Reducing the Potential for Experimental Errors with Smart Safety Controls in the Thermo Scientific Varioskan LUX Multimode Reader

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Technical Notes

Goal

This technical note describes how the automatic safety controls of the Thermo Scientific™ Varioskan™ LUX multimode microplate reader can help you reduce the potential for errors and avoid wasting reagents, samples and time in microplate measurements.

Introduction

The Varioskan LUX multimode reader is designed for a variety of microplate assays of different complexities. The instrument supports five measurement technologies: absorbance, fluorescence intensity, luminescence, time-resolved fluorescence and AlphaScreen. The instrument can be equipped with onboard dispensers for easy and accurate reagent addition, and with a gas control module for controlling CO_2 and O_2 concentrations in cell-based assays. The Varioskan LUX microplate reader also includes a built-in shaker and incubator, making it a versatile tool for multi-user labs performing a wide range of microplate assays.

The Varioskan LUX microplate reader, paired with Thermo Scientific™ SkanIt™ software, is designed to notify you if something isn't right – a mismatch or a wrong setting that could harm the instrument, hinder your results or waste precious time and reagents. With the smart safety controls the user is alerted of mistakes before they occur.

Safety controls and their benefits

The following examples present the operating principles and benefits of the automatic safety controls of Varioskan LUX.

1. Plate check

The Varioskan LUX microplate reader has an automatic plate check that won't allow you to start a run without a microplate in place on the plate tray. If a plate is not detected, the instrument will notify the user and the measurement will not be started.

- Prevents accidental runs without a plate and ensures measurement results originate from samples in a microplate rather than from an empty instrument.
- Prevents accidental reagent dispensing inside the instrument without a plate. Therefore, the instrument is protected against contamination that could possibly cause incorrect measurement results and a need for service.

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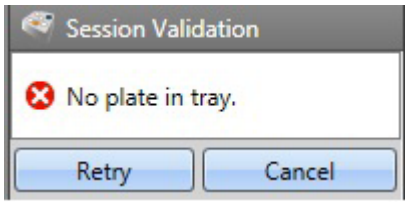
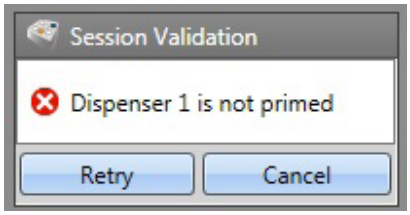


2. Dispenser prime check

The Varioskan LUX multimode reader can be equipped with onboard reagent dispensers. When you start a run that includes dispenser use, the system checks that the dispenser has been primed (tubing and dispenser head is filled with liquid). If priming has not been performed, the user is notified and the run won't start until the dispenser has been primed.

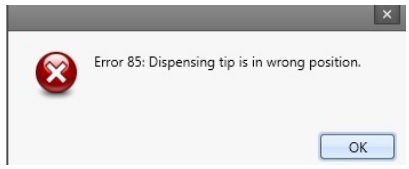
- Helps to ensure the dispenser is properly filled with liquid for accurate and precise dispensing into all wells. Without proper priming, dispensers could miss adding liquid to the first wells of the plate, which would affect the results.



3. Priming position check

The Varioskan LUX microplate reader confirms the dispenser head is not accidentally inserted into the dispensing position during priming. For added security, the dispensers cannot be primed if there is no plate in the tray.

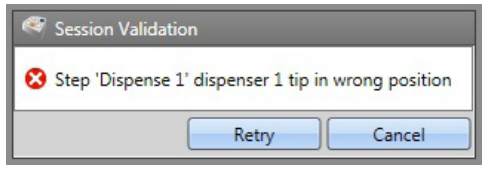
- Protects the instrument by preventing liquid dispensing inside the instrument during priming.



4. Dispenser position check

The Varioskan LUX has two dispensing positions (F and L). The dispensers are equipped with an individual dispensing head position sensor to identify which dispensing head is located in which dispensing position. This way the system ensures there's no mismatch between the positions where the dispensing heads are inserted in the instrument and the positions selected in the SkanIt software.

- Prevents dispensing reagents into wrong wells.
- Protects the instrument from malfunction and the need for unnecessary service resulting from dispensing outside the plate.



5. Dispensing volume check

The Varioskan LUX microplate reader controls dispensing volumes to help prevent accidental overfilling of the microplate wells. The total dispensed volume cannot exceed 80% of the maximum well volume. The maximum well volumes are stored in SkanIt software according to plate manufacturer specifications. If a run includes multiple dispensing steps, the system takes all dispensing steps into account when calculating volumes. However, the original liquid volume present in the wells prior to dispensing is not known by the system, so it is not taken into account in the volume check.

- Helps prevent accidental instrument contamination and wasting samples.
- Helps prevent liquids from damaging the instrument optics.

6. Preventing dispensing with lidded plates

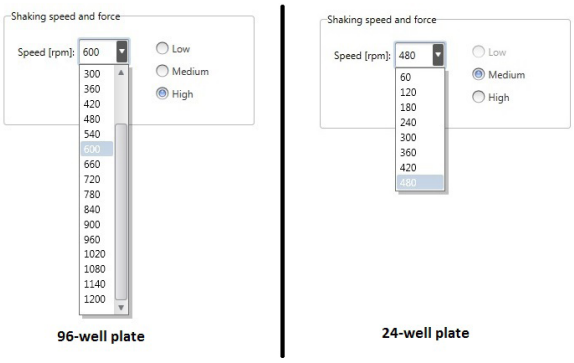
You can measure plates with or without a lid with the Varioskan LUX microplate reader. However, the instrument prevents use of dispensers when a lidded plate is used. Separate plate adapters are available for plates with or without lids to ensure the plate is always at the optimal height for measurement. The instrument automatically recognizes which adapter is in use. A run that includes dispensing steps cannot be started if an adapter for plates with lids is in use.

- Prevents dispensing reagents to lidded plates.
- Helps protect the instrument and dispensers from malfunction and the need for unnecessary service.

7. Shaking speed check

The Varioskan LUX microplate reader controls the parameters for combinations of shaking speed and force to help prevent spillage inside the instrument. The allowed parameters are plate format-specific; for example, a 96-well plate has different limits than a 24-well plate.

- Helps prevent liquid spillage inside the instrument, which could cause a malfunction and need for unnecessary service.
- Enables maximum shaking efficiency for optimal assay performance with shaking parameters controlled by plate formats.



8. Online data saving

SkanIt software captures measurement data throughout the run, not just at the end. The instrument sends data from a measurement action immediately to the software right after it has been performed. If a run is unexpectedly interrupted, the data up to that point is saved automatically. Unexpected interruption can be, for example, an electric power failure, communication issue between the instrument and PC, accidental USB cord detachment or run aborting.

- Prevents measurement data from being lost due to unexpected run interruption.

9. Managing software access

SkanIt software allows users with administrator rights to activate and manage user accounts for the software. The software uses Windows authentication for logging in. Different users can be granted different privileges in the software.

- Designed to prevent unauthorized use of the software and instrument.
- Helps to protect data.

Conclusions

The Varioskan LUX microplate reader with SkanIt software is an excellent tool for a variety of microplate assays. The smart safety controls are designed to prevent common experimental mistakes. This is important especially in a multi-user environment where a variety of microplate assays utilizing different reader functionalities are used.

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