FAST & FLUID MANAGEMENT

CALIBRATION WORKSHOP
user manual

**Calibration software for
automatic dispensers**

Article number: 1862164

PrismaPro

ENGLISH

⊘ Attention!
Always keep this manual in a safe place.

This is the manual for Fast & Fluid Management's CalibrationWorkshop software. CalibrationWorkshop is the software used to calibrate the automatic dispensers from Fast & Fluid Management for use with PrismaPro. CalibrationWorkshop can be used for dispensers from the Harbil series (HA 200/400/600, HAS, HAM, HAL), the Blendorama Tintmaster (BT), Tintmaster ™ and all Eurotinter models. It can be used both for volumetric and gravimetric dispensers. CalibrationWorkshop is designed to be used in combination with PrismaPro.

This manual is intended for all those who wish to use CalibrationWorkshop (for the first time). It is assumed that you are familiar with some statistical terms such as *average* and *standard deviation*. Section II explains the general principle how CalibrationWorkshop is used to calibrate your dispenser. The specific features of the CalibrationWorkshop windows and menu items are described in section III. The settings of the CalibrationWorkshop and the dispense process is descibed in section IV. Finally some special features of CalibrationWorkshop are described in section V.
CalibrationWorkshop can also be used to calibrate gravimetric dispensers. The calibration procedure, is the same for volumetric and gravimetric dispensers. However it is important to understand how measurement session data is used for calibration of a gravimetric dispenser. Calibration of a gravimetric dispenser is described in section V.1

Fluid Management has taken the utmost care when writing this manual. Nevertheless it is possible that inaccuracies have crept into this document. We would very much appreciate it if you would inform us of any errors or ambiguities you discover. Amendments will be incorporated in future editions.

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This section explains the general principles of the calibration process and shows you generally how CalibrationWorkshop is used.

1   Calibration principles

The smallest internal dispensing unit in a dispenser is called the *step*. During the calibration process the relation between dispenser *steps* and the amount of dispensed colourant in milliliter is established. The relation between steps and dispensed amounts is stored in a *calibration table*. Each *channel* has a separate calibration table. A *channel* is the name used for the combination of a valve and canister. A dispenser has as much channels as it has valves. The distinction between channel and canister is only relevant in dispensers that have more than one pump connected to a canister; e.g. a 2 and 5 ounce pump.

The reasons why each channel has its own calibration table is that there can be variations in dispensing behaviour as a result of differences between channels. These differences can be:
- colourant properties (viscosity, density, surface tension)
- pump capacity (1 ounce, 2 -ounce or 5 ounce)
- pump wear
- dispense settings (dispense speed, sniff etc)

The function of the CalibrationWorkshop program is to create calibration tables. CalibrationWorkshop can be installed from the PrismaPro installation CD-ROM.CalibrationWorkshop requires PrismaPro to be installed and configured correctly and a scale. Preferably an electronic scale connected to you PC. If your scale is not connected to the PC, calibration is possible, however you will be asked to enter measured scale weights frequently.

To summarize, the PC running CalibrationWorkshop requires at least two serial ports: one for the serial connection with the dispenser and one for the electronic scale.

How CalibrationWorkshop is used to create a calibration table, is explained in the next section.

2   Using CalibrationWorkshop

The CalibrationWorkshop program can be started by double clicking the **CALIBRATIONWORKSHOP** icon on the desktop of your computer, through the **FLUID MANAGEMENT** sub menu in the **PROGRAMS** menu which appears when you click the Windows **START** button in the lower left corner of the screen or directly from PrismaPro.

As soon as CalibrationWorkshop is started the main window will appear. An example of the main window is shown below.
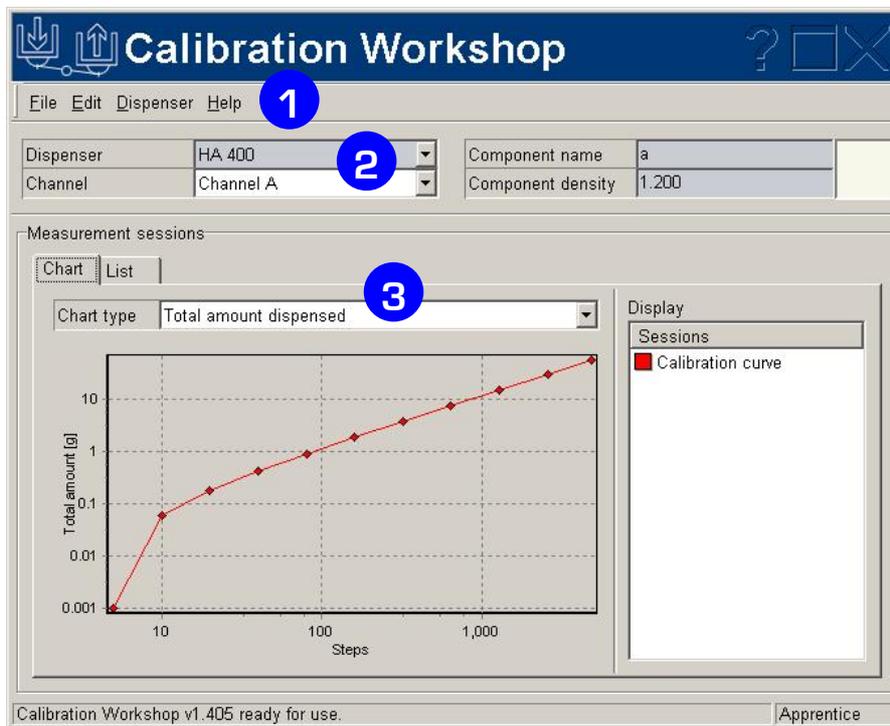
The most important items in the main windows are:

1. *Pull down menu's*

   All functionality of CalibrationWorkshop is accessible through the pull down menus. The most import menu is the *DISPENSER* menu, where all dispenser related functions are available. These are:
   - Measure… (create new measurement session data)
   - Configure (change all dispenser driver settings)
   - Clean nozzles
   - Purge
   - Recirculate
   - Agitate
   - Open valve
   - Refill canister
   - Reset dispenser

2. *Channels selection*

   The *CHANNEL* selection field allows you to select the channel to calibrate. If there is more than one dispenser connected to your PC, you are also able to select the correct dispenser. To the right the channel selection, the *COMPONENT CODE* and *COMPONENT DENSITY* dispensed through the selected channel are shown.

3. *Calibration and measurement session data*

   The *MEASUREMENT SESSIONS* box shows the calibration curve and measurement data of the selected channel. The data can be shown both in the form of a chart and a table. The *DISPLAY* list shows all available measurement sessions carried out in the past for the selected channel. Sessions previously measured are automatically archived at startup when the dispense parameters (e.g. speed settings) have changed. Archived sessions can be imported using the *IMPORT* option in the *FILE* menu.

If you run CalibrationWorkshop for the first time, you do not have measurement sessions except for a calibration curve. Using the *MEASURE* option in the *DISPENSER* menu, you can create new measurement sessions. A *measurement session* consists of a series of *measurement points* in which a number of steps is dispensed. At each measurement point a number of consecutive measurements are taken. An example measurement session would look something like this:

Nr of dispenser steps	Nr of repeated measurements
8	15
16	10
32	8
128	4
256	4
1000	3
4800	3

How a measurement session is performed, is described in more detail in section III1.

Before you perform a measurement session, it is important to make the correct preparations. These preparations include:

- Setting CalibrationWorkshop options and preferences (*EDIT* menu *OPTIONS*)
  Set your preferences on the calibration unit (ml, gram, shot) and automatic nozzle cleaning between dispense measurements. How these settings are made is described in section IV2.
- Setting/adjusting the channel dispense parameters (*DISPENSER* menu, *CONFIGURATION*)
  The calibration is (in theory) affected by the dispense parameter settings. Please check the channel settings (dispense speed, suck speed, sniff etc) before starting a measurement session. How this is done is described in section IV3.
- recirculation of the channel (*DISPENSER* menu , *RECIRCULATION*)
- purging the valve (*DISPENSER* menu, *PURGE*)
- cleaning the nozzle (*DISPENSER* menu, *CLEAN NOZZLES*)

After you have created a new measurement session, the charts in the *MEASUREMENT SESSIONS* box allow you to compare the current calibration curve with the created measurement session. Using the *CHART TYPES* selection field you can select different types of chart presentations of the measurement session data. The chart types and measurement data evaluation is explained in more detail in section III2.

Depending on the conclusions you draw from the measurement data and charts, you may 'upgrade' the measurement session to a calibration curve. How this is done is described in section III3.

This chapter explains how the different functions and windows in CalibrationWorkshop are used. If you are using CalibrationWorkshop for the first time, please read sections IV1 and IV2 first to configure your scale and set your CalibrationWorkshop preferences.

Section 1 explains how new measurement sessions are created. Section 2 describes the different types of charts that are availble to analyse your measurement sessions. Section 3 describes how a measurement session is 'upgraded' to a calibration table.

1   Measurement sessions

A measurement session is started through the *MEASURE* option in the *DISPENSER* menu. CalibrationWorkshop will ask you to select a range of dispense amounts:
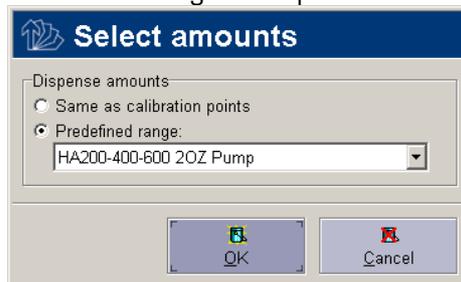
If you are calibrating a channel (using CalibrationWorkshop) for the first time, please select a predefined range appropriate for the type of dispenser you are using. E.g. "*HA200-400-600 20z Pump*" for a Harbil dispenser. If you are recalibrating a channel you can select the *"Same as calibration points"* option.

Note: Using the *OPTIONS* item in the *EDIT* menu (tabsheet *RANGES*), you can inspect and edit the available ranges and select a default measurement range.

If you press *OK*, in the *SELECT AMOUNTS* dialog (shown above) the *MEASURING PROGRESS* window will be opened:
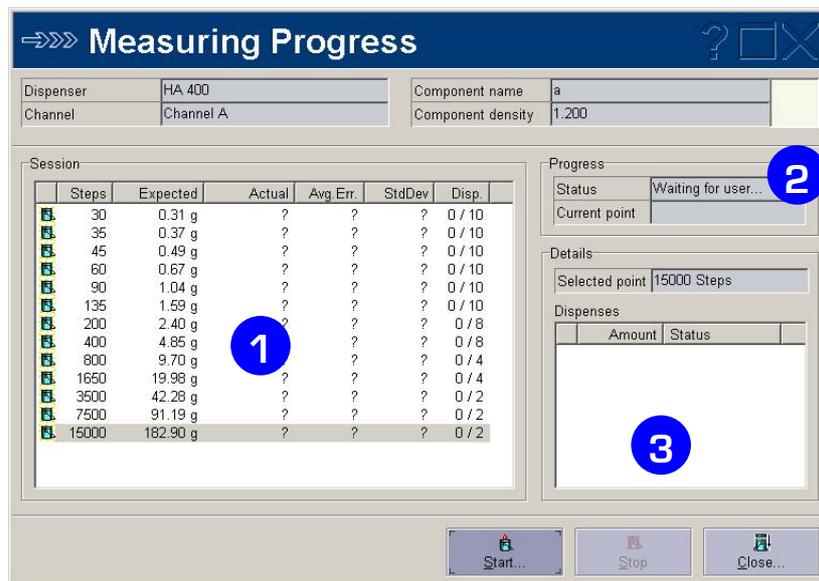
In this window the following boxes are present:
1. **Measurement session data**
    The measurement session table contains a number of columns with the following data:

- *steps*
  The number of steps to be dispensed
- *expected amount*
  The amount expected to be dispensed using the currently active calibration table
- *actual amount*
  The measured average amount dispensed
- *average error*
  The average error between the expected amount and actual amount in a percentage of the expected amount
- *stddev*
  The standard deviation of the measurements
- *Disp*
  The number of dispenses requested and done. E.g. 6/10 means that 6 out of 10 dispenses have been carried out.

2. **Progress**
   The progress box shows what the program is currently doing. The status field describes what is happening. The **CURRENT POINT** field shows what row in the **SESSION** table, CalibrationWorkshop is currently measuring.

3. **Details**
   The **DETAILS** box shows the individual measurements for the selected row in the session box. The status of a measurement can be: *Accepted*, *Rejected* or *Pending*. CalibrationWorkshop will only accept a measurement if the measurement result does not differ too much from the expected amount and/or from the average of previous measurements. A measurement is *pending* when CalibrationWorkshop is not yet able to accept or reject a measurement.

Click on the **START** button to start measuring a session. CalibrationWorkshop will ask you to place an empty container on the scale before it starts taring the scale and dispensing. The maximum contents of the container are a setting in the CalibrationWorkshop options (see section IV2). These maximum contents are used by CalibrationWorkshop to check that the container does not overflow during the calibration process.

The measurement session will take approx. 10 minutes depending on the number of points to measure and the number of measurements per point. The program will start measuring the largest number of steps first.

During the measurement session, CalibrationWorkshop will highlight the current dispense row. It is however possible to select other rows by clicking on the row. This feature allows you to look at the data of points previously measured in the **DETAILS** box. By right-clicking in the details box you can manually delete measurements that you do not want to accept (e.g. because the machine dispensed air during this measurement). When the machine is operating normally you'd never have to manually delete any measurements, because CalibrationWorkshop automatically rejects dispenses which are very different from the other measurements in the same group.

It is possible to adjust the number of measurements during a measuring session. This can be done by selecting a row and pressing the - and + keys. The second number in the **DISP** column increases or decreases when the + or - key are pressed.

When the measurement session is completed the measurement data is not yet stored. This will be done when the **CLOSE** button is pressed. CalibrationWorkshop will now ask you for a name to store the measurement results. The default name is the date and time of the session.
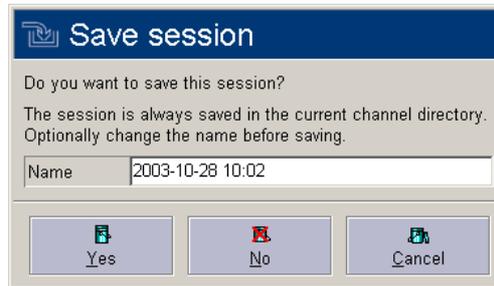
You may change this name or add some text and press *YES* to save the session data. Pressing *NO* will cause all measurement data to be lost!!

The next step is to analyse your measurement session and compare it to the current calibration curve. The analysis is best done using the different types of charts in the main window.

2   Presentation of measuring sessions

The main CalibrationWorkshop window allows you to analyse measurement session data. The data can be analysed both in the form of a graph or in the form of a list. These two options can be selected using the *CHART* and *LIST* tabs in the *MEASUREMENT SESSIONS* box. The *CHART* presentation is explained in section III.2.1. The *LIST* view is explained in section III.2.2.

III.2.1 Chart display of measurement sessions

In the *CHART* tabsheet the calibration table and measurement session results are presented in a graphical presentation.
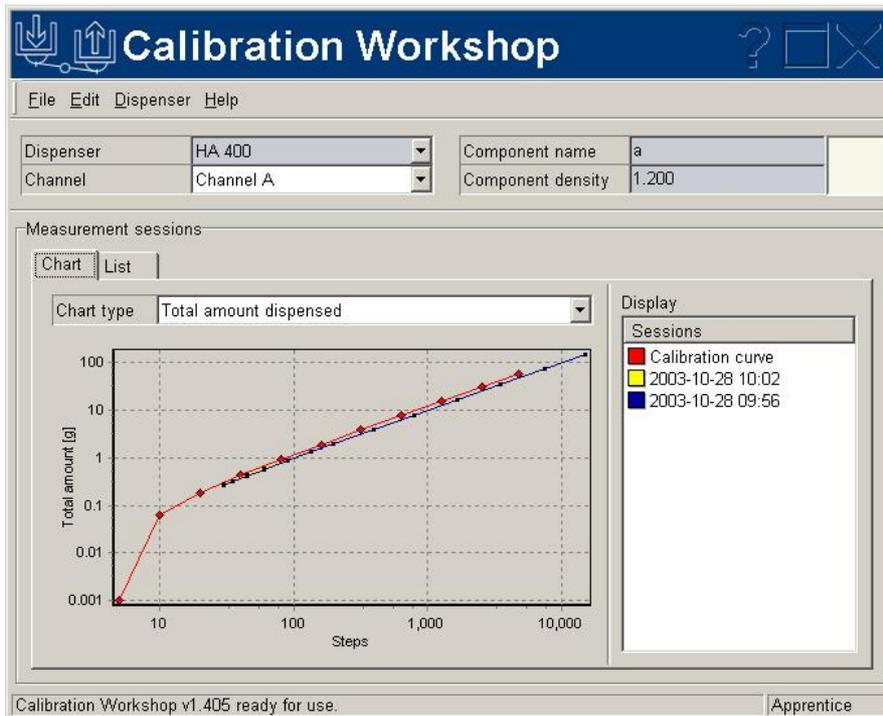
On the right hand side the available measurement sessions[1] are shown in the form of a list. The coloured boxes show you the colour of the session lines in the chart.
It is possible to hide one or more session that you do not want to see in the chart by clicking on the session name. The colour box will change to a cross if the session is not shown in the chart.

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[1]: In case you have made changes to the machine settings, only the sessions measured after you have made these changes are visible here. Sessions which have been created using diferent machine settings can be retrieved using the import function in the file menu.
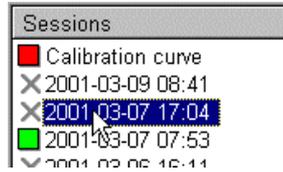
The following types of charts are available to view the session results:
1. Total amount dispensed
2. Average error (relative) of dispensed vs. expected amount
3. Average error (absolute) of dispensed vs. expected amount
4. Standard deviation (relative) of dispensed amounts
5. Standard deviation (absolute) of dispensed amounts
6. Average amount dispensed per step x 1/1000

The charts are automatically scaled so be aware that what can look like a large error at first glance can actually be quite acceptable. Please look at the chart's Y-axis scale carefully before drawing conclusions.

It is also possible to zoom in to specific part of the chart by pressing your left-mouse button on the upper left corner of the section you want to zoom into, and dragging your mouse to the lower-right corner of the area and releasing the mouse button.
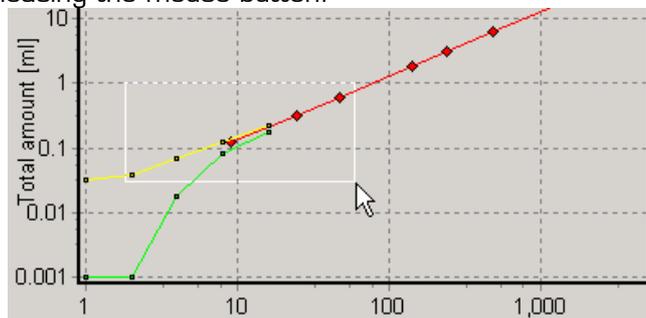
It is possible to re-invoke the auto zoom function by selecting a small section over a grid point from lower-right to upper-left.
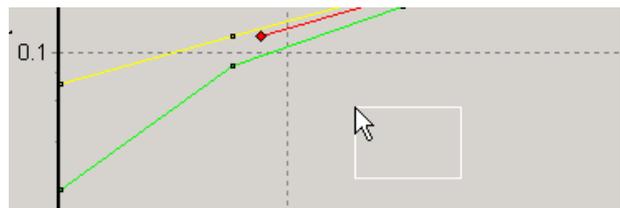
Each of the previously mentioned chart types is discussed in more detail below:

Total amount dispensed

The total amount dispensed shows the amount dispensed as a function of the number of steps made by the pump motor. The dispensed amount is shown in ml or gram depending on the setting in CalibrationWorkshop options menu (section IV2).

The scale of both the steps and amount are logarithmic to show more detail for small number of steps and small amounts. Normal behaviour of the machine should show a close to linear relation between steps and amount.
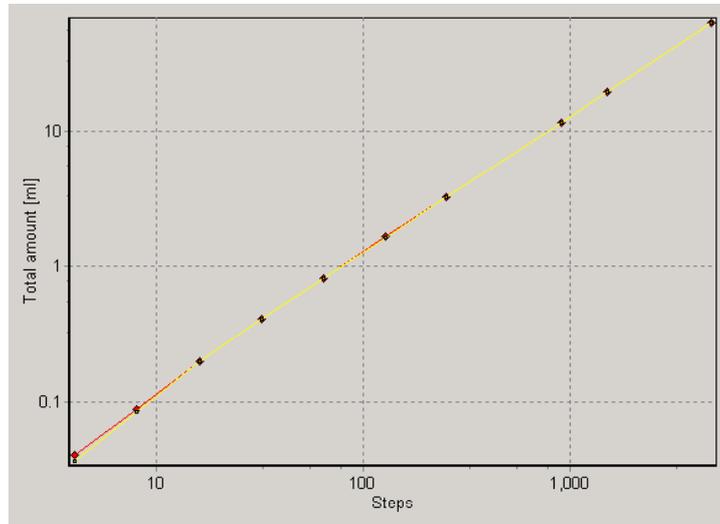
Average error of dispensed vs. expected amount

Over time, the dispensed amounts can become different from the amounts in the calibration table. Such differences can be caused by wear of the pump or changes in colourant properties.

The *AVERAGE ERROR ABSOLUTE* and *RELATIVE* charts shows you the difference between the measured average of the dispensed amounts and the amounts in the calibration table. This difference is shown either as an absolute amount (ml or g depending on the CalibrationWorkshop setting) or as a percentage of the expected amount.

An example of an absolute error chart is shown below.
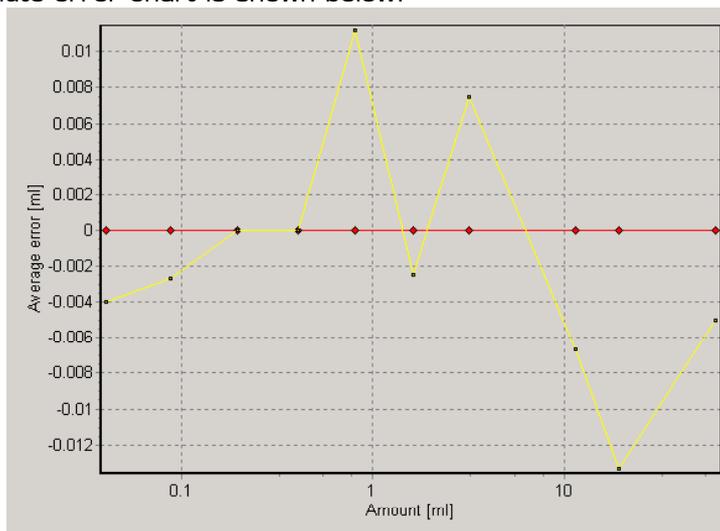
The yellow line in the above chart shows you that the dispenser, dispenses approx. 0.01 ml too little in the range of 10 to 100 steps, and up to 0.05ml too much for a full pump stoke.

The average error relative chart shows the same deviations as a percentage of the expected amount.
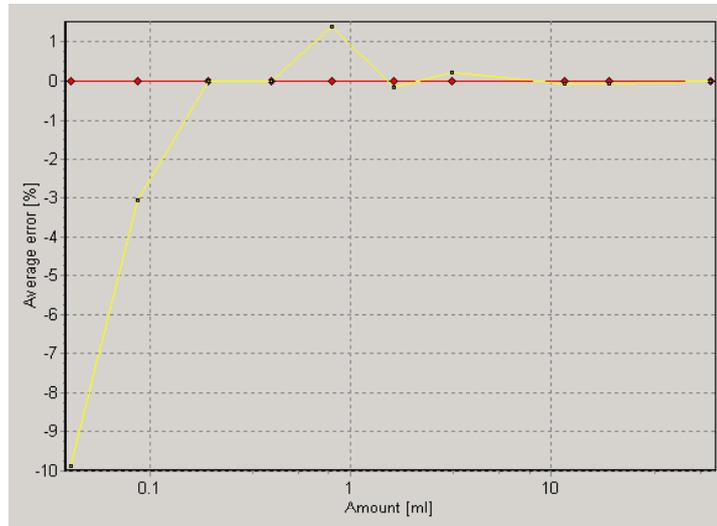
In the chart you can see that the average dispensed amounts in the yellow and purple sessions are lower than the amounts in the calibration table. The yellow line shows that in this session the dispenser dispensed approx. 7% less than is stored in the calibration table.

The average error charts is used to detect structural differences between the calibration table and the measured dispenser output. Such differences may indicate gear pump wear in ET-type dispensers. This error can easily be removed by upgrading the calibration table with the last measured session.

Standard deviation of dispensed amounts

The standard deviation (stddev) is the average deviation of the average in a series of measurements. The standard deviation shows you how much spread there is in a series of consecutive measurements. The standard deviation indicates the repeatability of the dispense process. In practice the dispense process will always have a small standard deviation of approx. "one drop". How much this is, is strongly dependent upon the viscosity and surface tension of the colourant. For large quantities the standard deviation can be larger.

The standard deviation can be shown both as an absolute amount or as a percentage of the dispensed amount. The standard deviation is especially important for the calibration of gravimetric dispensers. (See also section V1)

An example chart of the absolute standard deviation is shown below.
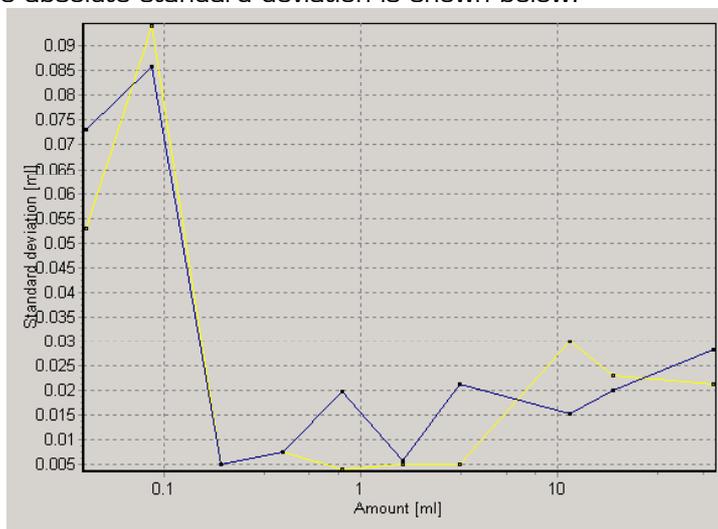
The accuracy of a dispenser is in practice dependent upon the **relative** accuracy of the machine. The *STANDARD DEVIATION (RELATIVE)* chart shows the standard deviation as a percentage of the number of

steps. The relative standard deviation is the absolute standard deviation divided by the dispensed amount. This means in practice that the smaller the amount is, the larger the relative standard deviation becomes.
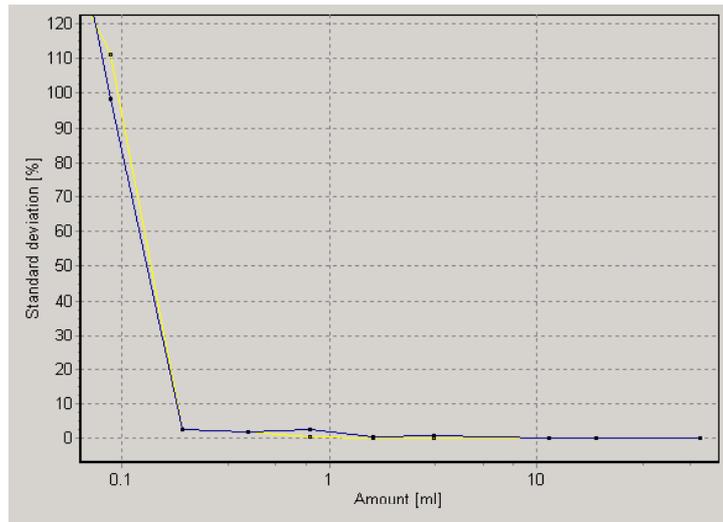
Average amount dispensed per step x 1/1000
The last type of chart is the amount dispensed per step. Theoretically this value should be a constant amount determined by the diameter of the pump and spindle type, and stepper motor type.
In practice the dispensed amount per step is smaller for small quantities as shown in the chart below.
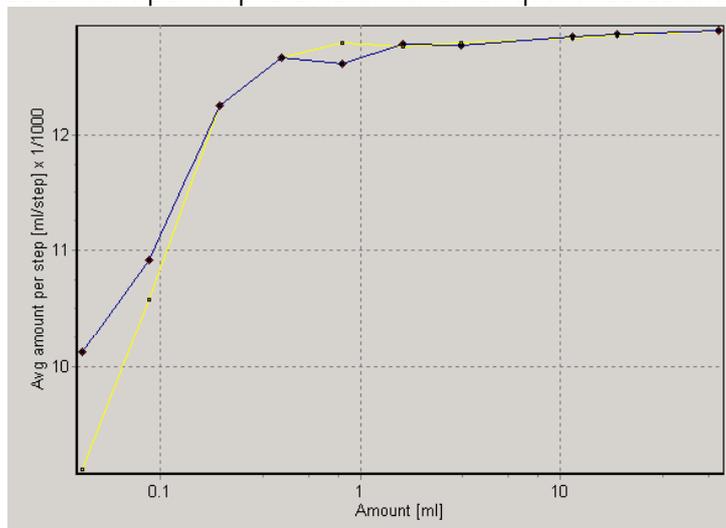
III.2.2 Measuring sessions in table form
Measurement session data can also be examined in table form in stead of chart view. The view can be changed by clicking on the *LIST* tab in the *MEASURING SESSIONS* box.

The session data to be displayed can be selected in the *SESSIONS* selection field (nr 1 in image below). The measurement point results of the selected session are shown in the *MEASURE POINTS* table (nr 2). A row in this table can be selected by clicking on it. The individual measurements for the selected measurement point are shown in the *DISPENSES* list (nr 3).
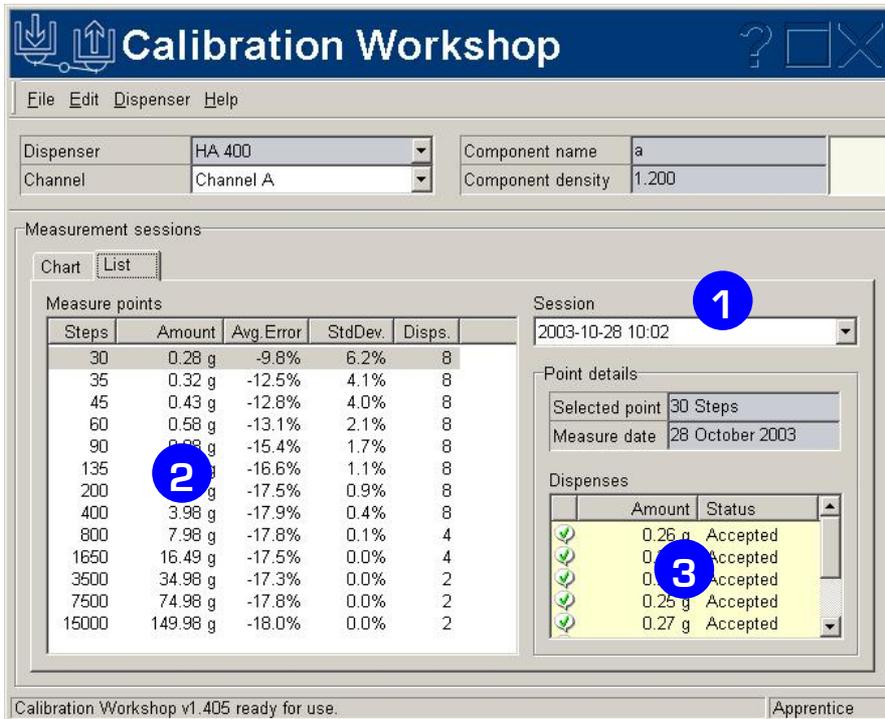
The information shown in the measurement points table also depends on the selected detail level. This can be selected in the CalibrationWorkshop options (see section IV2).

3 Updating a calibration

After you have evaluated one or more measurement sessions using both the graphs or the lists, you may want to 'upgrade' your measurement session to a calibration table/curve. How this works is described in this session.

To update a channel's calibration table you need to select the correct measurement session you want to use for the new calibration. Click with the right mouse button on the session you want to convert to a calibration table. Select the **UPDATE CALIBRATION CURVE** option as shown in the screenshot below.
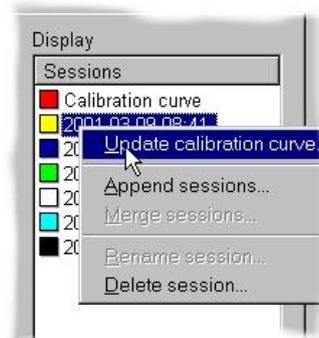
CalibrationWorkshop will ask you to confirm to update the calibration table using the measurement data of the selected measurement session. Press **OK** to do so.
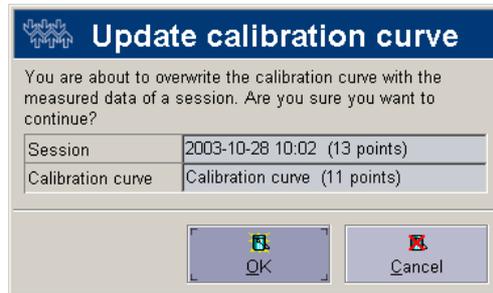
The calibration curve in the main window graph will be updated as well as the calibration table in the PrismaPro driver.

CalibrationWorkshop will automatically archive the old calibration table, using the date and time of the new update. An old calibration table can be imported into CalibrationWorkshop using the *IMPORT OLD CALIBRATION CURVE* option in the *FILE* menu. The old calibration curve will appear in the session list as a measurement session.

1   Configuring the Scale

CalibrationWorkshop can communicate with the following types of scales:

- Mettler PG5002S (5 Kg / 0.01g)
- Sartorius U4100S (3 Kg / 0.01g)
- Sartorius FC2CCE-SX (2.2kg / 0.01g)
- Kern EG (0.3 Kg / 0.001g)

A manual scale can also be used, however CalibrationWorkshop will ask you to enter the scale weights after every dispense. In practice this means that you will have to enter numbers very frequently!

The correct scale can be set through the *CONFIGURE* option in the *DISPENSER* menu. In the configuration window, please click on the *SCALE* tab sheet.
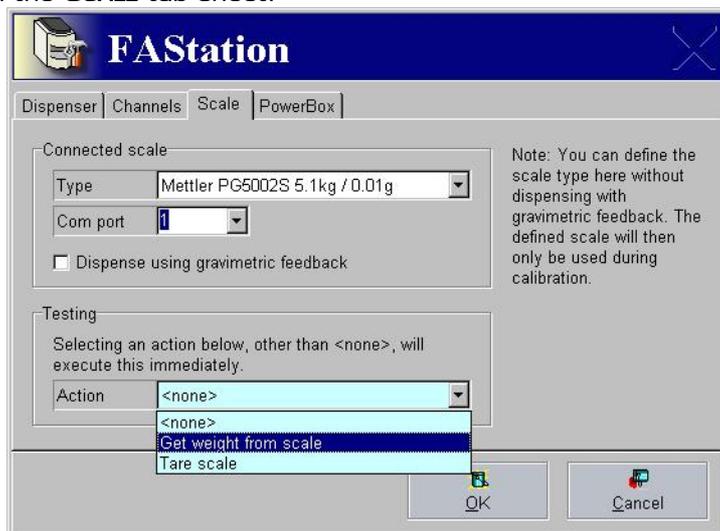
Select the correct scale type and serial port in the *CONNECTED SCALE* box.

Please exit and restart CalibrationWorkshop before testing the scale communication.
Please check if the scale communication works correctly by selecting the *GET WEIGHT FROM SCALE* item form the *ACTION* selection list in the *TESTING* box.

2   CalibrationWorkshop settings

The preferences in CalibrationWorkshop can be set through the *OPTIONS* menu in the *EDIT* menu.
When you select this menu item, the Options window is opened.
This window has the following five tab sheets explained in detail in the rest of this section.

1. General
2. Ranges
3. Automatic tasks
4. Weighing
5. Display

General

The General tab sheet contains two settings:

- Confirm when the program is closed
  When set to *YES*, CalibrationWorkshop will ask you to confirm that you really want to exit the program when you click on the close cross in the upper right corner of the window.
- Detail level in session data list
  When set to High, the absolute average error and absolute standard deviation are also shown in the List view in the main window,
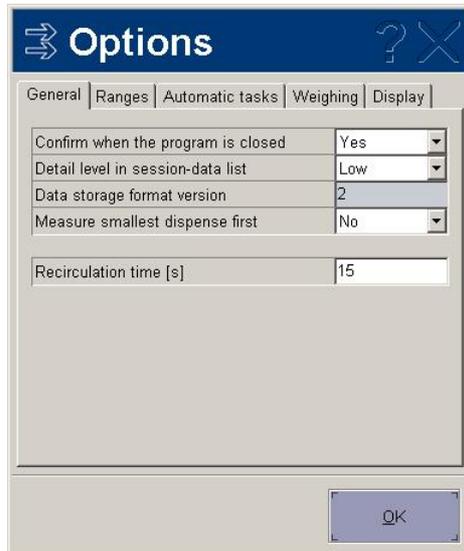
Ranges

The RANGES tab sheet allows you to examine, edit, add and delete the predefined measurement ranges that can be used when a new measurement session is started. CalibrationWorkshop includes the standard ranges for most Fluid Management dispensers.

Using the USE RANGE AS DEFAULT FOR MEASURING field can be used to select a specific range as the default to be used for new measurement sessions.
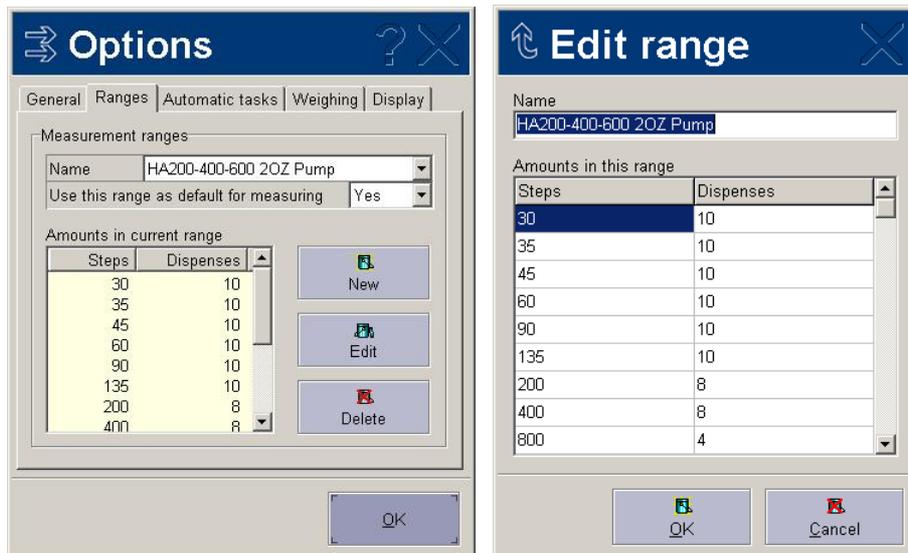
Automatic tasks

The automatic tasks tab sheet allows you set automatic cleaning and automatic recirculation between calibration measurements.

To get optimum calibration results it is reccommended to let CalibrationWorkshop perform an automatic nozzle cleaning round every single dispense. Because this makes the calibration very time consuming, it is recoomendable to clean the nozzles every 5 to 10 dispenses. The setting depends on the build-up of colourant remains on the nozzle after dispensing. Please verify if the nozzle stays clean during consecutive dispenses.

Note: On some dispensers (e.g. EuroTinter) cleaning is not possible while a can is present at the dispensing position. For these machines this setting has no effect and cleaning is never carried out.

Weighing

The weighting tab sheet shows the current type of scale. To change the type of scale, please use the *CONFIGURE* menu option in the *DISPENSER* menu.
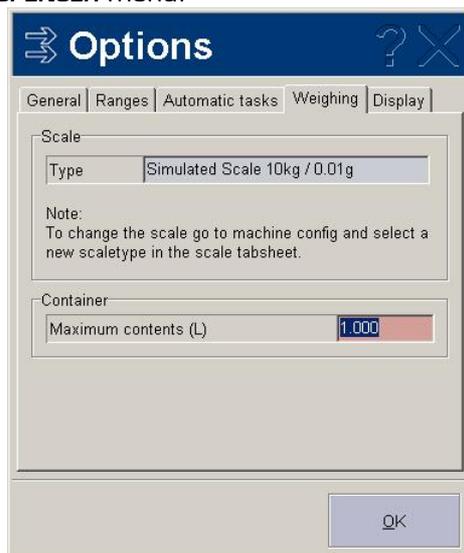
In the *CONTAINER* box it is possible to specify the maximum contents of the can used during calibration. These contents are used to avoid can overflow during large calibration actions.

Display

The *DISPLAY* tab sheet allows you to choose the unit to display dispense amounts. Both volumetric and gravimetric units can be selected. The decimal digits are the numbers of digits behind the decimal point.
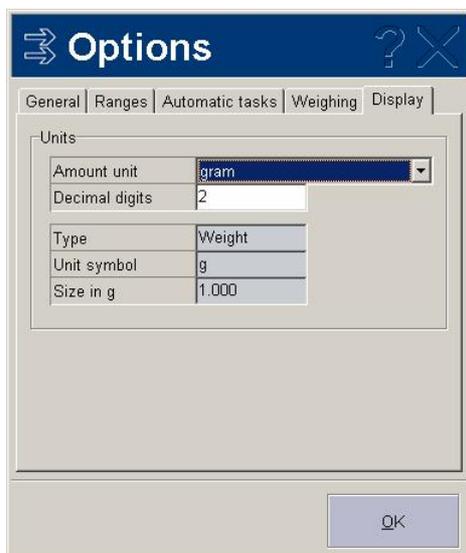
3 Change user level

By default CalibrationWorkshop will log you on as *Apprentice* when started as a separate program. As an *Apprentice* you are able to perform (re)calibrations. However as an *apprentice* you are limited in the dispenser configuration settings. To be able to change all dispenser configuration settings, you need to change your user level. As of version 1.3x CalibrationWorkshop automatically logs you in at the same level as PrismaPro when started from PrismaPro.

Changing the user level is possible using the **CHANGE USER LEVEL** option in the **FILE** menu. The following window will appear.

In the level selection field you can select the desired user level. In the Password field you need to enter the appropriate password for the user level. The tickbox 'Automatically login on this level in the future' will make CalibrationWorkshop remember the user level and password. This means that you will be at the selected user level every time you start CalibrationWorkshop.

To obtain the *Foreman* or *Service* passwords, please contact the Fast & Fluid Management service helpdesk (tel +31 252 240842).

4 General channel settings

General channel settings can be accessed through the **CHANNEL DETAILS** menu option in the **EDIT** pull down menu. Most of the channel properties can only be viewed here and have to be changed from PrismaPro. The component density can be changed here though, without using PrismaPro.
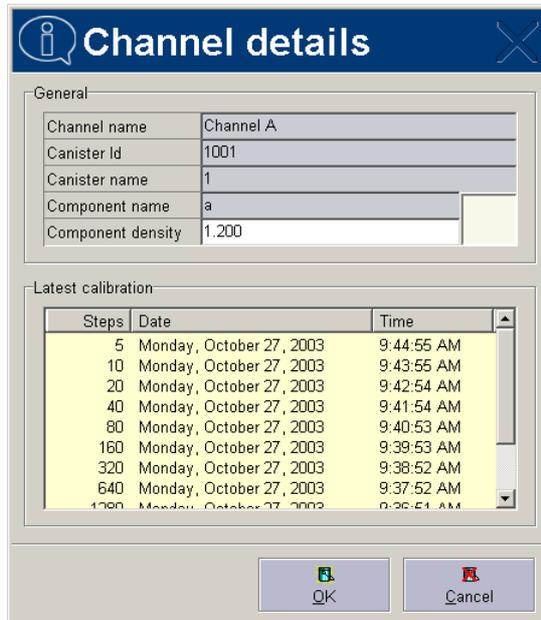
5 Channel settings for HA, FA and BT type dispensers

Channel settings can be accessed through the *CONFIGURE* menu option in the *DISPENSER* pull down menu. Select the tab sheet *CHANNELS* in the settings window. This should bring you to a window that looks similar as shown below.

You need to be logged on as *Foreman* or *Serviceman* to be able to change all channel parameters. Section 3 explains how you can change your user level to *Foreman* or *Serviceman.*

If you are not familiar with the channel setting, please do not change them without consulting you colourant supplier or a Fluid Management service technician.
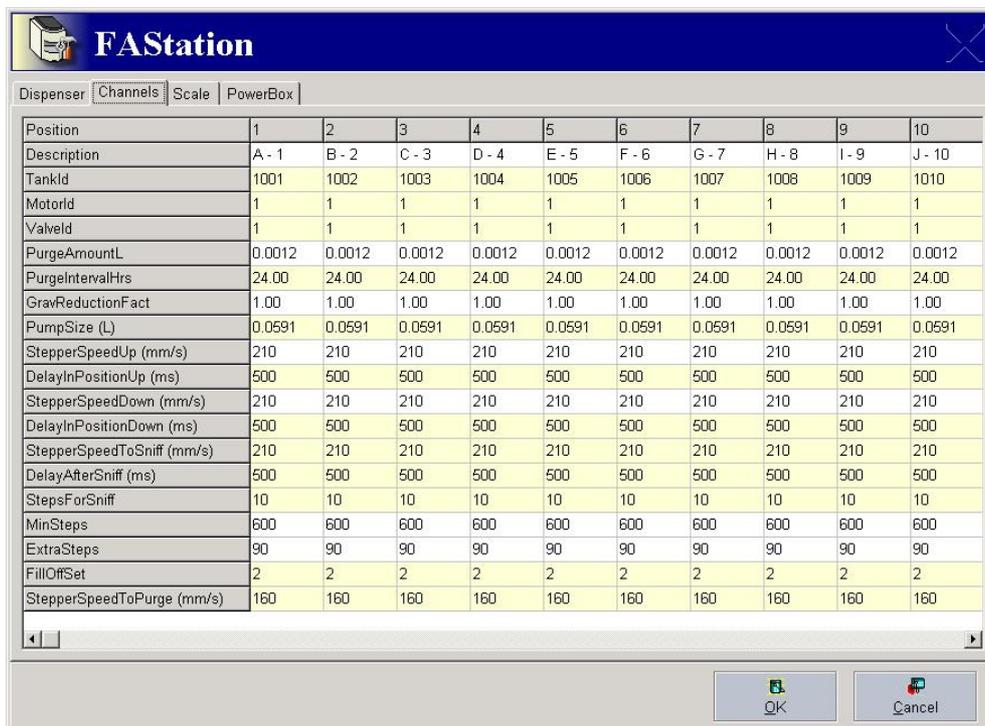
The channel table allows you to change all driver parameters for each channel separately. Some important parameters are explained below:

- *StepperSpeedUp*
  This is the speed in mm/s of the piston when colourant is sucked up from the canister into the piston pump.
- *StepperSpeedDown*
  This is the speed in mm/s of the piston when colourant is dispensed from the piston pump.
- *SteppsForSniff*
  These are the steps that the stepper motor will turn back after the disensing, but before closing the valve. The *StepsForSniff* value should remain 1 on all HA model dispensers. Do not change this value without consulting F&FM service department.

If you have changed the above channel settings, CalibrationWorkshop will hide previous measurement session of that channel. This is to prevent calibration errors as a result of changes in dispense setting. Old measurement session can be read back using the **LOAD SESSION** option in the **FILE** menu.

1 Calibration of Gravimetric dispensers

Gravimetric dispensing is the term that is used for dispensers that use an electronic scale to get feedback on the amount of colourant that was dispensed. The purpose of using a scale is to enhance the dispensing accuracy and guarantee the accuracy as specified in PrismaPro colourant properties.

When gravimetric dispensing is enabled (*CONFIGURE* option in *DISPENSER* Menu, tab sheet *SCALE*) PrismaPro will always try to dispense within the specified tolerances.

The tolerances are set in the component (edit) window in PrismaPro.

The dispense tolerances are specified in PrismaPro both relative and absolute. The relative tolerance is normative for large dispenses, the absolute tolerance is normative for small dispenses. This is best explained using an example. Suppose the settings in PrismaPro are a 1% relative tolerance and an absolute minimum tolerance of 0.05 g. This means that allowed tolerance on a dispense of 20.0 g is 1% * 20gr = 0.2 g; the allowed tolerance on a dispense of 2.0 g is 1% * 2.0 g = 0.02 g, however this is less than the absolute minimum of 0.05 g, meaning that the allowed tolerance used is 0.05 g. In other words dispenses smaller than 5.0 g use the absolute tolerance; dispenses larger than 5.0 g use the relative tolerance.

In PrismaPro there is also distinction between under and over dispense tolerances. This is explained further on.

The normal behaviour of the dispenser is that there is always a certain tolerance in the dispensed amount. The dispense behaviour is assumed to have a Normal distribution as show below. Imagine a series of 100 consecutive dispenses of 10 ml. In practice the dispenser will sometimes dispense exactly 10.0 ml, sometimes 9.9 ml or 1.1 ml. The *average* is the amount that occurs the most frequent. The *standard deviation* is the average deviation of the average.
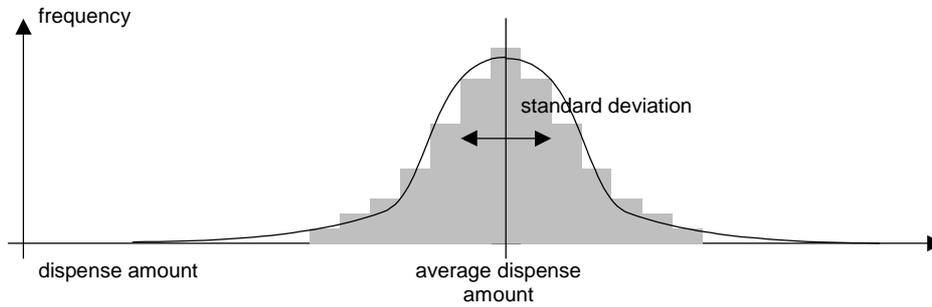
During the gravimetric dispensing process the dispenser will iteratively dispense the requested amount in a number of iterations, depending on the allowed under tolerance. If the standard deviation of the dispenser is larger than the allowed maximum tolerance, the dispenser will dispense less than the desired amount to avoid the risk of over dispensing. This is usually the case for small amounts. The reduction is related to the standard deviation of the dispenser for the requested amount.

After the first dispense, the dispenser will perform a number of dispense cycles where small amounts of colourant are dispensed until the requested amount is measured by the scale.

When (by accident) the dispenser dispenses too much (more than the specified over-dispense tolerance, the dispense job will be aborted with the error message that an over dispense occurred.

The standard deviation of the dispenser is an important value for the calibration of a gravimetric dispenser. When you update a measurement session to a calibration curve for a gravimetric dispenser, the standard deviations are stored in the calibration table. To get reliable values for the standard deviation, it is important to have sufficient repeated measurements per calibration point. At least 5 repeated measurements is recommended. 8 repeated measurement is optimal.
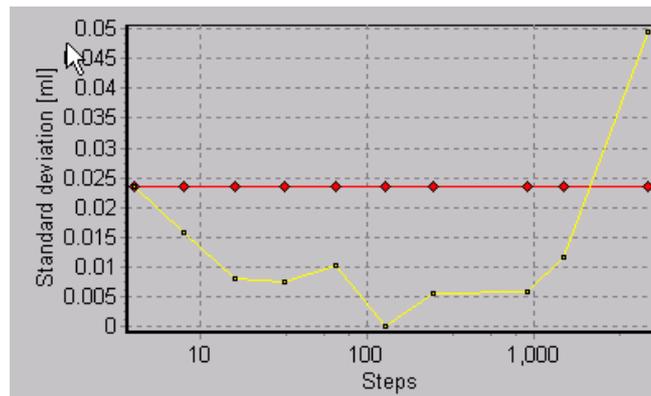
Each channel has a special setting, called *GRAVREDUCTIONFACT*. This setting can be changed through the *CONFIGURATIONS* window. The *GRAVREDUCTIONFACT* is a safety factor for gravimetric dispensing. E.g. when *GRAVREDUCTIONFACT* is 2.0, PrismaPro will under dispense with two times the standard deviation as shown in the chart below.
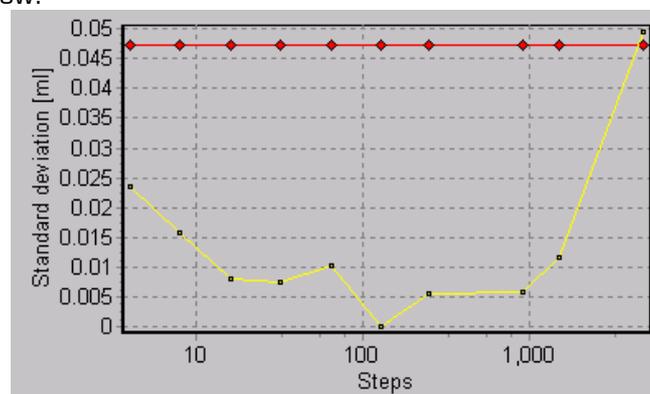
Please note that the dispense accuracy settings do not say anything about the smallest amount that can be dispensed. The smallest amount is most likely one "droplet". How much this is, depends primarily on the density and surface tension of the material. A rough indication for the amount of one droplet is 0.07ml.

Furthermore it is recommended to use a larger setting for over-dispense tolerances than for under-dispense settings. Obviously a tight setting for over-dispenses raises the risk of getting an over dispense error. This is undesirable because the dispense job is aborted, wasting time and material. A tight under-dispense tolerance does not cause errors. Instead the dispenser will continue to try to add a small amount of material to reach the desired amount. This process does take time, and therefore makes the dispenser slower.

Typically the tightest possible accuracy settings for a gravimetrical dispenser are:
*   absolute under dispense: 0.03g
*   absolute over dispense 0.06g
*   relative under dispense 1.0%
*   relative over dispense 1.0%

Higher relative under and over dispense tolerances are recommended to make the dispense process quicker. It is however possible to set the relative tolerances at 0.0%. In this case only the absolute tolerances are used.

The more tight the accuracy settings are, the longer the dispense process takes, and the more likely over-dispense errors become. Tight accuracy settings may also require the ***GravReductionFact*** factor to be increased to make the dispense process "more careful" to avoid over-dispense errors.

2   Export

For further analysis or to print reports of the measurement sessions or current calibration curve an export function is available. The dispense statistics of individual measurement sessions can be exported by clicking with the right mouse button on the session. You will be asked to provide a file name of the comma separated values ('.csv') format file. CSV files can be read in Microsoft Excel.
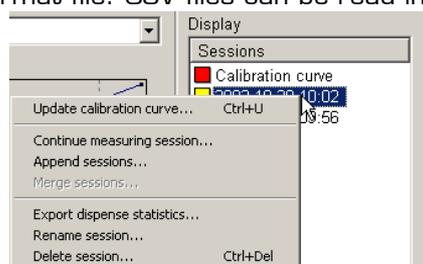
The same option is also available via the ***Export*** option in the ***File*** menu. The session or calibration curve highlighted in the sessions list of the main screen is exported as a CSV file.