove the following parts:
- Tray's
- Tray disc
- Tray support screw (white plastic; positioned under the needle arm)
- Tray cover

Replace the tray disc and tray's

Adjustments in front to back position can be done by changing the stop position of the tray. This stop position is fixed by an optical interrupter which is mounted on a aluminium plate. This place can rotate around the spindle foot of the tray and is held in place with screw marked X

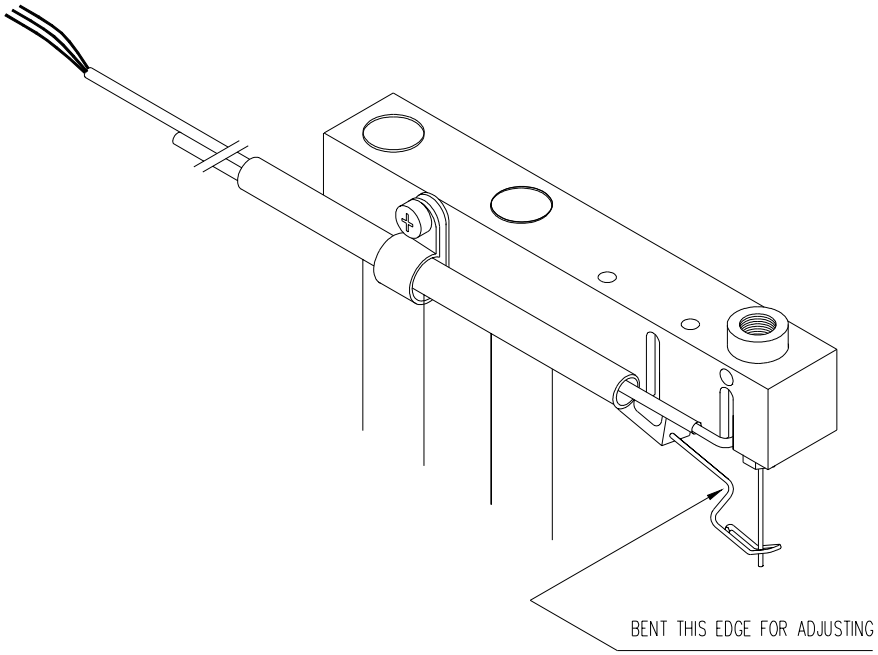
- Place a couple of empty decapped vials in the tray's
- Power up the Basic Marathon in the service mode
- Push key "3" The needle moves down and up in every second position of the tray.
- Turning screw marked X counter clockwise will resulting in an earlier stop position of the tray under the needle arm.

7.3 VIAL SENSOR

The Basic Marathon Autosampler is standard equipped with an vial sensor.

The vial sensor actuator is a part of the needle arm, and the optical interrupter is mounted inside the needle arm.

The function of the vial sensor can be checked in the service mode



Check or Adjustment procedure:

- Place the lowest capped vial in the tray
- Power up the Marathon in the service mode (See section “Service Mode”)
- Rotate the tray so that the vial is under the needle arm.(Key: 1)
- Move the needle arm down (Key: HOLD/CONT)
- The display should give:“vial”
- If no vial is detected; readjust the vial sensor hinge.
- Repeat procedure after readjusting.

The signals of the sensor can also be measured on the Control Board.

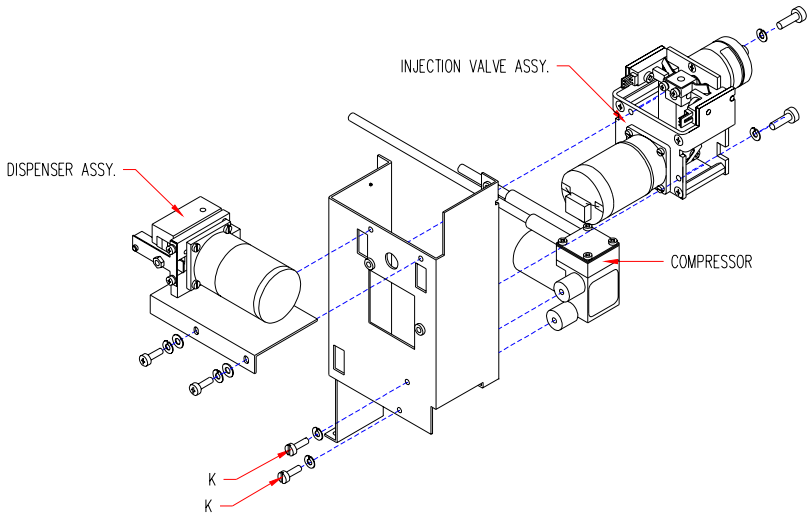
If a vial is detected the output of the optical interrupter should be high: >4 Volts, and if there is no vial placed in the tray the optical interrupter should be low: <1 Volts.

This can be measured on the Control Board on Connector J4.
Pin 9 (Blue wire) is the sensor signal
Pin 8 (Red wire) is the sensor power line (5V)
Pin 7 (Black wire) is the sensor ground line

8 COMPRESSOR

The compressor of the Basic Marathon takes care for the overhead vial pressure of 0.5 Bar for a improved injection system. The timebased loopfilling mode needs also the compressor to fill the loop.

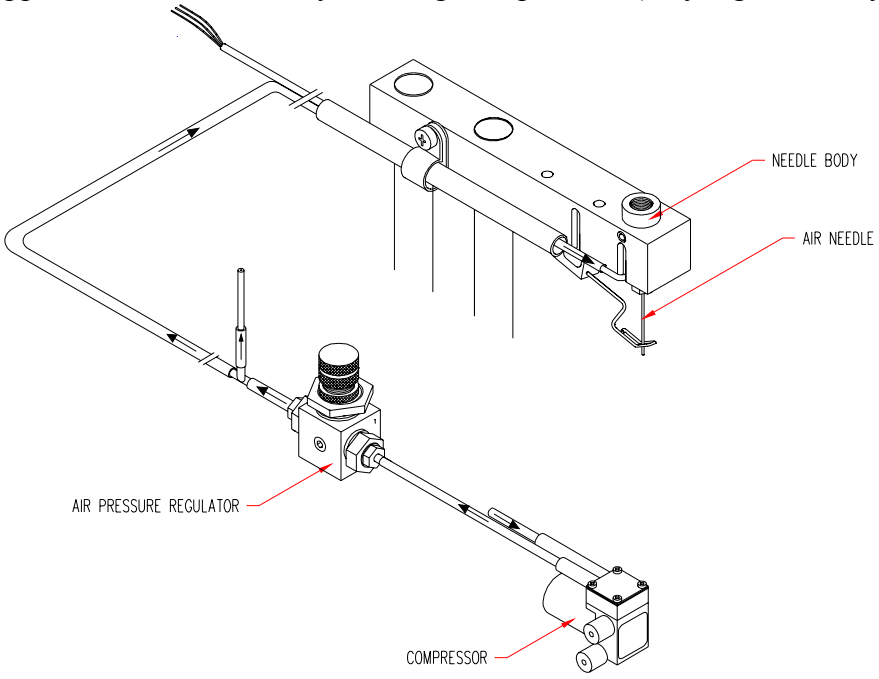
The compressor is a solid state membrane type and delivers a pressure from approximately 1.5 Bar, and is located under the injection valve assembly.



The pressure form the compressor is reduced via an pressure regulator to 0.5 Bar

The headspace pressure of the vial should be 0.5 Bar ±20% and can be readjusted with the pressure regulator. The pressure can be measured in an empty capped vial; the pumptubing cassette should be closed, with an pressure gauge.

For some applications it is necessary to change the pressure (very high viscosity samples).



10 INJECTION SYSTEM MALFUNCTIONS

To make sure the analytical problem is caused by the Autosampler, and the rest of your system works fine, make a few injections with an manual injector.

SYMPTOM	POSSIBLE CAUSE	REMEDY
No Injection	Blockage in sample flow path.	See section Sample Flow Path.
	HPLC pump not on/no solvent.	Turn pump on/check solvent.
Bad reproducibility	Loopvolume in settings list (F9) not the same as installed loop.	Change Loopvolume in settings list.
	Volume per stroke of the DDS not correct	Calibrate DDS See section DDS Calibration.
	Cassette block not closed by the inlet or outletfinger of the DDS	See section Cassette Block adjusting.
	No overhead vial pressure	See section Sample Flow Path
	Rotor Seal defect	Replace rotor seal (Check Stator surface)
	Handtight fittings overtightened	Replace the tubing and ferrules
Memory Effect	Loop not correct in the injection valve ports fitted	Install a new loop.
	Needle/Valve tubing not straight	Make the tubing's end straight.
	Rotor seal worn-out	Replace rotor seal. Check stator for scratches.

11 BASIC MARATHON TEST PROCEDURE

The Basic Marathon is factory tested for reproducibility and carry over according to the following test procedure.
The conditions of the analytical system are as follows:

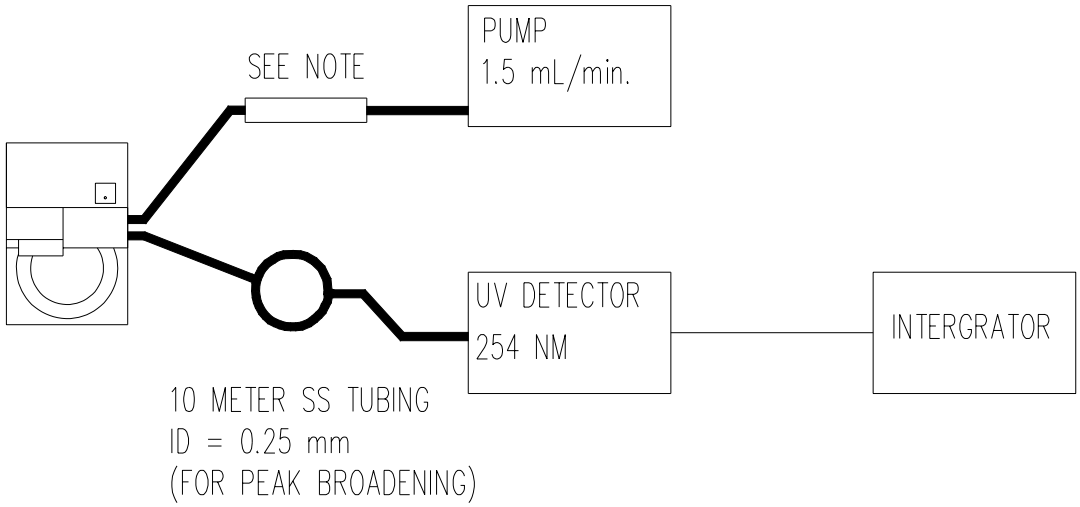
Basic Marathon settings

SYSTEM SETTINGS			**RUN PARAMETERS**		
LOOPVOLUME	:	20µl	FIRST VIAL	:	1
SAMPLE VOLUME	:	STD	LAST VIAL	:	7
FLUSH	:	VOLUME	NO.OF INJ/VIAL	:	3
NEEDLE WASH	:	NO	PREFLUSH	:	30µl
AUXILIARIES	:	NO	ANALYSE TIME	:	1:00 min.
SECOND OVEN TEMP	:	NO			

Analytical Parameters

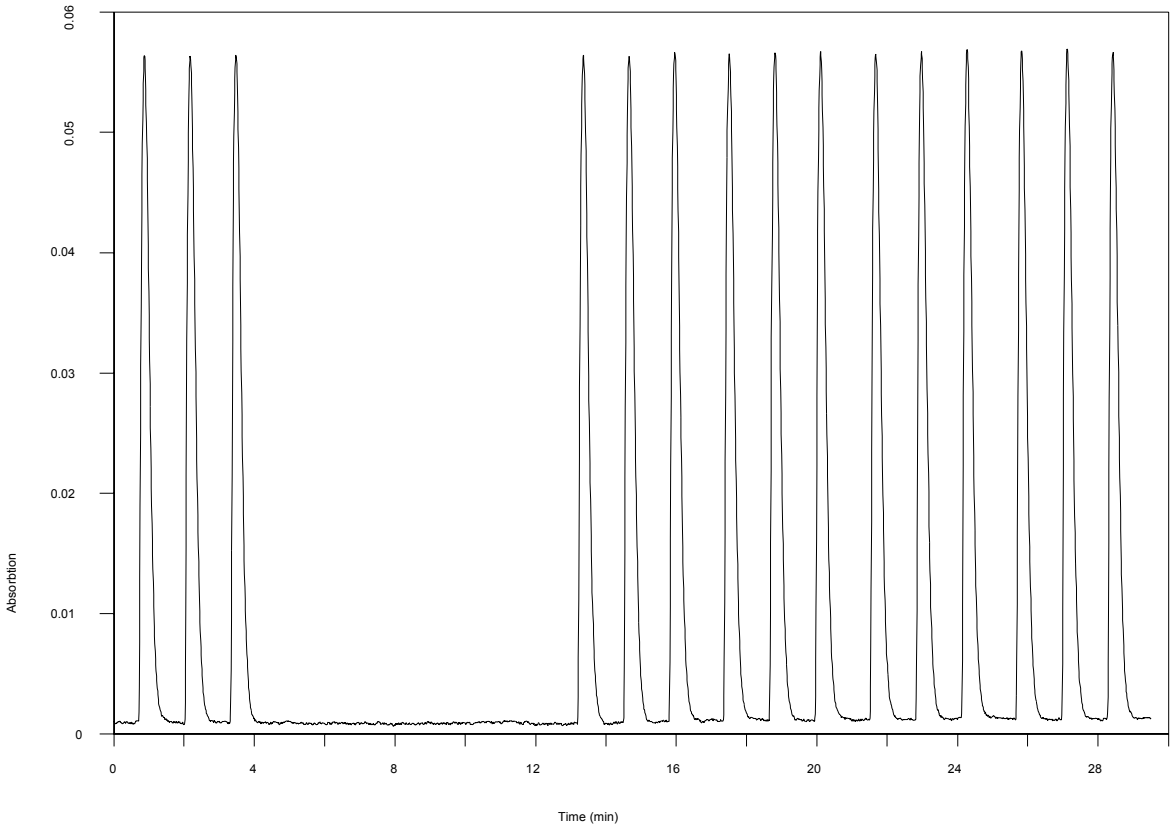
PUMP	FLOW	:	1.5 ml/min.
	ELUENT	:	distilled water
DETECTOR	WAVELENGTH	:	254 nm
SAMPLE		:	Uracil in distilled water (50 PPM)

Vials 1,4-7 filled with Uracil sample (50 PPM)
Vials 2 and 3 filled with distilled water (ELUENT)



NOTE: Some pumps require a backpressure of approximately 20 bar (250 psi) in order to supply a constant flow. In those cases an extra capillary as restriction needs to be placed between the pump and the injection valve.

11.1 EXAMPLE OF TESTCHROMATOGRAM



Above is an test chromatogram example printed. From the integration results the Relative Standard Deviation (RSD.....%) can be calculated.
The necessary formula's are printed below:

$$\overline{Peak\ area} = \frac{\sum Peak\ area}{n}$$

$$\sigma_{n-1} = \sqrt{\frac{\sum \left(Peak\ area - \overline{Peak\ area}\right)^2}{n-1}}$$

$$RSD\% = \frac{\sigma_{n-1}}{\overline{Peak\ area}} \times 100\%$$

Calculating the RSD% from the example integration results will give a RSD% of 0.36%

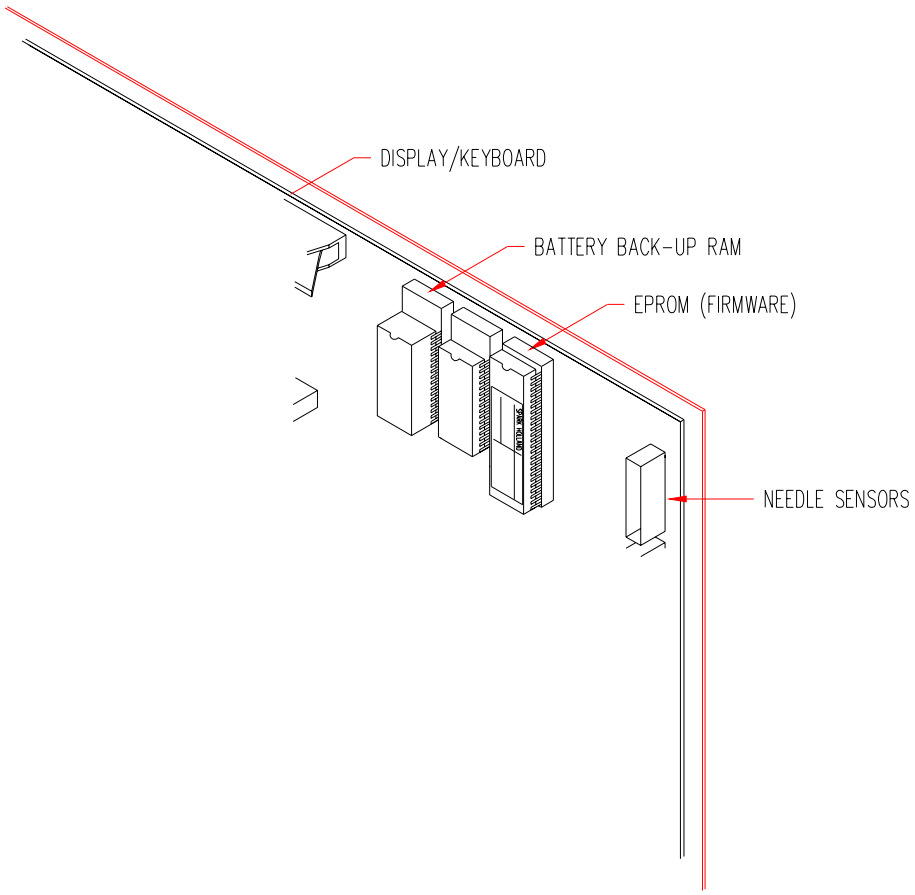
Peak Number	Retention Time	Peak Area
1	0.877	14.57611
2	2.181	14.65836
3	3.480	14.71600
4	13.363	14.59072
5	14.665	14.61937
6	15.964	14.62571
7	17.513	14.59504
8	18.815	14.65542
9	20.114	14.67614
10	21.680	14.58954
11	22.693	14.64998
12	24.281	14.49563
13	25.831	14.57137
14	27.129	14.58835
15	28.430	14.62109

Integration results

12 FIRMWARE

The firmware of the Basic Marathon is programmed in an EPROM.
For firmware replacement proceeds as follows:

- Make a notice of the system settings and run parameters
- Turn main power off
- Open the rear panel (See section disassembling rear panel)



- Replace the EPROM (U7 located on the top of the control I/O Board)
- Close the rearpanel and reassemble the screws.
- Check and Reprogram the system settings and run parameters.

CAUTION: The EPROM is highly sensitive for Static discharges.

13 ERROR MESSAGES

13.1 MEMORY ERROR ALL VALUES DEFAULT

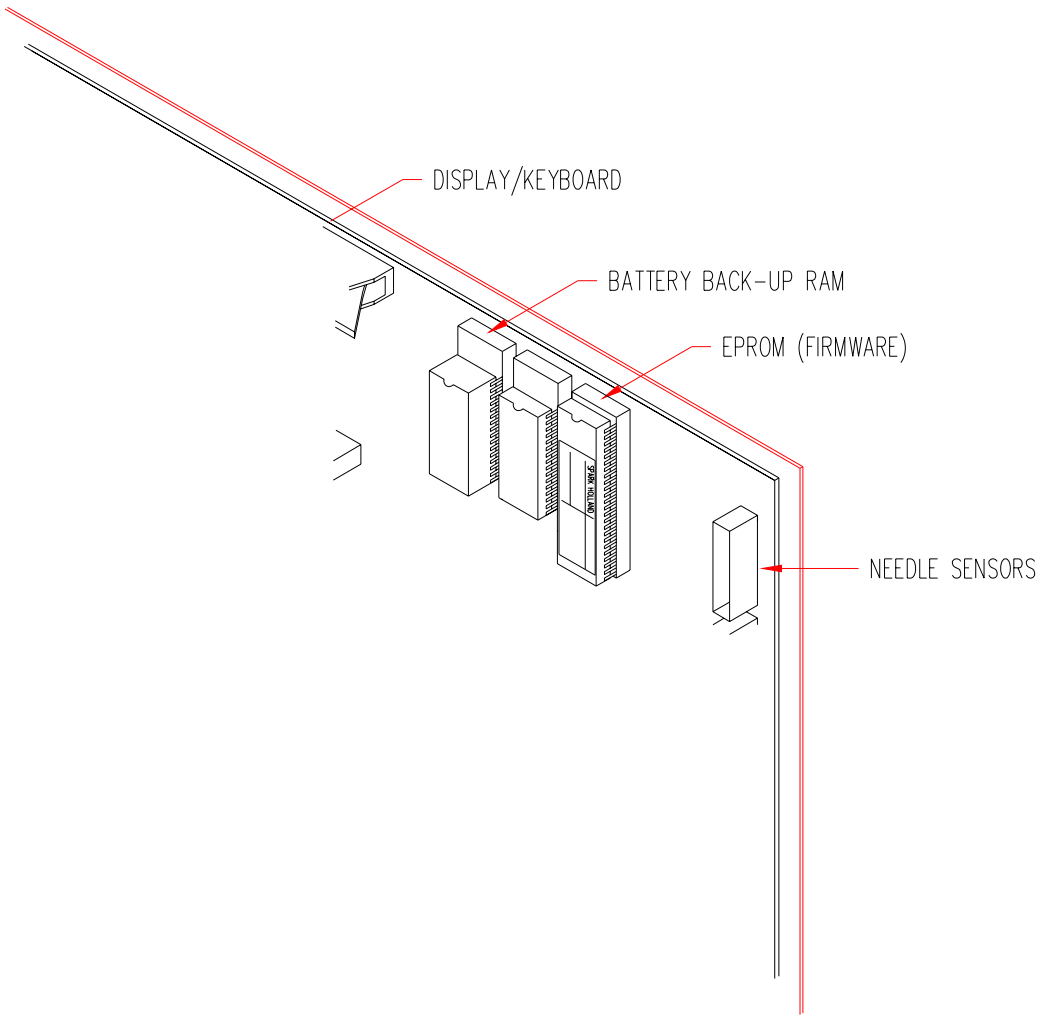
Possible cause:

- New Control I/O Board installed (Turn power OFF and ON)
- New firmware installed (Turn power OFF and ON)

  If errors still occurs:

- RAM with built in battery back up defect (P/N:2510.210)

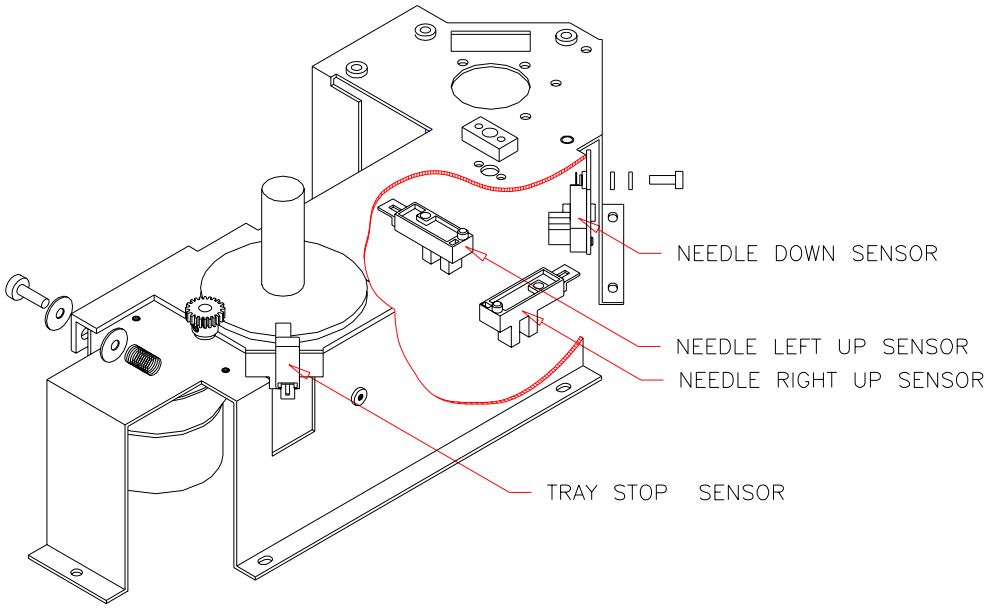
Reprogram all RUN and TEMP.CONTROL parameters and check SYSTEM SETTINGS



13.2 TRAY ROTATION FAILURE

Possible cause:

- Tray movement is obstructed; check/remove obstruction.
- Optical Tray Sensor defect; check in service mode
- AC motor defect; check AC power lines to motor.
- Loose wire from motor or sensor to connector J11
- Loose wire from Bridge rectifier to connector J17
- Loose soldering on motor or capacitor
- Control Board Basic Marathon defect
- Tooth wheel on gearbox loosened



13.3 NEEDLE UNIT FAILURE

Possible cause

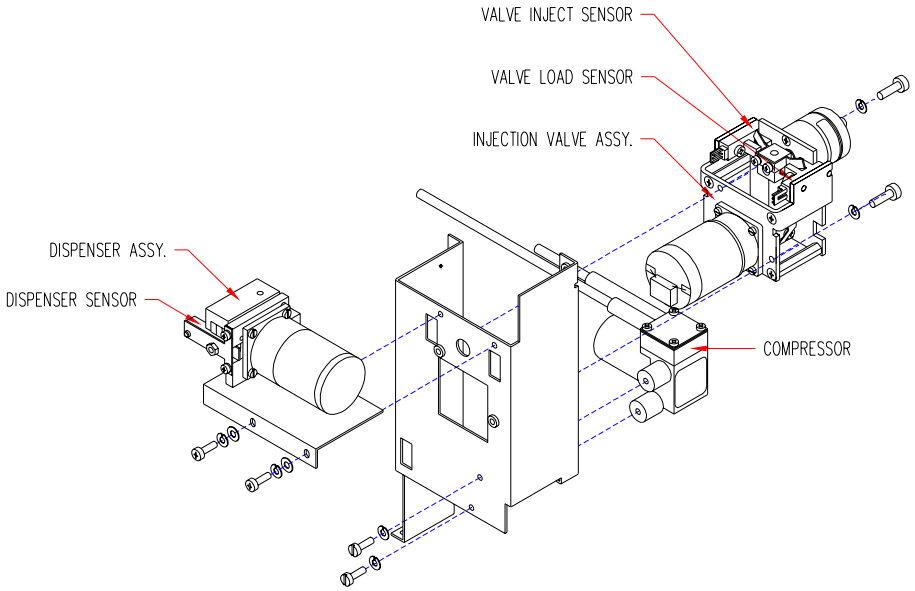
- Needle right up sensor defect; check in service mode
- Needle left up sensor defect; check in service mode
- Needle horizontal sensor defect; check in service mode
- Needle down sensor defect; check in service mode
- Needle Horizontal Motor defect; check DC power lines
- Needle Vertical Motor defect; check DC power lines
- Loose wire from sensors /motors to connector J4 or J9

- Control Board Basic Marathon defect
- Horizontal motor stop vane not in sensor gap; check in service mode
- Sensor vane needle left/right & up not in sensor gap; check both positions in service mode
- Sensor vane needle down not in sensor gap; check in service mode
- Vial sensor defect; check in service mode

13.4 DISPENSER FAILURE

Possible cause:

- Dispenser sensor defect; check in service mode
- Dispenser motor defect; check DC power lines
- Loose wire from motor/sensor to J10
- Control Board Basic Marathon defect



13.5 INJECTION VALVE ERROR

Possible cause

- Sensor Inject defect; check in service mode
- Sensor Load defect; check in service mode
- Injection valve motor defect; check in service mode
- Loose wire from motor/sensors to J15
- Control Board Basic Marathon defect
- Injection valve screws over tightened

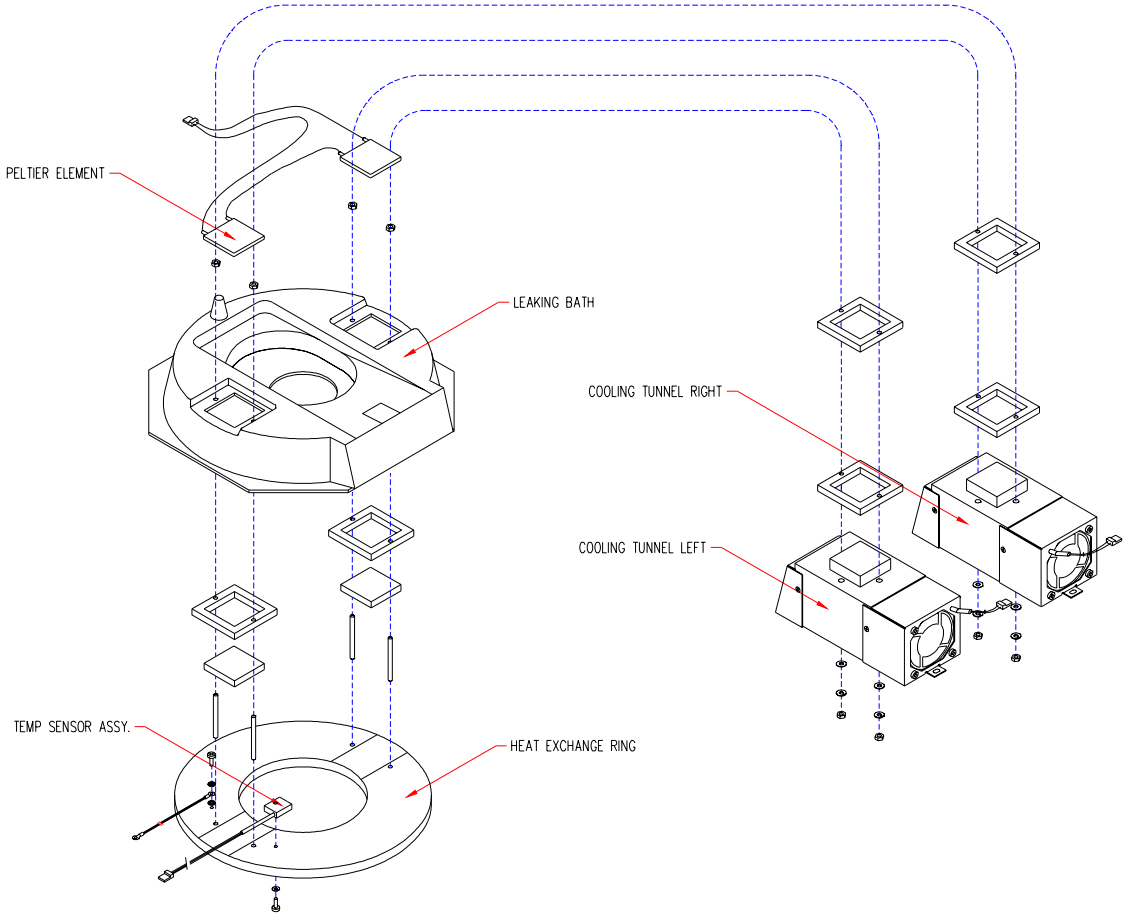
14 COOLING OPTION

The Basic Marathon can optional be equipped with a Peltier cooling. This option is only factory installed. The cooling option includes a heat exchange ring mounted underneath the sample tray, a special set of sample tray segments and a tray cover

The aluminium bottom plates of the tray segments are sliding over the heat exchange ring to ensure maximum contact between the tray and the heat exchange ring.

Sample vials are completely surrounded by the aluminium tray inserts.

The heat exchange ring is cooled with 2 Peltier elements which are controlled by the I/O board.



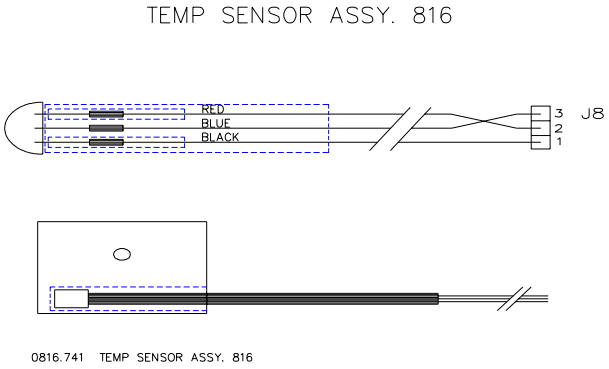
NOTE: See section 14.2 for available spare parts

Select COOLING CONTROL mode, with Basic Marathon in READY status, key F,7.

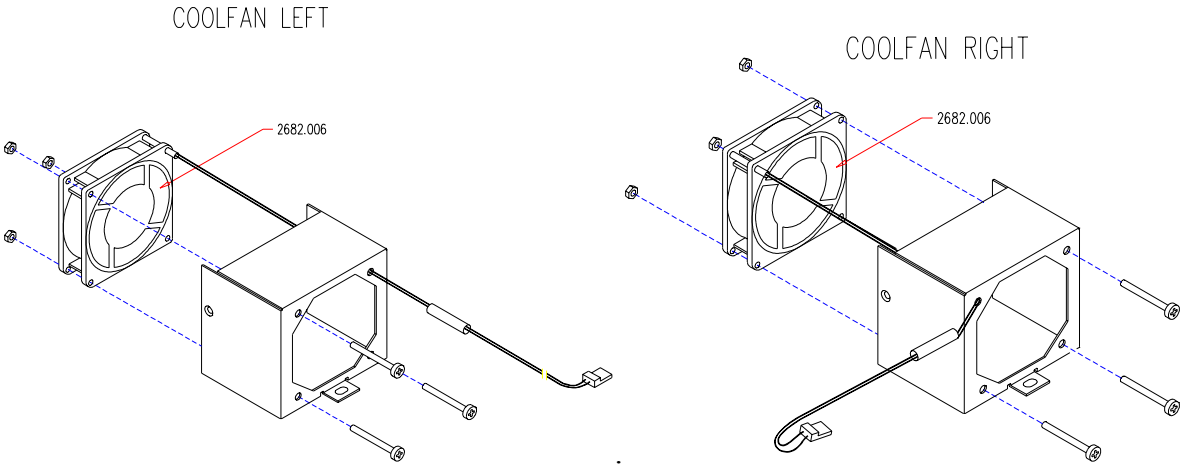
TRAY COOLING (ON/OFF);	Press 1 to switch ON the sample tray cooling Press 0 to switch OFF the sample tray cooling

14.1 TEMPERATURE SENSOR

The temperature from the heat exchange ring is measured with a temperature sensor.
This temperature sensor is located at the bottom of the heat exchange ring.



The two peltier elements are mounted between the heat exchange ring and the heat sinks, one for each peltier element.
Two fans are used to cool the heatsinks.



NOTE: In case of a defect Peltier element it is necessary to replace the complete sub assemble.

14.2 SPARE PARTS OF THE COOLING OPTION

Partnumber	Description
2682.006	Fan
0816.740	Cool option replacement kit (including fan's and sensor)
0816.741	Temp sensor assy. 816
0043.588	Cooling cover

15 SPARE PARTS NOT SHOWN IN DRAWINGS

Part Number	Description
0810.329	PUMPTUBING CASSETTE
0810.327	SERUM PUMPTUBING CASSETTE
0810.718	AIR NEEDLE (INCLUDING SEAL)
0810.720	INJ. NEEDLE PCK/3
0810.711	SERUM AIR NEEDLE (INCLUDING SEAL)
0810.712	SERUM INJ. NEEDLE PCK/3
2997.844	TEFLON COATED LONG LIFE NEEDLE PCK/1
2002.223	RHEODYNE 7010-122 INJECTION VALVE
2002.230	RHEODYNE 9010 PEEK INJECTION VALVE
2002.242	VALCO 22-2006 SPHM INJECTION VALVE
3796.004	RHEODYNE 7010 ROTOR SEAL
3796.050	RHEODYNE 7010 TEFZEL ROTOR SEAL
3796.005	RHEODYNE 7010 STATOR
3796.040	RHEODYNE 9010 ROTOR SEAL
3796.041	RHEODYNE 9010 STATOR
3796.042	RHEODYNE 9010 STATOR FACE ASSY.
3796.043	VALCO 22-2006 ROTOR SEAL
3796.044	VALCO 22-2006 STATOR
3796.032	RHEODYNE ‘RHEFLEX’ FERRULE
3796.033	RHEODYNE ‘RHEFLEX’ NUT
3796.020	VALCO FERRULE 1/16”
3796.021	VALCO NUT 1/16”
3796.035	RHEODYNE 5µL LOOP
3796.009	RHEODYNE 10µL LOOP
3796.010	RHEODYNE 20µL LOOP
3796.011	RHEODYNE 50µL LOOP
3796.012	RHEODYNE 100µl LOOP
3796.013	RHEODYNE 200µl LOOP
3796.014	RHEODYNE 500µL LOOP
3796.015	RHEODYNE 1000µL LOOP
3796.076	RHEODYNE 20µL PEEK LOOP
3796.016	RHEODYNE 100µL PEEK LOOP
3796.046	VALCO 5µL LOOP
3796.029	VALCO 20µL LOOP
3796.030	VALCO 200µL LOOP
3796.031	VALCO 500µL LOOP