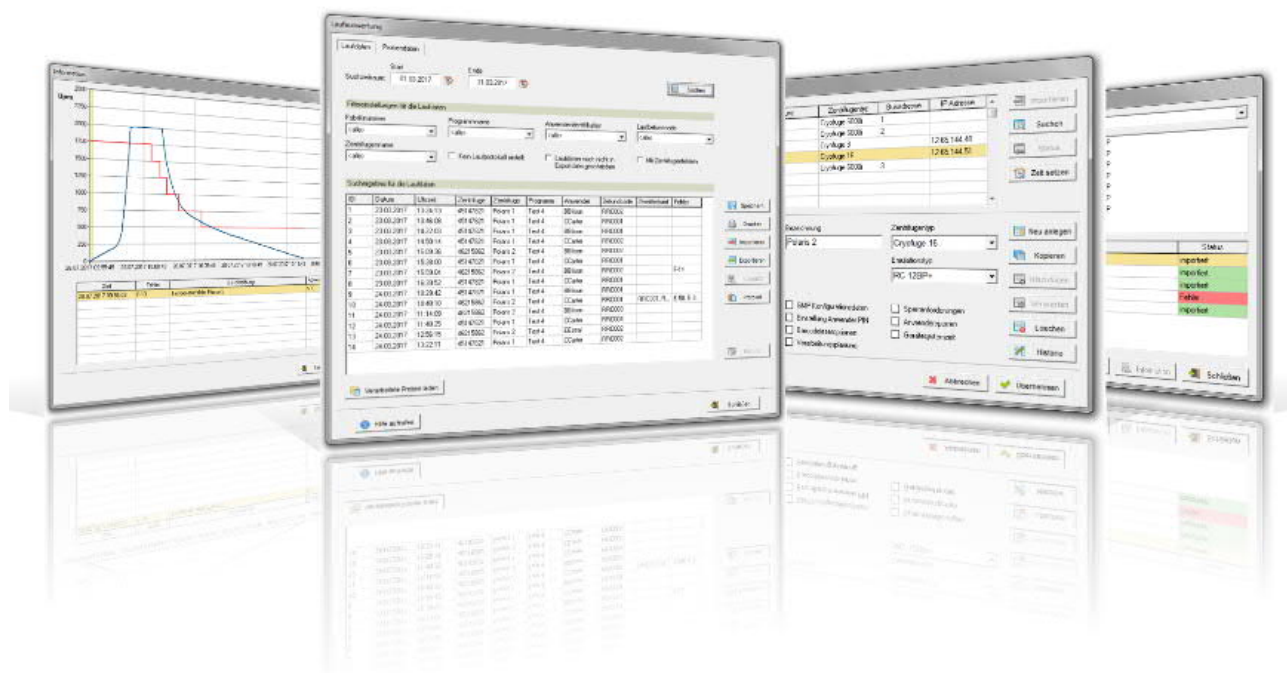




Thermo Scientific

Centri-Log Plus

User manual

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thermoscientific

Index

1. Program access	5
1.1. User log-in	5
1.2. Setting a new password	6
1.3. Status messages after log-in.....	6
2. Access history	8
3. Program configuration	9
3.1. System settings.....	10
3.1.1. General system settings.....	10
3.1.2. User log-in options.....	12
3.2. Centrifuge settings.....	15
3.2.1 User log-in options.....	15
3.2.2. Definition of the process sequence	16
3.2.3. Barcodes.....	19
3.2.4. Error handling	26
3.3. Data export.....	27
3.3.1. Settings for Run log files.....	27
3.3.2. Settings for export files.....	31
4. Workspace management	36
4.1. Configuration of an exported workspace.....	36
4.2. Disabling the connection to a workspace	37
4.3. Import workspace.....	38
5. Data management	39
5.1. Centrifuge management	39
5.1.1. Device management table	40
5.1.2. Device data editing area	44
5.2. User management	49
5.2.1. User overview table.....	50
5.2.2. User data editing area.....	51
5.2.3. Unlock user access.....	56
5.3. Program data management	57
5.3.1. Program overview table.....	58
5.3.2. Program data editing area	59
5.3.3. Display of dataset history.....	64
5.4. Result code management.....	65
5.4.1. Results code overview tables	66
5.4.2. Result code editing area.....	67
5.5. Barcode generation	69
5.5.1. Barcodes for a single record.....	69
5.5.2. Barcodes for all records	70
6. Data evaluation.....	71
6.1. Run data evaluation	71
6.1.1. Import from run log	73
6.1.2. Filtering of run data	78
6.1.3. Display of run data.....	79
6.2. Evaluation of sample data.....	80
6.2.1. Filtering of sample data	82
6.3. Adding result information	83
6.4. Switching between run and sample view	84
7. Data acquisition and display.....	85
7.1. Starting communication.....	85
7.2. Stopping communication	87

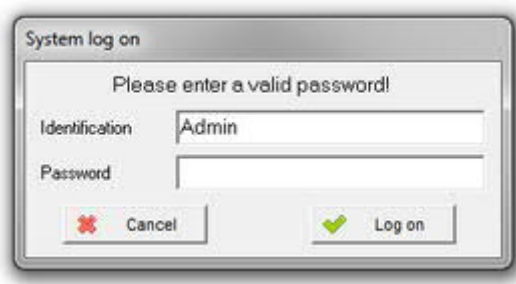
7.3. Data displayed in the program interface	88
7.3.1. Data displayed in the detail window	89
7.3.2. Data displayed in the overview window	90
7.3.3. Informational icons for special operating states	90
8. Appendix	91
8.1. ASCII protocol data structure	91
8.1.1. Process identification data	91
8.1.2. Product specifications based on product definition	92
8.1.3. Centrifuge set values	95
8.1.4. Centrifuge actual values	97
8.1.5. Errors	98
8.1.6. Finding information	99
8.1.7. Time stamp format	100
8.1.8. Structure of a log file from the separate data blocks	101
8.2. Use of regular expressions	103
8.2.1. Verifying individual characters	103
8.2.2. Verifying code start	103
8.2.3. Verifying code end	104
8.2.4. Definition of character class	104
8.2.5. Special characters as placeholders	105
8.2.6. Special characters for determining frequency of occurrence	105
8.2.7. Alternative character strings	106
8.3. Formatting instructions for entering times	108
8.4. Special barcodes	110

1. Program access

All program functions that may result in a change of the database or the configuration data are initially blocked right after starting the program. A registered user must log in to activate these functions.

1.1. User log-in

The log-in window is displayed automatically by the Centri-Log Plus software after the program has checked the necessary environment data. This log on window can also be accessed with the menu item "[Program/Log on](#)" or by clicking the corresponding button in the toolbar.



The user ID stored in the system, along with the associated password must be entered in this window for the user to log in. Then users press the "[Log on](#)" button to complete the user log on.

The logged in user can also log off when the necessary work on the data inventory has been completed. This is done with the menu item "[Program/ Log off](#)" or by clicking the corresponding button in the toolbar.

The following icons in the toolbar are used for logging the user on/off:



Pressing this button logs the user on the software. The log on window depicted here is then displayed as well.



This button serves to log the user out. The software continues to run normally after the user logs out; however, all functions used to change current settings are blocked.

1.2. Setting a new password

The user can define a new password by selecting the menu item "[Program/Change password](#)" after logging in. The following dialog window is then displayed:



A dialog window titled "Changing the password" with a subtitle "Please enter a new password!". It contains four input fields: "Identification" (pre-filled with "Admin"), "Password", "New password", and "Repeat password". At the bottom, there are two buttons: "Cancel" with a red 'X' icon and "Change" with a green checkmark icon.

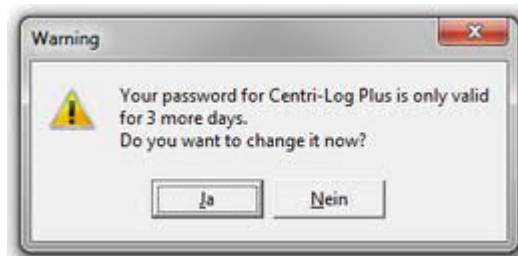
The user ID is also already displayed, as the user has already logged in. This data cannot be changed in this dialog window. To define a new password you must first enter the current password. You can then enter the new password and confirm it below the current password. The new password is applied by the software when you then click "[Change](#)".

1.3. Status messages after log-in

Based on the configuration of the Centri-Log Plus software, different status messages can be displayed after the user logs in. These messages either indicate that a new password must be entered, or are displayed due to access by the user being blocked.

Expiration of current password

If the Administrator for the Centri-Log Plus software has defined a limited period of validity for user passwords, the software checks each time when a user logs in whether the current password must be changed. If the expiration date for the current password is near, the software displays the following status message:



When you click the button "[Yes](#)" the window for changing the password is displayed. However, if the user clicks "[No](#)", user log-in is completed normally and work can be performed using the software.

If the date for defining a new password has been reached or passed, entering of a new password is no longer optional. The following dialog window appears after the user logs in:



Click on "OK" to display the window for changing the password. The user remains logged in to the software after a new password has been specified. If this process is discontinued instead, the user is logged off automatically and further access to the software is blocked.

Blocking of user due to failed log-in attempts

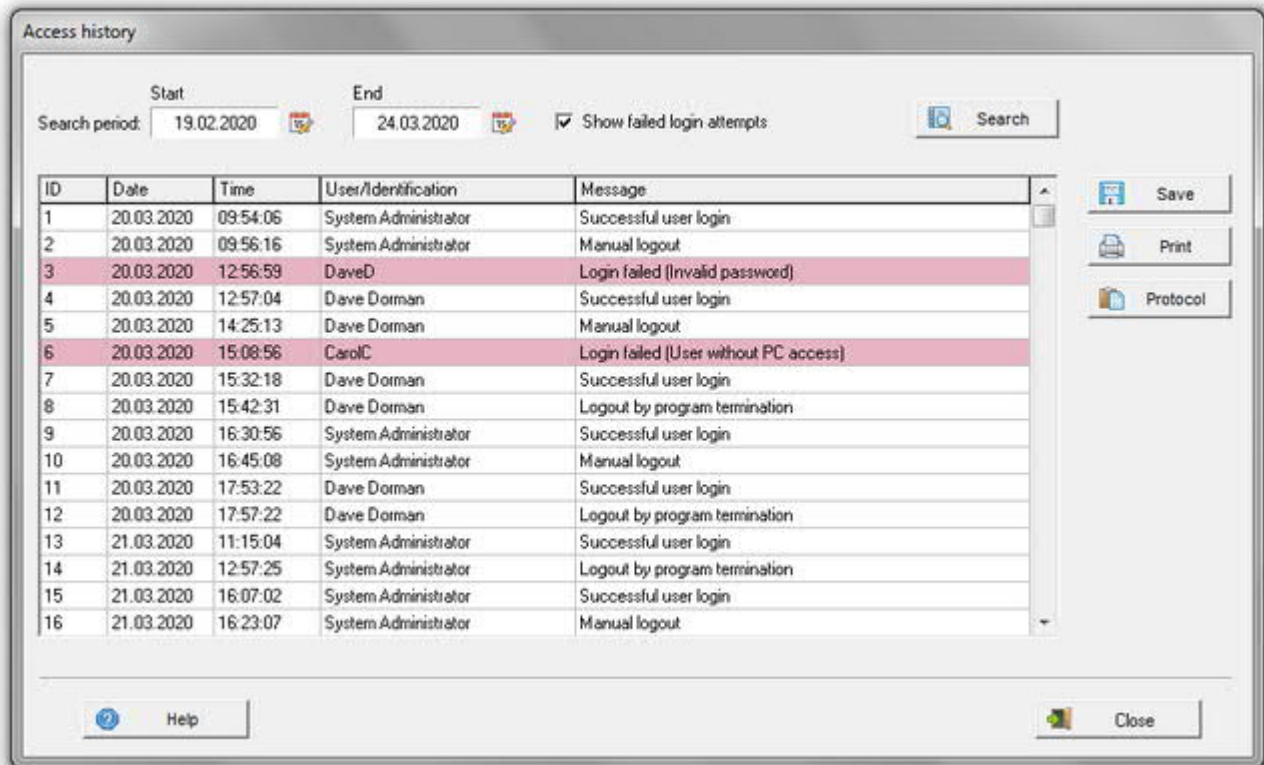
A further setting in the Centri-Log Plus configuration enables access blocking for individual users on multiple failed log-in attempts. If the software detects that the set number of failed log-in attempts has been reached, access by that particular user will be blocked at once. The following message is displayed when the user attempts to log in:



If access for a certain user has been blocked, an Administrator must cancel this blocking in user management. Details of this are given under "Reactivating blocked users".

2. Access history

The access history window displays the Centri-Log Plus software access log. All actions that require the user to log on are listed here. To display the data more clearly, the time range for the displayed data can be limited. There is also an option to highlight failed login attempts.



Specifying the Search Period and Executing the Search

You can restrict the time period for a search for access data in the database. This is done by specifying a start date and an end date for the search. By clicking on the calendar symbol you can call up a calendar to select these dates.

You can then initiate the search of the database by clicking the "Search" button. All of the access datasets found are then displayed in the table at the completion of the search.

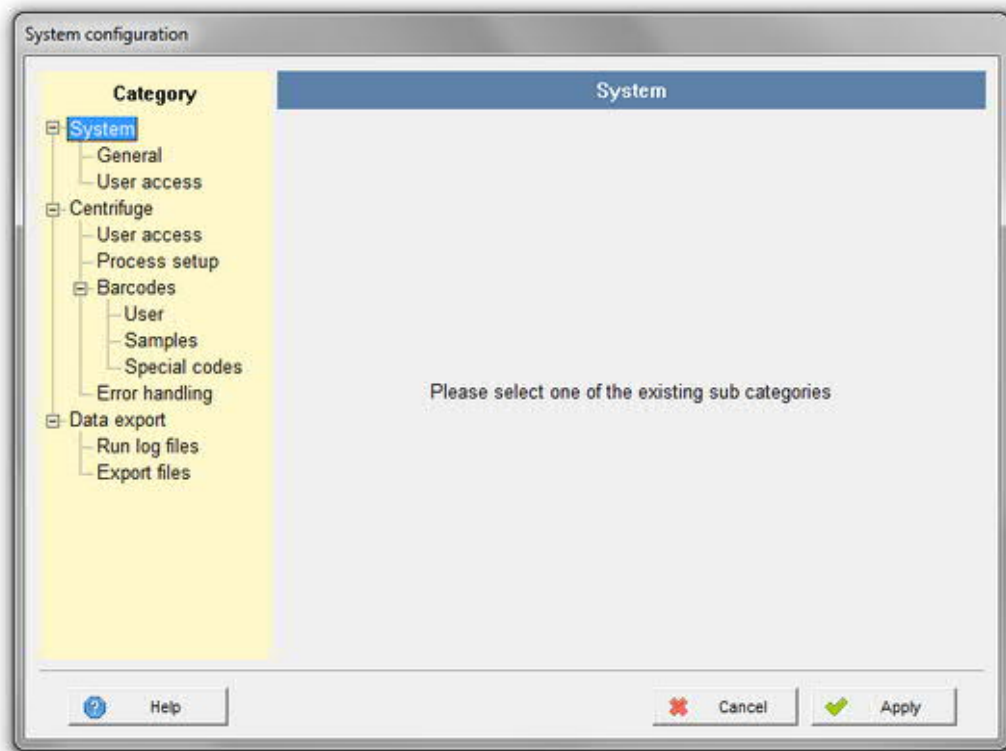
Buttons for Processing of Access Data

Several buttons are provided next to the access data table for editing the data inventory. The following functions are available here:

- Save** Use this button to have the contents of the displayed table saved to a file. This function can be used for a subsequent manual evaluation of the data. The data formats available are CSV, JSON and XML.
- Print** Use this button to output the datasets in the displayed table to a printer.
- Protocol** If a printout of a log is required for access data, this can be initiated using this button. The printout contains all the information shown in the table on this page.

3. Program configuration

The program configuration is used to define in detail how the software behaves. Settings can be made there for general program response, user log-in, process control, barcode reader support and data export. These settings make it possible to adjust the program functions to the individual needs of the respective user.



The configuration window depicted above shows the basic structure of all pages within the configuration.

The left side features a list of the available topics in the form of a hierarchy display, sometimes also called a tree structure. This type of listing provides an overview over all configuration topics and each level is easy to navigate.

The right side of the window has an area for displaying the respective options. The title in the blue frame also provides additional orientation help since it also lists the currently selected category.

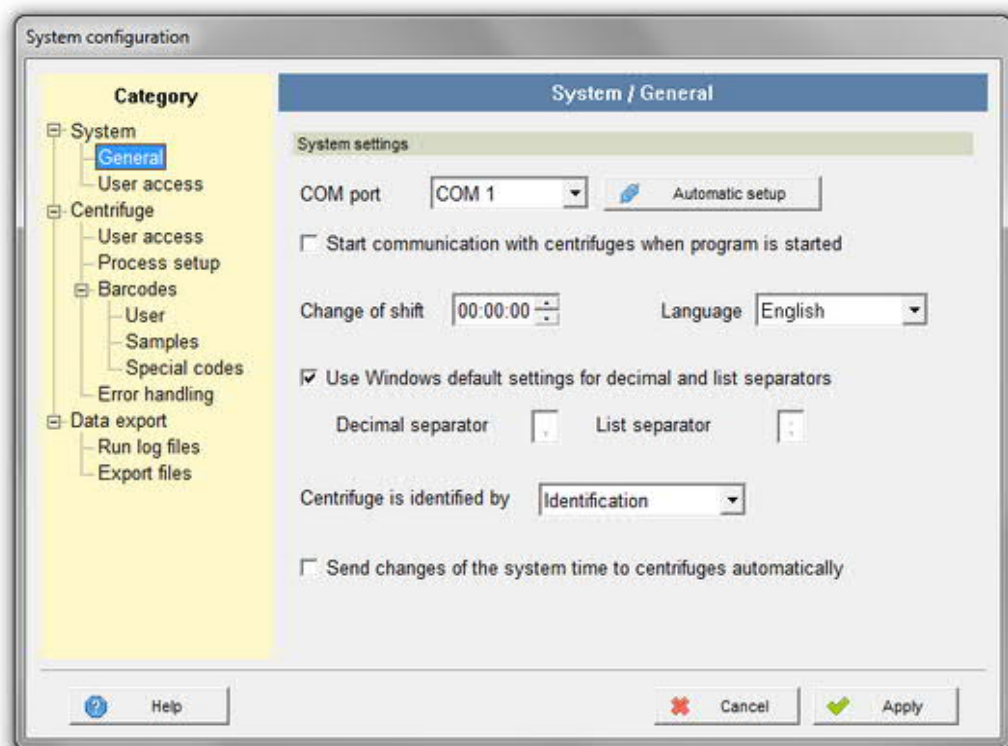
The lower window area lists the buttons for accessing help, closing the window without applying the changes, and for closing the window after accepting the data. If changes to the configuration are activated by clicking the "Apply" button, the data will be saved automatically in a configuration file. This enables the specified settings to be available again when the program is (re)started.

3.1. System settings

The "**System**" category includes all configuration settings defining the Centri-Log Plus software behavior. There are two types of settings in this category. The first type is general settings for different areas of the software. The second type contains the settings for user log-on/access.

3.1.1. General system settings

The figure below shows the configuration screen for the general system settings.



This configuration screen also contains the following options:

Select interface to master interface

Under "**COM port**" you can specify the serial interface to be used by the Centri-Log Plus software for communicating with the master interface for the fieldbus devices. You can select the correct port manually or automatically search for the master interface. The automatic search considers all RS232 interfaces of the PC. These can be actual physical interfaces or virtual interfaces as they are provided by a USB-serial port converter. This setting can be ignored if network centrifuges are used exclusively.

Start communication with centrifuges when program is started

Use this selection field to define whether the program automatically initiates communication with the centrifuges linked with the system. If this field is marked, communication is initiated automatically when the program is called and the associated display screen(s) also called up.

Change of shift

Here you can select a time for the shift change. This setting is important when subdirectories are created. Creating daily subdirectories is usually based on the time of the day. That is, a new directory would be created at midnight. When the shift change time is set, this time changes to the time of the day indicated here.

Language

Use this drop down box to select a language to be used for the user navigation of the Centri-Log software. Additional languages are available at this time. The software must be restarted after changing the language.

Select separators

Separators are used for decimal numbers and when importing or exporting data to separate individual parts of decimal numbers and individual data. These separators differ depending on the selected language. A different separator can be selected to match the selected language. A separator can be selected from the standard characters of the Windows installation or set manually.

Identification of the centrifuge within the software

The lower window area features the selection box to determine how centrifuges are identified. The Centri-Log software uses the centrifuge identification in many areas. This is the case in the selection box for opening the display window, the window title bar of the display window, or in the log files. There are three identification options:

Serial number	The serial number of the centrifuge as entered into the device table is used for identifying the centrifuge.
Identification	The name defined by the user as entered into the network settings is used for identifying the centrifuge.
Address	The bus address/IP address of the centrifuge is used to identify the centrifuge.

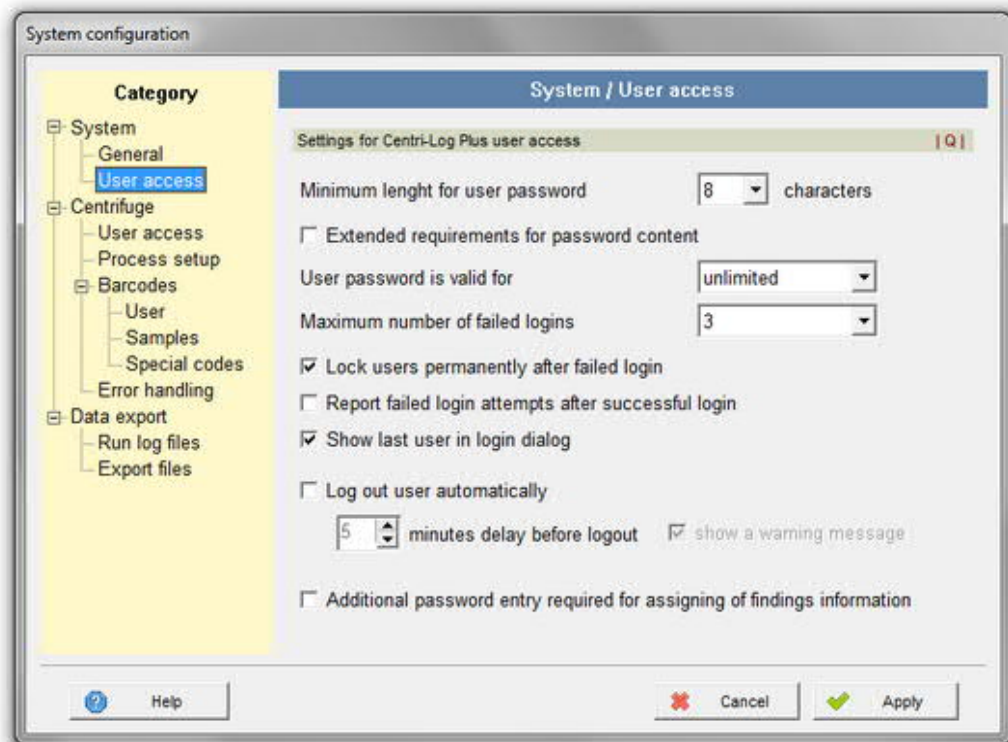
Synchronization of the centrifuge time setting

This option of the software allows the time setting of the centrifuges to be automatically synchronized with the PC time. For this purpose the software evaluates messages about changes to the system time. Furthermore, the software also automatically detects the change between summer and winter time. Whenever the system time is changed, the new time setting is sent to the centrifuges as soon as data synchronization is possible.

3.1.2. User log-in options

In the configuration screen "System/User access" the Centri-Log Plus software Administrator can define the conditions for user log-in in the software. Whereas general access privileges are controlled in User management, this screen is used to define global user log-in/access settings and the requirements for specifying passwords.

The configuration screen described above is shown in this figure:



The following settings for user log-in/access can be defined here:

Minimum length for user password

Here, the Administrator for the Centri-Log Plus software can specify the minimum length for the passwords to be used in the system. This length is not completely freely definable however, but must lie within a range from 4 to 20 characters.

Extended requirements for password content

This option is used to define that the passwords used must also satisfy an additional condition. If this option is activated, the specified password must contain at least one character from three of the four following types of characters: Lower case letters, upper case letters, numbers and special characters. If this condition is not met when a new password is specified, the password is rejected by Centri-Log Plus and the user must define a different password.

Setting the period of password validity

The Administrator can also define a limited period of validity for newly specified passwords to ensure that users change their passwords at regular intervals. Besides permanent validity, the Administrator can specify validity periods of three, six and twelve months.

Maximum number of failed logins

The software can also block access by a user after a few failed log-in attempts so as to thwart identity theft. When this option is activated, access can be blocked after three or five failed log-in attempts. If access by a user has been blocked by this function, an Administrator must subsequently re-activate that user's log-in/access privileges. Details of this are given under "Reactivating blocked users".

Permanent blocking of the user

If the maximum number of failed login attempts has been reached, the user's access to the Centri-Log Plus software is blocked. This option allows an administrator to specify whether the access is permanently blocked or only temporarily. In case of a permanent lock, access must be released again by an administrator. In case of a temporary lock, access is automatically released after 30 minutes.

Indication of failed login attempts

If a user has successfully logged on to Centri-Log Plus, the software can issue a message about failed login attempts. This message refers to login attempts with the identification of the logged in user. The number of failed login attempts since the last successful login is displayed.

Display identification of last user logged in

If the login dialog of the Centri-Log Plus software is displayed, the input field for identification may already contain the correct information from the last successful login. In this case only the password needs to be entered. This speeds up the registration process, but also provides valid user identification. If this is to be avoided, this option should be deactivated. In this case the identification and the password must be entered completely.

Log out user automatically

The user must log onto the system to execute many of the Centri-Log software functions. If security is a concern, it is possible to specify that users are logged out automatically. The user is logged out automatically after a specified time of inactivity if this option is checked.

If automatic log out is enabled, you can set the inactivity time here. The user is automatically logged out after that time.

It is also possible to configure the software to display a warning before the user is automatically logged out. This warning is displayed approx. 20 seconds before the log out process starts and can be used to cancel the log out.

Re-entry of password for assignment of findings

After a login, the user is given access to all functions for which he/she has been assigned the appropriate rights. If this also includes the assignment of findings, this option can be used to achieve additional security. By entering the password again when assigning findings reports, the user can be uniquely identified for this processing step.

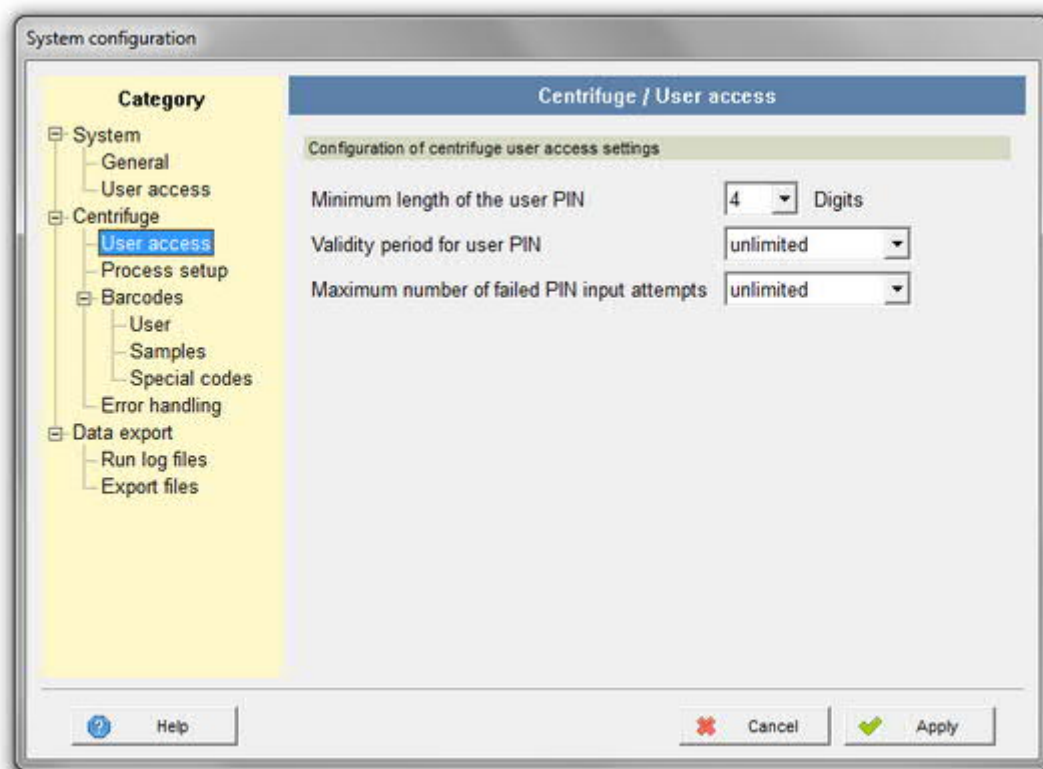
3.2. Centrifuge settings

The centrifuge settings configuration pages can be used to define details of the desired functionality of the software when working with the centrifuges. Use these pages to determine how the user login to the centrifuges works, which data to log and which alternate sequences to make available to the user at the centrifuge.

3.2.1 User log-in options

In the configuration screen "**Centrifuge/User access**" the Centri-Log Plus software administrator can define which conditions shall apply to the use of the PIN within the centrifuge software.

The configuration screen described above is shown in this figure:



The following settings for users PINs can be defined here:

Minimum user PIN length

Here, the administrator for the Centri-Log Plus software can specify the minimum length for the PIN to be used. This length is not completely freely definable however, but must lie within a range from 4 to 10 digits.

PIN validity period

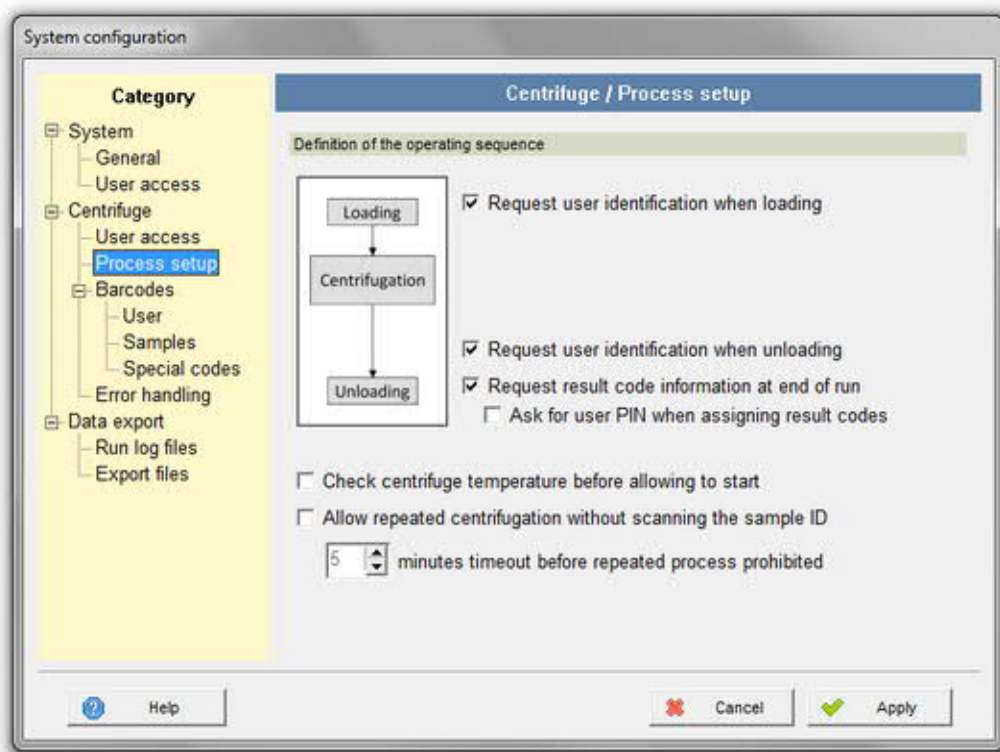
The administrator can also define a limited period of validity for newly specified PINs to ensure that users change their centrifuge access PIN at regular intervals. Besides permanent validity, the administrator can specify validity periods of three, six and twelve months.

Maximum number of failed logins

The software can also block access to the centrifuge by a user after a few failed log-in attempts so as to thwart identity theft. When this option is activated, access can be blocked after three or five failed log-in attempts. If access to the centrifuge by a user has been blocked by this function, an administrator must subsequently re-enable that user's log-in/access privileges. Details of this are given under "Unlock User Access".

3.2.2. Definition of the process sequence

The process setup page provides options for the easy configuration of the desired operating steps when working with the centrifuges. The figure below depicts this configuration page:



3.2.2.1. Query process data

The upper half of the window features a graphical depiction of the entire process sequence. The sequence starts with loading the centrifuge, followed by the actual centrifugation run and the subsequent unloading of the centrifuge. The options for the individual data acquisition steps are located to the right of the process visualization. Here, you can activate or deactivate the respective step.

The following options are available for defining the operation sequence:

Request user identification when loading

Request the identification of the user when loading the centrifuge. Enable this step and the user ID must be scanned at the centrifuge as a barcode before every centrifugation.

Request user identification when unloading

Request the identification of the user when unloading the centrifuge. If this option is checked, the software prompts for a personnel ID when opening the lid. The system is not ready for the next run until this ID has been scanned and entered. There is no personnel ID prompt if centrifugation has not been carried out. This means the prompt is skipped if the lid is only closed and immediately opened again.

Request result code information at end of run

At the end of centrifugation the user can assign results to individually processed samples or to the entire run. This operating step is enabled by selecting this option.

Note: The option "[Ask for user PIN when assigning result codes](#)" applies only to centrifuges linked through the network. This option is not available for centrifuges linked via the fieldbus.

3.2.2.2. Check centrifuge temperature before allowing to start

A temperature tolerance range can be specified for each product definition. This is done by checking the second option. If the actual temperature before starting the centrifuge is outside of the permitted tolerance range, this would result in an error message at the start of the monitoring process. To prevent this, the software can check the temperature before the start and only allow the start to commence if the temperature is within the permitted tolerance range.

3.2.2.3. Allow repeated centrifugation without scanning blood bags

Note: This function is supported only by centrifuges linked via the fieldbus. It is not available for centrifuges linked through the network.

Check the selection box "[Allow repeated centrifugation without scanning the sample ID](#)" to determine that the user at the centrifuge is permitted to carry out a centrifugation run with the product and sample data of the previous run.

Usually, the personnel ID, the product ID, and the barcodes of the samples must be scanned and entered before each run. If an error occurs during the run, it may be necessary to centrifuge the same samples a second time. The user can scan a special barcode after scanning the personnel ID to save time. This barcode

informs the Centri-Log Plus software that the same product code with the same sample data is to be used again for centrifugation.

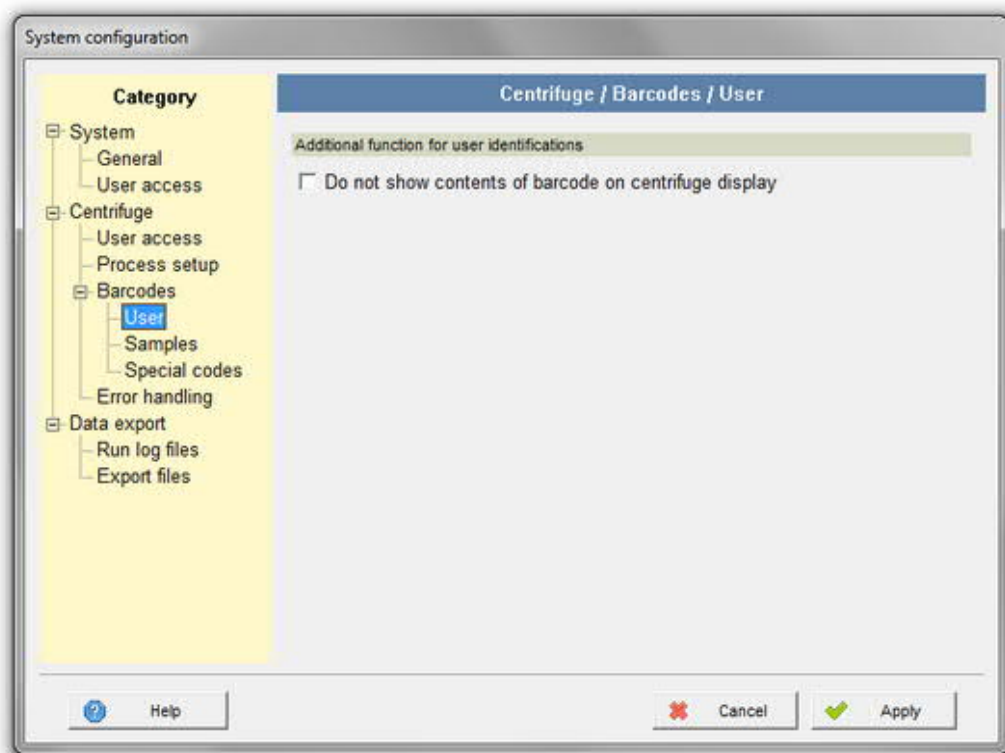
This function is linked with the centrifuge. This means only the previous run of the respective centrifuge can be repeated. It is also possible to define a timeout for the saved data. Once the specified time has run out, the data are no longer available for a repeat run.

3.2.3. Barcodes

In the Barcodes configuration screens you can define the response of the software when processing the process data after it has been imported. The configuration options here are restricted to the user barcodes and the product barcodes, as set specifications exist for many of the process steps that are used. The special barcodes screen offers one possibility for generating the barcodes required for use at the centrifuge.

3.2.3.1. Options for user barcodes

This configuration screen for barcode processing offers only one option. Here, you can define that a user barcode read into the system not be displayed at the centrifuge. The following figure depicts the configuration page:



If the user ID is also used for accessing other IT systems, this ID should always be kept confidential. Normally, an imported barcode is shown in the display at the centrifuge. To prevent this for the user ID you can mark the option "[Do not show contents of barcode on centrifuge display](#)". The then entered code is depicted as asterisks in the display.

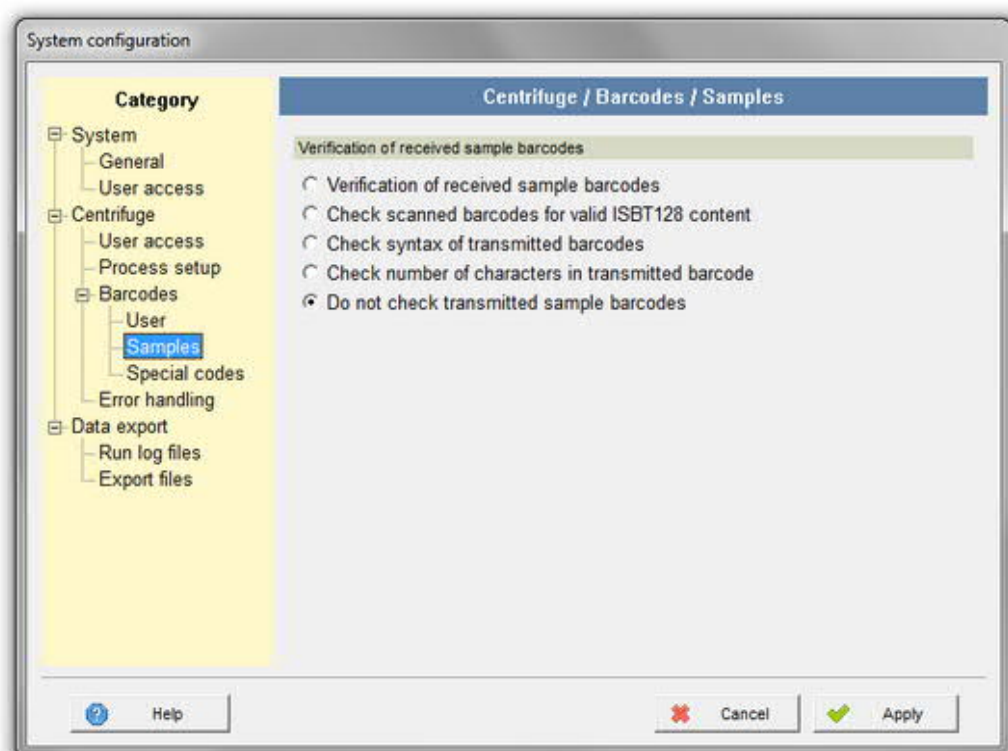
Note: This setting applies only to centrifuges with a separate LC display for use with Centri-Log. If process control is exercised through dialog windows in the centrifuge GUI, the barcode will not be displayed anyway.

3.2.3.2. Options for sample barcodes

The configuration screen for sample barcodes offers selections for verification of the imported barcodes. The following five options are available for verification of the sample barcodes:

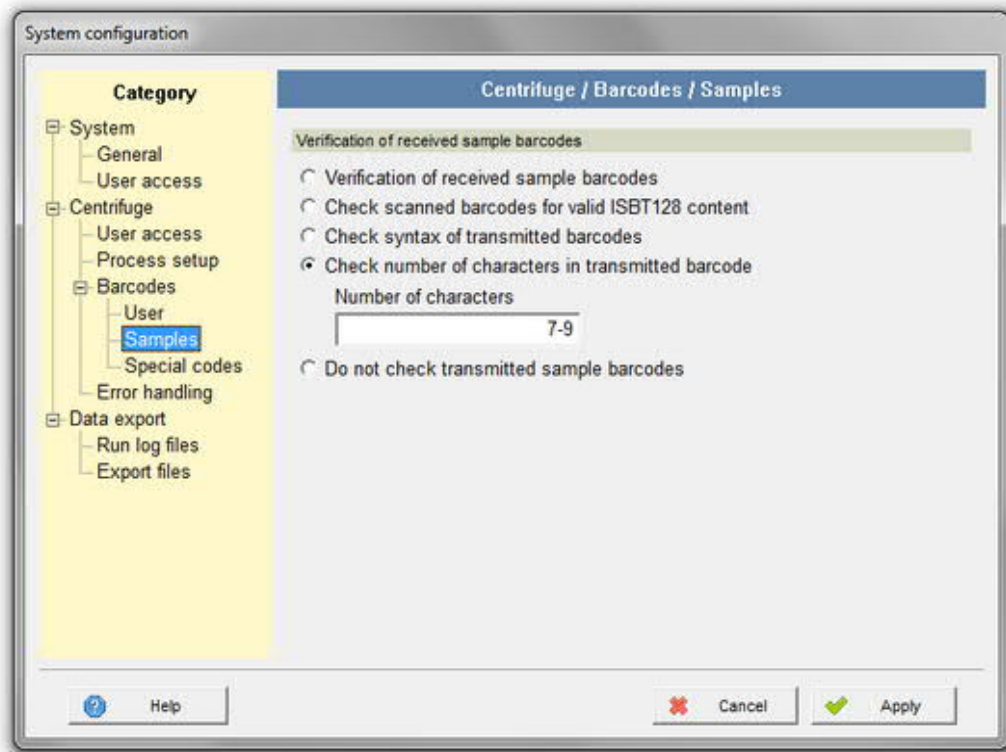
Do not check transmitted sample barcodes

If this option is marked, all transmitted barcodes will be accepted without any verification and accepted into the data inventory as valid sample identification.



Check number of characters in transmitted barcode

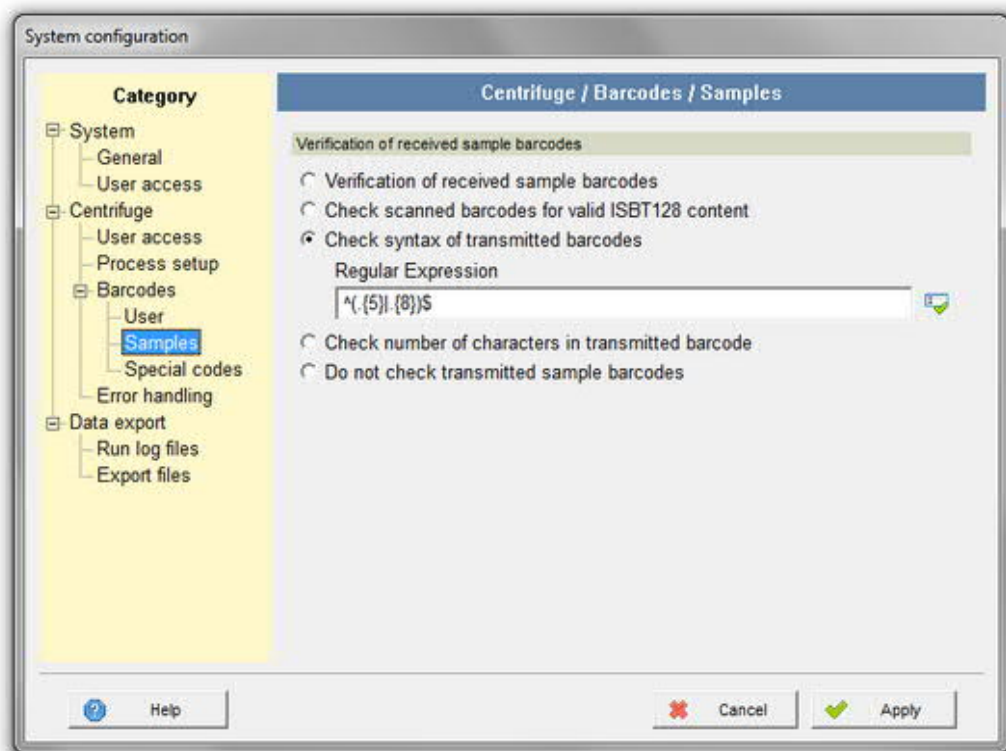
To increase data security, the software can check the length of the transmitted barcodes. An additional input field opens when this option is enabled. Here you can enter the expected code length:



The anticipated number of characters can be given as individual digits (e.g., 7, 9, 12), or as a value range (e.g., 7-9). A combination of the two forms is also possible. The individual ranges may also overlap for this.

Check syntax of transmitted barcodes

The syntax of the transmitted barcodes is checked using “regular expressions”. This expression is used to define a pattern that must correspond with the scanned barcode. The software can now interpret the transmitted character string based on this pattern.

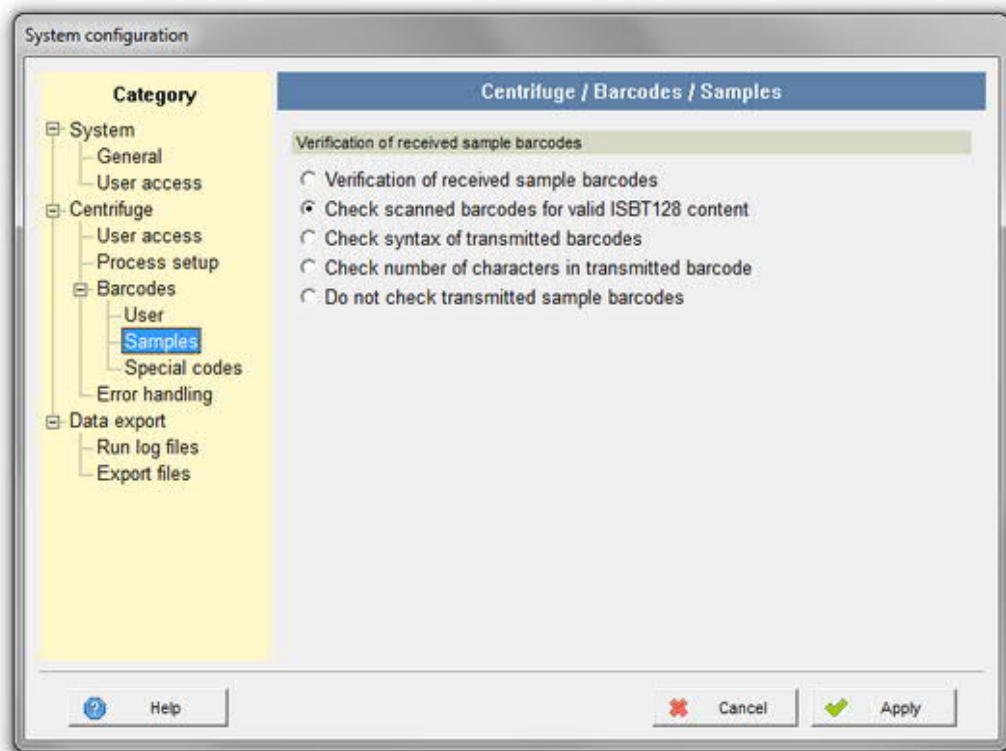


Use the "Regular expression" input box to enter the pattern for checking the transmitted barcode. A button next to the input box can be used to test the regular expression. Click this button to open a window where you can enter a sample scanned barcode. The program then indicates whether the barcode matches the regular expression.

Please consult Appendix of this manual for additional information about regular expressions.

Check scanned barcodes for valid ISBT128 content

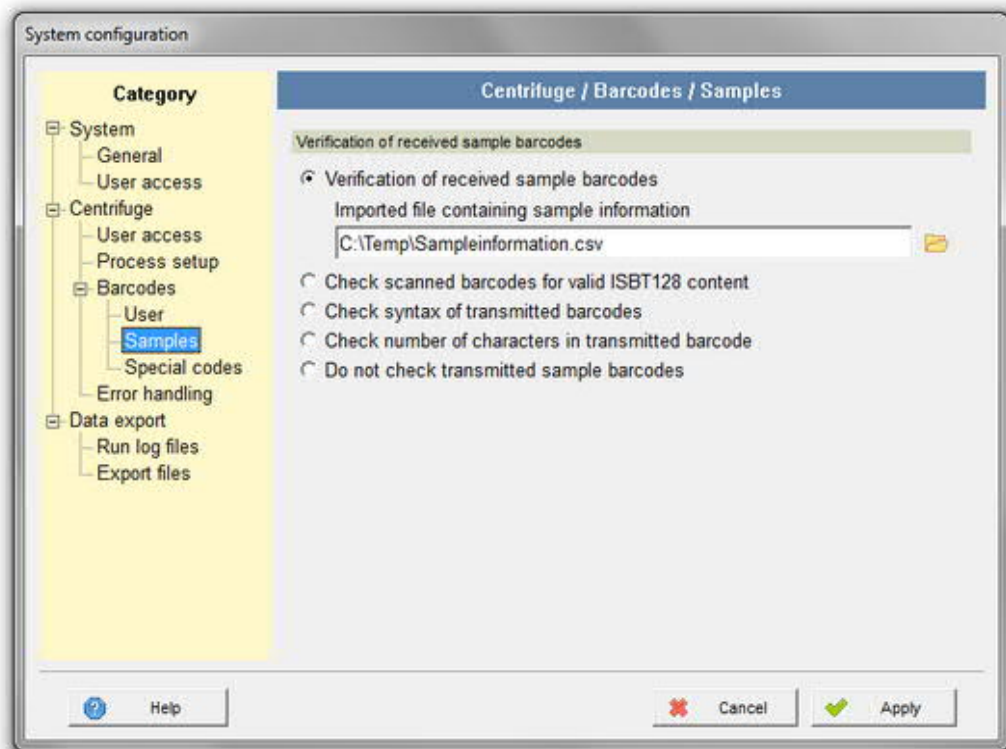
If this option is marked for the sample barcodes, the software will check each scanned barcode based on the rules valid for ISBT128 blood bag barcodes.



As the definition given in ISBT128 applies to the complete structure of the barcode, no additional information is required here in the configuration.

Allow processing of registered samples only

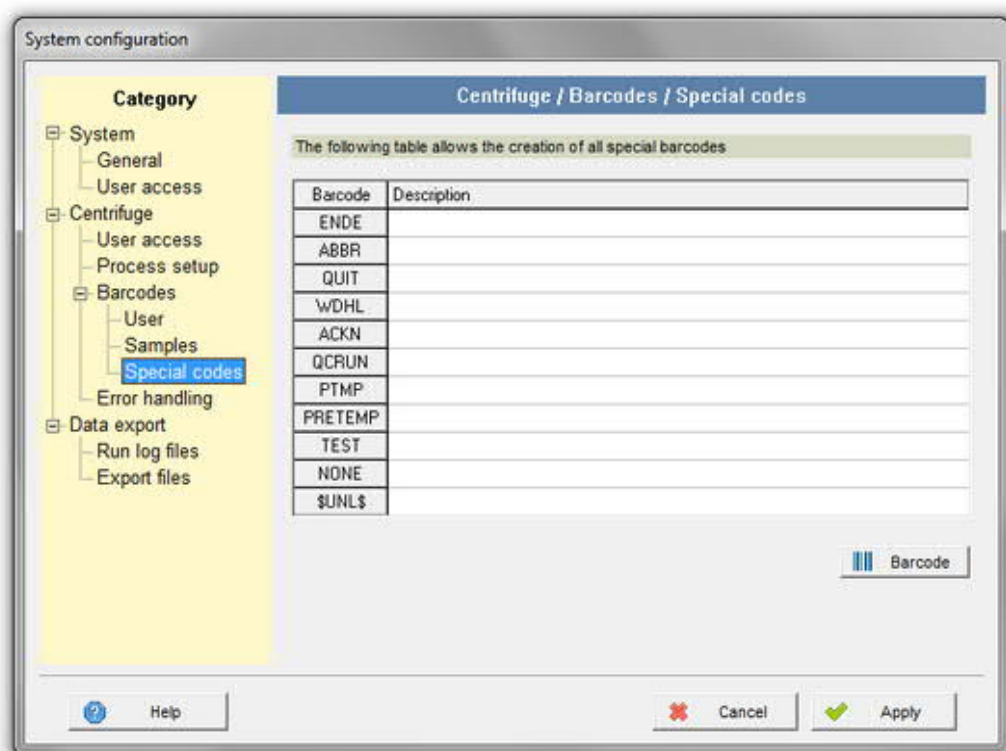
If this option is marked, the Centri-Log software will read in at rapid intervals a data file that contains both the blood bag barcode and the product code for the next respective processing step. Enable this option to open an input box for the file name and path.



Use the button next to the input box to open the dialog for selecting the data file. The data file must be made available from a central EDP system and must be updated regularly.

3.2.3.3. Options for special barcodes

The page for special codes features a table listing all special codes. The following figure depicts the page with the special codes:



The first table column lists the special codes. These are fixed defaults and cannot be changed. The second column can be used to enter a plain text for each code.

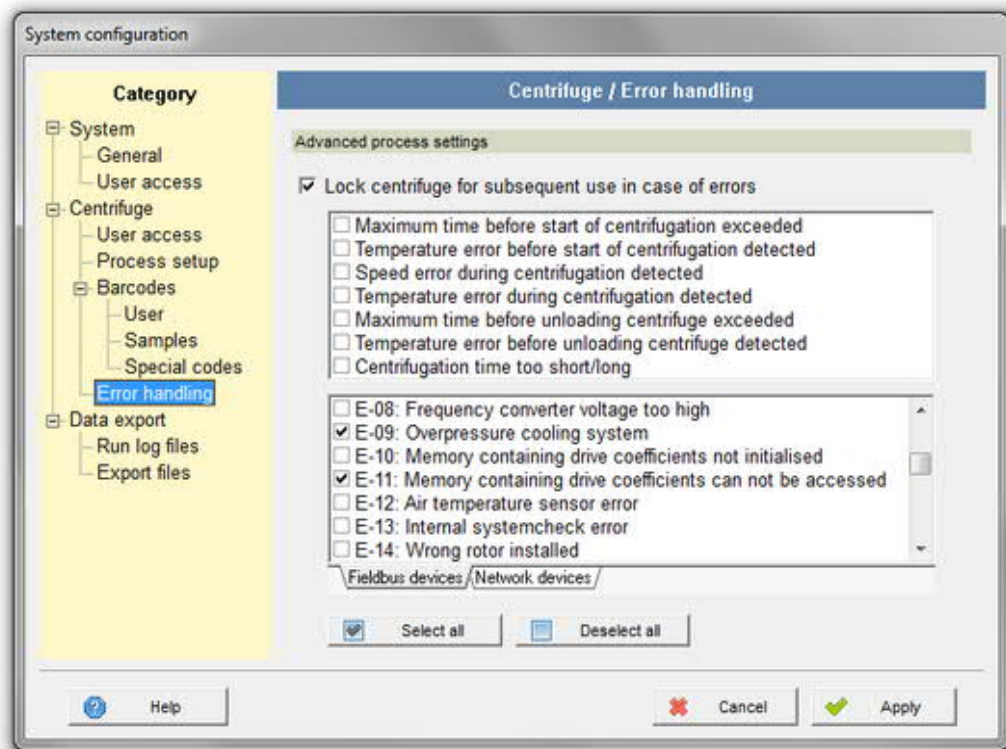
Use the "Barcode" button to generate a barcode for special codes. If a row in the table is selected, the barcode window for this barcode opens. If no row is selected, the barcode window to generate all barcodes opens.

More information on creating barcodes is given under "Generating barcodes".

Note: If one of the records is selected, this selection can be reversed by clicking in the first cell of the title.

3.2.4. Error handling

The option for blocking a centrifuge in the event of a fault is given in the screen for advanced settings for the operation sequence. The following figure depicts the configuration page:



If a centrifuge malfunctions, additional runs with this centrifuge should perhaps be blocked. This function is enabled with the option "**Lock centrifuge for subsequent use in case of errors**". If this option is enabled, the centrifuge cannot be used for any additional runs after a malfunction. Only a user with the corresponding privileges can release the centrifuge later on. Privileges can be assigned to individual users when editing the user data.

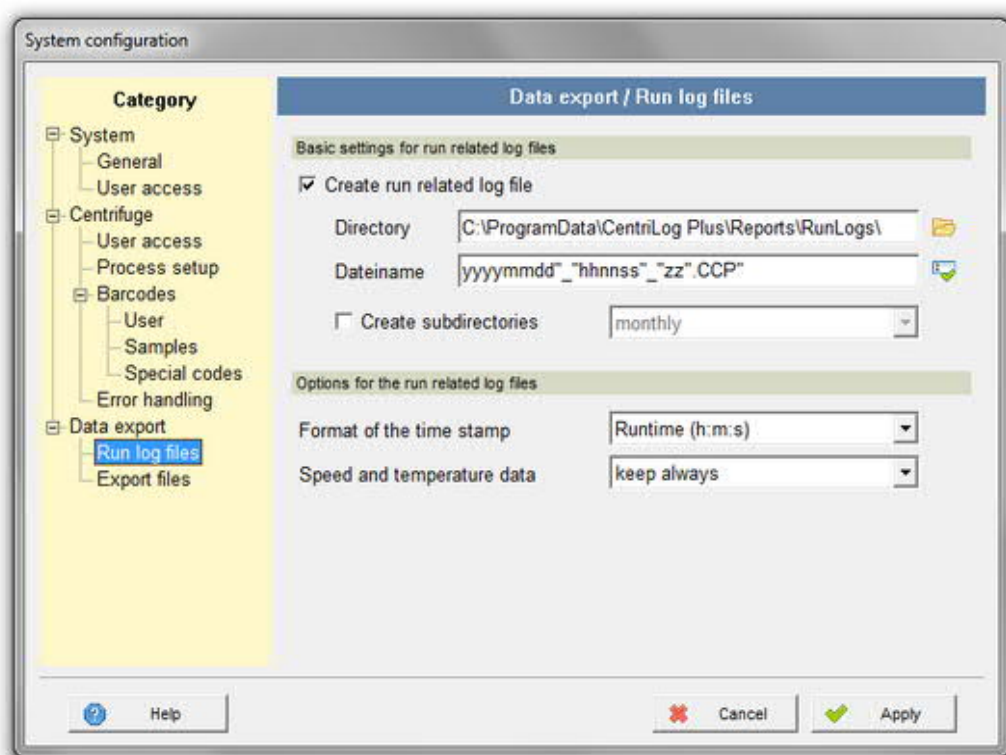
After this function is globally enabled, the displayed error list can be used to fine-tune the program behavior. For example, it is possible to specify for each error if the centrifuge is to be blocked after this error occurs.

3.3. Data export

The settings for saving the acquired process data in ASCII transfer files are explained in the two configuration screens for data export. One page contains all options for the run logs, the other the settings for the export file. Both file formats can be used to transfer the saved data to an external software system.

3.3.1. Settings for Run log files

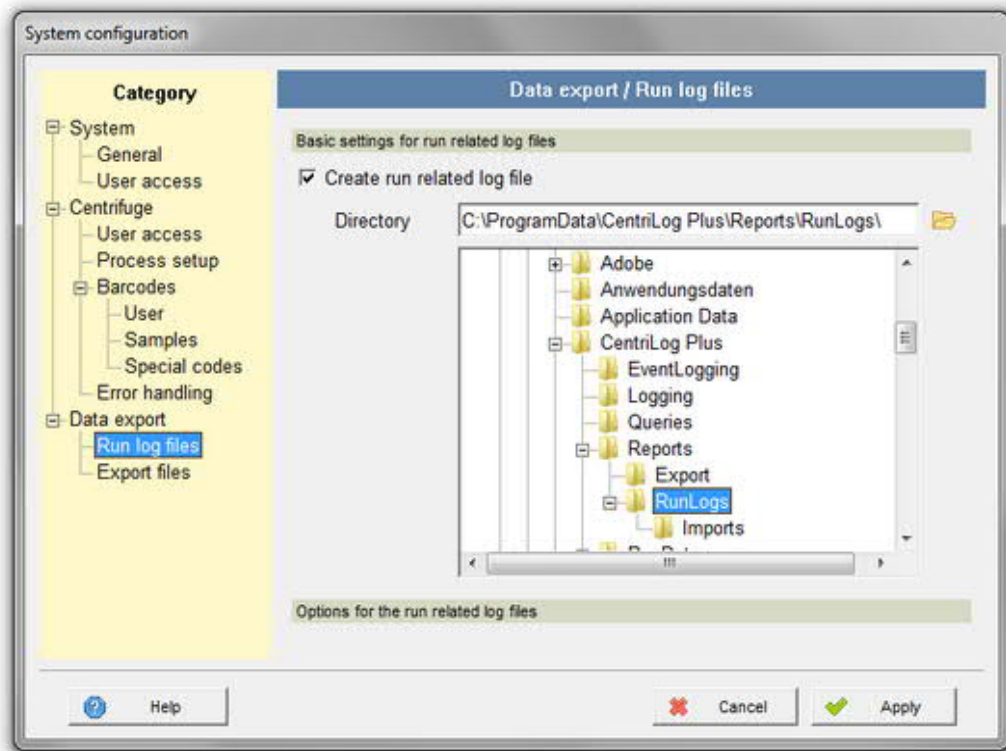
The setting options for the ASCII log files that can be created for each centrifuge run are given in the "[Run log files](#)" configuration screen. The following figure depicts the corresponding configuration window:



The upper window area features the option of enabling or disabling run-related logs. This is performed using the "[Create run related log file](#)". Creating of log files must be marked in order for changes to be made to the configuration settings.

3.3.1.1. Select drive and default directory

Use the "**Directory**" selection box to determine the drive and default directory for saving the log files. Click the button next to the input box to select a directory. The following figure shows the configuration window with the opened directory selection window.



After the storage path for the run logs has been selected, the directory selection window can be closed again by clicking the button next to the input box.

The directory must be on the local computer or a linked network drive. If the selected directory cannot be accessed while the program is running (e.g., due to an interruption of the network connection), no log files will be created. It is noted in the database, however, that log files remain to be created for the runs performed. The Centri-Log Plus software will create the missing log files when access to the directory is again possible. A corresponding error message is displayed if this problem persists for a longer period.

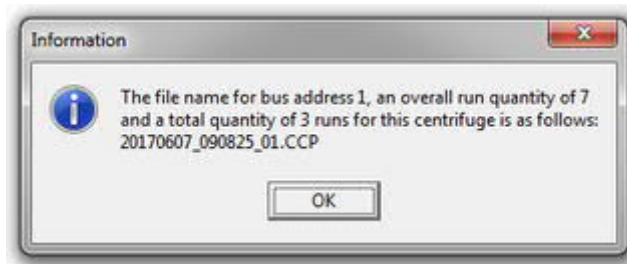
3.3.1.2. File name template

A sample can be entered in this input box for the file name to be used. This sample can consist of plain text and a series of defined control characters. The control characters make it possible for the software to include additional information in the file name. These may be date and time information as well as values from the run count. A detailed overview of the possible control characters is given in the attachment to these instructions.

The following example depicts a template for a file name and how this translates into the actual file name of the run-related log:

Template:	yyyymmdd"_"hhnnss"_"zz".HCP"	
Converts to:	yyyymmdd	Consists of the date of centrifugation. A run on 22 September 2017 generates the character string 20170922.
	hhnnss	Consists of the time of centrifugation. A run carried out at 11:18:12 generates the character string 111812.
	zz	These characters result in the centrifuge address being entered into the file name. The character string is therefore 01 if the centrifuge has the address 1.
File name:	All characters enclosed in " " are applied to the file name without being changed. This example therefore results in the following file name: 20050922_111812_01.HCP	

Use the button next to the input box to test the file name generation. This test uses sample data and the current date to see if generating a file name is possible. If the file name was successfully created, this name is then displayed in a message window. The following figure shows the window for the example listed above:



An error message is displayed if the file name cannot be created. If this is the case, the template for the file name must be checked and corrected if necessary.

The selected file name should be unique if possible. This is already achieved by using the centrifuge address or a combination of date and run count. If the file name is not unique, the software automatically adds a file count.

3.3.1.3. Create subdirectories

In this configuration screen you can activate the creation of subdirectories for the ASCII run log files. Options available for selection here are daily, weekly, monthly or yearly changing of the directory.

3.3.1.4. Format of the time stamp

This setting determines the format used to save points in time in the log file. Which format is more advantageous depends on how the log file is to be processed later. The following four options are available:

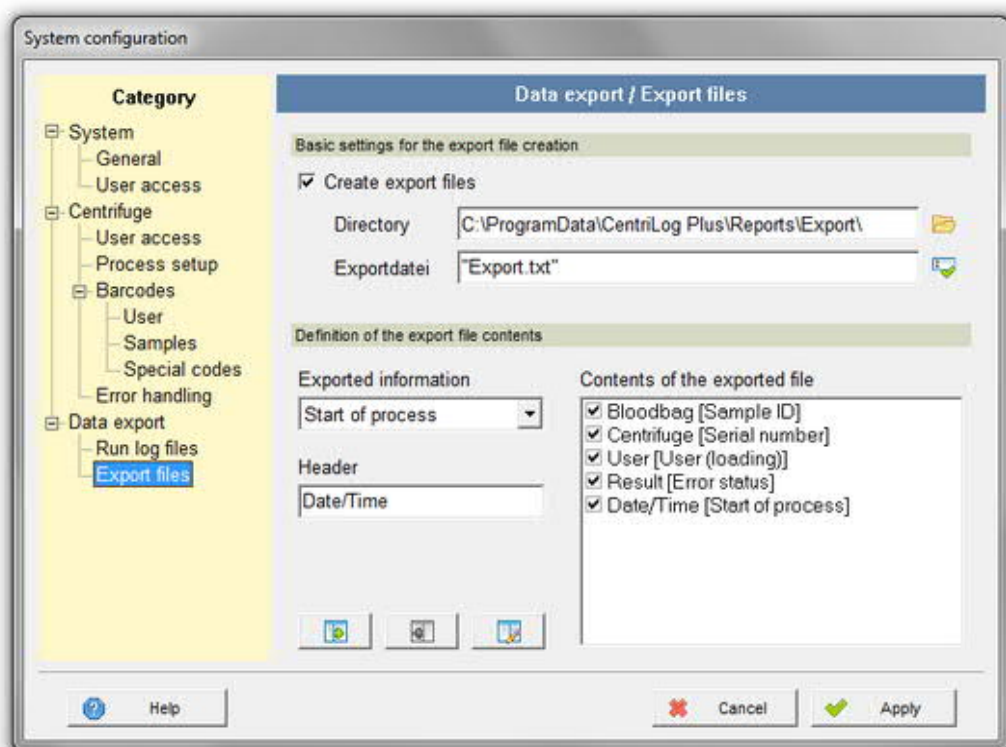
- | | |
|-----------------|---|
| Runtime (h:m:s) | The time of scanning saved in the format hour/minute/second. Time information is relative to the logging start. |
| Runtime (s) | The time of scanning is later than the number of expired seconds since logging started. |
| Daytime | Each time stamp documents the actual time when a scan was carried out. |
| Date & Time | In addition to the time of scanning, the time stamp also indicates the date. |

3.3.1.5. Speed and temperature data

Speed and temperature are logged in a defined timeframe during the centrifugation run. If the run was free of errors, the actual values do not contain any additional information compared with the also logged set values. The actual values can therefore be suppressed to reduce the volume of the logged data. This requires that the setting in the field "[keep always](#)" be changed to "[keep in case of errors](#)".

3.3.2. Settings for export files

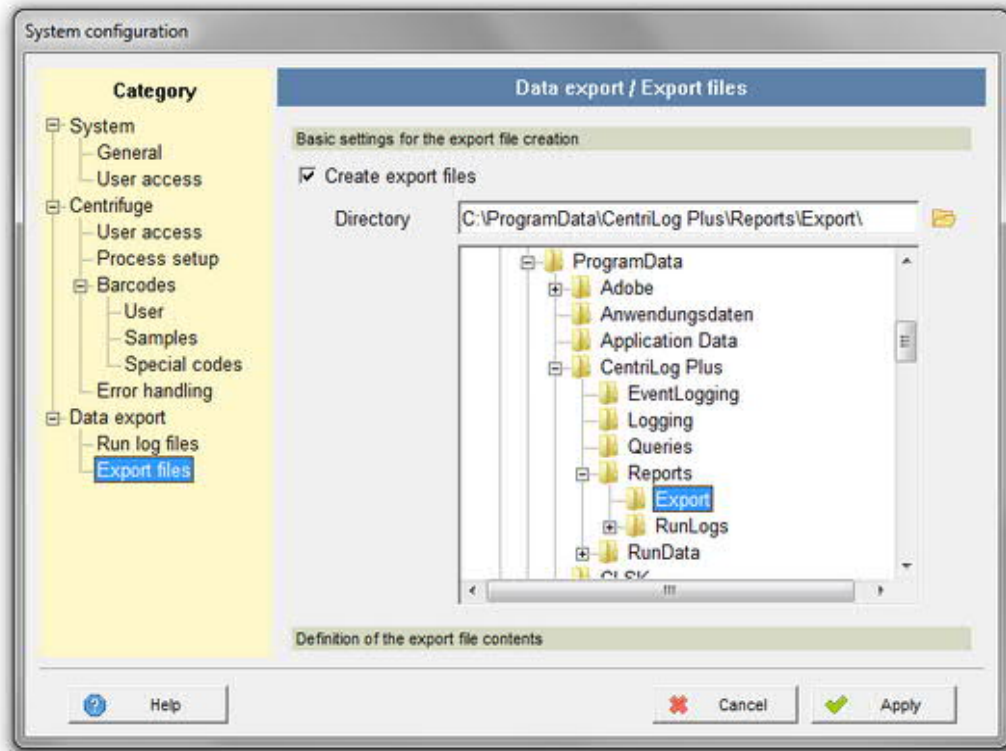
The second data storage page lists all basic settings for the export file creation. Export files are used for transferring selected information of the saved data to a central data processing system. Data are stored in the export file not per run but as it pertains to each processed sample. The following figure depicts the configuration window:



The upper window area features the option of enabling or disabling creating the export file. Only if the export file creation function is enabled is it possible to make changes to the configuration settings.

3.3.2.1. Select drive and default directory

In the field "Directory" you can specify the drive and base directory for saving the export files. Click the button next to the input box to select a directory. The following figure shows the configuration window with the opened directory selection window.



Once you have specified the location at which the export file is to be saved you can close the directory selection window by clicking again on the button next to the field.

The directory must be on the local computer or a linked network drive. If the selected directory cannot be accessed while the program is running (e.g., due to an interruption of the network connection), no entries are made to the export file. It is "noted" in the database, however, that the export file must still be updated for the runs performed. The Centri-Log Plus software then generates the missing entries in the export file when the directory can be accessed again. A corresponding error message is displayed if this problem persists for a longer period.

3.3.2.2. Export file name

Use the input box underneath the directory selection box to enter a file name for the export file. You can also use the file name to determine an automatic time interval for saving data to a file. This is done by entering a file name that also includes timeframe information.

Option 1: Create single export file

If a plain file name is entered, Centri-Log uses this file to save information to be exported in this file. The following are examples of such simple file names: "EXPORT.TXT" or "2004-04.EXP" Make sure these file names are always enclosed in " " as well.

Option 2: Automatic creation of export files

The files names of export files may also include control statements for the automatic generation of file names. The thusly generated file names may include regular characters and additional time information (date/time). All characters applied to the file name without further editing must be enclosed by the characters " ".

Example: Entering yyyy-mm".EXP" would generate the same export file for April 2004 as if "2004-04.EXP" was entered. This has the advantage that file names are created automatically for subsequent months, i.e. in May 2004-05.EXP, in June 2004-06.EXP, and in January 2006 the file 2006-01.EXP.

Detailed information about the formats for the control instructions is given in the attachment to these instructions.

3.3.2.3. Definition of the export file contents

The lower half of the window features the options than can be selected for the export file. Use these options to define what data are stored in the export file.

The window is here divided into three sections:

1. Selection field for entering the title
2. Active buttons for changing the selection
3. Field list with all fields that appear in the export file

3.3.2.3.1. Field selection and header input

Use the "[Exported information](#)" selection box to determine which fields are to be added to the export file. The input box "[Header](#)" below this drop-down selection box is used to specify which header is to be displayed in the first row of the export file for this field. If the desired field is already displayed in the selection box, the header input field shows the header previously defined for this field. An empty input box is displayed in case of new fields.

3.3.2.3.2. Action buttons for the selected fields

Use the three action buttons underneath the field selection box to add fields to the list, delete fields from the list, or display additional information about specific field types.

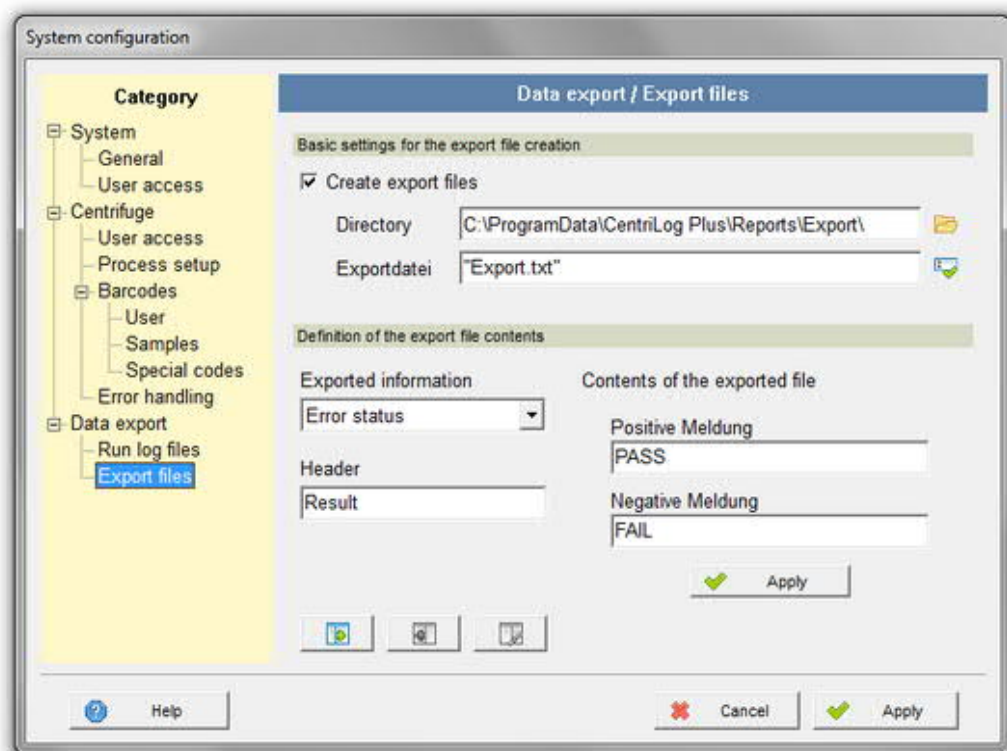


Button to add selected field to field list

Use this action button to add the field listed above to the definition of the export file. If this field is already in the list, the software first checks whether a new header was entered. If the header is different from the one in the list, the entry is updated. If the header is the same, a warning message is depicted and the field list is not changed. If no entry in the list is selected, the field is appended to the end of the list. However, if a row in the field list is selected, the entry is added before this row.

Additional information may be needed for some fields. This includes the fields Error status and Start time, among others. If one of these fields is added to the selection list, the list is first hidden and an additional input area is depicted.

The following figure depicts the window section with the input area for the error status:



A freely selectable text can be used for the "Positive message" (run without problems) and "Negative message" (run with errors) status information. The text is then saved in the export file as specified.

Time information fields can be used to determine in which format the time is to be saved in the export file. Please consult Appendix of this manual for additional information about possible formats.

Click "[Apply](#)" to return to the field list view. Changes to the additional information are not saved.



Button to delete selected field from field list

Use this button to delete a selected entry from the list.



Button to edit additional information

If a field with additional information is selected (via field selection of the field list), click this button to edit the additional information. Click the button to open the corresponding input area in the window. Input is completed with the "[Apply](#)" button.

3.3.2.3.3. Field list

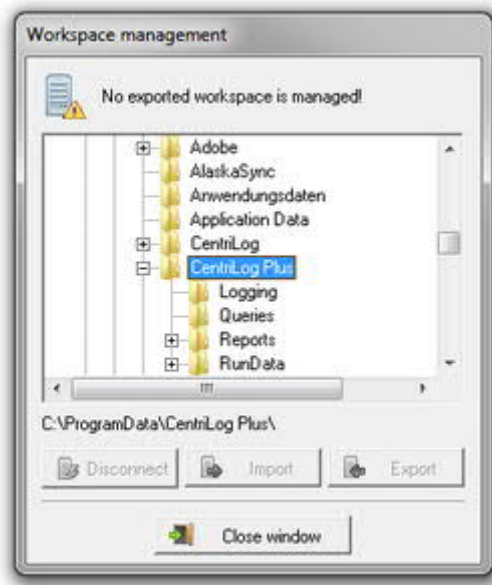
The field list includes all fields that can be entered into the export file. The order in this list corresponds with the order of the fields in the list. Each entry in this list consists of a header and the field name in square brackets.

You can also remove individual fields from the list without actually deleting them right away. Simply place the mouse cursor into the checkbox in front of the corresponding entry. Then click the left mouse button. A small tick is displayed in the checkbox when saving the field; otherwise, the field remains empty.

If an entry in the field list is selected, the field selection and the input box for the header is immediately updated to reflect the corresponding selection.

4. Workspace management

Click the [Program/Workspace](#) menu item to open the following dialog to administrate the workspace:



In a standard Centri-Log Plus installation all of the configuration files will be located on the PC on which the software is installed. Data security can be enhanced by copying these configuration files to a network drive.

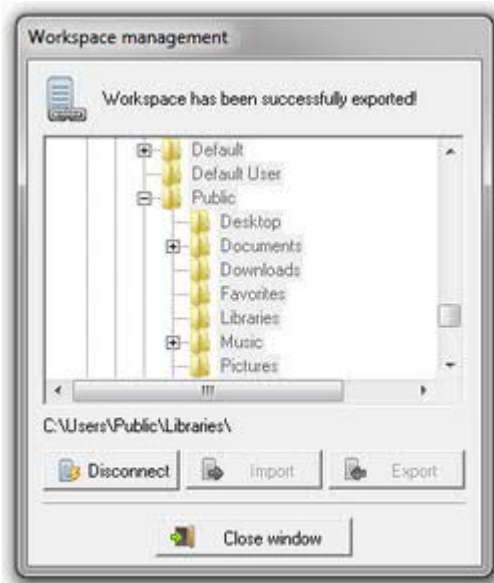
This dialog makes it possible to move the configuration files to a network directory and to import existing configuration files, for example, after a new installation of the software.

4.1. Configuration of an exported workspace

If the configuration data for the Centri-Log Plus software is to remain on a network drive, the software can export the local workspace (which is the storage location for local files) to that network.

First, select the directory from the directory selection to which the configuration files are to be moved. Then click "[Export](#)" to export the workspace to the selected directory. A corresponding message is displayed if the export of the files was successful. Otherwise, an error message is displayed. In case of an error message, check whether the selected directory has the respective permissions and attributes allowing the creation of files.

If the export was successful, this is indicated in the window.



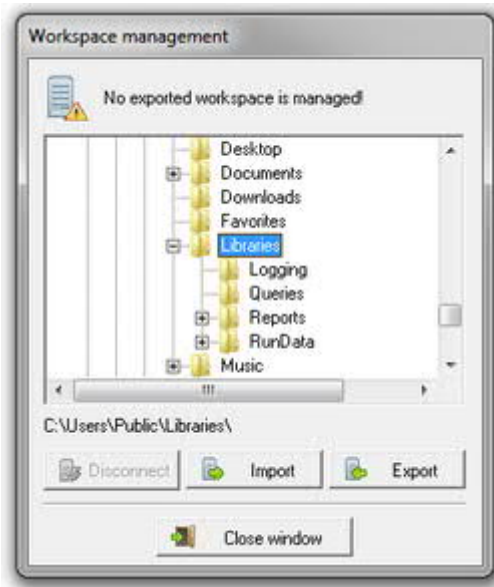
The message "Workspace has been successfully exported" is displayed above the directory selection box. The button to disconnect the workspace located at the bottom of the window is then available as well.

4.2. Disabling the connection to a workspace

The connection with the exported workspace can be severed if the workspace is no longer needed or the files are to be saved to a different location. Simply click "[Disconnect](#)". Confirm the security prompt and the software deletes all configuration files in the directory of the workspace. This eliminates the possibility of two versions of the files no longer being synchronized by the software.

4.3. Import workspace

It is also possible to import configuration files if an exported workspace does not yet exist. This is done by first selecting the directory with the configuration data. If all files with the correct version are in this directory, the "Import" button is enabled.



Click "Import" and the Centri-Log Plus software imports all of the configuration data from the selected directory to the local configuration directory. This function makes it possible to restore the entire database in case of a new software installation without having to re-enter the data.

5. Data management

In the screens for data management you can process all of the data required for the installed centrifuges, users, manufacturer's specifications and results codes. This data is required by the Centri-Log Plus software to register and record the centrifugation processes.

5.1. Centrifuge management

The device management screen is shown here. This screen includes all of the settings required for managing the installed centrifuges.

The screenshot shows the 'Device management' window. It features a table of registered centrifuges at the top, a detailed configuration section in the middle, and a set of action buttons on the right and bottom.

Serial number	Identification	Centrifuge type	Bus address	IP address
42149645	Cryo 1	Cryofuge 6000i	1	
42236932	Cryo 2	Cryofuge 6000i	2	
45147821	Polaris 1	Cryofuge 8		12.65.144.40
46215962	Polaris 2	Cryofuge 16		12.65.144.51
46892165	Cryo 3	Cryofuge 6000i	3	

Below the table, the configuration section for the selected entry (Cryo 1) is shown:

- Serial number: 42149645
- Identification: Cryo 1
- Centrifuge type: Cryofuge 6000i
- Bus address: 1
- Operating mode: Monitoring
- Configuration setting: (empty)
- Device interface software: (empty)
- Master interface software: (empty)

On the right side of the table, there are buttons: Import, Search, Status, and Set time. On the right side of the configuration section, there are buttons: New, Copy, Add, Discard, Delete, and History. At the bottom, there are buttons: Help, Cancel, and Apply.

A table containing an overview of the registered centrifuges is displayed in the top half of the screen. The buttons for handling the entire data inventory are provided on the right in this screen.

The information for the selected entry in the table is displayed in the center of the screen. You can also edit the information given for the centrifuges here. The buttons for editing the displayed dataset are located to the right of the display area.

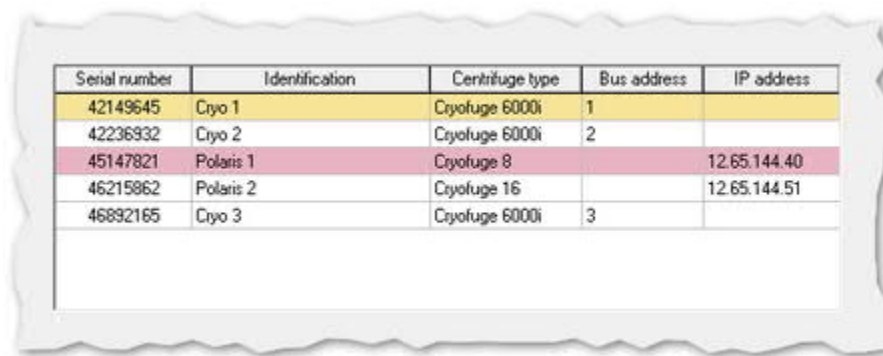
The bottom area of this screen is reserved for the general buttons for calling the Help function and for closing the screen. A copy of the data from the database is always processed when the management screen is opened. The data for the copy is canceled when you click "Cancel". When you click "Apply" the contents of the database are updated with the changed data of the copy.

5.1.1. Device management table

A list of all the installed centrifuges is shown in the overview table. Only selected, available information is displayed for each device however. The following data is displayed in the table:

- Centrifuge serial number
- The name of the centrifuge specified by the user
- The selected centrifuge type
- The bus address for devices connected to the fieldbus
- The IP address for devices connected to the network

Highlighting is done in the overview table using two different colors.



Serial number	Identification	Centrifuge type	Bus address	IP address
42149645	Cryo 1	Cryofuge 6000i	1	
42236932	Cryo 2	Cryofuge 6000i	2	
45147821	Polaris 1	Cryofuge 8		12.65.144.40
46215862	Polaris 2	Cryofuge 16		12.65.144.51
46892165	Cryo 3	Cryofuge 6000i	3	

The line in the table highlighted in yellow shows the currently selected dataset. The information for that device is displayed in the editing area for device data in the screen.

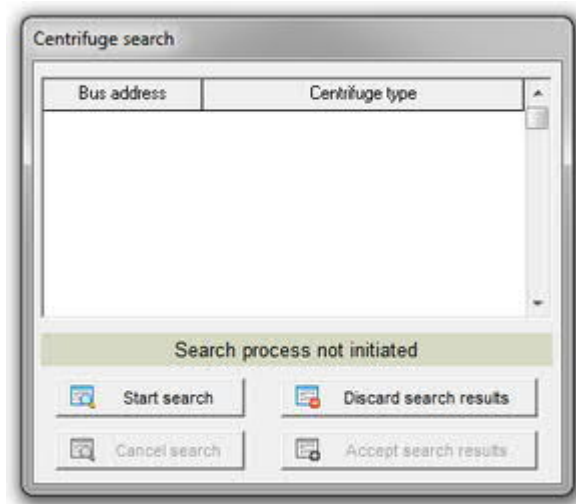
All lines in the table highlighted in light red are for centrifuges connected to the network whose data must still be updated. More information about this is given in the section on the device data editing area.

Three buttons are provided next to the table containing the device data for editing the entire data inventory for the device data. The following functions are available:

- | | |
|----------|--|
| Import | This button is used to import the configuration data for an existing Heranet or Centri-Log installation. This enables a list containing fieldbus device to be applied for Centri-Log Plus without having to re-enter all the information separately. This function is only available however when the device table is still empty, as there is no automatic comparison between existing and imported data. |
| Search | This button opens a window for searching for centrifuges connected to the fieldbus. More information about this function is given in the section "Centrifuge search". |
| State | Clicking on this button opens a window containing information about the communication status of devices connected to the network. Details about this are given in the section "Communication status display". This function is only available if communication with the centrifuges has been activated. |
| Set time | By pressing this button the user can request a synchronization of the system time of the centrifuges with the clock on the PC. However, the synchronization is not executed immediately, but only when the button "Apply" is pressed. |

5.1.1.1. Centrifuge search

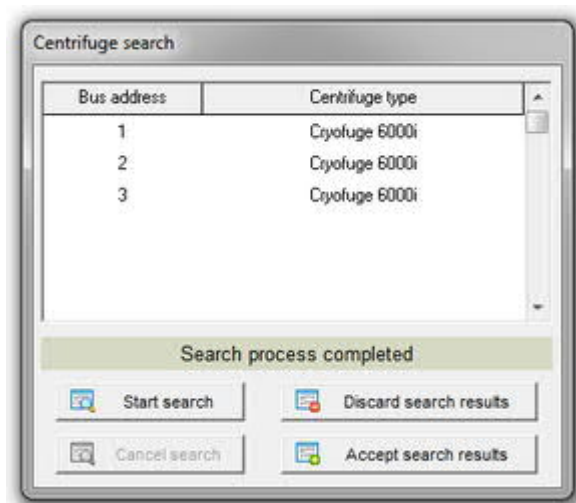
Configuring the centrifuge network is made easier by the automatic centrifuge search function. Click "[Search](#)" to open the automatic centrifuge search window. Please note here that the software cannot automatically configure networked centrifuges. This requires that the assigned IP addresses be entered manually.



Click "[Start search](#)" to begin searching for connected centrifuges. The software then attempts to query the configuration setting from every possible centrifuge address. If a valid "hit" is found, the configuration and the associated centrifuge type is depicted in the window.

If the search process is not to include all addresses, the search can be stopped at any time with the Stop search button. The software may not react at once when clicking the button. This is because any started query must be processed and finished first.

After the search is finished, all found centrifuges are listed in the window:

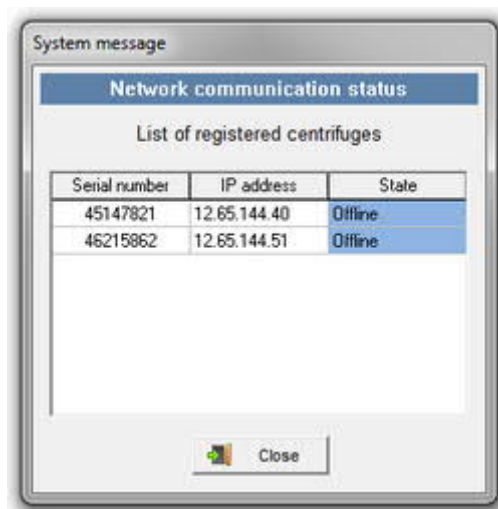


Click "[Discard search results](#)" to close the window without applying the found centrifuges to the device table.

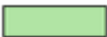
Click "[Accept search results](#)" and the Centri-Log Plus software imports the found centrifuges to the device table. The serial number and the centrifuge name are automatically assigned in this case. Only centrifuges not already in the table can be added to the table. This is based on the assigned bus address.

5.1.1.2. Communication status

Clicking the button "[State](#)" opens the window displaying the communication status of networked centrifuges. This window shows the status of the data link to the individual centrifuges.



The table also shows the serial number, IP address and current communication status of every installed centrifuge. The communication status is indicated here in both plain text and with a color code. The following status information is used:

Text	Color code	Description
Unknown		Not possible to display status information for the selected centrifuge. This is normally the case only directly after initiation of communication.
Connecting		The Centri-Log Plus software is attempting to set up a data link. This status is always indicated when communication is started, or when the status of an "Offline" centrifuge is checked.
Offline		A centrifuge is "Offline" if it was not possible to set up communication to it. This always holds true when the centrifuge is switched off. If the centrifuge is switched on and still displays the status "Offline", this may be due to a disruption of the network connection.
Online		If communication has been established with the centrifuge, its status is indicated as "Online". This status is also retained even if communication is not in progress at that particular moment. The validity of the "Online" sta-

Text	Color code	Description
		tus is then checked on the next attempt to contact the centrifuge.
Active		The status Active is indicated for all centrifuges at which centrifugation is currently in progress, or at which process data is being collected. This status indicates that data synchronization is not currently possible for the centrifuge concerned.
Download		This status is reported when data is being read from the centrifuge, or when Centri-Log Plus data is being transferred to the centrifuge. At the completion of data transfer, the centrifuge returns to the status Online.
Stopped		If communication with the centrifuges is halted, any data transfer already in progress must first be completed. This status is then indicated as soon as this data transfer is complete. Communication is ceased completely when all centrifuges have this status.
Foreign device		Every centrifuge is logically connected with a Centri-Log Plus installation on a defined PC. This connection is established by a unique software code being stored at the centrifuge. The status of the centrifuge is displayed in this manner when the centrifuge is already logically connected to a different PC.
Ignored		If a centrifuge is logically linked to a Centri-Log Plus installation on a different PC, the centrifuge can be accepted by the running Centri-Log Plus software when communication is started. If this is not desired, the centrifuge will be ignored for further communication attempts and this status set.
Incompatible		The centrifuge type and emulation type must be selected in the Centri-Log Plus software for each centrifuge. The status "Incompatible" is indicated if a different type of centrifuge or emulation exists at the specified IP address.

5.1.2. Device data editing area

The editing area for device data can have two different appearances. Whether a device is linked to the fieldbus or to the network determines which input fields are available. Regardless of this, there are three input fields that are always available.

- | | |
|-----------------|--|
| Serial number | The serial number for the managed centrifuge can be specified in this field. The Centri-Log Plus software can use the serial number for identifying the centrifuge. |
| Identification | An individual name can also be specified for each centrifuge. This name can also be used as an alternative means of identifying the centrifuge, instead of by its serial number. |
| Centrifuge type | The centrifuge type of the managed device can be defined using the drop-down list. All device types are available here, regardless of whether they are linked to the fieldbus or to the network. |

If a device linked to the fieldbus is being edited, the editing area will appear as follows:

The screenshot shows a form with the following fields and values:

Serial number	Identification	Centrifuge type
42149645	Cryo 1	Cryofuge 6000i
Bus address	Operating mode	
1	Monitoring	
Configuration setting	Device interface software	Master interface software

In this case, the following additional information is also required:

- | | |
|------------------|--|
| Fieldbus address | Use this selection field to specify the address to be used for managing the centrifuge linked to the fieldbus within Centri-Log Plus. You can select from the 30 bus addresses here which can be assigned for this type of device communication. |
| Operating mode | The operating mode for the centrifuge to be edited can be selected using this drop-down list. This setting can be specified separately for each device. Select one of three modes of operation: <ul style="list-style-type: none">Data display The data display mode of operation queries all centrifuges during a normal cycle. The collected data are displayed by the program. However, the software does not carry out any other tasks. The connected barcode readers are not supported either. This setting is intended for test operations or special tasks.Logging The next step then consists of logging and evaluating the collected data. The Centri-Log Plus software logs every centrifuge run during which the necessary process data has been imported. The software checks all specified tolerance limits while still in logging mode but any violation of these limits is only recorded without indicating this to the user.Monitoring While in monitoring mode, the Centri-Log software is able to block or release centrifugation runs. A release is usually issued only if all of the required information is available and the centrifuge settings match those of |

the product specifications.

The lower section of the editing area displays the status information for external fieldbus hardware. This information is only displayed when communication with the centrifuge has been activated.

Configuration This field displays information about the configuration settings for the centrifuge interface. This setting determines with which centrifuge the interface is working. The configuration setting is defined during the installation of the Centri-Log Plus hardware into the centrifuge and is depicted here for informational purposes. The following configuration settings are defined for the centrifuges:

Configuration	Centrifuge
k1	RC 12BP+
k3	RC 3BP+
k5	Cryofuge 5500i
k6	Cryofuge 6000i
k7	RC BIOS
k8	Cryofuge 8500i

Device interface software The field for the device interface software indicates the software code for the process at the centrifuge interface. This ID is comprised of an internal admin number and the revision or version ID.

Master interface software The software code for the processor at the master interface is displayed in this field. This ID is comprised of an internal admin number and the revision or version ID.

If a device linked to the network is being edited, the editing area will appear as follows:

The screenshot shows a configuration window with the following fields and options:

- Serial number:** 45147821
- IP address:** 12.65.144.40
- Identification:** Polaris 1
- Centrifuge type:** Cryofuge 8 (dropdown menu)
- Emulation type:** Polaris (dropdown menu)
- Pending device updates:**
 - ☒ User information
 - ☐ Program information
 - ☐ Run result codes
 - ☐ Sample result codes
 - ☐ GMP configuration data
 - ☐ User PIN settings
 - ☐ Barcode reader options
 - ☐ Processing planning
 - ☐ Centrifuge lock requests
 - ☐ User lockout
 - ☐ Device time

The following additional information is required for networked centrifuges:

IP Address	IP address of the centrifuge within the network. It is recommended to set the IP address of the centrifuge to a fixed value and to not use the DHCP option. This ensures that the centrifuge IP address does not change and that it is always accessible by the Centri-Log Plus software.
Emulation type	The emulation type defines the acceleration and deceleration profiles for the centrifuge. Besides the newly defined profiles for the device family, the profile set for the Cryofuge 6000i/8500i, the RC3BP+ or the RC12BP+ can also be selected.

In this screen, information concerning pending updates for the centrifuge being processed is displayed in the lower section of the editing area. If communication with the centrifuge is not active, any changes made to the relative data must be transferred at a later time. A corresponding note (flag) is entered for this in the database. This section of the screen shows the status of these notes in the database.

User information	This mark is set when changes to user data have been made in the Centri-Log Plus software.
Program information	This field indicates that changes have been made to the programs.
Run result codes	When this mark is active, the data inventory for the run result codes have been updated within Centri-Log Plus.
Sample result codes	This mark indicates that the data inventory for the sample result codes has been updated within Centri-Log Plus.
GMP configuration data	If the process data acquisition sequence has been changed in the program configuration, this can be indicated by the field GMP configuration data.
PIN configuration data	If the configuration for using the PIN for centrifuge login has been changed, this display is active until the setting has been transferred to the centrifuge.
Barcode reader options	If this field is active, changes have been made to the barcode reader option within the Centri-Log Plus software configuration. These options also include checking of the imported sample barcodes for correct length or logical structure.
Processing planning	In process planning, all samples that can be handled in the centrifuge are managed. The permitted program is saved along with the sample barcode. This field is activated when there is a change to the data inventory.
Centrifuge lock requests	The centrifuge can be blocked for further use in the event of an error. This field indicates the corresponding status when changes are made to the conditions for this blocking (lock).
User lockout	If the PIN of a user has been entered incorrectly several times when logging on to the centrifuge, this user access may be locked. This lockout must also be activated on the other centrifuges. As long as this is pending, this display field is active.
Device time	In order to keep the time setting of the centrifuges up to date, the Centri-Log Plus software can transfer the information on date and time to the centrifuge. As long as this is pending for the centrifuge displayed, this display field is active.

If a change is made in the input fields, this change is added to the temporary data inventory as soon as a different dataset is to be displayed, or when the window is closed. This basically means that changes do not have to be additionally confirmed. It is sufficient to simply select a different dataset in the overview table, or to call up the function for creating a further dataset.

The buttons shown in this area of the screen can be used for the following editing functions for the device data:

Create a new dataset for a device

To create a new dataset click the button "[New](#)". The mark for the active dataset is removed from the overview table and the input fields cleared. Once you have entered all required information for the new dataset, confirm your input and add this information to the data inventory by clicking "[Add](#)".

Copying a dataset for a device

If a data set is not to be created completely from scratch, a copy of the displayed data set can be created by pressing the "[Copy](#)" button. Since the data in the editing area does not change as a result of the copy process, the only indication of this is that the selection for the active record has been removed from the summary table. After the necessary changes have been made, the record can be added to the database by clicking the "[Add](#)" button. To cancel the process, use the "[Discard](#)" button. The record will then not be added to the database and the previously edited record is displayed again.

Delete dataset displayed for the device

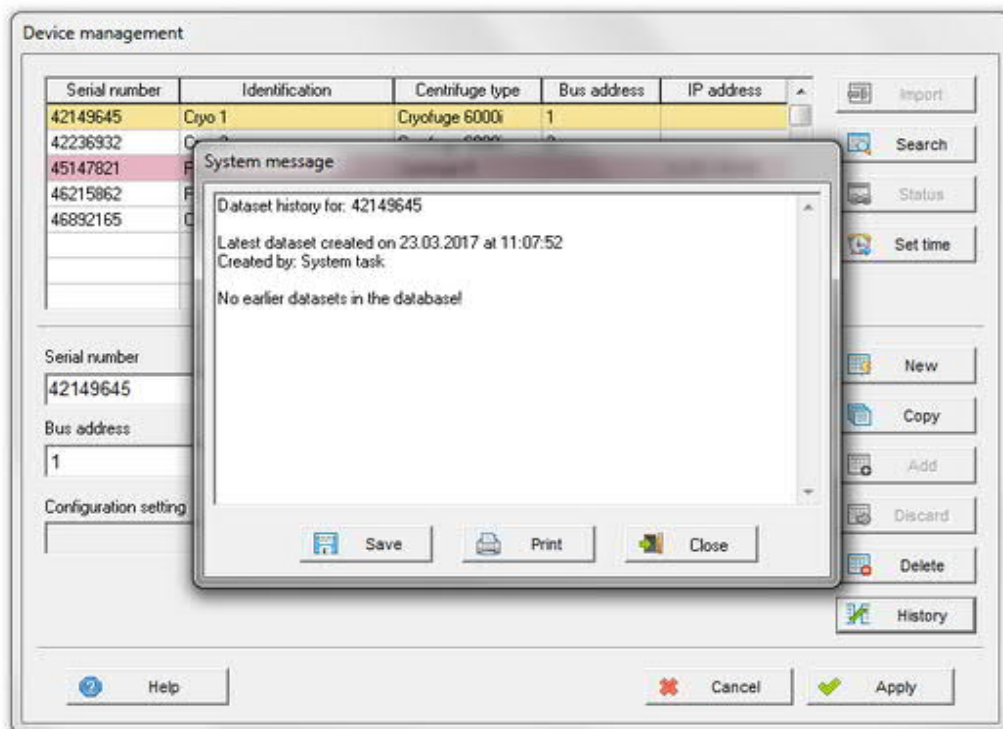
To remove the dataset being displayed from the active data inventory, click on the button "[Delete](#)". If the delete function is called up, this process must subsequently be confirmed. Datasets are not actually deleted from the database, but rather are merely marked as canceled. This enables references stored for this dataset to continue to be valid.

Show dataset history for the displayed device

Click on the "[History](#)" button to call up information on all changes made to the dataset being displayed up to the present time. More information about this is given in the section "Display dataset history".

5.1.2.1. Display of dataset history

Every change to the datasets in device management is saved as a new entry in the database. This enables older data to be retained and all changes can be clearly tracked. If a centrifuge is selected in the overview table, you can click on "[History](#)" to call up an overview of all changes made to the device dataset up to the present time.



In the dataset history screen the time and date of the change, by whom the change was made and what change was made to the dataset is listed for all changes. In this screen you can also print and save the displayed information.

5.2. User management

The figure below shows the user management screen. This screen contains all of the settings for management of the registered users for centrifuge operation and access to the Centri-Log Plus software.

The screenshot shows the 'User management' window. At the top, there is a table with two columns: 'Last name' and 'First name'. The table contains five rows of user data. Below the table, there is a checkbox for 'Automatically synchronize user data with import file' and fields for 'Import file' and 'Last import'. To the right of the table, there are buttons for 'Export', 'Import', and 'Barcodes'. Below the table, there are two tabs: 'Centrifuge operation' and 'PC operation'. The 'Centrifuge operation' tab is selected, showing fields for 'Last name', 'First name', 'User identification', 'User PIN', 'User barcode', and 'User access level'. To the right of these fields, there are buttons for 'New', 'Copy', 'Add', 'Discard', 'Delete', 'History', and 'Barcode'. At the bottom of the window, there are buttons for 'Help', 'Cancel', and 'Apply'.

Last name	First name
Administrator	System
Bilson	Ben
Carter	Carol
Dorman	Dave
Estral	Ellen

☐ Automatically synchronize user data with import file

Import file:

Last import:

Centrifuge operation | PC operation

Last name: First name:

☒ Activate user centrifuge access

User identification: User PIN:

User barcode: User access level:

Buttons: Export, Import, Barcodes, New, Copy, Add, Discard, Delete, History, Barcode, Help, Cancel, Apply

A table showing the users currently logged in is displayed in the top section of the screen. The buttons for handling the entire data inventory are provided on the right in this screen. The display area for automatic import of user data is given beneath the table.

The information for the selected entry in the table is displayed in the center of the screen. User information can also be edited here. Two views are provided for the editing area. The first view shows all the information required for operation of the centrifuge. The second view shows the data required for operating the PC. The buttons for editing the displayed dataset are located to the right of the display area.

The bottom area of this screen is reserved for the general buttons for calling the Help function and for closing the screen. A copy of the data from the database is always processed when the management screen is

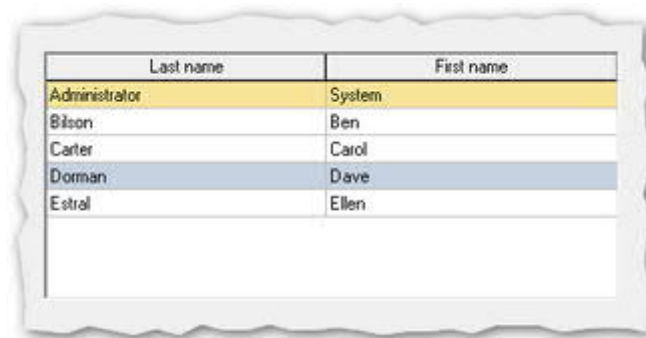
opened. The data for the copy is canceled when you click "Cancel". When you click "Apply" the contents of the database are updated with the changed data of the copy.

5.2.1. User overview table

All of the managed users are listed in the overview table. Only selected information available for a user is displayed in this table. The following data is displayed in the table:

- First name of the user
- Last name of the user

Highlighting is done in the overview table using two different colors.



Last name	First name
Administrator	System
Bilson	Ben
Carter	Carol
Dorman	Dave
Estrel	Ellen

The line in the table highlighted in yellow shows the currently selected dataset. This information is displayed in the user data editing area of the screen.

All rows in the table highlighted in blue indicate users with access to the Centri-Log Plus software. More information about this is given in the section user data editing area.

Three buttons are provided next to the table containing the device data for editing the entire data inventory for the device data. The following functions are available:

- | | |
|----------|--|
| Export | Click this button to export the entries in the user table to a CSV file. This export is limited to the information required for operation of the centrifuge. Security considerations preclude the export of access data for the Centri-Log Plus software, or of information about the user level or PIN. |
| Import | Click this button to import the user data for an existing Heranet or Centri-Log installation. This button is also used to initiate automatic import of user data. More information about this is given in the section "Importing user data". |
| Barcodes | This button opens a screen for creating barcodes for all persons in the user table. More information about this function is given in the section "Barcodes for all datasets". |

5.2.1.1. Importing user data

The button for importing user data has two functions. If the user table is completely empty, importing of existing user data from a Heranet or Centri-Log installation can be performed using the table. If the user table already contains data, the import function allows for adding of users from a CSV file. The file structure must match the structure of the export file.

If the software imports and integrates the data from the import file into the user table, the data is synchronized. Users not yet listed in the user table are added at that time. If a user from the user table is not listed in the import file, this user is removed from the user table. As with the export, importing from a CSV file only involves the information required for operating the centrifuge. Users with access to the Centri-Log Plus software are not removed from the user table, even if they are not included in the import file.

If the import has been performed successfully, the information about the import is displayed beneath the overview table.



The date and time of the last data import is indicated here, along with the name of the import file. Automatic data import can still be activated here. If this option is activated synchronization is carried out as soon as the software is started and every midnight. This function makes it possible to centrally manage the user table without using the function within the Centri-Log software each time a change occurs.

5.2.2. User data editing area

Two different views are provided for the saved data in the user data editing area. The first view displays the information required for centrifuge operation. In the second view the software shows the data saved for using the PC. A user does not necessarily have to have privileges for operating the centrifuge and access to the Centri-Log Plus software. Both of these tasks can be assigned separately from one another.

If a change is made in the input fields, this change is added to the temporary data inventory as soon as a different dataset is to be displayed, or when the window is closed. This basically means that changes do not have to be additionally confirmed. It is sufficient to simply select a different dataset in the overview table, or to call up the function for creating a further dataset.

The buttons in this area of the screen enable the following functions for processing user data:

Create a new dataset for a user

To create a new dataset click the button "New". The mark for the active dataset is removed from the overview table and the input fields cleared. Once you have entered all required information for the new dataset, confirm your input and add this information to the data inventory by clicking "Add".

Copying a dataset for a user

If a data set is not to be created completely from scratch, a copy of the displayed data set can be created by pressing the "Copy" button. Since the data in the editing area does not change as a result of the copy process, the only indication of this is that the selection for the active record has been removed from the summary table. After the necessary changes have been made, the record can be added to the database by clicking the "Add" button. To cancel the process, use the "Discard" button. The record will then not be added to the database and the previously edited record is displayed again.

Delete the displayed dataset for the user

To remove the dataset being displayed from the active data inventory, click on the button "Delete". If the delete function is called up, this process must subsequently be confirmed. Datasets are not actually deleted from the database, but rather are merely marked as canceled. This enables references stored for this dataset to continue to be valid.

Show the dataset history for the displayed user

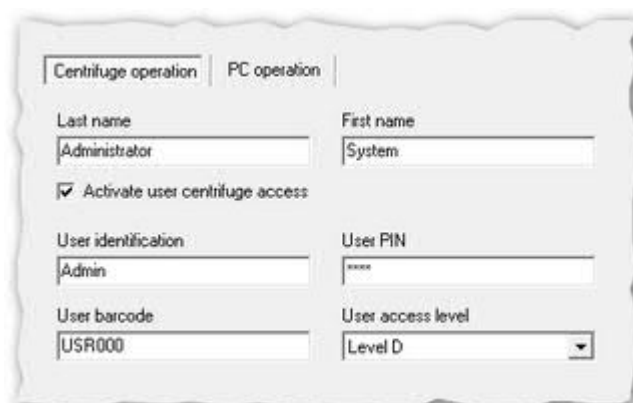
Click on the "History" button to call up information on all changes made to the dataset being displayed up to the present time. More information about this is given in the section "Display dataset history".

Generate a barcode for the displayed user

You can generate the barcode for the dataset being displayed by clicking the button "Barcode". For more information refer to the section "Barcode for a single dataset".

5.2.2.1. Data for centrifuge operation

The figure below shows the section of the editing screen for a user authorized to operate the centrifuge. The general information about the first name and last name of the user is identical for both screen views.



The screenshot shows a web-based form with two tabs: "Centrifuge operation" (selected) and "PC operation". The form contains the following fields and controls:

- Last name:** Text input field containing "Administrator".
- First name:** Text input field containing "System".
- Activate user centrifuge access:** A checked checkbox.
- User identification:** Text input field containing "Admin".
- User PIN:** Text input field containing "****".
- User barcode:** Text input field containing "USR000".
- User access level:** A dropdown menu currently showing "Level D".

A selection field for authorizing use of the centrifuge is given beneath the input fields for the user's first and last name. This selection field must first be activated in order to access the elements beneath the field in the screen. This ensures that the user data is made available to the managed centrifuges at the next opportunity.

The following user data is required to operate the centrifuge:

User identification	The user ID is the user's name that is used at the respective centrifuge. As the display of the name on the centrifuge GUI is limited in length, it is usually not possible to use the entire combination of first name and last name here.						
User PIN	The user can log in at the centrifuge using the PIN. This PIN is also required when result codes are imported to the centrifuge and when authentication is required by entering the PIN. When a new user is created, the standard PIN "0000" is initially set.						
User barcode	Within the GMP process the user identifies him/herself at the centrifuge by reading in a barcode. The contents behind the barcode do not have to correspond to the user ID and can be defined separately.						
User access level	Each user is assigned a user level at the centrifuge. This user level is applied to determine which functions are available to that particular user at the centrifuge. The following distinctions are required for centrifuge operation using Centri-Log Plus: <table><tr><td>Level A</td><td>The user may use the centrifuge only with the set program. Selection of a different program is prohibited.</td></tr><tr><td>Level B</td><td>The user can choose one of the saved programs at the centrifuge. The user may not, however, perform any runs with freely definable setpoints.</td></tr><tr><td>Level C&D</td><td>The user can log in as an administrator at the centrifuge and perform any centrifuge runs.</td></tr></table>	Level A	The user may use the centrifuge only with the set program. Selection of a different program is prohibited.	Level B	The user can choose one of the saved programs at the centrifuge. The user may not, however, perform any runs with freely definable setpoints.	Level C&D	The user can log in as an administrator at the centrifuge and perform any centrifuge runs.
Level A	The user may use the centrifuge only with the set program. Selection of a different program is prohibited.						
Level B	The user can choose one of the saved programs at the centrifuge. The user may not, however, perform any runs with freely definable setpoints.						
Level C&D	The user can log in as an administrator at the centrifuge and perform any centrifuge runs.						

5.2.2.2. Data for PC operation

The figure below shows the section of the editing area for a user with access to Centri-Log Plus software. The general information about the first name and last name of the user is identical for both screen views.

Centrifuge operation | **PC operation**

Last name: Administrator First name: System

☒ Activate PC operation for user

Identification: Admin Password / Repeat: [masked]

☐ User must change password at next login

Assigned user privileges:

- ☒ Start centrifuge communication
- ☒ Stop centrifuge communication
- ☒ Access to device management features
- ☒ Access to user management features
- ☒ Access to centrifuge program management features
- ☒ Access to result code management features
- ☒ Set up/delete a workspace
- ☒ Change the configuration for system settings

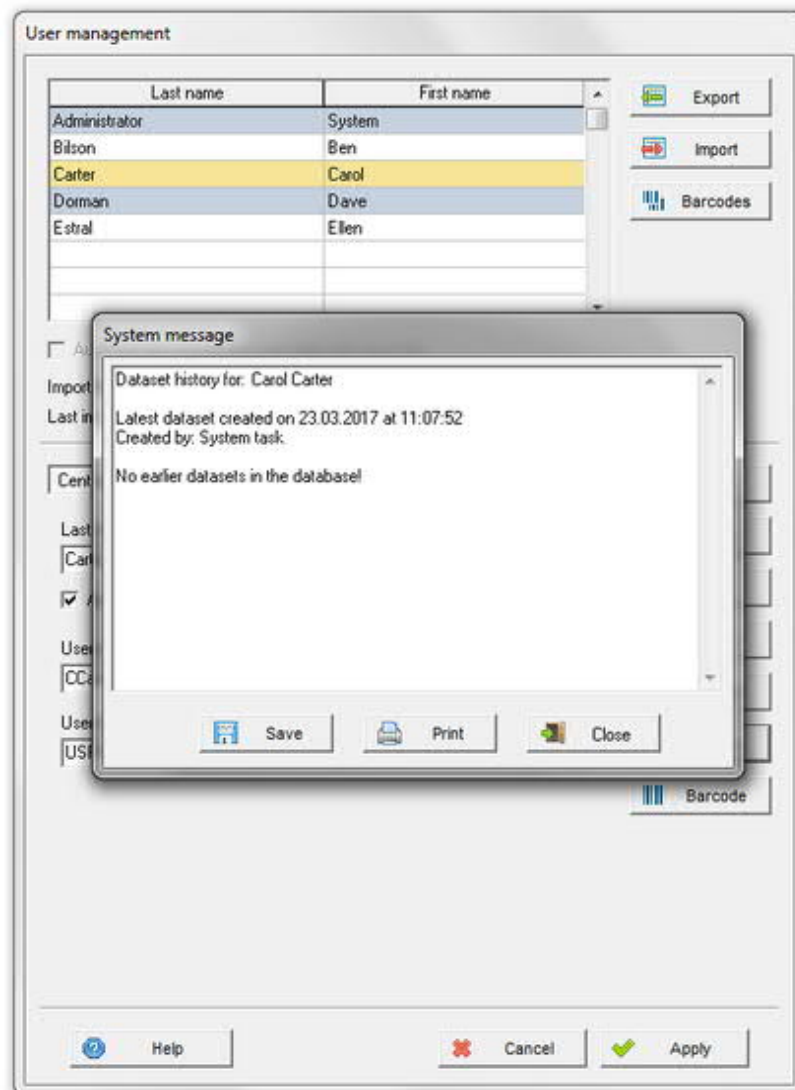
A selection field for authorizing access to the Centri-Log Plus software is given beneath the input fields for first name and last name. This selection field must first be activated in order to access the elements beneath the field in the screen.

The following user information is required for using the Centri-Log Plus software:

Identification	The user ID is the name he/she uses for logging in to the software. This ID does not necessarily have to consist of a combination of first name and last name. It can be freely specified here.
Password	The user password must be entered here. The password must be repeated to confirm this entry. The standard password "password" is initially set when a new user is added. This password should be changed to a personal password as soon as possible.
Changing the password	Here, you can also request that the password be changed on the next log-in. This is especially critical if the standard password has not been changed.
Assigned user privileges	The privileges assigned to a user within the Centri-Log Plus software are defined in this table. The varying functions are listed here, allowing a fine gradation of user privileges to be defined.

5.2.2.3. Display of dataset history

Every change to datasets in user management is saved as a new entry in the database. This enables older data to be retained and all changes can be clearly tracked. When a user is selected in the overview table you can click the button "[History](#)" to obtain an overview of the changes made to date on that particular dataset.



In the dataset history screen the time and date of the change, by whom the change was made and what change was made to the dataset is listed for all changes. In this screen you can also print and save the displayed information.

5.2.3. Unlock user access

If access has been blocked by the Centri-Log Plus software administrator for a user after unsuccessful log-in attempts, this can result in the user being blocked. The affected user is informed of this the next time he/she attempts to log in. A registered administrator must unlock access to enable the user to access the software again.

If the blocked user is selected in the user management table, this access lock is displayed in the data screen for PC operation. The button for unlocking user access is also provided in this screen.

User management

Last name	First name
Administrator	System
Bilson	Ben
Carter	Carol
Dorman	Dave
Estral	Ellen

☐ Automatically synchronize user data with import file

Import file:

Last import:

Centrifuge operation | **PC operation**

Last name: First name:

☒ Activate PC operation for user

Due to several unsuccessful logon attempts, this user is temporally blocked from using the software.

Press the "Unlock user access" button to give the user access the software.

Blocking of a user is canceled directly by clicking the button "Unlock user access". A password does not need to be entered here, as the administrator will have already logged in to the software.

5.3. Program data management

The figure below shows the screen for program data management. This screen contains all of the settings for managing centrifuge programs and the monitoring limits for the reported set values.

Barcode	Description	Centrifuge
PRG001	Centrifuge test application #1	Cryofuge 6000i
PRG002	Centrifuge test application #2	Cryofuge 6000i
PRG003	Centrifuge test application #3	RC 3BP+
PRG004	Centrifuge test application #4	Cryofuge 8
PRG005	Centrifuge test application #5	Cryofuge 8
PRG006	Centrifuge test application #6	Cryofuge 8
PRG007	Centrifuge test application #7	Cryofuge 16
PRG008	Centrifuge test application #8	Lynx 6000

Description: Centrifuge test application #5

Centrifuge: Cryofuge 8 Emulation: Polaris Rotor: HAEMAFlex 8 Bucket: Single Bag

Barcode: PRG005 Name: Test 5 Color code: Syringe Purple

Set values

Acceleration profile: 7
Deceleration profile: 4
Speed: 1500
Runtime: 00:08:00
Temperature: 20
☐ Brake-Off: 0

Acceptance criteria

Allowed deviation in runtime
Positive: 60 s
Negative: 30 s

A table with an overview of the product instructions stored in the system is displayed in the top section of the screen. The buttons for handling the entire data inventory are provided on the right in this screen.

The information for the selected entry in the table is displayed in the center of the screen. Information on the selected program and the limit values can be edited here. The buttons for editing the displayed dataset are located to the right of the display area.

The bottom area of this screen is reserved for the general buttons for calling the Help function and for closing the screen. A copy of the data from the database is always processed when the management screen is

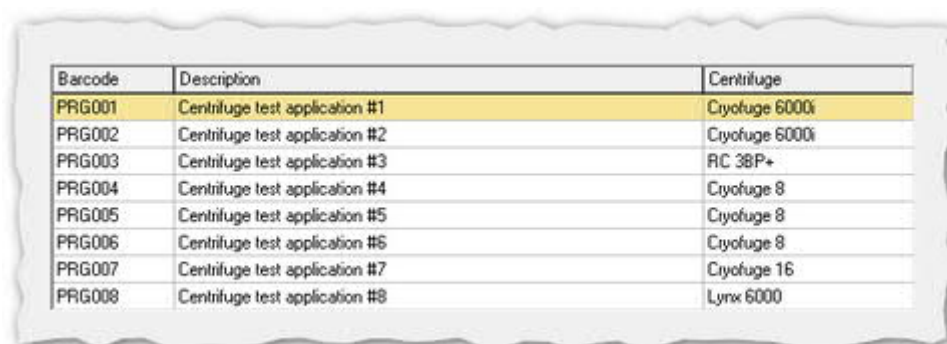
opened. The data for the copy is canceled when you click "Cancel". When you click "Apply" the contents of the database are updated with the changed data of the copy.

5.3.1. Program overview table

All product instructions are listed in the overview table. Only a selection of the information available for the product instructions is displayed here however. The following data is displayed in the table:

- The barcode for the product instruction, as it is to be read in at the centrifuge
- A description for the product instructions, along with an explanation
- The centrifuge type for which the product instructions have been defined

Color coding is also used in the overview table.



Barcode	Description	Centrifuge
PRG001	Centrifuge test application #1	Cytofuge 6000i
PRG002	Centrifuge test application #2	Cytofuge 6000i
PRG003	Centrifuge test application #3	RC 38P+
PRG004	Centrifuge test application #4	Cytofuge 8
PRG005	Centrifuge test application #5	Cytofuge 8
PRG006	Centrifuge test application #6	Cytofuge 8
PRG007	Centrifuge test application #7	Cytofuge 16
PRG008	Centrifuge test application #8	Lynx 6000

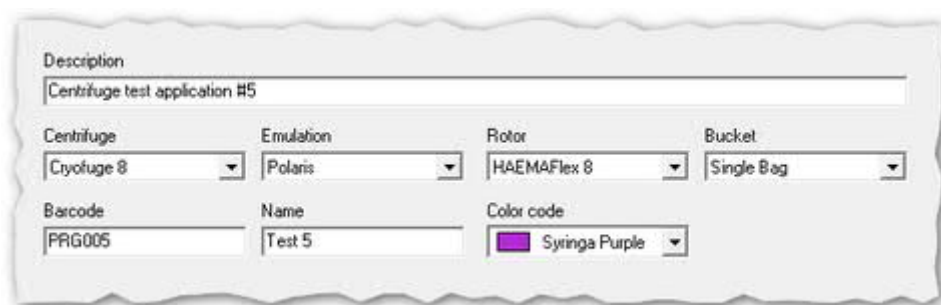
The line in the table highlighted in yellow shows the currently selected dataset. This information is displayed in the "Program data editing area" of the screen.

Besides the table containing the product instructions, two buttons for editing the entire data inventory are also provided in this section. The following functions are available:

- Import** This button is used to import the product instructions for an existing Heranet or Centri-Log installation. This enables a list of product instructions for Centri-Log Plus to be added without having to enter all of the information separately. This function is only available however when the product instruction table is still empty, as no automatic comparison takes place between existing and imported data.
- Barcodes** This button opens a screen for creating the barcodes for all entries in the product instruction table. More information about this function is given in the section "Barcodes for all datasets".

5.3.2. Program data editing area

A number of input fields are given in the program data editing area beneath the overview table. The basic properties for the processed program are defined by the information entered in these fields.



The screenshot shows a form titled 'Description' with a text input field containing 'Centrifuge test application #5'. Below this are several dropdown menus: 'Centrifuge' (set to 'Cytofuge 8'), 'Emulation' (set to 'Polaris'), 'Rotor' (set to 'HAEMAFlex 8'), and 'Bucket' (set to 'Single Bag'). At the bottom, there are three more fields: 'Barcode' (text input 'PRG005'), 'Name' (text input 'Test 5'), and 'Color code' (a color selection dropdown showing a purple swatch and the text 'Syringa Purple').

You can make the following input here:

Description	A description for the processed program is entered in this field. The text entered here will not be used at the centrifuge, but rather is used only for unambiguous identification within Centri-Log Plus.
Centrifuge	In this field you can define the type of centrifuge for which the program is defined. Any type of centrifuge supported by Centri-Log Plus can be entered here.
Emulation	If the selected centrifuge offers the option for selecting a profile set emulation, that same setting can also be made here.
Rotor	Every program that is created must also be linked to a certain type of rotor. The rotor selection list will be adapted automatically to the available rotor when the centrifuge type is changed.
Bucket	In addition to the rotor type, the type of bucket to be used must also be specified. The selection list for buckets adapts automatically to the specified type of rotor.
Barcode	Enter the barcode in this field as it is to be read in at the centrifuge. The length of this barcode is limited to 16 characters.
Name	The name is a short text for identification of the program at the centrifuge. This text is displayed there in the program list and also appears on the main screen when the program is loaded.
Color code	The color code for the program can be selected in this field. This color coding will then be applied at the centrifuge for identification of the program.

If a change is made in the input fields, this change is added to the temporary data inventory as soon as a different dataset is to be displayed, or when the window is closed. This basically means that changes do not have to be additionally confirmed. It is sufficient to simply select a different dataset in the overview table, or to call up the function for creating a further dataset.

The buttons in this section of the screen enable the following functions to be performed for editing of the program data:

Create a new dataset for a product instruction

To create a new dataset click the button "[New](#)". The mark for the active dataset is removed from the overview table and the input fields cleared. Once you have entered all required information for the new dataset, confirm your input and add this information to the data inventory by clicking "[Add](#)".

Copying a dataset for a product instruction

If a data set is not to be created completely from scratch, a copy of the displayed data set can be created by pressing the "[Copy](#)" button. Since the data in the editing area does not change as a result of the copy process, the only indication of this is that the selection for the active record has been removed from the summary table. After the necessary changes have been made, the record can be added to the database by clicking the "[Add](#)" button. To cancel the process, use the "[Discard](#)" button. The record will then not be added to the database and the previously edited record is displayed again.

Delete the displayed dataset for the product instruction

To remove the dataset being displayed from the active data inventory, click on the button "[Delete](#)". If the delete function is called up, this process must subsequently be confirmed. Datasets are not actually deleted from the database, but rather are merely marked as canceled. This enables references stored for this dataset to continue to be valid.

Show the dataset history for the displayed product instruction

Click on the "[History](#)" button to call up information on all changes made to the dataset being displayed up to the present time. More information about this is given in the section "Display dataset history".

Create a barcode for the displayed product instruction

You can generate the barcode for the dataset being displayed by clicking the button "[Barcode](#)". For more information refer to the section "Barcode for a single dataset".

5.3.2.1. Set value entry area

The input area for the set values is given in the left half of the screen below the basic properties of the processed program. This input area adapts to the selected type of centrifuge based on the available set values.

The figure below shows a selection of the different presentation formats for entering set values.

The screenshot shows a 'Set values' window for the Cryofuge 6000i. It contains the following fields:

Parameter	Value
Acceleration profile	8
Deceleration profile	7
Speed	1100
Runtime	00:02:00
Delayed start	0
Temperature	20
Delta-Temperature	0

Cryofuge 6000i

The image at the left shows the input range for set values for the centrifuge type Cryofuge 6000i. This type of set value input provides the following properties:

- Selection of speed or RCF value.
- No alternative for run time.
- Additional option for entering a delayed start.
- Additional option for entering the Delta temperature.

The screenshot shows a 'Set values' window for the Cryofuge 8 (normal program). It contains the following fields:

Parameter	Value
Acceleration profile	7
Deceleration profile	4
Speed	1500
Runtime	00:08:00
at start	
Temperature	20
Brake-Off	0

At the bottom of the window is a button labeled 'Create steprun'.

Cryofuge 8 (normal program)

Compared to the Cryofuge 6000i, the following different input can be made for the Cryofuge 8:

- If a runtime is selected, the options "at start" and "at speed" will then be available.
- An ACE value can also be specified instead of the runtime.
- There is no delayed start or Delta temperature for this type of centrifuge.
- Additional option for entering a brake-off speed.
- Additional option for defining a StepRun.

Cryofuge 8 (StepRun)

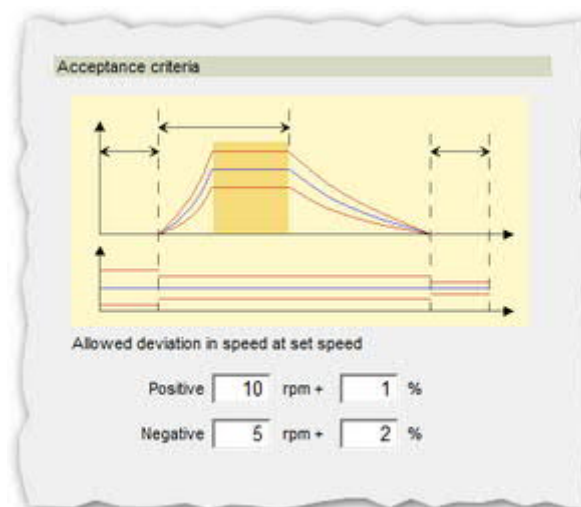
If a StepRun is specified for the centrifuge, the presentation of the input for set values will be changed. This presentation also changes as a function of the displayed step of the StepRun.

- The buttons for navigating through the steps and for adding and deleting of steps are displayed at the bottom of the input area.
- The brake-off speed option is not given for StepRuns.
- Certain input is inhibited, depending on the step that is currently being displayed. For example, in the first step it is not possible to specify a deceleration profile. In subsequent steps it is not possible, for example, to select between Speed and the RCF value, or between Runtime and ACE value.

Note: If the centrifuge type, rotor type or bucket type is changed after set values have been entered, the set values may be adjusted automatically. This always takes place if the set values lie outside the limits for the selected combination of centrifuge, rotor and bucket. The user is not notified of this in any additional message. You should therefore always first specify the centrifuge, rotor and bucket type.

5.3.2.2. Specifying limits

The input area for the monitoring limits is to the right of the centrifuge data. Limits are used by Centri-Log Plus to assess the centrifugation run. The depicted graphic shows an example of a centrifugation process. Moving the mouse cursor across the graphic emphasizes the respective part of the process with a color change. Click with the left mouse button to select the process step and the associated limit values, which are then depicted below the graphic.



Monitored centrifugation can be divided into roughly three phases:

Phase 1: Delay between closing of the lid and start of centrifugation.

In addition to the max. time you can also enter the temperature limits to be monitored. The upper and lower limit can be defined for the temperature and later the speed and runtime.

Phase 2: Centrifugation

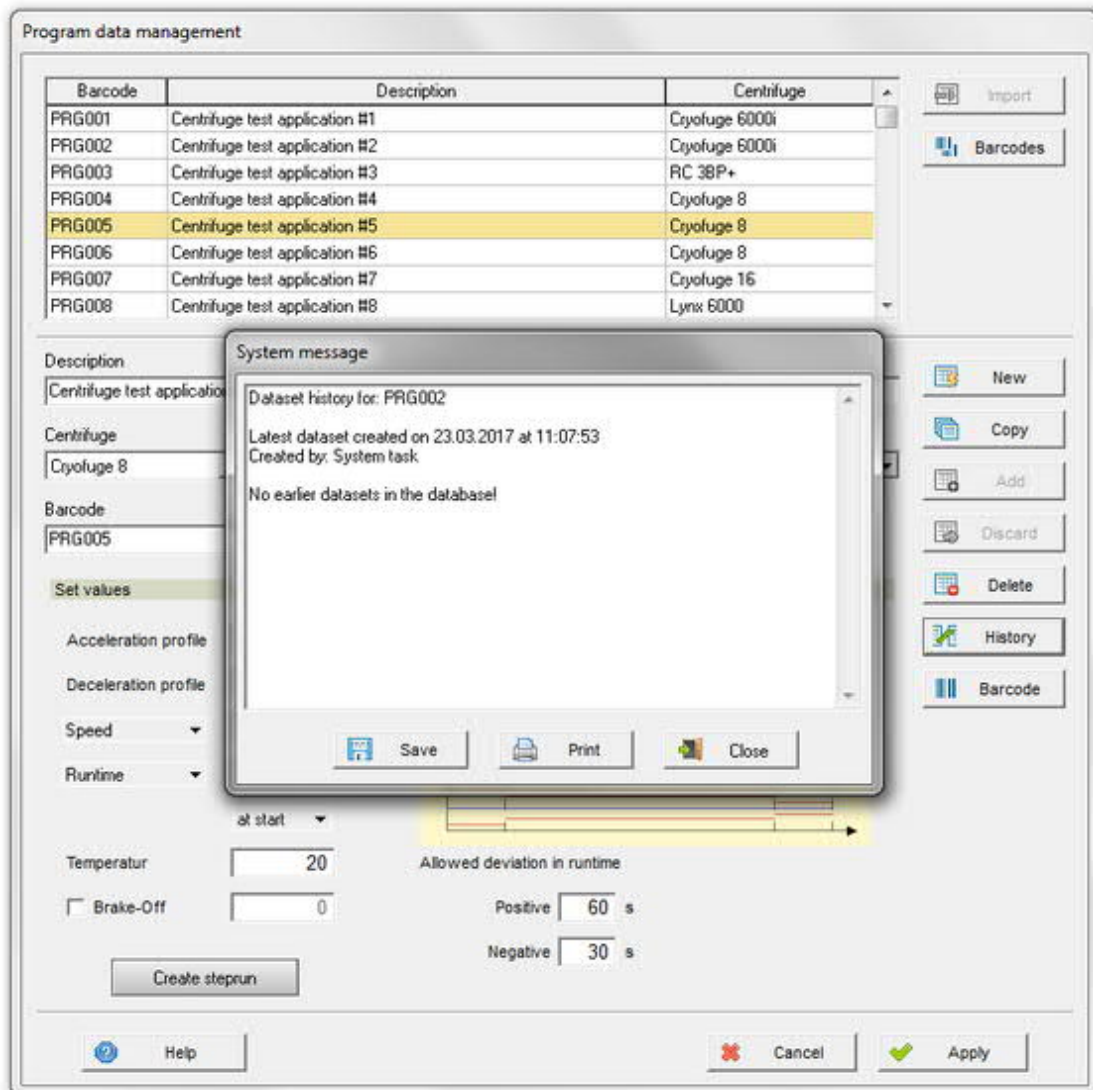
In addition to temperature limits it is also possible to indicate runtime control and speed limits for the centrifugation process. The input for the speed is subdivided into acceleration, final speed, and braking phase.

Phase 3: Delay after centrifugation end until opening lid

Phase 3 has the same structure concerning the required inputs as phase 1. Enter the limits for the delay and temperature.

5.3.3. Display of dataset history

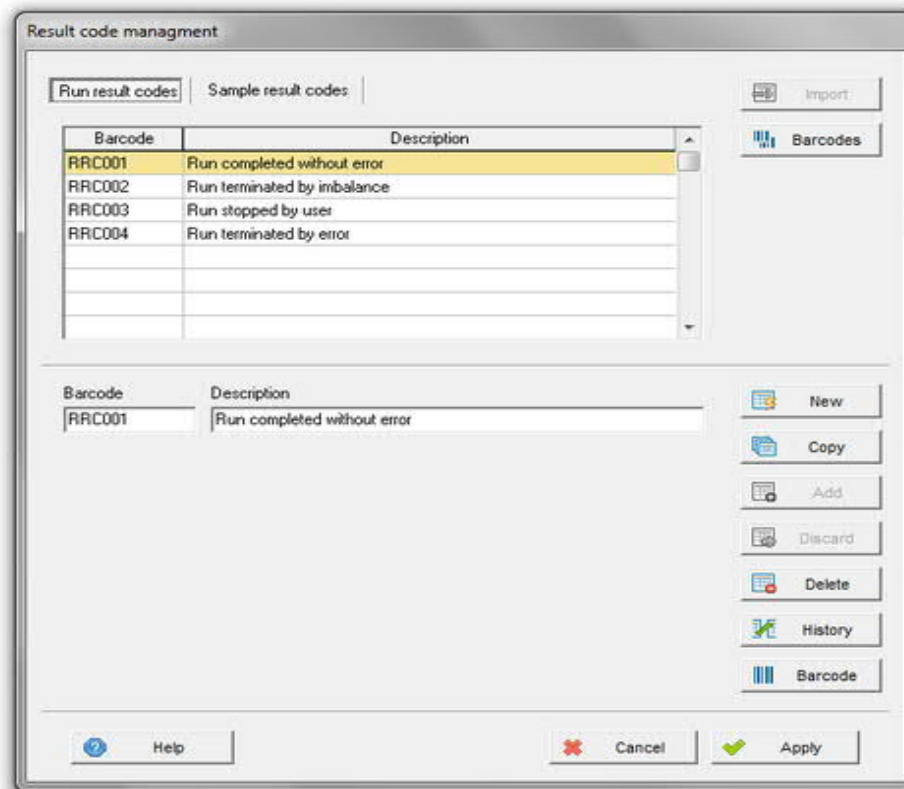
Any change to datasets for product management will be saved as a new entry in the database. This enables older data to be retained and all changes can be clearly tracked. When a user is selected in the overview table you can click the button "History" to obtain an overview of the changes made to date on that particular dataset.



In the dataset history screen the time and date of the change, by whom the change was made and what change was made to the dataset is listed for all changes. In this screen you can also print and save the displayed information.

5.4. Result code management

The figure below shows the screen for results code management. This screen contains all of the settings for managing the results codes for centrifugation runs and the samples that are processed.



A table containing an overview of the managed results codes is displayed in the top section of the screen. This table can be switched to show the results of the runs or the sample results. The buttons for handling the entire data inventory are provided on the right in this screen.

The information for the selected entry in the table is displayed in the center of the screen. The data for the selected results code can also be edited here. The buttons for editing the displayed dataset are located to the right of the display area.

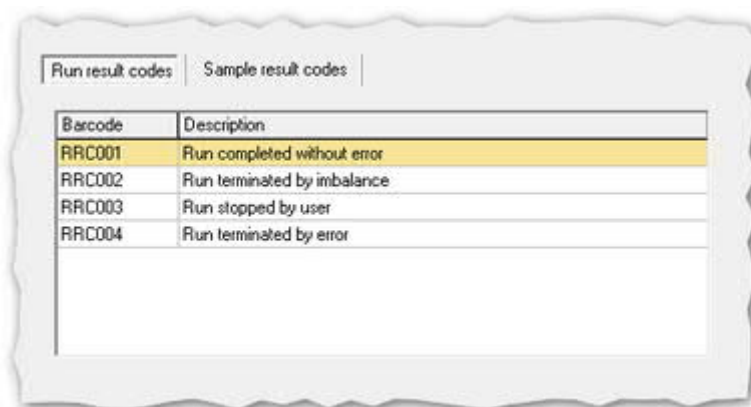
The bottom area of this screen is reserved for the general buttons for calling the Help function and for closing the screen. A copy of the data from the database is always processed when the management screen is opened. The data for the copy is canceled when you click "Cancel". When you click "Apply" the contents of the database are updated with the changed data of the copy.

5.4.1. Results code overview tables

All of the results codes for runs and samples are listed in the overview tables. Only certain information available for the result codes is displayed, however. The following data is displayed in the table:

- The barcode for the results code, as it is to be read in at the centrifuge
- A description for the result code, with an explanation

The buttons above the table can be used to switch between the display for run result codes and sample result codes. Color coding is also used in the overview table.



Run result codes	Sample result codes
Barcode	Description
RRC001	Run completed without error
RRC002	Run terminated by imbalance
RRC003	Run stopped by user
RRC004	Run terminated by error

The line in the table highlighted in yellow shows the currently selected dataset. This information is displayed in the result code editing area of the screens.

Two buttons for editing the entire data inventory for the run or sample results data are provided to the right of the table with the result codes. The following functions are available:

- Import** This button is used to import the results data for an existing Heranet or Centri-Log installation. This enables a list of results data for Centri-Log Plus to be added without having to enter all of the information separately. This function is only available, however, when the results table is still empty, as there is no automatic comparison between existing and imported data.
- Barcodes** This button opens a screen for creating barcodes for all of the entries in the active results table. More information about this function is given in the section "Barcodes for all datasets".

5.4.2. Result code editing area

There are only two input fields in the editing area for result codes. The figure below shows the corresponding section of the management screen:



The image shows a screenshot of a software interface for editing result codes. It features two input fields side-by-side. The first field is labeled 'Barcode' and contains the text 'BRC001'. The second field is labeled 'Description' and contains the text 'Separation successful'. The fields are enclosed in a light gray rounded rectangle with a subtle drop shadow.

You can make the following input here:

- | | |
|-------------|--|
| Barcode | Enter the barcode in this field as it is to be read in at the centrifuge. The length of this barcode is limited to 16 characters. |
| Description | Enter a description for the result code to be edited. The text entered here will not be used at the centrifuge, but rather is used only for unambiguous identification within Centri-Log Plus. |

If a change is made in the input fields, this change is added to the temporary data inventory as soon as a different dataset is to be displayed, or when the window is closed. This basically means that changes do not have to be additionally confirmed. It is sufficient to simply select a different dataset in the overview table, or to call up the function for creating a further dataset.

The buttons in this section of the screen enable the following functions to be performed for editing of the results data:

Creating a new dataset for run results or sample results

To create a new dataset click the button "[New](#)". The mark for the active dataset is removed from the overview table and the input fields cleared. Once you have entered all required information for the new dataset, confirm your input and add this information to the data inventory by clicking "[Add](#)".

Copying a dataset for run results or sample results

If a data set is not to be created completely from scratch, a copy of the displayed data set can be created by pressing the "[Copy](#)" button. Since the data in the editing area does not change as a result of the copy process, the only indication of this is that the selection for the active record has been removed from the summary table. After the necessary changes have been made, the record can be added to the database by clicking the "[Add](#)" button. To cancel the process, use the "[Discard](#)" button. The record will then not be added to the database and the previously edited record is displayed again.

Delete the displayed dataset for the runs results or sample results

To remove the dataset being displayed from the active data inventory, click on the button "[Delete](#)". If the delete function is called up, this process must subsequently be confirmed. Datasets are not actually deleted from the database, but rather are merely marked as canceled. This enables references stored for this dataset to continue to be valid.

Show the dataset history for the displayed runs results or sample results

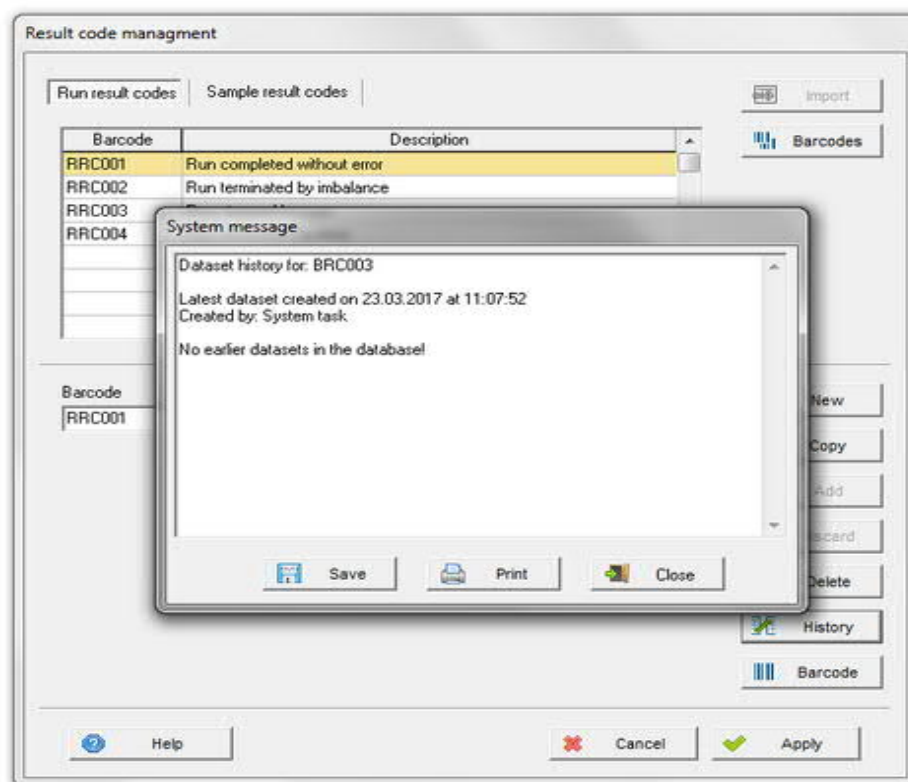
Click on the "[History](#)" button to call up information on all changes made to the dataset being displayed up to the present time. More information about this is given in the section "Display dataset history".

Create a barcode for the displayed run results or sample results

By clicking the "[Barcode](#)" button you can create a barcode for the displayed dataset. For more information refer to the section "Barcode for a single dataset".

5.4.2.1. Display of dataset history

Any change to the datasets for results code management will be saved as a new entry in the database. This enables older data to be retained and all changes can be clearly tracked. If a barcode is selected in the overview table you can use the button "[History](#)" to call up an overview of changes made to the dataset to date.



In the dataset history screen the time and date of the change, by whom the change was made and what change was made to the dataset is listed for all changes. In this screen you can also print and save the displayed information.

5.5. Barcode generation

Creating of barcodes can be called up from the configuration screen for special barcodes, from user management, from program data management and from results code management. The layout of the opened window depends on whether the barcode is to be generated for one record or for all records.

5.5.1. Barcodes for a single record

If creating of barcodes is requested for a dataset, the following screen is opened when you click the button "Barcode":



The upper window area depicts the generated barcode. The alternative text and showing the actual barcode can be enabled by ticking the corresponding checkboxes. If necessary, the alternative text can be edited. Use the "Code type" selection box to select the type of barcode to be generated.

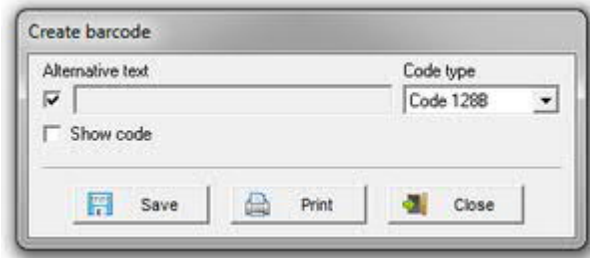
Note: Some barcode types may restrict the type of characters you can use. For example, some code types can only depict letters and numbers. An error message is displayed if the desired barcode cannot be generated.

Click "Save" to save the generated barcode as a *.bmp file. This means the barcode is available for additional processing.

Click "Print" to print out the generated barcode.

5.5.2. Barcodes for all records

If creating of barcodes is requested for all datasets, the barcode screen will be opened in the view for printing of all barcodes. The following figure depicts this window:



As with generating barcodes for an individual record, it is possible to enable showing the alternative text and the plain text of the code as well. However, this window does not provide an option for indicating an alternative text since changes in this window would affect all barcodes. Use the "[Code type](#)" selection box to select the type of barcode to be generated.

The two buttons "[Save](#)" and "[Print](#)" have the same functions as with the individual barcodes.

An error message is displayed during saving or printing if one of the records cannot be converted to the desired code type and that particular record is skipped.

6. Data evaluation

All of the data collected for a run is saved by the Centri-Log Plus software in a dedicated database. This enables the data to be evaluated without having to first transfer it to the central database. Data evaluation is divided into two separate areas. Evaluation of run data and evaluation of sample data.

6.1. Run data evaluation

The figure below shows the screen for data evaluation for run data. This screen is divided into three areas. In the top section of the screen you can specify the search period for run data. The center section of the screen contains input fields for filtering the run data that is obtained. A table containing the search results is displayed toward the bottom of the screen. The buttons for further editing of the data are also located here.

Run data evaluation

Run data | Sample data

Search period: Start 01.03.2017 End 31.03.2017 Search

Filter settings for run data

Serial number <all> Program name <all> User identification <all> Run result code <all>

Centrifuge name <all> ☐ No run log created ☐ Run data not included in export ☐ With centrifuge errors

Search result for run data

ID	Date	Time	Centrifuge	Centrifuge	Program	User	Result code	Second result	Error
1	23.03.2017	13:24:13	45147821	Polaris 1	Test 4	BBilson	RRC002		F-13, F-15
2	23.03.2017	13:46:08	45147821	Polaris 1	Test 4	CCarter	RRC001		F-14
3	23.03.2017	14:22:03	45147821	Polaris 1	Test 4	BBilson	RRC001		F-14
4	23.03.2017	14:50:14	45147821	Polaris 1	Test 4	CCarter	RRC002		
5	23.03.2017	15:09:36	46215862	Polaris 2	Test 4	BBilson	RRC002		
6	23.03.2017	15:28:00	45147821	Polaris 1	Test 4	CCarter	RRC001		F-14
7	23.03.2017	15:59:04	46215862	Polaris 2	Test 4	BBilson	RRC002		F-14
8	23.03.2017	16:39:52	45147821	Polaris 1	Test 4	CCarter	RRC001		F-14
9	24.03.2017	10:29:42	45147821	Polaris 1	Test 4	BBilson	RRC001		
10	24.03.2017	10:48:10	46215862	Polaris 2	Test 4	CCarter	RRC001		F-14
11	24.03.2017	11:14:09	46215862	Polaris 2	Test 4	BBilson	RRC003		F-14
12	24.03.2017	11:40:25	45147821	Polaris 1	Test 4	CCarter	RRC004		F-14
13	24.03.2017	12:56:15	46215862	Polaris 2	Test 4	EEstrat	RRC002		F-14
14	24.03.2017	13:22:11	45147821	Polaris 1	Test 4	CCarter	RRC002		F-14

Save Print Import Export Information Protocol

Load processed samples

Help Close

Specifying the search period and executing the search

You can restrict the time period for a search of run data in the database. This is done by specifying a start date and end date for the search. By clicking on the calendar symbol you can call up a calendar to select these dates. You can then initiate the search of the database by clicking "[Search](#)". All of the datasets for the run data found are then displayed in the run data table at the completion of the search.

Filtering of run data

The run data that is obtained from the search can also be filtered after the search. Different filters are available for this in the center section of the screen. More information about filtering of run data is given in the section "Filtering of run data".

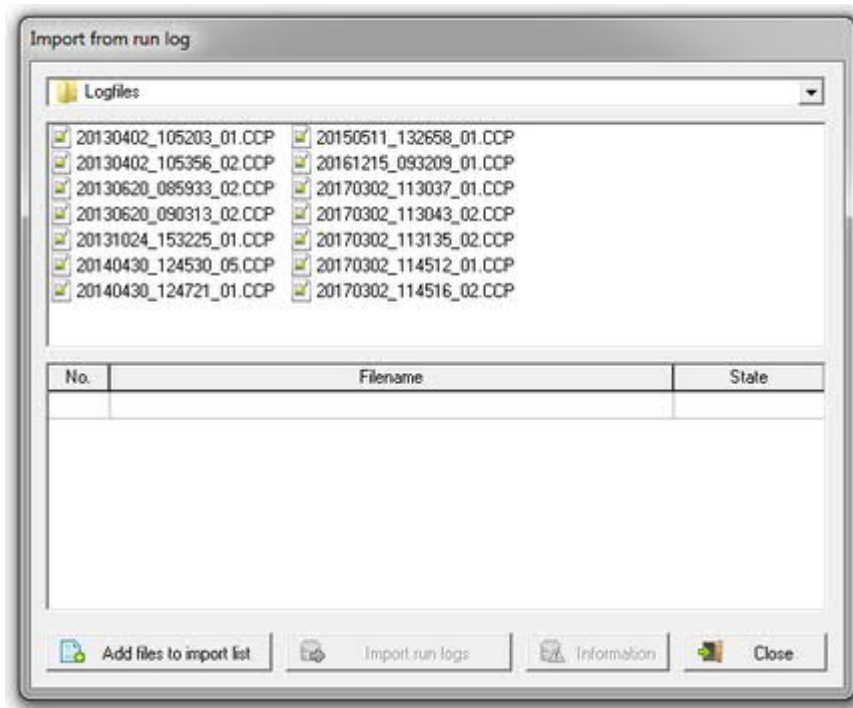
Buttons for processing of run data

Besides the table containing the run data, several buttons are also provided for editing the data inventory. The following functions are available here:

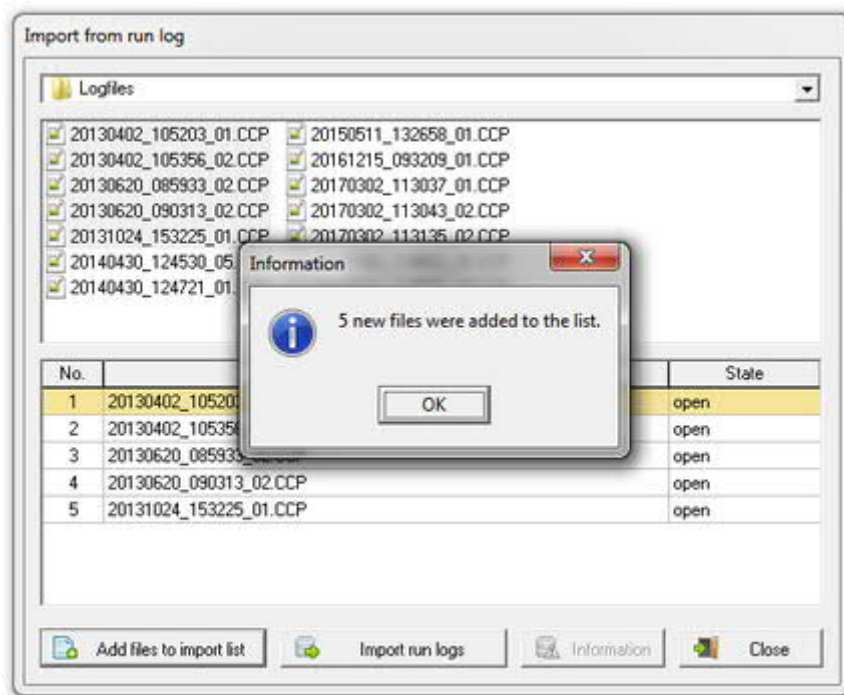
Save	Use this button to have the contents of the displayed table saved to a file. This function can be used for a subsequent manual evaluation of the data.
Print	Use this button to output the datasets in the displayed table to a printer.
Import	The Centri-Log Plus software has an import function for old run data records to enable data from Heranet and Centri-Log software protocols to be processed. More information about this is given in the section "Importing run data protocols".
Export	The Centri-Log Plus software can automatically write centrifugation data to an export file. This export file is used for transferring data to a higher-order data processing system. ("Settings for export files") Here, the software provides a button for manual exporting of run data.
Information	After selecting one entry in the run data table, this button will open an additional window to display the recorded information on the run. The speed/rcf data and the temperature will be shown together with all monitoring errors. More information on this feature can be found in section "Display of run data".
Protocol	If a print-out of a protocol is required for a run or group of runs, this can be initiated using this button. This print-out contains all of the information about the run performed and the processed samples on one page.
Result code	While the centrifuge is being unloaded, the employee operating the centrifuge can read in barcodes to assign status information to the run or to individual samples. ("Managing result codes") In this view, additional results information for the run can be saved as part of data evaluation. Refer to "Adding result information".

6.1.1. Import from run log

The Centri-Log Plus software can import run protocols in an ASCII if these have been generated by Heranet 3.x or Centri-Log 1.x. The following dialog window opens when you click the button "[Import](#)" in the screen for run evaluation:

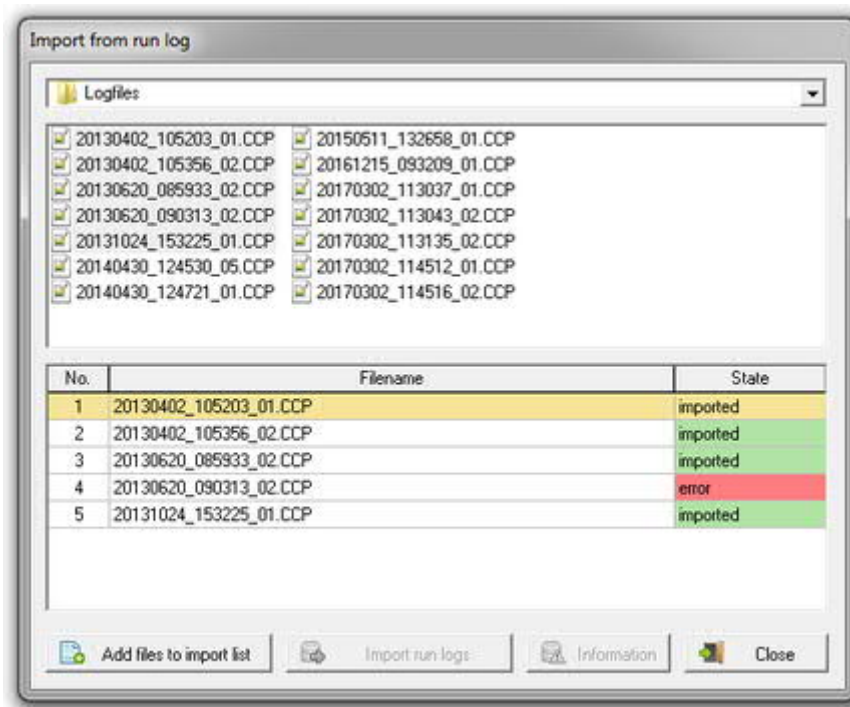


In the top section of the screen you can select the directory containing the log files. After this, all compatible log files in the selected directory will appear in the selection list. You can mark the files in this list that you wish to import. When you then click on "[Add files to import list](#)" the files will be selected for importing. The figure below shows this screen after adding five files:

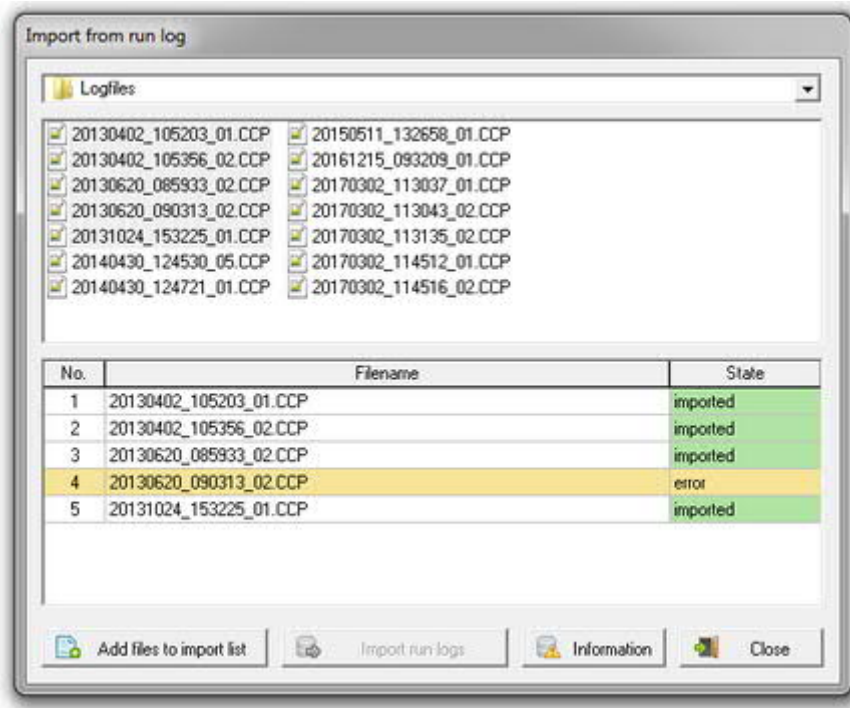


When you click the button the files in the import table will be listed in the lower section of the screen. A dialog window will inform you of how many files have been added to the list. The software automatically prevents the same file being added twice. Neither are any files added if they have already been imported by the software previously. This is why the number of files indicated in the dialog window may differ from the number of files selected.

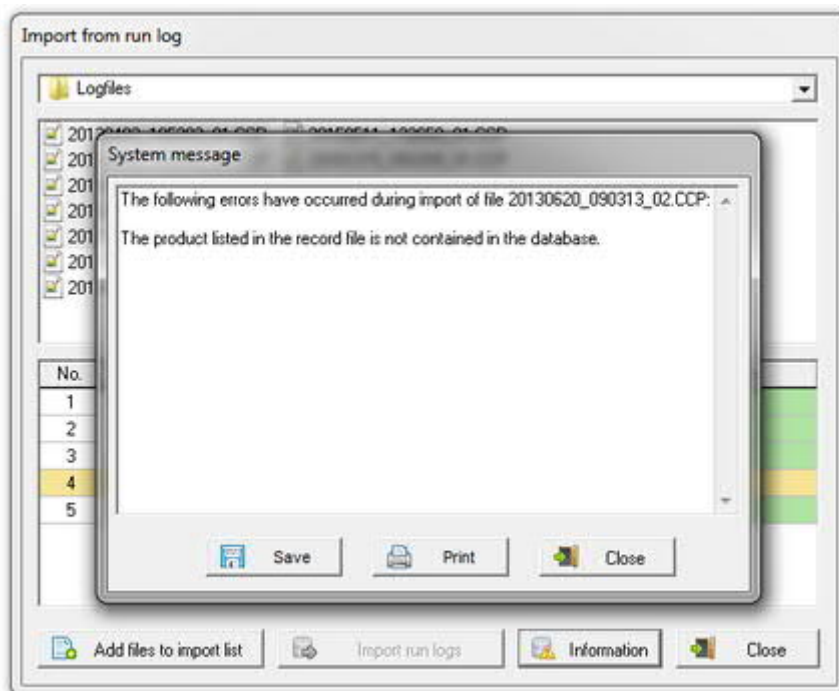
You can initiate the import by clicking "[Import run logs](#)" after you have selected of the files you wish to import. The progress of the import is indicated in the column "[State](#)". All properly imported files are highlighted in a green cell in the table. Cells highlighted in red indicate files with an import error. The figure below shows the results of the import for the selected sample files.



If a row of the table containing an error is selected, the status of the "[Information](#)" button will change. This button becomes active and enables you to call up additional information about the error(s) that occurred.



Clicking on the "Information" button opens an additional dialog window containing information about the errors detected. This information can be used to check and, where applicable, adapt the log files to obtain a successful import.



Note: The log files contain references to the user for loading and unloading of the centrifuge and to the product produced. It must be possible for these references to be evaluated by the import function in order for the log data to be successfully accepted in the data inventory. This requires that the corresponding users and product must exist in the data inventory. This can also be done by importing old Heranet or Centri-Log data inventories in the screens for user management or program data.

6.1.2. Filtering of run data

You can refine the obtained run data further using the filter settings in the center section of the screen. When you call up the screen the fields are initialized automatically with the data from the device, user, program and result codes tables. Every change to this data will therefore be available automatically within the filter function. Deleted or updated entries from these tables are also used for the filters. This function can be used for example to set a filter for a previous employee who is no longer on the current staff.

The next figure illustrates filtering of the run data for a certain centrifuge. In this example, the name of the centrifuge was selected to refine the displayed data:

Filter settings for run data

Serial number: <all> Program name: <all> User identification: <all> Run result code: <all>

Centrifuge name: Polaris 2

☐ No run log created ☐ Run data not included in export ☐ With centrifuge errors

Search result for run data

ID	Date	Time	Centrifuge	Centrifuge	Program	User	Result code	Second result	Error
5	23.03.2017	15:09:36	46215862	Polaris 2	Test 4	BBilson	RRC002		
7	23.03.2017	15:59:04	46215862	Polaris 2	Test 4	BBilson	RRC002		F-14
10	24.03.2017	10:48:10	46215862	Polaris 2	Test 4	CCarter	RRC001		F-14
11	24.03.2017	11:14:09	46215862	Polaris 2	Test 4	BBilson	RRC003		F-14
13	24.03.2017	12:56:15	46215862	Polaris 2	Test 4	EEstral	RRC002		F-14

More than one filter can be used for this filter function. This can be applied, for example, to expand the above example so that defined run results can also be used instead of just the centrifuge as a filter.

Filter settings for run data

Serial number: <all> Program name: <all> User identification: <all> Run result code: RRC002

Centrifuge name: Polaris 2

☐ No run log created ☐ Run data not included in export ☐ With centrifuge errors

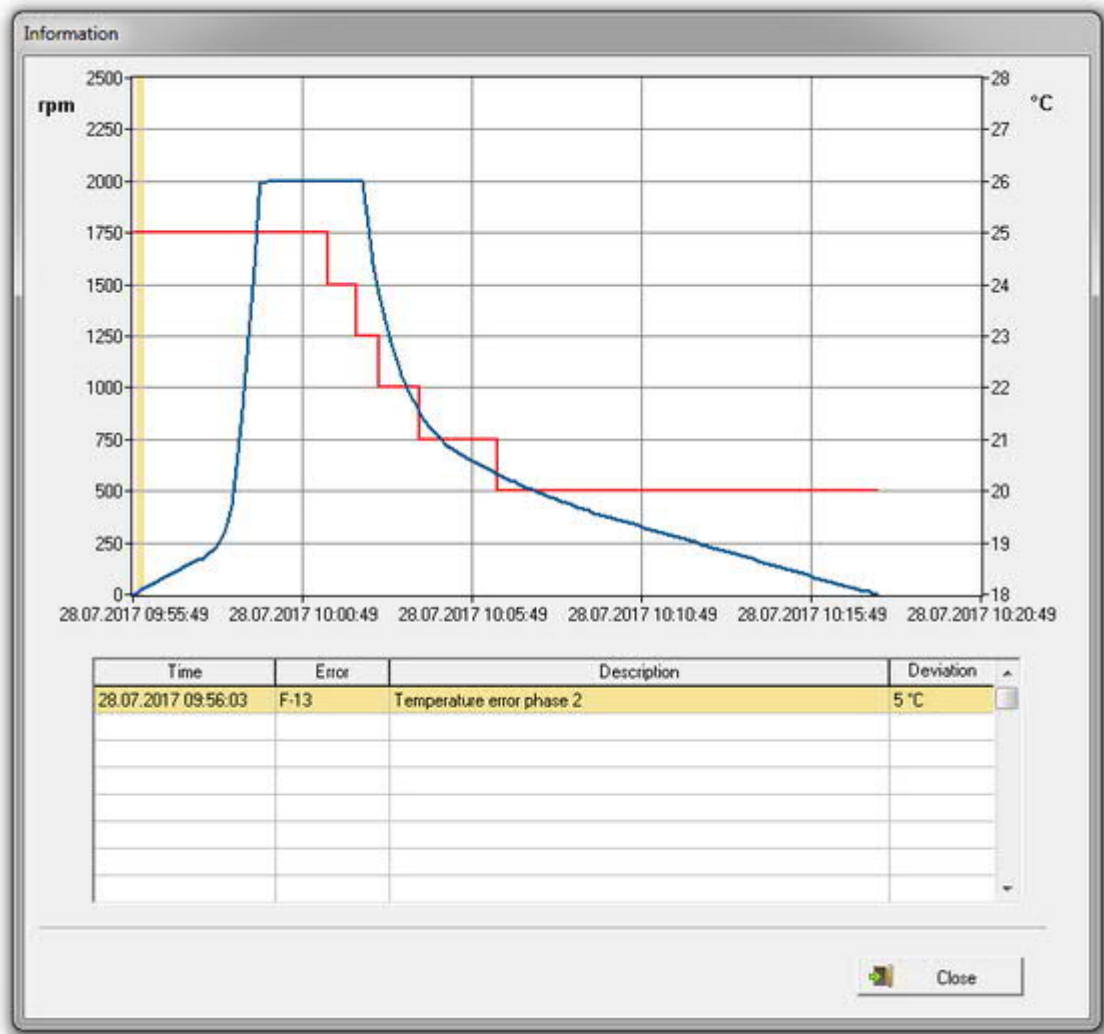
Search result for run data

ID	Date	Time	Centrifuge	Centrifuge	Program	User	Result code	Second result	Error
5	23.03.2017	15:09:36	46215862	Polaris 2	Test 4	BBilson	RRC002		
7	23.03.2017	15:59:04	46215862	Polaris 2	Test 4	BBilson	RRC002		F-14
13	24.03.2017	12:56:15	46215862	Polaris 2	Test 4	EEstral	RRC002		F-14

With these filters set, only those runs which were completed at the selected centrifuge with defined run results will be displayed in the table.

6.1.3. Display of run data

The window for displaying the run data contains a graph for the recorded speed/rcf value and the temperature. The table below the graphics lists all monitoring errors for the run. The following picture shows the window for an exemplary run containing a temperature error:



The table for monitoring errors lists the time of the error, the error code, a description of the error and the recorded deviation. If one line of the table is selected, a marker will be shown in the graphics to highlight the point in time at which the error was recorded.

6.2. Evaluation of sample data

The figure below shows the screen for data evaluation with sample data selected. This screen is divided into three areas. In the upper section of the screen you can define the search period for the sample data. The center section of the screen contains fields for filtering the obtained sample data. A table containing the search results is displayed toward the bottom of the screen. The buttons for further editing of the data are also located here.

The screenshot shows the 'Run data evaluation' window. At the top, there are tabs for 'Run data' and 'Sample data'. Below the tabs, there are input fields for 'Start' (01.03.2017), 'End' (31.03.2017), and 'Sample barcode'. A 'Search' button is located to the right of the 'Sample barcode' field. Below these fields is a section titled 'Filter settings for sample data' with dropdown menus for 'Serial number', 'Program name', 'Sample result code', 'Centrifuge name', and 'Sample barcode'. Below the filter settings is a section titled 'Search result for sample data' containing a table with 16 rows of data. To the right of the table is a vertical toolbar with buttons for 'Save', 'Print', 'Import', 'Export', 'Information', 'Protocol', and 'Result code'. At the bottom left is a 'Load related runs' button, and at the bottom right are 'Help' and 'Close' buttons.

ID	Barcode	Result code	Second result	Program	Centrifuge	Centrifuge	Run ID
1	3752044375845701			Test 4	45147821	Polaris 1	1
2	3752044375845702			Test 4	45147821	Polaris 1	1
3	3752044375845703	BRC002		Test 4	45147821	Polaris 1	1
4	3752044375845704			Test 4	45147821	Polaris 1	1
5	3752044375845711	BRC002		Test 4	45147821	Polaris 1	2
6	3752044375845712	BRC002		Test 4	45147821	Polaris 1	2
7	3752044375845713	BRC001		Test 4	45147821	Polaris 1	2
8	3752044375845714			Test 4	45147821	Polaris 1	2
9	3752044375845715	BRC001		Test 4	45147821	Polaris 1	2
10	3752044375845716	BRC001		Test 4	45147821	Polaris 1	2
11	3752044375845721			Test 4	45147821	Polaris 1	3
12	3752044375845722			Test 4	45147821	Polaris 1	3
13	3752044375845723	BRC001		Test 4	45147821	Polaris 1	3
14	3752044375845724	BRC002		Test 4	45147821	Polaris 1	3
15	3752044375845705	BRC001		Test 4	45147821	Polaris 1	4
16	3752044375845706			Test 4	45147821	Polaris 1	4

Specifying the search period and executing the search

You can limit the relevant time period for the search for sample data. This is done by specifying a start date and end date for the search. By clicking on the calendar symbol you can call up a calendar to select these dates. You can then initiate the search of the database by clicking "Search". All of the datasets for the run data found are then displayed in the run data table at the completion of the search. The option of searching for a certain barcode is also given for sample data. This barcode can be entered in the corresponding input field and may also contain the following wildcards:

- The character "_" stands for one single character within the barcode. This means that the character string "123_" will turn up all sample barcodes containing the string "123" and any other fourth character (e.g., "1234", "123A" or "123+").

- The "%" character stands for an arbitrarily long character string. Entering "123%" will turn up sample barcodes containing the string "123", followed by any number of other characters (e.g., "1234", "123456" or "123+456")

If you are using a sample barcode in your search you do not need to specify the time period. The entire data inventory will then be searched. It is therefore not necessary to know the exact time period during which the sample was processed.

Filtering of sample data

You can also filter the sample data after it has been found. Different filters are available for this in the center section of the screen. More information about filtering sample data is given in the section "Filtering of sample data".

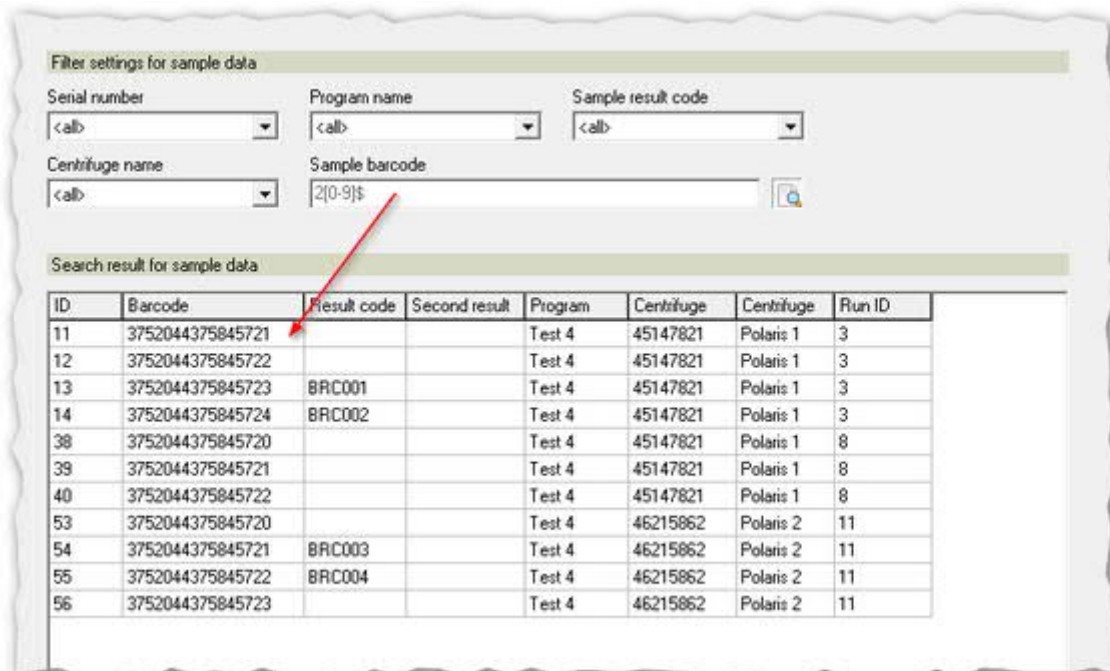
Buttons for editing sample data

Several buttons are provided next to the sample data table for editing the data inventory. The following functions are available here:

Save	Use this button to have the contents of the displayed table saved to a file. This function can be used for a subsequent manual evaluation of the data.
Print	Use this button to output the datasets in the displayed table to a printer.
Result code	While the centrifuge is being unloaded, the employee operating the centrifuge can read in barcodes to assign status information to the run or to individual samples. ("Managing result codes") In this view, additional results information for the run can be saved as part of data evaluation. More information about this is given in the section "Adding result information".

6.2.1. Filtering of sample data

The same requirements and conditions apply to filtering of sample data as described for the filtering of run data. Here, however, there is also the option of using a regular expression for the sample barcodes. The example below illustrates the filtering for barcodes that end in the digits 20 to 29:



Filter settings for sample data

Serial number: <all> Program name: <all> Sample result code: <all>

Centrifuge name: <all> Sample barcode: [0-9]\$

Search result for sample data

ID	Barcode	Result code	Second result	Program	Centrifuge	Centrifuge	Run ID
11	3752044375845721			Test 4	45147821	Polaris 1	3
12	3752044375845722			Test 4	45147821	Polaris 1	3
13	3752044375845723	BRC001		Test 4	45147821	Polaris 1	3
14	3752044375845724	BRC002		Test 4	45147821	Polaris 1	3
38	3752044375845720			Test 4	45147821	Polaris 1	8
39	3752044375845721			Test 4	45147821	Polaris 1	8
40	3752044375845722			Test 4	45147821	Polaris 1	8
53	3752044375845720			Test 4	46215862	Polaris 2	11
54	3752044375845721	BRC003		Test 4	46215862	Polaris 2	11
55	3752044375845722	BRC004		Test 4	46215862	Polaris 2	11
56	3752044375845723			Test 4	46215862	Polaris 2	11

Several filters can also be combined for filtering of sample data.

6.3. Adding result information

When the corresponding setting is specified in the Centri-Log Plus software configuration, the user can read in a result barcode for the run or for individual samples at the centrifuge. Data evaluation now enables a second result to be added to the initial result. If an entry is selected in the evaluation table you can click on the "Result code" button to open the screen for result management.

Result management

Result history

Result information already assigned:

At the end of the centrifugation by Peter Pan
RRC001: Result code 1

Result code: RRC001

Description: Result code 1

Comment

Add

Cancel Apply

An overview of the result information allocated up to now is initially displayed in this screen. The familiar result codes are offered for selection below this screen. ("Result management") The description of the result code is also displayed here to facilitate selection of the proper code. If the barcode to which information is to be added is selected you can add an additional comment in the field below. The new result code appears in the result history when you click the "Add" button.

The change is entered in the database when you click "Apply". Any changes made are discarded if you click the "Cancel" button. Results are always added to the data. Result information that is added cannot be removed afterwards. If this information is incorrect, it can only be "eliminated" by adding a further result.

6.4. Switching between run and sample view

If you are working with run evaluation, the displayed data can be synchronized between the run data table and the sample data table. This is helpful when samples must be found which were processed in certain centrifugation runs. The example below shows a typical case for this task.

Search result for run data

ID	Date	Time	Centrifuge	Centrifuge	Program	User	Result code	Second result	Error
5	23.03.2017	15:09:36	46215862	Polaris 2	Test 4	BBilson	RRC002		
7	23.03.2017	15:59:04	46215862	Polaris 2	Test 4	BBilson	RRC002		F-14
10	24.03.2017	10:48:10	46215862	Polaris 2	Test 4	CCarter	RRC001		F-14
11	24.03.2017	11:14:09	46215862	Polaris 2	Test 4	BBilson	RRC003		F-14
13	24.03.2017	12:56:15	46215862	Polaris 2	Test 4	EEstral	RRC002		F-14

Load processed samples

Search result for sample data

ID	Barcode	Result code	Second result	Program	Centrifuge	Centrifuge	Run ID
53	3752044375845720			Test 4	46215862	Polaris 2	11
54	3752044375845721	RRC003		Test 4	46215862	Polaris 2	11
55	3752044375845722	RRC004		Test 4	46215862	Polaris 2	11
56	3752044375845723			Test 4	46215862	Polaris 2	11

First, a search for the run data table was conducted and the data then filtered for a defined centrifuge. Here it is apparent that a special result code (RRC003) was read in for the run with ID 11. This run is selected by clicking in the corresponding row in the table. That row is then highlighted in a different color in the table (1).

As a second step, click the button "[Load processed samples](#)" (2).

The screen then switches automatically to the sample table view. This table contains all of the samples processed during the selected run. This is confirmed by the same run ID being displayed for all of these samples (3).

You do not have to necessarily select a run in the table before loading the samples. If you click the button "[Load processed samples](#)" without first selecting a run, the samples processed for all runs will be loaded to the table. In the example shown here this would be runs 5, 7, 10, 11 and 13.

This process also functions in the opposite direction. If several entries are listed in the sample table, automatic switch-over to the run data table is performed by clicking the button "[Load related runs](#)". This table then includes all runs during which the corresponding samples were processed.

7. Data acquisition and display

The section Data acquisition and display deals with how communication with the centrifuges is set up and ultimately terminated. The data display in the program interface is discussed as well.

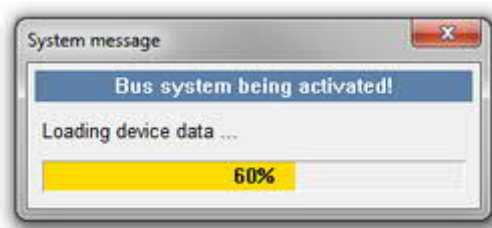
7.1. Starting communication

Communication must be initiated manually if automatic starting of communication has not been activated (see "General system settings"). This is done with the menu item "[Program/Start](#)" or by clicking the corresponding button in the toolbar. However, communication cannot be started unless a user with the corresponding privileges is logged on.

After the start of the communication, the Centri-Log Plus software starts to establish communication between the PC and the individual centrifuges.

Setting up communication with centrifuges connected to the fieldbus

Since the complete processing of data takes place on the PC, all relevant data is first queried from the centrifuges. The following window depicts the progress of this process.



The initialization phase is divided into four individual steps carried out in the following order:

Step 1: Reading configuration information

The centrifuge configuration is read first. This information indicates which device is addressed at the utilized bus address.

Step 2: Reading processor identification

The software then determines the processor ID of the interface processor. This is an internal identification and serves only service-related tasks.

Step 3: Reading status information

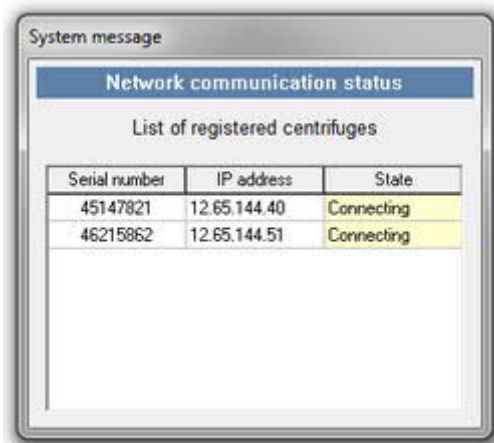
The third step consists of the software reading the status information from the centrifuges.

Step 4: Reading centrifuge values

The last step consists of updating the centrifuge values. This involves reading all current data of the centrifuge.

Setting up communication with centrifuges connected to the network

Setup of communication with centrifuges connected to the network is also displayed in a status window. Every centrifuge is listed in a table in this window. The current communication status is indicated in one of the columns in the table.



A data comparison is performed after communication is established at each active centrifuge. This involves synchronizing the changes in the data inventory on the PC with the centrifuge. At the same time, the run data buffer at the centrifuge is also checked. When required, the software will transfer stored runs to the database on the PC.

This window closes automatically as soon as a clear status is determined for all centrifuges. An explanation of the meaning of status information is given in the section "Display of communication status".

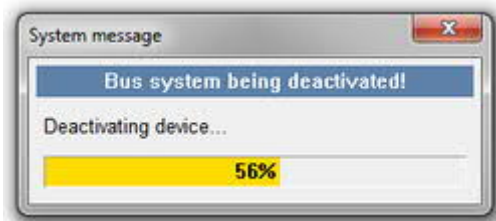
Note: If a centrifuge is not activated, its status is indicated as "Offline". The Centri-Log Plus software makes repeated attempts to set up communication with the centrifuge during operation. This is conducted at different intervals in order to achieve a more even flow of traffic on the network when several centrifuges have the status "Offline". The time intervals between the individual attempts lie between 30 seconds and one minute.

7.2. Stopping communication

If communication with the centrifuges is to be terminated, this is done using the menu item "[Program/Stop](#)". A button is also available in the toolbar to carry out the same function.

Ending communication with centrifuges connected to the fieldbus

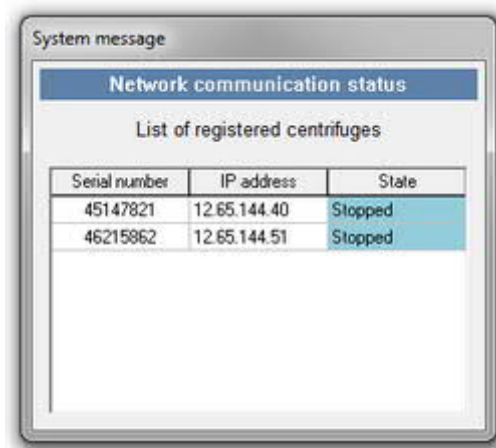
While communication is stopped, the familiar information window is displayed.



If communication with the centrifuges is to be terminated, Centri-Log Plus will transmit an additional volume of information to each device that is required to ultimately terminate communication. This is also why ending communication takes a certain amount of time illustrated with the progress bar.

Ending communication with centrifuges connected to the network

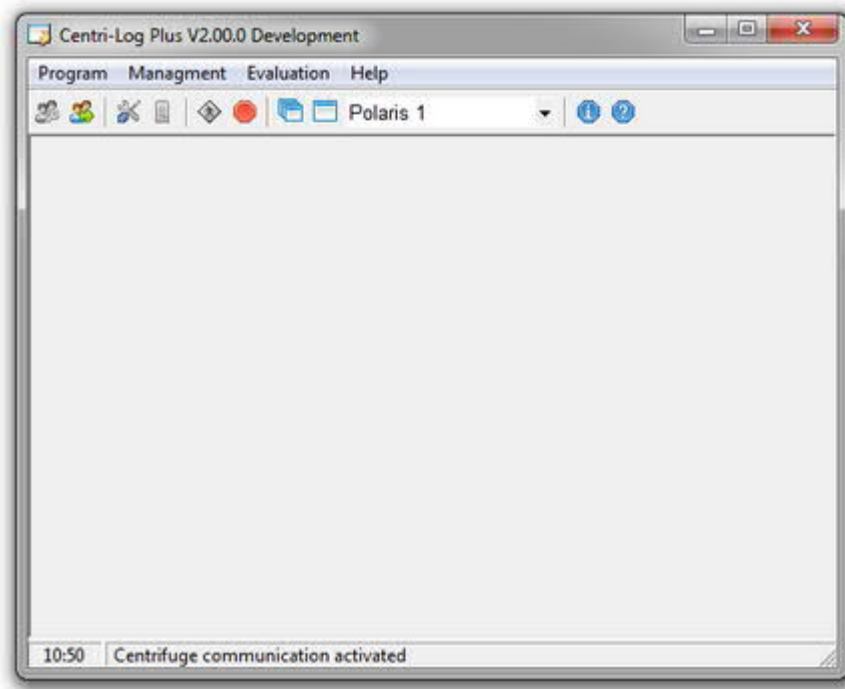
Centri-Log Plus also displays this status window when communication with centrifuges connected to the network is also to be terminated.



All centrifuges will then be set to the status "Stopped" by the software. When communication with one of the centrifuges is active, data exchange will be completed before the centrifuge is set to a passive status. This window is closed automatically if all of the centrifuges have the status "Stopped".

7.3. Data displayed in the program interface

When communication is started, the window showing the status of communication setup is hidden and the selection options for the display window activated in the toolbar of the screen.



-  Use this button to open the overview windows. A window is opened for each registered centrifuge. However, this window only depicts the current data concerning speed, runtime, and temperature.
-  The second button opens a detail view of a centrifuge. This window then shows all available centrifuge information.

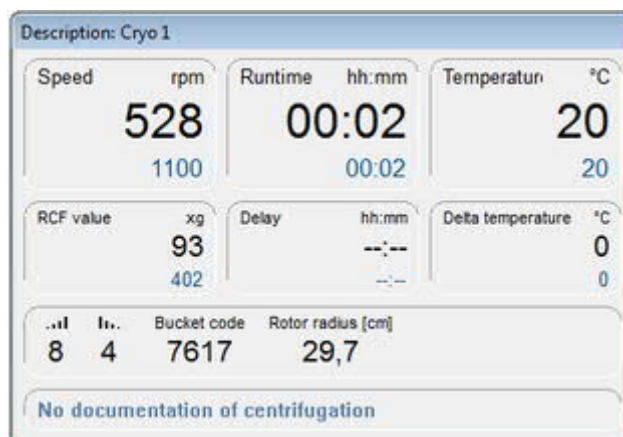
A selection box for the centrifuges is located in the toolbar in addition to these two buttons. This list contains all of the centrifuges registered in device management. Here, the address, serial number, or the name is used as the designation depending on the selection in the configuration. (See also "General system settings")

If the detail window of a centrifuge is open, then this window can be used to quickly toggle between the centrifuges. The selected centrifuge remains selected when switching from the detail view to the overview windows. The selection list is automatically updated when one of the overview windows is enabled with the mouse.

7.3.1. Data displayed in the detail window

Information about one of the centrifuges can be depicted in an open detail window. Use the selection list in the toolbar to determine which centrifuge to depict. A centrifuge identification is also depicted in the title bar of the open window.

The figures below show examples of the screen for a Cryofuge 6000i:



The set values and the actual values take up most of the space of the window. Insofar as available, both values are displayed together in one data block. The set value is depicted in a smaller font and more subdued color since the current values are the more important information.

The lower half of the window features an area to depict the status. This area is used to display sequence and error messages. The software also shows here the remaining time until the centrifuge comes to a standstill. This time is calculated from the specifications for the acceleration and braking profile as well as the set runtime or set ACE value. Since the calculation is based on the ideal behavior of the centrifuge, a slight adjustment of the calculated time may be made during centrifugation. This calculation is also not possible for all operating conditions of the centrifuge.

Note: Different data may be displayed for the different types of centrifuge. This is due to the differing properties for the individual centrifuges and the type of data link between the Centri-Log Plus software and the centrifuge.

7.3.2. Data displayed in the overview window

The overview windows represent a simple form of displaying data. They contain only the three important actual values. These are speed, time/ACE, and temperature. This restriction means many of these small windows can be displayed at the same time. The figure below shows only one overview window that would be the same for all centrifuges since there are no differences when it comes to centrifuge types.



The upper window area depicts the three actual values; the status is indicated in the lower area. Information about sequence and error messages is shown in this small window as well. A progress bar as shown in the detail view status indication is not available here due to space constraints. However, the software again shows the remaining time until the centrifuge comes to a standstill.

7.3.3. Informational icons for special operating states

Icons for special operating states can be depicted in the process sequence display window. The following are the three possible icons:



If this icon is shown in the display screen, the software is currently in a process phase in which sample barcodes are being processed. This can involve the input of sample data during loading of the centrifuge, or allocation of status information at the end of centrifugation. The screen for entering barcodes is opened if this icon is clicked.



This icon indicates that the centrifuge is blocked from any further use. If the corresponding option is enabled in the program configuration, the Centri-Log Plus software is able to block the centrifuge after a malfunction or error. Only a user with the corresponding privileges can release the centrifuge later on. Explanations about activating this function and for assigning of privileges to users are given in the sections "Advanced settings" and "Data for PC operation". Click on the icon to release the centrifuge. The user authentication window opens if no user is logged on or the logged on user does not have the corresponding privileges or permissions. The centrifuge is released after entering identification and password.



The software has detected a deviation in the defined sequence when this icon is displayed in the window. This could be a monitoring error for the speed or the temperature, for example. This icon indicates a variety of other information as well. Click on this icon to open an information window containing the software messages.

These icons are depicted in the overview windows as well as the detail windows. There is no difference in functionality between the two display types.

8. Appendix

The appendix to this document includes general additional information on the use of the Centri-Log Plus software.

8.1. ASCII protocol data structure

Centrifugation data is saved in the ASCII log file. Information is divided into several groups here which contain logically associated data. Every group is identified by an identifier placed in front of the data input. The individual entries for each group are separated by a semicolon.

8.1.1. Process identification data

Process data is identified in the log file by the identifier <P>.

Number	Entry	Remarks
1	Device type	Plain text identification of the used device type. (ex.: Cryofuge 6000i, RC12BP+)
2	Identification of the device	Here you specify which device is used for centrifugation. One of three pieces of information can be saved: 1. Centrifuge serial number 2. User-defined ID (device name) 3. Fieldbus address/IP address of the centrifuge
3	User identification (Loading)	The barcode scanned by user at centrifuge for identification is entered. The entry "-" is listed here if no identification is specified.
4	User identification (Unloading)	The barcode scanned by user at centrifuge for identification is entered. The entry "-" is listed here if no identification is specified.
5	Product identification	If a barcode was scanned to identify the product to be produced, this barcode is saved here. The entry "-" is listed here if this identification is missing.
6 .. n	Sample data	The data for the centrifuged samples is present starting at the fifth position. Number of entries is here variable. However, only a max. of 16 entries can be used here. The entry "-" is listed here if no data were scanned at the centrifuge.
n+1	Timestamp	The time stamp identifies the start of centrifugation. It has the following format: DayMonthYearHourMinute ex.: 120520171353 for 12.05.2017 13:53

8.1.2. Product specifications based on product definition

Product specifications are indicated in the log file by the identifier <V>.

Number	Entry	Unit	Remarks
1	Device type		States in plain text the device type for which the product is defined. (ex.: Cryofuge 5500i, Cryofuge 6000i)
2	Emulation type		Contains the selected profile emulation of a Cryofuge 8/16 or Sorvall BP8/BP16 centrifuge. If the device does not support profile emulation, the entry will be "-".
3	Rotor identification		Includes the last four digits of the rotor order number or the name of the rotor for which the product is defined. If the information cannot be requested from the centrifuge, the entry will be "-".
4	Bucket identification		Includes the last four digits of the bucket order number or the name of the bucket for which the product is defined. If the information cannot be requested from the centrifuge, the entry will be "-".
5	Acceleration profile		Input is always required at this position for Cryofuges. An entry is listed only when slow start is active and no step run is being processed with a RC3BP+, RC12BP+ and RC BIOS.
6	Deceleration profile		Input is always required at this position for Cryofuges. An entry is listed only when slow stop is active and no step run is being processed with a RC3BP+, RC12BP+ and RC BIOS.
7	Final speed	rpm	
8	RCF value	g	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
9	Runtime	s	The run time is entered here in seconds, regardless of the time setting at the centrifuge. If a run with ACE preselection is active with a RC3BP+, RC12BP+ or RC BIOS, "-" is entered here.
10	ACE value		When centrifugation with ACE preselection is active with a RC3BP+, RC12BP+ or RC BIOS, an entry is made here.
11	Delayed start	min	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
12	Temperature	°C	
13	Delta-Temperature	°C	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
14	Brake-off speed	rpm	Speed for deceleration for RC3BP+, RC12BP+ or RC BIOS.

Number	Entry	Unit	Remarks
15	maximum admitted delay between closing of the lid and start of centrifugation.	min	Entry structure: Absolute value ex.: 3
16	maximum positive temperature offset between closing of the lid and start of centrifugation.	°C	Entry structure: Absolute value ex.: 5
17	maximum negative temperature offset between closing of the lid and start of centrifugation.	°C	Entry structure: Absolute value ex.: 5
18	upper limit for speed-time profile in acceleration phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
19	lower limit for speed-time profile in acceleration phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
20	upper limit for speed-time profile in final speed phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
21	lower limit for speed-time profile in final speed phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
22	upper limit for speed-time profile in deceleration phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
23	lower limit for speed-time profile in deceleration phase.	Upm	Entry structure: Absolute value "+" relative value "%" ex.: 10+1%
24	maximum positive temperature offset between start of centrifugation and standstill.	°C	Entry structure: Absolute value ex.: 5
25	maximum negative temperature offset between start of centrifugation and standstill.	°C	Entry structure: Absolute value ex.: 5
26	upper limit for the deviation during run time.	s	Entry structure: Absolute value ex.: 3
27	lower limit for the deviation during run time.	s	Entry structure: Absolute value ex.: 3
28	upper limit for the deviation with ACE value.		Entry structure: Absolute value ex.: 2,50e03

Number	Entry	Unit	Remarks
29	lower limit for the deviation with ACE value.		Entry structure: Absolute value ex.: 2,50e03
30	max. permissible time between standstill and opening of the lid.	min	Entry structure: Absolute value ex.: 25
31	max. positive temperature deviation between standstill and opening of the lid.	°C	Entry structure: Absolute value ex.: 4
32	max. negative temperature deviation between standstill and opening of the lid.	°C	Entry structure: Absolute value ex.: 4

All of the information for the production specifications is listed in one line.

8.1.3. Centrifuge set values

The centrifuge set values are identified in the log file by the identifier <S>.

Number	Entry	Unit	Remarks
1	Timestamp		See below for time stamp format.
2	Program number		When a program is being processed with a RC3BP+, RC12BP+ or RC BIOS, the program number of the defined program is entered here. The entry "-" is listed here in case of a different centrifuge.
3	StepRun ID		When a step run is being processed with a RC3BP+, RC12BP+ or RC BIOS, "1" is entered; the character "-" in all other cases.
4	Acceleration profile		Input is always required at this position for Cryofuges. An entry is listed only when slow start is active and no step run is being processed with a RC3BP+, RC12BP+ and RC BIOS.
5	Deceleration profile		Input is always required at this position for Cryofuges. An entry is listed only when slow stop is active and no step run is being processed with a RC3BP+, RC12BP+ and RC BIOS.
6	Final speed	rpm	
7	RCF value	g	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
8	Runtime	s	The run time is entered here in seconds, regardless of the time setting at the centrifuge. If a run with ACE preselection is active with a RC3BP+, RC12BP+ or RC BIOS, "-" is entered here.
9	ACE value		When centrifugation with ACE preselection is active with a RC3BP+, RC12BP+ or RC BIOS, an entry is made here.
10	Delayed start	min	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
11	Temperature	°C	
12	Delta-Temperature	°C	A value is then entered here only if the used product definition was generated for a device that supports this parameter. The entry "-" is listed here if this value is missing.
13	Brake-off speed	rpm	Speed for switching off the brake for RC3BP+, RC12BP+ or RC BIOS.
14	Rotor number		This field is only used for centrifuges with automatic rotor detection. If the rotor is detected, the last four digits of the order number are entered here. The entry "-" is listed here for centrifuges without automatic rotor detection.

Number	Entry	Unit	Remarks
15	Bucket number		This lists the bucket number entered by the user. The entry "-" is listed here if a rotor without bucket is used with centrifuges with automatic rotor detection.
16	Rotor name		Contains the name of the rotor for centrifuges RC3BP+, RC12BP+ and RC BIOS. The entry "-" is listed here for all other centrifuges.
17	Rotor radius	0,1 mm	The radius of the rotor is entered here. The entry corresponds with the set bucket for centrifuges without automatic rotor detection. If the device features automatic rotor detection, the entry is made after the completed rotor detection.

8.1.4. Centrifuge actual values

The centrifuge actual values are identified in the log file by the identifier <I>.

Number	Entry	Unit	Remarks
1	Timestamp		See below for time stamp format.
2	Speed	rpm	
3	Temperature	°C	Optional, depending on program configuration

8.1.5. Errors

Errors are identified in the log file by the identifier <F>.

Centrifuge errors

Number	Entry	Remarks
1	Timestamp	See below for time stamp format.
2	Error ID	"E-" and 2-digit number
3	Error description	Description

Please consult the user manual of the centrifuge for the possible error identifiers.

Monitoring errors

Number	Entry	Remarks
1	Timestamp	See below for time stamp format.
2	Error ID	"F-" and 2-digit number
3	Error description	Description

The following error identifiers are possible:

- F-01 User intervention during centrifugation. (Stop key pressed)
- F-02 User intervention during centrifugation. (Quick stop pressed)
- F-10 Permissible waiting time in phase 1 exceeded.
- F-11 Temperature limits in phase 1 exceeded.
- F-12 Speed error during centrifuging.
- F-13 Temperature limits in phase 2 exceeded.
- F-14 Permissible waiting time in phase 3 exceeded.
- F-15 Temperature limits in phase 3 exceeded.
- F-16 Noncompliance with preset run time.
- F-17 Set-point centrifuge values do not match product specifications.
- F-18 Lid of centrifuge opened again without run.
- F-19 Centrifuge switched off during data logging.
- F-20 Incorrect device for scanned product code.
- F-21 Incorrect rotor/bucket for scanned product code.
- F-22 Bus system stopped during run.
- F-23 Pretemp temperature error
- F-24 Centrifuge reset during logging
- F-50 Acceleration profile not verifiable.
- F-51 Deceleration profile not verifiable..

8.1.6. Finding information

Result information is identified in the log file by the identifier .

An evaluation of the entire centrifugation run can be stored in the log file using the finding information. It is also possible to store an evaluation of each centrifuged vessel. However, the evaluation is only entered if the status input is enabled on the corresponding barcode page.

Number	Entry	Remarks
1	Sample ID	Barcode of one of the centrifuged sample. Or the character "-" for the Run result code.
2	Result code	Entered result code.
3	Result text	Plain text information about the scanned finding code.

At least one evaluation line is entered if finding information is available in a log file. This line then contains the run result code. The maximum number of lines is here one line more than the number of centrifuged samples.

8.1.7. Time stamp format

Users can select from four different time stamp formats. Which time stamp to use depends on the requirements (GMP) and the intended use of the log file. These four formats are:

1. Elapsed time since closing of the cover, in seconds.
Format: sss.sss ex.: 000.210
2. Elapsed time since closing of the cover, in hours, minutes, seconds
Format: hh'nn'ss ex.: 00'03'30
3. Absolute time in hours, minutes, seconds
Format: hh:nn:ss ex.: 10:30:50
4. Absolute time in days, months, years, hours, minutes, seconds
Format: tt.mm.jjj;hh:nn:ss ex.: 19.06.2017;10:30:50

8.1.8. Structure of a log file from the separate data blocks

The simplest form of a log file consists of the following blocks:

1. One block with process data (P)
2. One block with product specifications (V)
3. One block with set values (S)
4. One block with actual values (I)
5. One block with error information (F)

Such a log file is illustrated in the following example.

```
<P>
RC12BP+;Thermo 02;8047;-;211;11111;22222;120820101730
<V>
RC12BP+;-;-;H12000;-;-;7;5;1200;478;360;-;-;20;-;-;5;5;5;100+2%;
100+2%;20+0%;20+0%;50+1%;50+1%;5;5;30;30;-;-;15;5;5
<S>
00'00'00;-;-;7;5;1200;478;360;-;-;20;-;-;-;-;H12000;2972
<I>
00'00'00;00000;+20
00'00'10;00000;+20
00'00'20;00044;+20
00'00'30;00088;+20
00'00'40;00162;+20
00'00'50;00322;+20
...
...
00'08'20;00039;+20
00'08'30;00031;+20
00'08'40;00023;+20
00'08'50;00014;+20
00'09'00;00006;+20
00'09'10;00000;+20
00'09'20;00000;+20
00'09'30;00000;+20
00'09'40;00000;+20
00'09'50;00000;+20
<F>
No monitoring error
```

CAUTION: Display of the product specifications in several lines is due to the automatic word wrap. The entry is listed in one line in the log file.

Individual types of data blocks can also exist multiple times in the log file. These include the error blocks, the set value and the actual value blocks. If the set values are changed during a run, a set value block will be entered in the log file at the time of the change. The run is continued with a new actual value block after the set value block. If the device experiences an error during a run, the error is also entered at once in the log file. The run is continued with a new actual value after the error has been entered.

The example here illustrates the log file for a run during which a change was made to the set values:

```
<P>
RC12BP+;Thermo 02;8047;-;211;11111;22222;120820101742
<V>
RC12BP+;-;-;H12000;-;-;7;5;1200;478;360;-;-;20;-;-;5;5;5;100+2%;
100+2%;20+0%;20+0%;50+1%;50+1%;5;5;30;30;-;-;15;5;5
<S>
00'00'00;-;-;7;5;1200;478;360;-;-;20;-;-;-;-;H12000;2972
<I>
00'00'00;00000;+20
00'00'10;00000;+20
00'00'20;00000;+20
<S>
00'00'30;-;-;7;5;2800;478;360;-;-;20;-;-;-;-;H12000;2972
<I>
00'00'30;00000;+20
00'00'40;00013;+20
00'00'50;00057;+20
00'01'00;00104;+20
...
...
00'10'21;00014;+20
00'10'31;00005;+20
00'10'41;00000;+20
00'10'51;00000;+20
00'11'01;00000;+20
00'11'11;00000;+20
00'11'21;00000;+20
<F>
00'00'30;F-17;Set values invalid
00'02'30;F-12;Speed error;1394 1/min
```

CAUTION: Display of the product specifications in several lines is due to the automatic word wrap. The entry is listed in one line in the log file.

8.2. Use of regular expressions

Regular expressions are usually used to search for character strings in longer texts. Special characters make it possible to define conditions. For example, it is possible to determine that a specific character (or a group of characters) is to occur at a specific frequency. The Centri-Log Plus software uses regular expressions only to verify a scanned barcode with a specified pattern. When using this syntax verification, it is important to remember that the existence of the defined character string is checked. This means a positive result is always reported if the regular expression is found somewhere in the barcode. Please refer to the respective examples for additional information.

8.2.1. Verifying individual characters

If an individual character is indicated in the regular expression, which is not a special character, then this character must be contained in the barcode. The same applies to an indicated character string.

Example 1	The regular expression	123
	accepts the barcodes	1234567
		0123456
	and not	012456

As you can see from the examples, the regular expression must only be included in the barcode. It is of no importance where in the character string the regular expression is located.

8.2.2. Verifying code start

The special character ^ can be used to prevent a positive result from being yielded on any occurrence of a regular expression in the barcode. The beginning of the barcode is defined by this character.

Example 2	The regular expression	^123
	accepts the barcodes	1234567
		123ABCD
	and not	0123456

The example shows that now only barcodes are accepted where the requested character string occurs at the beginning.

Note: In this example, the special character ^ is used to define the beginning of the code. However, if these special characters are included in the barcode itself, you must redefine them as plain characters and not special characters. This is done by using the characters \ in front of the special characters. The regular expression \^123 hence checks for the character string ^123 and not for 123 at the beginning of the barcode as cited above.

8.2.3. Verifying code end

It is also possible to do the same thing for the end of the barcode. The special character is then \$.

Example 3	The regular expression	123\$
	accepts the barcodes	0000123
		ABCD123
	and not	0123456

The complete code can be described by the combination of code beginning and code end. Code flexibility is also retained here, as only the first and last characters of the code are defined, without restricting the length of the barcode.

Note: In this example, the special character \$ is used to define the end of the code. However, if these special characters are included in the barcode itself, you must redefine them as plain characters and not special characters. This is done by using the characters \ in front of the special characters. The regular expression 123\\$ hence checks for the character string 123\$ and not for 123 at the end of the barcode as cited above.

8.2.4. Definition of character class

In many cases, a barcode is not checked for a specific character string, but rather simply for proper structure. Character classes can therefore be defined in regular expressions. Such a definition is always indicated inside square brackets. Examples of character classes are: [0-9] with all digits from 0 to 9, [a-z] with lower case letters from a to z, or [123] with the three digits 1, 2 and 3. Once a character class has been defined, the barcode must then contain one of the characters at the corresponding position in order to be accepted.

Example 4	The regular expression	^12[ABC]
	accepts the barcodes	12A4567
		12C4567
	and not	12F4567

The example shown here depicts a positive list. Which characters may be included in the barcode is also specified in the character class. However, it is also possible to create a negative list. If this is the case, none of the characters in the character class are allowed at the corresponding position in the barcode.

In order to define the character class as a negative list, the first character within the square brackets must be the special character ^ . Example 5 depicts the use of such a negative list as a character class.

Example 5	The regular expression	^12[^ABC]
	accepts the barcodes	12V4567
		1234567
	and not	12A456

Note: Various predefined character classes are available. These may be used in regular expressions as well as in user-defined character classes. The following are among the predefined classes:

\w an alphanumeric character including the character "_"
\W no alphanumeric character, not even the character "_"
\d a numeric character
\D no numeric character

These predefined classes can be used to write the regular expression as ^12[0-9] as well as ^12\d.

8.2.5. Special characters as placeholders

The special character . (period) serves as placeholder for any character.

Example 6	The regular expression	^12.45
	accepts the barcodes	1234567
		12A4567
	and not	1233456

As the example shows, a specific character must be at the position of the special character in the scanned barcode. If that position has several characters, the verification has a negative result.

8.2.6. Special characters for determining frequency of occurrence

A character to determine frequency can follow any of the characters of a regular expression. This character can be used to determine how often the previous characters must occur in the barcode for the verification to be positive.

The following list depicts the special characters to determine frequency:

*	Does not occur or occurs multiple times
+	Single or multiple occurrence
?	No or single occurrence
{n}	Exactly n occurrence
{n,}	At least n occurrence
{n,m}	At least n, but at most m occurrence

Here are few examples to illustrate this:

Example 7	The regular expression	<code>^12.+45</code>
	accepts the barcodes	1234567 120304567
	and not	12456

The placeholder `.` in this example is defined as occurring once or multiple times (+). This means not only the code with the 3 in the placeholder's stead is accepted but also the code with the inserted character string 030. A barcode without characters in place of the placeholder, however, is rejected.

Example 8	The regular expression	<code>^12.*45</code>
	accepts the barcodes	1234567 12030456 124567

By entering the special character `*` behind the placeholder, now barcodes without a character at the position of the placeholder are accepted as well.

Example 9	The regular expression	<code>^12[0-9]{2}45</code>
	accepts the barcodes	12334567
	and not	12AA456

The expression `{2}` behind the character class `[0-9]` clearly defines that only two digits may occur at this position within the barcode. Barcodes with one digit or letter are therefore rejected.

Example 10	The regular expression	<code>^12[0-9]{2,3}45</code>
	accepts the barcodes	12334567 12303456
	and not	123456 1230034567

The expression `{2,3}` determines that all codes with two or three digits at the position of the character class are to be accepted.

8.2.7. Alternative character strings

If several character strings are enclosed in parentheses `()` and separated by the special character `|`, then this is an alternative character string. The syntax verification now checks whether one of the defined character strings is at the indicated position.

Example 11	The regular expression	<code>^12(34 AB)56</code>
	accepts the barcodes	1234567
		12AB567
	and not	12356
		1204567

By combining the individual elements, regular expressions can be created that allow for comprehensive syntax verification. For example, the transferred barcodes can be checked for a specific structure.

8.3. Formatting instructions for entering times

At some positions the Centri-Log Plus software can interpret the entered character string as formatting instructions for time data. This includes, for example, the file name of the export file, as well as the format of the time entry precisely in this file. The list below is provided to illustrate the options that exist for formatting.

Each character string consists of a series of formatting and pure text characters. The following list contains all formatting characters.

d	Displays the day as a number, without a preceding zero (1-31).
dd	Displays the day as a number, with a preceding zero (01-31).
ddd	Displays the day as an abbreviation (Mon - Sun).
dddd	Displays the day as a complete word (Monday - Sunday).
dddddd	Displays the date in the format saved as a short date format in the Windows regional settings.
ddddddd	Displays the date in the format saved as a long date format in the Windows regional settings.
m	Displays the month as a number, without a preceding zero (1-12).
mm	Displays the month as a number, with a preceding zero (01-12).
mmm	Displays the month as an abbreviation (Jan - Dec).
mmmm	Displays the month as a complete word (January - December).
yy	Displays the year as a two-digit number (00-99).
yyyy	Displays the year as a four-digit number (0000-9999).
h	Displays the hour, without a preceding zero (0-23).
hh	Displays the hour, with a preceding zero (00-23).
n	Displays the minutes, without a preceding zero (0-59).
nn	Displays the minutes, with a preceding zero (00-59).
s	Displays the seconds, without a preceding zero (0-59).
ss	Displays the seconds, with a preceding zero (00-59).
tt	Displays the time in the format specified by the Windows regional settings.
/	Uses the date separator specified in the regional settings.
:	Uses the time separator specified in the regional settings.
"xx"	Characters in quotation marks do not have an effect on the formatting and are treated as normal text.

A few examples are given below to clearly illustrate the formatting instructions function. Here, it is assumed that the current date is April 30, 2017, and the time is 10:15:30 a.m.

Instruction	Output	Comment
d.m.yy	30.4.17	-
d/m/yy	30.4.17	Same results as in the previous example. The character / instructs Centri-Log Plus to use the date separator from the Windows regional settings. Here, this is a period.
dd.mm.yyyy	30.04.2017	-
dd. mmm yyyy	30. Apr 2017	-
dddd, dd.mm.yyyy	Freitag, 30.04.2017	-
dddddd	Freitag, 30. April 2017	Here, the long date format from the Windows regional settings is used.
dd.mm.yyyy hh:nn	30.04.2017 10:15	-
dd.mm.yyyy hh.nn.ss	30.04.2017 10.15.30	-
dddd tt	30.04.2017 10:15:30	This formatting character string uses the time format as well as the short date format from the Windows regional settings.
"Es ist "dddd	It is Friday	Text in quotation marks will not be processed by Centri-Log Plus. It is directly output.

Note: As the characters / and : are used as formatting instructions, observe the following for the definition of the character strings:

- If the default settings for Windows are to be used as the date and time separator characters, the characters / and : must be used as separators in the character string.
- If the formatting instructions are to be used independently of the Windows default settings, the separators must be put in quotation marks.

The format hh:"nn":ss always uses a colon as the separator. The formatting hh:nn:ss only uses the colon as long as it is defined as the time separator in the Windows country settings.

8.4. Special barcodes

Finishing data input for sample IDs



ENDE

Canceling process data input



ABBR

Repeating previous centrifugation



QUIT

Confirming a data input error



WDHL

Special run to check function (QCRUN)



ACKN

Special run to pre-regulate temperature of centrifuge



QCRUN

Special run for centrifuge function test



PTMP

Centrifugation with considering set-point value



PRETEMP



TEST



NONE

Local centrifuge release



Thermo Electron LED GmbH
Zweigniederlassung Osterode
Am Kalkberg, 37520 Osterode am Harz
Germany

thermofisher.com

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France +33 2 2803 2180
Germany 0800 1 536 376
+49 6184 90 6000

India +91 22 6716 2200
Italy +39 02 95059 552
Japan +81 3 5826 1616
Netherlands +31 76 579 55 55
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Nordic/Baltic/CIS countries
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