

Creating Custom Calibrations

Note: a comprehensive guide on creating custom calibrations is available on our website at <http://www.distell.com/downloads/CustomCalibrations.pdf>.

Measurement methodology

Clearly define your measurement protocols

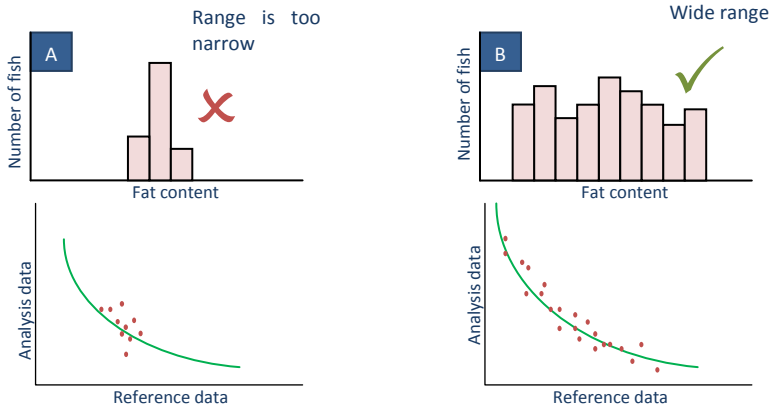
It is important to clearly define your measurement methodology for the product well in advance of the actual measurements. To help you decide on the measurement method, you will find on the CD-ROM supplied by Distell, a large number of calibration charts which outline different measurement protocols for different products. Your choice of measurement method will be determined by the weight, shape, and known characteristics of the Product and by the measurement objective.

Having considered exactly what representative measurement you wish to achieve, print out your measurement protocol in detail, and follow the method in a consistent and rigorous manner.

Selecting your product samples

To create a calibration from scratch you will need a minimum of 20 – 25 samples of product for the measurements. These samples should be evenly spaced across the range of fat content that is expected for the product from very low fat content to very high fat content. This will ensure an accurate calibration.

These graphs show two different situations. Graph 'A' shows a sample where all the samples have a similar fat content. Graph 'B' shows a sample where the fish cover a wide range of fat content from low to high.



In graph 'A', where the samples all have similar fat content, then the custom calibration will only be able to give accurate readings when used on product in the middle range of fat content. When it is used on product with high or low fat contents, i.e. outside the range represented by the samples used to create the calibration, it will not be able to give accurate data because there are no source data points in those areas.

Measurement of samples using the meter

Overview

For a given item of produce, whether meat or fish, a number of samples should be prepared. Ideally these will come from multiple sources - it is best to cover as wide a range of fat content as possible. Each of these samples will be given a unique ID then measured with the Fat Meter on (normally) the Research-1 setting. This measurement forms part of the reference data set.

Each sample is then analysed to find the exact fat content. The fat content is part of the analysis data set. The analysed fat content is paired with the Research-1 measurement. Once all the reference - analysis pairs have been obtained the custom calibration can be created.

Procedure

Having chosen your samples, and prepared your measurement protocol, you can proceed to take measurements for each sample using the Meter in the normal manner:

- Switch the meter on and allow 5 minutes for the sensor to stabilise
- Check the meter values are in agreement with the meter's check pad
- Choose the RESEARCH-1 calibration setting, known as the 'Reference Calibration'
- Set the number of readings to be averaged between 1 and 8
- Note carefully each set of readings taken on each sample, especially the average value. The readings will also be stored in meter's memory, and you can download the data at any time to the DMS. These readings are known as the 'Reference Dataset'
- After each set of readings identify each sample with a unique reference and place it in a sealed bag to retain the sample in its original condition

Once you have measured all of the samples

- Check the number of samples
- Check all the samples have been clearly marked with a unique reference
- Download your sample data from the meter and obtain a printout for reference as well as saving the data on the computer
- If the laboratory analysis is not being carried out immediately store all the samples carefully to preserve their original condition

The samples are now ready to send to laboratory for analysis by the method of your choice. The laboratory results are referred to as the 'Analysis Dataset'.

Laboratory analysis of samples

It is important that the laboratory personnel are fully informed of your sample requirements. Questions to consider are:

- What portion of the sample do you wish to analyse?
- What do you wish the analysis to represent?

In the case of a fish product

- Is it the whole fish carcass?
- Is it the trimmed fillets of the fish?
- Is it a defined section of the fish?

In the case of a meat product

- Is it a standard 300 gm sample of minced product (3 – 8mm grind)?
- Is it a whole piece of meat?

Information required from the laboratory analysis

- Fat content
- Water content
- Total solids
- Calorific / bio-energetic values

Once you have received the data from the laboratory, match each laboratory sample value (the Analysis Dataset) with the corresponding Fatmeter sample value (the Reference Dataset). This will give you a list of paired results. One way to retain this data is to create an extra column in the DMS Grid table and record the laboratory value alongside the Fatmeter sample data.

Once completed you are ready to create custom calibration using the DMS.

Components required for a custom calibration

A Custom Calibration for your Fatmeter is produced from combining the following datasets:

- The **Reference Calibration** for your Meter (RESEARCH-1)
- The **Reference Dataset** (Fatmeter values of sample product, produced using the reference calibration)
- The **Analysis Dataset** (Laboratory values of sample product)

Creating a custom calibration

Each meter is shipped with the following calibration settings:

Product settings

- A minimum of four standard product calibrations

Research settings

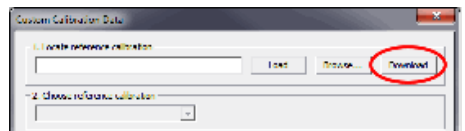
- One research calibration, known as RESEARCH-1, and which is used for reference when creating your own custom calibrations

The data that makes up these product datasets is called a calibration. The DMS provides the capability to create a new calibration, and upload the calibration into the group of research settings.

The process of creating a custom calibration in the DMS follows. To begin, select 'Create Custom Calibration' from the File menu in the DMS. This will open the 'Custom Calibration Data' window.

The following steps should be followed:

1. The first stage is to load the **Reference Calibration**. You can use the 'Download' button to copy the RESEARCH-1 calibration directly from the meter, assuming it is attached via the supplied USB cable. Instructions are given on screen, but the process is quite simple:

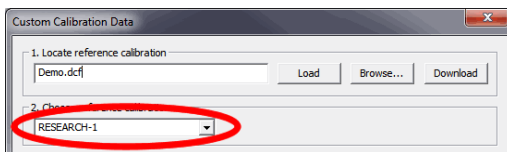


- a. Click on the 'Download' button.
- b. Select 'Send Ref' from the meter's Choices menu
- c. Save the DCF file on your computer for future reference
- d. The data is now available in the Custom Calibration window. You can, for future work, either use the DCF file saved from this process or you can repeat the download.

If the reference calibration you used is not RESEARCH-1 then please get in touch with Distell for guidance.

If you are using an existing DCF file, e.g. one that you downloaded from the meter previously, click on the 'Browse...' button to navigate to the file then click 'Load' to load the reference calibration data from the file. Alternatively you can drag the file from the Windows desktop or a file explorer window and drop it on the Create Custom Calibration window.

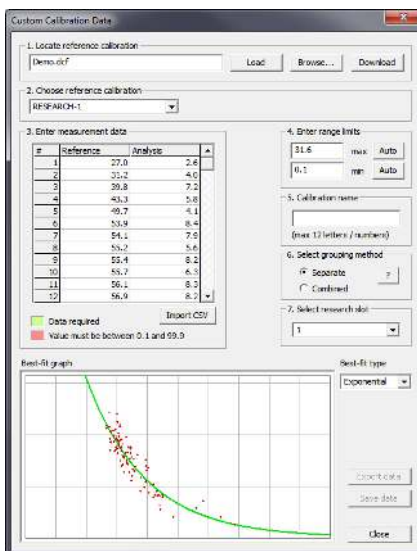
- The second stage is to select the reference calibration you wish to use. The .DCF file in stage 1 may contain multiple calibrations, though only those used in the Freshness Meter's Research menu are able to be used for this. Select the appropriate calibration from the drop-down list and the DMS will use this file as your **Reference Calibration** for calculating new custom calibration. You must choose the calibration setting that was used to take the measurements; typically this will be RESEARCH-1.



- Using the table, enter the values for **Reference Dataset** in left hand column and **Analysis Dataset** in right hand column, for each pair of samples. The data is checked after each entry and any errors in the data will be highlighted in different colours; the key to the colours is shown below the data table. If the data shows no errors then the DMS will now create a calibration curve based upon data values entered, and the new custom calibration will be displayed in the form of a graph.

There is an option to import this data from a CSV file, which may be more convenient for large datasets. The CSV file should be formatted as two columns with no header, the first column being the Reference value and the second column being the Analysis value.

- The fourth stage, once the data has been entered, is to choose maximum and minimum threshold values. This allows you to limit the range of values in the calibration. Anything outside of your chosen range will appear as 'out of range' on the meter itself. The DMS will attempt to choose sensible values for these, but you can override them with your own choice if you wish.
- The fifth stage is to enter the name of the new calibration. This is limited to 12 letters, symbols or numbers, due to the size of the display on the meters. The meter will show the calibration name given here on the display.



- Select the grouping method according to instructions available in the Help Section of the DMS. Normally you will choose 'Separate'.
- The seventh stage is to select the research setting, or slot, that the new calibration should use. Meters have, by default, 16 slots in the bank of research calibration settings. The first of these is always filled with RESEARCH-1, leaving 15 vacant slots. It is the user's responsibility to track which slots are filled and which are vacant.

8. You can now save the Data in two formats:

- For uploading your custom calibration to the meter using the DMS, save as a Distell Calibration File (.DCF). The uploading process is discussed in the next section.
- For exporting to a spreadsheet or database save as a Comma Separated Value file (.CSV). In this form, the data is presented as a series of 1000 discrete data points that reflects the measurement range of the meter.

Note that the best-fit type is best left at Exponential for a natural calibration.

Uploading Calibrations to the Meter

Programming a meter with a new calibration setting

Note: a more comprehensive guide on uploading calibrations is available on our website at <http://www.distell.com/downloads/UploadingCalibrations.pdf>.

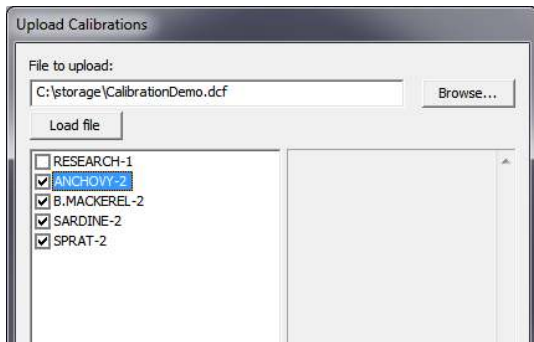
Your meter is shipped with several calibrations pre-installed, but if you have purchased an additional calibration, or you have created a custom calibration, then this option allows you to upload it to your meter.

Note: each calibration is unique to a specific meter because it has been tuned to the exact electronic profile of the sensor in the meter. You *can* upload a calibration to a different meter, but it will not give accurate results.

To upload a calibration to your meter, proceed as follows:

In the DMS

- Open the DMS, select the **File** menu, then **Upload Calibrations**.
- Locate the **Custom Calibration** file that you wish to upload. This should have a .DCF file extension. You can use the Browse... button to help you find the file. Once you have the filename, click **Load** to open the calibration file.
- The third step is to choose which individual calibrations from the file that you wish to upload to the meter. The file may contain more than one calibration, so only tick the calibrations that you wish uploaded at this time.



Important note: You should check the version of the firmware that is on your meter (this is shown when the meter is switched on).

Fatmeters with version 2.6 firmware (or higher) and Freshness meters with version 1.08 firmware (or higher) can upload multiple calibrations at once, but meters with older firmware can only upload one calibration at a time. For these older meters only the first ticked calibration will be uploaded, even though the DMS will look like it is uploading all of the ticked calibrations. To upload multiple calibrations to the older meters, you will need to go through this process once for each calibration. It is best to tick only one calibration each time.

The newer firmware will upload multiple calibrations in one operation.

In the meter

Once you have selected the calibration to upload, switch meter ON, and go to the '**Add Product**' option of the **Choices Menu** on the meter, and press the **Y (Read / Yes)** button.

When you are ready to perform the upload, press the **Y (Read / Yes)** button at the '**Data Ready?**' prompt.

When the meter shows '**Waiting data**' you can click the Start button in the DMS to begin the upload.

You can monitor the upload progress on the meter display, and also on the computer.

Note: If you cancel the upload before it is complete you will have an incomplete calibration in the meter and measurement results will be unpredictable and inaccurate.

You should always allow the upload process to finish.

