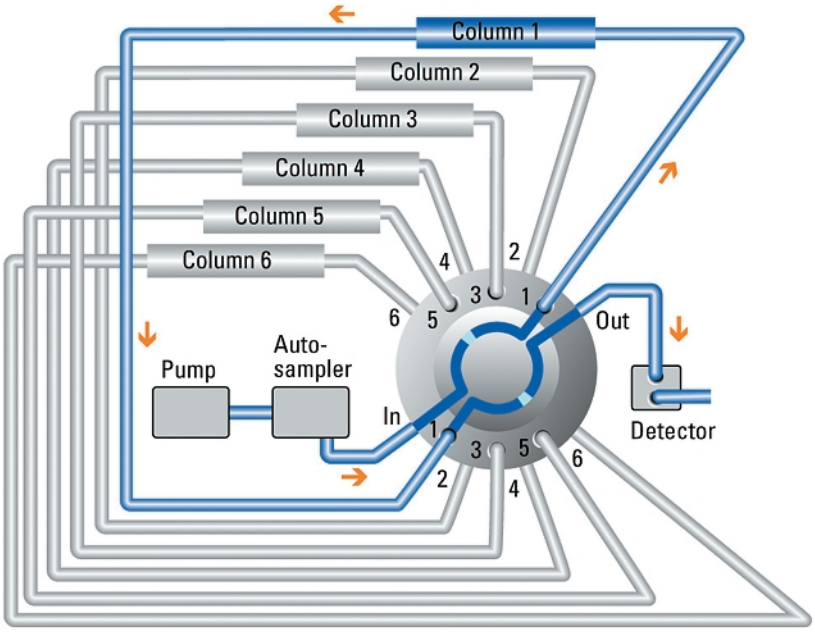
PSO Europe Valve Solutions: Increasing your productivity by adding functionality to your Agilent 1100 Valve Series

Technical Note for LC and LC/MSD

Bernhard Freitag
Wim Verhaegen



Abstract

In this Technical Note we describe the hardware and software involved. A complete description of the entire solution and how the European Project Organization can provide a customized solution is given.

Agilent Technologies

Introduction

Ability to switch between solvents and/or columns on a single HPLC system significantly expands the flexibility and range of application. Whether establishing a single system capable of running several different methods or running chiral screening or method development, solvent and column switching capability can be invaluable and cost effective.

However, simply changing the solvent and/or the column is not sufficient in order to control the complete LC-system. Depending on what has been altered the system needs to be primed with the new solvent and equilibrated before the next injection can be performed.

The PSO Valves Solution offers new Automation capabilities, through use of the Agilent 1100 Valves and/or Rheodyne valves in combination with the Agilent ChemStation and the PSO Valve Add-on macro. This provides an evolution for Flexibility and Productivity, with programmable automatic preparation and sequence controlled valve switching.

Supported Valves

The Enhanced Control Software delivered as part of the solution, is able to handle different types of valves. Depending on the valve type, the control is done with an optional BCD-board or the Agilent CAN-Bus (table 1).

Easy Software Control

The software has a configurable control which allows you to select which solvent and/or column selection is to be used.
The Agilent 1100 series valves are automatically detected and fully integrated. All original ChemStation functionality is still available and used (figure1, 2).

	Agilent	Rheodyne
Solvent Selection	G1160A	EV100-106
Column Selection	G1159A	EV501-104
Others	G1157A	*
	G1158A	*
	G1162A	*
	G1163A	*

Table 1
Supported valves

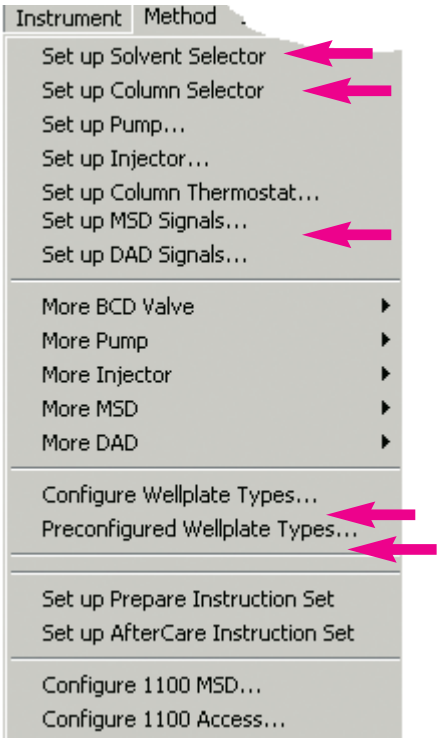


Figure 1
Integrated menu's

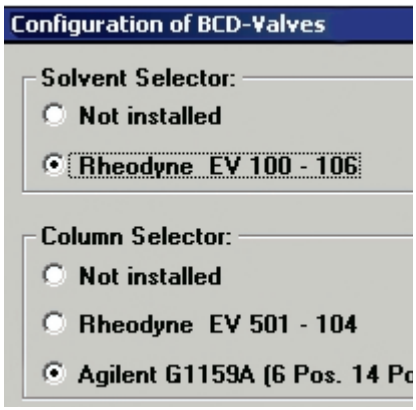


Figure 2
Configuration dialog box

Easy Software Control

The software offers a user interface to setup, so called, “prepare and after care instructions sets”. These instructions can be stored out of the method with a unique name. As a pre run and or post run command, you can easily select which instruction set to execute. The “Prepare Instruction Sets” are used in order to automate the system preparation, which can include:

- Selection of a different solvent independent of the method settings
- Flushing of the solvent lines
- Equilibration

The example (figure 3) will flush the solvent lines at the start of each run (before the injection) as followed:

- Switch the column selector to an open position to allow higher flow rates
- Switch the solvent selector to the position specified in the method or sequence
- Change the composition of pump 3 and increase the flow
- Load the original method back and equilibrate the column with the method specific parameters
- Inject and run the method

The ”After Care Instruction Sets” are executed after the run and can be used, for example, to prepare your column for storage (figure 4).

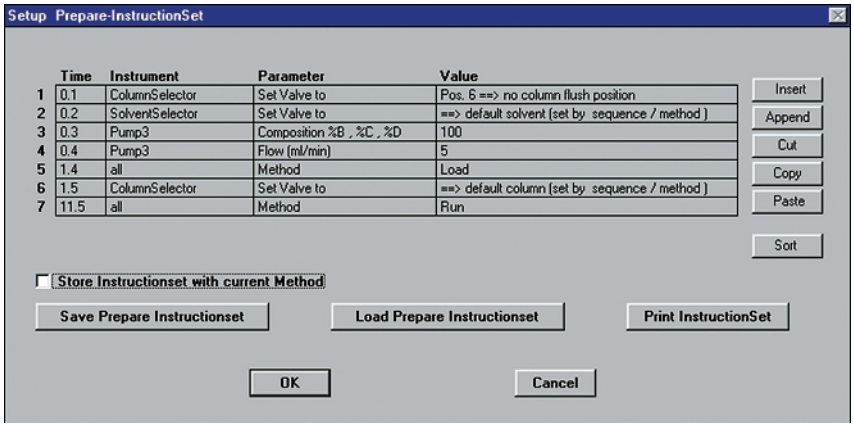


Figure 3
Prepare Instruction Set

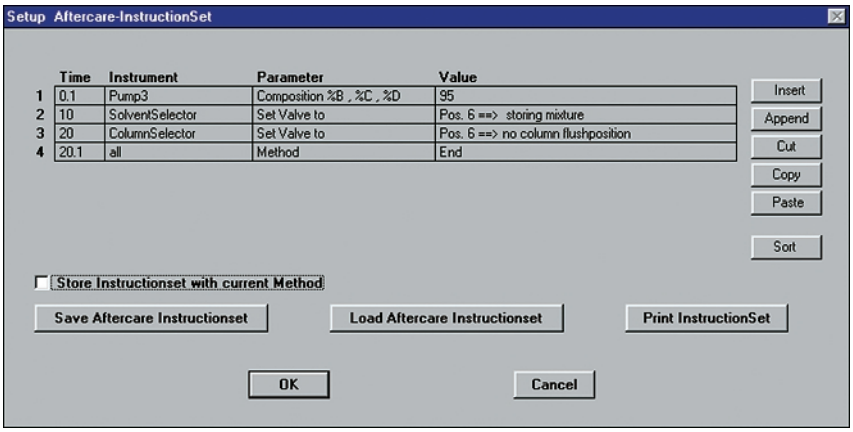


Figure 4
After Care Instructions Set

Solvent Selection

For Solvent Selection purposes the Agilent 1100 Series G1160A or the Rheodyne EV100-106 can be used (table 2).

	Agilent G1160A	Rheodyne EV100-106
Solvent Channels	12	6
Flow Range	< 10 ml/min	< 100 ml/min
Control	CAN bus	BCD Board[1]

Table 2
[1] An Agilent 1100 system can have max 14 modules. Using a BCD board and Rheodyne valve can be the solution if the number of modules should exceed 14.

The Agilent G1160 valve provides ability to select between 12 different solvents. The valve has standard 1/16 inch fittings. The Rheodyne EV 100-106 valve offers a larger internal diameter and can be used for high flow and preparative scale applications. The solvent connection tubing has an inner diameter of 1.5mm and 1/8" inch fittings. The valve allows selection from up to 6 different solvents (figures 5, 6).
The Agilent G1160 valve is uses the original ChemStation Software dialog box but offers extra benefits with the usage of the prepare and after care instructions sets. Control from the editable sequence table is also possible.
The Rheodyne EV100-106 valve has its own specific dialog box. Both dialog boxes enable specification of up to 6 solvent names. A "don't move" or "use current" command can be used to keep the valve in the current position.
All activities of both valves and the instruction sets are documented in the ChemStation Logbook. Actual position and names are shown in the graphical user interface (figure 7)

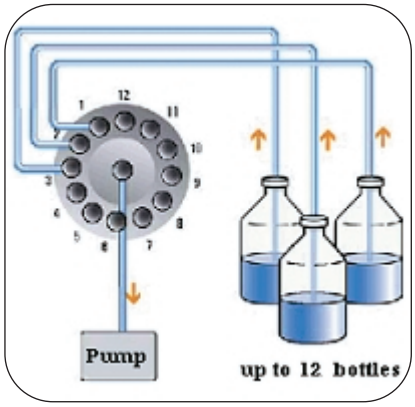


Figure 5
Agilent G1160A

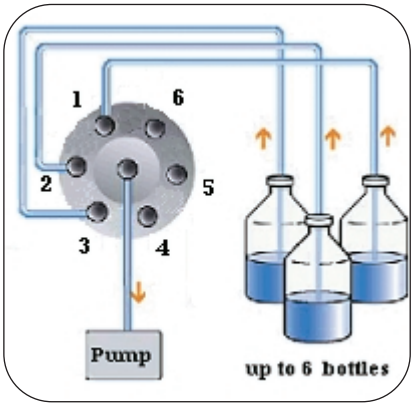


Figure 6
Rheodyne EV100-106

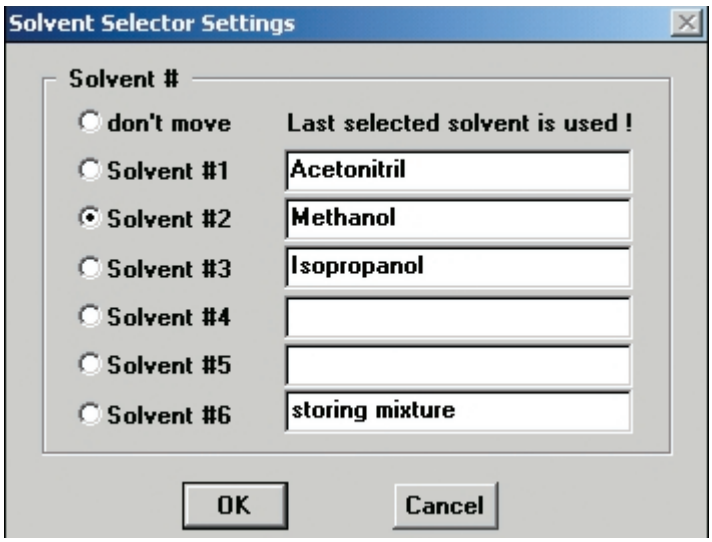


Figure 7
Rheodyne Solvent Selector

Column Selection

For Column Selection purposes, the Agilent 1100 Series G1159A or the Rheodyne EV501-104 can be used. Both valves are 14 port high pressure valves which allow connection of up to 6 columns.
As the Rheodyne EV501-104 is controlled by a BCD board, the valve can be used in cases where a complex HPLC system with more than 14 modules is involved.

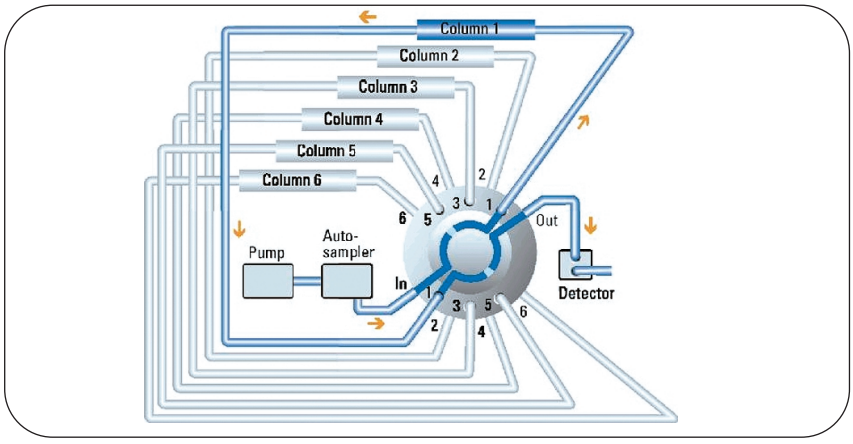


Figure 8
Column Selector

(An 1100 system can have max 14 modules connected by CAN bus). The Agilent G1159 valve uses the original ChemStation Software dialog box whilst providing the extra benefits of the prepare and after care instructions sets. Control from the editable sequence table is possible. The Rheodyne EV500-104 valve is has own specific dialog box. Both dialog boxes enable specification of up to 6 column names. A “don’t move” or “use current” command can be used to keep the valve in the current position. All activities of both valves and the instruction sets are documented in the ChemStation Logbook. Actual position and names are shown in the graphical user interface (figure 9).

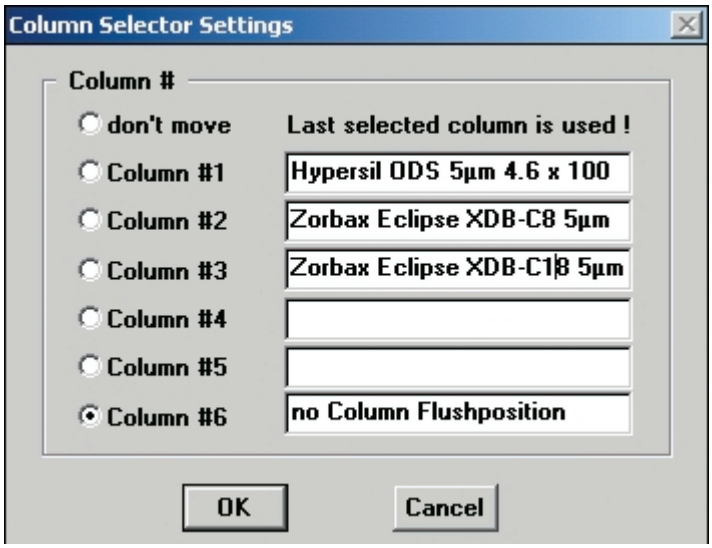


Figure 9
Rheodyne Column Selector

Enhanced Sequence Interface

The PSO Europe Valve Solutions adds a configurable sequence table editor which offers easy access to full-automated control of the system.All default sequence functionality such as “Sequence Parameters”, “Sequence Output” and “Sequence Summary” are still applicable for the Enhanced Sequence Table (figure 10). The user can configure the appearance of the sequence table. He can decide which columns are shown in which order. Columns can be added, removed and the order of the columns can be modified. With the “Edit Column Settings” the appearance of the selected column can be customized. The user can change the “title”, “width” and the “position”. Within the sequence table you can change the valve position and include the prepare and after care instructions set (figures 11, 12).

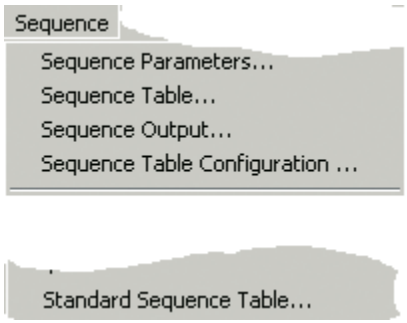


Figure 10
Sequence Menu

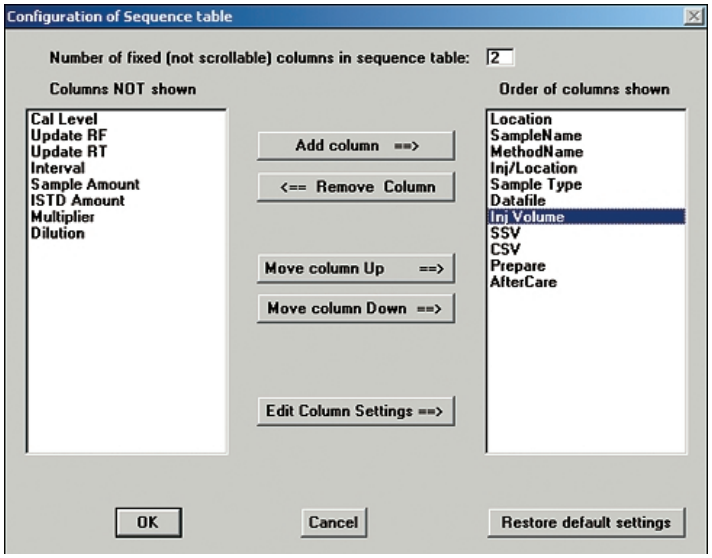


Figure 11
Sequence Table Configuration

Required Parts

The valve based solution for solvent and / or column selection for a single 1100 Series HPLC System depends on the valves used (Agilent or Rheodyne EV-Series) and the equipment already installed. The following parts list shows which parts are available for setting up the system. Please Note: The Agilent parts can also be ordered separately, however the Rheodyne valves (if used) must be part of the proposal!

All parts / services in 'bold' comprise the standard order as add-on for a new 1100 HPLC System.

The parts and services in 'italics' are optional and should be ordered if the customer does not already have these.

PSO Services

The solution can be tailored to the needs of a customer, based on a number of building blocks. A consultant from PSO Europe will contact the customer to clarify all details about the requested solution. The advantages of this service are a clear definition of a specific customer solution and the customer gets a fixed price quote, which reflects the customer requirements

PSO Support

The solution will be supported by the local field organization. All Agilent parts will be replaced or repaired according to the standard processes. All other (e.g. Rheodyne) parts will be repaired locally or returned to PSO Europe for replacement if required.

Ordering Process

This is a non-standard solution, which combines Agilent parts, third party parts and customized software. This customized solution is covered in a PSO proposal, which describes the deliverables and sets the customer expectations properly. Therefore, the following order process should be followed.

- Fill in the FAX sheet on the last page of this document.
- Fax the completed form to PSO in Waldbronn.
- PSO will respond with a "customized proposal".
- The proposal describes the solution in detail.

For details about this service contact:
Birgit Kreid
Hewlett-Packard Str. 8
76337 Waldbronn
Germany
(+49) 7243 602 275

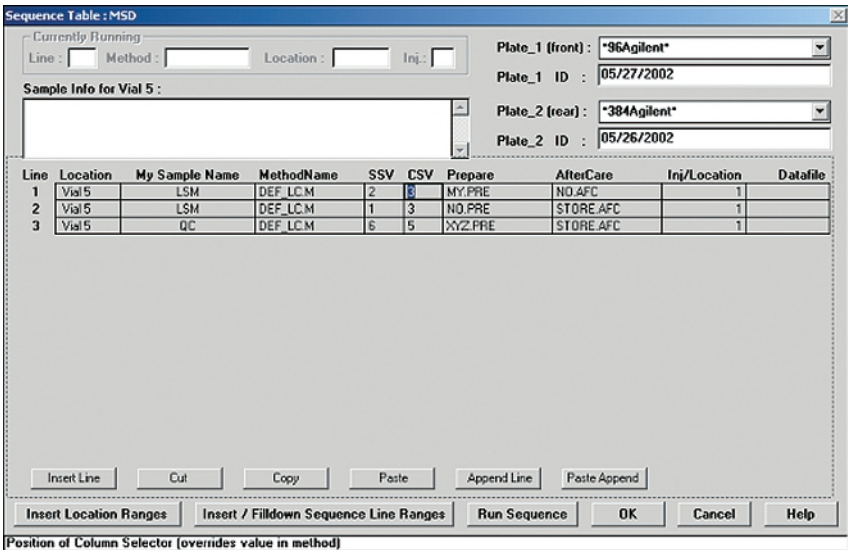


Figure 11
Enhanced Sequence Table

Bernhard Freitag, Wim Verhaegen
European Project Service Organization at Agilent Technologies, Waldbronn, Germany.

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Fax to:
+49 (0)7243 / 602-155

Contact: Birgit Kreid/ Elsa Schäfer +49 (0) 7243 / 602-275
E-mail: pso.europe@agilent.com
Address: Agilent Technologies Deutschland GmbH
European Project Services Organisation (E-PSO)
Hewlett-Packard Str. 8
76337 Waldbronn, Germany

Please prepare a Proposal for the following Customer:

Customer Contact: .....
Phone: .....
Customer Address: .....
.....
.....
E-Mail Address: .....

FE Name / E-Mail: .....

Solution will be implemented on ☐ **an existing 1100 System** ☐ **a new 1100 System (which will be ordered separately**

Option	Part Description	Part Number	QTY required per system	Include in proposal	Total Quantity
Both SSV & CSV	**Control Software BCDVALVE.MCX**	**N / A**	**1**	✔	
Both SSV & CSV	**Installation & Operation Manual**	**N / A**	**1**	✔	
Agilent SSV	**Solvent Selection Valve**	**G1160A**	**1**		
	Tubing Kit for 4 channels	G1160-68706	3		
	Adaptor long external	0100-2298	12		
	Solvent Bottle transparent	9301-1420	12		
	Solvent Bottle amber	9301-1450	12		
	Solvent cabinet	5062-8581	3		
	Bottle Head assembly	G1311-60003	12		
	1/8" Tubing 1.5 mm ID (5 m)	5062-2483	2		
	Tube screw (10 / Pk)	5063-6599	1		
	Ferrules with lock ring (10 / Pk)	5063-6598	1		
	External power supply	0950-4422	1		
Rheodyne SSV	**Solvent Selection Valve**	**EV 100-106**	**1**		
	1/8" Tubing 1.5 mm ID (5 m)	5062-2483	2		
	1/8" Tubing Kit (4 x 300 mm long)	G1322-67300	2		
	Union Pack (10 / pk)	**5022-2155**	**1**		
	Solvent Bottle transparent	9301-1420	12		
	Solvent Bottle amber	9301-1450	12		
	Solvent cabinet	5062-8581	2		
	Bottle Head assembly	G1311-60003	6		
	Tube screw (10 / Pk)	5063-6599	1		
	Ferrules with lock ring (10 / Pk)	5063-6598	1		
Agilent CSV	**Column Selection Valve**	**G1159A**	**1**		
	Capillary Kit for 6 columns 0.17mm	G1156-68712	1		
Rheodyne CSV	**Column Selection Valve**	**EV 501-104**	**1**		
	Capillary Kit for 6 columns 0.17mm	G1156-68712	1		
Other capillaries for column switching	Capillary 0.17 mm ID 400 mm long	5021-1819	12		
	Capillary 0.12 mm ID 400 mm long	5021-1823	12		
	Capillary 0.5 mm ID 400 mm long	G2260-87301	12		
	Capillary 0.17 mm ID 280 mm long	5021-1818	2		
	Capillary 0.12 mm ID 280 mm long	5021-1822	2		
	Capillary 0.5 mm ID 280 mm long	5022-6510	2		
	Capillary 0.17 mm ID 600 mm long	5065-9933	2		
	PEEK Tubing 0.18 mm ID 5m	5042-6462	1		
	PEEK Tubing 0.13 mm ID 5m	5042-6461	1		
Other fittings for column switching	Fitting screw long (each)	G1156-22401	14		
	Front Ferrule (10 / Pk)	5180-4108	2		
	Back Ferrule (10 / Pk)	51804114	2		
	Finger tight fitting long (each)	0100-1816	14		