

BRUINS INSTRUMENTS

PHYSIKALISCHE MESS-SYSTEME

ANALYSEN-SOFTWARE

Manual
OmegAnalyzer
Food/Meat

Read the instructions in this manual carefully before installing or starting the system. BRUINS INSTRUMENTS can not accept liability for damages due to non-observance of this manual.

Read the software license agreement in the Appendix of this manual before you open the software package.

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1 Introduction

The BRUINS INSTRUMENTS OmegAnalyzer F is a new near infrared spectrometer which is designed for the compositional analysis of samples using the near infrared absorbance characteristics of sample spectra. The instrument operates in transmission mode.

This manual provides information about the installation, operation and maintenance of the OmegAnalyzer F. We assume that operators have a basic technical knowledge.



Read this manual carefully before installing or starting the OmegAnalyzer F.

Always keep the manual near the system.

The manual is divided into the following sections:

Section 1	Introduction
Section 2	Safety Precautions
Section 3	Description
Section 4	Installation
Section 5	Operation
Section 6	The Omega Software
Section 7	Analyzing Samples
Section 8	Instrument Maintenance
Section 9	Troubleshooting
Section 10	Spare Parts
Section 11	Software License Agreements
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All of us at BRUINS INSTRUMENTS are committed to providing our customers with a high degree of after-sales support to ensure your complete satisfaction with our products and services. Please contact your local BRUINS INSTRUMENTS office or representative if you have any problems or questions.

1.1 Conventions used in this manual

The following safety warnings are used:



Danger: Used when failure to observe a safety precaution may result in serious injury or death.



Warning: Used when there is a danger of minor injury or serious damage to the system if you do not follow the precautions.



Caution: Used when there is a danger of minor damage to the system if you do not follow the precautions.



Hint: Used to indicate supplementary information or to call attention to recommendations which simplify daily operation

2 Safety Precautions

2.1 General

**Danger:**

The OmegAnalyzer F contains electrical circuits, devices and components operating at dangerous voltages. Contact with these circuits, devices and components can cause electrical shock which may result in death or serious injury.

Non-observance of the safety instructions can result in severe personal injury, death or property damage. Therefore observe the following:

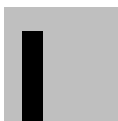
- Before connecting the OmegAnalyzer F to a mains supply, check that the mains supply voltage corresponds to the voltage indicated on the instrument label at the rear.
- Do not open the cover of the OmegAnalyzer F.
All work on parts requiring the opening of the cover shall be performed by BRUINS INSTRUMENTS Service personal only.
- Good grounding is essential to avoid serious electric shock. Make sure that power sockets are earth-grounded at the grounding pin.
- Before using the instrument, check the power cord for damage. Do not operate the instrument if the power cord shows any sign of wear or damage.
- Unplug the power cord prior to any maintenance and cleaning.
- Clean the instrument with a dampened cloth only. Do not allow liquid or any other material to enter the instrument.
- Do not use the OmegAnalyzer F in any way which could impair its safety or for applications for which it is not intended.
- Do not attempt to use the OmegAnalyzer F if it appears to have a fault.

**Warning:**

The instrument is designed for normal environments only. Do not operate it in corrosive, humid or other extreme environments.

Make sure that any additional and relevant safety regulations which apply in your case are observed and followed, even if they are not mentioned in this manual.

Make sure that only qualified and trained personnel operates and maintains the instrument.

**Warning:**

Do not unplug the power cord without properly shutting down the software before. Otherwise software problems may occur.

3 Description

3.1 Introduction

The BRUINS INSTRUMENTS OmegAnalyzer F is a near-infrared spectrometer which is used to analyze the composition of samples using the near infrared absorbance characteristics of the sample spectra.

It is suitable for the compositional analysis of a wide variety of food products like meat, cheese and other semi-solid or paste products. An unlimited number of chemicals or physical parameters and properties of meat and meat products, such as fat, protein, moisture, and collagen can be analyzed simultaneously.

When a meat sample is illuminated with NIR light, the radiation is partly absorbed by the meat, but also scattering and reflectance occur at the many different optical interfaces within the sample volume. As a result, the beam after interaction with the sample is no longer well defined in terms of geometric optics (like the transmittance characteristics of water or other clear liquids); this is why the measuring principle is called diffuse transmittance.

A sample drawer is used as sample presentation unit. In the OmegAnalyzer F the sample is exposed to near infrared light of specific wavelength, selected from a monochromator. The light penetrates the sample, interacts with sample molecules and is partly absorbed and partly diffusely transmitted. The transmitted light is measured by a detector located above the sample.

The amount of light absorbed by the sample at different wavelengths is directly related to the concentration of chemical functional groups, such as C-H; O-H and N-H. As these concentrations are in turn related to concentrations of the properties of interest, e.g. fat, protein, moisture, property values can be determined.

Before the instrument can be used to analyze samples, it must be calibrated, using a representative set of similar samples of the product to be analyzed and their known reference values. These values must have been obtained by using standard laboratory methods of high accuracy. In a calibration, a correlation between the NIR absorbance values at the different pathlength and sample composition is established, and calibration constants are calculated for each wavelength.

Instrument control and calculation is performed by the integrated PC and the easy-to-use, menu driven Omega software, running under Windows 98. An integrated dialog display serves as user interface with an interactive touch screen.

3.2 General description

The OmegAnalyzer F is a compact unit with keyboard, display and sample drawer at the front and a Power On switch and connectors at the rear. Following elements are situated on the front panel:

Display

The display is located at the upper part of the front panel. It is the user interface for the integrated Omega software and displays menu options, dialogs, measurement results, error messages etc. The display serves as touch screen at the same time.

Sample drawer

The sample drawer at the lower front part of the instrument is used as sample presentation unit.



Fig. 3.1: Front view of the OmegAnalyzer

The following elements can be found at the rear panel (see figure 4.1):

- Power ON/OFF switch
- input power connector
- 2 USB connectors
- 1 serial connector (Com1)
- 1 parallel printer connector (LPT1)
- 1 network connector (Ethernet)
- 1 PS/2 connector (Keyboard / mouse)

Internally, the instrument is divided into the following sections:

- Sample presentation unit
- dust sealed Optics module
- Controller module (integrated PC)

The OmegAnalyzer F is calibrated with the GRAMS/32 software. A product of the Thermo-Galactic Industries Corporation. For further information please contact the

Thermo-Galactic Industries Corporation

395 Main St. Salem, NH 03079

Tel.: (603) 898-7600

Fax: (603) 898-6228

or an authorized franchised dealer like Bruins Instruments, Puchheim / Germany.

3.3 The Omega software

The BRUINS INSTRUMENTS Omega software is a menu-oriented graphical user interface which provides all instrument functions. The main features are:

- dynamic product database
- unlimited number of products and properties
- simultaneous measurement and display of multiple properties
- archive functions to back up measuring results on diskettes
- print-outs for measurements, product and property information
- software upgrade capability

The OmegAnalyzer F is delivered with the current Omega version installed.

3.4 Principle of Operation

The beam path of the instrument is schematically represented in Fig. 3.2.

The light of a tungsten halogen lamp illuminates the entrance slit of the monochromator. Inside the monochromator, the light is diffracted by an optical grating. For each grating angle, a different NIR wavelength is obtained at the exit slit. The monochromatic NIR light leaving the monochromator strikes the meat placed into the sample compartment. After interaction with the grain meat sample, the remaining light leaves the sample. A large portion of this light is collected under a wide angle on a silicon detector underneath the sample plate to generate a corresponding photometric signal.

As different portions of the sample are sequentially presented in the sample compartment, the averaged spectrum obtained at the end represents the mean properties (protein, moisture, oil, etc.) of a significant sample volume.

From the ratio sample reading/reference reading the reflectance value is calculated which provides the basis for calculating the property values of the sample.

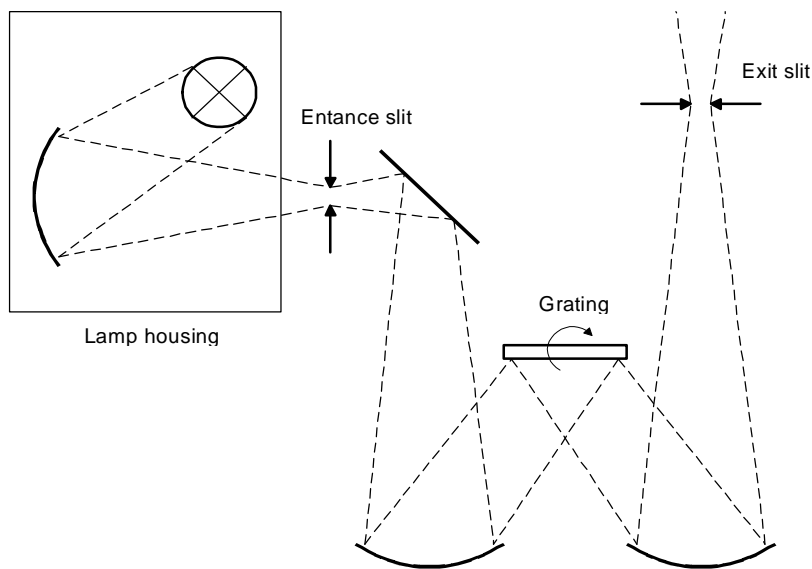


Fig. 3.2: Monochromator principle

3.5 Technical Data

Optical data

Measurement time	approx. 50 s
Spectral range	730 – 1100 nm (standard configuration)
Integrated computer	at least Pentium II with at least 166 MHz and a hard disk of at least 8 GB
Software	Integrated Omega software
Dimensions:	Height: 590 mm Width: 355 mm Depth: 385 mm
Weight:	41 kg
Power requirements	210 – 260 V AC (50 – 60 Hz) or 110 – 130 V AC (60 Hz)
Power consumption	80 VA
Environmental specifications:	
Operating temperature:	5 to 40°C / 41 to 104°F
Storage temperature:	0 to 40°C / 32 to 104°F
Humidity limit:	Up to 80% relative (non-condensing)

4 Installation

4.1 Installation Requirements

General

The instrument should be installed on a horizontal surface in a clean area, free of corrosive vapors, vibrations, electrical fields, excessive humidity, and temperature variations.

Space requirements

36 cm width x 39 cm depth plus an extra 5 cm at the rear for cable connections, and an extra 27 cm at the front to pull out the sample drawer.

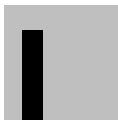
Power requirements

210 - 260 V AC (50 - 60 Hz) or 110 - 130 V AC (60 Hz). (Always check that the mains supply voltage indicated on the instrument label at the back of OmegAnalyzer F corresponds to your mains supply voltage).

Operating environment

Temperature: 5 to 25°C / 41 to 104°F

Humidity: Up to 80% relative (non-condensing)



Warning:

The instrument is designed for normal environments only. Do not operate it in corrosive, humid or other extreme environments.

Make sure that any additional and relevant safety regulations which apply in your case are observed, even if they are not mentioned in this manual.

4.2 Transport and Storage

Before the OmegAnalyzer F is installed it is best kept in the air-sealed transport container. Storage temperature is 0 to 40°C / 32 to 104°F in a non-condensing atmosphere.



Warning:

Avoid sudden impacts during transport

4.3 Unpacking and Inspection

Unpack the contents of the cartons and remove all exterior packing material. Save all cartons and packing material for possible future use.

The following items will be delivered with the OmegAnalyzer F:

- Lamp Accessory
- Software package (the Omega software is already installed)
- Operation manual

The following items are optional:

- Keyboard
- Mouse
- Ticket printer
- Parallel printer
- GRAMS-software
- External CD or high capacity disk drive

Inspect all items for damage and call BRUINS INSTRUMENTS if necessary.

4.4 Electrical Connections

Install the OmegAnalyzer F as follows:

1. Connect one end of the power cable to the input power connector at the rear of the OmegAnalyzer F (pos. 7 in Fig. 4.1) and the other end to an AC source providing 210 – 260 V AC and 50 – 60 Hz or 110 – 130 V AC and 60 Hz.
2. If a printer is to be used, connect the corresponding cable to the printer connector at the rear of the instrument (pos. 2 in Fig. 4.1).
3. Additional connections for keyboard and / or mouse are possible via the PS2 connector. If both devices should be attached, a Y wedge must be used.
4. Keyboard and mouse can be connected also via the USB connectors, as well as further devices, like external drive or modem.
5. To link the system to your network use the Ethernet connector.
6. A modem can be attached either to an USB or the serial connector.

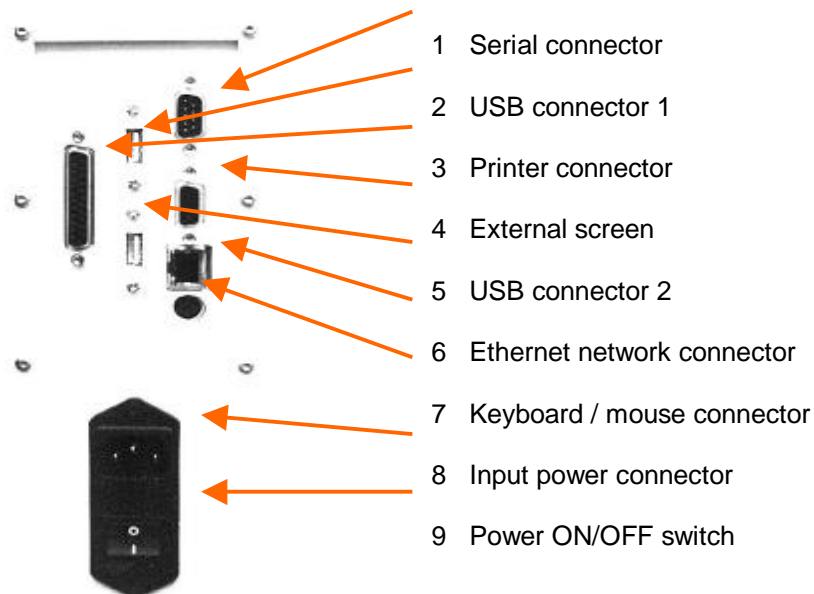


Fig. 4.1: Connectors of the OmegAnalyzer F

5 Operation

5.1 Start-up and Shutdown

When all OmegAlyzer F components have been installed, the instrument can be started: Use the ON/OFF switch at the rear panel of the instrument to switch it on. Allow at least 10 minutes for the spectrometer to reach its operating temperature, then you can start measuring spectra. (For a description on how to operate the Omega Software, refer to the next section)



Caution:

Before you switch off the instrument, always make sure that you terminate the Omega software first to avoid damaging files.

6 The Omega Software

Designed as control software for the BRUINS INSTRUMENTS OmegAnalyzer F the Omega software provides easy run programming and data processing and retrieval.

For the software description following conventions are used:

Bold type	Field labels, dialog boxes and windows e.g. Auto ++
Bold + italic type	Buttons and menu options you can select, e.g. <i>Measure</i> .
Typewriter text	File or directory names and text to be entered via the keyboard, e.g. C:\Meat

Although the instrument is equipped with a touch screen, it is also possible to operate it via mouse and keyboard as the corresponding interfaces are provided at the rear. Therefore the terminology concerning the software operation is related to the operation via mouse and keypad, so that you will find expressions like 'click' and 'press'.

6.1 Starting Omega

To start Omega proceed as follows:

- Switch on the instrument.
- As the Omega software is part of the Windows system Autostart file, so the software is started automatically.
- If you are on the top of the Windows start menu, double-click ***Meat*** to start Omega.
- The Warm up Instrument window is displayed at the screen and you are asked to wait until the instrument has reached its operating temperature.

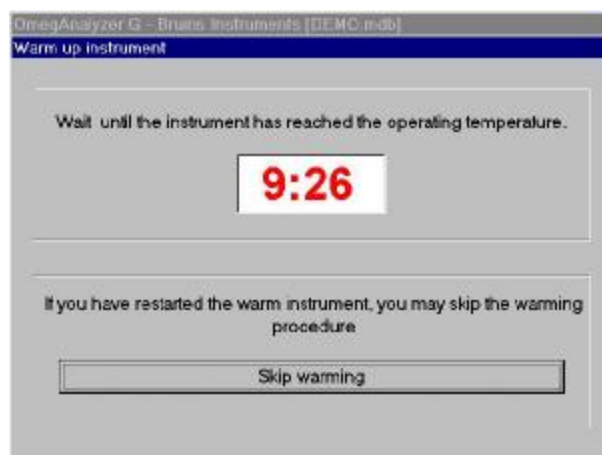


Fig. 6.1: The Omega Start Window

- The warm up time is adjusted to 10 minutes. After these ten minutes the window will change. Click at **Start reference scan**, to take a reference scan which is needed for adjustment before starting sample measurements.
- If you have restarted the warm instrument, you may skip the warming procedure by clicking the **Skip warming** button to get directly to the Omega main window.

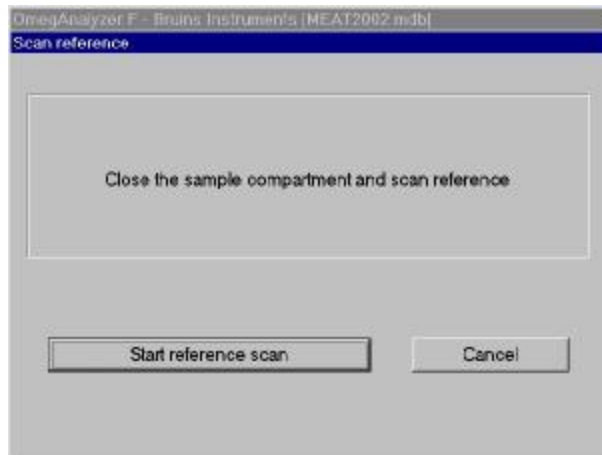


Fig. 6.2: Start reference scan

6.2 Terminating Omega and Shutting down the System

To exit Omega and shut down the system, proceed as follows:

- Close all open dialogs and windows.
- Click **Shutdown system** in the Functions dialog box.
- You will be asked whether you want to shut down your system or cancel shutdown, click the corresponding button.

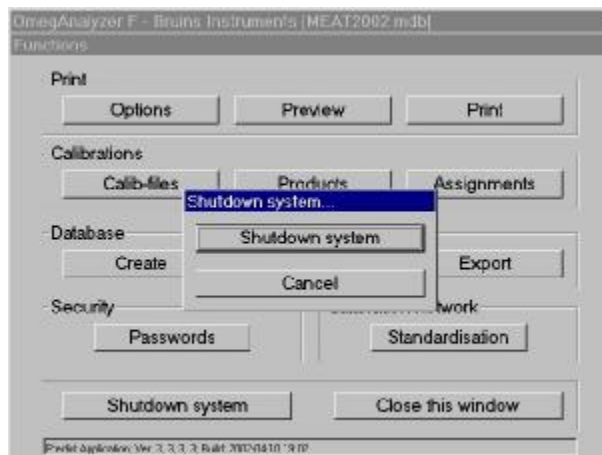


Fig. 6.3: Shutdown system

- A screen message will let you know when you can safely turn off your computer.
- Now you can switch off the OmegaAnalyzer F with the ON/OFF switch at the rear.



Caution:
To avoid damaging files, always shut down Windows before you switch off your computer.

6.3 The Omega Main Window

After the warming up period is finished and the reference measurement has been taken, the Main window appears on the screen. In the headline, the name of the current database is displayed. In the field below, the name of the currently selected product is indicated.

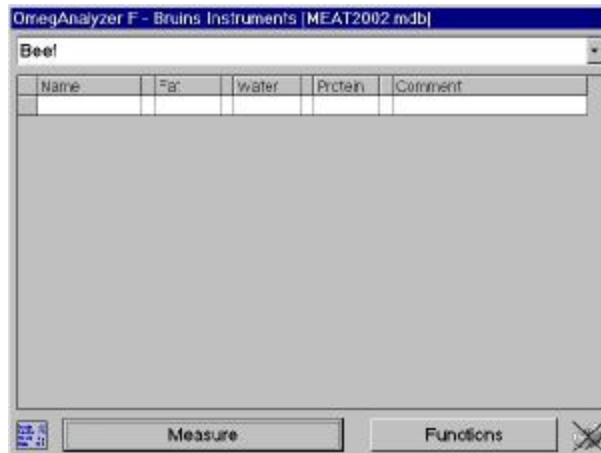


Fig. 6.4: The Omega Main Window

The Main window contains two buttons: Measure and Functions. They provide the following options:

- Measure** To open the Scan sample dialog box where the spectrum name, a corresponding remark and additional features can be entered and the measurement can be started, see below.
- Functions** To open the Functions dialog box where different functions can be carried out and additional dialogs can be opened, see section 6.5.

To change the product, click the arrow at the right-hand side of the product field and select another product from the appearing drop-down product list by clicking on it.

The Omega Main window contains a table with a certain number of columns depending on the number of assigned properties that are to be analyzed in the selected product.

The first column shows the name given to the corresponding spectrum before measurement. It can be changed by clicking the corresponding line and typing in a new name.

The following columns each contain a different property that is to be analyzed in the selected product. The measured values for these properties are displayed in the corresponding columns.



The measuring results cannot be deleted!

In the last column, remarks about the measurement can be entered to provide more information about it. These remarks can also be entered after a measurement. To enter or change a remark, just click the corresponding line and type in the remark.

Sample details

To look at the sample details of a certain sample spectrum, double-click the corresponding line in the table of the Main window. The **Sample details** dialog box will open:



Fig. 6.5: Sample details

In this dialog box the spectrum name, the date of the measurement and a comment providing more information about the spectrum are displayed. The comment is optional and can be changed after the measurement by clicking in the corresponding line.

Furthermore the dialog box contains the product name and optionally the storage and processing conditions, the duration of the storage and the temperature at which the product was measured. You can determine parameters by clicking the arrow next to the corresponding field.

If you change the product name after a measurement, you will be asked whether you want to update the predictions corresponding to the new product or not.

Click **yes** to update the predictions corresponding to the new product and store the value under the corresponding Product name, or click **no** to store the current measuring value under the corresponding product name.

The check box **Export performed** is activated automatically when you have already exported the corresponding spectrum to a database (see section 6.6.3.3).

If you do not want the corresponding spectrum to be printed in a report, activate the **Mark as deleted** check box.

In the table subscribed with '**Predicted value and Reference laboratory value for sample's components**' the sample components (properties) are displayed with their assigned calibrations, the Offset (bias) and Factor (skew) values determined in the **Parameters for Calibration** dialog box, the measured value calculated with the selected calibration, and a reference value from a reference laboratory, if available.

Click **Save and >>** to save all changes and display the following sample details, click the **<<** or **>>** button to move to the following or previous sample details without storing, or click **Close** to close the dialog box and return to the Main window without storing.

To look at the spectrum with its 16 scans in a graphical representation, click the button right next to the small red graph. The perspective of the graph can be changed by pressing the right mouse button and moving the mouse.

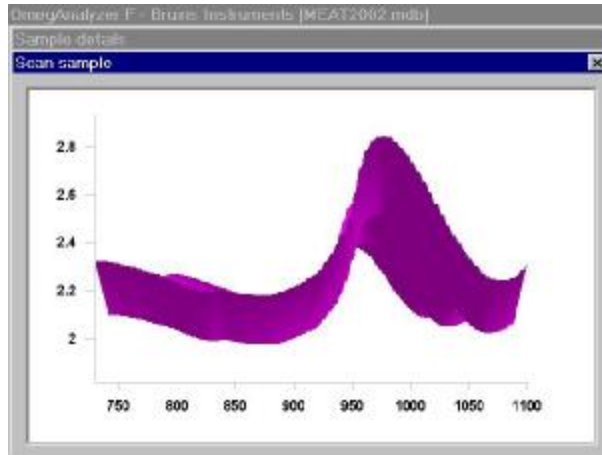


Fig. 6.6: Sample Scan

6.4 Scan Sample

After warming up, you can start a measurement by clicking **Measure**. In the Scan sample dialog box the sample name has to be entered. This is the name under which the spectrum is stored in the database. If you want to change the name after the measurement has been carried out, just click the corresponding line in the table of the Main window and type in a new name.



Fig. 6.7: Scan Sample

If you attach a number to the spectrum name and activate the Auto+ + check box, the number behind the spectrum name will be increased automatically for the next measurement. You can also increase or decrease the added number by clicking on the arrows next to the spectrum name.

A temperature can be entered in the °C field indicating the temperature of the sample during the measurement.

The sample should always be measured at temperatures comparable to those the meat had during the calibration process. Otherwise the measuring results could be distorted.

You may also add a remark for each spectrum in the **Remark** box in order to provide more information about it. The remark for each measurement will be displayed in the table of the Main window.

If you want to add a remark or change the remark after the measurement has been carried out, just click the corresponding line in the table of the Main window.

After having typed in a spectrum name, you can start measuring your sample. Place the sample into the drawer if you have not done so yet, and click **Start sample scan** to start the measurement of your sample, or click **Cancel** close the dialog box without starting a measurement.

The screenshot shows a software window titled "OmegAnalyzer F - Bruins Instruments [MEAT2002.mdb]". Inside, there is a dropdown menu set to "Beef" and a table with the following data:

Name	Fat	Water	Protein	Comment
Mix 1	12.0	67.3	18.0	
Mix 1	12.3	67.3	18.6	
Mix 2	13.5	66.2	18.5	
Mix 2	13.6	66.0	18.6	
Mix 3	13.9	66.8	18.6	
Mix 4	13.9	66.9	18.4	
Mix 5	12.4	67.4	18.6	
Mix 5	12.6	67.8	18.7	
Mix 6	12.3	67.3	18.7	
Mix 6	12.6	67.4	18.7	
Mix 6	12.6	67.4	18.7	
Mix 7	x	x	x	
Mix 7	x	x	x	
Mix 7	14.0	66.5	18.8	
Mix 7	14.1	66.5	18.2	

At the bottom of the window, there are buttons for "Measure" and "Fonctions" (with a crossed printer icon).

Fig. 6.8: Main Window with Result

The measuring results are given in a unit according to the calibration (for example percent, ml, g etc.). Before being displayed on the screen, they are tested in different ways concerning Spectral Residuals, the Mahalanobis Distance and the concentration limits given for the corresponding calibration.

The Mahalanobis Distance aims at finding out how well the sample fits in the calibration model. The test concerning the concentration limits makes sure that the measuring results remain within the predetermined concentration limits. For the concentration limits a tolerance rate of 5% is applied to the measuring results in order to guarantee more stable and reliable values.

Measuring results within the limits of the used calibration are displayed on the screen. Outliers according to the tests carried out are not displayed on the screen. You will just see a cross in the line behind the corresponding parameter indicating an outlier according to one of the tests.

Ticket printout

By clicking at the crossed printer icon at the lower right corner, the actual results will be printed at an attached ticket printer.

The next measurements will be printed, until the printout will be disabled by another click at the printer icon.

Single sample display

Especially for use in production a larger display might be needed. By clicking at the table icon in the lower left corner the screen will change to a single sample display with bigger characters.

Clicking again to this icon will change back to the table display.

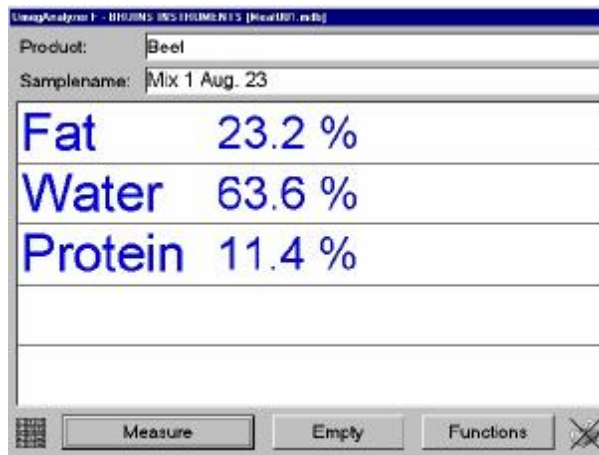


Fig. 6.9: Big display

If you double-click in the table display a field with an outlier cross, the Test-Results dialog box will open, providing more information about the constituent with the outlier reason. Clicking in this field without outlier will show information about mean, max and standard deviation of the subsamples. Click **OK** to close the dialog box.

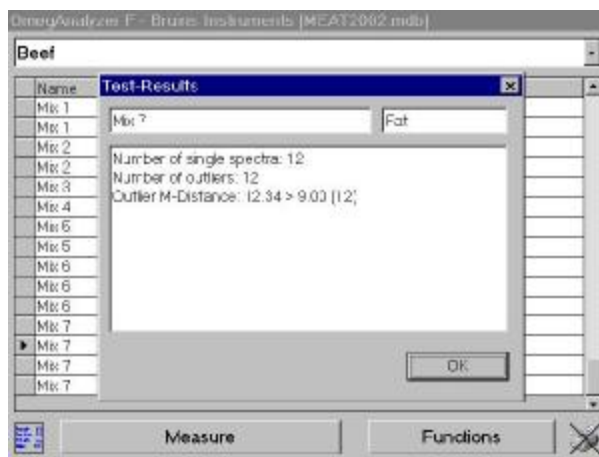


Fig. 6.10: Outlier data

6.5 The Functions Dialog Box

To carry out further adjustments and options, click **Functions**. The **Functions** dialog box will open:

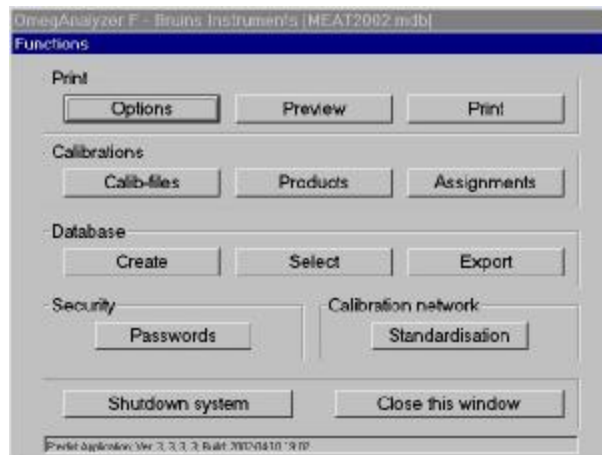


Fig. 6.11: Functions

F

The functions accessible via the Functions dialog box might be password protected. If this is the case, you are asked to enter the corresponding password after having clicked a button. Type in the password for the function you want to activate and press Enter. The corresponding dialog will appear.

The **Functions** dialog box provide following options:

Options	To set the print options (section 6.6.1.1)
Preview	To preview the print-out (section 6.6.1.2).
Print	To print a report (section 6.6.1)
Calib-files	To load calibration files (section 6.6.2.1)
Products	To add or delete products (section 6.6.2.2)
Assignments	To assign calibrations to products (section 6.6.2.3)
Create	To create a new database (section 6.6.3.1)
Select	To load an existing database (section 6.6.3.2)
Export	To export data (section 6.6.3.3)
Passwords	To determine passwords to protect functions (section 6.6.4.1)
Standardization	To measure samples for standardization (section 6.6.5)

6.5.1 Print

6.5.1.1 Options

To determine which lines and products of the table in the Main window are printed out in the report, click **Options**. The **Options for printing** dialog box will open:

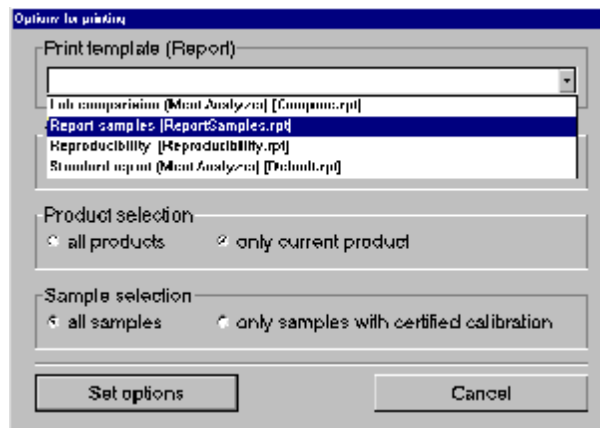


Fig. 6.12: Print Options

Print template (Report)

In the upper part of the **Options for printing** dialog box you can determine what kind of report you want to print. The software offers several templates for printing.

Time selection

The time selection enables you to determine which measuring results are printed. You can either print all measuring results stored in the database or the measuring results of the current day by activating the corresponding check box.

You can also select the time frame check boxes and enter two dates to determine the time interval of which you want the report to be printed.

Product selection

By means of the Product selection you can choose whether you want to print the measuring results of all products or just those of the product currently selected, by activating the corresponding check box.

Sample selection

The sample selection enables you to choose whether you want to print all samples or only the samples with a certified calibration.

Click **Set options** to store all changes and close the dialog box, or click **Cancel** to close the dialog box without storing any changes.

6.5.1.2 Preview

To preview the print-out of your defined report on the screen, click **Preview**. The **Preview window** appears:








The screenshot shows a window titled 'Print report' with a toolbar at the top containing navigation and printing icons. The main content area displays a table with the following data:

Date	Name	Fat	Moisture	Protein	Comme
26.09.02 16:10:18	*Beef1	12.9	65.6	13.4	
26.09.02 16:12:06	*Beef2	13.7	65.0	13.3	
26.09.02 16:13:36	*Beef3	13.3	65.4	13.4	
26.09.02 16:14:23	*Beef4	12.7	65.9	13.4	
26.09.02 16:41:16	*Beef4	12.6	67.2	13.7	
26.09.02 16:42:16	*Beef4	12.7	67.0	13.5	
26.09.02 16:43:04	*PC	12.8	67.2	13.5	
26.09.02 16:44:32	*Mea 1	12.6	67.3	13.4	
26.09.02 16:51:20	*Mea 1	12.3	67.3	13.4	
26.09.02 16:53:42	*Mea 2	13.5	65.2	13.5	
26.09.02 16:54:47	*Mea 2	13.8	65.1	13.8	

Fig. 6.13: Report Preview

In the report shown above, the date and time of the measurement, the spectrum name, the measured constituents and the corresponding comment are printed.

According to the settings, the following buttons are active:

-  First page to display the first page of the report.
-  Previous page to display the previous page of the report.
-  Next page to display the next page of the report.
-  Last page to display the last page of the report.
-  Print report to print the report or a part of it on the connected printer.
-  Export to export the report in a certain format to a certain destination.
-  Close to close the preview screen.

6.5.1.3 Print

To print a predefined report on your connected printer, click **Print**. The report will be printed immediately.

6.5.2 Calibrations

6.5.2.1 Calib-files

To carry out calibration adjustments, click **Calib-files**. The **Calibration files** dialog box is displayed:

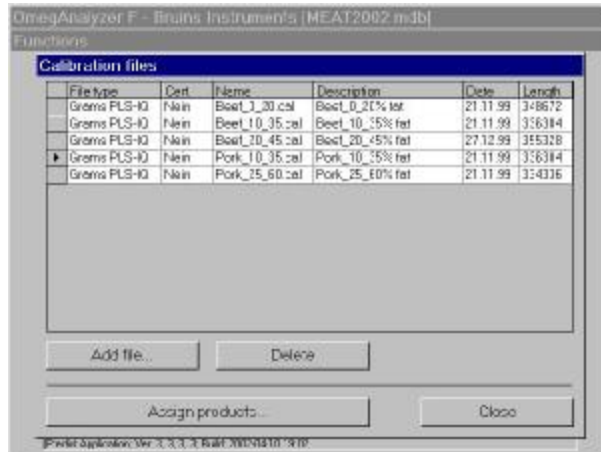


Fig. 6.14: Calibration list

It contains a table with the File type, a statement whether the corresponding calibration is certified or not, the name of the calibration, a description of it, the date of its creation, and the file length of the calibration file.

Adding a calibration file

Click **Add file** to add a calibration file. The **Add calibration file dialog box** appears:



Fig. 6.15: Add calibration

In this dialog box you can select a calibration file type and determine whether the calibration you want to open should be certified or not by activating the check box **Certified**. Click **Open** to determine the directory in which the calibration file is stored, search the corresponding directory, select the calibration file you want to open and click **Open** again.

The selected calibration file with further details concerning the file is displayed in the dialog box.

To add the selected calibration file to your list of calibrations, click **Add**, to close the window without adding a new calibration file, click **Cancel**. You will return to the **Calibration files** dialog box.

To delete a calibration file from the list in the Calibration files dialog box, mark the corresponding line in the table with the arrow and click **Delete**.

Assigning calibrations to products

When you click **Assign products** **Assignments of calibrations to products** dialog box will open:

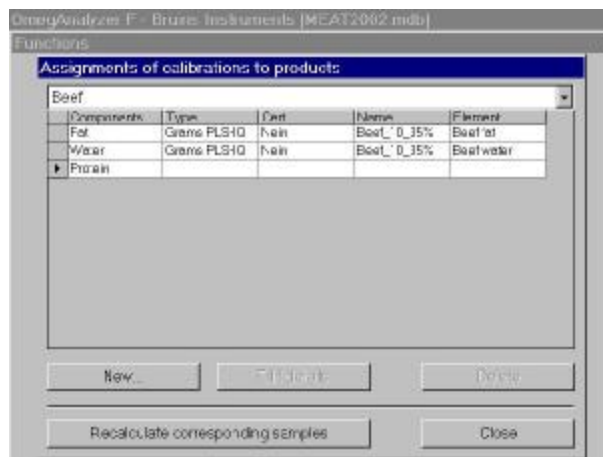


Fig. 6.16: Assign calibration

At the top of the dialog box the product currently selected is displayed. The table below contains the components (properties) to be analysed in the product, the type of calibration assigned to the properties, a statement whether the corresponding calibration is certified or not, the name of the calibration, and the elements it consists of.

If you have changed any factor in the **Parameters for Calibration** dialog box or if you have assigned a new calibration to a product, the button **Recalculate corresponding samples** in the dialog box **Assignments of calibrations to products** becomes active.

When you click this button, the measurement results of the current product are recalculated according to the changes performed.

To delete a line in the table of the **Assignments of calibrations to products** dialog box, mark the line by clicking it and click **Delete**.

To close the **Assignments of calibrations to products** dialog box, click Close You will return to the Functions dialog box.

Click **New** to assign a calibration to a product. The **Assign calibration to product** dialog box appears:

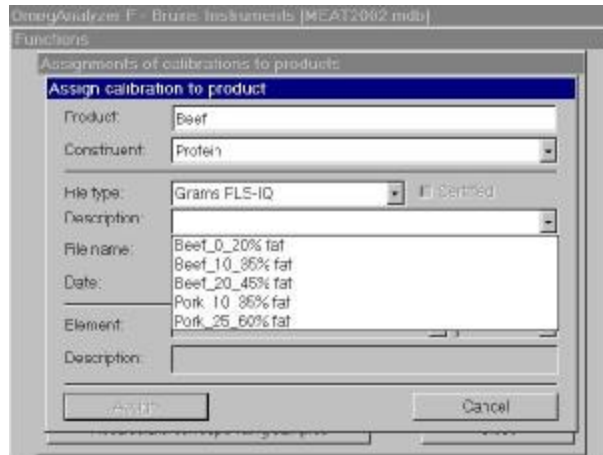


Fig. 6.17: Select Calibration

In the dialog the product selected in the **Assignments of calibrations to products** dialog box is displayed.

Select the constituent of the product for which you want to assign a calibration by clicking the arrow next to the Constituent field.

Then choose the calibration file type and the description. The file name, date and the file length will be displayed automatically after the selection.

Finally the element of the calibration can be determined according to the selected constituent.

Click **Assign** to assign the selected calibration to the current product, or click **Cancel** close the dialog box without assigning. You will return to the Assignments of calibrations to products dialog box.

To edit the details click **Edit details**. The **Parameters for Calibration** dialog box will open:

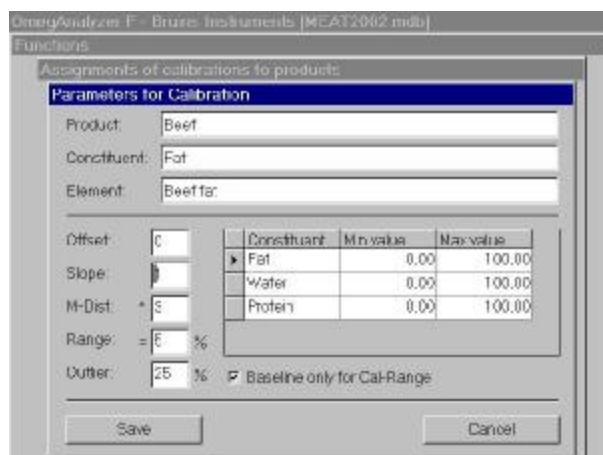


Fig. 6.18: Edit calibration details

In this dialog box you can determine the **Slope** (skew), the **Offset** (bias) value, the **Mahalanobis** limits, the extended **range** and the allowed percentage of **outliers** in subsamples applied to the measuring results.

If the calibration uses only a part of the measured wavelength range, mark **Baseline only for Cal-Range**.

Click **Save** to store all changes and close the dialog box, or click **Cancel** to close the dialog box without storing any changes. You will return to the Assignments of calibrations to products dialog box.

6.5.2.2 Products

Click **Products** to carry out product adjustments. The **Products** dialog box will open:

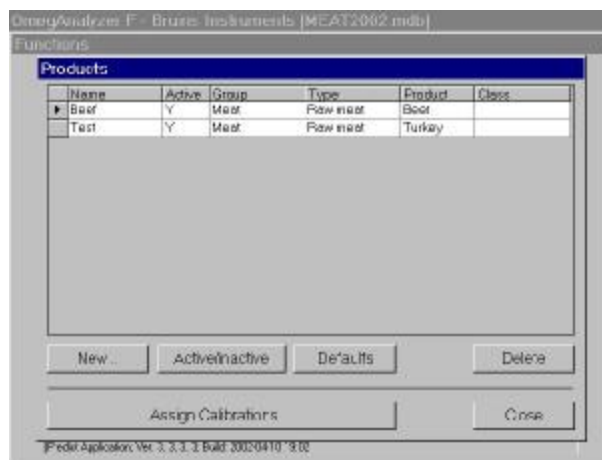


Fig. 6.19: Product list

It contains a list of all possible products to choose from with a statement whether they are switched active or inactive, the group the product belongs to, the product type, and the product class.

Adding a new product

Click **New** to add a new product to the list. The **Add new product** dialog box will open:

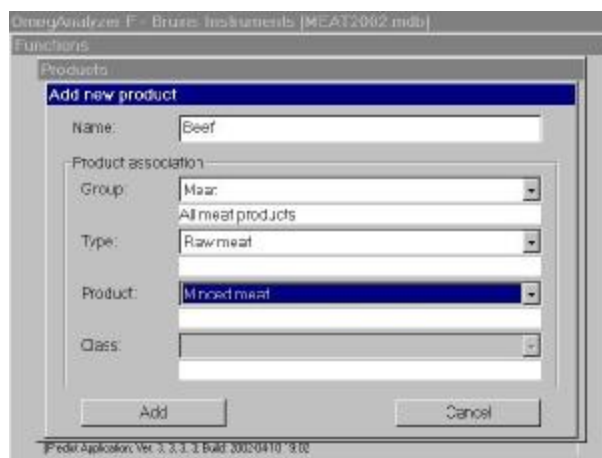


Fig. 6.20: Add product

Type in the name of the new product in the dialog box and assign a group, a type, a product and, if possible, a class to it.

Click **Add** to add the new product to the Products list, or click **Cancel** to close the dialog box without adding anything. You will return to the Products dialog box.

If you want to inactivate one or several products, that they will not appear in the product list of the Main window, select the corresponding product by clicking the corresponding line and click **Activate/Inactivate**. The status of the product will change. An activated product is marked with a 'Y' in the table, an inactivated with an 'No'.

To delete a Product from the table, mark the corresponding line by clicking on it and click **Delete**.

When you click the **Assign calibrations** button, the **Assignments of calibrations to products** dialog box will open (for details concerning this dialog see page 30f).

Click **Close** to close the dialog box and return to the Functions dialog box.

6.5.2.3 Assignments

When you click the **Assignments** button the **Assignments of calibrations to products** dialog box will open (for details concerning this dialog see page 30f).

6.5.3 Database

6.5.3.1 Create

Click **New** to create a new database. The **Create New Database** dialog box will open:

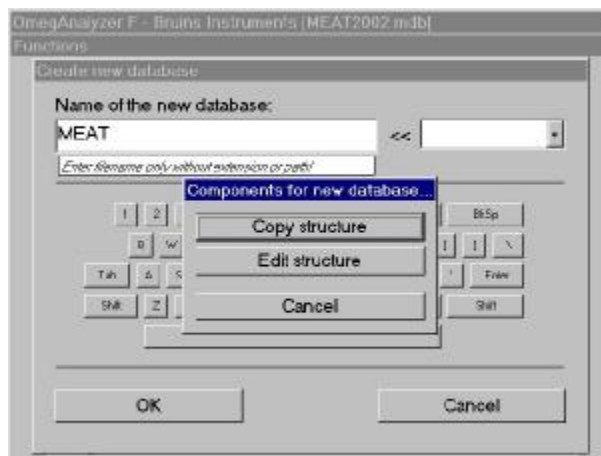


Fig. 6.21: Create database

Type in the name of the new database you want to create without extension or path. In the field on the right-hand side you can select additional information about the database concerning the time of its creation that is attached to the name.

Click **OK** to store all changes and close the dialog box, or click **Cancel** to close the dialog box without storing any changes.

After having clicked OK you are asked whether you want to copy the structure of the currently open database to the new one or if you want to edit the structure.

If you want to copy the structure without performing any changes in the selection of constituents, click **Copy structure**. You will return to the Main window.

If you want to edit the structure, click **Edit structure**. The **Database structure** dialog box will open:

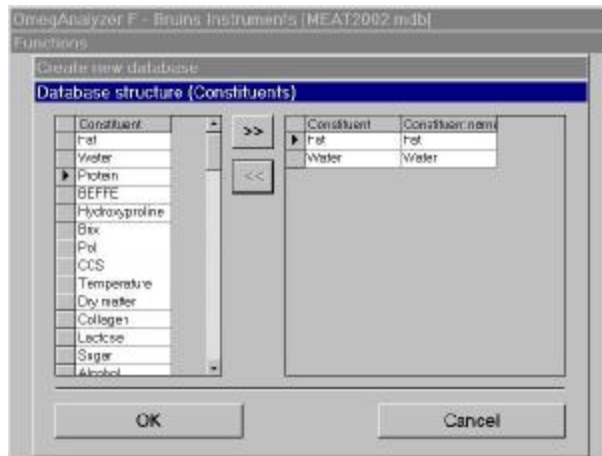


Fig. 6.22: Edit database structure

In this dialog box you can determine the constituents to be displayed in the table of the Main window.

On the right-hand side of the dialog box you have a list of all possible constituents to choose from.

On the left-hand side the constituents currently selected for your database are displayed.

To edit the table on the right, use the buttons in the middle:

If you want to add a constituent to the table on the right, mark the corresponding constituent on the left by clicking on it and click the >> button.

To delete a constituent from the table on the right, mark the corresponding constituent by clicking on it and click the << button.

In the column subscribed with 'Constituent name' you can edit the name of the constituent by clicking the corresponding line, thus determining the actual subscription of the columns in the Main window.

6.5.3.2 Select database

Click **Select** to open an existing data base.

Search the directory in which want to load is stored and open it. The selected database will be loaded and displayed in the Main Window,

6.5.3.3 Export data

Click **Export** to export a data. You can now choose between:

- Export database to database
- Export database to Spectra- and CFL-files
- Export database to Report-Database
- Exit Export

Exporting a Database

If you want to export an extract of your current database with all calibrations and spectra, click **Database**. The **Export database extract** dialog box will open:



Fig. 6.23: Export database

To select the destination of your export, click the **To file** button to determine the directory to which the database extract should be exported, search the corresponding directory or create a new one and save it.

In the **Export database** dialog box extract you can set the time interval of which you want the database to be exported by clicking the arrow next to the date fields.

If you do not want to export samples which have already been exported before, activate the corresponding check box.

After you have set all parameters, click **Export** to export the current database to the selected file, or click **Cancel** to close the dialog box without exporting. You will return to the **Functions** dialog box.

When a database has been exported, the **Export performed** check box in the corresponding **Sample details** dialog box is marked (see section 6.4).

Exporting Spectra for Products

To export only the SPC-files containing the spectra and the CFL-files containing all laboratory values of a certain product, e.g. for calibration development, click **Export-Spectra- and CFL-files**. The corresponding dialog box will open:

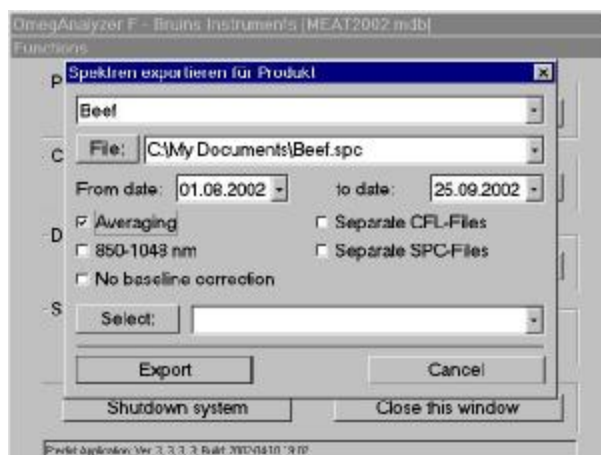


Fig. 6.24: Export Spectra

You can select the product of which you want the spectra to be exported by clicking on the arrow next to the field at the top of the dialog.

Click **File** to determine the directory to which you want to export the spectra, search the corresponding directory or create a new one and save it.

In the **Export spectra for products** dialog box you can set the time interval of which you want the spectra to be exported by clicking the arrow next to the date fields.

If you do not want to export all 16 scans of a spectrum, but only the average of the measurement, activate the **Averaging** check box.

To create separate CFL-files for each constituent, activate the **Separate CFL-Files** check box.

If you do not want data pretreatment of the spectra, activate **No baseline correction**.

To create separate SPC-files, activate the **Separate SPC-Files** check boxes.

If you want to export only the spectra measured within the specific wavelength range from 850-1048 nm, activate the **Only 850-1048 nm** check-box.

After you have set all parameters, click **Export** to export the spectra of the selected product to the selected file, or click **Cancel** to close the dialog box without exporting. You will return to the **Functions** dialog box.

Exporting a Report-Database

To create your own report design or statistic purposes, you can export a report database with products and measuring values by clicking the corresponding button. The **Export Report-Database** dialog box will open:



Fig. 6.24: Export an Access report file

Click **To file** to determine the directory to which you want to export the database extract, search the corresponding directory or create a new one and save it.

In the **Export Report Database** dialog box you can set the time interval of which you want the database to be exported by clicking the arrow next to the date fields.

After you have set all parameters, click **Export** to export the Report-Database to the selected file, or click **Cancel** to close the dialog box without exporting. You will return to the **Functions** dialog box.

6.5.4 Security

Passwords

To determine the passwords for different pass word-protected Omega features or change existing passwords, click **Passwords**. The **Passwords for protected functions** dialog box will open:

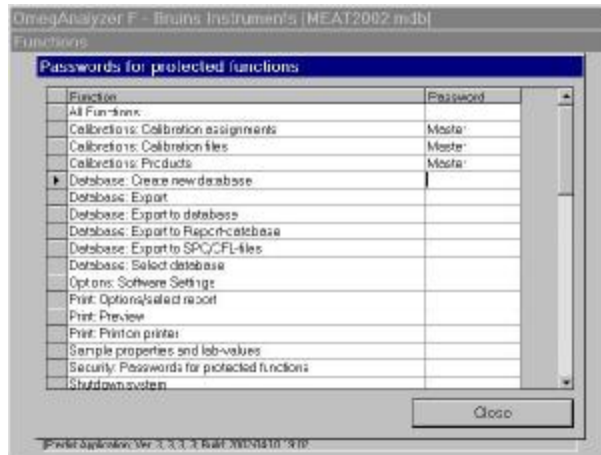


Fig. 6.26: Password input

In this dialog box, you can change the passwords for different functions of the **Functions dialog box**.

Type in the new password/s for the functions you want to be pass word-protected or delete the password/s for the functions you do not want to be pass word protected.

The changes are automatically saved as soon as they are typed in. Click **Close** to return to the **Functions dialog box**.



Caution: If you delete a password it cannot be restored!

Write your passwords down to keep them in mind.

Note: Passwords should be kept secret for safety reasons. If you write down your password, make sure that only authorized people have access to the information.

We recommend to change the passwords in periodical intervals

In the Functions dialog box, click **Close** to close the dialog box and return to the **Main window**, or click **Shutdown system** to shut down your system.

7 Analyzing Samples

Once you have set up the desired products and properties, you can start analyzing samples with prediction of property results.

When you have prepared the sample it can be filled into the sample cup which can then be inserted in the drawer for sample analysis. BRUINS INSTRUMENTS provides a number of different cup types for different sample types. For further information please contact your local representative.



Please observe the hints about sample preparation and filling technique for the open cup in the following chapter.

To start the measurement, proceed as follows:

- Click **Measure**. The Scan Sample dialog box appears.
- Enter a sample name, and optionally, a remark and temperature.
- Click **Start** Sample Scan to **start the measurement**.

The measuring results will be displayed in the Main Window as soon as the measurement is completed. For detailed information on the Scan Sample dialog box, see section 6.4

7.1 Sample Preparation

The sample preparation techniques required vary according to the sample type to be analyzed. The following will give you some general guidelines that should be observed.

- **Uniform distribution**

Before taking a sample, make sure that the product in the container is uniformly distributed. This is necessary, because the sample to be analyzed should be representative of the whole container.

A uniform distribution can usually be obtained by mixing the product in the container before taking a sample.

This is extremely important for samples that will be used to set up a calibration. The sample sent to a laboratory to obtain reference values must have the same composition as the one used for analysis on the OmegAnalyzer F.

The OmegAnalyzer F is designed for the analysis of non-homogeneous products.



Once a grinder and grinding procedure have been established do not change them while using the same calibration

The same procedures must be used on both calibration and unknown samples, because the particle size influences the amount of scattered light on the sample surface and therefore also the reflectance values of the sample.

7.2 Filling the Sample Plate

1. Clean the bottom of the plate with the glass window as necessary:
If the window is greasy, clean it with isopropyl alcohol and a clean, lint-free cotton cloth or soft paper tissue or, even better, with special lens paper. Afterwards make sure the window is completely dry, otherwise the spectra will be influenced.



Do not touch the window with your fingers, because grease or scratches can impair the measurements.

2. Thoroughly mix the product to be able to take representative samples.
3. Fill the plate to overflowing using a spatula (see Fig. 7.1) and tab it down.



Fig. 7.1: Filling sample into the plate

4. Remove the excess sample with one smooth horizontal motion of the spatula across the top of the plate (see Fig. 7.2).



Fig. 7.2: Removing the excess sample

5. Place the plate on the rotary support in the sample drawer.

8 Instrument Maintenance

This section contains maintenance procedures. To ensure proper operation of the instrument, you should carry out the following procedures at the suggested intervals:

Regular maintenance

- Cleaning the instrument when it appears dirty.
- Replacing the lamp when indicated by the Omega software.

8.1 Cleaning the Instrument

Clean the exterior of the instrument

Wipe the exterior of the OmegAnalyzer F and the display with a soft damp cloth and wipe it dry with a soft cloth as well. For the display it is even better to use a mild glass cleaner.

Clean Sample drawer

1. If the instrument is switched on, shut it down as described on page 19.
2. Extend the Sample drawer to its fully out position
3. Remove dust or sample deposits on the drawer with a soft clean and damp cloth.
4. Close the Sample drawer.

8.2 Replacing the Lamp

The halogen lamp in the spectrometer has a limited life and must be replaced after a certain time when it is defective or the light intensity is too low (normally after half a year).

The intensity of the lamp is automatically checked by the Omega software and a message will be issued if the lamp needs to be replaced.

To remove the lamp proceed as follows:

- 1 Switch off the OmegAnalyzer F and unplug the power cord.
- 2 Unscrew the two Allen screws holding the lamp assembly with an Allen key (fig. 8.1).



Fig. 8.1: Unscrewing the Allen

- 3 Remove the lamp assembly from the housing by taking the plug and carefully pulling it out (fig. 8.2).



Fig. 8.2: Removing the lamp

- 4 Loosen the plug by pressing the push button at the plug and carefully pulling it out (fig. 8.3.).



Fig. 8.3: Removing the plug

To install a new lamp proceed as follows:

1. Take a new lamp assembly and orient it so that the groove is located at the top, above the positioning pin in the lamp housing.
2. Carefully slide in the lamp assembly into the housing without jamming it, until the pin fits into the groove and the assembly has reached its fully in position.
3. Put the plug back into the lamp assembly and fasten the two Allen screws.
4. Plug in the power cord and switch on the instrument.

No further adjustment of the lamp assembly is necessary.



Warning: Be careful not to touch the halogen lamp to avoid burning your fingers.

The position of the halogen lamp in the assembly is factory-adjusted for optimum output. Do not loosen any of

9 Troubleshooting

9.1 General Troubleshooting Information

The Omega software automatically checks for:

- **Hardware errors**
e.g. the lamp has to be replaced.
- **Software errors**
e.g. database errors.
- **User errors**
e.g. an invalid product has been selected for analysis.

When the software detects such an error, an error number and a brief error message will appear on the display. For a list of these errors and remedial action, see following list.

To detect possible hardware problems as early as possible, you should carry out reference measurements at regular intervals.



Danger:

As dangerous voltages are present inside the unit when power is on, and as the unit contains components that can become improperly adjusted, further troubleshooting or repair work requiring the opening of the housing may be done by BRUINS INSTRUMENTS service personnel only.

If you carry out troubleshooting or repair work which is not described in this manual, you will invalidate the warranty, and BRUINS INSTRUMENTS will not accept any liability if the instrument does not meet the specifications or fails to function properly.

9.2 Error Message List

If an instrument function cannot be successfully executed within the software, an error message will be displayed on the screen. In the following table, you will find a list of error messages of the Omega and recommended solutions to the problem.

Call your local BRUINS INSTRUMENTS representative if assistance is required.

Error message	Remedial action
OLE initialization failed.	Make sure that the OLE libraries are the correct version.
Not enough memory to open database.	Close all other applications and try again.
Database already exists. Overwrite?	Change the name of the new database or overwrite the existing one.
Password is not correct. Access denied.	Type in the correct password.
Error creating database.	Select a valid path name.
Cannot create database.	Select a valid path name.

10 Spare Parts

The following list contains the spare parts that are available for the OmegAnalyzer F Basic System. Please contact your local BRUINS INSTRUMENTS representative if you need any of these parts.



Parts not listed here should only be replaced by BRUINS INSTRUMENTS service personnel.

Unauthorised replacement of other parts will invalidate the guarantee, and BRUINS INSTRUMENTS cannot accept any liability if the instrument fails to meet the specifications or fails to function properly.

Part	Part-No.
Keyboard	
Mouse	
External 250 MB ZIP drive (100 – 240 VAC)	
Lamp Assembly	
Sample cup	
Path length 2 mm	
Path length 3 mm	
Path length 4 mm	
Path length 5 mm	
Path length 6 mm	
Path length 7 mm	
Path length 8 mm	
Path length 9 mm	
Path length 10 mm	
Path length 11 mm	
Path length 12 mm	
Path length 14 mm	
Path length 16 mm	

11 Appendix: Software License Agreements

A.1 General Terms and Conditions for the Transfer of Software

1. Subject matter of agreement

- 1.1 You are granted in accordance with this agreement a right to use the programs delivered by BRUINS INSTRUMENTS and the documentation delivered with them. The right of use is non-exclusive and not transferable.
- 1.2 You shall be responsible for installing the programs in accordance with the instructions for installation that form part of the items delivered.
- 1.3 The choice of the program and advice concerning the use intended by you are no more a part of this agreement than instructions, training and other technical assistance. You alone shall bear the risk of selecting the programs and their suitability for the intended use.

2. Performance and function

The performance and function of the programs delivered is determined by the production specifications in force upon the conclusion of the agreement. Any other agreements must be made in writing in order to be valid. Any adjustments to the programs to be made to meet customers' requirements shall be agreed on in a separate agreement. BRUINS INSTRUMENTS does not assume any liability for the function of the programs under special conditions of use (that are not customary in this branch of business).

3. Granting of a license

- 3.1 This transfer agreement entitles you to use a copy of the program acquired from BRUINS INSTRUMENTS at any time on one single computer at the most. If you intend any additional use at the same time, you must obtain an additional license. Even storing the software in a computer in an intermediate storage or fixed storage constitutes use of the software. Storing in a network server to be used solely in other computers does not constitute use. You are responsible for ensuring by suitable working instructions that the software is used only on the scale agreed upon.
- 3.2 Insofar as the software is not provided with a technical copying protection device, you may make a backup copy only for filling purposes or file the original disk as a backup copy if the software is loaded in a fixed storage.
- 3.3 If the software is delivered to you in various media (e.g. 3 1/2 inch and 5 1/4 inch disks), you may use in each case only as many copies of the software as you have concluded contracts.
- 3.4 You may neither rent out nor lend out the software. You may not transfer the rights of use to third parties either.
- 3.5 Reverse engineering, decompiling and disassembling of the software shall only be permitted if this is absolutely essential to obtain the necessary information to bring about the interoperability of an independent computer program with other programs and this information has neither been published nor is otherwise easy of access and you have not received this information from BRUINS INSTRUMENTS on request. Only on these conditions will BRUINS INSTRUMENTS agree to your decompiling within the framework of § 69e Copyright Act (UrhG). In this case you shall inform BRUINS INSTRUMENTS without undue delay which programs you will decompile. Our rights under § 69e UrhG shall not be affected. For access to this decompiling information BRUINS INSTRUMENTS shall receive an appropriate remuneration from you.
- 3.6 Reproducing written documents, e.g. user manuals and other parts of the documentation, is not permitted.
- 3.7 You shall urge all users of the software by standing instructions to observe the proprietary rights of BRUINS INSTRUMENTS and to comply with the above restrictions of the license.

4. Warranty

- 4.1 BRUINS INSTRUMENTS warrants that the programs delivered have the functional and performance characteristics contained in the product specifications in force upon conclusion of the agreement.
- 4.2 The warranty claims shall expire six months after the date of the delivery of the programs to you.
- 4.3 If during this period the programs prove to be defective, which impairs the value and fitness not just insignificantly, BRUINS INSTRUMENTS shall remedy the defects without undue delay without any charge after receipt of the notice of defects. A requirement of the rectification of defects is that the effects of the defects are reproducible, have been sufficiently described by you and the defects were notified to BRUINS INSTRUMENTS without undue delay. Warranty claims shall be satisfied by rectification of defects, which at the option of BRUINS INSTRUMENTS may also be performed by delivering a new program version free of charge or, until delivery of such a program version, in the form of a temporary correction of defects.

4.4 If BRUINS INSTRUMENTS has let lapse a reasonable extension for the rectification of defects through own fault, you may demand a rescission of the agreement. This right shall also exist in other cases of failure to rectify defects.

4.5 BRUINS INSTRUMENTS shall be liable for further claims, in particular for compensation of damage that has not been caused to the programs themselves, only in accordance with item 5.

5. Liability of BRUINS INSTRUMENTS

5.1 BRUINS INSTRUMENTS shall be liable - on whatever legal grounds - in accordance with legal provisions and the provisions of this agreement only for damage caused intentionally.

5.2 BRUINS INSTRUMENTS shall also be liable in case of gross negligence of the proprietor or managerial employees or its subcontractors as well as in case of culpable infringement of essential contractual duties.

5.3 In case of culpable infringement of essential contractual duties BRUINS INSTRUMENTS shall be liable - except in cases of intent and gross negligence of the proprietor and managerial employees - only for the damage that is typical of the agreement and reasonably foreseeable.

5.4 Not affected thereby is liability under the Product Liability Act for personal injury and material damage to privately used objects and liability in the event that expressly warranted characteristics are lacking, if the purpose of the warranty was to cover the customer against the damage occurred.

5.5 BRUINS INSTRUMENTS shall not be liable for the recovery of data.

6. Rights of third parties

6.1 You shall inform BRUINS INSTRUMENTS without undue delay if you are held liable by third parties for alleged infringements of proprietary rights. In such case BRUINS INSTRUMENTS may, at its option, either procure at its expense the right of use of the programs or freely arrange these proprietary rights or replace them by an alternative comparably efficient program. BRUINS INSTRUMENTS may also request you to defend yourself against the infringement of the proprietary rights. Insofar as you leave it to BRUINS INSTRUMENTS to take the necessary defensive measures and conduct any negotiations about a settlement, BRUINS INSTRUMENTS shall assume the costs imposed on you and amounts of compensation.

6.2 If it is not possible by reasonable means to take the measures described in 6.1 each contracting party may terminate this transfer agreement without notice. In this case BRUINS INSTRUMENTS shall be liable for the damage caused to you by the notice of termination, our liability being limited in terms of amount to the charge for the use agreed on for one year or the single royalty of the subject matter of the agreement. Further, item 5 shall apply.

6.3 We shall no longer be liable insofar as claims of third parties are based on the fact that the program delivered was changed by you yourself or used under other conditions than the specified conditions of use.

7. Return of the program

7.1 If the program delivered with this agreement is exchanged in whole or in part within the framework of the warranty or on account of infringement of rights of third parties, you shall be obligated to destroy the first edition of the program, furnishing proof of such destruction, or to return the same to the licensor.

8. Termination of the agreement

8.1 You may terminate the agreement, insofar as it is of unlimited duration, in whole or in part with six months' notice to the end of the month. If a single royalty was paid for the delivery of the programs, this shall not be reimbursed.

8.2 The right to terminate this agreement without notice in accordance with this agreement and for cause shall not be affected thereby.

8.3 Upon termination of the agreement you shall be obligated to return to BRUINS INSTRUMENTS the original of the program concerned as well as well copies and partial copies and changed copies or copies connected with other program materials, or to destroy the same, furnishing proof of such destruction. The same applies to program documentation and other documents delivered. Retention of a file copy for security purposes requires a separate written agreement.

9. Written form

9.1 Subsidiary agreements and amendments must be made in writing; this also applies to any amendment of this clause.

10. Jurisdiction

10.1 The courts of Munich shall have jurisdiction over all disputes arising from this contractual relationship.

10.2 German law applies.

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