IKA® Calorimeter Software C 5040 CalWin

OPERATING INSTRUCTIONS *GB*

30 451 01

CalWin Vers. 04

Reg. Nr. 4343-01

Explanations of symbols

This symbol indicates information, **which must be observed without fail**.

This symbol indicates information, **which is important for technically correct operation of the software**.

This symbol indicates information and recommendations for safe use of the software.

Contents

1 User notes

The C 5040 CalWin calorimeter software is used when making calorimetric measurements with any of the following IKA® Calorimeters from a PC workstation: C 5000 Control or DuoControl, C 2000, C 7000 and C 4000.

The types C 2000, C 5000 and C 7000 calorimeters do not have to be specially configured. However, the C 4000 calorimeter must configured as described below before installing CalWin (the settings are identical to those for IKA® C 402 software and MULTICAL, see the C 4000 Operating Instructions, "Using a PC"):

Configuration of C 4000

Switch 21: Off
Switch 24: REMOTE
DIP-switch 23/1: 0
23/2: 1
23/3: 0
23/4: 0
23/5: 1
23/6: 1
23/7: 1
23/8: 0

Connecting a balance and sample racks

C 5040 CalWin permits control of an analytical balance, which may be connected to a C 2000 or C 5000 calorimeter, or to the serial interface of a PC. It is not possible to control a balance connected to a C 7000 calorimeter. C 5020 sample racks that are connected to C 2000 or C 5000 calorimeters can also be controlled with C 5040 CalWin.

1.1 Scope of supply

C 5040 CalWin software comprises:

- Installation CD
- Serial adapter cable C 5041.10
- Operating Instructions C 5040 CalWin

A serial adapter cable C 5041.10 is included for each calorimeter (C 2000, C 5000 and C 7000 FZ). Further serial adapter cables, cables for earlier models of calorimeter (C 4000, C 7000) and for balances are available as accessories:

Serial adapter cable (2 m)	Id. No. 3036000
Serial adapter cable (5 m)	Id. No. 3036001
Serial adapter cable (10 m)	Id. No. 3036002
Connection cable C 4000 (2 m)	Id. No. 2349600
Connection cable C 4000 (5 m)	Id. No. 2349601
Connection cable C 4000 (10 m)	Id. No. 2349602
Connection cable C 7000 (2 m)	Id. No. 7005800
Connection cable for Sartorius/ScalTec balances (2 m)	Id. No. 2361800
Connection cable for Mettler AE balance (2 m)	Id. No. 2408800
Connection cable for Mettler AT, AM balances (2 m)	Id. No. 7047700
Connection cable for Mettler PR, PS, AG balances (2 m)	Id. No. 7210500

1.2 System requirements

For use of C 5040 CalWin, your system must have the following minimum requirements:

Operating system	Windows 95, Windows 98, Windows ME, Windows NT 4.0 or Windows 2000
Available hard disc capacity	50 MB
Interfaces	Sufficient free serial interfaces for connection of calorimeters and balance. If necessary, a free PCI slot for a multi-serial interface board

If your PC does not have enough free serial interfaces for connection of all your calorimeters, a multi-serial interface board, PCI 8.2 (PCI-Bus), is available as an accessory. Install this as described in the "User's Manual", which is included with the board. CalWin does not support other boards.

Under Windows NT and Windows 2000, administrator's authority is necessary to install the board.

Normally, your PC will have two serial interfaces designated COM1 and COM2. Following a standard installation of the multi-serial interface board, the connection at socket 1 of the interface box will be COM3, and that at socket 2 will be COM4 etc. If only COM1 was present initially, socket 1 becomes COM2, and socket 2 COM3 etc. When connecting the calorimeter to the PC, start with the first free interface, then make connections to the other sockets in numerical order. A balance should be the last unit connected.

When using C 2000, C 5000 or C 7000 calorimeters, the full scope of C 5040 CalWin functions is only available when the following conditions are fulfilled:

- a C 2000 calorimeter has software version 1.10 or higher;
- a C 5000 calorimeter has software version 1.24 or higher;
- a C 7000 calorimeter has software version 8.0 or higher.

C 5000 calorimeters with software version 2.00 or higher must be considered as a separate type and specially configured (see Section 3.2 "Configuring interfaces"). This means that there are two different C 5000 calorimeters, which differ slightly in the way *CalWin* controls them:

- C 5000 with a software version lower than 2.00. This is designated C 5000 in all subsequent sections.
- C 5000 with software version 2.00 or higher. This is designated C 5000(2) in all subsequent sections.

2 Installation and de-installation

2.1 Installing CalWin

Before starting to install the CalWin software, ensure that all cables are connected to the calorimeters, and that all units are ready for use.

If CalWin is installed for a calorimeter which has already been calibrated, then the C-values of all decomposition vessels must be noted before starting the installation, because the CalWin software overwrites the C-values stored in the calorimeter.

To install CalWin, proceed as follows:

①
Load the *CalWin* CD-ROM into the CD-ROM drive.

②
The installation program normally starts automatically once the CD has been loaded. If it does not start, you must start the installation program on the CD-ROM manually. To do this, click on the Windows Start button, open the menu *Run*, and enter *d:**setup.exe* ("d" must be the name of the CD-ROM drive). Confirm with *OK*, and follow the instructions on the screen.

When entering the name of the installation directory, it must not be more than 8 characters long.

During installation, a directory named *CalWin* will be created in the Windows Start menu. It contains the start files *CalCFG* and *CalWin*.

③
If the installation was successfully completed, the configuration program *CalCFG* starts automatically. It is used to configure the system, as described in Section 3, "Configuration with CalCFG".

2.2 De-installation of CalWin

Because CalWin software is not entered in the Windows system registry during installation, a special de-installation program is not required. To de-install CalWin software, simply delete the complete CalWin directory, for example using Windows Explorer.

3 Configuration with CalCFG

Using the program *CalCFG*, a system comprising a PC, and connected calorimeters and balances can be set up. The program can be used for:

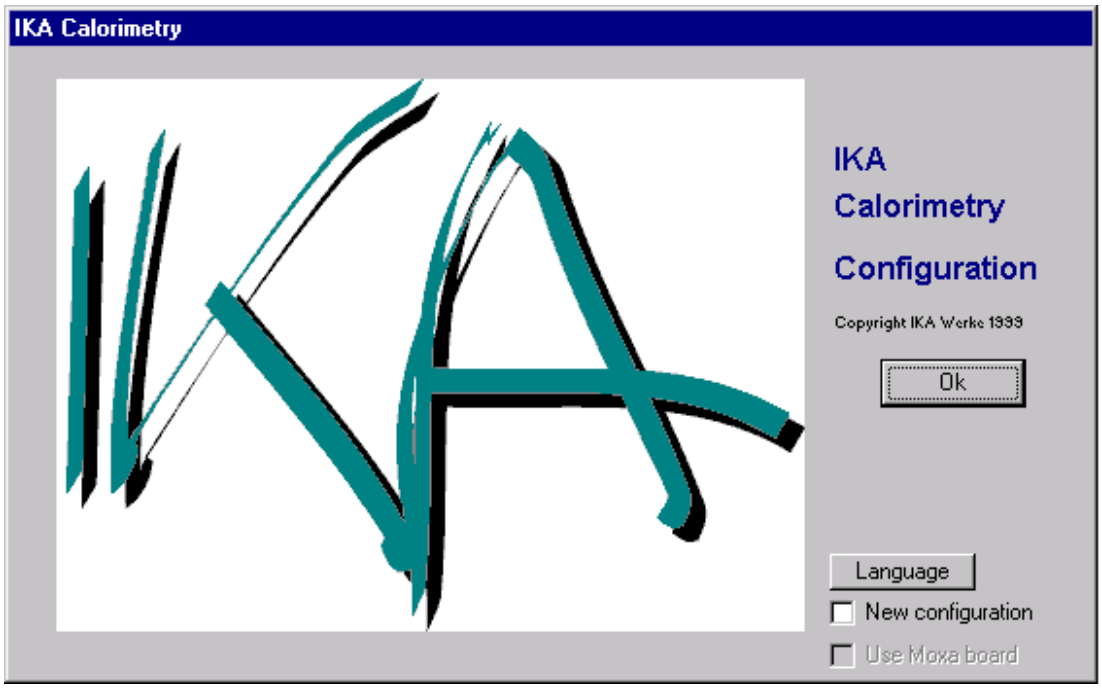
- Configuration of the interfaces to connected devices;
- Configuration of the type of operation and test procedure for the calorimeter selected in the configuration window;
- Configuration of balances;
- Configuration of the basic set-up for data evaluation;
- Selecting the units of measurement;
- Managing decomposition vessels in relation to the calorimeters used;
- Selection of the language the program uses.

3.1 Starting CalCFG

Before starting CalCFG, all units connected to the PC must be ready for use.

A mouse click on the symbol in the *CalWin* directory will start *CalCFG*. The *CalWin* directory is in the Windows *Start* menu.

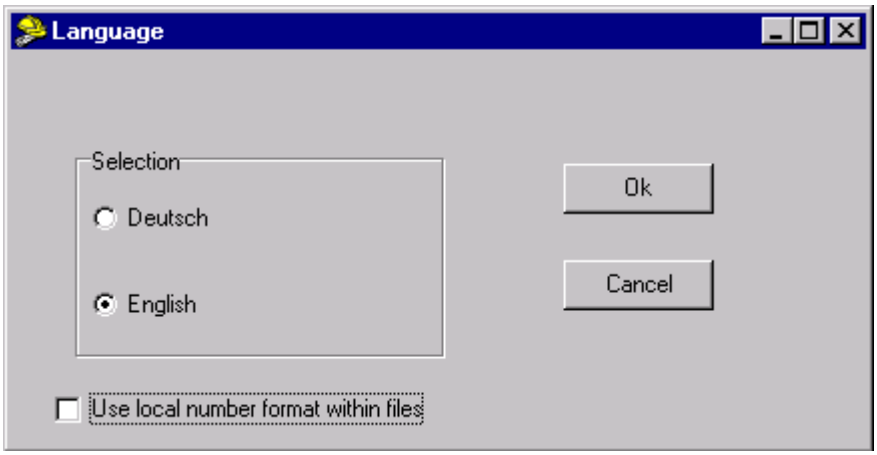
The *CalCFG* program starts automatically after successfully installing *CalWin*. When *CalCFG* starts, the following window appears:



Start window after installing *CalCFG* (without PCI 8.2 board)

The start window offers two options and the *Language* button:

- *Language*
  By clicking on this button, the program goes to the *Language* screen. You can choose to have the *CalCFG* user interface in German or English.



  If files generated in *CalWin* are to be exported to Microsoft Excel, activate the option *Use local number format within files*. Depending on the language of the operating system, output data are then formatted with a decimal comma (German) or decimal point (English).

  By selecting *English* and confirming with *OK*, you will remain with the English version of the *Start* window. The following sections refer exclusively to the English dialogue windows.

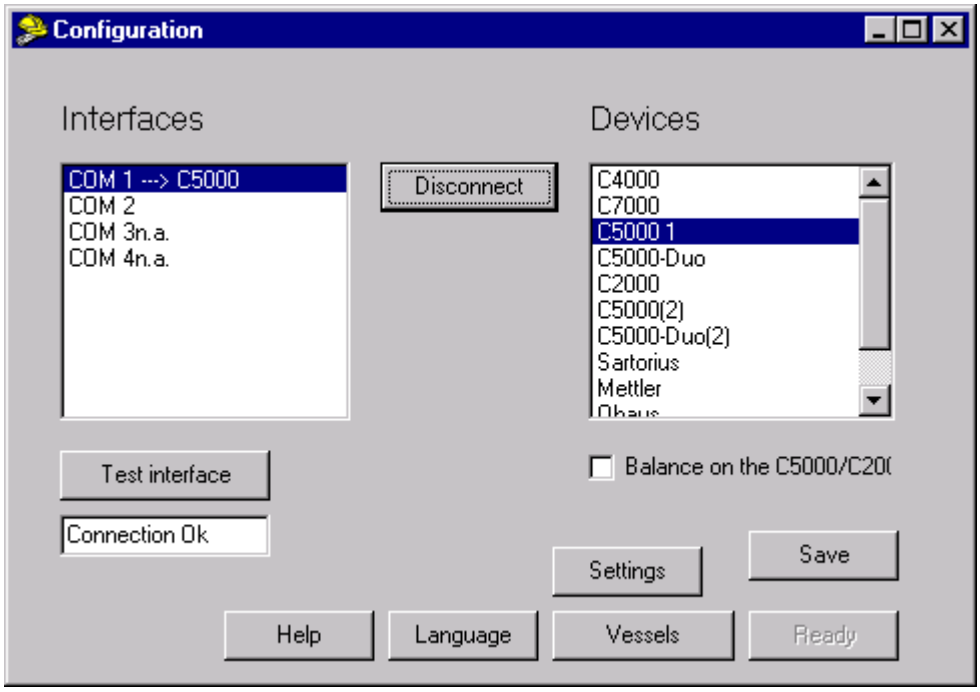
- *New configuration*
  If you want to reject the configuration last used, activate this option. To retain the configuration last used, leave this option de-activated.

- *Use Moxa board*
  Activate this option, if you are using the PCI 8.2 multi-serial interfaces board with its interface box.

Confirm and close the *Start* window with *OK*.

3.2 Configuring interfaces

When you close the *Start* window, the main *CalCFG* window opens.



Main *CalCFG* window (without PCI 8.2 board)

The calorimeters C 5000(2) and C 5000-Duo(2) – subsequently both are designated C 5000(2) – are C 5000 calorimeters with software version 2.00 or higher. The software version is displayed when a C 5000 calorimeter is switched on.
There are several places in these Operating Instructions which refer to special features of the C 2000 and C 5000. When special features of the C 5000 are mentioned, this will not apply to the C 5000(2) unless specifically stated. Where the C 2000 and C 5000 are covered together, then the C 5000(2) is also included.

With this screen, one of the PC serial interfaces or an interface on the board can be assigned to each calorimeter and connected balance. Regardless of whether the standard PC interfaces are used or those on the interface board, the configuration program recognises which are assigned and which are still available. Interfaces which are already used by the PC are marked *n.a.* Interfaces that have already been assigned to devices show an arrow and the name of the unit. Free interfaces have no additional information.

If a calorimeter is removed when carrying out a new or re-configuration, the existing assignment of decomposition vessels to the calorimeter will be erased for all earlier measurements.
The settings and calibrations of a calorimeter that has been removed from a system configuration can be restored, if you quit the configuration program without storing.

Assigning an interface

How to assign a particular unit to a free interface:

①
Use the mouse to select a free interface in left-hand window of the main screen.

②
Use the mouse again to mark a unit in the right-hand window that is still free.

③
Click on the button *Assign device*.
The device you have selected is now assigned to the free interface. At the same time, the button changes from *Assign device* to *Release*.

If the connection is properly established, when a calorimeter is connected to a PC, the message *Connection OK* appears in the field below the *Test interface* button. When a balance is connected to a PC, a message specific to the balance, in which the current weight can be read, is displayed.

If the button *Assign device* is inactive or not present, either the selected interface is not available (*n. a.*), or it is already assigned (→), or the selected unit is not compatible with this version.
If you want to re-assign an interface that is already occupied, it must first be released. To do this, select the appropriate interface and click on the button *Release*.

If no message appears below the *Test interface* button, check the connection cable. In the case of a connection between a balance and a PC, you can first try to transfer data from the balance. Use the transfer or print button on the balance, to send the displayed weight to the PC. Make sure that the connection cable is in the correct sockets on both the unit and the PC. Use only original IKA® cables.

If an incomprehensible message is shown, the interface parameters of the unit and PC must be reset. For calorimeters, the following standard settings apply:

C 5000: 2400 Baud rate, 8 data bits, parity none
C 2000: 2400 Baud rate, 8 data bits, parity none
C 4000: 4800 Baud rate, 8 data bits, parity odd
C 7000: 2400 Baud rate, 8 data bits, parity none

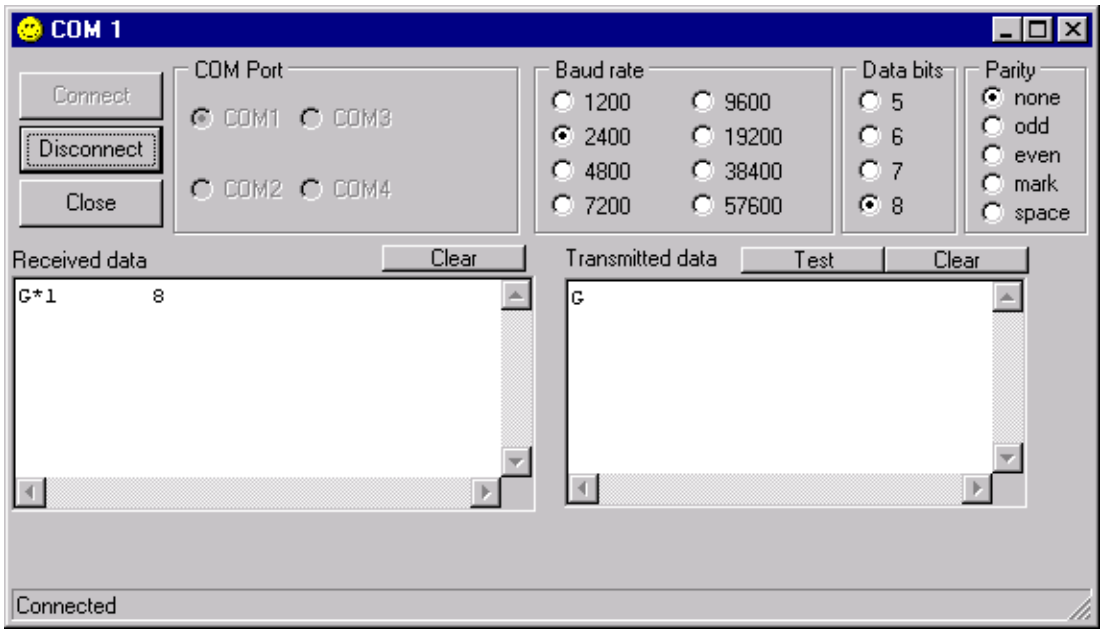
A balance is tested by sending the result of a weighing from balance to PC. For the interface parameters, there are many possible variations, which can only be usefully exploited given accurate knowledge of the balance interface, and basic knowledge of serial interfaces.
See also the operating instructions for the balance.

Configuring interfaces

How to configure calorimeter and PC interface parameters:

①

Click on the interface that is to be configured in the left-hand window of the main screen, and then on the *Test interface* button. The interface configuration window appears.



Interface configuration window (without PCI 8.2 board)

②

Click on the *Test* button. This tests the interface between the PC and unit that was selected on the main screen. For a PC / calorimeter connection, the interface functions correctly if the message *Received data* in the left-hand window contains the following:

- *G ...* (for C 2000 and C 5000
- *@ ...* (for C 4000 and C 7000)

For a PC / balance connection, the string of characters in the window must correspond to the balance interface – see the relevant operating instructions.

③

In the option fields in the upper part of the window, set the specific parameters *Baud rate*, *Data bits* and *Parity* for the unit that is to be connected. With the buttons *Connect* and *Disconnect*, an existing connection between the PC and a unit can be cut or reconnected. The two *Clear* buttons remove any messages there may be in the text windows below them.
Click on the *Test* button again, and if necessary change the parameters until the required message is displayed.

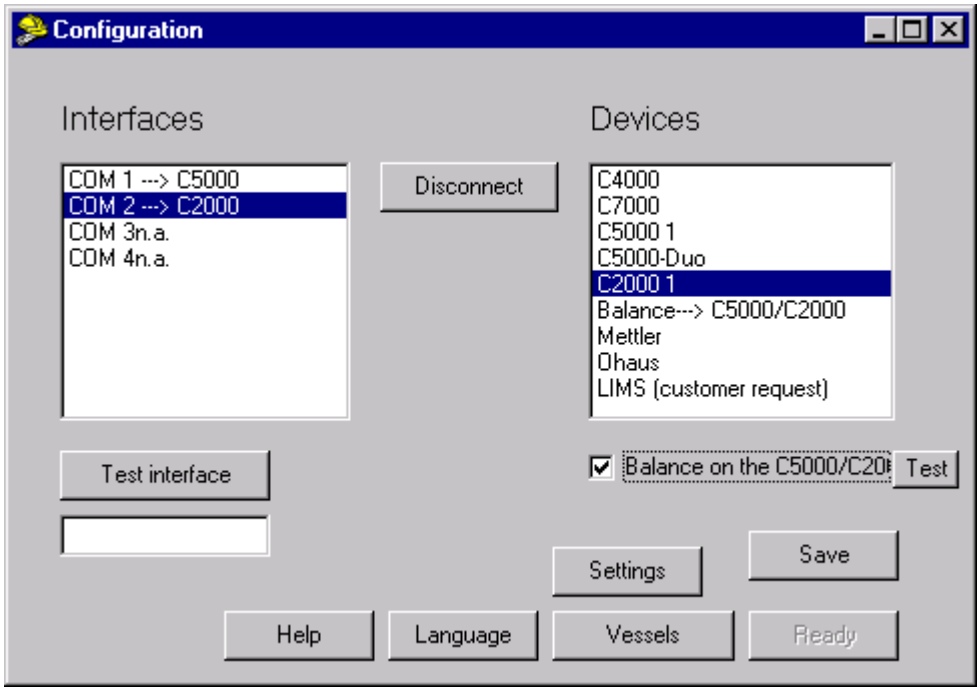
④

Quit the interface configuration window by clicking on the *Close* button.

Connecting a balance to a C 2000 or C 5000

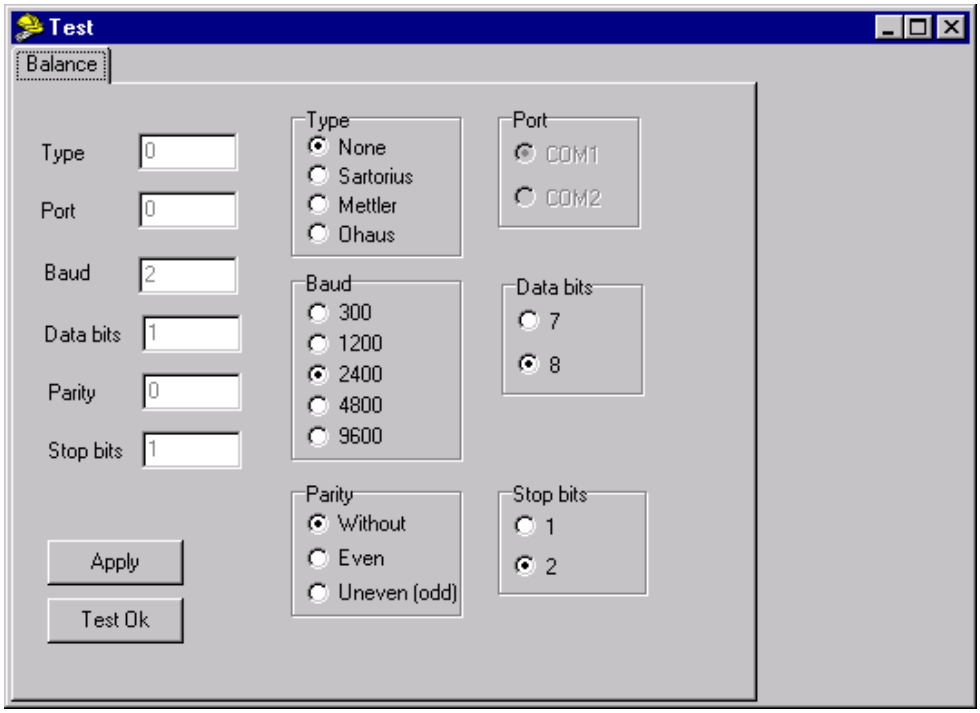
If you want to connect a balance to a C 2000 or C 5000 calorimeter, activate the box *Balance on C5000/C2000*.

With the C 5000 calorimeter, the type and settings for the balance are configured directly on the calorimeter. For a C 2000, when the box *Balance on C5000/C2000* has been activated, a button *Test* appears. This button will only be active when the interface, at which the C 2000 calorimeter and balance both are connected, is selected.



***Balance on C 5000/C 2000* activated**

Clicking on *Test* opens the interface configuration window and another window in which the type of balance and its interface parameters can be set. For individual settings, please see the operating instructions for your balance.



Clicking on the *Apply* button makes the balance ready for use. Now the result of a weighing can be transmitted from the balance, and the result assessed in the interface window. Clicking on the button *Test Ok* ends the balance setting procedure.

CalWin cannot be used to control a balance connected to a C 7000 calorimeter.

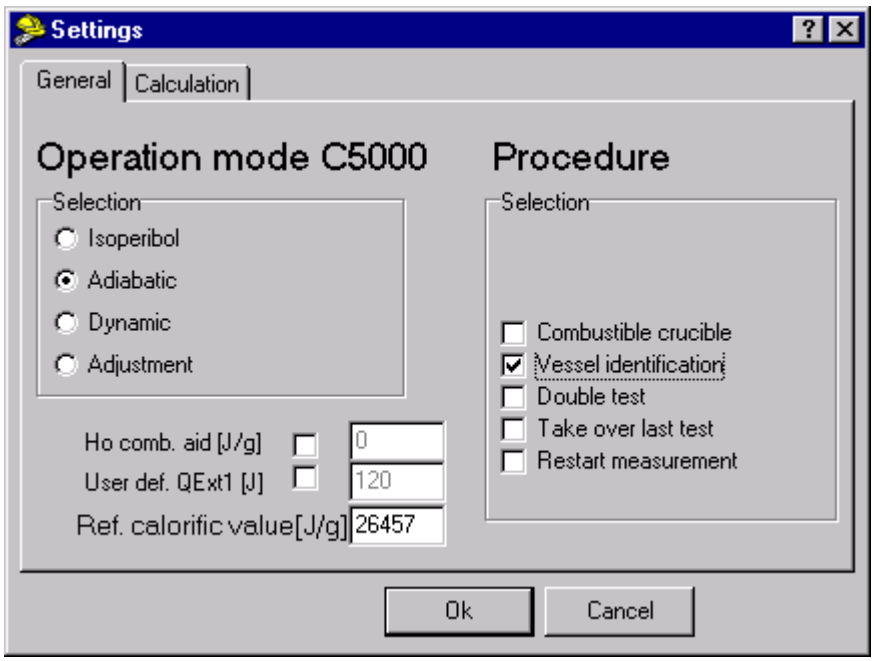
3.3 Configuring devices

In the configuration program *CalCFG*, the type of operation and test procedures for calorimetric measurements can be preset. Configuration must be carried out separately for each unit that is shown in the *Interfaces* window of the main *CalCFG* screen. A mouse click on the *Settings* button opens the dialogue window for the interface selected on the main screen. All calorimeters and balances, to which an interface has been assigned, can be configured in this way.

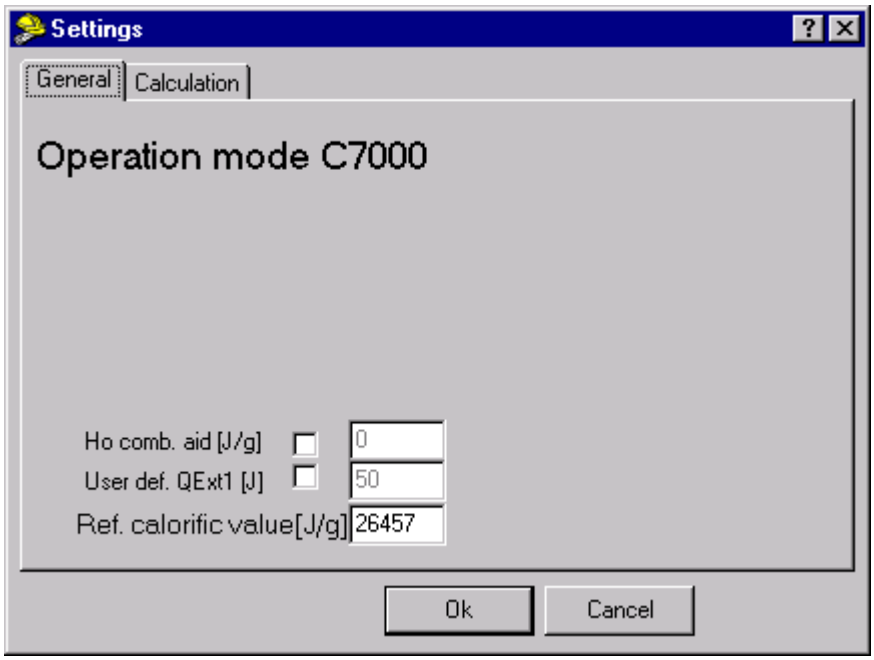
The dialogue *Settings General* shows only those setting options, which can be configured on the unit selected. The settings *Double test*, *Restart measurement*, *Take over last test*, and *Ref. calorific value* are available for all calorimeters.

Settings for calorimeters are described in the section dealing with *CalWin* too.

***Settings General* dialogue for calorimeters**



Dialogue *Settings General* register for C 5000 (without a balance)



Dialogue *Settings*, *General* register for C 7000

Depending on the model of calorimeter, the dialogue *Settings*, General register gives access to the following possibilities:

Operation mode
Select the mode of operation you require.

- Modes of operation for C 2000:
  Isoperibol 25°C to DIN 51900 Part 2
  Isoperibol 30°C to DIN 51900 Part 2
  Dynamic 25°C (Isoperibol at 25°C with shorter measuring time)
  Dynamic 30°C (Isoperibol at 30°C with shorter measuring time)
- Mode of operation for C 4000:
  No settings possible, calorimeter measurements are always adiabatic to DIN 51900 Part 3
- Modes of operation for C 5000 and C 5000(2):
  Isoperibol to DIN 51900 Part 2
  Adiabatic to DIN 51900 Part 3
  Dynamic (adiabatic with shorter measuring time)
  Adjustment
  (for the C 5000 Duo Control, the mode is set for measuring cell 1, and adopted for measuring cell 2)
- Mode of operation for C 7000:
  No settings possible.

Ho comb. aid
If there is no balance connected, and you are using a combustion aid, the gross calorific value of the combustion aid can be entered here. Activate this option and then enter the gross calorific value in the text field (all types of calorimeter).

Ref. calorific value
Enter the gross calorific value of the calibration substance in J/g (all types of calorimeter).

User def. QExt1
After activating this option, a value for external energy can be entered in the text field for external energy *QExt1*. This value is then used in subsequent calculations instead of the standard value (see Section 5.4 "Preparing for new measurements").

Combustible crucible
Activate this box when using combustible crucibles. The external energy 1 is then automatically reduced by 50 J (no cotton thread). However, external energy 2 from the combustible crucible must be taken into account (all types of calorimeter except C 4000).

Vessel identification
The C 2000, C 5000, C 5000(2) and C 7000 calorimeters all have decomposition-vessel recognition. When this box is activated, a decomposition vessel is not assigned to a measurement, assignment is carried out by the calorimeter at the start of measurement. For the C 5000 calorimeter, this option must also be set on the unit itself. On the C 7000, decomposition-vessel recognition cannot be switched off.

Double test
When this box is activated, two measurements are made for each sample code. For further information, please see Section 5.1 "Configuring the devices" (all types of calorimeter except C 7000).

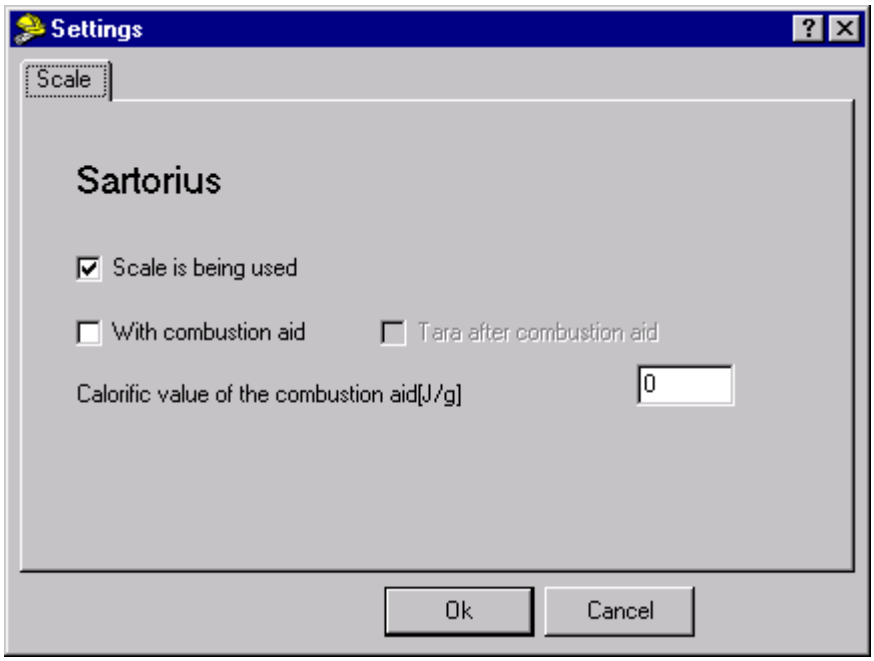
Take over last test
With this option, when a measurement is prepared, QExt1, the sample characteristics, and the operator's name from the previous measurement are used (all types of calorimeter except C 7000).

Restart measurement
When this box is activated, interrupted measurements are returned to the *Restart* condition if ignition has not occurred, and they can be restarted. Even if a test is interrupted after ignition with the error message *No temperature increase*, the test can still be restarted. For the C 5000 calorimeter, this option must also be set on the unit itself (all types of calorimeter except C 7000).

Explosive
This option applies only to a C 2000 which has been fitted with Calorimeter Conversion C 60. In addition, only a Peters bomb modified with IKA® Electrode Set C 61 may be used. The use of C 5010 and C 5012 standard vessels is not permitted in this mode.

This option can only be activated when decomposition-vessel recognition is deactivated. The latter enables up to 20 decomposition vessels to be used per calorimeter, and changes the procedure when starting measurements (See Section 5.5 "Starting and recording new measurements")

Settings dialogue for balances



***Settings* dialogue for balances**

Scale is being used
Activate this box if data are to be transmitted from a balance.

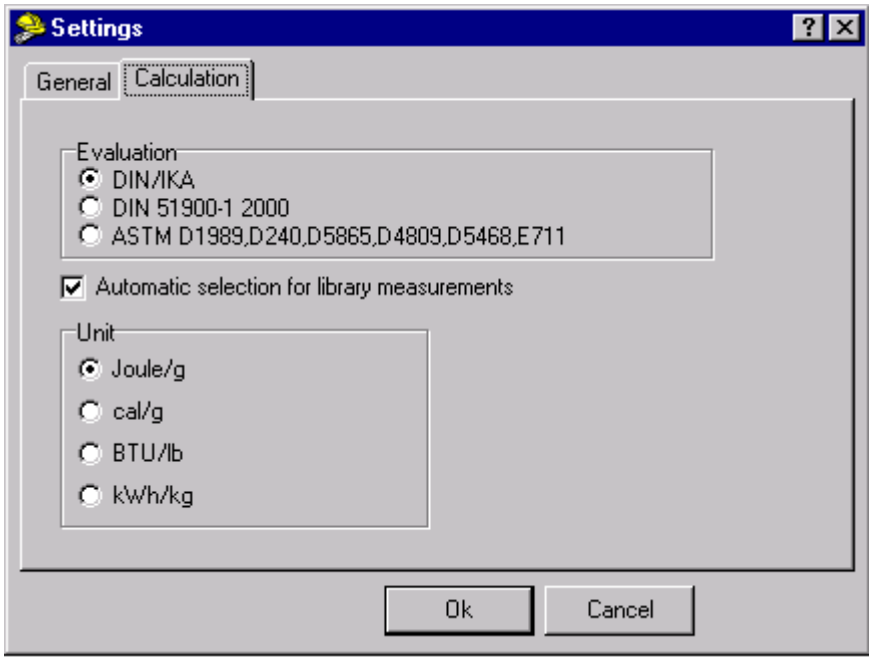
With combustion aid
Activate this box so that for every sample first the weight of combustion aid, and then the weight of combustion aid plus sample are transmitted. External energy 2 is calculated from the weight and calorific value of the combustion aid.

Calorific value of the combustion aid
You must enter the correct value for the combustion aid in J/g when the *With combustion aid* is activated.

Tara after comb. aid
Activate this box if the balance should be tared after it has transmitted the weight of the combustion aid.

3.4 Evaluation settings and units

The *Calculation* register enables you to select the type of evaluation to be used when making the calculations, and the units to be employed.



***Calculation* register**

The *Calculation* register is independent of the calorimeter. This means that the type of evaluation and the units set apply to all connected calorimeters and balances.

In the *Calculation* register, the following settings are possible:

Evaluation
You can choose to evaluate measurements to either of two different procedures. The procedure set then applies to all measurements made thereafter and also to all measurements, stored in the library, but not yet evaluated.

- *DIN/IKA*
  This procedure offers seven different modes for evaluating measurements. These evaluation modes are used completely or partially for evaluations with the C 2000, C 5000, C 7000 calorimeters, and C402, MULTICAL and CalWin 1.30 software.
- *DIN 51900-1 2000*
  This procedure evaluates measurements to DIN 51900-1 2000.
- ASTM D1989, D240, D5865, D4809, D5468, E711
  This procedure takes into account current US standards for combustion calorimetry of solid and liquid fuels, and wastes.

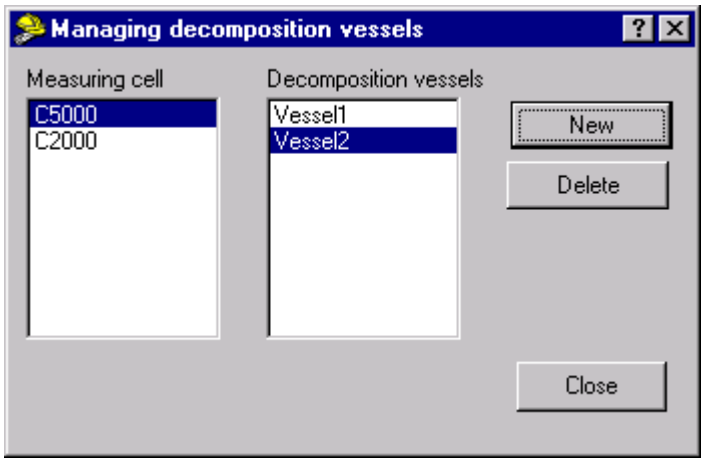
Automatic selection for library measurements
When this box is activated, already evaluated measurements stored in the library will retain their original evaluation procedure if the procedure is subsequently changed.

Units
Here, you can select the units in which results are displayed on the screen and when printed.

- *J/g* calorific values displayed in J/g, heat capacities in J/K
- *Cal/g* calorific values displayed in cal/g, heat capacities in cal/K
- *BTU/lb* calorific values displayed in BTU/lb, heat capacities in BTU/lb*g/K
- *KWh/kg* calorific values displayed in kWh/kg, heat capacities in J/K

3.5 Management of decomposition vessels

In the *CalCFG* configuration program, you can specify decomposition vessels for all configured calorimeters. Clicking on the button *Vessels* opens the dialogue *Managing decomposition vessels*.



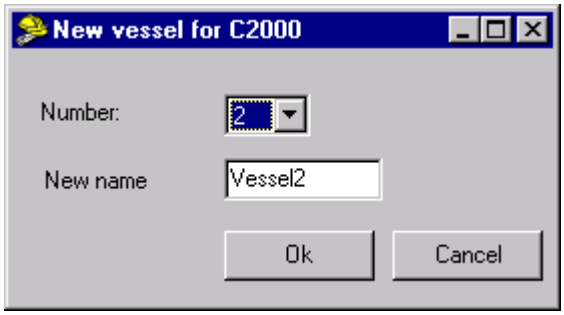
The calorimeters are listed in the field on the left of the window, and decomposition vessels for that calorimeter on the right.

Decomposition-vessel management can also be carried out using the *CalWin* part of the program.

Decomposition vessel management

Management of decomposition vessels for a configured calorimeter is carried out as follows:

①
To enter a new decomposition vessel, mark the relevant calorimeter in the left-hand field and click on the button *New*. The dialogue *New vessel* opens.



②

In the *Number* field, you can unscroll a list, which shows the numbers of the vessels for that calorimeter, which have not been taken. Select a suitable number. The number must agree with the coding on the vessel. The following numbers can be applied to vessels:

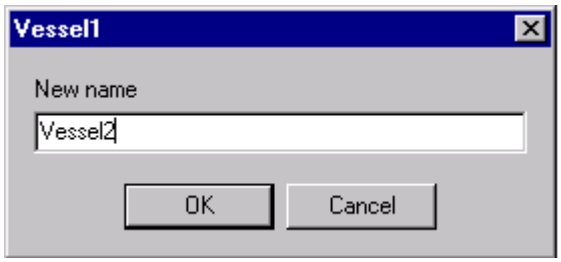
- 1 ... 4 for C 2000/C 5000
- 1 ... 16 for C 4000
- 0 ... 7 for C 7000

In the text field *New name*, enter a name for the newly-entered vessel, and click on *OK*. The new vessel is entered and assigned to the specified calorimeter.

③

Re-naming bombs and units

To change the name of a vessel or calorimeter, double-click on the name in the appropriate list. A dialogue window appears in which you can enter the new name. Click on the *OK* button when you have entered the new name.



The change of name is only completely effective after closing *CalWin* and restarting it.

④

Deleting a bomb

To delete a decomposition vessel, select it with the mouse, and click on the *Delete* button. Confirm with *OK*.

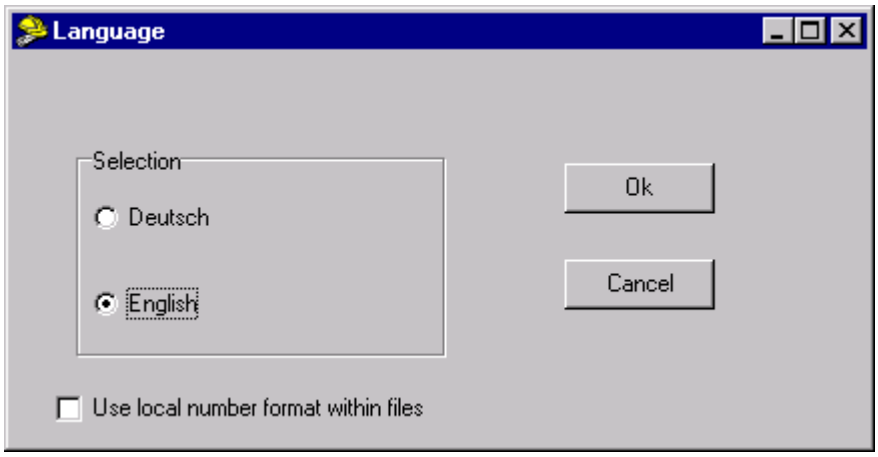
If you delete a decomposition vessel, the assignment of calorimeter and vessel for all previous measurements using that vessel will be erased. Calibrations with that vessel will also be erased.

For the C 5000 calorimeter, both entering (*New*) and deleting (*Delete)* decomposition vessels must be carried out in parallel on the calorimeter display.

3.6 Changing language

To change language, all windows except the main screen must be closed.

In the configuration program *CalCFG*, you can choose between German and English for the user interface. Click on the *Language* button to open the *Language* dialogue.



Dialogue *Language*

The language changes immediately you confirm with *OK*.

The names of devices and vessels must be changed individually, see Section 3.5 "Management of decomposition vessels".
After changing language, user-defined tables must be rewritten.

If files generated in *CalWin* are to be exported to Microsoft Excel, activate the option *Use local number format within files*. Depending on the language of the operating system, output data are then formatted with a decimal comma (German) or decimal point (English).

3.7 Storing configuration data and closing CalCFG

When you quit the *CalCFG* configuration program, you must decide whether the changes you have just made to the configuration should be stored, or if the previous configuration should be retained.

Store configuration data and close

To store the present configuration and quit *CalCFG*:

①

In the main window, click on the *Save* button. That stores the present configuration and activates the *Ready* button below it.

②

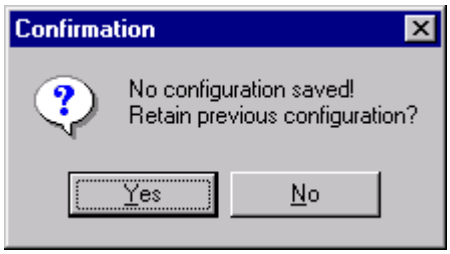
Close CalCFG with a mouse click on the *Ready* button.

Close *CalCFG* without storing

To quit *CalCFG* without storing the present configuration:

①

Click on ☒ in the top right-hand corner of the main window to close the program. The following warning appears:



②

Clicking on *Yes* closes the program without storing changes just made. Pressing *No* returns you to *CalCFG*.

4 CalWin Fundamentals

The CalWin calorimeter software is made up of two sub-programs, *CalCFG* and *CalWin*. To avoid confusion, in this and subsequent sections, "CalWin" refers to the sub-program *CalWin* unless otherwise stated.

4.1 Starting CalWin

When you switch a calorimeter on, always wait to ensure that the self-test (C 2000 Control, C 4000, C 7000), initialisation phase (C 5000, C 5000(2)), or system check (C 2000 Basic) are successfully concluded. Only then should you start the CalWin software. After starting, check that the connection to the calorimeters has been established. All connected units must be marked *waiting* in the status line of the main screen.

For the C 2000 Control and C 4000, the **self-test** finishes when the stirrer is switched on for a short time, and, for the C 7000, when the menu display appears.

The **initialisation phase** for the C 5000 and C 5000(2) calorimeters is finished when the display shows *waiting, stable*.

On the C 2000 Basic calorimeter, the **system check** is finished when the display shows *waiting, ready*. If CalWin is started during a system check on the C 2000 Basic, the check will be broken off and restarted by CalWin. Under unfavourable circumstances, this can result in the system check not being successfully completed, so that both calorimeter and software have to be restarted.

The program *CalWin* is started by a mouse-click on the appropriate symbol in the *CalWin* directory. You will find the *CalWin* directory in the Windows start menu. On starting, *CalWin* displays the screen shown below.

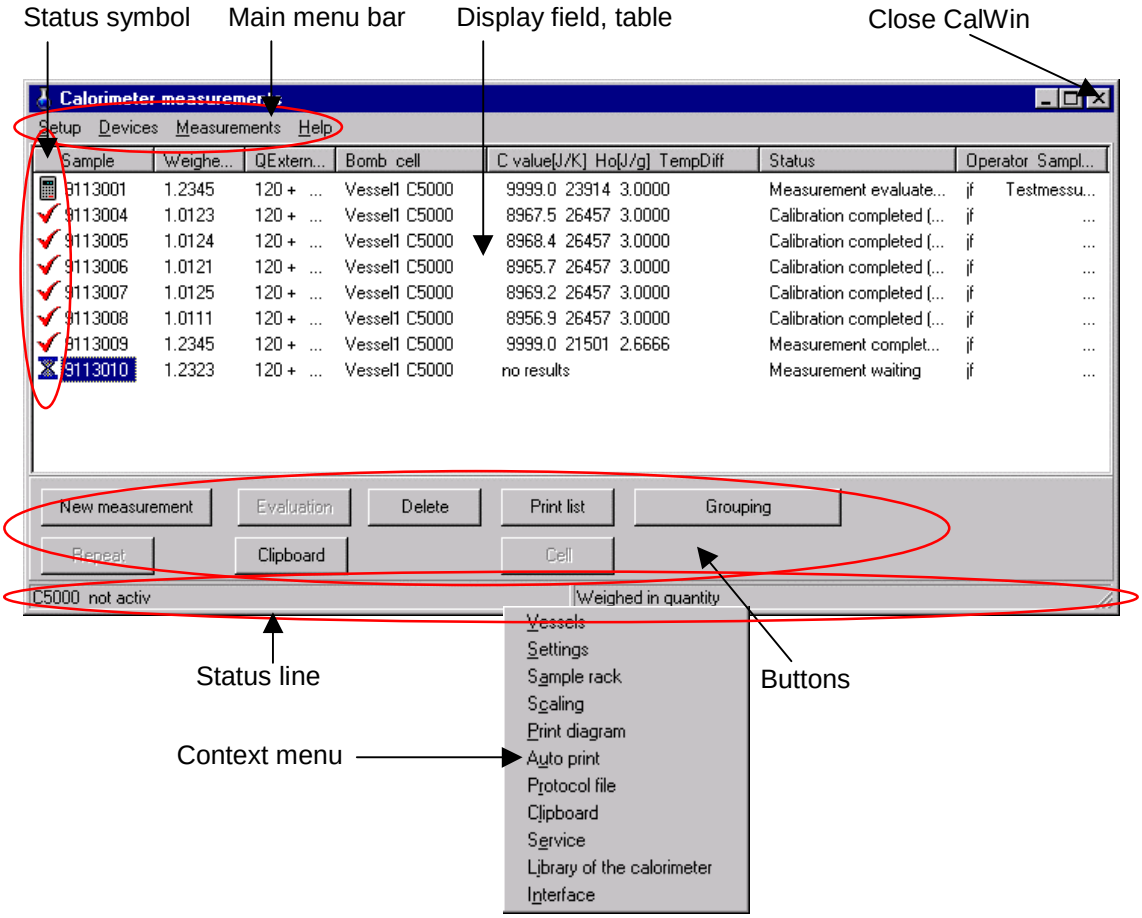
***CalWin* start screen for the C 5000**

The type of calorimeter currently connected with *CalWin* is shown on the right of the screen. If several calorimeters are connected with *CalWin*, this is indicated by the word *Multi*. Acknowledge the start screen with *OK*.

4.2 The main CalWin window

When the start screen closes, the main *CalWin* window opens. This window is the starting point for all settings, measurements and evaluations. The *Display field* is empty when you start the program for the first time that day, assuming that no crucible from the previous day is in the sample rack. On restarting, the current status for that day is always displayed.

Main *CalWin* screen



Five main elements characterise the main *CalWin* screen the *Status symbols* indicate the status of measurements. The symbols have the following meanings:

- measurement waiting
- measurement running
- measurement running → Restart
- parameters being transmitted to calorimeter
- measurement is evaluated
- sample in sample rack / measurement prepared in *Explosive* mode for C 2000
- measurement completed with result
- measurement should be repeated (the results of duplicate measurements differ by more than 100 J)
- repeat measurement
- measurement was interrupted

- The menus in the *Main menu bar* are used to call up dialogue for administration and configuration. In addition, the *Main menu bar* gives access to the online help system.

- The *Display field* lists detailed information on the day's measurements in tabular form, including the most important data and status. The widths of columns in the table can be changed by the user by pulling on the margins in the heading line with the mouse. The column headings can be changed by clicking on the name you wish to change and typing in a new one.

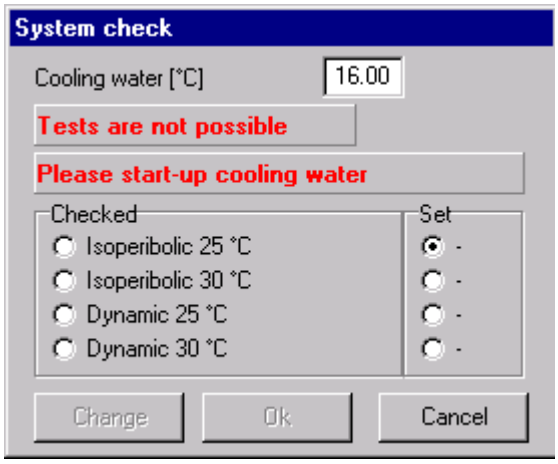
- The status line shows the connected units and their current status. The fields in the status line react to mouse clicks. A left mouse click on a unit opens the window for it, and a right mouse opens a *Context menu* for the same unit.

The menu item *Interfaces* in the context menu of the main screen must only be used for maintenance and service. The window can be used to check the connection, and if necessary correct problems.

- Clicking on the *Buttons* carries out various actions. To avoid incorrect operation, some buttons are inactive at certain times.

4.3 System check (only for C 2000)

If *CalWin* successfully created a connection to a C 2000 calorimeter when it was started, a window for a system check will appear.



System check for C 2000

At initial start-up, the boiler and hose systems of the calorimeter will be filled with water. If you are working with a cooler, you must now adjust the filling level of the thermostat. During this process no measurement may be running, and the inner boiler must not be filled! If necessary, empty the inner boiler! Subsequent loss of water (e.g. through evaporation) must only be made good when the calorimeter is in this operating condition.
When using the Cooler KV 500, please take care that its filling level is not more than 1 cm below the rim.

During the system check, the functions of the C 2000 calorimeter are verified. In particular, the flow rate and temperature of the cooling water are tested. The window shows, on the left, the mode of operation possible at the current cooling-water temperature, and, on the right, the operating mode last used. Measurements are only possible when both displays agree or are changed by the operator until they agree.

The system check takes about 3 minutes. When agreement is reached, the button *OK* is activated, and after clicking on it, you can start making measurements. Confirmation occurs automatically after about five minutes.

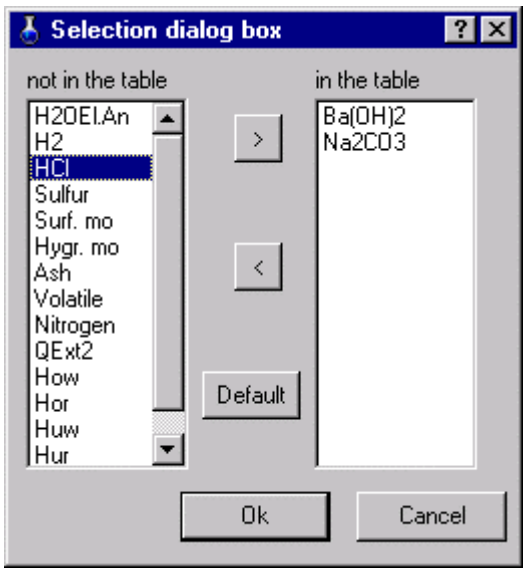
When the current cooling-water temperature only allows a different operating mode, clicking on the button *Change* enables you to change to this mode. Subsequent measurements will then be carried out in the new mode; a warning appears to make this absolutely clear. If the button *Change* is not used, after about five minutes the dialogue is broken off. In the status line for this calorimeter, the message *System check not OK* appears, and it is not possible to make measurements with the calorimeter.

The dialogue is also broken off automatically if it is impossible to use the calorimeter in any mode. The most frequent causes for this are a lack of flow or cooling-water temperature above 28°C.

The *system check* is also broken off without result if the user clicks on the button *Cancel*. In all cases, the system check can be repeated by using the menu entry *Settings* in the context menu for this calorimeter.

4.4 Extension of table headings by the user

To extend the table containing measurements in the main screen, you can determine which parameters should be displayed in addition to the standard information. In the main menu bar, select *Setup* → *Table*. The window *Selection dialog box* will open.



In the list on the left of the window, the parameters are shown that are not included in the table in the main screen, and on the right the parameters that will be added. To move a parameter from the left window to the right, mark the parameter and click on the button **>**. Similarly, with the **<** button you can move a parameter from right to left. A click on the *Default* button moves all parameters to the left-hand window (status as delivered).

You can also rename parameters, and so modify the column headings in the main screen. Double click on a parameter and enter the new heading in the *Change text* window that then opens.

All settings made in the *Selection dialog box* will be stored when you close *CalWin*.

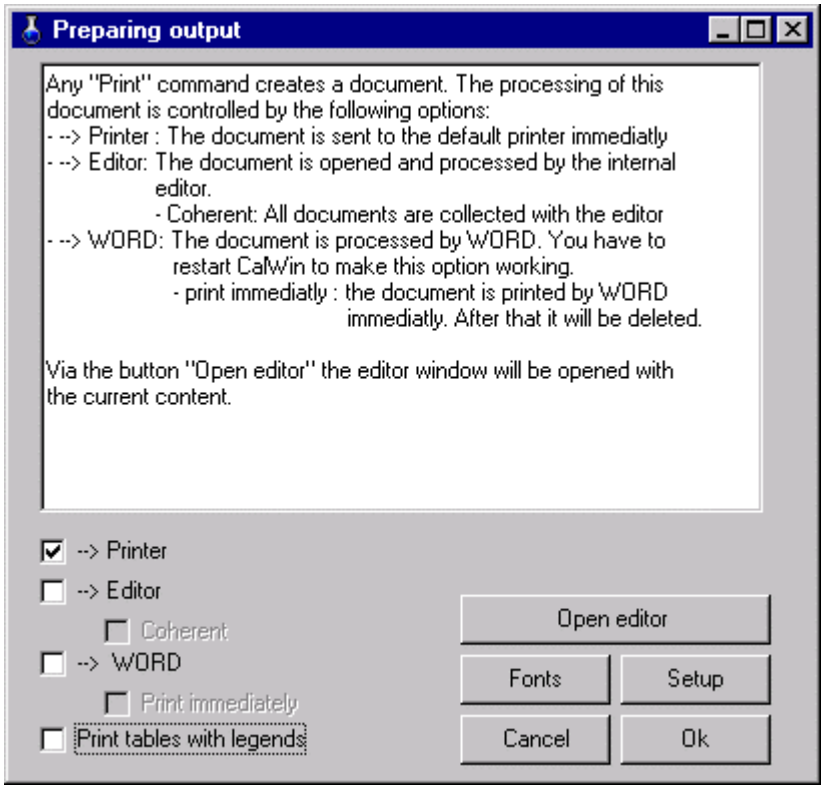
When the window is closed with *OK*, the table in the main screen will be rewritten. You can then modify the column widths to suit the new headings by clicking on the margins in the heading line and dragging.

The headings of the standard columns can also be changed. Click on the column heading and enter the new title. If you delete the text completely, the original column heading will be restored. If you print the table, the user-defined headings will be printed. If required, a legend can be printed with the table relating the new headings to the originals (see Section 4.5 "Preparation for data output").

After changing language, a user-defined table must be reconstructed.

4.5 Preparation for data output

CalWin provides several procedures for printing the text and data in different dialogue windows. You can set the way you choose in the window *Preparing output*. Open this window by selecting *Setup* → *Preparing output* in the menu bar of the main screen.



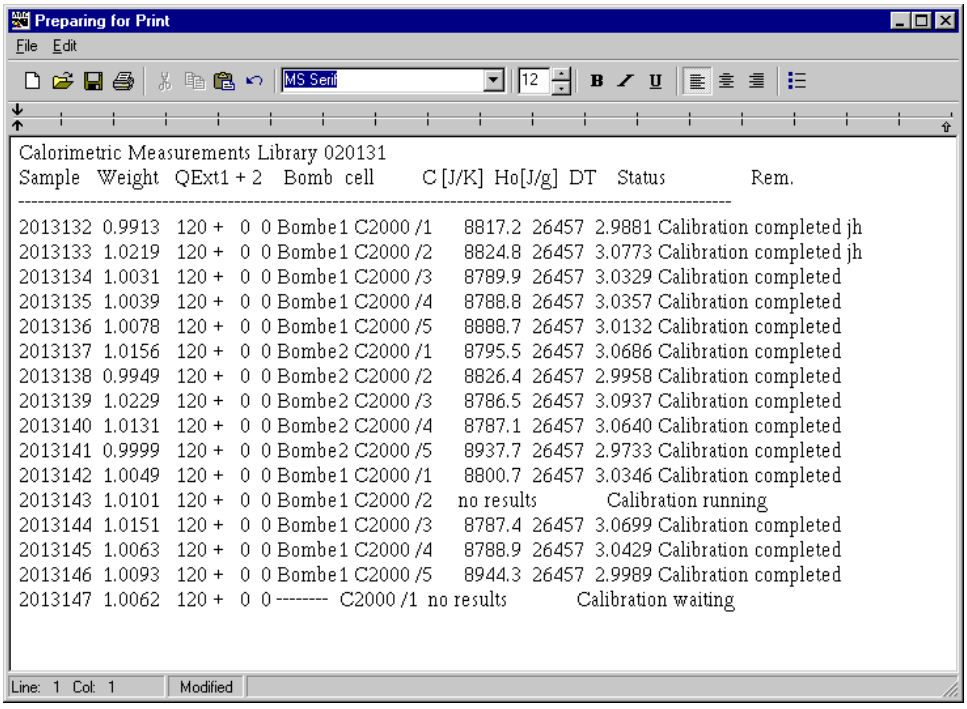
***Preparing output* window**

Every print command, whether it be initiated by clicking on a *Print* button or from an appropriate menu entry, produces either a print out or a document that can be modified either with an editor or using Microsoft Word. The following options are possible:

- → *Printer*
  When the box → *Printer* is activated in the window *Preparing output*, the document will be printed directly on the standard printer.

- → *Editor*
  A print command loads the document in the internal text editor, where you can modify, format, store as a text or RTF file, and finally print it. If the box *Coherent* is also activated, you can collect the data from several printing operations in the text editor and merge them together.

Editor window
Preparing for print



- → *Word*
  A print command passes the document to Microsoft Word. There you can also collect the data from several print operations together, and modify, format, store as a Word file, and finally print it. This setting only becomes active after closing and restarting *CalWin*. If the box *Print immediately* is also activated, the document will be printed immediately by Word and then deleted. This option can only be set when Word was automatically started by *CalWin*.
  For more information about the connection to Word, please see the next section "Connections to Microsoft Office".

- → *Print tables with legends*
  If this option is active, clicking the button *Print list* in the main window will print the table together with a legend that relates the user-defined (shortened) headings of table columns to the original headings.

The button *Fonts* opens the window *Typeface*. All typefaces with fixed character width that the printer accepts are displayed. The typeface *Courier New* in character size *10* is preset. Select the typeface and character size and click on *Apply* to make these settings effective for subsequent printing operations.

The *Setup* button opens the window *Printer settings*. This is mainly of interest for selecting upright or landscape format.

The settings chosen here apply for printing tables and measurement protocols, but not for results and calibration protocols.

With *OK*, you store your entries in the window *Preparing for print*. With the button *Open editor*, depending on the setting, you will open the editor window or Word with the current content.

4.6 Connections to Microsoft Office

Connections to Microsoft Office make *CalWin* an extremely flexible program, because data can then, for example, be subjected to further evaluation or prepared for presentation. While the connection to Word is used for storing and printing data, results can be analysed and displayed in Excel and Access.

Direct connection to Office applications is dependent on correct system installation. For example, invalid registry entries (which may be generated by any application) can prevent connection.

Always close *CalWin* first and then an Office application!
If an Office application is closed while *CalWin* is still open, it will be impossible to make the connection after restarting *CalWin*. This can lead to a system crash. The systems must then be restarted.

The connections have been tested using Office 97 with Windows 95, Windows 98 and Windows NT.

Connections to Word
Whenever the box *WORD* is activated in the *Preparing output* window, *CalWin* tries to create a connection to Word every time it is started. However, two different cases must be considered:

- Automatic operating mode
  Word is not open when *CalWin* is started. When *CalWin* starts, Word is started as well and opens a blank document. Every printing task is fed into the current document. When *CalWin* is closed, Word is also closed but without storing.

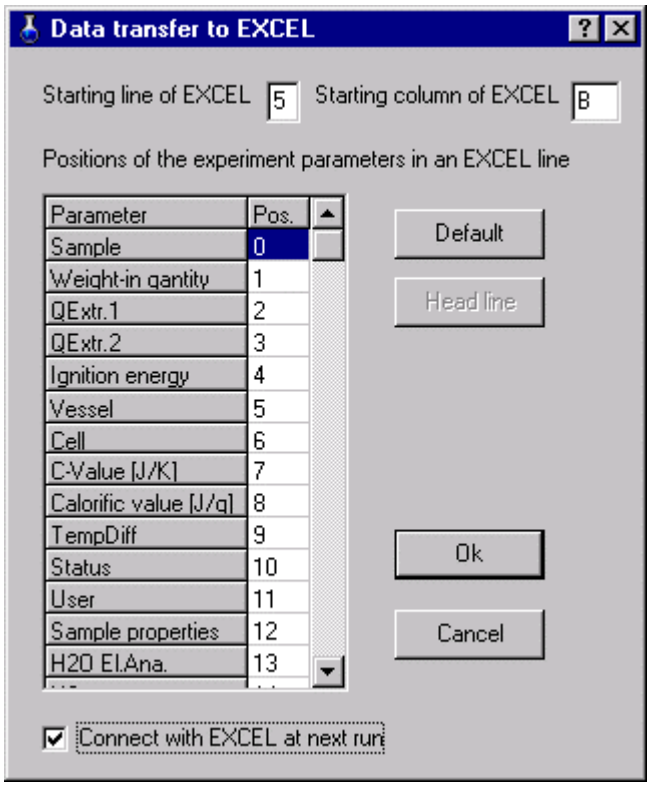
- Flexible operating mode
  Word is already open when *CalWin* is started. *CalWin* makes no changes to opened files or document settings. Every printing task is fed into the current document and closed with a page break. The actual printing operation must be initiated by the Word user. Closing *CalWin* has no effect on Word.

Regardless of the operating mode, the user retains full control of Word.

Following a successful connection, the button *OK – Open editor* in the *Preparing output* window has the recognised Word version added to its label.

Data transmission to Excel
From any table of measurements (daily table, library, groups, calibration), a selected measurement can be transmitted to the current Excel worksheet. Every transmission seizes one line of the worksheet and increases the number of the line for the next transmission by one.

You can determine from which position in a worksheet the insertion of measurements starts, and in which sequence the parameters of a measurement are transmitted. You can do this from the menu bar of the main screen by selecting *Setup* → *Excel*, which opens the window *Data transfer to Excel*.



***Data transfer to Excel* window**

Whenever the box *Connect with Excel at next run* is activated, *CalWin* tries to create a connection to Excel every time it is started. However, two different cases must be considered:

- Automatic operating mode
  Excel is not open when *CalWin* is started. When *CalWin* starts, Excel is started as well and opens the file that was last active in this mode. When *CalWin* is closed, Excel is also closed. The last file that was active will be used when the next connection is made in this mode.

- Flexible operating mode
  Excel is already open when *CalWin* is started. *CalWin* makes no changes to opened files or settings. Closing *CalWin* has no effect on Excel.

Regardless of the operating mode, the user retains full control of Excel.

You can make the following transmission settings in the window *Data transfer to Excel*:

- *Starting line of EXCEL*
  Measurements will be stored from this line in a worksheet. Each transmission increases the number of the current line by one. If an incorrect entry is made, the line number is reset to the standard setting (5).

- *Starting column of EXCEL*
  Measurement parameters will be stored from this column in a worksheet. If an incorrect entry is made, this will be reset to the standard setting (B).

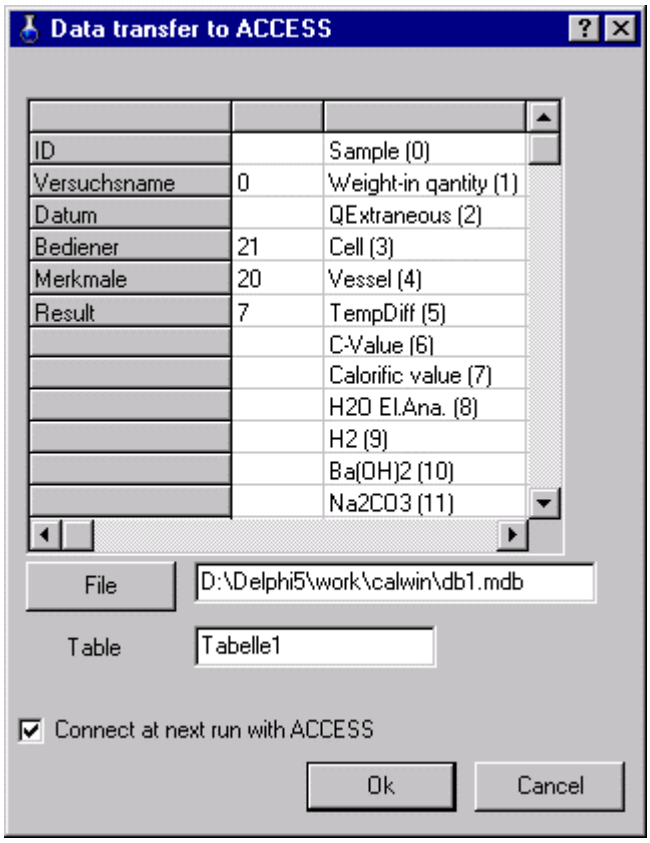
- *Position of experiment parameters in an EXCEL line*
  For every measurement parameter, an Excel column number can be specified within an Excel line, **relative** to the start column.
  Example: The C-value is transmitted to the column B+8 = J.
  If the position field remains blank, this parameter will not be transmitted. The same applies for a mis-entry.

- *Standard*
  Resets all transmission data to the standard values.

- *Headline*
  A heading line is transmitted to the line above the specified start line in the Excel worksheet. It will contain the (user-definable) headings for the parameters that are to be transmitted.

Data transmission to Access

Every successfully-completed measurement can be written once as a new data record in an Access table. You can determine which database or table is to be used, and how the fields in the table are related to the measurement parameters. You can do this from the menu bar of the main screen by selecting *Setup* → *Access*, which opens the window *Data transfer to Access*.



Window for *Data transfer to Access*

Whenever the box *Connect at next run with Access* is activated, *CalWin* tries to create a connection to Access every time it is started. However, two different cases must be considered:

- Automatic operating mode
  Access is not open when *CalWin* is started. When *CalWin* starts, Access is also started at the database table defined in the dialogue. Both *File* and *Table* must be specified. (Within Access, the database table is **not** opened automatically; it is not necessary). When *CalWin* is closed, Access will be closed as well. The last database table that was active will be used when the next connection is made in this mode.

- Flexible operating mode
  Access is already open when *CalWin* is started. *CalWin* accepts the database currently open. Closing *CalWin* has no effect on Access.

Regardless of the operating mode, the user retains full control of Access. *CalWin* inserts data records "in the background", all other database-specific actions must be carried out by the user within Access.

You can make the following transmission settings in the window *Data transfer to Access*:

- *Field name*
  The field names of database tables are listed. If there is no connection to Access, this column is empty.

- *Parameter*
  In this column, the parameters that can be transmitted after a measurement are listed with their order.

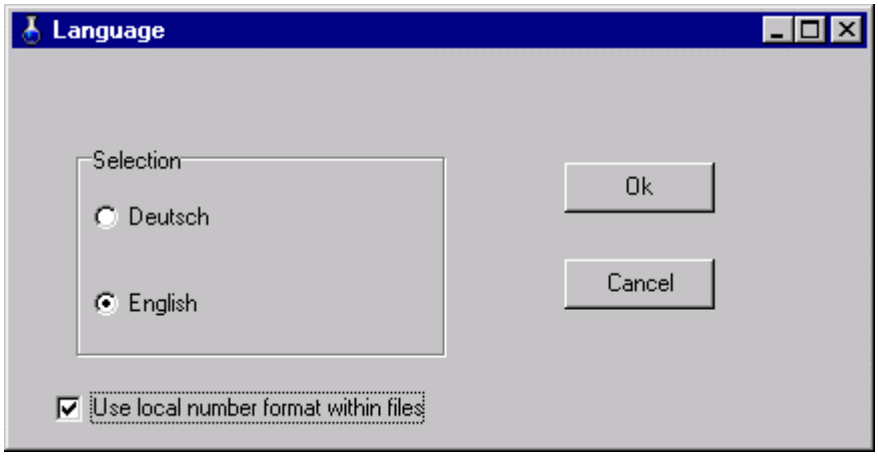
- ← *No.*
  In this column, the order of the parameters is entered. The number refers to the field name to its left.
  Example: parameter 7 (calorific value) appears under the field name *Result* in the Access database table.
  In addition, the sequence numbers 24 (date) and 25 (date and time measurement was started) can be used. These numbers can only be assigned to Access fields of the type date/time (dbDate). In other cases, an attempt is made to suit the type of parameter to the type of Access field assigned to it. On the Access side, only the field types double (dbDouble) or text (dbText) should be used. (Exception: the parameter *Status* can only be assigned to fields of the type long (dbLong).

- *File*
  In a file window, a database file can be selected.

- *Table*
  A table from the selected database can be entered here.

4.7 Changing the user-interface language

In *CalWin* you can choose between user interfaces in German and English. In the menu bar of the main screen, select *Setup* and the entry *Language* to open the window shown below.



***Language* window**

The language changes immediately you confirm with *OK*.

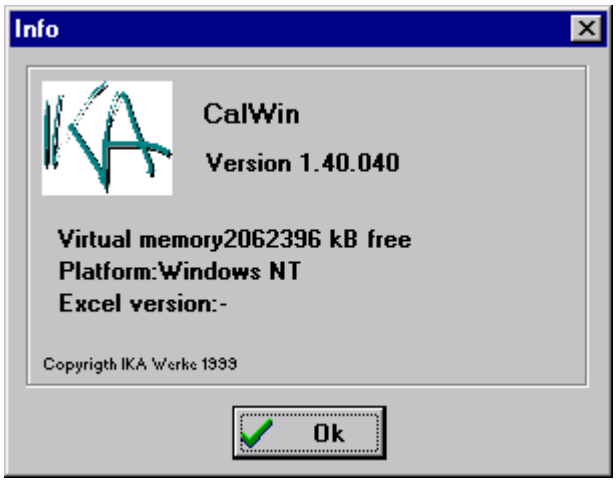
The names of units and vessels must be changed individually, see Section 3.5 "Administration of decomposition vessels".

If files generated in *CalWin* are to be exported to Microsoft Excel, activate the option *Use local number format within files*. Depending on the language of the operating system, output data are then formatted with a decimal comma (German) or decimal point (English).

4.8 Calling up online help and CalWin version

In *CalWin*, you can call up a context-sensitive online help for the current window at any time by pressing the *F1* key. Alternatively, you can use *Help* → *Help contents* in the main menu bar, and then start a search for keywords as usual under Windows.

To see the CalWin version installed on your computer, use *Help* → *Info* in the main menu bar.



Call up CalWin version

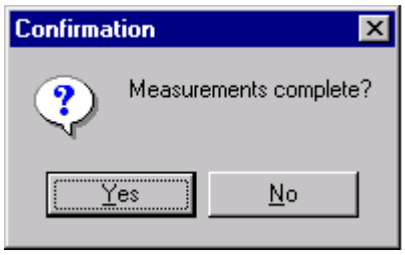
4.9 Closing CalWin

While working with a calorimeter system, CalWin can be closed and restarted if no measurements are running in the calorimeters. When you have finished work with a calorimeter system, first all decomposition vessels should be removed from the calorimeters. In addition for the C 2000 Control, the cover must be closed by pressing *Cancel* in the CalWin window *Measuring cell*. Then CalWin can be closed down. Finally, any other calorimeters must be closed and calorimeters and coolers switched off.

The covers of the calorimeters are closed:

- on the C 2000 Basic by using the menu command *Exit* on the calorimeter;
- on the C 2000 Control using CalWin;
- on the C 4000 manually;
- on the C 5000 and C 5000 (2) by using the menu command *Exit* on the calorimeter;
- on the C 7000 manually.

Click on ✕ at the top right-hand corner of the main screen to close CalWin. The window shown below appears.



By clicking on *Yes*, you close the program. If you click on *No*, you return to CalWin.

5 Preparing and Carrying Out Measurements

Whereas configuration of the interfaces to the connected units can only be carried out in *CalCFG*, all other settings can be made in *CalWin*, therefore, several of the settings already described in Section 3 "Configuration with *CalCFG*" recur here. In this section, all settings are described, that are possible with *CalWin* and are connected with preparing and carrying out calorimeter measurements. They are:

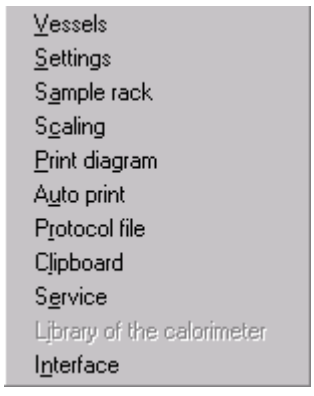
- Configuration of operating modes and test procedures of a calorimeter
- Configuration of a balance
- Configuration of the basic set-up for data evaluation
- Selecting the units of measurement
- Use of sample racks
- Preparing new measurements
- Starting and monitoring new measurements.

5.1 Configuring the devices

If this has not been done in the configuration program *CalCFG*, the operating modes, test procedures, and calculation settings must first be determined before using a calorimeter. These settings must be entered separately for each connected device.

All devices, to which an interface was successfully assigned in *CalCFG* and which are switched on when *CalWin* is started, will be shown in the status bar of the main CalWin window. A click with the right mouse button on a device in the status bar opens a context menu. The menu items available depend on the device selected.

Context menus for calorimeters and balances



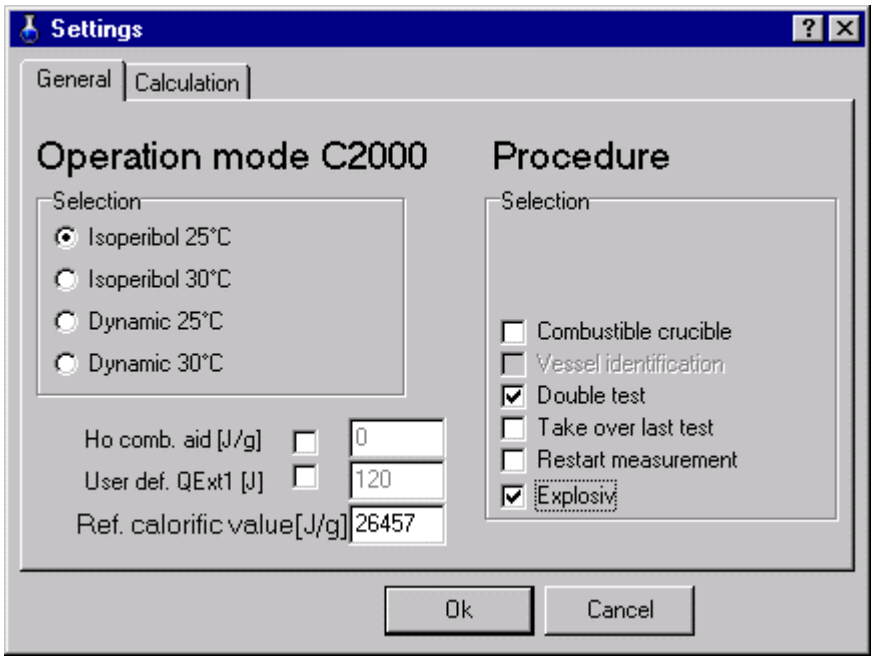
Calorimeters C 2000/C 5000

Balance

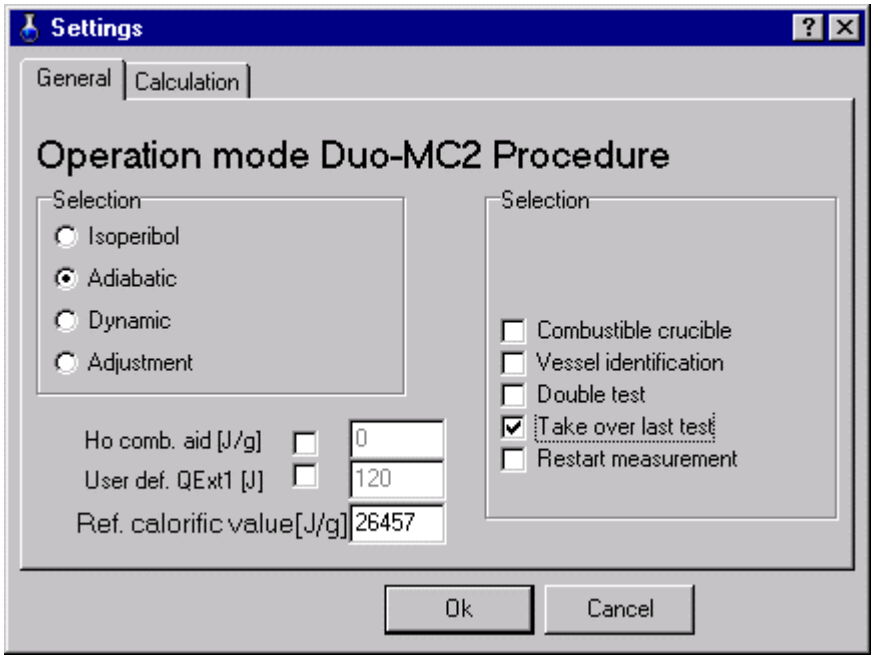
With a click on the menu item *Settings*, the dialogue *Settings* opens in a form depending on the device selected. All calorimeters and balances in the status bar can be configured in this way.

The dialogue *Settings General* shows only those setting options, which can be configured on the device selected. The settings *Double test*, *Restart measurement*, *Take over last test*, and *Ref. calorific value* are available for all calorimeters.

Settings General dialogue for calorimeters



Dialogue *Settings General* for C 2000 (without a balance)



Dialogue *Settings General* for C 5000 DuoControl

Depending on the model of calorimeter, the dialogue *Settings General* gives access to the following possibilities:

Operation mode
Select the mode of operation you require.

- Modes of operation for C 2000:
  Isoperibol 25°C to DIN 51900 Part 2
  Isoperibol 30°C to DIN 51900 Part 2
  Dynamic 25°C (Isoperibol at 25°C with shorter measuring time)
  Dynamic 30°C (Isoperibol at 30°C with shorter measuring time)
- Mode of operation for C 4000:
  No settings possible, calorimeter measurements are always adiabatic to DIN 51900 Part 3
- Modes of operation for C 5000 and C 5000(2):
  Isoperibol to DIN 51900 Part 2
  Adiabatic to DIN 51900 Part 3
  Dynamic (adiabatic with shorter measuring time)
  Adjustment
  (for the C 5000 Duo Control, the mode is set for measuring cell 1, and adopted for measuring cell 2)
- Mode of operation for C 7000:
  No settings possible.

Ho comb. aid
If there is no balance connected, and you are using a combustion aid, the gross calorific value of the combustion aid can be entered here. Activate this option and then enter the gross calorific value in the text field (all types of calorimeter).

Ref. calorific value
Enter the gross calorific value of the calibration substance in J/g (all types of calorimeter).

User def. QExt1
After activating this option, a value for external energy can be entered in the text field for external energy *QExtraneous1*. This value is then used in subsequent calculations instead of the standard value (see Section 5.4 "Preparing for new measurements").

Combustible crucible
Activate this box when using combustible crucibles. The external energy 1 is then automatically reduced by 50 J (no cotton thread). However, external energy 2 from the combustible crucible must be taken into account (all types of calorimeter except C 4000).

Vessel identification
The C 2000, C 5000, C 5000(2) and C 7000 calorimeters all have decomposition-vessel recognition. When this box is activated, a decomposition vessel is not assigned to a measurement, assignment is carried out by the calorimeter at the start of measurement. For the C 5000 calorimeter, this option must also be set on the unit itself. On the C 7000, decomposition-vessel recognition cannot be switched off.

Double test
When this box is activated, and sample codes have already been entered (see Section 5.7 "Measurements with pre-defined sample codes"), two measurements will be made for each sample code. Two measurements increase the reliability of test results. The option *Double test* gives a better overview of measurements. Both measurements are assigned to the same sample code and placed one above the other in the table in the main window. The symbol appears in the main window if the results of the two tests differ by more than 100 J. In such a case, a third measurement should be made, see Section in Chapter 5.6 "Repeat measurements for double tests" (all types of calorimeter except C 7000).

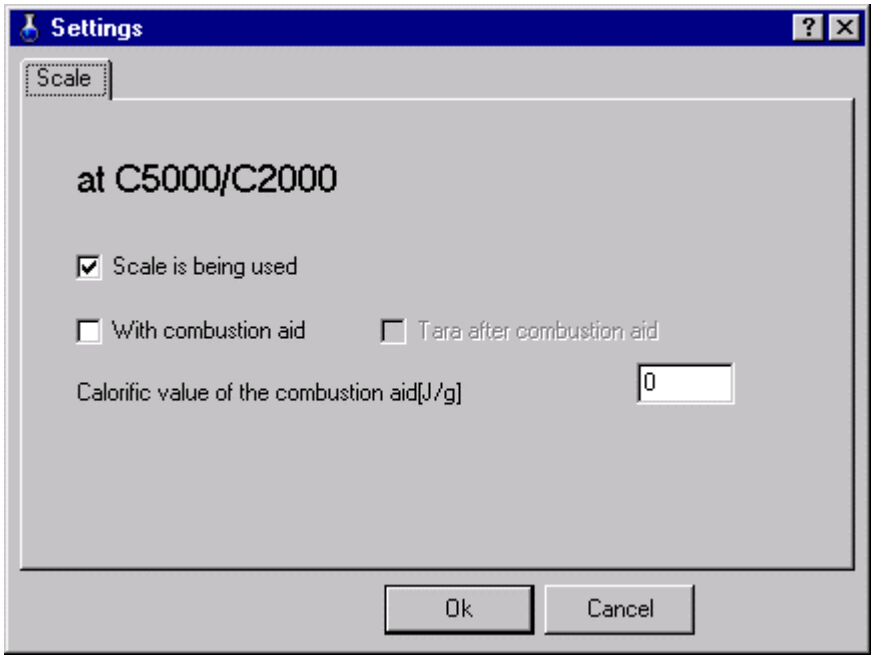
Take over last test
With this option, when a measurement is prepared, QExtraneous1, the sample characteristics, and the operator's name from the previous measurement are used (all types of calorimeter except C 7000).

Restart measurement
When this box is activated, interrupted measurements are returned to the *Restart* condition – indicated in the *Status* column of the table in the main window – if ignition has not occurred. They can then be restarted. For the C 5000 calorimeter, this option must also be set on the unit itself (all types of calorimeter except C 7000).

Explosive
This option applies only to a C 2000 which has been fitted with Calorimeter Conversion C 60. In addition, only a Peters bomb modified with IKA® Electrode Set C 61 may be used. The use of C 5010 and C 5012 standard vessels is not permitted in this mode.

This option can only be activated when decomposition-vessel recognition is deactivated. The latter enables up to 20 decomposition vessels to be used per calorimeter, and changes the procedure when starting measurements (See Section 5.5 "Starting and recording new measurements")

***Settings* dialogue for balances**



***Settings* dialogue for balance on C 5000**

Scale is being used
Activate this box if data are to be transmitted from a balance.

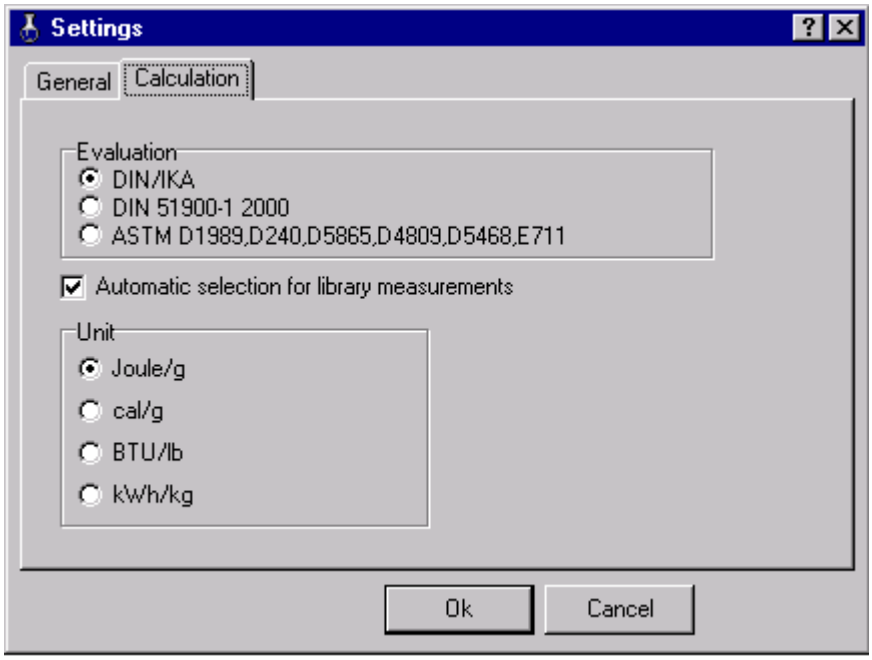
With combustion aid
Activate this box so that for every sample, first the weight of combustion aid, and then the weight of combustion aid plus sample are transmitted. External energy 2 is calculated from the weight and calorific value of the combustion aid.

Calorific value of combustion aid
You must enter the correct value for the combustion aid in J/g when the *With combustion aid* is activated.

Tara after comb. aid
Activate this box if the balance should be tared after it has transmitted the weight of the combustion aid.

5.2 Evaluation settings and units

The *Calculation* register enables you to select the type of evaluation to be used when making the calculations, and the units to be employed.



***Calculation* register**

The *Calculation* register is independent of the calorimeter. This means that the type of evaluation and the units set apply to all connected calorimeters and balances.

In the *Calculation* register, the following settings are possible:

Evaluation
You can choose to evaluate measurements to either of two different procedures. The procedure set then applies to all measurements made thereafter and also to all measurements, stored in the library, but not yet evaluated.

- *DIN/IKA*
  This procedure offers seven different modes for evaluating measurements. These evaluation modes are used completely or partially for evaluations with the C 2000, C 5000, C 7000 calorimeters, and C402, MULTICAL and CalWin 1.30 software.

- *DIN 51900-1 2000*
  This procedure evaluates measurements to DIN 51900-1 2000.
- ASTM D1989, D240, D5865, D4809, D5468, E711
  This procedure takes into account current US standards for combustion calorimetry of solid and liquid fuels, and wastes.

Automatic selection for library measurements
When this box is activated, already evaluated measurements stored in the library will retain their original evaluation procedure if the procedure is subsequently changed.

Units
Here, you can select the units in which results are displayed on the screen and when printed.

- *J/g* calorific values displayed in J/g, heat capacities in J/K
- *Cal/g* calorific values displayed in cal/g, heat capacities in cal/K
- *BTU/lb* calorific values displayed in BTU/lb, heat capacities in BTU/lb*g/K
- *KWh/kg* calorific values displayed in kWh/kg, heat capacities in J/K

5.3 Managing a sample rack under CalWin

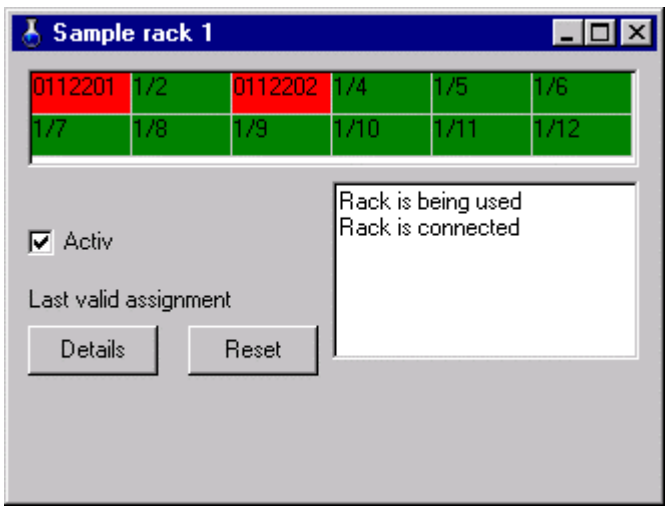
The sample rack – in conjunction with C 2000 and C 5000 calorimeters – is used for storing samples. It enables the registration of samples after they have been weighed and their processing in the calorimeter to be carried out at different times.

After placing a crucible in the sample rack, the sample is identified and registered. Registration is retained until the sample rack is deactivated. You can register as many samples as there are compartments in the rack.

Management of a sample rack with CalWin is carried out as follows:

①
With the right-hand mouse button, click in the status bar of the CalWin main window on the calorimeter whose sample rack is to be managed. The appropriate context menu opens.

②
With the left-hand mouse button, click on the entry *Sample rack* in the context menu. The dialogue window *Sample rack* opens. In it, the sample rack can be managed.



***Sample rack* window**

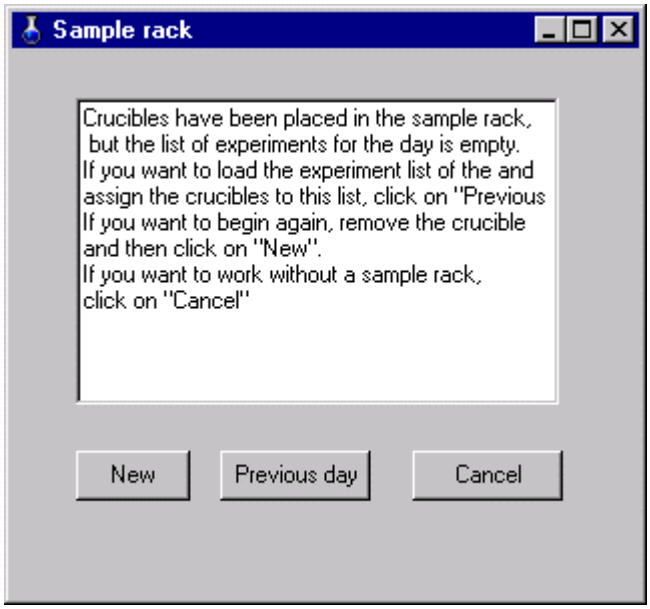
③

The box *Active* can be used to switch the sample rack on and off. In the management window on the right, messages about the current status or incorrect allocation are displayed. By clicking on the *Details* button, the difference between current and the last valid assignment can be seen. *Reset* returns the sample rack to the ready-for-use condition, after a valid allocation has been reinstated.

Allocation of the sample rack is shown symbolically. Free compartments are green with the compartment designation (rack number/compartment number), occupied compartments are red with the sample designation of the crucible.

Checking sample racks when *CalWin* is started

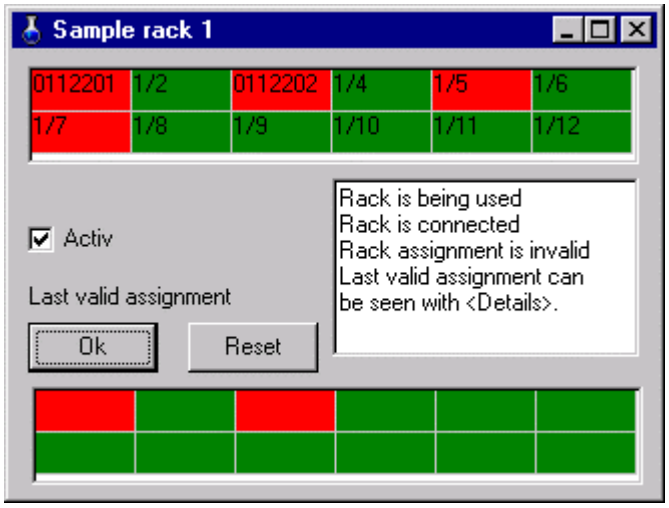
When CalWin is started, it checks occupation of the sample rack, and compares it with list of tests for the day. If there are differences, the following dialogue opens:



Follow the instructions given in this window.

Changing assignment when the sample rack is switched off

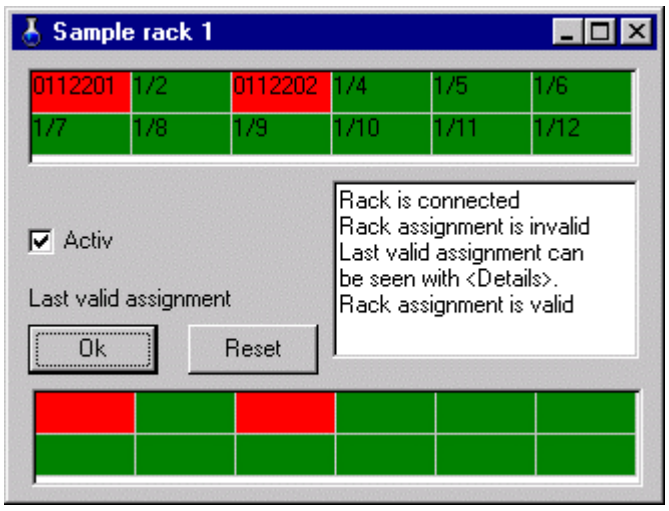
When the sample rack is switched off, do not make any changes to assignment. If changes have been made, this will be indicated in the management window for the rack.



Invalid assignment of sample rack

A click on the *Details* button will show the differences between the current and last valid assignments. In the case shown here, two additional crucibles have been placed in the rack. This is indicated by the difference between the coloured boxes in the upper and lower sections of the window, and in the missing sample designations in the upper box. These two crucibles must be removed to return the sample racks to a valid condition.

Sample rack returned to valid condition



After clicking the *Reset* button, you can continue work with the sample rack.

5.4 Preparing for new measurements

The following requirements must be fulfilled before a new measurement can be entered:

- The device on which the measurement is to be made must be switched on.
- The device on which the measurement is to be made has had an interface assigned to it using *CalCFG* (see Section 3 "Configuration with *CalCFG*").
- All the calorimeters on which the measurements are to be made have had decomposition vessels assigned to them. How to assign decomposition vessels is explained in Section 3 "Configuration with *CalCFG*". How to assign decomposition vessels and manage calibration using *CalWin* is explained in Section 6 "Managing decomposition vessels and calibrations".

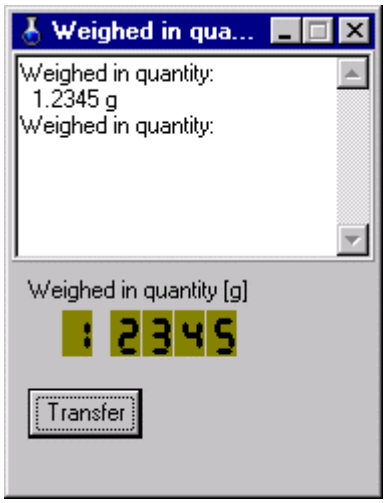
Potential situations for entering a new measurement

How you enter a new measurement depends on the current situation. The following situations are possible:

- Working without sample rack, balance not in use
- Working without sample rack, balance being used
- Working with sample rack, balance not in use
- Working with sample rack, balance being used.

When using a balance, there is also a distinction between whether or not a combustion aid is to be used, and, if so, with which option.

If you are using an analytical balance, you can use the left mouse button during a measurement to click on the button *Weighed in quantity* in the status bar of the main window. The dialogue *Weighed in quantity* opens; it shows the current reading of the balance.



Close the window *Weighed in quantity* by clicking on ✕ or by clicking again on *Weighed in quantity* in the status bar of the main window.

Working without sample rack, balance not in use
Click in the *CalWin* main window on the button *New measurement*. The dialogue *New measurement* appears in which you can enter the necessary data.

Working without sample rack, balance being used
Here, the procedure depends on whether you have configured the balance with or without a combustion aid (see Section 5.1 "Configuring the devices"). There are the following possibilities:

- No combustion aid is to be used
  Transmit the sample weight by pressing the transfer button on the balance. The dialogue window *New measurement* opens automatically with the weight already displayed.

- The option *With combustion aid* is activated
  If this option is used, the box *With combustion aid* must be activated in the *Settings* window for the balance, and the calorific value of the combustion aid entered.
  Weigh the combustion aid and transmit its weight by pressing the transfer button on the balance. The dialogue window *New measurement* opens automatically with the amount of combustion aid shown in the field *QExtraneous2*. Now weigh the sample and transmit its weight by pressing the transfer button on the balance. The weight of the sample will be automatically displayed in the window *New measurement*.

- The options *With combustion aid* and *Tara after combustion aid* are activated
  For these options, the boxes *With combustion aid* and *Tara after combustion aid* must be activated in the *Settings* window for the balance, and the calorific value of the combustion aid entered.
  Weigh the combustion aid and transmit its weight by pressing the transfer button on the balance. The dialogue window *New measurement* opens automatically with the amount of combustion aid shown in the field *QExtraneous2*. Then tare the balance before you weigh the sample and transmit its weight by pressing the

transfer button on the balance. The weight of the sample will be automatically displayed in the window *New measurement*.

Working with sample rack, balance not in use
Place the crucible with a weighed sample in the sample rack. The sample will be identified and registered, and the window *New measurement* opened automatically. Manually enter the sample weight in the field *Weighed in quantity*. Click on *OK* in the window *New measurement*. If you later remove the crucible from the sample rack, the window *New measurement* opens again so that all other parameters can be entered.

Working with sample rack, balance being used
Here, the procedure depends on whether you have configured the balance with or without a combustion aid (see Section 5.1 "Configuring the devices"). There are the following possibilities:

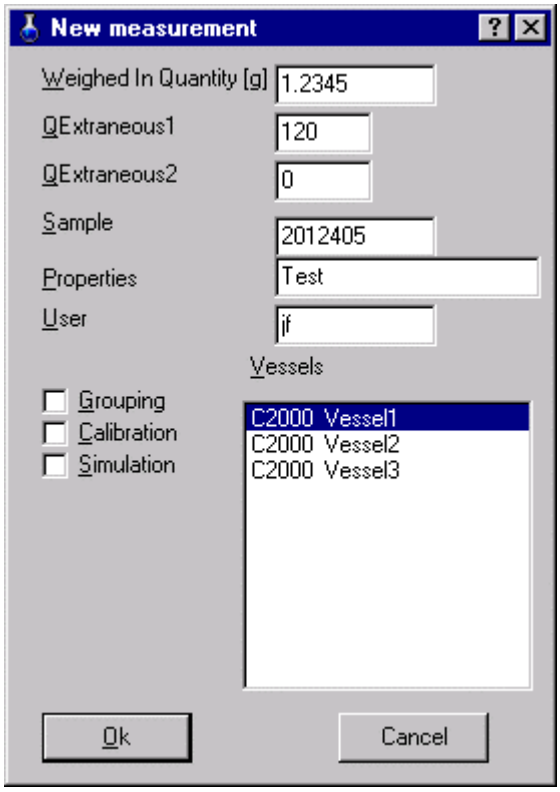
- No combustion aid is to be used
  Transmit the sample weight by pressing the transfer button on the balance. Place the crucible with a weighed sample in the sample rack. The sample will be identified and registered, and the window *New measurement* opened automatically with the weight already displayed. Click on *OK* in the window *New measurement*. If you later remove the crucible from the sample rack, the window *New measurement* opens again so that all other parameters can be entered.

- The option *With combustion aid* is activated
  If this option is used, the box *With combustion aid* must be activated in the *Settings* window for the balance, and the calorific value of the combustion aid entered.
  Weigh the combustion aid and transmit its weight by pressing the transfer button on the balance. Then weigh the sample and transmit its weight by pressing the transfer button on the balance. Place the crucible with a weighed sample in the sample rack. The sample will be identified and registered, and the window *New measurement* opened automatically with the values already displayed in the fields *Weighed in quantity* and *QExtraneous2*. Click on *OK* in the window *New measurement*. If you later remove the crucible from the sample rack, the window *New measurement* opens again so that all other parameters can be entered.

- The options *With combustion aid* and *Tara after combustion aid* are activated
  For these options, the boxes *With combustion aid* and *Tara after combustion aid* must be activated in the *Settings* window for the balance, and the calorific value of the combustion aid entered.
  Weigh the combustion aid and transmit its weight by pressing the transfer button on the balance. Then tare the balance before you weigh the sample and transmit its weight by pressing the transfer button on the balance. Place the crucible with a weighed sample in the sample rack. The sample will be identified and registered, and the window *New measurement* opened automatically with the values already displayed in the fields *Weighed in quantity* and *QExtraneous2*. Click on *OK* in the window *New measurement*. If you later remove the crucible from the sample rack, the window *New measurement* opens again so that all other parameters can be entered.

Entering sample parameters

After opening the window *New measurement*, all the sample parameters that are still missing can be entered, and a decomposition vessel selected for the measurement.



Dialogue window *New measurement*

Depending on the path by which the dialogue window *New measurement* was opened, there may be some parameters already entered. The descriptions here cover all possible entries in the *New measurement* window:

- *Weighed in Quantity*
  Only values greater than zero can be entered. Enter 4 figures after the decimal point to ensure the necessary accuracy of the result. Invalid characters are not accepted.
  There must always be an entry in this field.

When you use a balance, you can also try to call up a value from the balance by clicking or double-clicking in this field. Depending on the type of balance, this may or may not work.

- *QExtraneous1* (external energy 1)
  For measurements without a combustion aid, the following external energies must be taken into account according to the type of calorimeter:
  - C 5000, C 2000 (software version 1.xx): 120 J (50 J cotton thread + 70 J electrical ignition energy)
  - C 5000(2), C 2000 (software version 2.xx): 50 J (cotton thread), ignition energy will be assigned separately
  - C 7000: 50 J (cotton thread),
  - C 4000: 80 J (50 J cotton thread + 30 J ignition wire).

The user can define a different standard value for *QExtraneous1* (see Section 5.1 "Configuring the devices").

- *QExtraneous2* (external energy 2)
  External energy from a combustion aid can be entered here. If a connected analytical balance is being operated in the *With combustion aid* mode, the external energy from a combustion aid is already taken into account.

- *Sample* (sample name)
  The sample name can have a maximum of 16 characters. With a C 5000 calorimeter, only the first 7 characters are transmitted, which means that these 7 characters must be an unambiguous identification for the sample. Characters that are not accepted by Windows Explorer (\ / : * ? “ < > |) and blanks are not accepted.
  There must always be an entry in this field.
  As standard, *CalWin* issues a unique sample name, made up of *Year / Month / Day / Test number*. This sample name can be changed by the user.
  If the option *Double test* is activated (see Section 5.1 "Configuring the devices“), the following also apply:
  - the sample name may not have more than 5 characters, the sequence numbers "_1" and "_2" will be added automatically;
  - all status symbols are shown with a grey background during double testing.

- *Properties*
  Any desired text (max. 40 characters) can be entered, it appears in the measurements protocol.

- *User*
  Any desired text (max. 16 characters) can be entered, it appears in the measurements protocol.

- *Grouping*
  When this box is activated, this measurement is added to a table that contains grouped measurements as well as to the standard table. This box can only be activated if an appropriate grouping has previously been entered. The measurement is only entered in the currently active grouping if it is successfully completed. For more information about grouping, see Section 8.4 "Grouping".

Calibrations cannot be grouped. The *Calibration* box can therefore not be activated if *Grouping* is marked.

- *Calibration*
  When this box is activated, the new measurement will be carried out as a calibration.

- *Simulation*
  No measurement will be carried out.
  When this box is activated, the field *DT=* appears below it. A fictitious temperature increase in Kelvin can be entered in this field. This value is used to calculate the results for a simulated measurement. The measurement is entered in the table in the main window with the status *Measurement completed (simulation)*, and can be further processed as if it were a real measurement.
  A decomposition vessel must be selected for the simulation; all registered decomposition vessels are available.

- *Vessels* (decomposition vessels)
  If decomposition vessels are not automatically recognised, a list with all currently available decomposition vessels is displayed. A measurement can be assigned to every decomposition vessel in the list. Decomposition vessels are not available in this list when they are assigned to a measurement which has not been completed in the calorimeter.

  With the C 7000 calorimeter, decomposition vessels are always automatically assigned, and with the C 4000, always by the user. For the C 2000 and C 5000 calorimeters with decomposition-vessel recognition, both possibilities exist. Whether recognition is manual or automatic is controlled by the option *Vessel recognition* in the *Settings* dialogue for that calorimeter.

If a decomposition vessel is to be automatically recognised by the calorimeter, then only that device must be selected, the assignment of a decomposition vessel takes place at the start of measurement in the calorimeter. In that case, only one measurement per calorimeter can be prepared.

If a decomposition vessel is selected for which a calibration sequence is running, the box *Calibration* is marked automatically. This can only be prevented by interrupting the calibration sequence. The subject of calibration sequences is explained in detail in Section 6 "Managing decomposition vessels and calibrations".

5.5 Starting and recording new measurements

When all parameters have been entered in the *New measurement* window, you can start testing. If you want to reject data, you can press the *Cancel* button to close the *New measurement* window without creating a new measurement. Otherwise, proceed as follows:

①

Confirm your entries in the *New measurement* window with *OK*. The window closes and the new measurement is written in the table in the main window with the status  (parameters being transmitted to the calorimeter). When data transmission is complete, the calorimeter acknowledges the action. In the main window, the status changes to  (measurement waiting).

If data transmission is unsuccessful, an appropriate message appears on the screen. After acknowledgement, data transmission can be repeated by clicking on the button *--->Cell*. See also Section 9 "Troubleshooting".

If the option *Restart measurement* is activated in the *Settings General* window for this calorimeter, and a measurement is running or in *Restart* status (indicated in the *Status* column of the table in the main window), the measurement prepared at this time remains in the  status (parameters being transmitted to the calorimeter). By clicking on the button *--->Cell*, this measurement cannot be transmitted to the calorimeter until the previous measurement has been completed or deleted.

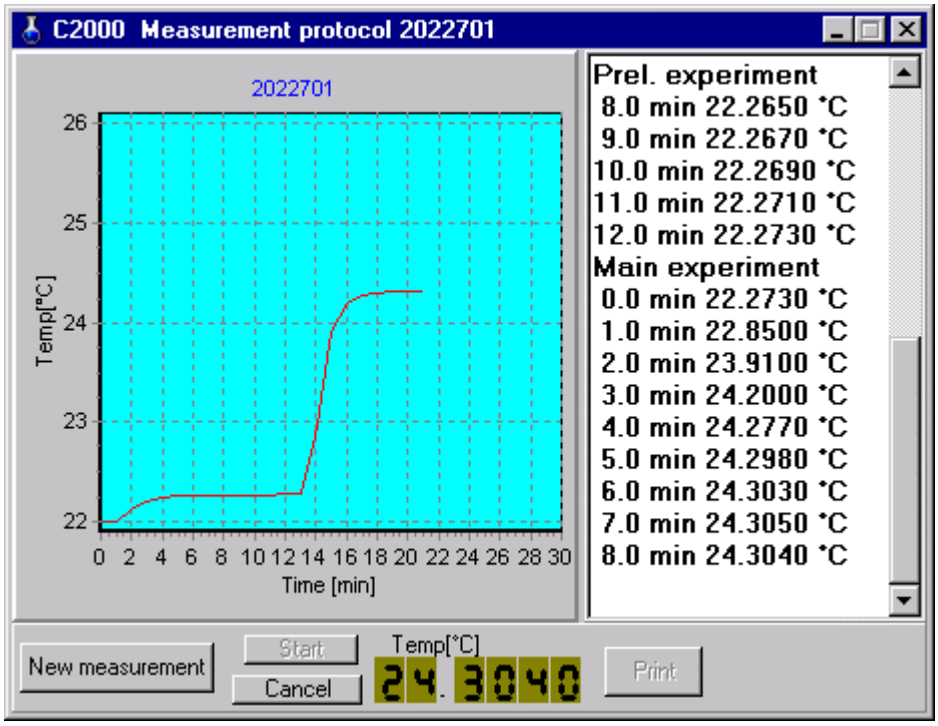
Only for C 2000: if the option *Explosiv* is activated in the *Settings General* window for this calorimeter, the parameters for the measurement will not be transmitted to the calorimeter, it remains in the status *Measurement prepared*. Only as many measurements can be prepared as there are decomposition vessels available. For all such prepared measurements, the button *Measurement xxxxxx* appears. By clicking on this button, parameters will be sent to the calorimeter.

②

Starting a measurement

Now start the measurement at the calorimeter. The C 4000 and C 7000 calorimeters are started by manually closing the cover of the calorimeter. The C 5000 can be started either using the start button on the device, or as described below using *CalWin*. The C 2000 and C5000(2) calorimeters must always be started using *CalWin,* because, by coupling the calorimeter with the software, the calorimeter start button is deactivated. To start a measurement using *CalWin*, click on the start button in the *Measuring cell* window. For full details of the measurement procedure, please consult the operating instructions for your IKA calorimeter system.

The process of measurement will be registered and recorded by *CalWin*. Progress is displayed both in the main *CalWin* window and in the *Measuring cell* window. To open the *Measuring cell* window, click on that field in the status bar of the main window in which the calorimeter is marked.



***Measuring cell* window**

The appearance of this window and the parameters displayed depend on the type and operating status of the calorimeter used. In all versions, the progress of temperature measurement is displayed both graphically on the left of the window and in tabular form on the right. In addition, the current temperature inside the vessel is shown.

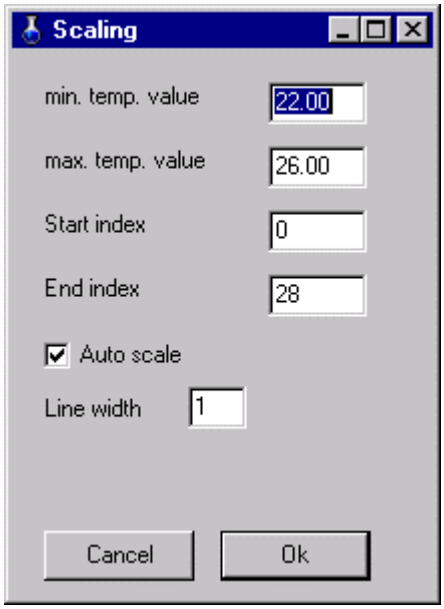
A right mouse-click in the *Measuring cell* window opens the same context menu as in the main window for the calorimeter shown in the status bar.

The menu item *Interface* in the context menu available from the *Measuring cell* window must only be used for maintenance and service. In the window it opens, a connection can be checked and any problems corrected.

③

Scaling the temperature graph

Selecting the menu item *Scaling* in the context menu (right mouse-click in the *Measuring cell* window) produces the following dialogue:



Here, you can modify the temperature graph to suit your requirements by entering temperature limits (y-axis) and the start and end indices (x-axis). With Line width, the curve can be made broader or narrower. If the box *Auto scale* is activated, *CalWin* scales automatically to suit the values measured.

④

Print diagram

By selecting the menu item *Print diagram* in the context menu, the current content of the temperature-time graph will be printed. The various forms of output are explained in Section 4.5 "Preparation for data output".

⑤

Printing a report in the *Measuring cell* window

By clicking on the *Print* button, the information in the text field of the *Measuring cell* window for the last measurement can be sent to output when the test has been completed. If the entry *Auto print* is activated in the context menu, a report of the last measurement completed will be printed automatically.

⑥

Creating a protocol file

If you activate this entry by clicking on it in the context menu, a file with the name *DATUM_x.PRO* (x = device number) will be created, and, from this moment, all lines that appear in the report will be stored in this file. The name of the menu item changes to *DATUM_x.PRO*. Clicking on this menu item will now close the file again. A protocol that is active when *CalWin* is closed will be continued when the program is next started. How to call up and print protocol files is explained in Section 8.5 "Printing protocol files".

⑦

Copying a measurement protocol to the Windows clipboard
Click on the menu item *Clipboard* in the context menu to activate it, this copies the protocol of the last measurement to the Windows clipboard. It is also possible to mark text in the protocol window with the mouse, and use the key combination Ctrl + C to copy them to the clipboard.

⑧

Cancelling a measurement
With the C 4000 and C 7000 calorimeters, measurements can be broken off by opening the calorimeter cover. For the C 5000 calorimeter, the *Cancel* button on the calorimeter is used, and for the C 2000 and C 5000(2) the *CalWin Cancel* button. Both calorimeters and the program *CalWin* can break off measurements automatically if there is something wrong.

For measurements marked with the status  (measurement cancelled), a new measurement must be prepared and carried out. Measurements on the C 4000 calorimeter are an exception if they show Error 02 (no ignition-wire recognition), they remain in waiting status and can be restarted when the fault has been corrected.

5.6 Managing measurements in the main window

In the main window, you have the following alternatives for managing your measurements:

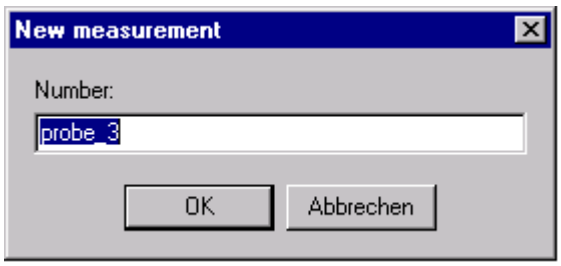
Deleting a measurement
By clicking on the *Delete* button, a selected measurement in the table in the main window can be deleted. Measurements that are then running in the calorimeter cannot be deleted. Measurements with the status  (measurement waiting) or  (parameters being transmitted to calorimeter) are also deleted in the calorimeter. Measurements with the status *Restart* – indicated in the *Status* column in the table in the main window – are not deleted, instead they are marked with the status  (measurement was interrupted).

Printing measurements listed in the main window
By clicking on the *Print list* button, the table with all measurements listed in the main window, with additional heading information, is printed. The various forms of output are explained in Section 4.5 "Preparation for data output".

Copying experiment table to Windows clipboard
Click on the *Clipboard* button to copy the whole table of tests in the main window to the Windows clipboard as text.

Repeat measurements for double tests

The *Repeat* button is only active if the box *Double test* was marked in the calorimeter configuration (see Section 5.1 "Configuring the devices"). If the results of the two measurements of a double test differ by more than 100 J, the test is marked with the status  (measurement must be repeated). In such a case, it is necessary to carry out a third measurement. Click on the measurement with the sequence number "_1", and then click on the button *Repeat*. A new measurement with the sequence number "_3" will be created.



If the result is still not satisfactory after preparing and carrying out this measurement, the entire procedure can be repeated for sequence number "_2".

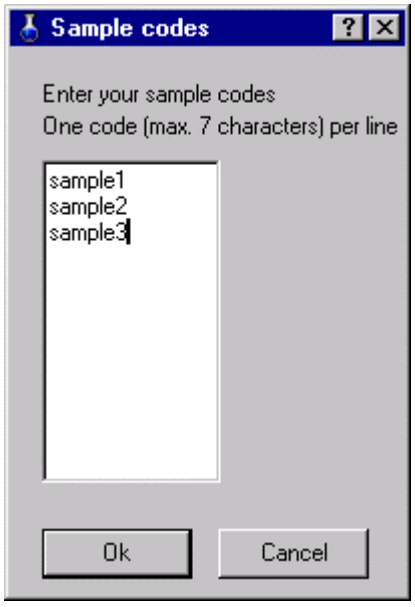
Grouping measurements

Successfully completed measurements can be dragged out of the *CalWin* main window, by clicking with the left mouse button and holding it down, into any desired existing grouping shown in the field *Grouping files* of the Grouping window. If a grouping has been selected as the current grouping, you can only drag into that one. A measurement can only be dragged once into any one grouping. For more information, please see Section 8.4 "Groupings".

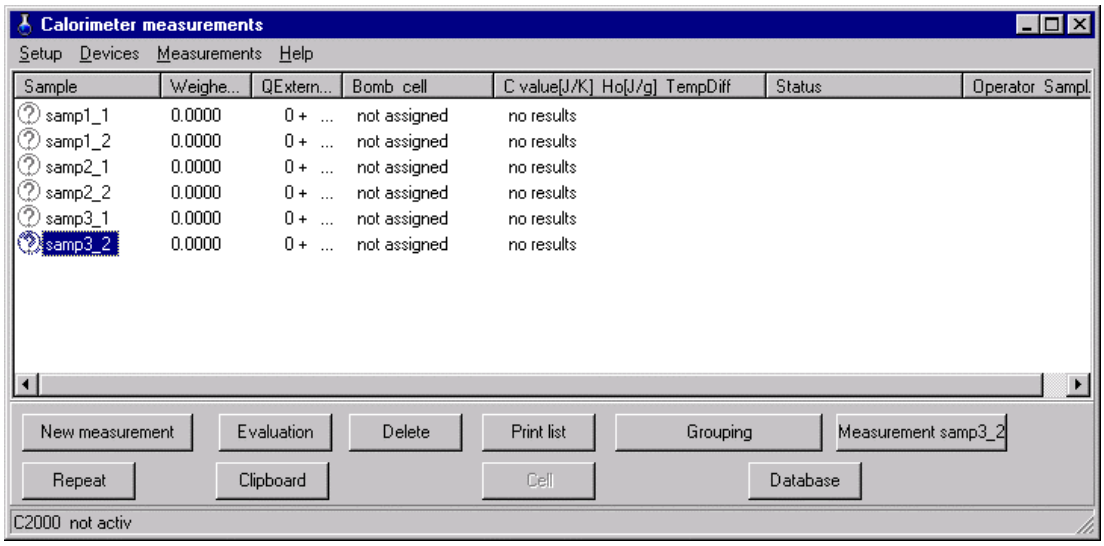
5.7 Measurements with pre-defined sample codes

With *CalWin*, you can define sample codes in advance for planned measurements. This is especially useful if you want to prevent the calorimeter automatically generating and issuing sample codes – at the same time, you do not have to enter a sample code for each individual measurement. For example, you can predefine codes in the morning for a whole day's measurements.

By clicking on *Setup* → *sample codes*, the window *Sample codes* opens, in which a list sample codes can be entered.



From this list, the measurements to be carried out will be shown in the main window. If the box *Double test* was marked in the calorimeter configuration (see Section 5.1 "Configuring the devices"), two measurements will be generated for each sample code.



Main window with predefined sample codes for double testing

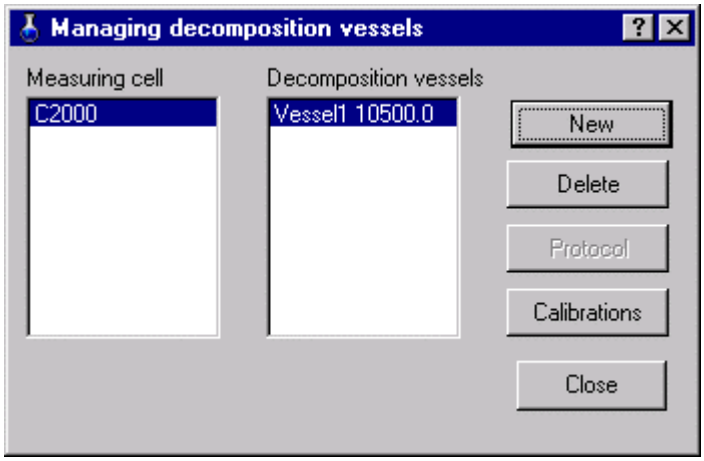
By clicking on a measurement in the list, a button with the name *Measurement* "*Sample name*" appears, where *Sample name* is the name of the sample you clicked on. A click on this button or a double click on the measurement in the list opens the window *New measurement* with the name of the appropriate sample.

6 Managing decomposition vessels and calibrations

As in the configuration program *CalCFG*, you can manage decomposition vessels in *CalWin*. *CalWin* provides the additional possibility of dealing with the calibrations for each individual decomposition vessel.
Starting point for the management of decomposition vessels and calibrations is the window *Managing decomposition vessels*. There are two ways of opening this window:

- Select *Devices* → *Decomposition vessels* in the menu bar of the main window, to open the *Managing decomposition vessels* window. In this window, all connected calorimeters and all decomposition vessels used are displayed.

- Click with the right mouse button on the field in the status line of the main window in which the relevant calorimeter is displayed. The context menu for the calorimeter opens. Select the entry *Decomposition vessels* to open the window *Managing decomposition vessels*. In this window, you will now find only those decomposition vessels that are assigned to the selected calorimeter.



In the left field the connected calorimeter systems are listed. The right-hand field shows the decomposition vessels that are assigned to the marked calorimeter.

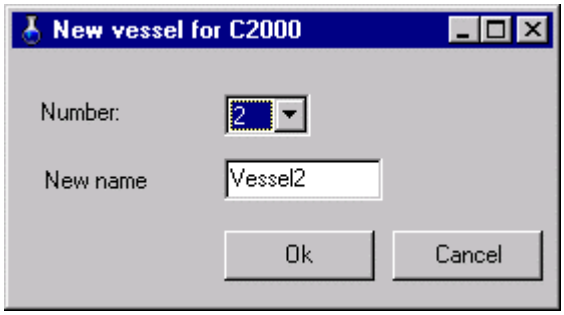
6.1 Managing decomposition vessels under CalWin

Decomposition vessel management

Management of decomposition vessels for a configured calorimeter is carried out as follows:

①

To enter a new decomposition vessel, mark the relevant calorimeter in the left-hand field and click on the button *New*. The dialogue *New vessel* opens.



②

In the *Number* field, you can scroll down a list, which shows the numbers of the vessels for that calorimeter, which have not been taken. Select a suitable number. The number must agree with the coding on the vessel. The following numbers can be applied to vessels:

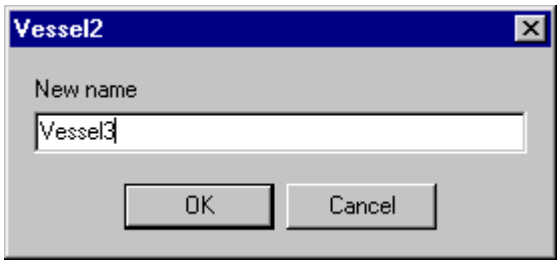
- 1 ... 4 for C 2000/C 5000
- 1 ... 16 for C 4000
- 0 ... 7 for C 7000

In the text field *New name*, enter a name for the newly-entered vessel, and click on *OK*. The new vessel is entered and assigned to the specified calorimeter.

③

Re-naming vessels and devices

To change the name of a vessel or calorimeter, double-click on the name in the appropriate list. A dialogue window appears in which you can enter the new name. Click on the *OK* button when you have entered the new name.



The change of name is only completely effective after closing *CalWin* and restarting it.

④

Deleting a vessel

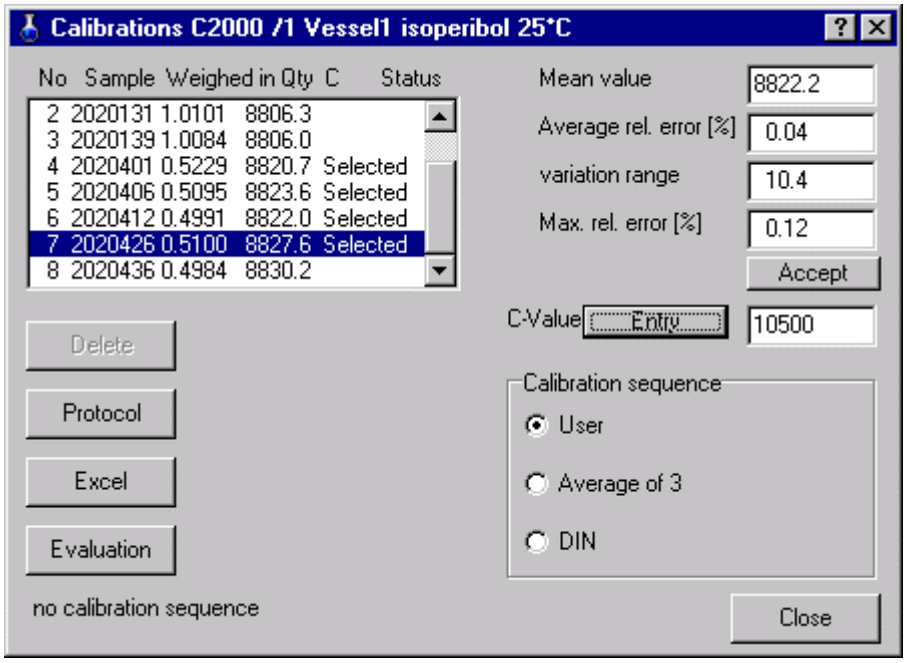
To delete a decomposition vessel, select it with the mouse, and click on the *Delete* button. Confirm with *OK*.

If you delete a decomposition vessel, the assignment of calorimeter and vessel for all previous measurements using that vessel will be erased. Calibrations with that vessel will also be erased.

For the C 5000 calorimeter, both entering (*New*) and deleting decomposition vessels must be carried out in parallel on the calorimeter display.

6.2 Configuration and management of calibrations

A mouse click on the button *Calibrations* in the window *Managing decomposition vessels* calls up the window *Calibrations*.



Here, all calibrations, that were completed with a result, are listed for the selected decomposition vessel. All data refer to the current operating mode of the calorimeter. Beside the list, the mean value, average relative error, variation range, and maximum relative error are given for the calibrations selected in the table. A calibration is selected (Status *Selected*) or deselected (no status) for averaging by double-clicking on the appropriate line of the table. In addition, a calibration sequence for a decomposition vessel can be set in this window.

If you want to select calibrations manually, the calibration sequence must be set to *User* mode. In the modes *Average of 3* and *DIN*, calibrations are selected automatically.

Setting calibration sequence
The results of every calibration measurement are automatically entered in the table for the decomposition vessel. In the *User* mode, the evaluation dialogue can be called up by the user when required, and evaluation carried out as described in Section 7 ”Evaluation of measurements”. In addition, the box *Calibration* in the window *New measurement* must be marked.

In the other cases, all selections in the table are deleted, and a calibration sequence for the decomposition vessel started. After the calibration sequence has been completed, the newly completed calibrations are automatically selected. When a calibration sequence for a decomposition vessel is running, the box *Calibration* in the window *New measurement* is marked automatically. However, this is not the case if the option *Vessel identification* is set in the configuration of the calorimeter. The *Calibration* box must then be marked manually. For the C 7000 calorimeter, the *Calibration* box must always be marked manually.

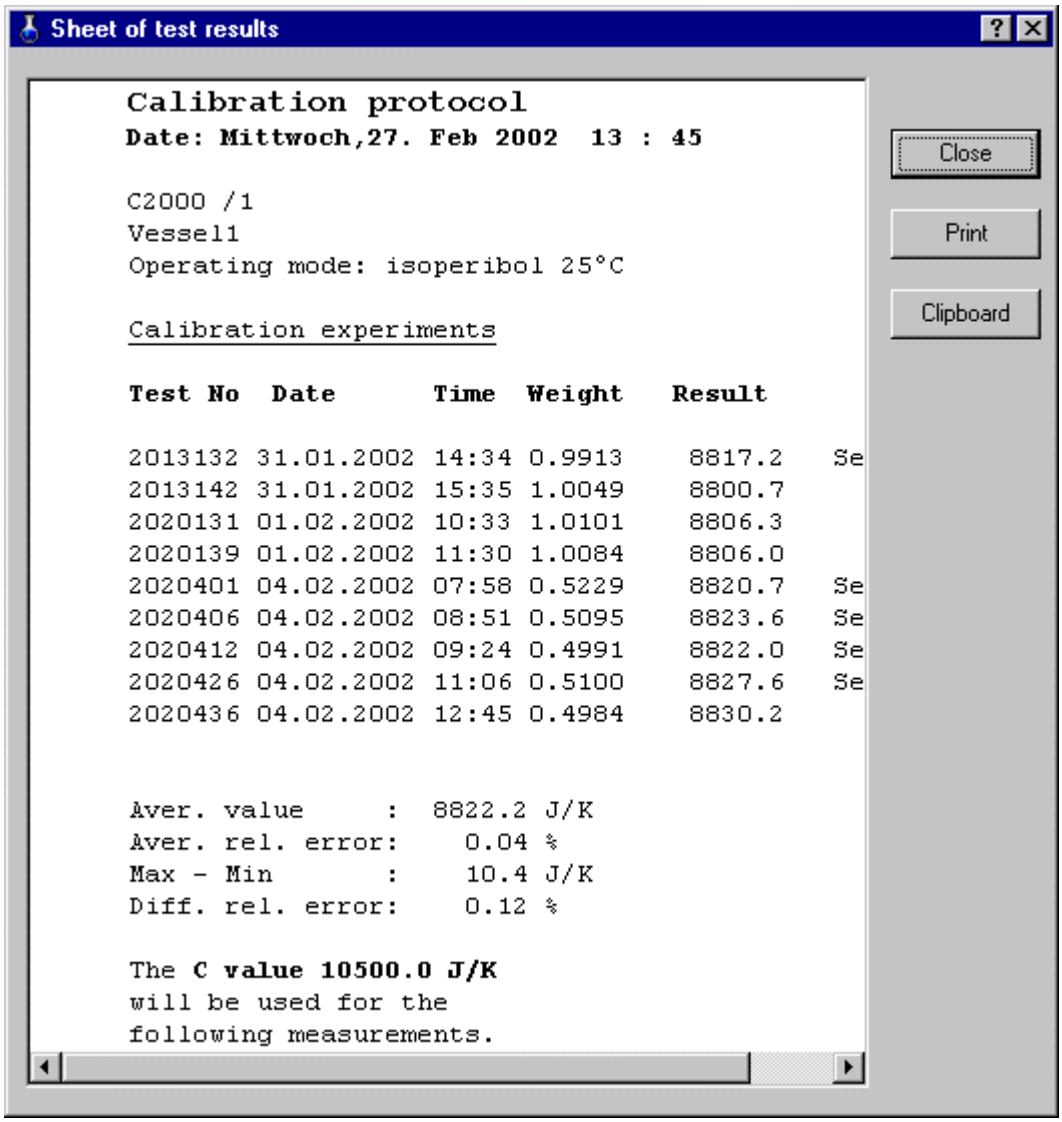
In the mode *Average of 3*, the calibration sequence comprises three calibrations. On completion of the third calibration, the evaluation dialogue is called up automatically, and the average of the three calibrations can be adopted by clicking on *Accept*. The calibration sequence is then finished.

In the mode *DIN*, five or six calibrations are carried out. If the evaluation of five measurements meets the requirements of DIN 51900, the evaluation dialogue is called up automatically after the fifth calibration and the calculated average can be adopted. Otherwise, the calibration furthest from the average is rejected, and the evaluation dialogue automatically called up after an additional sixth measurement. In both cases, the calibration sequence is then terminated.

Adopting the average as C value
If the average of the selected calibrations meets the requirements of the standard used, it can be defined as the current C value for the decomposition vessel by clicking on *Accept*.
For the C 5000 and C 7000 calorimeters, the C value is transmitted to the connected calorimeter.

C value entered by the user
Instead of using an average, the user can enter an externally determined C value in the field provided. A value can only be entered after clicking on the *Entry* button. The entry is confirmed by again clicking the button, which is now marked *Confirm*.
For the C 5000 and C 7000 calorimeters, the C value is transmitted to the connected calorimeter.

Displaying the calibration protocol
By clicking on the *Protocol* button, the calibration protocol for the selected decomposition vessel is displayed. You can find the *Protocol* button in the window *Managing decomposition vessels* too.



Calibration protocol

A mouse click on the *Print* button will print the calibration protocol shown in this window. The various forms of output are explained in Section 4.5 "Preparation for data output". By clicking on the *Clipboard* button, you can write the contents of the calibration protocol in the Windows clipboard.

Deleting a calibration

A marked calibration can be deleted by clicking on the *Delete* button, if it is not selected.

Transmission to Excel

A marked calibration can be transferred to an Excel spreadsheet by clicking on the *Excel* button.

The *Excel* button is only available if there is a connection to Excel with a worksheet open.

Evaluation of calibrations

For calibrations, evaluation is only necessary if significant quantities of atmospheric nitrogen are found in the decomposition vessel. Click on the *Evaluation* to start the procedure. Only values for acid correction are entered.

Evaluation is only possible for calibrations that are not in the list of experiments for the day. Calibrations that are in this list must be evaluated in the main window.

7 Evaluation of measurements

Evaluation of a measurement is started from the main window. To carry out an evaluation, click first on the measurement concerned and then on the button *Evaluation*.

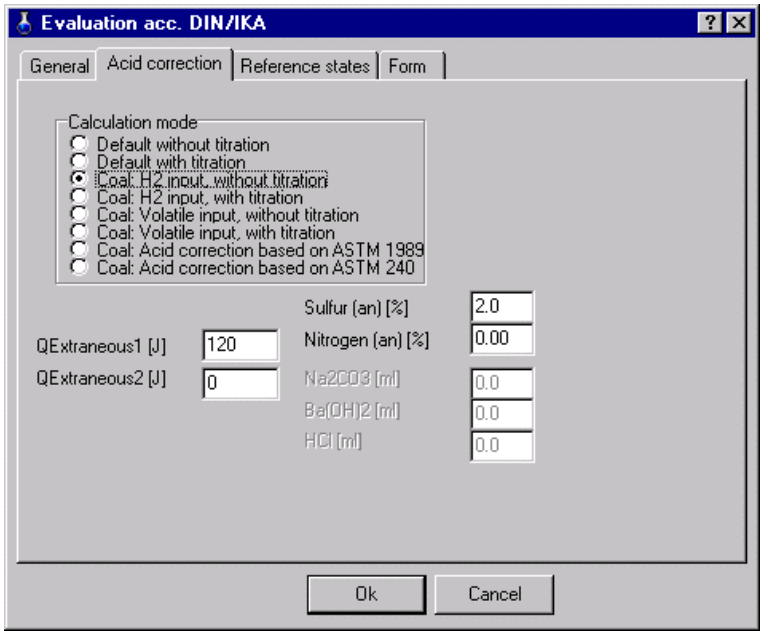
Evaluation is carried out on the basis of a standardised evaluation procedure, which was selected in the window *Settings – Calculation* (see Section 5.2 "Evaluation settings and units"). There is a choice between evaluating to *DIN/IKA, DIN 51900-1 2000* or *ASTM D1989, D240, D5865, D4809, D5468, E711*.

For calibrations, evaluation is only necessary if significant quantities of atmospheric nitrogen are found in the decomposition vessel. Click on the *Evaluation* to start the procedure. Only values for acid correction are entered. For further information on evaluating calibrations, please see Section 6.2 "Configuration and management of calibrations".

If an already evaluated measurement is to be re-evaluated using a different procedure (see Section 5.2), all evaluation parameters are automatically reset to zero. Changing between calculation modes does not reset evaluation parameters to zero.

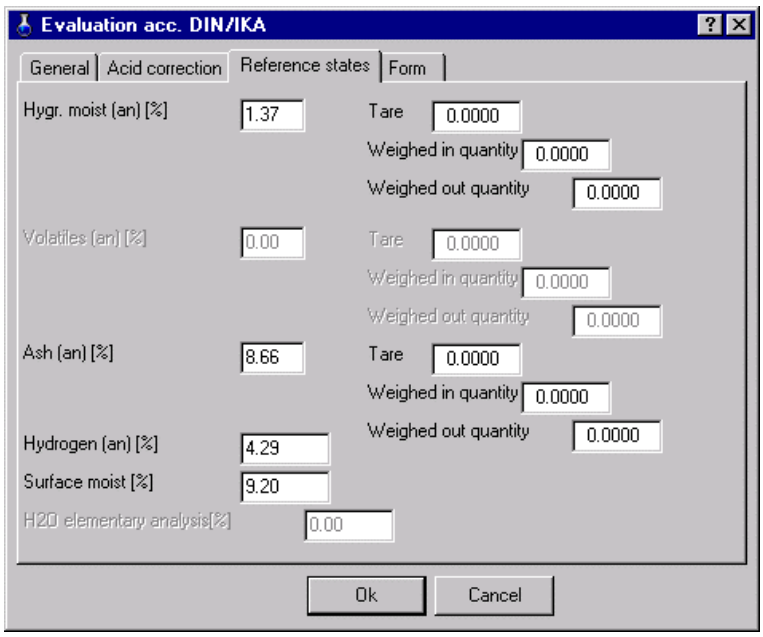
7.1 Evaluations to DIN/IKA

The window *Evaluation* contains several registers. First, the calculation mode is selected under *Acid correction*, and the necessary acid-correction data entered. Details of the various calculation modes are given in the operating instructions for your calorimeter.



***Evaluation* window, *Acid correction* register**

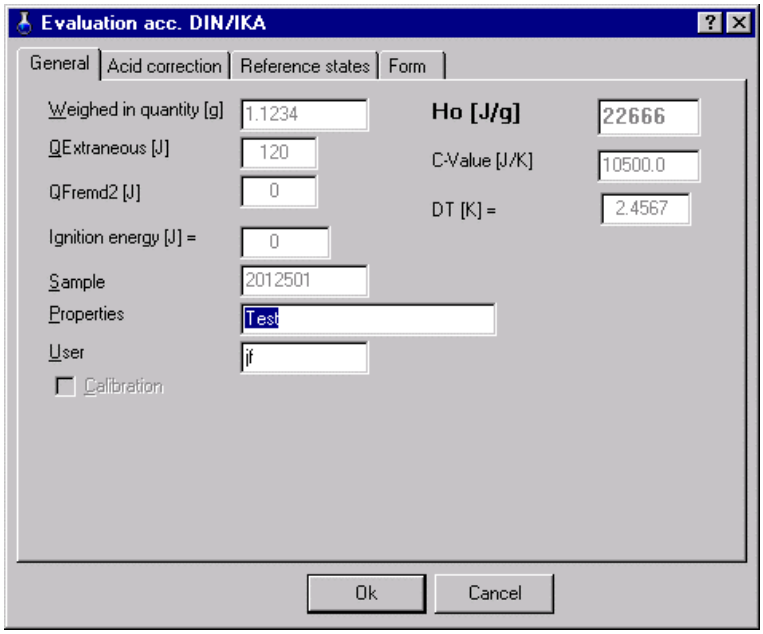
The register *Reference states* is used to enter the data needed to calculate the reference states *raw* and *water and ash-free (waf)*.



***Evaluation* window, *Reference states* register**

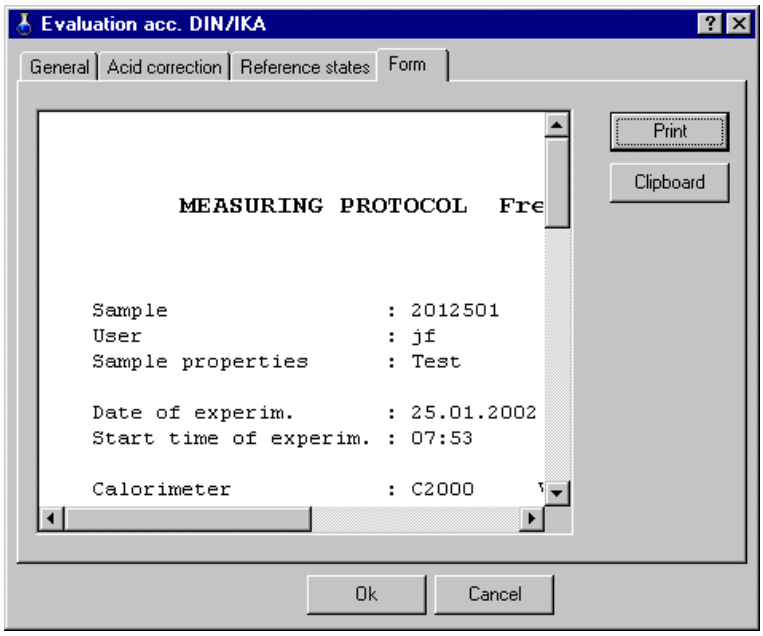
Because the data needed for hygroscopic moisture, volatile components, and ash content are determined by weighing, it is also possible to transmit the results direct from a balance. To do this, either click on the appropriate parameter and press the transfer button on the balance to send a result, or a double-click on the parameter will call up a reading from the balance. When the results of all weighings needed for a parameter are present, it will be automatically calculated.

In the *General* register, the results of calorimetric measurements are presented.



***Evaluation* window, *General* register**

The *Form* register displays the complete results protocol.



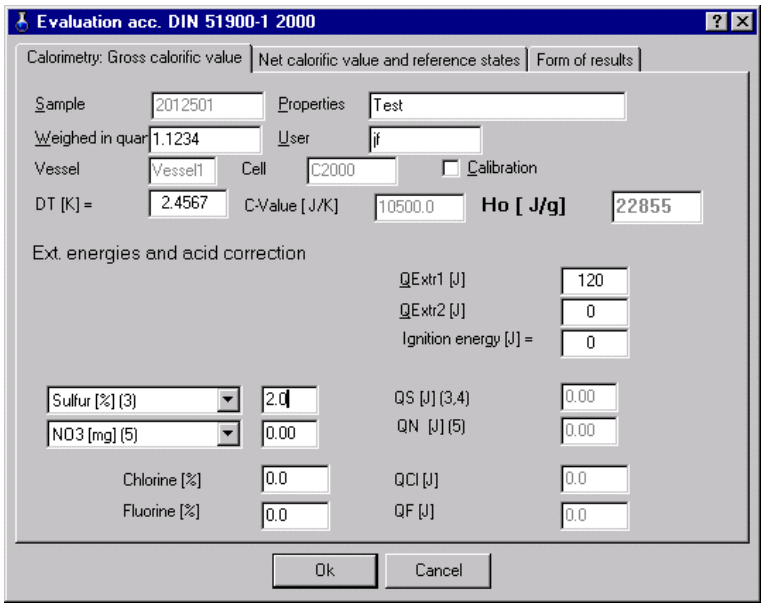
***Evaluation* window, *Form* register**

The results form can be printed by clicking on the *Print* button, or the *Clipboard* button writes it in the Windows clipboard.

7.2 Evaluation to DIN 51900-1 2000

When using this evaluation procedure, the sole calculation reference is the DIN standard. The terms and formula numbers used are also taken directly from this standard. With this procedure, the *Evaluation* window contains the following registers:

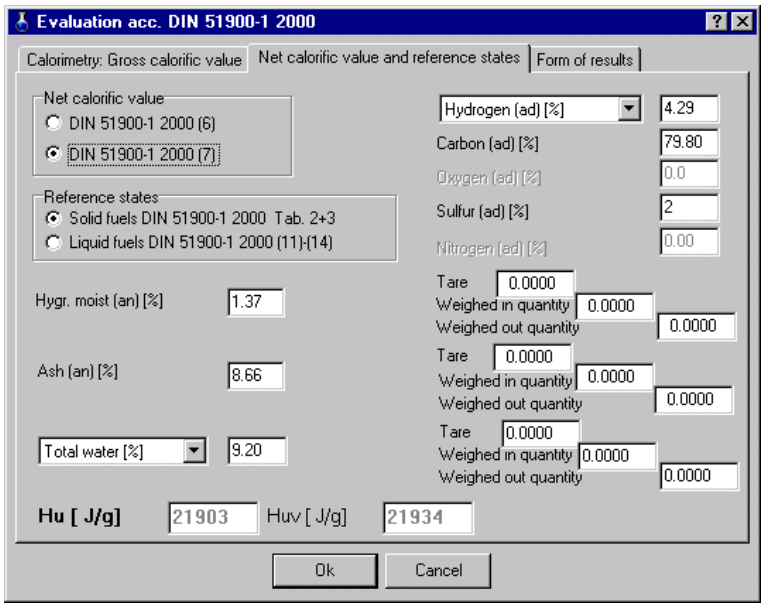
Calorimetry: Gross calorific value



***Evaluation* window, *Calorimetry GCV* register**

Evaluation to DIN 51900-1 2000 Section 11 and DIN 51900-2 Section 5.3, 5.6 Comments

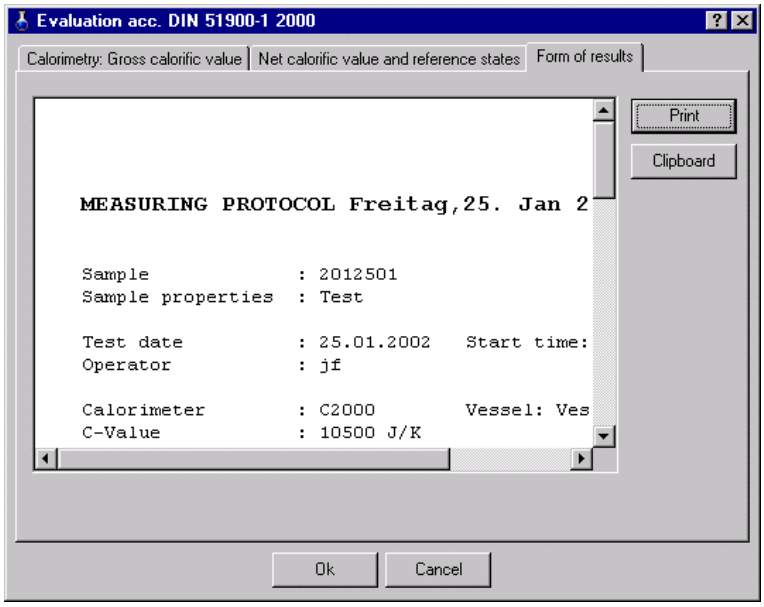
Net calorific value and reference states



***Evaluation* window, Net calorific value register**

Evaluation to DIN 51900-1 2000 Sections 15, 16, Appendix A

Results form



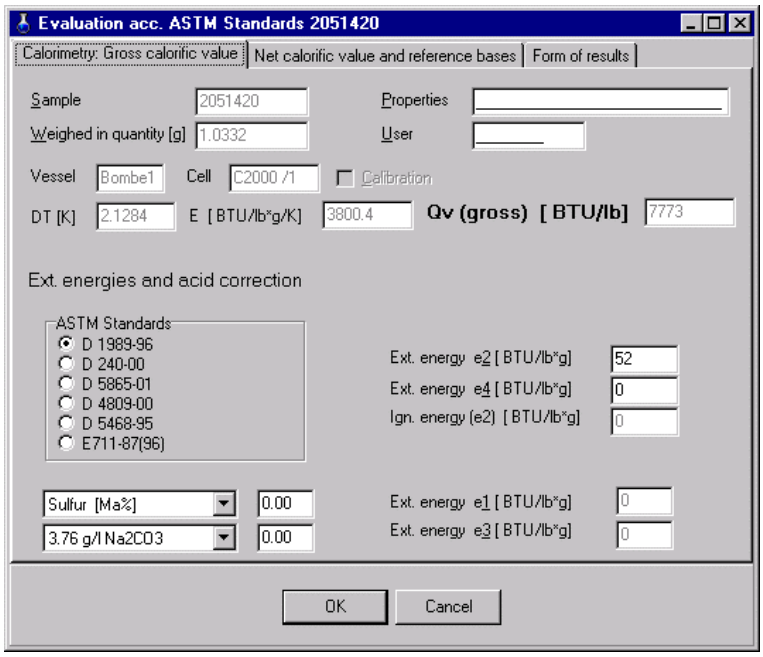
***Evaluation* window, *Form of results* register**

The results form can be printed by clicking on the *Print* button, and the *Clipboard* button writes it in the Windows clipboard.

7.3 Evaluation to ASTM D1989, D240, D5865, D4809, D5468, E711

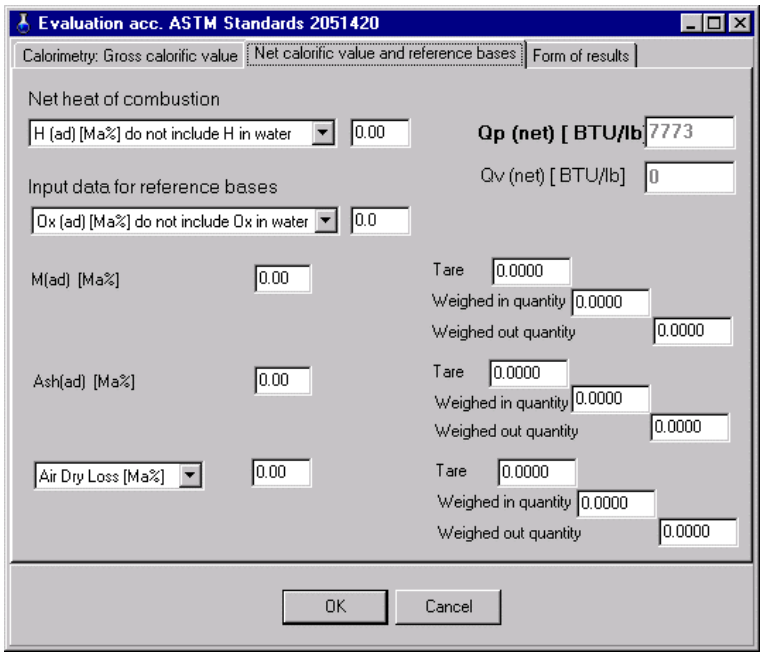
For this evaluation scheme, the sole calculation references are the quoted ASTM standards. The terms and formula numbers used also refer directly to these standards. It contains the following registers:

Calorimetry: Gross calorific value



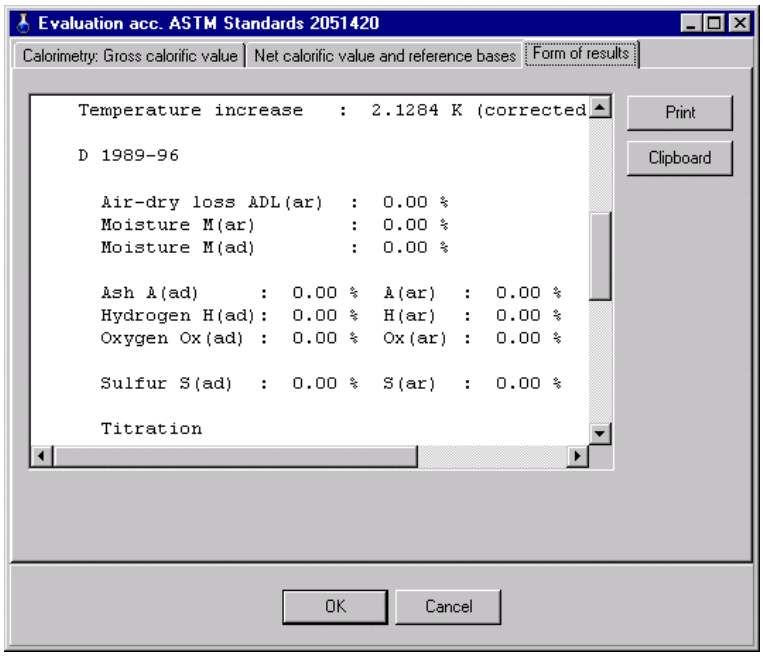
***Evaluation* window, *Calorimetry GCV* register**

Net calorific value and reference bases



***Evaluation* window, Net calorific value register**

Form of results



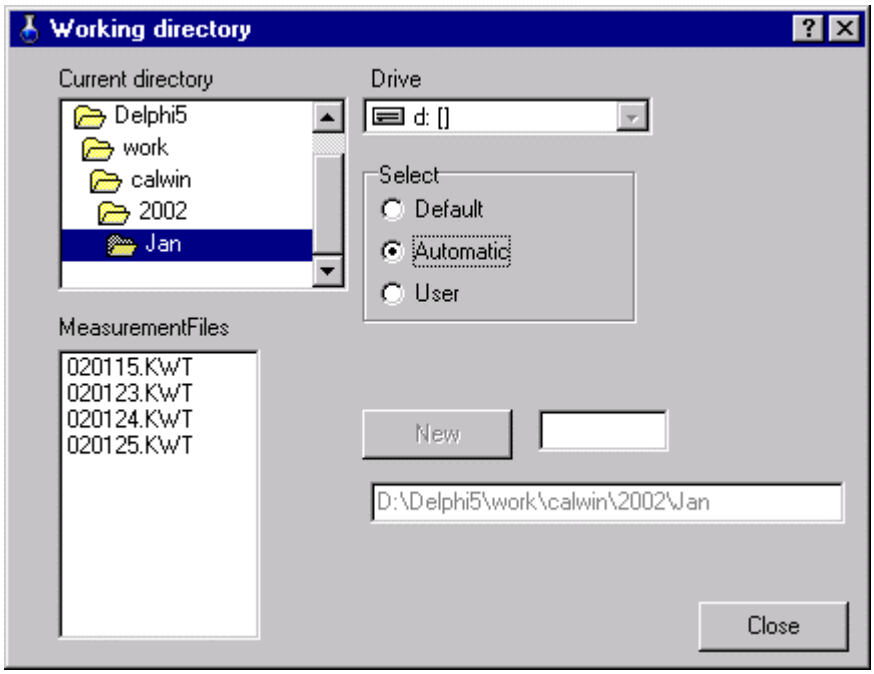
***Evaluation* window, *Form of results* register**

The results form can be printed by clicking on the *Print* button, and the *Clipboard* button writes it in the Windows clipboard.

8 The CalWin library

8.1 Directories and files in CalWin

To manage the files that are created in the course of a day, a suitable directory structure is needed. Under *CalWin*, you can either use the existing structure or develop your own. To make this choice, select *Measurements* → *Working directory* in the main-screen menu bar. This opens the window *Working directory*.



Determining the working directory

The directory shown in the field *Current directory*, is the storage location of files generated on that day. Selection of drive and current directory follows standard Windows practice. The following options are available:

- *Default*
  Files generated in the course of a day are stored in the *CalWin* root directory.

- *Automatic*
  Files generated in the course of a day are stored in a directory structure generated by *CalWin*. CalWin creates sub-directories for the current year and months.

- *User*
  With this option, you can choose yourself in which directory files generated in the course of a day are stored. Double-click on the desired directory in the list *Current directory*. If you want to define a new directory for the measurements, click, in addition, on the button *New* and enter the name of the new directory in the text field beside it. Then click on *Accept*.

CalWin saves files generated in the course of a day with specific extensions. *CalWin* uses the following types of files:

- *Measurement files*
  A file name contains the day's date in the form *Year/ Month / Day*. The extension is *KWT*. For example: the file *980807.KWT* is the measurement file from 7. August 1998. The files are saved in the directory that was selected in the window *Current directory*.

- *Library files*
  The file name can be given by the user, the extension is also *KWT*. The files are saved in the directory that was selected in the window *Library* (see Section 8.2 "Managing measurements in the library").

- *Grouping files*
  The file name can be given by the user, the extension is *KWG*. The files are saved in the directory that was selected in the window *Groupings* (see Section 8.4 „Groupings“).

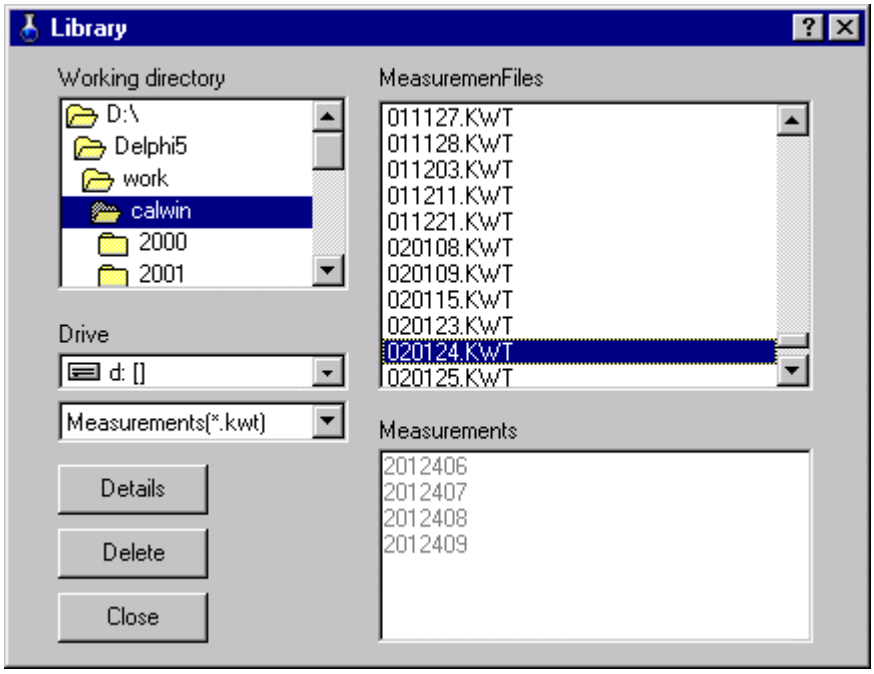
- *Protocol files*
  The file names are given automatically. A file name contains the day's date in the form *Year / Month / Day*. The extension is *PRO*. A file name thus has the form *DATUM_X.PRO*, where *X* is the device number. These files are stored in the directory in which relevant measurement data are stored.

- *Calibration files*
  A file name is an unambiguous designation for the appropriate decomposition vessel and mode of operation. The extension is *KWK*. For example: the file *B1ISO.KWK* is for the decomposition vessel numbered *1* and operating mode *Isoperibol*. These files are stored in the *CalWin* root directory.

- *Configuration files*
  Various files with the extension *CFG* and the file *CALWIN.INI* are also stored in the *CalWin* root directory. All these files have text format and can, for example, be imported into Excel or Word.

8.2 Managing measurements in the library

By selecting *Measurements* → *Library* you can open the *Library* window.

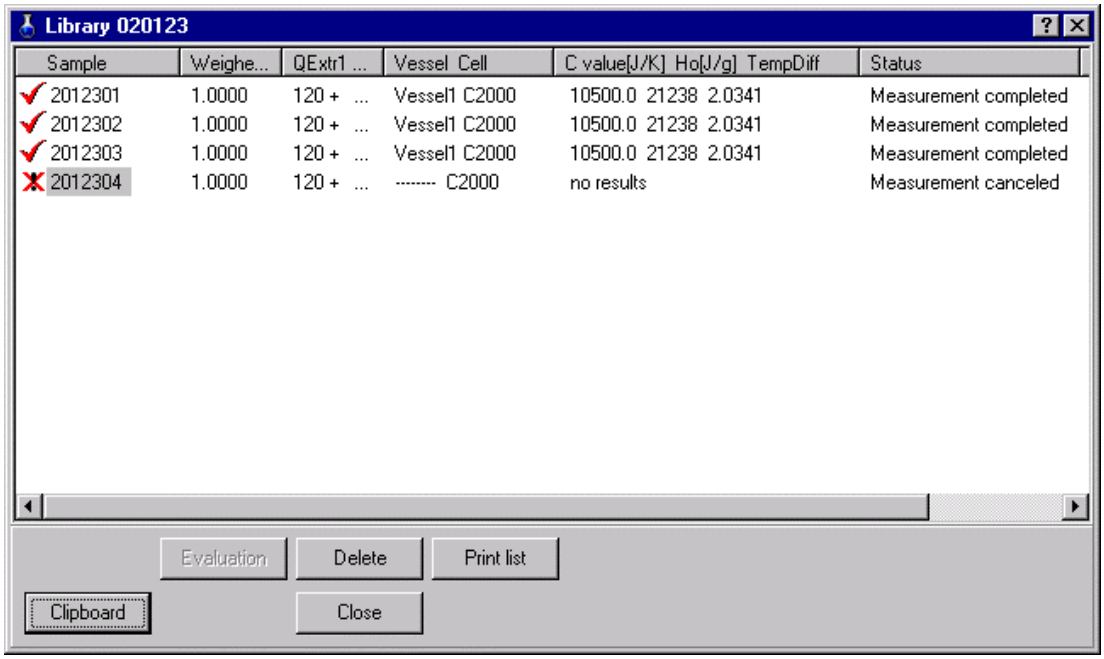


Library overview

The *CalWin* library is used for administration of the files in which measurements are saved daily. Any desired file can be selected using the fields *Drive*, *Working directory* and *Measurement files*. The sample names of measurements stored in this file are displayed in the field *Measurements*. The buttons carry out the following actions:

- Deleting a measurement file
  Clicking on the *Delete* button deletes the selected file, but asks you to confirm first. This operation deletes all measurements stored in that file. Additional savings of measurements in calibration or grouping files and the calorimeter library are not affected.

- Detailed display of a measurement
  Clicking on the *Details* button opens the *Library* window with the file names previously selected added. The contents of the selected file are displayed.



Detailed Library window

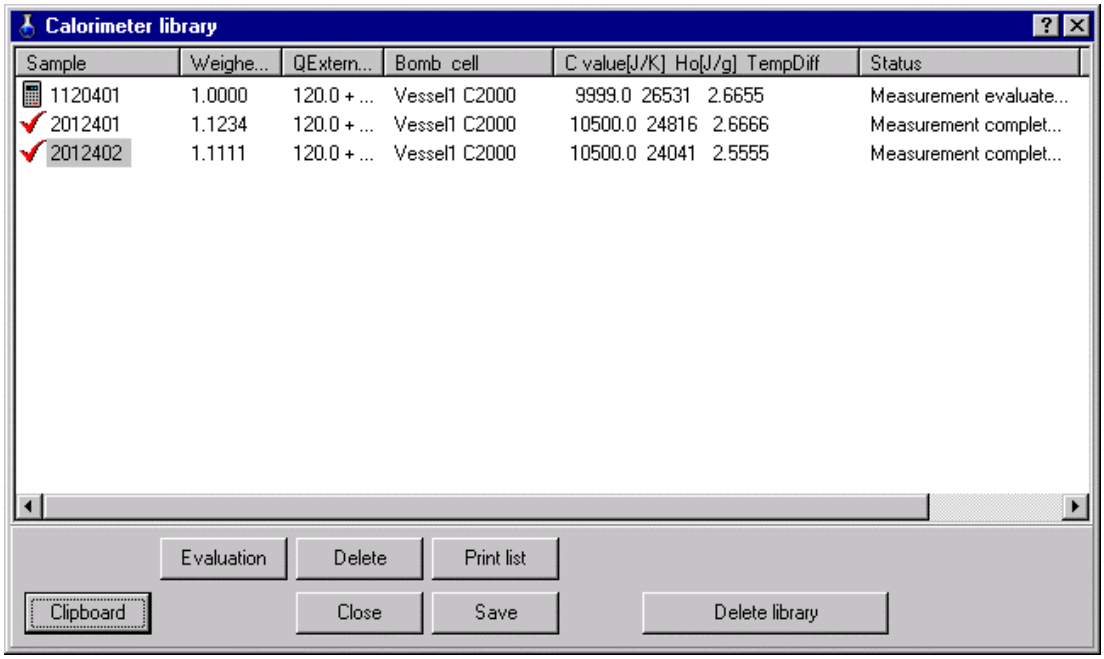
The actions that can be carried out here are similar to the functions available in the main *CalWin* window, so that they are not described again here.

8.3 Reading from the calorimeter library

The C 5000 and C 7000 calorimeters have an integrated measurement library. This library can be used both in stand-alone operation and when the calorimeter is controlled using *CalWin*. It is especially valuable to be able to read from this library to extract information after stand-alone operation. This also applies to the C 2000 and C 5000(2), but this library cannot be used when the calorimeter is controlled by *CalWin*.

Using the menu item *Calorimeter library* in the context menu of the device window enables the libraries of calorimeter models C 2000, C 5000, C 5000(2) and C 7000 to be extracted completely. When extraction is complete, the window *Calorimeter library* opens and the contents of the library are displayed. The calorimeter concerned must not be making a measurement. The C 2000 or C 5000(2) calorimeter must not have been used to make a measurement.

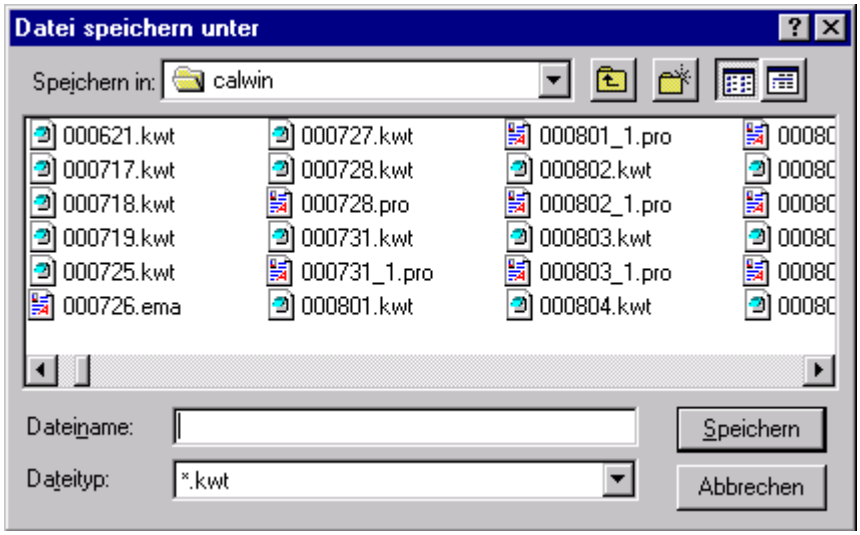
Extracting a library can take several minutes.



Library extracted from a calorimeter

Except for two actions, the actions that can be carried out here are similar to the functions available in the main *CalWin* window, so that they are not described again here. The additions are buttons to save and delete library files.

- Saving a library as a measurement file
  Libraries extracted from C 2000, C 5000, C 5000(2) and C 7000 calorimeters can be stored as *CalWin* measurement files, and are then fully available in the *CalWin* library. To save an extracted library, click on it and then on the *Save* button. The window *Save file as* opens.



Saving library as measurement file

Enter a suitable name for the library file and click on *Save*.

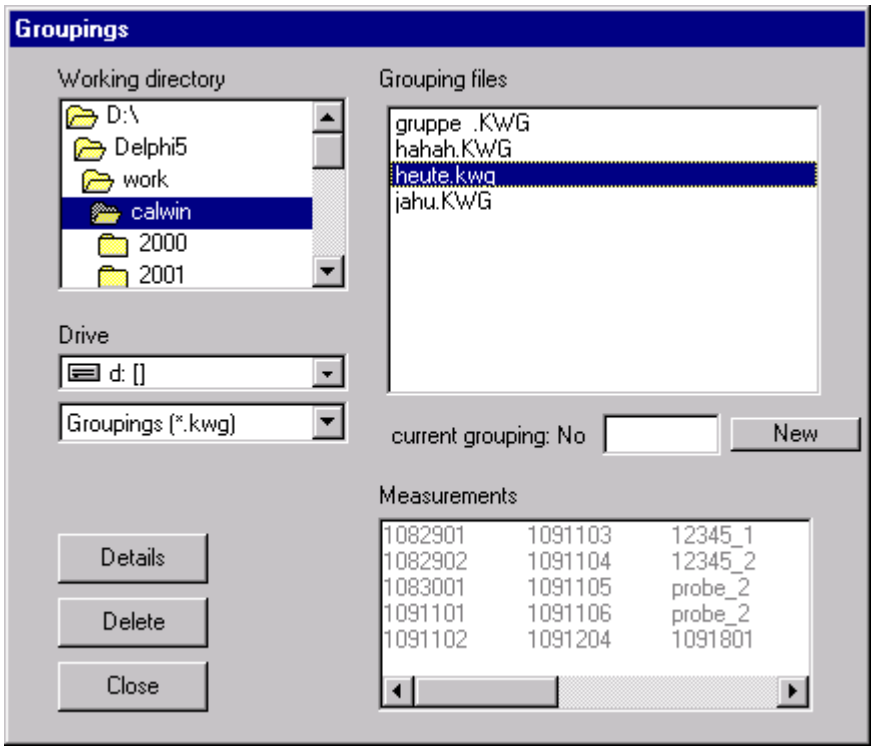
- Delete the whole library file in the calorimeter
  Click on the *Delete library* button and acknowledge the warning to delete the library in the calorimeter completely.

8.4 Groupings

In *CalWin*, grouping means that successfully completed measurements can be managed in an extra table, as well as in the standard table in the main window. Whether and how measurements are to be grouped is entirely the user's decision. Example of a grouping: all samples of a ship's cargo of coal, whose average calorific value is to be determined, form a grouping.

Select *Measurements* → *Groupings* in menu bar of the main window to open the *Groupings* window. If no grouping is currently selected, you can click on the *Groupings* button in the main window too.

Managing groupings



In the *Groupings* window, all files can be managed that were created by grouping measurements. The management of existing groups follows the same principles as managing a library.

Successfully completed measurements can be dragged out of the *CalWin* main window, by clicking with the left mouse button and holding it down, into any desired existing grouping shown in the field *Grouping files*. To do this, the required Grouping must be opened using the button in the main window. If a grouping has been selected as the current grouping, you can only drag into that one. A measurement can only be dragged once into any one grouping.

To manage groupings in *CalWin*, proceed as follows:

①

To define a new Grouping, click on the New button and enter the name of the new grouping in the text field beside it. Characters not accepted by Windows Explorer (\ / : * ? “ < > |) and blank spaces cannot be used. Finally click on Accept.

Double-clicking on a grouping file makes this the current grouping. But if it was already the current grouping, its selection is cancelled. The button *Grouping* in the main window will be labelled accordingly. A change of directory or drive, cancels the current grouping selection.

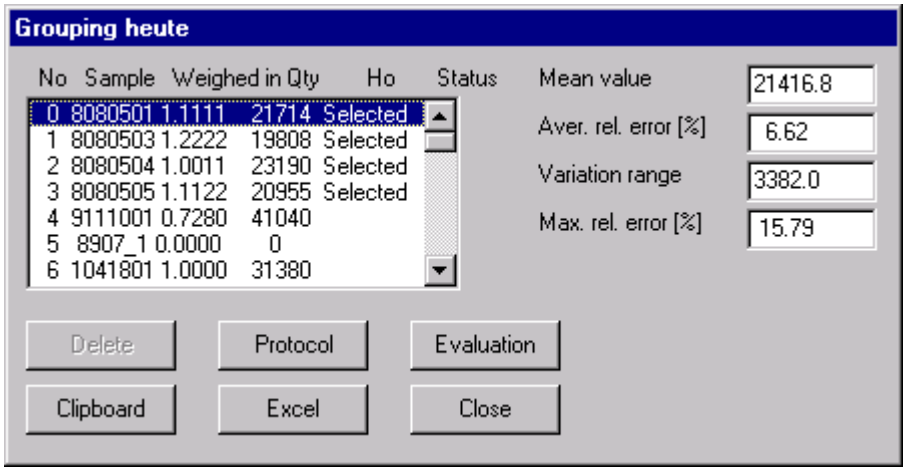
②

For subsequent measurements that should be included in the current grouping, the option *Groupings* in the window *New Measurements* (see Section 5.4 "Preparing for new measurements") must be activated. The results of these measurements are then automatically entered in the current grouping.

③

By clicking on the button *Details*, you can see a list of all measurements in the current (or another selected) grouping in the window *Groupings* with the selected *File name* added. You can also access this window by clicking *Groupings "Grouping name"* in the main window.

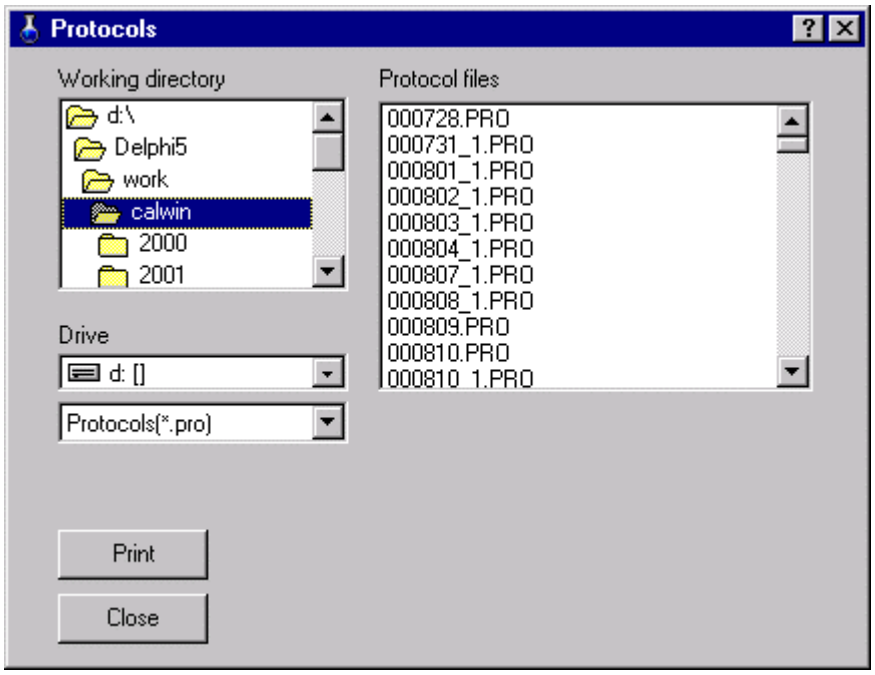
Grouping statistics



The actions that can be carried out here are similar to the functions available in the main *CalWin* window, so that they are not described again here. When deleting selected measurements in a grouping file, it is important to remember that they continue to exist in the appropriate daily-work file.
Individual measurements in the table can be marked by double-clicking. Statistics are calculated for the measurements marked and displayed in the appropriate fields.

8.5 Printing protocol files

Generating protocol files was described in Section 5.5 "Starting and recording new measurements". To output protocol files, select *Measurements* → *Protocol files* to open the window *Protocols*.



As in Windows Explorer, you can select a directory on the left side of the window, in which the required protocol file is stored. Then, in the list on the right-hand side of the window, up to four protocol files can be marked at any one time and printed by clicking the *Print*. For the various output possibilities, please see Section 4.5 "Preparation for data output".

9 Troubleshooting

In rare cases, there may be interference in data transmission between calorimeters and the PC. Possible causes are:

- action of external interference on the connection cable; cable to long
- high demands on the PC system
- high demands on the calorimeter processor when closing the cover, or filling with water or oxygen.

Possible effects and remedies are:

- A measurement sent by *CalWin* to the calorimeter fails to achieve the status *Measurement waiting*, and remains in the status *--->Measuring cell*.

  Remedy
  Click on the *Measuring cell* button in the main window to send this measurement again.

- The system signals an access violation with relevant address.

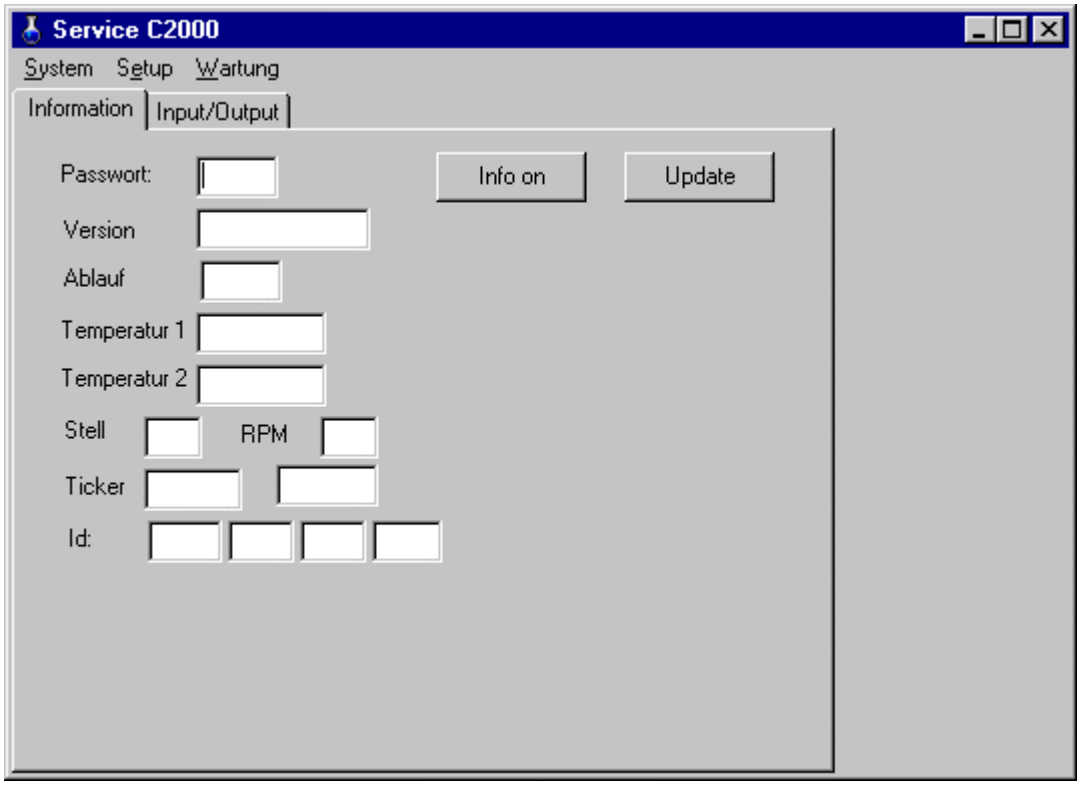
  Remedy
  Acknowledge message with *OK*. Close *CalWin* and restart it.

As long as there is no measurement running in a calorimeter, *CalWin* can be restarted at any time. As a rule, malfunctions and problem can be remedied by restarting.

9.1 Service dialogue for the C 2000 calorimeter

Service dialogue for the C 2000 calorimeter is intended exclusively for solving problems. It should therefore only be used in close cooperation with IKA® Service.

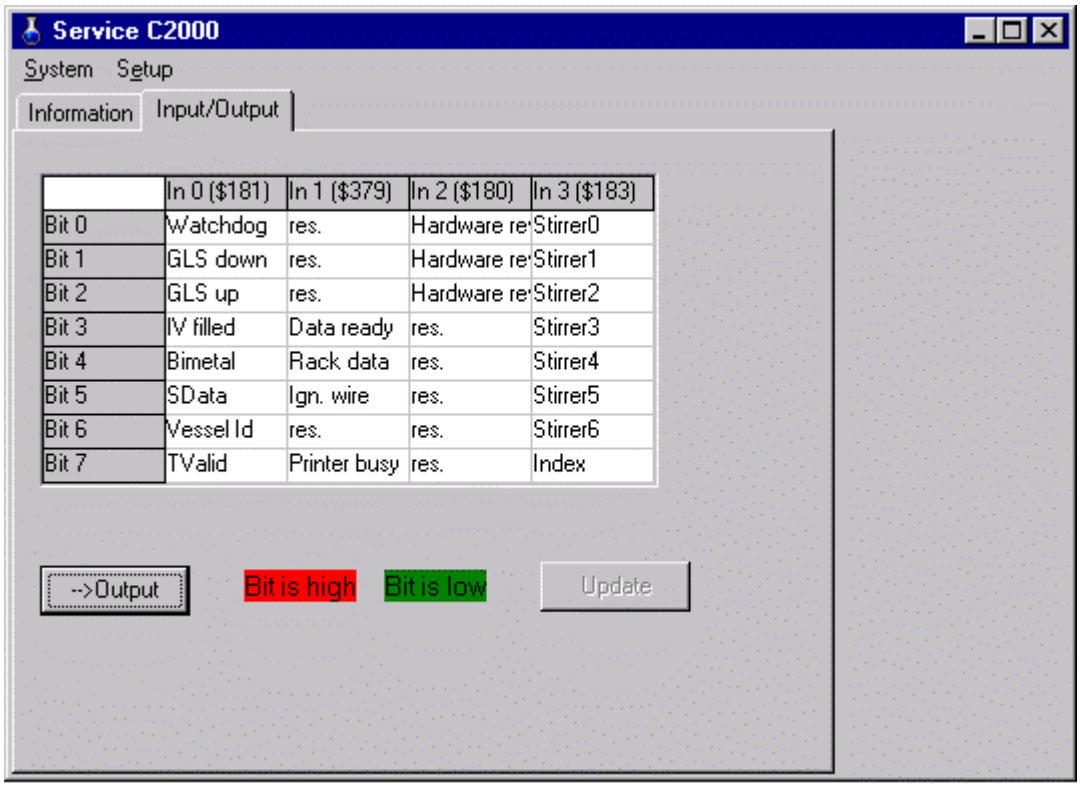
The service dialogue is opened by selecting *Service* in the C 2000 context menu (status line and right mouse button).



If there is no connection to the C 2000 calorimeter, no actions are possible from this window. If there is a connection to the C 2000 calorimeter, then click on the *Info on* button. This has the effect of transmitting all information that is important for service (on a C 2000 with control unit, in the info-window) to *CalWin* and keeping it continually up to date. A click on the *Update* button brings the display up to date at that moment. The transmission of information can be stopped with the button *Info off*, or by closing the service dialogue.

On the *Information* register, all values returned by the C 2000 calorimeter except the assignment of the input and output ports are shown. A password for more comprehensive service work can also be entered here. The unauthorised entry of a password is recorded, and can cause malfunctioning of the C 2000 calorimeter.

In the register *Input/Output*, the assignment of the input and output ports is shown. The *Output* button switches the display between input and output. If there is no connection to the C 2000 calorimeter, the text fields are white, and, after clicking on the *Update* button, they change to red and green.



Menu items in service dialogue

- *System → Exit*
  Closes the cover of a waiting C 2000 calorimeter.

- *Setup → Printer*
  Protocol printing is activated on a printer connected to a C 2000 calorimeter.

- *Setup → Balance*
  When this menu item is selected, the register *Balance* is activated. There, the connection of a balance to a C 2000 calorimeter can be set. As described in Section 3.2 "Configuring interfaces" (CalCFG), the type of balance is selected and the other interface parameters entered. Clicking on *Apply* transmits the information to the C 2000.

- *Maintenance*
  This menu item enables a defined status to be achieved following an uncontrolled interruption (mains failure etc.). In addition, it is possible to test several basic functions. This menu item is only available when no measurement is in progress, and when the connected C 2000 is in the *Waiting* or *Init* conditions. The sub-menu items are as follows:

– *Open cover*	Opens the cover (start/stop or end contact)
– *Close cover*	Closes the cover (start/stop or end contact)
– *Cooling water*	Only possible when device is ready for measurement. Water flows in outer vessel, the cooling-water temperature is shown in a window. Process is ended with *OK*.
– *Tempering*	Only possible when device is ready for measurement. Water flows in outer vessel and regulation is activated. The current target value is used (25 °C or 30 °C). The actual temperature is shown in a window. Process is ended with *OK.*
– *Stirrer on/off*	The stirrer is switched on and off. the stirring speed is shown in a window.
– *Temp. init.*	The temperature sensor is re-initialised.
– *IV empty*	The inner vessel is emptied for a specific time (standard: 90 s).
– *O2 fill*	An inserted decomposition vessel is filled with oxygen for a specific time (standard: 60 s) after the cover is closed. Then the cover is opened again.