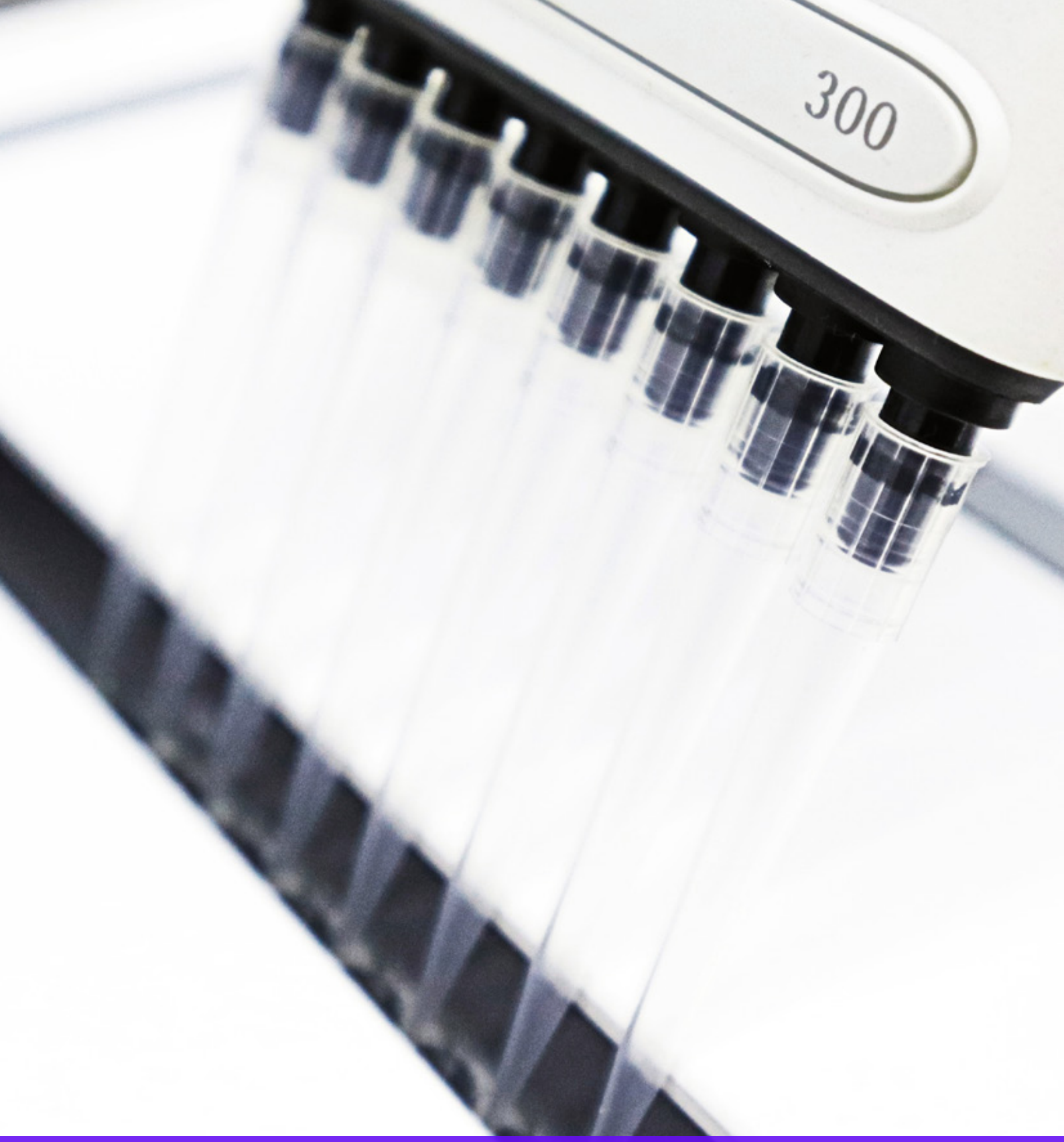


White Paper

SPEEDCAL MULTICHANNEL BALANCE

How to calibrate a multi-channel pipette in 15 minutes with myScal® software and Speedcal mobile system?

myScal®

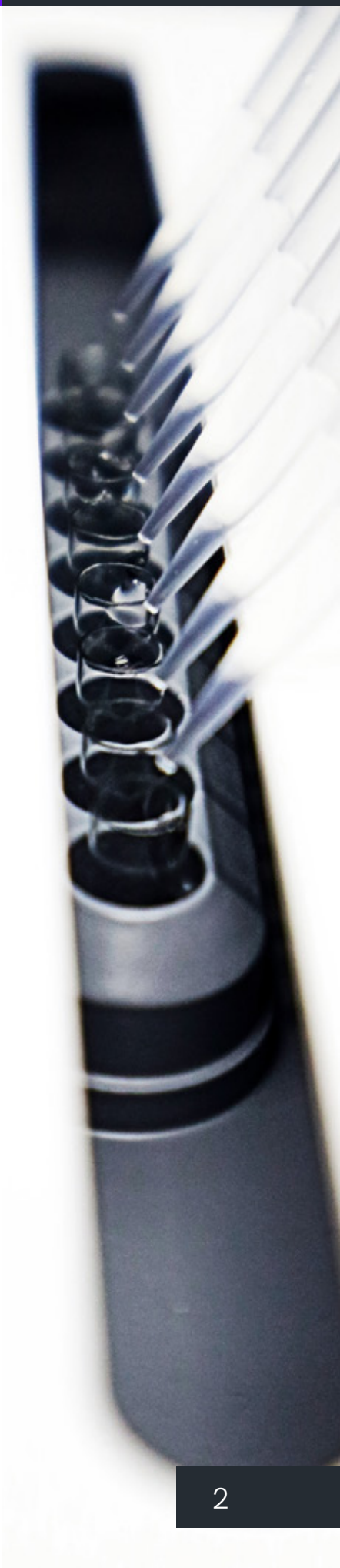
Introduction

The purpose of this White Paper is to describe how automatic calibration of multi-channel pipettes using myScal® software and multi-channel balance speeds up and optimizes the calibration process, with accurate and precise results, without paper documentation and the risk of human error.

As with all liquid handling devices, regular checks on the functionality and calibration of pipettes are required to ensure their accuracy and repeatability, in accordance with the criteria defined by the standard. Proper care of pipettes is one of the key factors affecting the quality of laboratory work. The performance of the pipette may get worse over time, most often due to frequent use which results in wear of its parts or contamination. With regular calibrations, it is possible to identify potential problems in a timely manner and correct them before they affect the integrity of laboratory results. Each calibration laboratory, for accurate and reliable testing, must have qualified and educated staff, adequately calibrated equipment, as well as a controlled test environment to perform calibration according to international **ISO 8655 standards.**

The international standard ISO 8655 combines a large number of requirements for piston volumetric devices (pipettes) and pipette calibration, providing detailed guidelines for **environmental conditions, procedures and appropriate equipment.** These guidelines clearly state the specifications of the pipette, for both manufacturers and users, as well as the test methods, conditions and even the effect of the various errors on pipetting. In accordance with this standard, regular tests of the efficiency of liquid handling devices are required, including both multi-channel pipettes and their individual channels, which can often be exhausting and time-consuming process. If the specifications and test methods of ISO 8655-6 are taken into account, according to which multi-channel pipettes are tested and calibrated according to the principle that ***"each channel is considered as one channel and tested and reported as such",*** it is necessary to test the efficiency of each channel of multi-channel pipettes.

Advantages of automatic testing of multi-channel pipettes



Standard calibration with e.g. a 12-channel pipette requires **360 cycles of pipetting** and gravimetric weighing (3 volumes x 10 repetitions x 12 channels), which can be extremely time consuming. When performed manually, each of these measurements can take approximately 4 minutes, which ultimately requires a total of **more than 3 hours** to calibrate only one pipette.

Minimizing the time required to calibrate and eliminate the risk of human error when manually entering the results of each individual channel, is enabled by today's innovative devices and advanced software capabilities provided by myScal® program in combination with multi-channel Speedcal balance that ensures maximum calibration productivity without loss of accuracy or precision.

Quality control in chemical, pharmaceutical and medical laboratories often requires regular calibration of multi-channel piston pipettes. This procedure is usually very time consuming because the standards prescribe that each individual channel must be tested several times. For this reason, many laboratories self-organize the calibration process with a large expenditure of time or leave it to third parties for calibration. In addition, the nature of this work can often cause **Repetitive Strain Injury** (RSI) during long-term operation, so adequate, flexible and efficient solutions that provide ergonomic handling with high efficiency and performance are required.

According to all the above, the main advantages of using an automated calibration procedure for multi-channel pipettes are:

- **shortening calibration procedures from 3 hours to 15 minutes**
- **automation of retrieval of measurement results reduces the risk of human error when manually entering measurement results**
- **minimized risk of repetitive injury due to stress during prolonged work.**

Speedcal Mobile - a long-term profitable investment for laboratories

The Speedcal multi-channel pipette calibration balance is designed for quick and easy calibration of multi-channel pipettes. This innovative solution includes up to 12 balances in one system. Speedcal is a **flexible and compact unit** that can be easily moved and used in different places in the laboratory. It is proving to be a long-term profitable investment for laboratories and service providers who want to test a large amount of multi-channel pipettes in an economical way. With this approach, it is possible to perform **calibration in accordance with ISO 8665** in the shortest possible time of 15 minutes - instead of 3 hours with a single-channel balance.

Speedcal is also used for rapid testing of individual pipettes. After pipetting into one weighing cell, it is possible to use the next one without waiting for transient effects, allowing single-channel pipettes to be tested in half the time.

The process of calibrating an 8-channel pipette using Excel and single-channel balance

- 240 water intakes
- 240 water discharges
- 240 tare balance
- 240 reading from the balance
- 240 manual typing of results in the calculation table

The process of calibrating an 8-channel pipette using myScal® software and Speedcal mobile

- 30 water intakes
- 30 water discharges
- 30 clicks in the software

Graphic 1. Comparative view of multi-channel pipette calibration using single-channel and multi-channel balance.

The usual time required to calibrate a single-channel pipette of approximately 45 minutes or an 8-channel pipette of 5-6 hours is shortened to 15 minutes.

The advantages of SpeedCal multi-channel balance are:

• gravimetric accuracy testing in accordance with international (ISO 8655) and national regulations (ISO 17025) in your laboratory
• up to 360 individual values for a 12-channel pipette in less than 15 minutes
• portable or stationary unit, easy to use
• available with 4, 8 or 12 channels with a volume of **10 µL to 1.2 ml**
• measurements take place completely automatically
• measurement and reading of results are simultaneous for all channels
• the integrated water compartment ensures stable humidity inside the weighing compartment, and the whole device is designed so that evaporation is negligible.

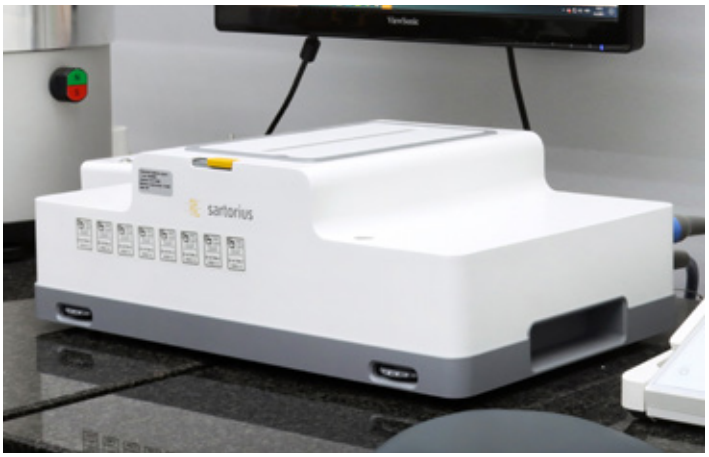
Why Speedcal mobile and myScal® are an ideal choice for your lab?

MyScal® in combination with the Speedcal multi-channel balance shows its greatest potential when calibrating the multi-channel pipette. **For the purposes of this research, the following were used:**

1. myScal® program
2. Speedcal multichannel balance
3. Speedcal Mobile web application
4. Arium® water purification system - pipette calibration medium
5. Sartorius multichannel electronic pipette
6. liquid container that allows easy and safe handling of the calibration medium.

To access the myScal® software, you need an Internet browser on your operating system, as the program is based on 'cloud' technology. **Why did we decide this way?** Because the user can use the program anywhere and at any time and the data is always available. In this way, we have enabled multiplatform programs and greater flexibility of use. On the other hand, installing the program on a Windows server environment is simple, so it can be easily integrated into existing organization solutions that have their own IT infrastructure.

Picture 1. Using an 8-channel pipette in combination with Speedcal mobile and myScal® software solution reduce calibration time to 15 minutes.



Picture 2. SpeedCal mobile is available with either 4, 8, or 12 channels, with the option of subsequently adding up to 12 channels.

When calibrating a multi-channel pipette using myScal® software and a Speedcal multi-channel balance, the following steps were performed:

1. By pressing **[Calibration - Pipettes]** opens a dialog box to start calibration in which you enter: customer name, basic pipette data, calibration equipment and environmental conditions (when entering a measuring device previously stored in the database, myScal® offers automatic selection of this device with all its data, comments and notes).
2. By pressing **[New Calibration]** starts the multichannel pipette calibration process.
3. Calibration begins by discharging the medium from the pipette into the Speedcal multichannel balance.
4. On the screen via the Speedcal Mobile software, the values of each channel with a **stabilization time < 4 seconds** are displayed.
5. In the myScal® software, the calibration results are automatically retrieved from the reference device for each channel at the same time. Within the interface of the pipette calibration module, the measuring mass from the media of each channel is displayed in one row, which the program automatically converts into volume.
6. By automatically retrieving the results from the Speedcal balance, the possibility of human error in manually entering the results is reduced, thus enabling reliable and accurate results.
7. The user has immediately visible calibration results in the software.
8. After the calibration and approval by the laboratory manager, the user can download the **digital calibration certificate** stored in the laboratory database for future calibrations.

Conclusion

Automatic retrieval of measurement results from reference devices (e.g. comparators, balances or thermometers) using the myScal® program ensures complete flexibility, time savings and minimization of the risk of human error.

The automation of measurement results in the myScal® program is particularly effective in combination with the Speedcal balance when calibrating multi-channel pipettes, which significantly reduces the time of this time consuming procedure, which requires that each individual channel is tested several times.

The calibration process is shortened from **3 hours to 15 minutes,** ensuring accurate and precise results while minimizing the risk of human error when manually entering data.

Advantages of using myScal® with Speedcal multi-channel balance:

- the calibration results of the multi-channel pipette are automatically retrieved from the multi-channel balance and stored in the myScal® program
- reduced risk of human error when entering data manually
- reduced time required to calibrate a multi-channel pipette (up to 15 minutes)
- calibration results are immediately available after calibration is completed
- digital calibration certificate - paperless work
- optimized and simplified calibration process
- increased accuracy and quality of measuring results.

Sartorius Croatia is the owner of the myScal® brand and registered trademark. The company has been operating for many years as an accredited calibration laboratory and a reliable partner in providing high-tech solutions for calibration laboratories.

For more information, visit www.myscal.com
or contact us at sartorius@sartorius.hr.