INTRODUCTION

A revolutionary new software control panel concept simplifies control and monitoring of liquid chromatography (HPLC) and ion chromatography (IC) front-end systems connected to MS instruments from different vendors.

A software panel tabset is a graphical user interface. It holds graphical controls (buttons, sliders, charts, etc.) for controlling a complete IC or LC front-end system or for single chromatography modules such as pumps or UV detectors.

Once the user connects the control software (Dionex Chromatography Mass Spectrometry Link, shortly DCMSLink) to the front-end instrument, a selection of suitable software panels opens automatically configured for the modules that are connected.

A “Home” panel provides an easy-to-grasp overview of the most important instrument parameters, such as:

- Instrument status (on/off, connected/disconnected)
- Flow rate and pressure
- Detector parameters (wavelength, data collection rate)
- Plot with the detector signals and other channel data such as temperature and pressure signals

Module-specific panels provide specific views with the most important parameters and controls for a single module, such as:

- Eluent composition (Pump panel)
- Injection parameters and sample tray information (Sampler panel)
- Nominal and current temperature (Column Compartment panel)

Sub-panels with advanced features/information can be opened by a click of a button, e.g.:

- Wellness (e.g. UV lamp energy, number of sampler needle cycles)
- Qualification data (i.e. last qualification date, qualification interval, and warning period)
- Service information (i.e. last service date, service interval, and warning period)

WHAT IS A PANEL AND A PANEL TABSET?

A software panel is a graphical user interface for instrument control. A panel consists of graphical controls like buttons, sliders, lamps, charts, etc, each of which is linked to certain instrument properties.

An HPLC or IC front-end has several modules (most often pump, autosampler, column compartment, and sometimes UV detector). Because each module has numerous properties, it is impossible to place all controls on a single panel. Instead they are placed on several module-specific panels. In addition a “Home” panel is provided for an easy overview. The panels are then represented as Tabs on the computer screen (Figures 1–3). This set of panels (suitable for a complete instrument system) is called a panel tabset.

HOME PANELS PROVIDE OVERVIEW

For each system a Home panel is provided (Figure 1). A Home panel offers an easy-to-grasp overview of the most important instrument parameters such as:

- Instrument status (connected to the software, ready for use) (Figure 1a)
- Pump flow, pressure and eluent composition; (Figure 1b)
- On-line signal plot and basic detection parameters (Figure 1c)
- Temperatures of the autosampler and the column compartment (Figure 1d)
- Note, that all communication is logged in an Audit trail (Figure 1e)
Panels Automatically Reconfigure Themselves

The “Home” Panel provides an overview of the most important system properties (the other tabs provide access to panels with module specific information).

a. Check mark = module is under software control
   Green light = module is ready for use

b. Pump parameters

c. On-line signal plot and detector parameters

d. Autosampler and column compartment parameters

ey. All communication with the modules is logged in an audit trail.

Figure 1. Home panel of an HPLC system. The Home panel provides overview of the most important system parameters, such as: (a) Instrument status; (b) Pump parameters; (c) On-line signal plot and detection parameters; (d) Autosampler and column compartment parameters. All communication is logged in an audit trail (e).
Figure 2 shows another Home panel, this time for an IC system. Compared to Figure 1, it is quite different. There are different panels (tabs) offered and the content of the panels is also very different. This illustrates one of the major benefits of using panels; they automatically reconfigure themselves based on the instrument to which they are connected.

Panels can reconfigure themselves based on the instrument they are connected to.

Figure 2. Home panel of an IC system. Compared to the HPLC Home panel in the previous figure, this panel offers different controls (b). Also, the offered set of panels adapts to the connected instrument (a). This illustrates the flexibly of the panels.
Module specific panels (accessible via tabs, Figure 3a), provide specific views with the most important parameters and controls for a module. As an example, Figure 3 shows a panel for a Dual Gradient Pump (a Dionex Dual Gradient Pump contains two complete ternary low-pressure gradient pumps in a single housing).

Although the module-specific panels provide more information, they still do not show the less frequently used or advanced features. These are grouped logically and available in sub-panels.

The module specific Panels (here the “Pump” panel) show more details and provide more control for the corresponding device.

a. Click on the various tabs to switch between the corresponding Panels

b. Advanced properties of the modules can be reached via sub-panels

Figure 3. Panel for a Dual Gradient Pump.
**SUB-PANELS WITH ADVANCED FEATURES/INFORMATION**

Less frequently used and advanced features and settings are grouped in module-specific sub-panels. These sub-panels can be easily opened using the buttons on the left side of the module's Panel (Figure 3b). As an example, Figure 4 shows the Wellness and Qualification sub-panels of the VWD-3400 Variable Wavelength Detector.

The Wellness Panel of the detector shows information that describes the state of the module and the related consumables such as:

- Model number, serial numbers, firmware version
- Serial number, number of ignitions, operation time and intensity for the UV and Visible lamps
- Operation time and intensity limits can be defined, after which the system can warn the operator or prohibit working with the system.

The Qualification Panel shows when the detector passed the qualification and allows setting a time period for re-qualification. A warning period can also be defined here, after which the system warns the operator. Once the additional grace period has expired, work can be prohibited.

![Figure 4. Sub-Panels provide access to advanced properties of the modules, such as Wellness and Qualification details.](image-url)
BENEFITS OF THE SOFTWARE PANEL CONCEPT

The software panel concept used in Dionex Chromatography Mass Spectrometry Link (DCMSLink) version 2.0 has the following benefits:

- Provides different level of details on different views: overviews, module specific views, and advanced views
- Allows easy switching between views
- Allows instant editing of instrument parameters such as flow or detector wavelength
- Provides an easy-to-learn interface for Dionex instrumentation from MS software
- Provides access to advanced Dionex technology such as qualification status monitoring