

# Ensuring robust sequences through automatic continuous management of HPLC mobile phases and waste

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## Abstract

Robustness and continuous problem-free operation of HPLC instruments is critical for analytical laboratories to achieve the highest productivity and reliable results. Laboratories face the challenge of running samples with as little human interference as possible. This requires both rugged instrumentation and capabilities for remote monitoring technologies, such as continuous solvent level monitoring. The use of the Thermo Scientific™ Vanquish™ Solvent Monitor (patented technology) together with the Thermo Scientific™ Vanquish™ HPLC and UHPLC systems results in uninterrupted sequence running through the avoidance of unintended dry solvent channels. In regulated environments, the Vanquish Solvent Monitor saves costs resulting from sequence interruption, unexpected instrument downtime, loss of precious compounds, and bureaucratic documentation due to running out of mobile phase.

## The Thermo Scientific Vanquish Solvent Monitor

The Thermo Scientific™ Vanquish™ Solvent Monitor utilizes individual sensors for each solvent channel on Vanquish HPLC and UHPLC systems to measure the live consumption of each mobile phase and accumulation of waste. There are two models available: a basic 4-channel version and an 8-channel version for advanced monitoring capability. The device is based on a patented technology that uses hydrostatic pressure measurements to accurately determine the remaining liquid in a solvent bottle or the empty volume in a waste reservoir. The Vanquish Solvent Monitor integrates an intelligent, self-calibrating algorithm for increased precision; it does not require any manual interaction or reference settings and is completely independent of the mobile phase type or composition.



Figure 1. A Vanquish UHPLC system equipped with the Vanquish Solvent Monitor – 8 channel version

When connected to Thermo Scientific™ Chromeleon™ CDS and a Vanquish HPLC or UHPLC system, this module provides constant feedback of the current volumes: absolutely simple and intuitive.

## Maximize your analysis uptime

Every analytical chemist has encountered the situation that their solvents have run dry and their waste has spilled over. This inconvenience has cascading consequences to an analytical environment: time loss, unnecessary solvent consumption, bureaucratic justification for the deviation, and safety concerns. These consequences can result in a loss of productivity and undesirable costs for the institution, especially in regulated environments. Based on a typical pharma company, a minimum of 2 hours up to a half-day of analytical uptime can be lost in case an HPLC system is de-wetted.

Sufficient solvent supply and ample waste capacity is the first step in creating a long, robust sequence. Utilizing the Vanquish Solvent Monitor, the user is not only reassured at sequence start that the application workflow will proceed uninterrupted, but also receives continuous and simple feedback regarding the status of each solvent and waste volumes, represented by green/yellow/red LED indicators on the module itself.



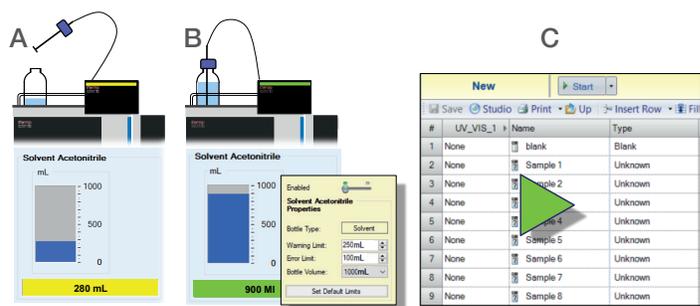
**Figure 2. The Vanquish Solvent Monitor provides live feedback as to the fill levels of each solvent channel as well as a waste container ensuring the completion of running sequences**

The Vanquish Solvent Monitor allows laboratories to avoid undesired sequence interruptions or safety concerns. This provides secure productivity and confidence for robust sequence execution.

## Simple as A B C

### The easy operation of the Thermo Scientific Vanquish Solvent Monitor

The Vanquish Solvent Monitor is a self-calibrating instrument which does not require user interaction to generate your robust sequence. Its operation is as simple as A, B, C.



**Figure 3. Simple as A: Removing the solvent line/dipstick from the old solvent bottle, B: allowing the automatic measurement of the liquid levels, and C: starting the sequence with confidence that the solvents and waste is in good standing**

### A – Place your bottle

Place your bottle with fresh solvent, as you normally would on your Vanquish HPLC or UHPLC system, and insert the solvent line with the Vanquish Solvent Monitor dipstick into the new bottle.

### B – Automatic volume recognition

The module senses the bottle change and immediately begins regular measurements. The Vanquish Solvent Monitor provides feedback in the chromatography data system, on the optional Vanquish User Interface, and directly on the color-coded LEDs on the module itself.

- No bottle taring is required
- No extra solvent specification entry required
- No limitations to solvent mixtures or compositions
- Default warning and error limits provided

### C – Begin your analysis

Now you can begin your analysis. The planned sequence duration and predicted eluent consumption are compared to the warning and error limits set by default or defined by the user. The user will be informed of a possible warning limit breach, while the sequence can be prevented from running if the error limit will be exceeded during the analysis, saving time, money, and the frustration of a dry system.

	Source	Device	Message
		PumpModule.Pump	Approximately 564.00 ml Water needed (+108.00 ml/h after end).
		PumpModule.Pump	Approximately 66.00 ml Acetonitrile needed (+12.00 ml/h after end).
!		PumpModule.Pump	This queue requires about 0.564 l of Water, but only 0.458 l are available until the lower limit is reached. Refill the eluent bottle first before starting the queue.

**Figure 4. The Ready-Check function in the Chromeleon CDS provides users assurance that there will be sufficient mobile phase and empty volume in the waste for the sequence to proceed uninterrupted.** These error and warning limits can be adjusted or turned off depending on the user's requirements.

## Remote real time monitoring

The LED indicators on the modules give at a first glance a self-explanatory feedback regarding the solvent and waste status without the need to check each single bottle. At the same time, all solvent and waste levels can be easily accessed remotely via the Chromeleon CDS panel without the need to enter in the lab.

## Conclusion

The Vanquish Solvent Monitor works together with all Vanquish HPLC and UHPLC systems and the Chromeleon CDS to accurately measure the liquid levels in each individual solvent channel and in the waste container without the need for any calibration.

The Vanquish Solvent Monitor provides simple feedback on the solvent status on the module itself as well as remotely in the CDS software panel.

The elimination of dry solvent bottles increases laboratory productivity. Avoidance of waste container spillages avoids potential hazards. The value of the Vanquish Solvent Monitor can be measured in time, productivity, and safety benefits.

Find out more at [thermofisher.com/VanquishCore](https://thermofisher.com/VanquishCore)