BRUKER

BMPC II

Bruker Magnet Pump Control II
User Manual

Version 001

think forward

The information in this manual may be altered without notice.

Contents

Contents

Contents

Contents

BRUKER BIOSPIN User Manual Version 001

Introduction

1

The BMPC II is a Windows XP based system that supervises and serves the pumps and valves that are needed for the stable operation of subcooled Bruker high field magnets.

The main functions include:

- Monitoring of the magnet status and the most important cryogen parameters.

- Monitoring and control of the pump system.

- Alarm system.

Figure 1.1.   System Block Diagram
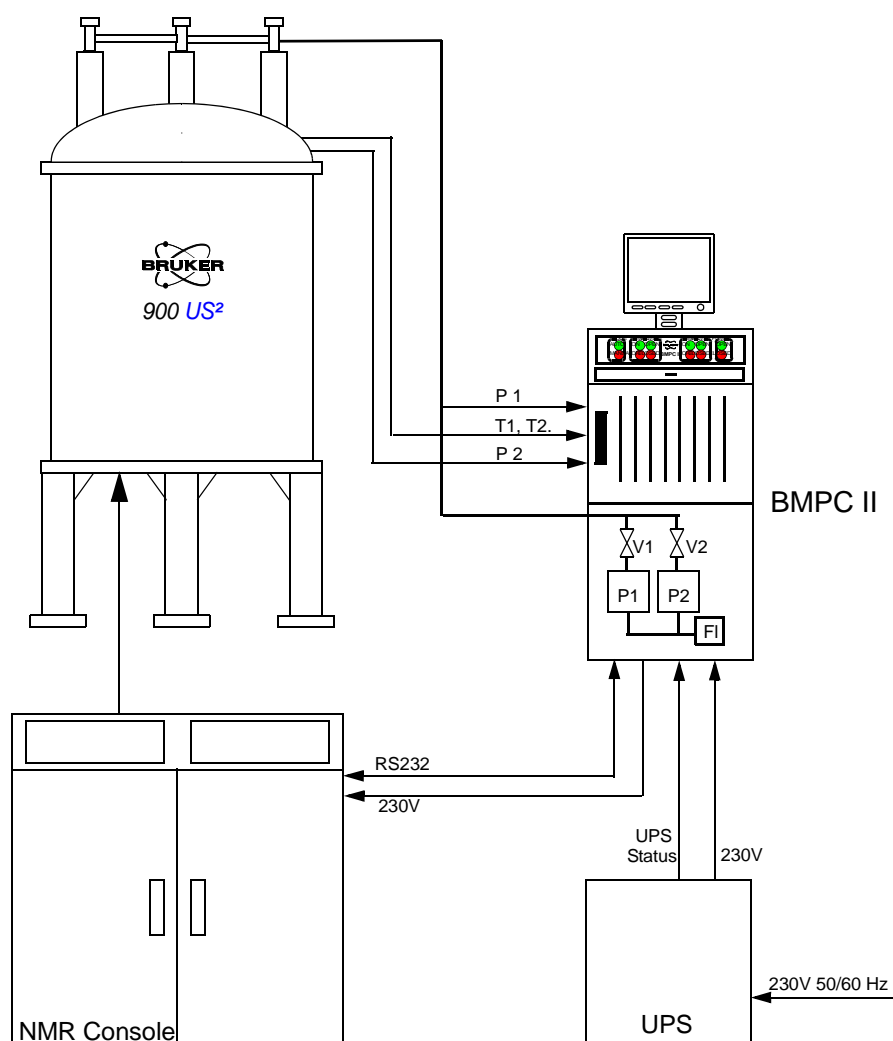
Disclaimer *1.2*

The BMPC II unit should only be used for its intended purpose as described in this manual.

Use of the unit for any purpose other than that for which it is intended is taken only at the users own risk and invalidates any and all manufacturer warranties.

Safety Issues *1.3*

Service and maintenance should only be accomplished by qualified personal.

Only personnel trained on the use of the BMPC II should operate the unit.

Read this manual completely before operating the BMPC II. Pay particular attention to any warning references made.

Warnings and Notes *1.4*

There are two types of information notices used in this manual. These notices highlight important information or warn the user of a potentially dangerous situation. The following notices will have the same level of importance throughout this manual.

Notes: Indicates important information or helpful hints. Please read the information carefully and act accordingly. Neglecting to follow the information may result in the machine not performing in the expected way.

Warning notices. Indicates the possibility of severe personal injury, loss of life or equipment damage if the instructions are not followed.

Contact for Additional Technical Assistance *1.5*

For further technical assistance on the BMPC II unit, please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

BRUKER BioSpin GMBH
Silberstreifen 4
D-76287 Rheinstetten
Germany

Phone: + 49 721 5161 0
FAX: + 49 721 5171 01
E-mail: Service@bruker-biospin.de
Internet: www.bruker.de

Product Name: BMPC II Magnet Pump Control
Part Number: H13031

If contacting Bruker always provide the serial number of your BMPC II.

Introduction

Manual Mode

2

Introduction *2.1*

The manual mode is the standard mode after a power on or reset. In manual mode all the pumps and valves can be operated manually.

Working in Manual Mode *2.2*

The operation of the pumps and valves in manual mode takes place with the help of the different keys on the front plate of the BMPC II control unit.

Figure 2.1.   BMPC II Control Unit Front Plate

Mode Keys   Pump 1 Keys   Valve 1 Keys   Pump 2 Keys   Valve 2 Keys   Valve 3 Keys
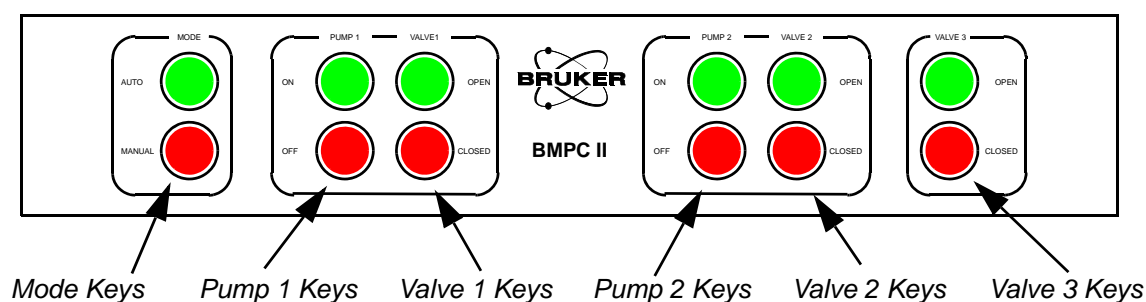
Mode Keys *2.2.1*

The mode keys are used to switch between manual and automatic mode.

To enter automatic mode press the AUTO mode key. The green lamp will light once the unit switches to automatic mode.

To return to manual mode press the MANUAL button. The green light will turn off and the red lamp will light indicating that the unit is in manual mode.

Pump 1 and Valve 1 Keys *2.2.2*

The Pump 1 and Valve 1 keys allow you to operate the BMPC II in manual mode. Pressing the Pump 1 ON key will start the Pump 1 and pressing the Valve 1 OPEN key will open the Valve 1. Likewise pressing the Pump 1 OFF key will stop the Pump 1 and pressing the Valve 1 CLOSE key will close the Valve 1. The pertinent lamps will indicate the current condition. The green lights will indicate that the pump is running or the valve is open. The red lights will indicate that the pump is off or the valve is closed.

Pump 2 and Valve 2 Keys   2.2.3

The Pump 2 and Valve 2 keys have the same function as the Pump 1 / Valve 1 described in the previous section, the only difference is that they affect Pump 2 and Valve 2.

Valve 3 Keys   2.2.4

The Valve 3 keys are intended for future extensions and presently are not used. When you press the keys you will hear a click, but no function will be performed.

Pumps and Valves in Manual Mode   2.3

In manual mode it is possible to use Pump 1 together with Valve 1 opened, Pump 2 with Valve 2 opened, or both pumps together with both valves opened.

When you use a pump in manual mode, always switch the pump on first, then wait 10 to 15 seconds before you open the associated valve. This procedure prevents a possible return flow of air into the pump line. Before switching a pump off, always close the associated valve first!

Never use Pump 1 when Valve 2 is open, or Pump 2 when Valve 1 is open. This can result in a return flow of air into the pump line and an increase in the magnet temperature.

In manual mode the condition of the pumping system is not monitored, thus when a pump or valve is not working correctly the system will not react.

In manual mode the BMPC II will not react to critical magnet parameters, e.g., when the helium flow is too low the Pump 2 will not automatically switch on.

However, when the BMPC II software is operating in Monitor & Alarm mode, you will nevertheless be alarmed when important magnet parameters exceed or fall below their limit values.

Therefore always place the BMPC II software in Monitor & Alarm mode when working in manual mode!

Refer to the section ***"Monitor & Alarm Mode" on page 25*** for more information on the BMPC II software.

Manual Mode

Automatic Mode

3

Introduction *3.1*

In automatic pump mode all the pumps and valves are controlled automatically. It is not possible to operate a pump or valve manually using the front panel keys.

Automatic pump mode is the preferential mode for the BMPC II.

Working in Automatic Pump Mode *3.2*

To use the BMPC II in automatic pump mode when you are in manual mode press the AUTO key. The green lamp indicates when the unit is in automatic pump mode.

Figure 3.1. Automatic Pump Mode vs. Manual Pump Mode
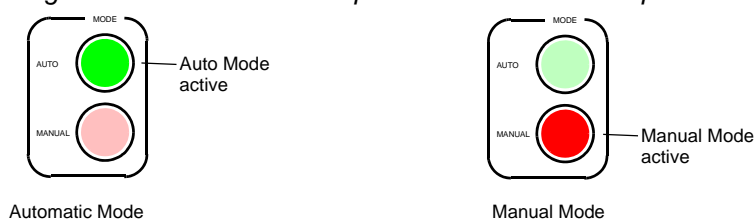
The BMPC II uses the currently running pump as the default pump for the automatic pump mode. If no pump is running when the unit is switched to automatic pump mode, then Pump I will be used as default. When both pumps are running when the unit is switched to automatic pump mode, then both pumps will be regarded as default pumps.

Using Pump 1 in Automatic Pump Mode *3.2.1*

When Pump 1 is used as the default pump in automatic pump mode, then the BMPC II continuously monitors the condition of this pump and the corresponding Valve 1. If either the pump or the valve malfunctions, the valve is closed automatically and the pump is stopped. Pump 2 then switches on automatically and the corresponding Valve 2 is opened. The BMPC II software then displays an error message.

Using Pump 2 in Automatic Pump Mode *3.2.2*

When Pump 2 is used as the default pump in automatic pump mode, then the BMPC II continuously monitors the condition of this pump and the corresponding Valve 2. If either the pump or the valve malfunctions, the valve is closed automat-

ically and the pump is stopped. Pump 1 then switches on automatically and the corresponding Valve 1 is opened. The BMPC II software then displays an error message.

Using Pump 1 and Pump 2 in Automatic Pump Mode *3.2.3*

When both Pump 1 and Pump 2 are used at the same time in automatic pump mode, the condition of both pumps and there corresponding valves are monitored by the BMPC II. Should one of them fail, the corresponding valve will be automatically closed and the pump will be shut off. The other pump will continue to operate and the BMPC II software displays an error message.

Monitoring in Automatic Pump Mode *3.3*

When you work in automatic pump mode, the BMPC II continuously supervises the most important magnet parameters and compares these with their preset limit values.

When the BMPC II uses an additional pumping system due to a limit value being exceeded, the pump will always operate for at least 1 hour. Afterwards the pump may continue to run for an additional hour or will be switched off depending on the the actual system status.

P1 Pressure Monitoring *3.3.1*

The P1 pressure is continuously monitored against a pre-specified upper and lower limit and the following actions taken if one of these limits is reached:

- When the P1 pressure is **lower** than the P1 **low warning** limit, then a warning is triggered.

- When the P1 pressure is **lower** than the P1 **low alarm** limit, then the alarm cycle is activated, if the software works in Monitor & Alarm mode.

- When the P1 pressure is **higher** than the P1 **high warning** limit, then the second pump is started and a warning is triggered

- When the P1 pressure is **higher** than the P1 **high alarm** limit, then the second pump is started and the alarm cycle is activated, if the software works in Monitor & Alarm mode.

T1/T2 Temperature Monitoring *3.3.2*

The T1 and T2 temperatures are continuously monitored against a pre-specified lower limit and the following actions taken if the limit is reached:

- When the T1 or T2 temperature is **lower** than the T1/T2 **warning** value, then the second pump is started and a warning is triggered.

- When the T1 or T2 temperature is **lower** than the T1/T2 **alarm** value, then the second pump is started and the alarm cycle is activated, if the software works in Monitor & Alarm mode.

FI Helium Flow Monitoring *3.3.3*

The FI helium flow value is continuously monitored against a pre-specified lower limit and the following actions taken if the limit is reached:

- When the FI value is **lower** than the flow **warning** value, then the second pump is started and a warning is triggered.

- When the FI value is **lower** than the flow **alarm** value, then the second pump is started and the alarm cycle is activated, if the software works in Monitor & Alarm mode.

Automatic Mode

Software

4

The BMPC/2 control & monitoring software is the user interface for the entire BMPC II. The software is necessary for adjustment of all the important BMPC II and magnet system parameters, as well as for the monitoring of all functions during normal operation.

Five different screen modes and four different work modes are available in the software interface.

Figure 4.1.   BMPC II Process Display
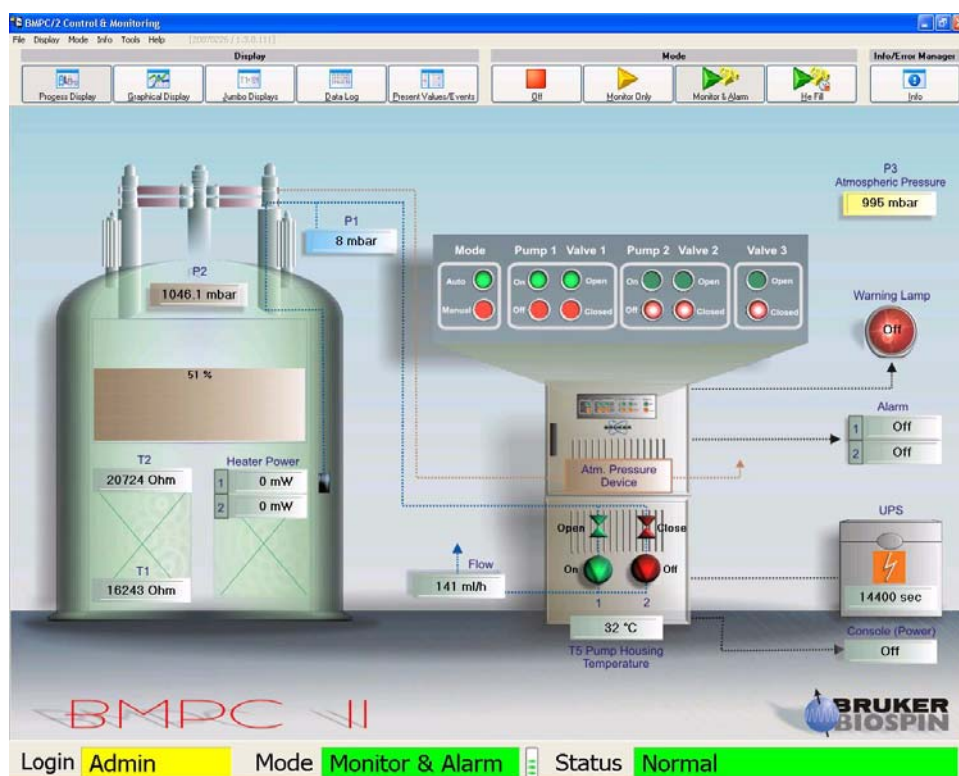
Figure 4.2.   BMPC II Login Screen
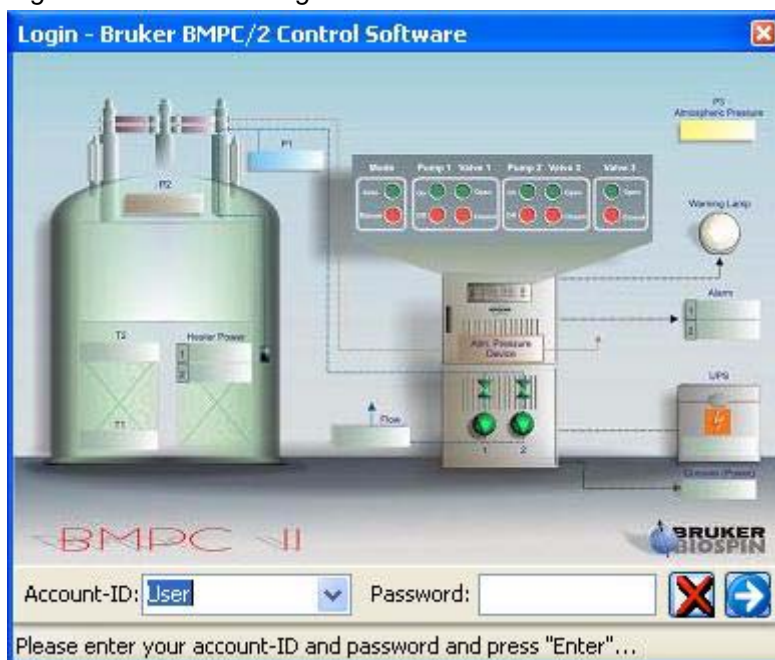
In order to start the BMPC II Control Software you must enter your account ID and password and press „Enter". There are several different account levels available:

User - Standard User Level

This is the default user display mode. In this mode you can switch between the various display modes, but to change to the „Off mode" it is necessary to enter the User password. The use of the functions under the Tools menu option are not permitted at this login level. The program can not be closed in user level.

Administrator - Revisionary Level

This mode is necessary primarily for changes in the BMPC II setup. Most of the functions under Tools are available at this level, with a few exceptions that are reserved for the Service level. The program can be closed while in administrator level.

Service - Service Level

This level is only accessible by trained service personnel and is only required during installation.

To login into the service account the appropriate password is required. For more information refer to the section on *"Administration of Passwords" on page 103*.

Program Overview *4.3*

The following screen organization is used in all the display modes.

Figure 4.3.   Display Organization
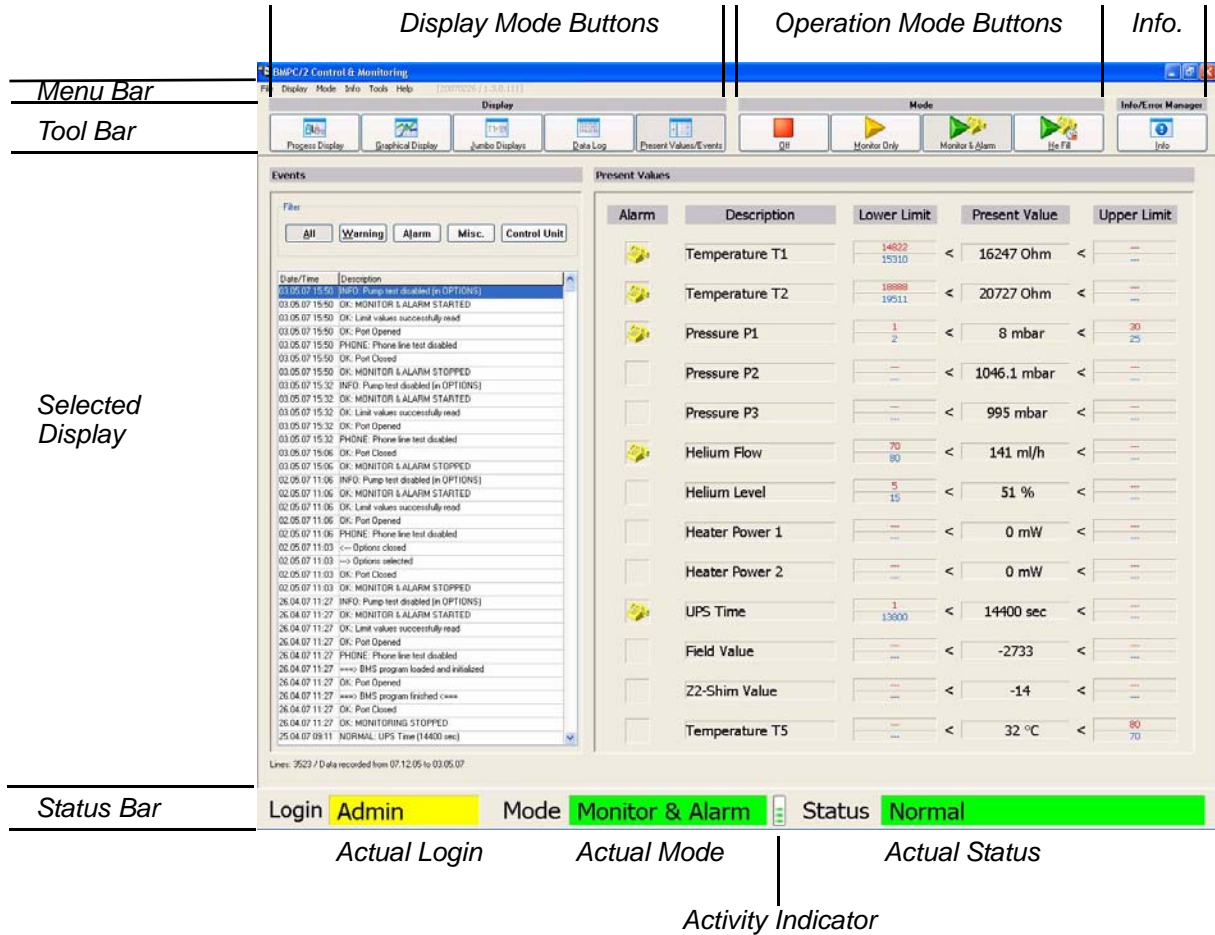
The top of the screen contains a standard Windows menu bar. Just under this is a tool bar which contains buttons providing quick access to the five different display modes, the four operation modes, as well as system information.

Under the tool bar is an area where the selected display mode is displayed. This will vary based on the mode you have selected. In the above example the Present Value/Event display is shown.

At the lower edge of the screen the current status of the system is shown. This includes the actual user login, the actual mode and the actual system status.

The Activity Level is also displayed at the bottom of the screen and indicates that communication between the PC and the control unit is taking place. This is continuously updated based on the current activity.

Operation Mode   *4.4*

With the help of Mode Buttons the user can navigate between the different operational modes of the software.

Figure 4.4.   Mode Buttons

OFF Mode   *4.4.1*

The OFF mode is necessary when software attributes need to be changed using the menu Tools option. The Tools menu option is only accessible when you shut operation mode to OFF. To set the operation mode to OFF, press the **Off** button in the toolbar. If you are logged in as User or Administrator you will be required to login again using the appropriate password.

The program can only be terminated if Off Mode is selected.

In Off Mode no data is written to the log files!
No alarm cycles are started in case of a malfunction!

Monitor Only Mode   *4.4.2*

In this mode all magnet and BMPC II data are displayed in accordance to the display mode that is selected. The data is also saved in the Data Log File when operating in this mode.

In Monitor Only mode the alarms are deactivated. When you operate your system in this mode you must remember that you are not operating at the highest safety level, when a magnet or BMPC II malfunction occurs you will not be informed through an alarm!

This mode is similar to the Monitoring Mode, but here the alarms are activated, you will be informed if a malfunction occurs.

Figure 4.5.   Present Values Display in Monitor & Alarm Mode
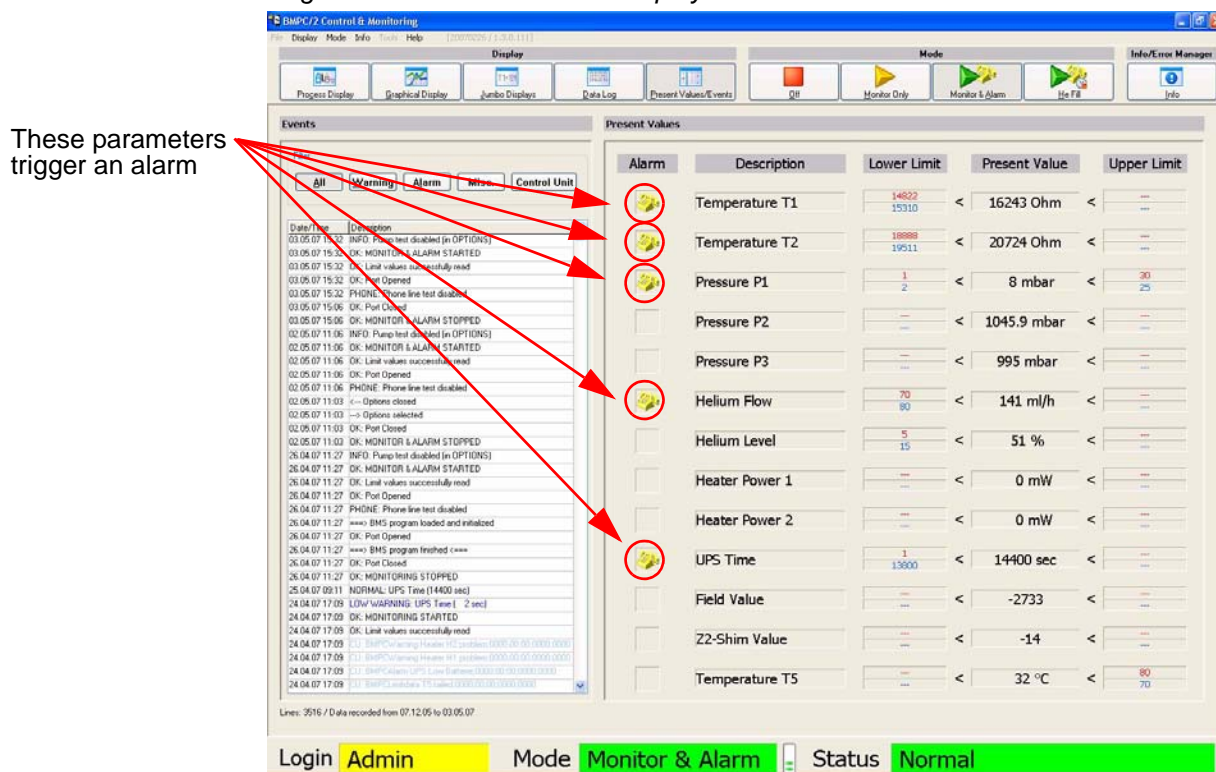
In the example above the Temperature T1, Temperature T2, Pressure P1, Helium Flow and UPS Time channel alarms are enabled. When one of these parameters is exceeded an alarm will be activated.

For a description of how to configure an alarm, refer to ***"Alarm Configuration" on page 62***.

Figure 4.6.   Temperature T1 in the Present Value Display
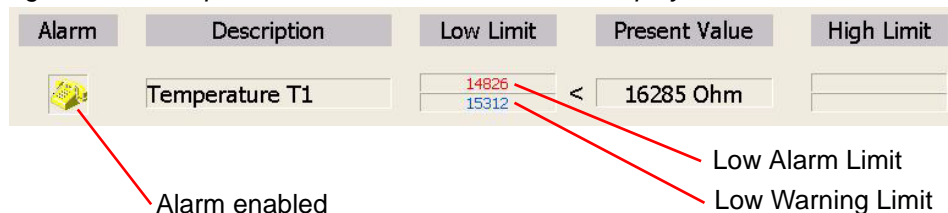
In the example above there is a low alarm limit of 14826 and a low warning limit of 15312 for the measured value Temperature T1. If the value for the Temperature T1 falls below the low warning limit value, the warning sequence is started. This means that the warning light appears and an entry is added to the event log file.

When an alarm is enabled, then an alarm will be triggered when a limit is reached, e.g. in the above example when the temperature falls below the low limit value. In this case an entry will be added to the event log file and the telephone alert notification will begin. Details on alarm procedures are discussed in the chapter ***"Alarm System" on page 61***.

He Fill Mode   *4.4.4*

The He Fill mode is useful when you refill the helium in the magnet. During the refilling process the T1 and/or T2 parameters, for which an alarm is furnished, briefly could fall below the alarm threshold. In order to avoid an alarm from being triggered the He Fill mode can be used which will suppress the T1/T2 alarm for a maximum of six hours.

In addition the P2 pressure control heater is disabled for one hour, as this is not efficient when the magnet is open and thus would only lead to unnecessary helium consumption.

When the He Fill mode is activated it is indicated in the status bar together with the length of fill time remaining.

Figure 4.7.   He Fill Mode 292 Minutes

The temporarily suppressed alarms are represented in the Present Values/Event display as indicated in the figure below.

Figure 4.8.   Alarm Temporarily Disabled

Alarm temporarily disabled

Once the helium refill is finished and the remaining time was expired, the program will automatically leave He Fill mode and return to monitoring mode.

Please read chapter ***"He-Refill / He Measurement" on page 53*** for configuring the He Fill mode.

Display Mode *4.5*

Using the five display buttons, you can easily switch between the five different display modes.

Figure 4.9.   Display Buttons
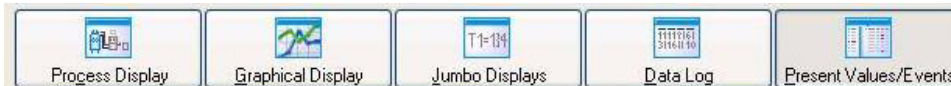
Process Display *4.5.1*

The process display is the default display in display mode. All magnet and BMPC II parameters are indicated in a representative process image. Thus, a correlation of the parameters to their functions is available at any given time.

Figure 4.10. Process Display
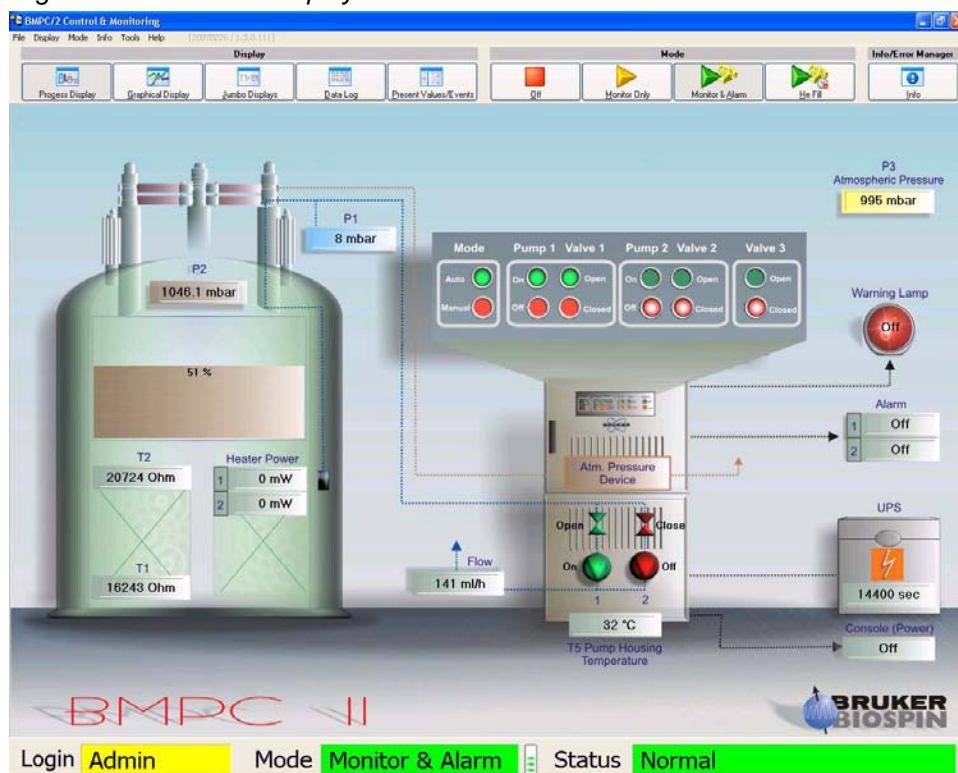
The graphical display allows you to plot arbitrary parameters on a timeline. Up to 3 different parameter groups can be represented simultaneously on the display screen. The parameter display is freely configurable according to specific needs.

Figure 4.11. Graphical Display

Configuration

Parameter Group 1 T1 and T2

Parameter Group 2 P2 and P3
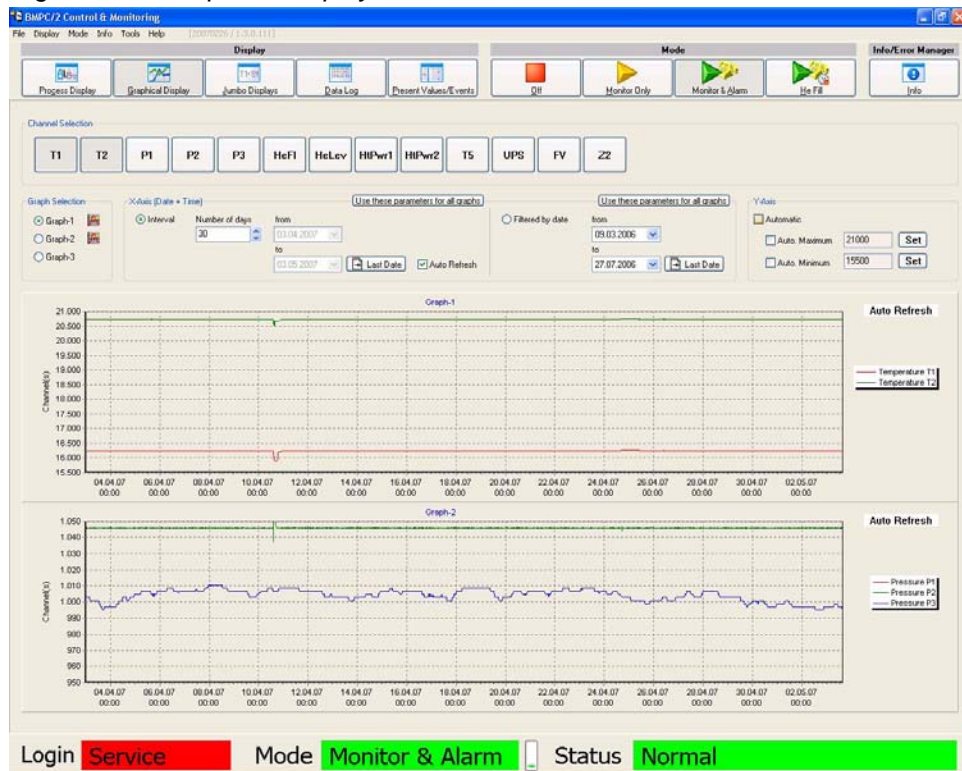
In the example above is a configuration for two groups of parameters. The settings for both groups of parameters is identical. In both examples data for the last 30 days is represented. Whenever new data is added to the log file the graphical display is automatically updated (refreshed).

Configuration

The configuration functions allow you to adapt the graphical display representation to your individual needs.

Figure 4.12. Graphical Display - Configuration X-axis

Channel Selection T1 + T2

Graph Selection Graph1

Interval Selection   Last Date   Auto Refresh   Filtered by Date Selection
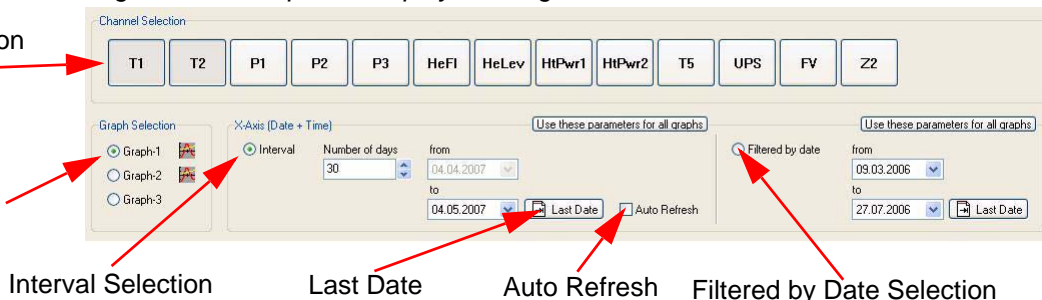
You can select up to 3 channels from the Channel Selection bar to be displayed on the selected graph. In the above example T1 and T2 parameters for Graph 1 have been selected.

For each graph you can subsequently adapt the X-axis (time) and the Y-axis (size) display to conform to individual requirements.

The configuration of the X-axis can either be an interval display or a filtered display based on a specified date.

- Interval display: The desired number of day to be represented, as well as the final date can be configured. The last logbook entry can be displayed by clicking on „Last Date". When you also select the auto-refresh option the graphical display will be automatically updated when a new logbook entry is made. In this case entering a Last Date is not possible.

- Filtered display: If you want to view the data from a certain timeframe, you can do so by entering a beginning and ending date.

By clicking on the „Use these parameters for all graphs" button the adjustments that have been made will automatically be used for all the other graphs, so subsequently they will all use the same time axis.

The adjustment of the Y-axis can take place automatically or manually.

Figure 4.13. Graphical Display - Configuration Y-axis

Automatic Y-Axis Configuration   *Manual Y-Axis Configuration*
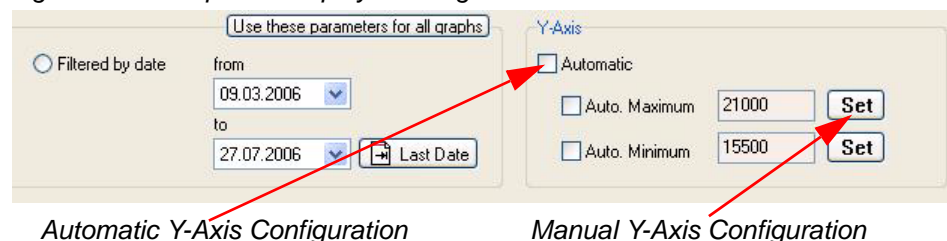
- **Automatic:** When Automatic is selected, the range of values is computed automatically based on the maximum and minimum values that have to be displayed. You can either select both, the maximum and the minimum to be computed automatically or just the maximum or just the minimum

- **Manual:** When Automatic is not selected, you can manually select the values by pressing the corresponding Set button and entering the values in the dialog window that appears.

The manual mode is meaningful when a value does not change over the entire given period and thereby the display of the upper and lower margins will always appear in the field of view.

Zoom Function

To improve the resolution, you can use the zoom function to enlarge parts of the graphical data. Therefore move the mouse cursor, with the left mouse key pressed, from the upper left corner to the lower right corner of the display window to zoom. You can repeatetly zoom the same data until you will get the best result.

Figure 4.14. Graphical Display - Zoom Function

Zoom into this selection   to get this result:
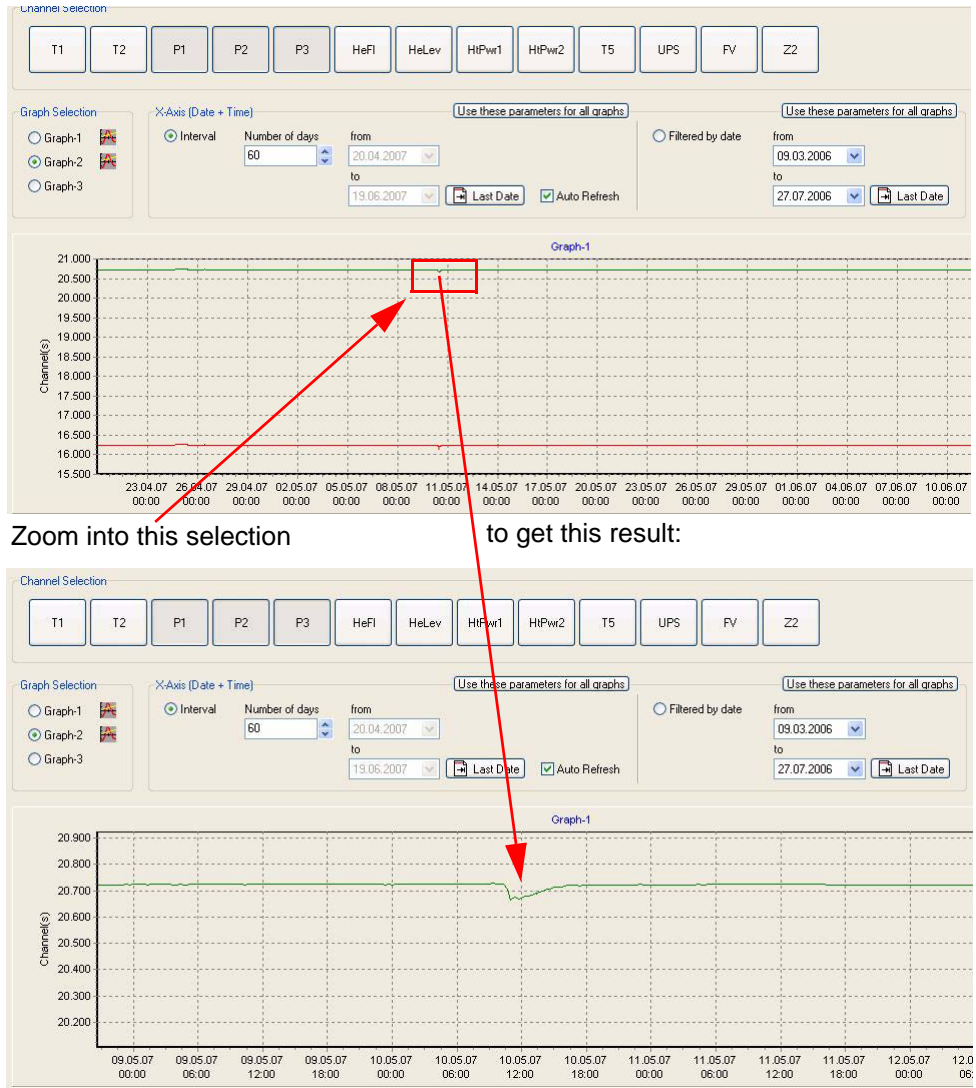
To undo the zoom function you only have to move the mouse cursor, with the left button pressed, from the lower right to the upper left anywhere in the zoomed area of the display. Only one zoom out is necessary to zoom back to the original display size.

In Jumbo display mode you can display up to 5 parameters using an extra large font size. This is useful if you want to read the displayed values when you are a greater distance away from your monitor.

Figure 4.15. Jumbo Display
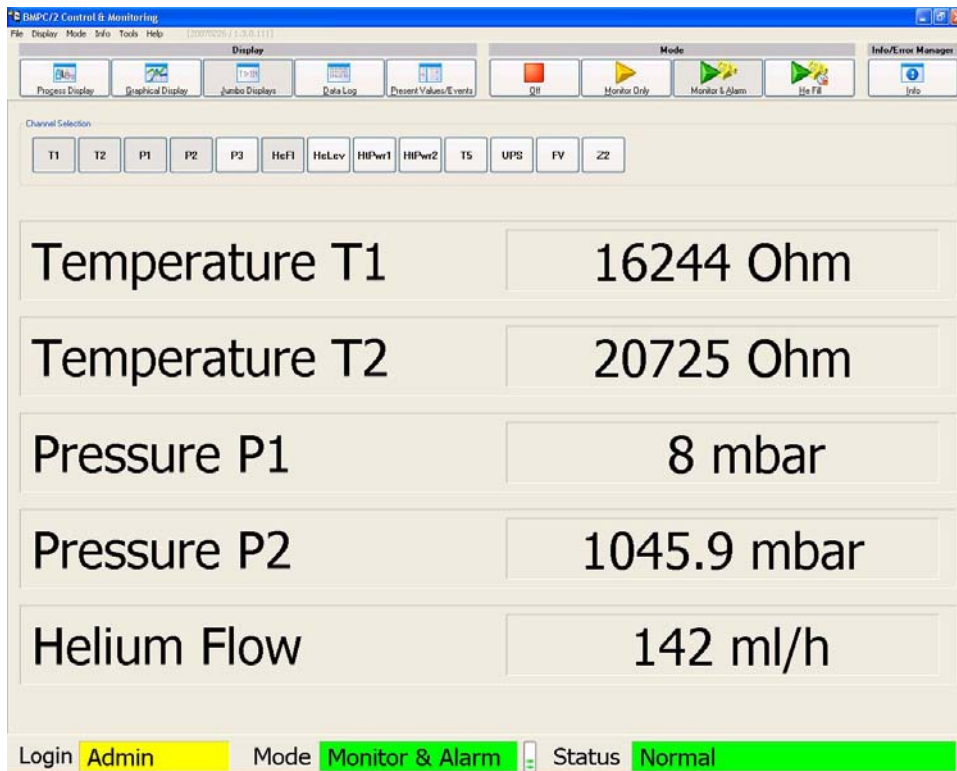
Configuration of the Jumbo Display

You can configure which parameters that will be displayed in the Jumbo Display using the Channel Configuration buttons.

Figure 4.16. Jumbo Display Configuration
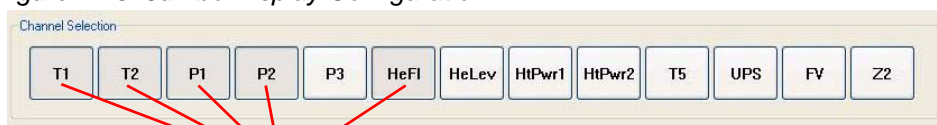
These channels have been selected to display in the Jumbo Display

The buttons that are grayed out in the Channel Selection area in the figure above are displayed using the extra large font size in the Jumbo Display window. To remove a parameter from the list you only need to click once on the corresponding channel button. To add a new channel to the Jumbo Display, simply click on the appropriate channel button. You can display up to 5 parameters at a time in the Jumbo Display. The order in which the individual parameters are displayed in the Jumbo Display are a result of the order in which the channels are selected.

The Data Log display is in the broadest sense a database browser. In this display you can display all the parameter data that is stored in the database.

Figure 4.17. Data Log Display
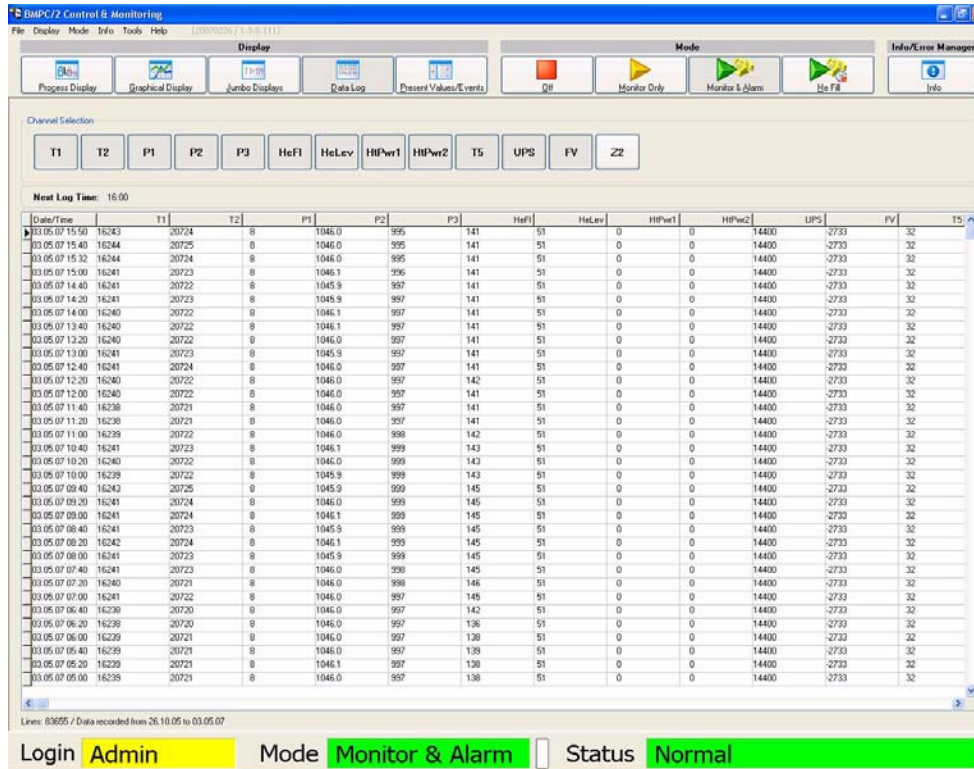
Here you can also determine which parameters will be displayed using the Channel Select buttons. The channels are arranged from left to right in order of selection. When more channels are selected than can be displayed in one screen, a horizontal scrollbar will appear which allows you to scroll to the other parameters.

The channel selection does not influence which data is stored in the log file, rather it only serves for the purpose of display in this display mode.

When a large quantity of data is stored in the data log file, it may take longer for the data to be displayed.

Refer to *"Sensor Channels" on page 51* for details on how to configure database entries.

The Present Value/Event Display provides a quick overview of how the system is configured, indicates whether there are any events which must be examined or can be used simply to present the current data in a simple table representation.

Figure 4.18. Present Values / Event Display
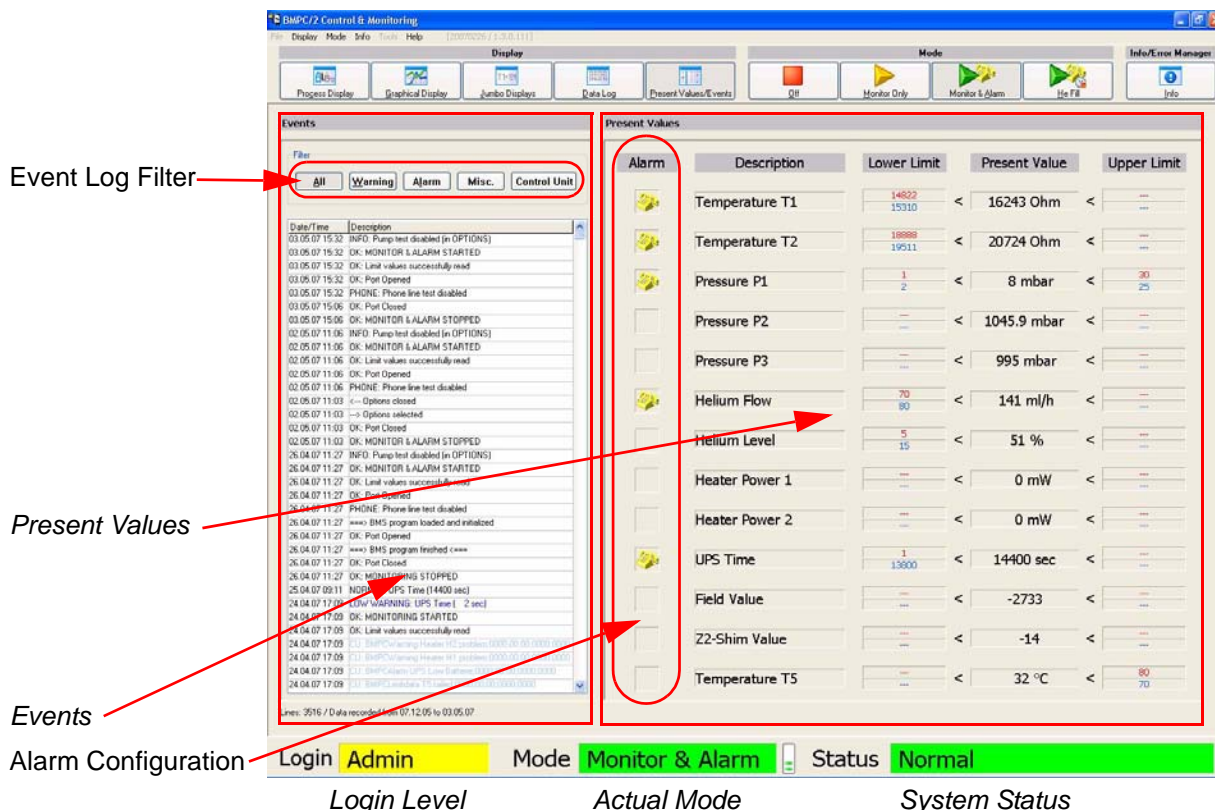
The Event Log allows you to examine all the BMPC II procedures. Here are all the warnings, alarms, system messages, as well as all error messages from the BMPC II Control Unit displayed. The Event Log filters allow you to select only the data that is relevant for your purposes.

The default filter setting is „All" (gray in the example). You can indicate which warning messages you want to display by clicking once on the appropriate button. You can select multiple filters by clicking on additional filter buttons. To deselect a filter you only need to click on the corresponding filter button again. When the Warning, Alarm, Misc. and Control Unit buttons are all pushed it is the same as when the All button is pressed.

With the help of the alarm configuration field, you can see which channels will trigger an alarm when a malfunction occurs in Monitor & Alarm Mode (refer to ***"Monitor & Alarm Mode" on page 25***). More information on configuring alarms can be found in ***"Alarm Configuration" on page 62***.

If you are logged in as a user or administrator, the display automatically will change to the Present Values / Event mode everytime a new entry to the Event log is written.

Automatic pump test 4.6

The BMPC II has two vacuum pumps, only one of which is needed during normal operation. The second pump is only required in the event of a malfunction. To ensure correct operation, should the second pump be needed, it must be tested on a regular basis.

To automate this test the automatic pump test has been implemented.

Function of the automatic pump test 4.6.1

To test the spare pump it is used instead of the original pump to operate on the pump line. During this time the pressure P1 and the helium flow Fl are monitored. If the spare pump is working correctly, these parameters are only allowed to deviate within a given range.

Test cycle

The spare pump is switched on. During the following minute the He-flow is monitored. If the pump is operating correctly, a short increase of the He-flow can be seen. This is due to the gas between the pump and its valve, which must first be pumped out. Only if this increase is observed does the test proceed to the next step.

Its valve is now opened and the original valve used is closed. The pump under test is now working on the pump line. The original pump is not switched off. A delay of one minute is now needed until the values for P1 and Fl have stabilised again.

During the following minute, the Pressure P1 and the Helium flow Fl are carefully monitored. Both parameters are allowed to deviate +- 15% from the original value. Only if within these limits is the pump test successful.

Following this phase of the test the valves are switched back to their original position. After a short delay of 15 seconds the pump under test is also switched off. Now the standard pump is working on the magnet again. During the following phase a decrease of the He-flow can be observed. This is due to a backflow of gas between the Helium flow sensor and the pump under test and its valve.
The test cycle now waits for another minute until all values have stabilized again and then the automatic pump test is finished.

If a problem occurs during the automatic pump test the test cycle is immediately aborted and the original pump configuration restored.

An error message is then displayed in the info window and in the event log.

Alarms during the automatic pump test

To prevent false alarms during the automatic pump test, all alarms are temporarely disabled.

Figure 4.19. Tools - Options - Control Unit - Pump Test - Configuration

enable/disable automatic pump test

select time and date for the next automatic pump test

select interval time for automatic pump test
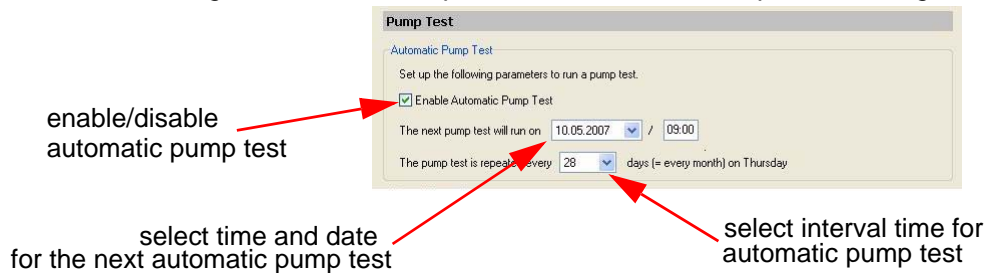
If the automatic pump test is enabled using the checkbox then the next pump test cycle will start at the selected time on the selected date. In the event log window (display mode „Present Values/Events") this is shown every time you start the Monitoring & Alarm mode. If the pump test is disabled this is also shown.

Figure 4.20. Event log - pump test

next pump test starts on 24.05.07 at 9.00

pump test disabled

Each successive automatic pump test is started at the same day of the week at the same time. You have the choice of selecting 1 week, 2 weeks, 4 weeks, 8 weeks or 12 weeks as an interval time between consecutive pump tests.

We suggest a pump test once a month (every 4 weeks).

The automatic pump test is only possible if the BMPC II is running in automatic mode!

To check the function of the spare pump manually or to demonstrate the operation of the automatic pump test you can start the pump test manually using the menu *Options - Pump Control - Pump Test*.

Figure 4.21. Tools - Options - Control Unit - Pump Test

manual start of pump test
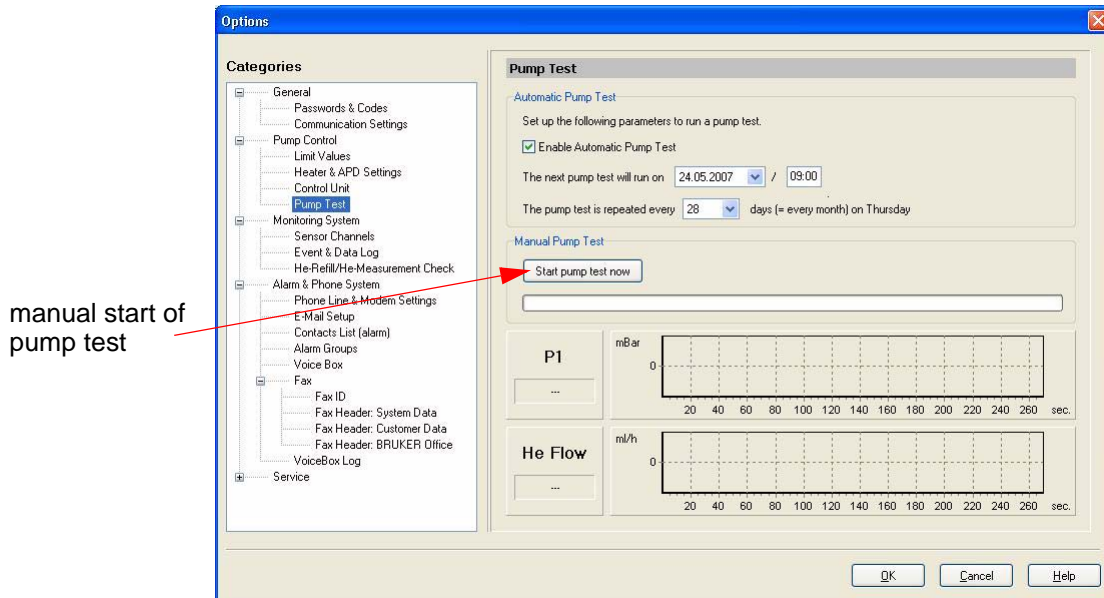
Check that the BMPC II is in automatic pump mode then press the button „Start pump test now". The pump test will now proceed as described before. A status bar and a text output shows the present status of the pump test cycle.

The field P1 shows the value of the pressure P1 and also a diagram of the pressure against time. The same applies for the He Flow. The x-axis is adjusted automatically.

If the automatic pump test is disabled, a faulty backup pump cannot be recognised. In the event that it were required it could not be used. This could lead to instabilities of the magnet. Also this will trigger an alarm cycle.

Configuration

5

Introduction   *5.1*

In order for the BMPC II to operate optimally several system parameters must be adjusted. In addition, some local adjustments are needed concerning the telephone system that is used and the error alerts that are required.

While installing the system, all settings concerning the magnet system are adjusted using the Magnet Configuration Wizard. The laboratory environment settings are adjusted with the help of the Customer Configuration Wizard.

The *"Magnet Configuration Wizard"* can be accessed using the menu *Tools - Magnet Setup*. Likewise, the *"Customer Configuration Wizard"* can be accessed using the menu *Tools - Customer Setup*.

Changes to an existing configuration can be made in the *"The Options Menu"*.

Magnet Configuration Wizard   *5.2*

The Magnet Setup Wizard is used to adjust the magnet dependent data, including all limit adjustments and adjustments for the magnet heater.

To access the Magnet Setup Wizard select *Tools - Magnet Setup* from the main menu. Press the **Next** button to precede to Step 1: Input of magnet parameters.

Figure 5.1.   Magnet Setup Step 1

Select the magnet type

Enter the data for the glass carbon sensors T1 + T2

These values will be automatically calculated

Configuration

Select your magnet from the pull-down list and enter the temperature measuring resistance for T1 and T2. The limit data is then calculated automatically. Press the **Next** button to continue to the next magnet setup step.

Figure 5.2.   Magnet Setup Step 2

Set Point for P2

Resistance Value for Heater 1 and for Heater 2
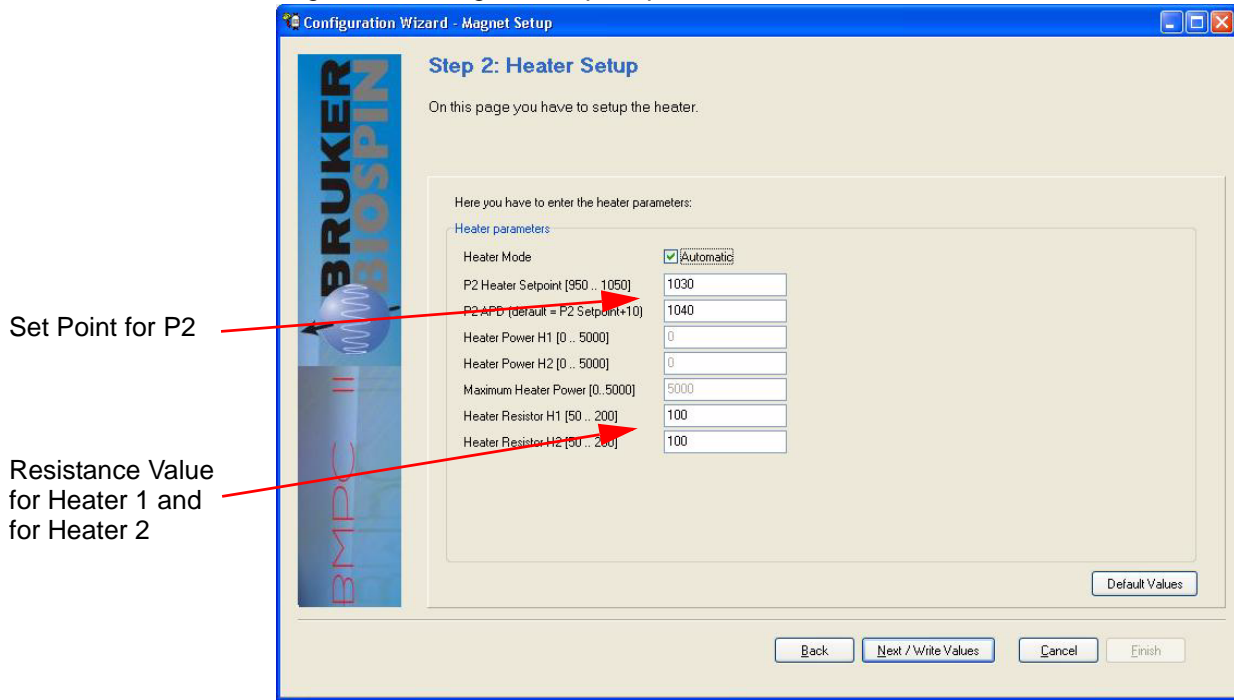
During step 2 you will be required to enter the Set Point for pressure value P2. This is the pressure that is to be reached with the help of the heating regulator. The P2APD set point will be calculated automatically.

Next, enter the resistance values for the two heating resistors. These are usually 100 Ohms. More detailed information can be found in the magnet manual.

Press the **Next/Write Values** button to assume the configuration data. You will be prompted to confirm that the configuration is correct, answer **Yes** when the data is correct or **No** if you need to revise the data.

Customer Configuration Wizard *5.3*

The telephone system, modem adjustments and alarm system for the BMPC II can be configured using the Customer Configuration Wizard.

To start the wizard select *Tools - Customer Setup* from the main menu.

Press the **Next** button to advance to the first step, Phone Line and Modem Settings.

Phone Line & Modem Setting *5.3.1*

Figure 5.3.   Customer Setup - Phone Line & Modem Settings

Enter the requested information and confirm it by pressing **Next**. This will advance you to the next step, the Contacts List setup.

Contacts List *5.3.2*

In this step data for the individuals that will be called in case of an emergency will be registered. You will also need to enter the private telephone numbers of at least 4 individuals responsible for the magnet system in case of a malfunction.

Enter the name, in-house work telephone number (proceeded with a „#" symbol), external telephone number in international format, and when available the E-mail address for each of the responsible individuals. At least 4 individual external telephone numbers and 2 individual internal telephone numbers are required. Cell phone numbers may be entered for the internal telephone numbers.

Figure 5.4.   Customer Setup - Contacts List (alarm)

When you desire that an additional fax (in addition to Bruker Germany) be sent in case of an alarm, enter the fax number in the space provided.

The 4 responsible individuals should be able to carry out the necessary steps required to stabilize the system in the event of a malfunction. Routine training of these individuals is highly recommended!

Once you have entered the required data, press the **Next** button to precede to the next step, Alarm Groups setup.

Alarm Groups   5.3.3

Figure 5.5.   Customer Setup - Alarm Groups
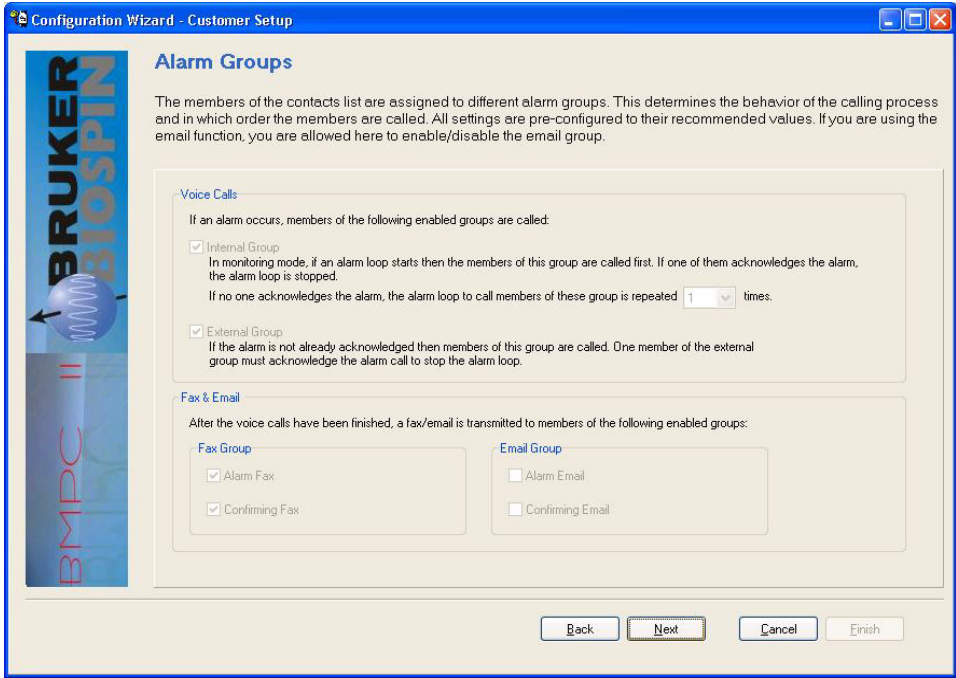
The Alarm Groups have already been pre-configured. Press the **Next** button to continue to the Fax Setup.

Fax Setup - Fax ID   5.3.4

Figure 5.6.   Customer Setup - Fax Setup - Fax ID

Configuration
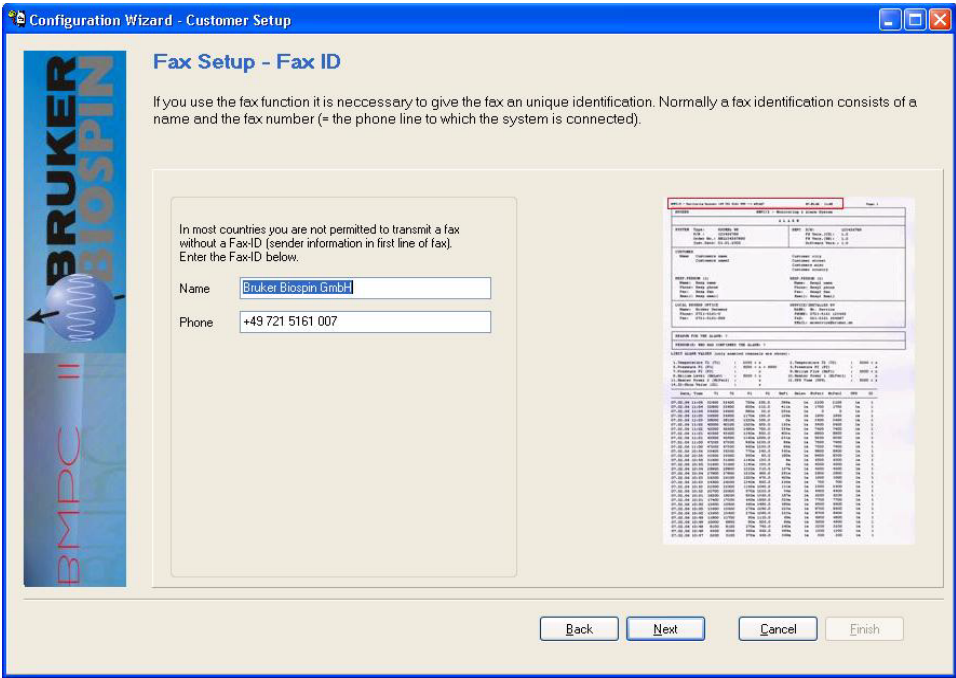
Enter the name of your company or institution and the appropriate fax number for the sender. These entries serve for the identification of the fax and do not influence the fax dispatch. Some countries require that this data be imprinted on each fax that is dispatched. This data apears on the fax as shown in the red marked area of *__Figure 5.6.__* Once you have entered all the information required, press the **Next** button to continue to the System Fax Header setup.

Fax Setup - Fax Header (System)   *5.3.5*

Figure 5.7.   Customer Setup - Fax Setup - Fax Header
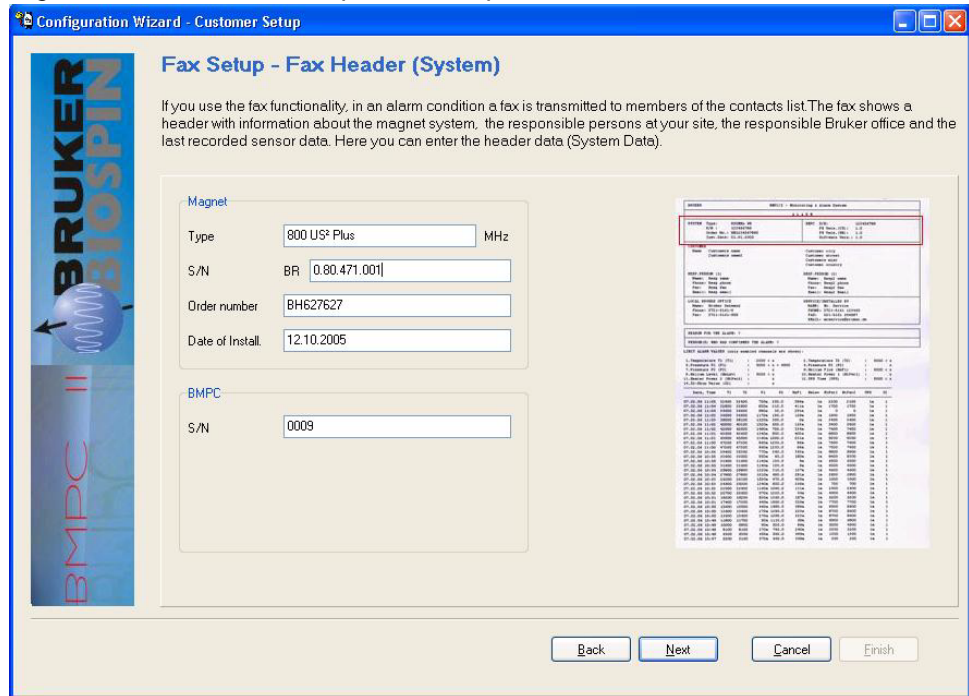
In this window you will be required to enter all the data related to your magnet system. When an alarm or status fax is sent this information will appear in the header of the fax, as indicated in the red marked area of *__Figure 5.7.__*.

When you have entered the required information press the **Next** button to continue to the Customer Fax setup.

Figure 5.8.   Customer Setup - Fax Setup - Fax Header (Customer)
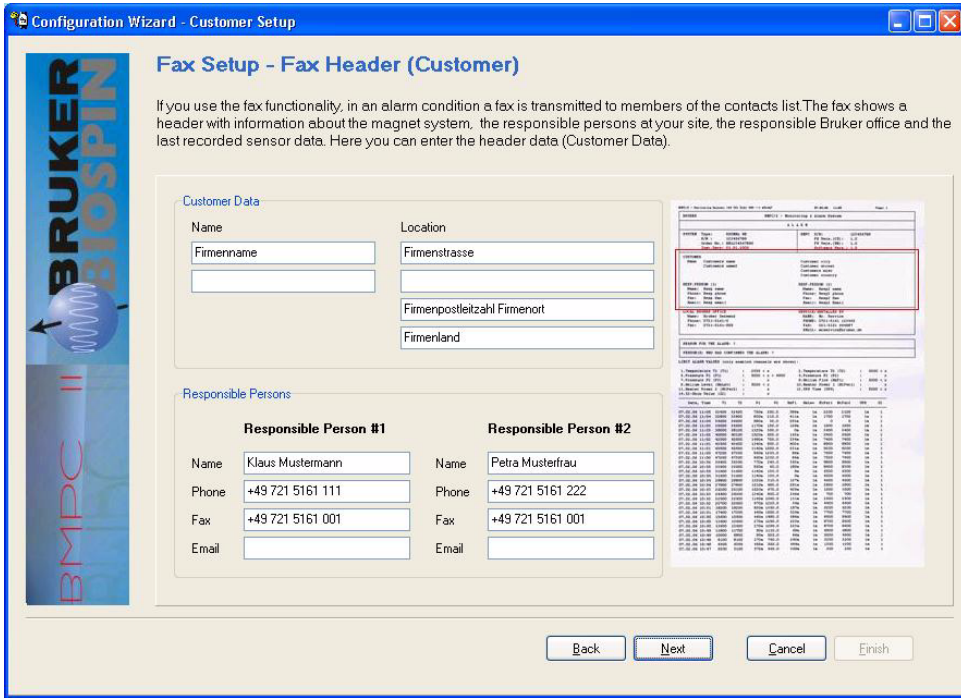
Enter the appropriate data for your company or institution in the Customer Data area of the setup form. Likewise, enter the individuals responsible for the magnet system in the space provided.

In the event of an alarm, Bruker can only provide effective assistance if all the information is entered in this setup window for the detailed fax alarm!

The data that is entered in this setup window will appear on the Alarm/Status fax as indicated in the red marked area of ***Figure 5.8.***.

When you have entered the required information press the **Next** button to continue to the Bruker Office Fax setup.

Configuration

Figure 5.9.   Customer Setup - Fax Setup - Fax Header (Bruker)
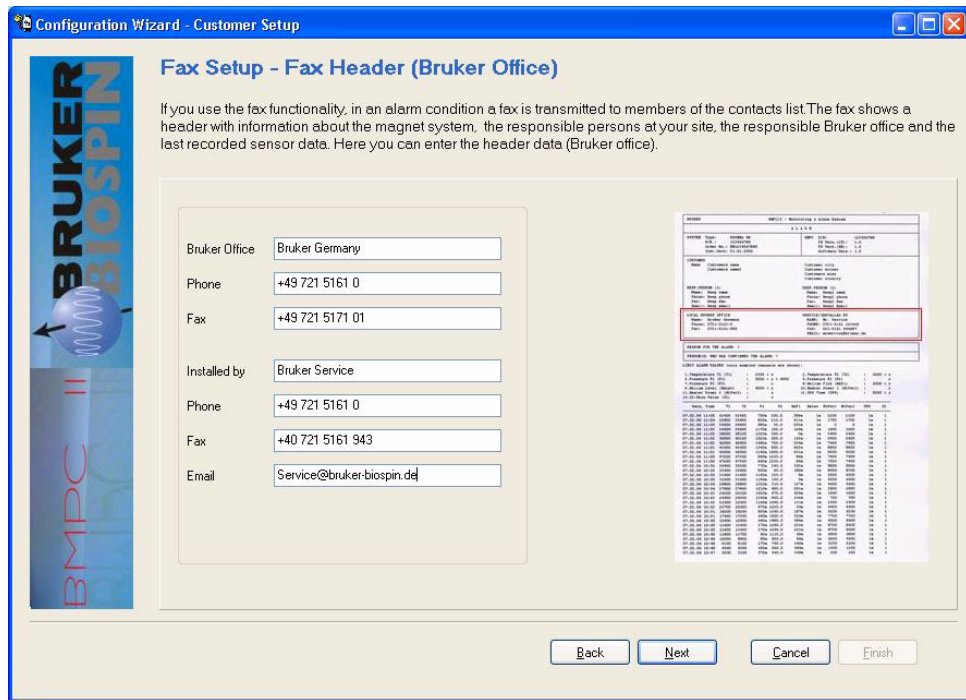
Enter the data for your local Bruker office in the upper fields of the setup window. In the lower fields enter the necessary information concerning the service engineer who installed the system.

The data that is entered in this setup window will appear on the Alarm/Status fax as indicated in the red marked area of ***Figure 5.9.***.

When you have entered the required information press the **Next** button to view a summary of the customer setup.

Figure 5.10. Customer Setup - Summary
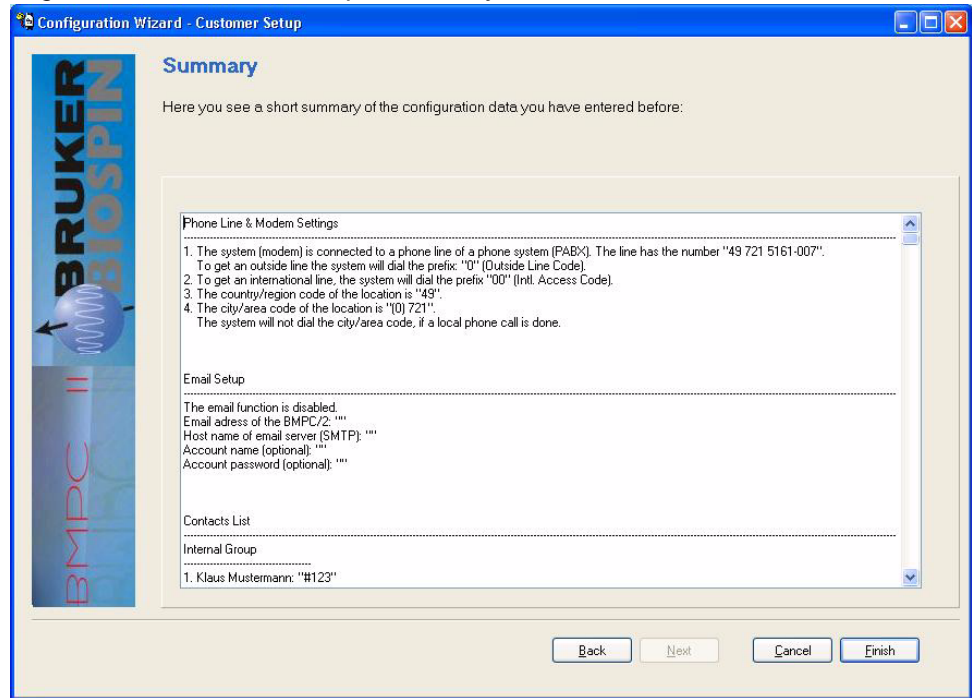
Verify the information in the summary for accuracy and completeness. If the information is correct press **Finish** to complete the setup, or **Back** to correct any setup data.

The Options Menu 5.4

The Options Menu allows you to make basic adjustments to the BMPC II. The adjustments that are allowed are based on the login level. You need to login as an administrator to make changes using the Tools - Options menu.

Figure 5.11. Tools - Options Menü

Options - General 5.4.1
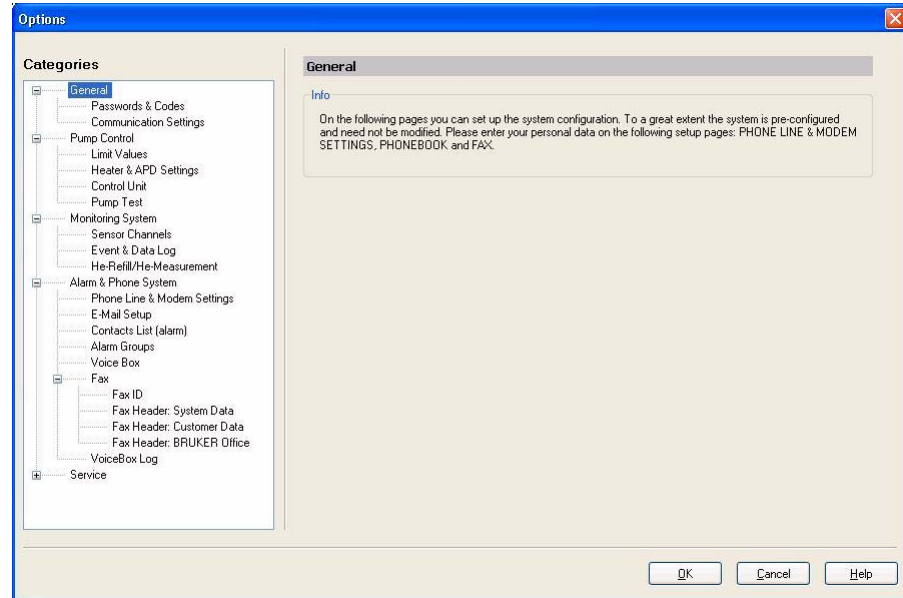
Password & Codes

Figure 5.12. Tools - Options - Passwords & Codes

The Passwords & Codes option allows you to assign passwords to access different rights of access. You can also change the codes necessary for controlling the system voice box.

Press the **OK** button in the main Options window to confirm the changes when you finished.

The service access password for your system is faded out and cannot be modified.
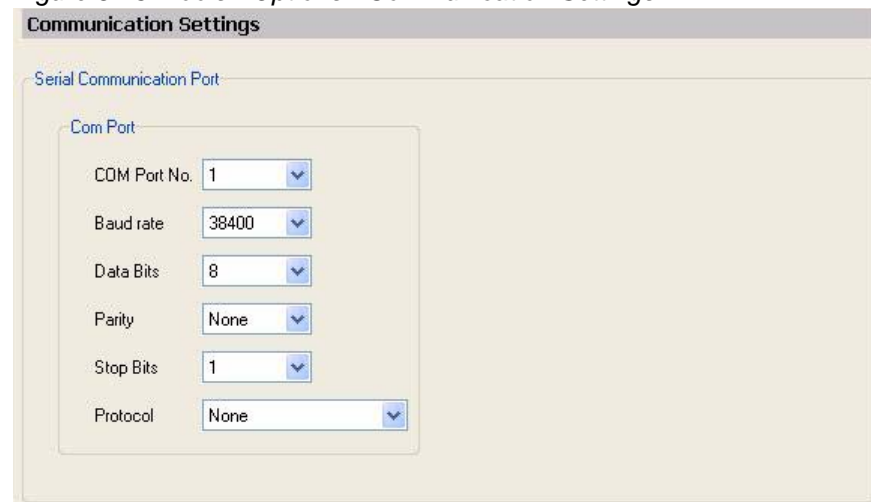
Only the passwords that are relevant for the current login level are displayed in the setup window. In this example the user was logged in as administrator.

If you have changed a password which was used by another person, do not forget to inform them about the changes!

Communication Settings

Figure 5.13. Tools - Options - Communication Settings

This settings window allows you to setup the communication parameters for the serial communication port. These values are correctly set at the factory and normally only need to be changed if the hardware configuration changes. In the above example the default values are shown, these can be used to restore the settings in case they are changed inadvertently.

Limit Values

The Pump Control option setup window allows you to set the various limit values for site conditions. Default values are normally already assigned during the magnet setup wizard, thus an adjustment is only needed in rare cases.

Changing the limit values may result in the system reacting differently then expected and may delay the triggering of alarms. Changes should only be made by experienced personnel that understand the implications of these changes.

When you want to change a limit value, first select the parameter, then enter the new upper and lower limit values. To transfer the new values to the BMPC II press the Write Values button.

Figure 5.14. Tools - Options - Limit Values

Selected Parameter

- Read Values: Pressing this button will result in the display of the actual values from the BMPC II. This is useful when you have changed the values, but not written them to the unit and want to reload the actual values.

- Read from Backup Database: With this button you can read the values backwards from the backup database. This is useful if you want to reuse a former configuration.

- Write Values: Pressing this button will write the current field values to the unit. **Warning: This will overwrite the current values saved in memory.**

- Write to Backup Database: When you press this button you can save the current field values in the database of the BMPC II control program.

Changes to the limit values will first take effect when you press the Write Values button. Once you are certain that the values are suitable you can add them later to the backup database by pressing the Write to Backup Database button.

Heater & APD Settings

In this settings window you can adjust the settings for the magnet heater.

Figure 5.15. Tools - Options - Heater & APD Setting
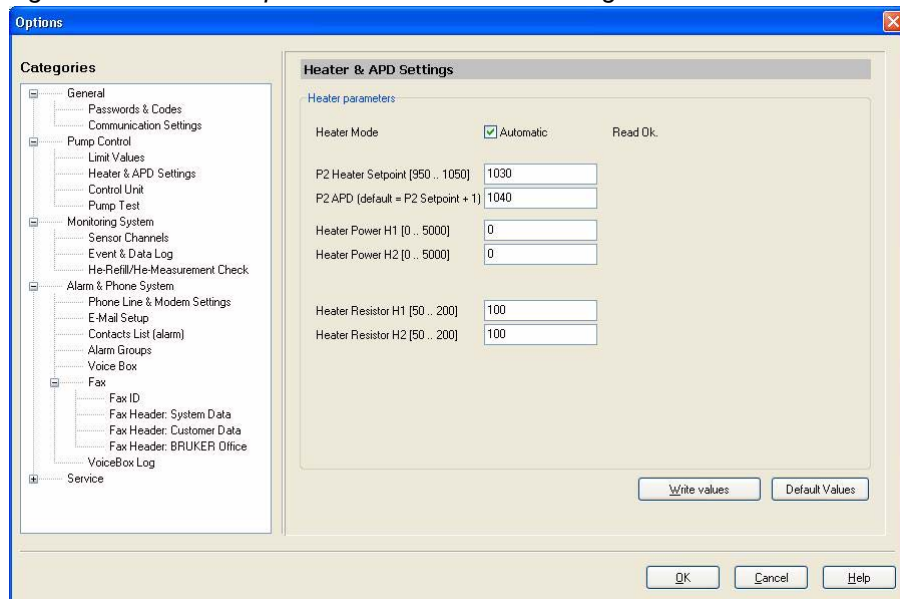
These values are normally entered during the installation and in most cases do not need to be modified.

- Heater Mode: It is possible to operate in automatic or manual heater mode. As default Automatic mode is selected. In automatic mode, internal regulation ensures that the P2 pressure remains constant in the magnet dewar, based on the values entered. In manual mode (Automatic must be deselected) the unit will be heated using a constant heater power.

- P2 Heater Set Point: This is the target value of the automatic heater control. This value must be at least 1 mBar lower as the P2 APD target value.

- P2 APD: This is the target value for the P2 absolute pressure regulator. The absolute pressure regulator ensures that the magnet remains at a constant pressure even when working in the over pressure range.

- Heater Power H1: This field allows you to enter the H1 heater heat value for heater operation in manual mode.

- Heater Power H2: This field allows you to enter the H2 heater heat value for heater operation in manual mode.

- Heater Resistor H1: This field is used to enter the resistance value for the H1 heater.

- Heater Resistor H2: This field is used to enter the resistance value for the H2 heater.

Press the **Write Values** button to write the values to the unit.

Changes in these adjustments may cause low pressure in the magnet dewar. This could lead to a dangerous icing of the magnet.

Control Unit

This option window allows you to read the current firmware version from the BMPC II, and to reset the control unit.

Figure 5.16. Tools - Options - Control Unit
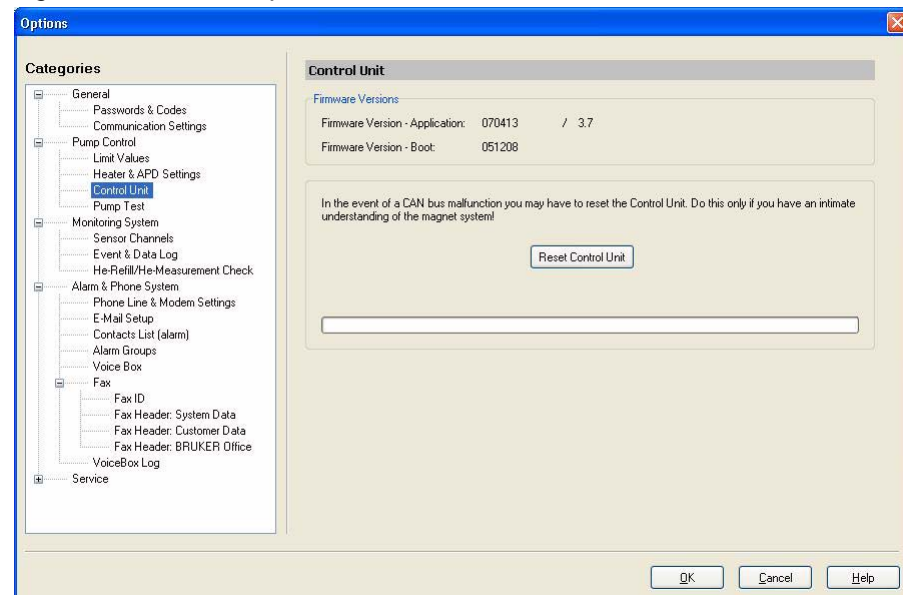
A software reset may be necessary when, during a system start or a firmware download, communication to various sensors does not start correctly.

To reset the control unit press the button and wait until the reset procedure is finished.

Pump Test

This option window allows you to adjust the automatic pump test. Please read the section *"Configuring the automatic pump test" on page 35*.

Sensor Channels

In this settings window you can configure the effect of the individual sensor channels on the alarms, as well as the representation of the channels in the various display options.

Figure 5.17. Tools - Options - Sensor Channels
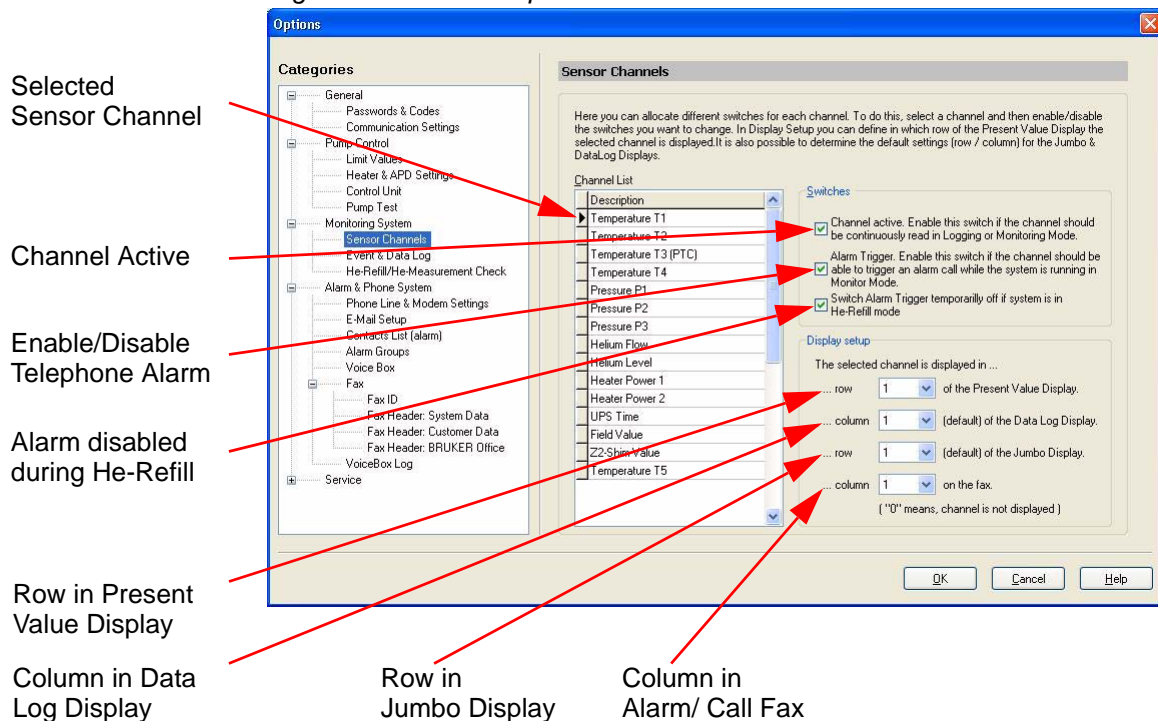
- Channel Active: When this option is selected, the data for this channel is updated continuously. When the option is not selected the channel information in the present value display is not actualized.

- Alarm Trigger: When this option is selected, the telephone-supported alert will be started when an alarm situation occurs (e.g. When a limit value is exceeded).

- Switch Alarm Trigger.. : When this option is selected the telephone alerting will be deactivated during the duration of the He-Fill cycle.

In the Field Display Setup you can adjust the position of the selected channel in the Present Value Display, Data Log Display, Jumbo Display as well as the Status / Alarm fax.

When a channel is not to be represented in the corresponding display then position „0" must be selected for this field.

Event & Data Log

In this settings window you can adjust the properties of the Event Log and the Data Log.

Figure 5.18. Tools - Options - Event & Data Log
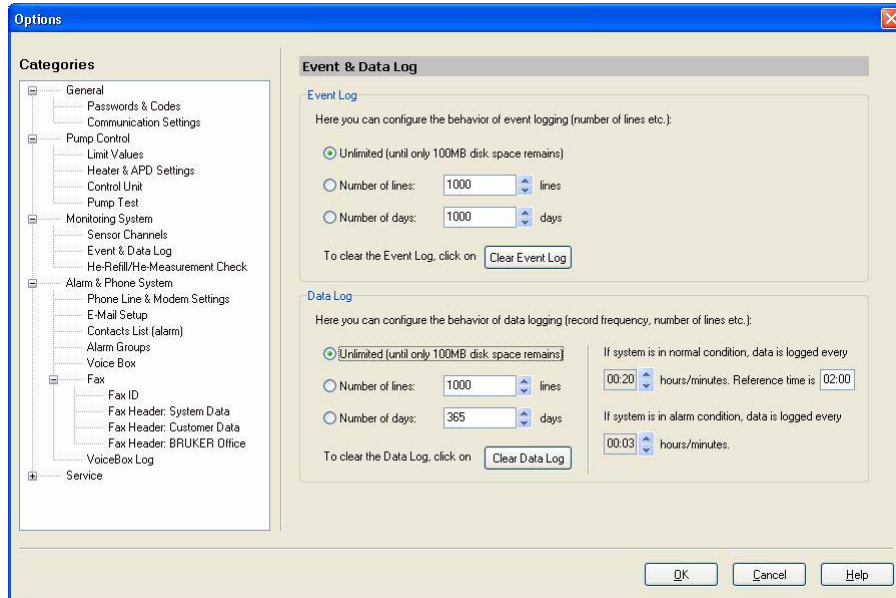
1. **Event Log** (see also *"Present Values / Event Display" on page 33*)

   The following possibilities can be selected:

   Unlimited: The log data will be saved until the maximum disk space has been reached.

   Number of lines: The maximum number of event log entries can be selected. When the maximum number is reached, the oldest entry will be overwritten.

   Number of days: A maximum number of days for which the event log will be stored can be selected. When the maximum number is surpassed, the oldest entry will be overwritten.

2. **Data Log** (see also *"Data Log Display" on page 32*)

   The same adjustments are available for the Data Log as the Event Log. In addition, there are also several adjustment possibilities for the frequency of entries:

   Data Log Interval: Here you can select the interval time for the Data Log. You can chose between the 3 minutes and up to 24 hours. If you select 3 minutes, for example, the complete data set will be written to the data log every 3 minutes. The recommended interval is 1 hour.

   Reference Time: The memory cycle is synchronized using this value.

   Data Log Interval in Alarm Condition: In alarm condition substantially more data needs to be stored in the log file. Default is 3 minutes. The sys-

tem switches automatically to a shortened log interval when an emergency occurs.

3. Clear Event / Data Log

In order to delete the entire data or event log file, you must use the Clear Data Log button.

Warning: Using the Clear Data Log button will delete all the data in the file!

It is advisable that you backup the log files on an external storage device (e.g. CD-ROM) before using the Clear Data Log function. To do this you can use the Export Data and Event Log button and/or save the complete log.mdb and log.ldb file from the database directory.

He-Refill / He Measurement

This settings window is used to adjust the properties of the helium refill function (refer to the section *"He Fill Mode" on page 26*).

Figure 5.19. Tools - Options - He-Refill / He Measurement
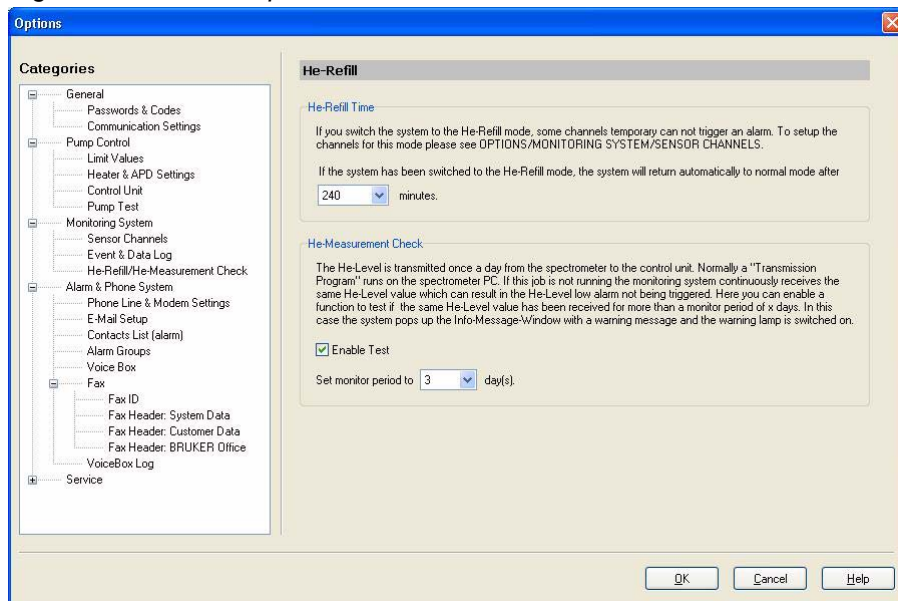
The helium refill time setting allows you to set the amount of time that the selected alarms will be deactivated during the helium refill. These alarm parameters are set in the Sensor Channels section under the Monitoring System settings (see also *"Sensor Channels" on page 51*).

In the He Measurement Check window you can activate the helium level monitoring. During the monitoring you can examine whether the helium changes over a preset period of time. This time period can be varied within a range of 1 and 7

Configuration

days using the field „Set Monitor Period to x days". When the value of the helium level remains stable for the selected time a warning will be given and a warning light will be activated. With this a missing or incorrectly initialized helium level measurement can be recognized.

Alarm & Phone System   *5.4.4*

For complete information on using the alarm and telephone system, also read *"Alarm System" on page 61*.

Phone Line & Modem Settings

In this settings window the most important adjustments for the telephone supported alarm system are configured.

Figure 5.20. Tools - Options - Phone Line & Modem Settings
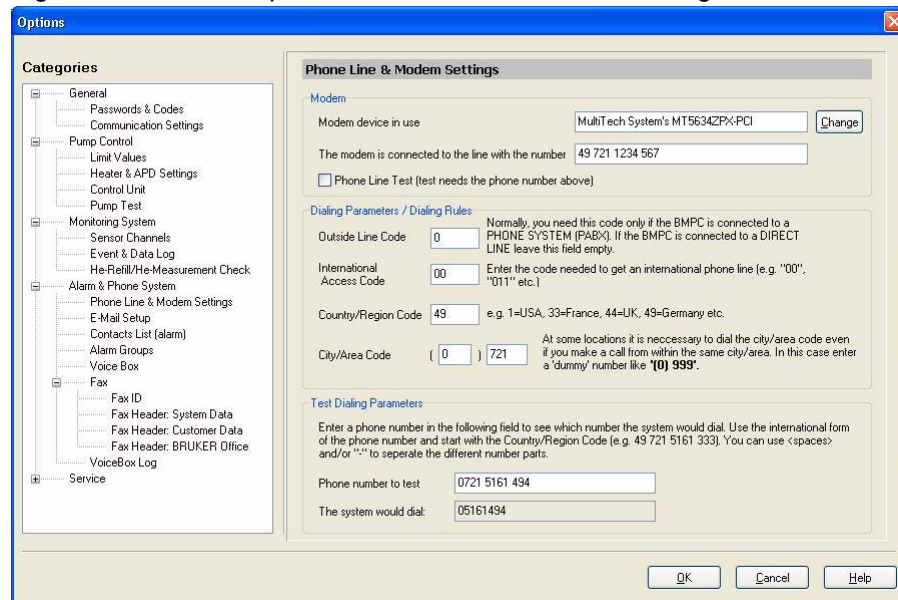
In order to use a modem with the system the modem information must be entered in the Modem settings area. Enter the name of your device and the telephone number used and press **Change** for the changes to take effect.

Once the modem and telephone number is entered you need to enter the following parameters in the *Dialing Parameters / Dialing Rules* fields:

- The outside line code. This may be required if the BMPC II is connected to, for example, a PABX telephone system.

- The international access code.

- The international country/region code where the unit is located.

- The city/area code where the unit is located.

To see what will be dialed for a given telephone number, simply enter this number in the *Test Dialing Parameters* field. The system shows you the number which would be dialed. If you are entering a number in the preselected area code, then the system should only show the local telephone number as shown in the above example.

E-mail Setup

This function is for future use.

Contact List (alarm)

In this window you can make changes to the contact list used for alarms. Press the corresponding button in order to add, edit, delete records or to scroll through the list.

Figure 5.21. Tools - Options - Contact List (alarm)
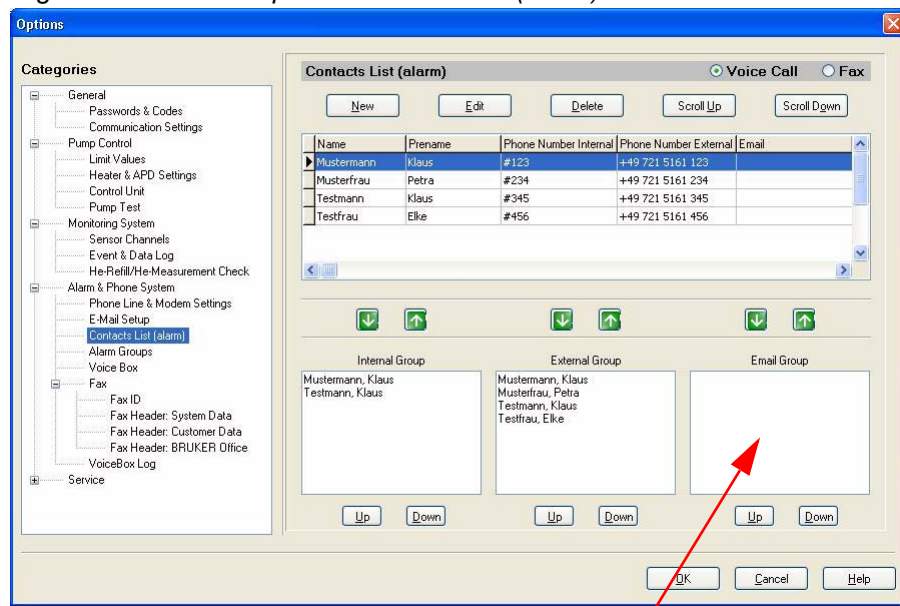
E-mail function not yet implemented

Through use of the Voice Call and Fax radio buttons, you can determine whether the Voice Call or Fax contact list is displayed.

When you highlight a record from the contact list or one of the groups on the bottom you can add member to or remove members from a notification group using the green arrow buttons.

A description of the various groups and the notification process is found in the section ***"Alarm Sequence" on page 62***.

You can change the sequence within these groups (and therefore the sequence in which they will contacted) by highlighting the name and using the up and down buttons.

You can also make changes to the groups through the use of Drag & Drop with your mouse.

If you want to add new individuals to the Contact List or you need to change data for an individual on the list, use the functions ***New*** or ***Edit.*** Enter or edit the data as shown in ***Figure 5.22.*** and press OK to accept.

Configuration

Figure 5.22. Tools - Options - Contact List (alarm) Edit Data
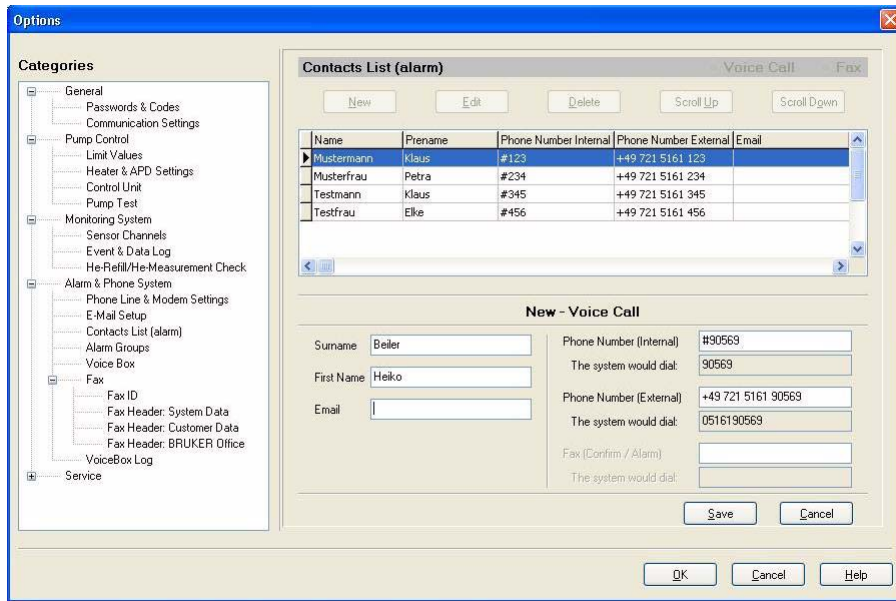
Alarm Groups

Figure 5.23. Tools - Options - Phone Line & Modem Settings
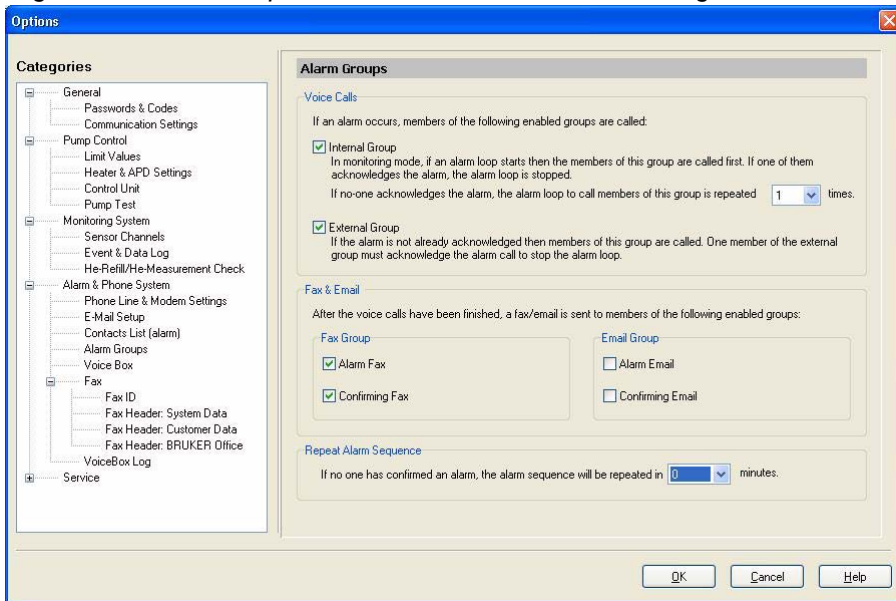
In this window you can modify the group alarm settings.

- Internal Group: When this box is checked the internal contact list is called when an alarm occurs. You can also specify how many times the call will be repeated if no one responds.

- External Group: When this box is checked the external contact list will be called if the internal group does not respond. The call will be repeated until a member of the group responds.

- Fax Group: After the internal and/or external group is contacted a fax is sent to one or more of the fax groups if the boxes are checked. When an alarm fax is

sent to an external receiver it is always meaningful to also send a confirmation fax to the same receiver so they are informed about the situation.

- E-mail Group: Not yet implemented.
- Repeat Alarm Sequence: Here you can enter an interval for how long the system should wait before it repeats the alarm sequence when no one confirmed the alarm previously. Default is zero minutes.

Voice Box

These settings are for service personal only.

Fax

In this window you can enter a default fax number. This fax number will be used, when selecting the default fax number while requesting a status fax. Please refer to section *"Remote Status Request" on page 64*.

Fax - Fax ID

All adjustments in the Fax settings window are used to configure the fax text. The Fax ID fields appear in the header of the fax that is sent.

Figure 5.24. Tools - Options - Fax ID
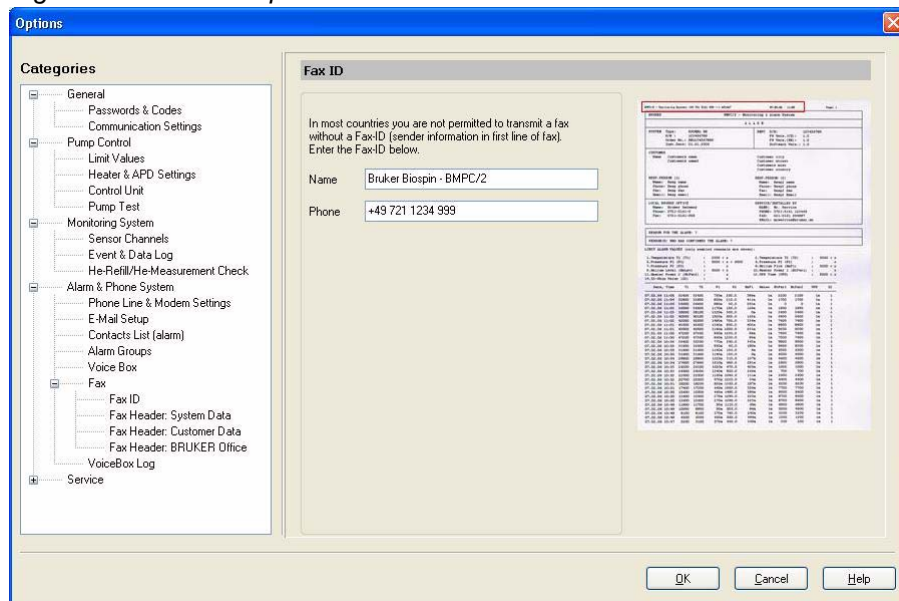
- Name: Be sure to enter a meaningful name, such as your company and device name. This information will appear in the status line of the fax.
- Phone: Enter the number used to reach the BMPC II.

Fax - Fax Header - System Data

This window is used to enter all the data concerning your magnet system and the BMPC II.

Figure 5.25. Tools - Options - Fax Header: System Data
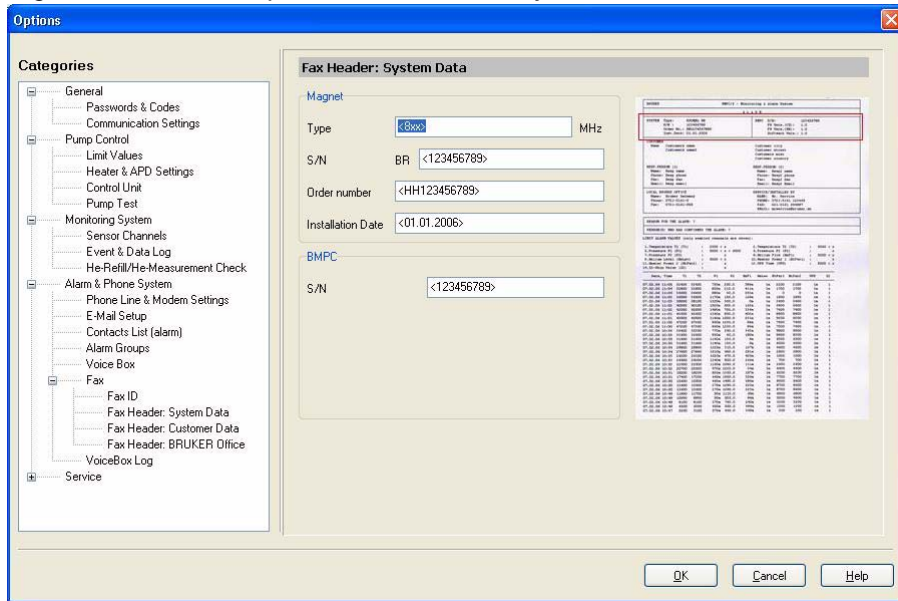
- Magnet Type: The magnet frequency and design.

- Magnet S/N: The serial number of the magnet.

- Magnet Order Number: The Bruker order number.

- Magnet Installation Date: The date of the installation.

- BMPC S/N: The serial number of the BMPC II H13031.

Fax - Fax Header - Customer Data

In this window the data for your company, including the name and contact information of the individuals responsible for the system must be entered. This information is used to contact your company, if necessary, when Bruker receives an alarm fax.

Figure 5.26. Tools - Options - Fax Header: Customer Data
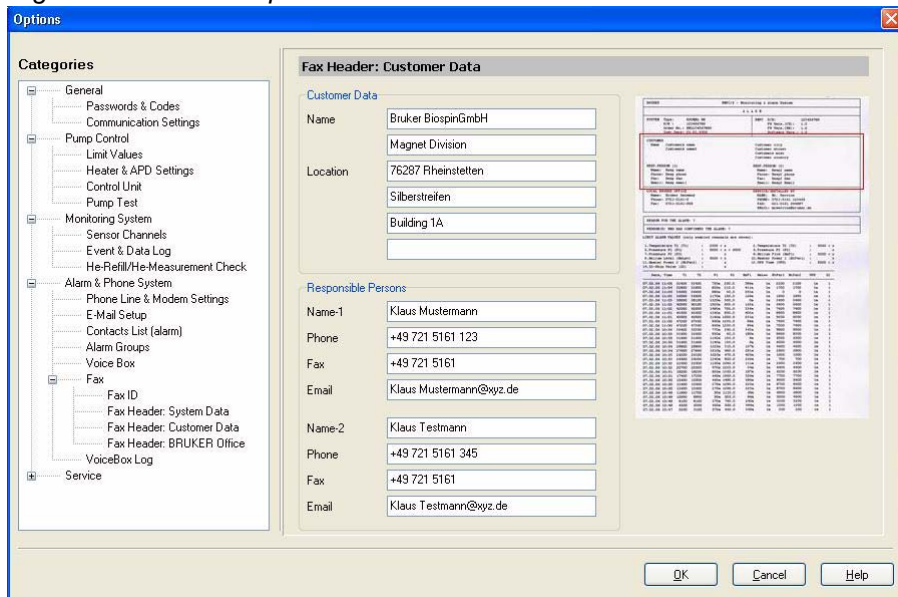
Fax - Fax Header - Bruker Office

In this window the data for your local Bruker office and the name of the service engineer that installed the system are maintained.

Figure 5.27. Tools - Options - Fax Header: Bruker Office
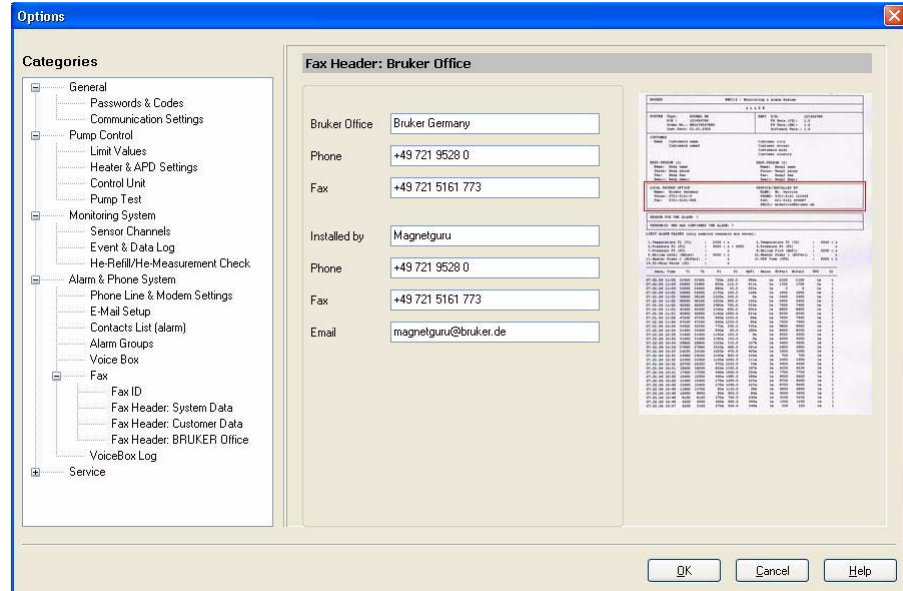
Fax - Voice Box Log

In this window you can adjust the settings for the Voice Box Log. Since this function serves primarily for error tracing in telephone systems you can use a relatively short log recording interval. It is the same rules as for the Data and Event logs (see *"Event & Data Log" on page 52*).

Figure 5.28. Tools - Options - Fax Voice Box Log
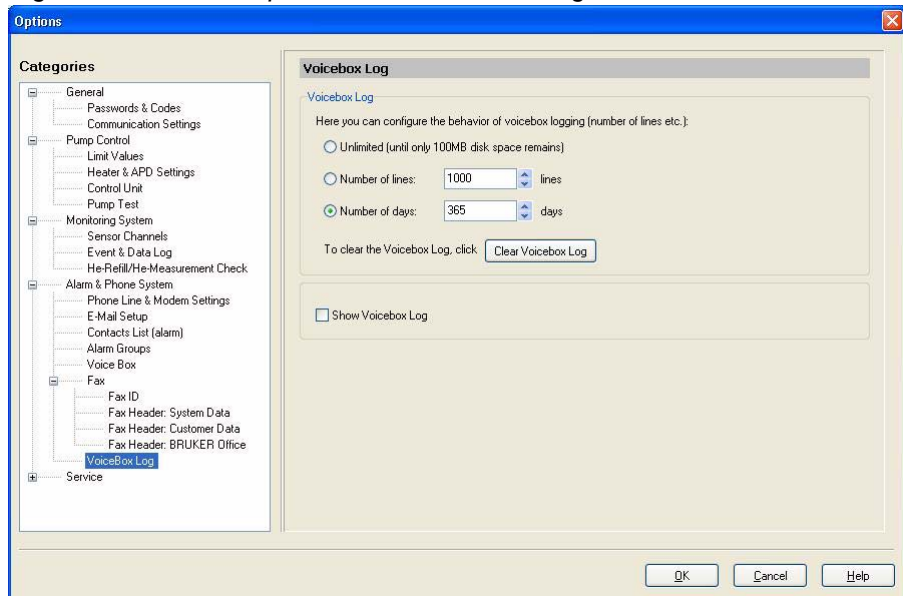
When you check the Show Voice Box Log check box, the Voice Box Log window will be displayed as long as you remain in this window.

Configuration

The service area is only accessible by Bruker service personnel.

Alarm System

6

Introduction *6.1*

The alarm system is an important part of the BMPC II and is needed for the supervision of the magnet system.

The alarm system uses the analog telecommunication network and should be available for use worldwide. It is based on a analog fax modem of the type „Multitech System's MT5634ZPX-PCI".

Function of the Alarm System *6.2*

When the BMPC II is working in the Monitor & Alarm mode, all system parameters are permanently monitored against their limit values. In case a parameter rises above or below a given alarm limit, an alarm cycle will be started.

Figure 6.1. Present Values/Events in Alarm Mode

In the above example the alarm cycle was triggered because of a too low helium flow. The status field shows that an alarm call is in progress and in the event log section you can see the different logs referring to this alarm situation.

Alarm Sequence *6.2.1*

If the system detects a deviation above or below a limit value, then an alarm cycle will be started. After one minute a check will be done to see if the deviation still exists. When the deviation still exists, the alarm cycle will be continued, otherwise, the alarm cycle will be terminated.

In an alarm sequence first all the people from the „Internal Group" (see ***"Contact List (alarm)" on page 55***) are called, sequentially until one of the group responds.

Internal Group

Only company internal phone numbers should be assigned to the „Internal Group". Typically during the week the possibility of getting through to someone on the internal group is very high, so the alarm transmission should be very fast. Depending on the configuration, it is possible that it needs more then one loop through the „Internal Group" before a person has acknowledged the alarm. (see also ***"Alarm Groups" on page 56***).

If nobody from the „Internal Group" acknowledges the alarm, the alarm cycle will begin to contact the „External Group".

External Group

The „External Group" list stores the private telephone numbers or cell phone number for the individuals responsible for the system. When no one acknowledges the alarm from the internal group the system will start calling all the people in the „External Group" repeatedly until a member of this group acknowledges the alarm call using the authorization code.

After transmitting the alarm, the system sends an additional alarm fax to the fax number(s) stored in the „Fax Group", if configured accordingly.

Fax Group

All fax numbers which are stored in the „Fax Group" will receive an alarm fax, after the alarm calls are finished.

When the person who has assumed responsibility for the system (because he acknowledged the alarm call) switches the system to „OFF" mode, a confirming fax will be send to all alarm fax recipients to show that the magnet system is under control.

Alarm Configuration *6.3*

All channels that have the option „Alarm Trigger" checked can trigger an alarm cycle. The alarm trigger option can be configured using the function from the menu *Tools - Options - Sensor Channels.*(for additional information see ***"Sensor Channels" on page 51***).

An alarm will also be triggered if the communication between the industrial PC and the BMPC II Control Unit (RS232) fails. This may occur, for example, when a power failure occurs, which lasts longer then the backup time of the external UPS, or which is not protected by the external UPS. The industrial PC then will be powered for 30 more minutes using the internal UPS, whereas an alarm cycle can be initiated during this time.

Voice Box System 7

Introduction 7.1

The voice box system is the telephone interface that is used for an alarm sequence or for requesting a remote status report.

To control the voice box system a standard Dual-Tone Multi-Frequency (DTMF) telephone (also called touch tone phone) is used. If the system requests an input for the voice box system, you will need to touch the corresponding key on your DTMF phone.

Alarm Call from the BMPC II 7.2

When an alarm sequence is activated, the voice box system calls all the telephone numbers on the internal and the external phone list (also see ***"Contact List (alarm)" on page 55*** until the alarm is confirmed.

When you answer the telephone, you will first hear a salutation and then a request for you to press the star button on your touch tone phone. This message will be repeated for 120 seconds. If you do not react during this time or if you hang-up the phone, the next phone number from the contact list will be called.

After pressing the star button you will hear the system status message with the detailed problem description and an additional request for to enter your authorization code. You now have to type in your authorization code, then press the star button. Please enter the numbers slowly (e.g. 1 second delay between the consecutive numbers), so that the voice box system can recognize the code.

The authorization code that needs to be entered during an alarm sequence is defined in the Alarm - Confirm Code settings window (see *"Changing Passwords" on page 103*).

After accepting the code you will hear the message „You are now responsible for the system". If the code is not recognized the authorization code must be entered a second time. If this also fails, the alarm call will be aborted, letting you know there has been a communication problem and the next telephone number on the contact list then will be called.

When you enter the correct code and take over responsibility for the care of the system, the alarm sequence is stopped by the voice box system.

If no one confirms the alarm the first time the voice box system calls the list it is possible that the system will be required to make more then one pass through the list until a person is found that enters the correct authorization code.

For details about the alarm cycle read the section *"Alarm System" on page 61*.

Remote Status Request   7.3

It is possible to request a status report at any time from any place in the world via a touch-tone phone. To do so, you only have to dial the telephone number from the BMPC II modem and then wait for the message greeting. When queried you will need to first press the star button, then type in the requested authorization code, followed by the star button. You should then hear the actual status of the BMPC II. The program will then proceed to the voice box menu.

The authorization code required when requesting a status report is maintained in the Request/Fax Poll Code settings! (see *"Changing Passwords" on page 103*).

Voice Box Menu   7.3.1

While in the main menu of the voice box system, you can select between three options using the corresponding code.

- '0': Exit the voice box system.
- '1': Select the fax menu.
- '2': Repeat the status report.

Fax Menu   7.3.2

In the fax menu you have the choice of 4 functions accessible by typing in the corresponding code.

- '0': Return to the main menu.
- '1': Status fax request with status of the last 24 hours (data log file).
- '2': Status fax request with status of the last 7 days (data log file).
- '3': Status fax request with status of a selectable period (data log file).

After selecting the format for the fax report, you will need to type in the telephone number of the fax machine where you want to receive the status report. You will need to use the international phone number format (i.e. 49 721 9515149). To finish the input press the star button. The system will then repeat the whole tele-

phone number. Press '1' if this is correct or '0' if it is incorrect. In case of a wrong number you will have an opportunity to enter the correct number a second time.

Alternatively you can use the default fax number which is configured in the *Tools-Options-Fax* settings window. In this case use only the key combination '#' '*'. Then the voice box system will repeat the number and you must also confirm it.

When selecting option '3', you will also have to enter the start and the ending date for the data that you want to receive. The format for the date is dd/mm/yy (e.g. for May 11, 2007 enter 110507).

After finishing the data input the voice box system will disconnect the connection and start the fax transmission.

Using the Voice Box *7.3.3*

To optimize the speed while working with the voice box system it is allowed to enter the corresponding codes while the system is explaining the options. For example, if you know which option you want, you can enter the option when the system begins with the text „You are now in the main menu. Press '1' to.....". When you do this the voice box system will skip the rest of the text and proceed directly to the selected option.

Due to the varying quality of phone lines, it is possible that you need to enter the correct data more then once, before the voice box system recognizes it. Do not enter the DTMF data too quickly, rather use short delays (e.g. 1 second) between the key inputs.

When the line quality is very bad it might help to hang-up and establish a new connection to the voice box system.

Voice Box System

Hardware

8

BMPC II Magnet Pump Control

The BMPC II Magnet Pump Control Unit (P/N H13031) is equipped with a pump cabinet (both vacuum pumps, their according valves, flow meter), the BMPC II Control Unit, the BMPC II Line Control Unit, the Industrial PC and an additional Uninterruptable Power Supply (UPS).

Figure 8.1. General Structure of the BMPC II Magnet Pump Control

TFT - Display

BMPC II Control Unit

PC Keyboard Drawer

Industrial PC

UPS

Pump Cabinet

Hardware
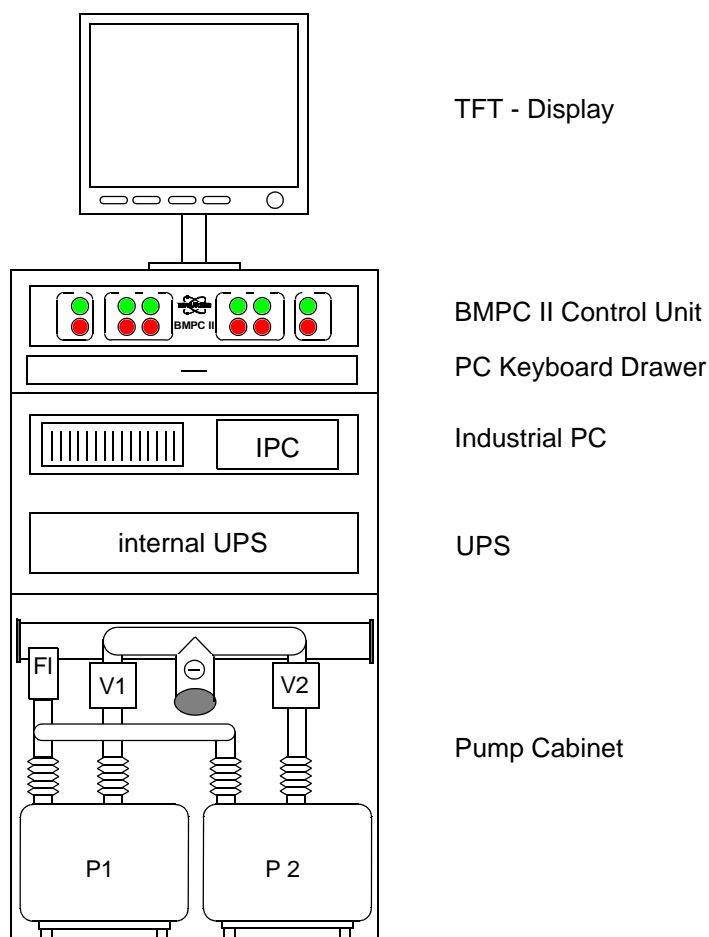
TFT Display   *8.1.1*

The system utilizes a standard 19" TFT display with a resolution of 1280 x 1024 pixel. The display also includes a 2 port USB hub for use with accessories.

BMPC II Control Unit   *8.1.2*

The BMPC II Control Unit (P/N H13029) consists of the following main components:

BMPC II Manual Control Board

This board (P/N H13024) is used for manual control of the pumps and valves.

BMPC II Automatic Control Board

This Board (P/N H13022) is used to fullfill the following functions:

- CAN bus master.
- Output controller for pumps and valves.
- Interface to the industrial PC (RS232).
- Temperature measurement inside pump cabinet.

Power Supply

Power Supply Cosel LEB 100F (P/N 85348)

5V   5A
24V   4A

The power supply is used to supply the BMPC II control unit and the wiring box.

Absolute Pressure Device

The Absolute Pressure Device (APD) (P/N 87488) is used to control the pressure P2 in the upper tank of the magnet. It is controlled via the CAN bus.

Industrial PC   *8.1.3*

Industrial PC with Windows XP which meets at least the following minimum requirements:

- Pentium M 2 GHz
- 512MB Ram
- 40GB Hard Disk
- DVD ROM
- 2 serial Ports (RS232)
- 19" rack mount 2HE
- 1 free PCI slot for internal modem

Uninterruptable Power Supply (P/N O10440)

- 1000VA, 230V AC

- 19" rack mount 2HE

- Bridgingtime: 7min at full output load (1000VA)

Pump Cabinet *8.1.5*

The pump cabinet consists of 2 vacuum pumps and 2 valves, connected to the pumping line. The helium flow meter measures the helium flow at the exhaust of both pumps. The flow meter (P/N 87487) is connected to the BMPC II control unit via the CAN bus. In addition there is a temperature sensor (PT100) to measure the temperature T5 inside the pump cabinet.

Figure 8.2.   Pump Cabinet

BMPC II Line Control Unit *8.1.6*
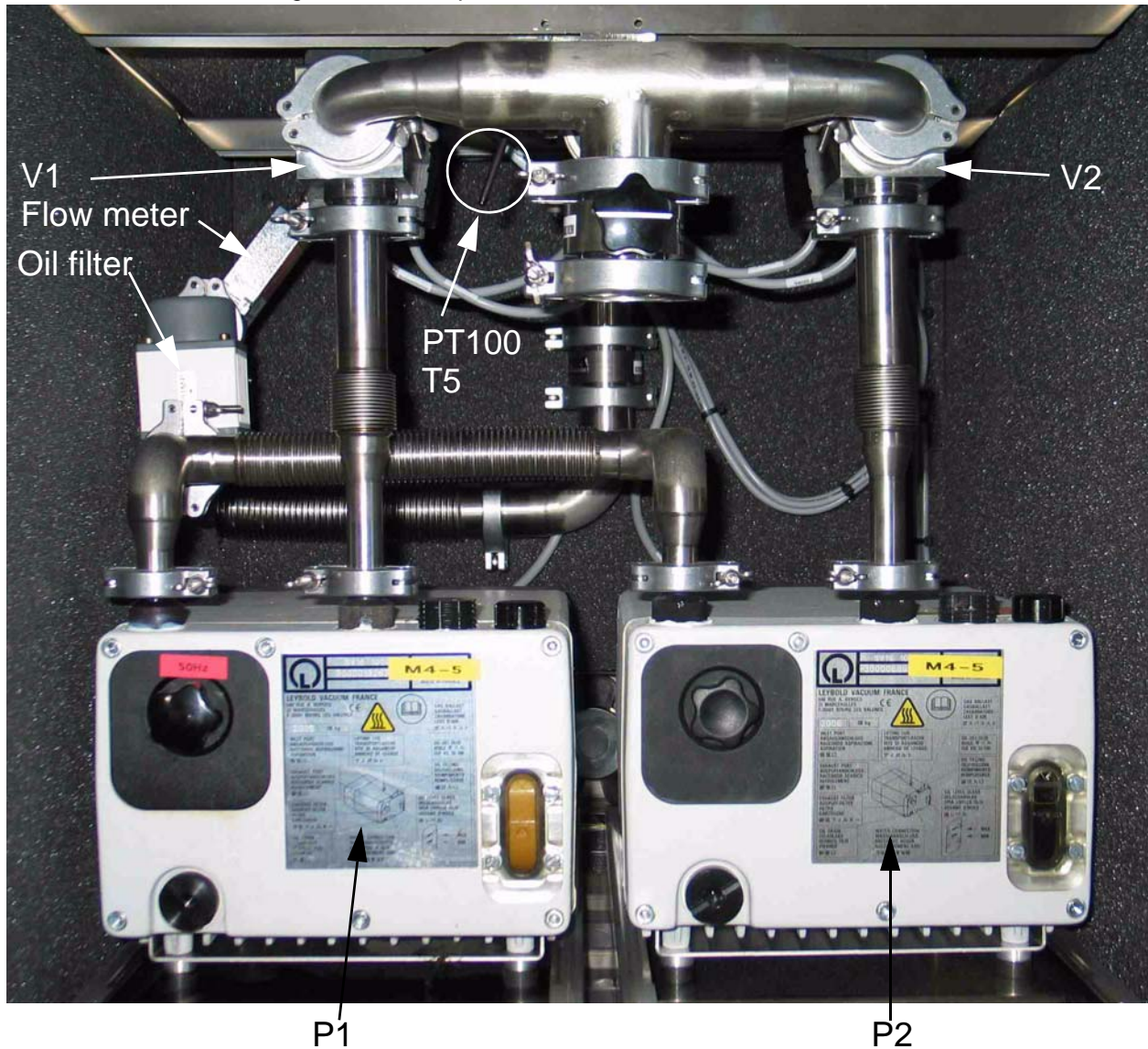
The BMPC II Line Control Unit is used as an interface between the BMPC II control unit, the vacuum pumps and their corresponding valves. All fuses, motor protection switches, conductors and relays needed for the function of the BMPC II are part of the BMPC II line control unit. The line control unit is located in the upper rear part of the BMPC II. To access the line control unit, you have to open the upper rear door using a screwdriver to turn both screws (quarter turn to the left). The door can then be easily removed.

Figure 8.3. BMPC II Line Control Unit

BMPC II Wiring Box *8.2*
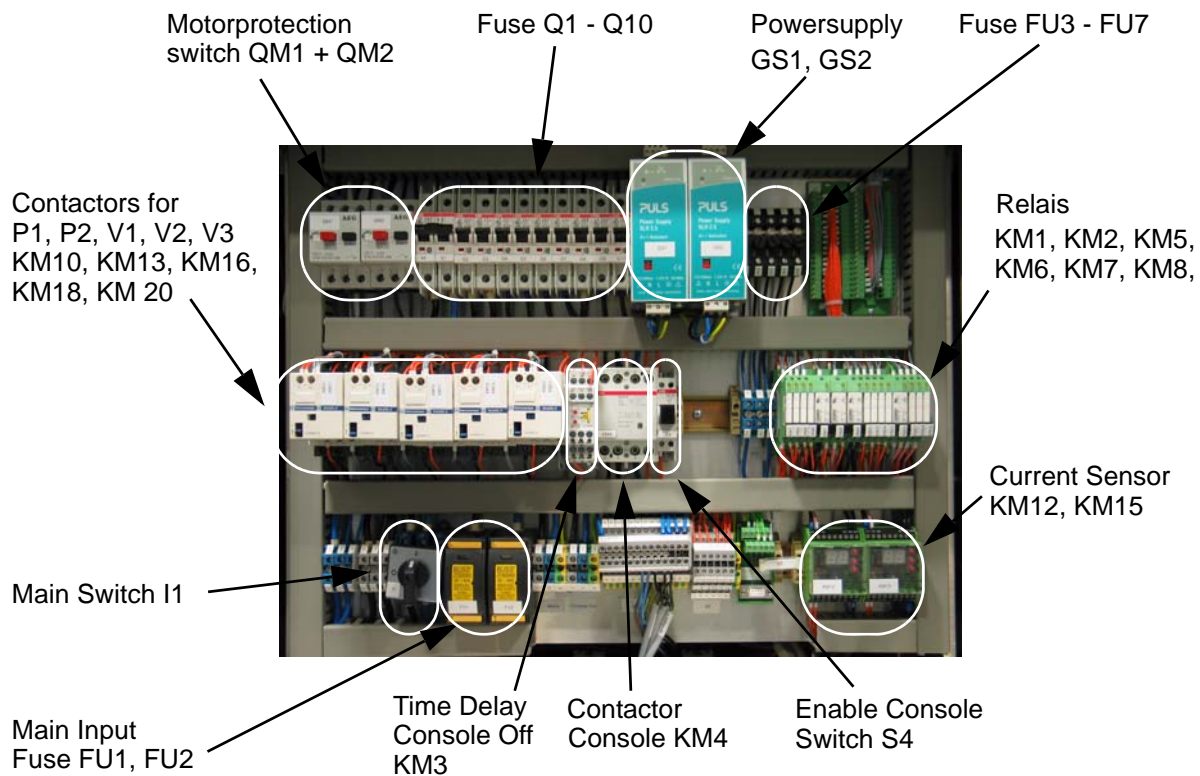
The BMPC II Wiring Box (P/N H13030) is mounted on a flange in the upper region of the magnet. It is designed as a CAN BUS slave and connects the BMPC II to the temperature sensors T1 and T2 and to the heater resistors for H1 and H2. The wiring box also contains a small LC display where the main magnet parameters and system messages can be viewed.

Figure 8.4.   BMPC II Wiring Box

Wiring Box
Heater H1 connector

Connect cable HZ13813
to this connector and
to flange 2 St. A

Wiring Box
Power supply connector

Connect cable HZ13592
to this connector

4 x 20 Character Display

Wiring Box H13030

Wiring Box
CAN bus connector
to BMPC II control unit

Connect cable 87497
to this connector

Wiring Box
T1, T2, H2 connector

Connect cable HZ13811
to this connector and
to flange 1 St. A

Wiring Box
Can Bus connector
to P1 sensor

Connect cable 87496
to this connector

CAN Bus   8.3

A Controller Area Network (CAN) bus is used to establish communication between all the sensors, the BMPC II wiring box, and the BMPC II. The CAN bus is an industrial standard bus which is often used in the automotive industry.

CAN Bus Structure   8.3.1

The BMPC II control unit is designed as a CAN bus master. This means all communication on the bus is controlled and monitored from this master.

All sensors and the BMPC II wiring box are designed as CAN bus slaves. The BMPC II wiring box is also able to fullfill CAN bus master functions in case the BMPC II control unit is not functioning.

Figure 8.5.   CAN Bus Structure
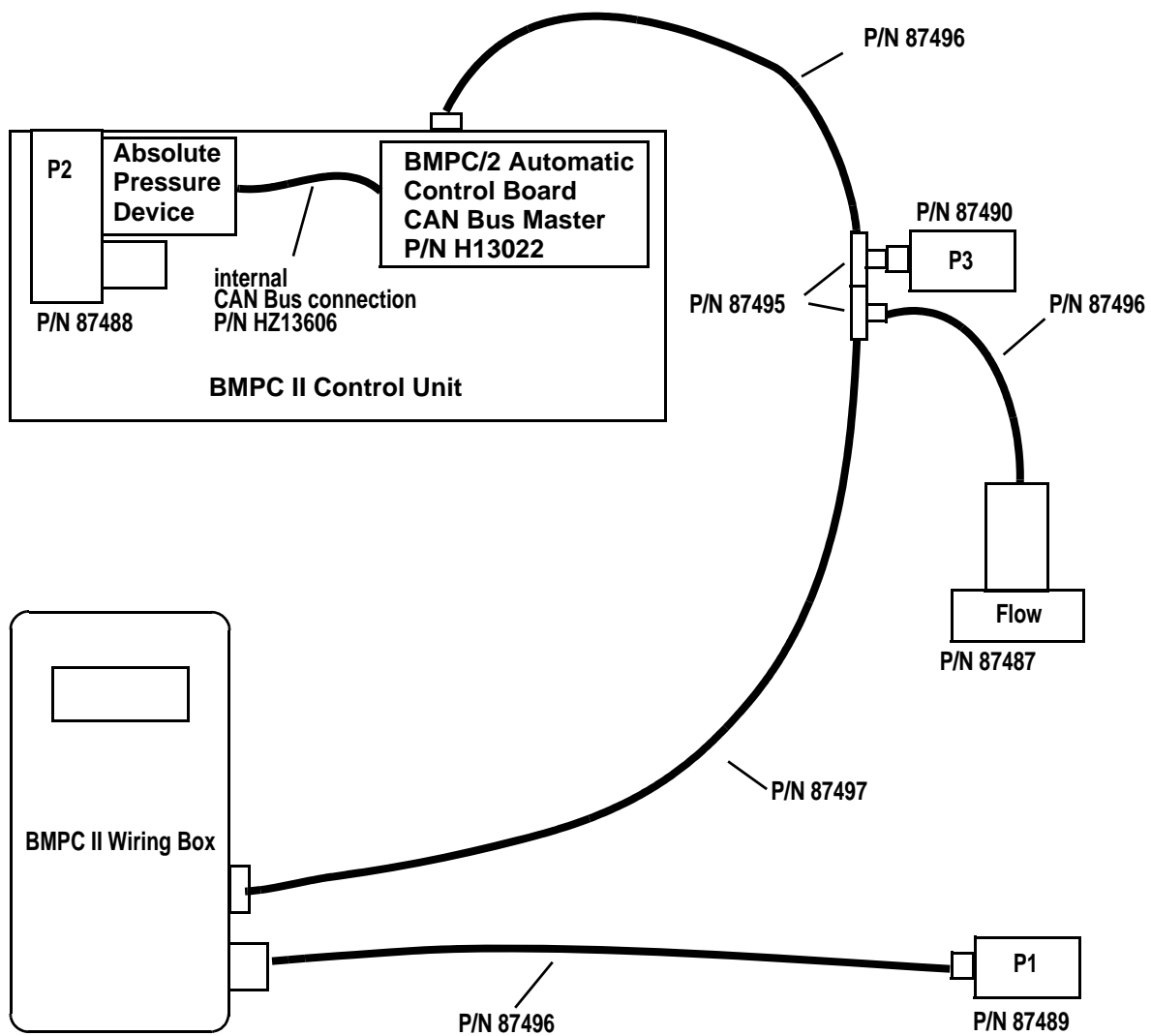
Wiring Overview *8.4*

External Wiring *8.4.1*

Figure 8.6.   External Wiring

Internal Wiring *8.4.2*

Figure 8.7.   Internal Wiring
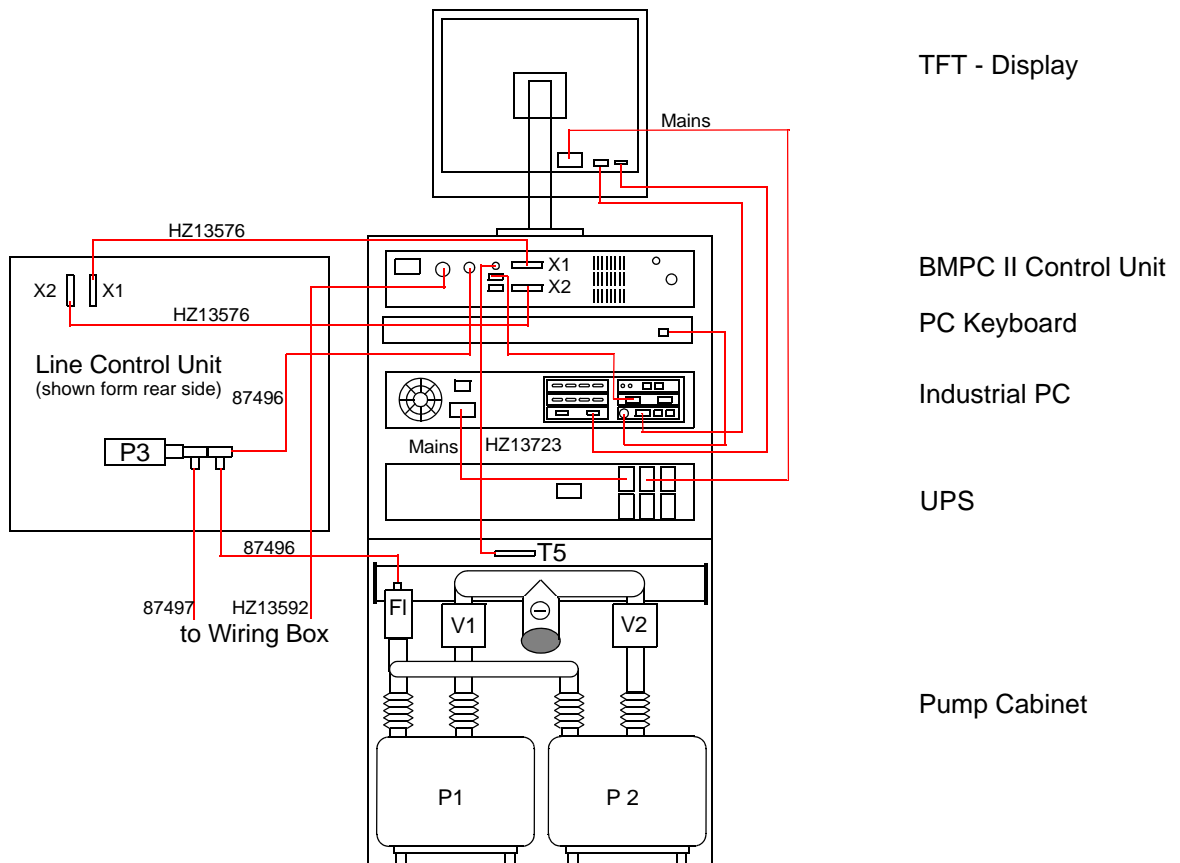
Electrical Connections Overview   8.5

BMPC II Control Unit   8.5.1

Figure 8.8.   BMPC II Control Unit Rear Panel

Mains Input
110-230V
50/60Hz

Wiring Box Power

CAN Bus

PT100
T5

RS232 to Control Unit
RS232 to NMR Console

Connection to X1 of Line Control Unit
Connection to X2 of Line Control Unit
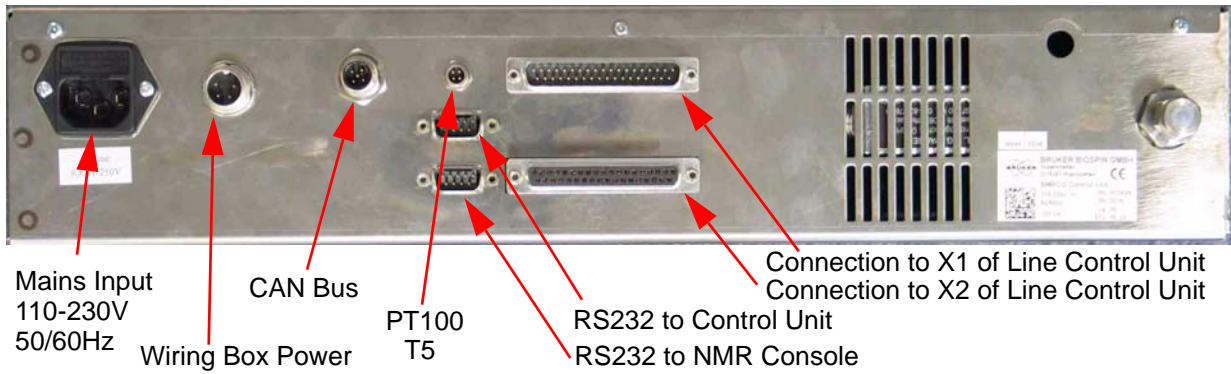
Industrial PC   8.5.2
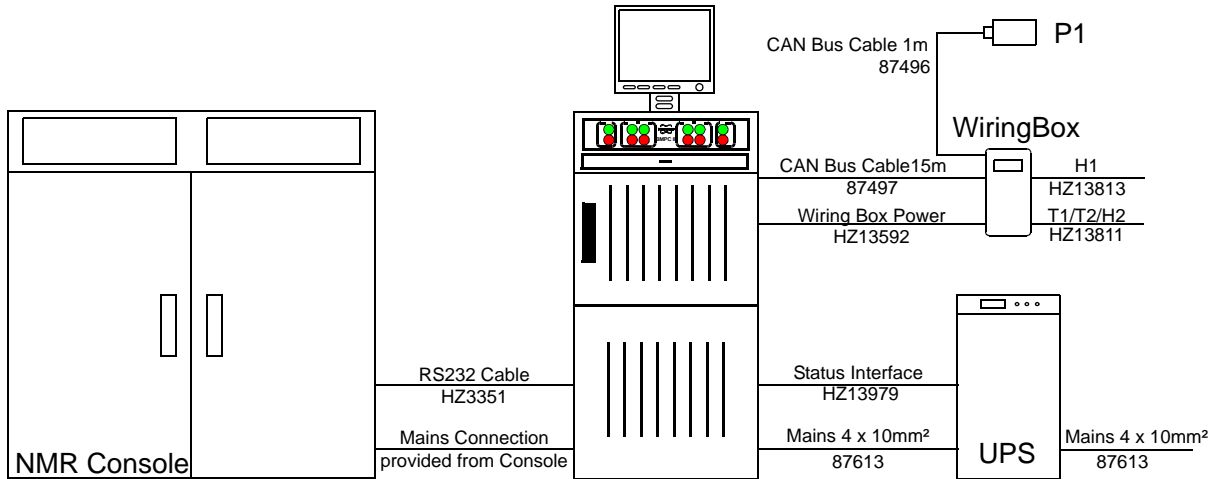
Figure 8.9.   Industrial PC Rear Panel

Mains Input
100-240V
47/63Hz

ON/OFF
Switch

USB Connection
to TFT Monitor

PS2 Connection
to Keyboard

VGA Output
to TFT Monitor

RS232 to
Control Unit

Line Output
Fax Modem
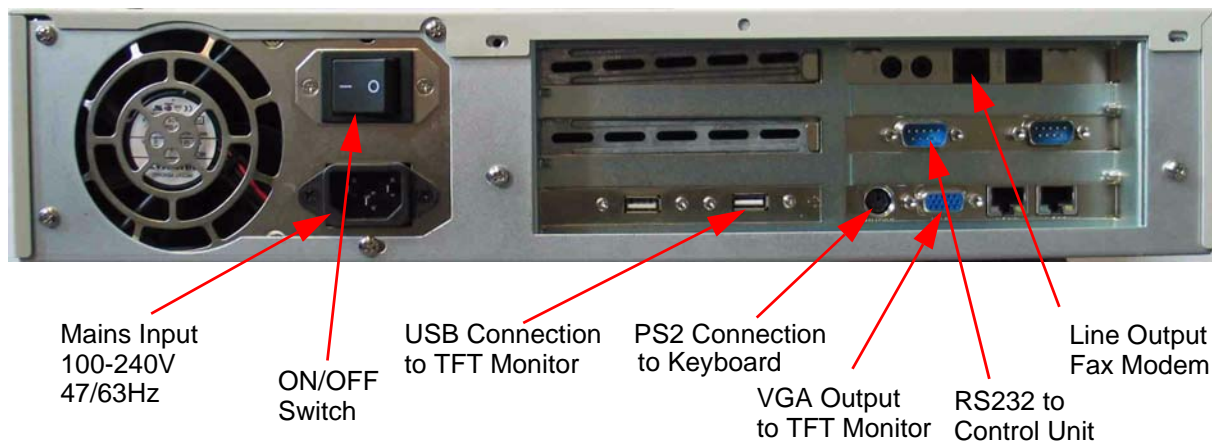
UPS   8.5.3

Figure 8.10. UPS - Uninterruptible Power Supply

RS232 Connection to IPC

Mains Input
166 - 276V
50/60 Hz

Mains Output to IPC   Mains Output to LCD
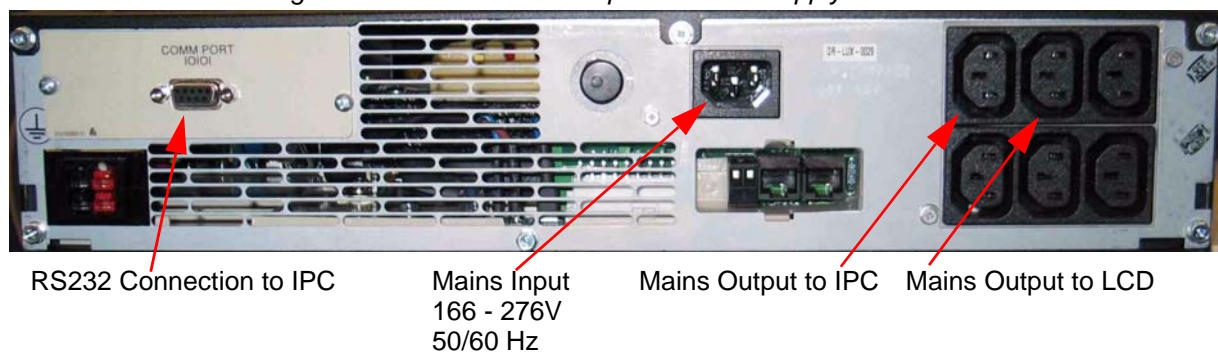
Connector X3 / X4 / X5

Line Control Unit Connector X3 / X4 / X5
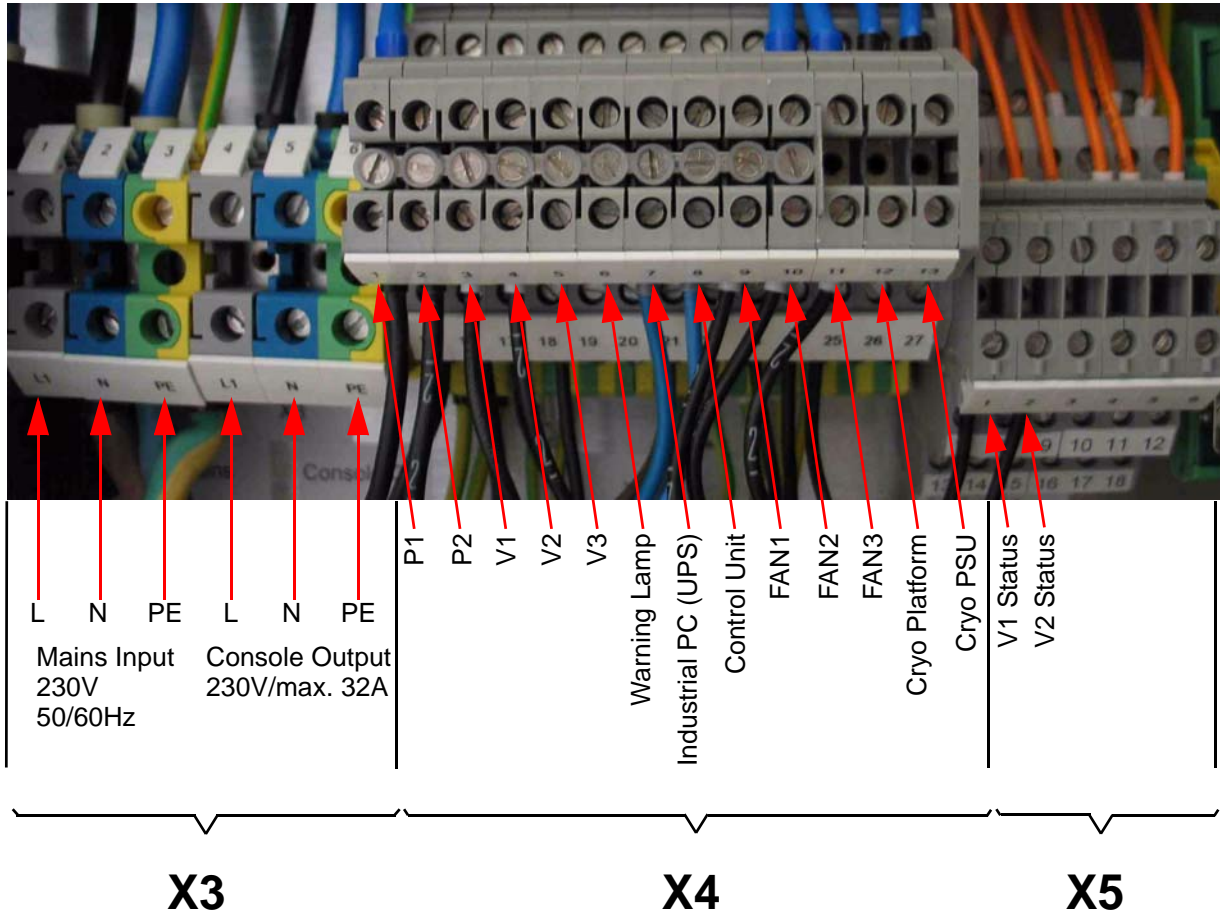
Table 8.1.   Pincount Connector X3

	Neutral	Line	PE
Mains Input	2	1	3
Console Output	5	4	6

Table 8.2.   Pincount Connector X4

Output	**Neutral**	**Line**	**PE**
P1	1	15	29
P2	2	16	30
V1	3	17	31
V2	4	18	32
V3	5	19	33
Warning Lamp	6	20	34
Industrial PC	7	21	35
Control Unit	8	22	36
FAN 1	9	23	37
FAN2	10	24	38
FAN 3	11	25	39
Cryo Platform	12	26	40
Cryo PSU	13	27	41

Table 8.3.   Pincount Connector X5

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	Valve1 Pin b	7	NC	13	Valve1 Pin d
2	Valve2 Pin b	8	NC	14	Valve2 Pin d
3	NC	9	NC	15	NC
4	NC	10	NC	16	NC
5	NC	11	NC	17	NC
6	NC	12	NC	18	NC

NC = Not Connected

Connector X6 UPS Status Interface
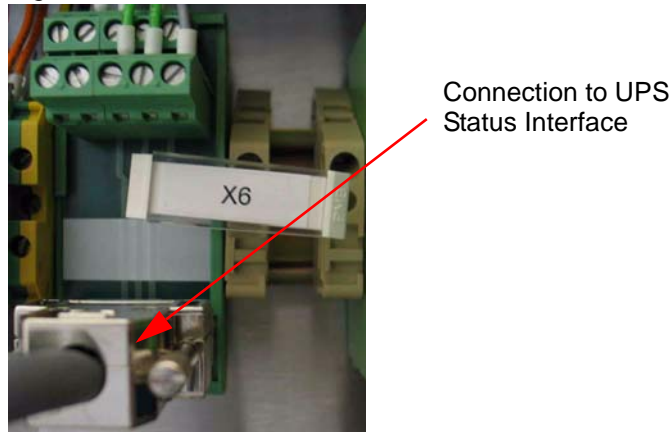
Figure 8.11. Line Control Unit Connector X6

Connection to UPS
Status Interface

Table 8.4.   Pin Count Connector X6

Pin Number	Pin Function
1	Not connected
2	Not connected
3	General alarm (normally opened)
4	On commercial AC (normally opened)
5	Ground
6	UPS on bypass (normally opened)
7	Battery low (normally opened)
8	UPS present (normally closed)
9	Not connected

If the cable HZ13979 is not connected to connector X6, it is not possible to switch on the console output and it is not possible to detect commercial power failures.

Hardware

# *Problems and Troubleshooting* *9*

When errors occur an error message is displayed inside the information (Info) window and must be acknowledged by the user.

These are very often error messages which need intervention by the user. For example, the error message „Warning possible fan failure pump cabinet" may be generated because of a faulty fan inside the pump cabinet. This should alert the user to check the function of the three fans inside the pump cabinet.

After the error has been corrected, the error message can be acknowledged by pressing the **Acknowledge** button. If the error still remains, it is possible that the same error message will be repeated a few minutes later.

Figure 9.1. Info Window
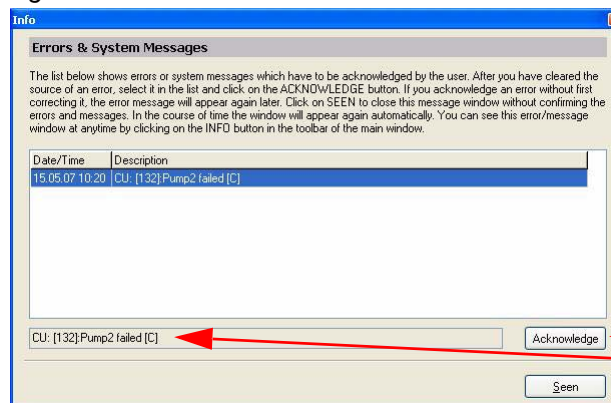
Acknowledge button - press to acknowledge this error message

The information can be closed temporarily by pressing the **Seen** button. As long as one or more errors have not been acknowledged, they will be periodically displayed in the information window. If all the error messages have been acknowledged, then the information window will remain closed.

Description of Error Messages *9.1.1*

The following section contains a description of some of the common error messages that might be displayed, as well as a solution to this problem.

Limit Data P1 failed

It was not possible to read the limit data for the pressure P1 from the EEProm, thus supervision of the Pressure P1 is not possible.

Solution: Using the function „Read from Backup Database" from the menu *Tools - Options - Limit Values (see "Limit Values" on page 48*) you are able to read the limit values stored on the PC's hard disk. To solve this problem you will need to re-load the values from the backup database to the BMPC II Control Unit using the „Write Values" function.

Limit Data T1 Failed

It was not possible to read the limit data for the temperature T1 from the EEProm, thus supervision of the temperature T1 therefore is not possible.

Solution: Reload the values from the backup database to the BMPC II as shown for Limit Data P1 fail.

Limit Data T2 Failed

It was not possible to read the limit data for the temperature T2 from the EEProm, thus supervision of the temperature T2 therefore is not possible.

Solution: Reload the values from the backup database to the BMPC II as shown for Limit Data P1 fail.

Limit Data T5 Failed

It was not possible to read the limit data for the temperature T5 from the EEProm, thus supervision of the temperature T5 therefore is not possible.

Solution: Reload the values from the backup database to the BMPC II as shown for Limit Data P1 fail.

Limit Data Flow Failed

It was not possible to read the limit data for the helium flow Fl from the EEProm, thus supervision of the helium flow Fl therefore is not possible.

Solution: Reload the values from the backup database to the BMPC II as shown for Limit Data P1 fail.

Limit Data Helium Level Failed

It was not possible to read the limit data for the helium level from the EEProm, thus supervision of the helium level therefore is not possible.

Solution: Reload the values from the backup database to the BMPC II as shown for Limit Data P1 fail.

Calibration T1 Failed

It was not possible to read the calibration values for the calculation of the magnet temperature T1 from the EEProm, thus calculation and supervision of the temperature T1 is not possible.

Solution: A software reset of the BMPC II Control Unit usually helps (see also *"Control Unit" on page 50*). If not, you will need to recalibrate the temperature T1 (see also chapter *"Calibrate Temperature Linearization Function" on page 102*).

Calibration T2 Failed

It was not possible to read the calibration values for the calculation of the magnet temperature T2 from the EEProm, thus calculation and supervision of the temperature T2 is not possible.

Solution: A software reset of the BMPC II Control Unit usually helps (see also *"Control Unit" on page 50*). If not, you will need to recalibrate the temperature T2 (see also chapter *"Calibrate Temperature Linearization Function" on page 102*).

Calibration T5 Failed

It was not possible to read the calibration values for the calculation of the pump cabinet temperature T5 from the EEProm, thus calculation and supervision of the temperature T5 is not possible.

Solution: A software reset of the BMPC II Control Unit usually helps (see also *"Control Unit" on page 50*).

Heater Initialization Failed

The initialization values for the pressure regulation for pressure P2 using the magnet heater could not be read from the EEProm, thus the pressure regulation could not be activated.

Solution: Reenter the data for the pressure regulation using the menu *Tools - Options - Heater & APD Setting*.

Resistor Initialization Failed

It was not possible to read the data for the heater resistors H1 and H2 from the EEProm. For the calculation of the heater power, the default values are used (100 Ohm), therefore the calculation may be wrong.

Solution: Reenter the data for the heater resistor using the menu *Tools - Options - Heater & APD Setting*.

APD Initialization Failed

It was not possible to read the configuration data for the absolute pressure device (APD) from the EEProm, thus the pressure regulation via the APD could not be started.

Solution: Reenter the data for the heater resistor using the menu *Tools - Options - Heater & APD Setting*.

Heater Regulation Initialization Failed

The parameters for the pressure regulation using the heater H1 could not be read from the EEProm, thus the default data was loaded. This data may not be optimal for your type of magnet, and therefore the pressure regulation may be imprecise.

Warning, Power Supply GS1 failed

The power supply GS1 in the BMPC II Line Control Unit failed.

Solution: The redundant power supply GS2 has taken over the function of GS1. Please check the GS1 fuse as shown in section *"Exchanging the GS1 or GS2 Power Supply Fuses" on page 93*. If this does not solve the problem the power supply GS1 must be replaced with a new one. Please contact your local Bruker

Service department.
The Bruker Part Number for this power supply is: 87491.

Warning, Power Supply GS2 failed

The power supply GS2 in the BMPC II Line Control Unit failed.

Solution: The redundant power supply GS1 has taken over the function of GS2. Please check the GS2 fuse as shown in section **_"Exchanging the GS1 or GS2 Power Supply Fuses" on page 93_**. If this does not solve the problem the power supply GS2 must be replaced with a new one. Please contact your local Bruker Service department.
The Bruker Part Number for this power supply is: 87491.

Even though the BMPC II works with a faulty power supply, it is strongly recommended that you replace the fuse and/or the power supply as soon as possible. If the second redundant power supply also fails you can no longer control the BMPC II.

Warning, Possible Fan Failure Pump Cabinet

A strong temperature rise inside the pump cabinet could be caused by a defective fan.

Solution: Check the fans inside the pump cabinet to see if they are functioning. It is possible that a fuse from one of the fans has blown. For instructions on how to exchange a fuse please read the section **_"Exchanging the Pump Cabinet Ventilator Fuse" on page 93_**.

Remark: This situation also can appear while opening or closing the front door of the pump cabinet.

Helium Measurement Error

The value for the helium level has not changed for a longer period of time, which indicates that the value for the helium level is probably wrong. For more information read the section **_"He-Refill / He Measurement" on page 49_**.

Solution: Check the function of the Helevtransfer program. This program transfers the helium level information and some other data once a day from the BSMS to the BMPC II. Only if this program runs, it is possible for the BMPC II to receive the newest data.
Please check also for a good cable connection between the He-Lev Sensor and the BSMS.
Also the calibration of the He-Lev Sensor may be wrong.

Pump 1 Failed

Pump P1 has failed or does not work correctly. If the pump was working in automatic mode the BMPC II is now using pump P2.

Solution: Switch to manual pump mode. Switch on P1, but do not open valve V1, and check to see if the pump is working correctly. If not, check the motor protection switch QM1. To do this open the upper rear panel of the BMPC II, QM1 is located on the upper left side of the BMPC II line control unit. Press the black QM1 button and check if the pump now works. If the pump still does not work, check the on/off switch for the pump itself. The on/off switch is located near to the mains cable input of the pump. If the pump still fails, it must be replaced.
For instruction on how to exchange a pump please read section _**"Replacing the Vacuum Pump" on page 88**_.

Valve 1 Failed

The valve V1 could not be switched or is not working correctly.

Solution: Switch to the manual pump mode. Switch on pump P1, and check the function of the valve, switching it on and off. If the valve does not work, check the fuse Q4. To do this open the upper rear panel of the BMPC II, the Q4 fuse is located on the upper left side of the BMPC II line control unit. The black Q4 switch must be in the up position. Recheck if the valve works, if it still does not work call bruker service for assistance.

Pump 2 Failed

Pump P2 has failed or does not work correctly. If the pump was working in automatic mode the BMPC II is now using pump P1.

Solution: Switch to the manual pump mode. Switch on P2, but do not open valve V2, and check to see if the pump is working correctly. If not, check the motor protection switch QM2. To do this open the upper rear panel of the BMPC II, QM2 is located on the upper left side of the BMPC II line control unit. Press the black QM2 button and check if the pump now works. If the pump still does not work check the on/off switch of the pump itself. The on/off switch is located near the mains cable input of the pump. If the pump is not working, it must be replaced.
For instruction on how to exchange a pump please read section _**"Replacing the Vacuum Pump" on page 88**_.

Valve 2 Failed

The valve V2 could not be switched or is not working correctly.

Solution: Switch to the manual pump mode. Switch on pump P2, and check the function of the valve, switching it on and off. If the valve does not work, check the fuse Q5. To do this open the upper rear panel of the BMPC II, the Q5 fuse is located on the upper left side of the BMPC II line control unit. The black Q5 switch must be in the up position. Recheck if the valve works, if it still does not work call bruker service for assistance.

Warning Commercial Power Failed

The input power to the external UPS has failed due to a commercial power failure.

Solution: If the power failure was not due to a commercial power outage, check the mains supply chain, perhaps one of the facility fuses has blown.

Alarm UPS Low Battery

The backup battery is low and will only supply power for a few more minutes.

Solution: Reestablish power to the unit (e.g. emergency generator or similar if power is not available).

Warning UPS on Bypass

The UPS is working in automatic bypass mode. This means that the UPS cannot switch to battery backup mode in case of a power failure.

Solution: Check the output load of the UPS. If this is too high (load on the NMR console), the UPS switches to the automatic bypass mode.

Warning UPS General Alarm

The warning message for the UPS may vary according to the make and model of the unit. Read the UPS manual that was delivered with the UPS for information on the meaning of the general alarm message.

Warning UPS Not Connected

The status interface between the BMPC II and the UPS is not connected. Therefore the BMPC II will not receive any information about the UPS status. In the event of a longer power failure no alarm procedure will be activated when the UPS battery fails. Additionally it is not possible to enable the console output.

Solution: Check the connection between the UPS and the BMPC II. The cable HZ13979 must be connected at X6, which is located on the lower right side of the BMPC II line control unit and to the external UPS Statusinterface.

Warning Heater H1 Problem

This warning indicates that there is a possible problem with the heater H1. The real output power does not correspond to the desired output power.

Solution: Please check the connection between the wiring box and the heater H1 (cable HZ13813).

Warning Heater H2 Problem

This warning indicates that there is a possible problem with the heater H2. The real output power does not correspond to the desired output power.

Solution: Please check the connection between the wiring box and the heater H2 (cable P/N HZ13811).

Pump Test Not Possible in Manual Mode

The automatic pump test can not be started in manual pump mode.

Solution: Use the automatic pump mode.

Pump Test Not Started

The automatic pump test could not be started due to an internal error. Please notify Bruker service.

Pump Test Not Possible, Both Pumps in Use

The automatic pump test could not be started because both pumps were in use when the pump test was started.

Solution: Wait until the next automatic pump test or start the pump test manually. To start the pump test manually select *Tools - Options - Pump control - Pump Test*.

Pump Test Pump 1 Failed

The automatic pump test detected that the pump P1 does not work reliably.

Solution: Check the pump very carefully, if is not working properly, then exchange the pump with the spare pump. To change the pump read the section ***"Replacing the Vacuum Pump" on page 88***.

Pump Test Pump 2 Failed

The automatic pump test detected that the pump P2 does not work reliable.

Solution: Please check the pump very careful. If not working good, then change the pump with the spare pump. To change the pump read the section ***"Replacing the Vacuum Pump" on page 88***.

Pump Test Not Possible, Parameter Error

The automatic pump test could not be started because the parameters for helium flow „Fl" and/or pressure1 „P1" could not be read correctly.

Solution: Read the section ***"When the Value of a Parameter is Displayed as NAN" on page 88***.

Problems and Troubleshooting

Any messages that appear during operation of the BMPC II are displayed In the Event Log of the „Present Values/Events" window. In addition the messages are stored in the Event Log file.

There are several different kinds of messages, which can be displayed or faded out using the filter adjustment of the event log browser:

- Warning: The upper or lower limits of a warning limit have been surpassed.

- Alarm: The upper or lower limits of an alarm limit have been surpassed.

- Misc: A general message, e.g. change of mode.

- Control Unit: All messages are transferred from the BMPC II through the serial port. These error message are marked with the prefix „CU".

Additional Error Messages in the Event Log 9.2.1

CAN Network Reboot

CAN Slave General

CAN Slave No Data

CAN Slave Initialization Failed

CAN Slave Unexpected Answer

CAN Slave Hardware Error

CAN Slave SBS Error

CAN Slave Reset Event

CAN Fatal RTX Initialization Failed

CAN Fatal RTX Internal

All of these error messages relate to a malfunction of the CAN bus. Carry out the step listed in the section ***"When the Value of a Parameter is Displayed as NAN" on page 88*** and if this do not correct the error contact Bruker service.

Error Message at the Start of BMPC II Control Program 9.3

The following error message may occur at the start of the BMPC II control program:

- Database Update Error
- Version Check Error
- Com Port Error

These errors are described in the following sections.

Database Update Error 9.3.1

When the BMPC II control program is started and the Database Update window appears it normally means the program has loaded an old version of the database structure due to a recent program update.

Figure 9.2. Update Database Error
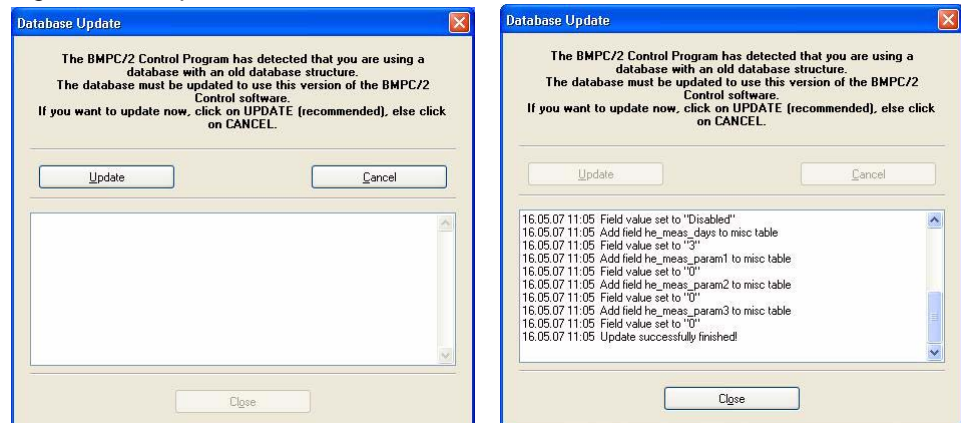
Display before the Update   Display after the Update

In order to use the new program version you will need to update the database. Press the **Update** button to actualize the database, or **Cancel** to close the window. If you close the window without updating the database you *will not* be able to start the control program. Once you have actualized the database you can then press Close and you will be able to start the control program.

Version Check Error 9.3.2

In order for the BMPC II control program to work, a firmware version of VX.Y or higher must be loaded to the control unit. When this is not the case, the communication between the PC and the BMPC II control unit will not function properly. Refer to the section ***"Downloading New Firmware" on page 100*** for information on how to download the latest version of firmware.

Com Port Error 9.3.3

When a Com Port error occurs, it mean that the communications port used for communication with the BMPC II cannot be used.

Either the port is in use from another program (e.g. SBS terminal or the BMPC II Setup Tool), or the cable connection to the control unit is not functioning correctly.

The standard configuration for the COM Port is COM1. Please check this configuration in *Tools - Options - General - Communication Setting*. Also refer to section ***"Communication Settings" on page 47***

Other Errors 9.4

When the Value of a Parameter is Displayed as NAN 9.4.1

When the value of a parameter is displayed as NAN (Not A Number), it means that the value of a sensor that is connected to the CAN bus cannot be read. This can lead to various consequences.

First try to reinitialize the CAN bus by doing a software reset of the BMPC control unit (see ***"Control Unit" on page 50***).

If this is not successful, you can try to turn the control unit on and off. Therefore open and close the Q10 safety fuse on the BMPC II. This is accessible by opening the rear side, upper cover of the BMPC. The Q10 safety fuse is on the upper left-hand side.

When this still not solves the problem, check the CAN bus wiring (see ***"CAN Bus" on page 72***).

Replacing the Vacuum Pump 9.5

When the vacuum pump need to be replaced, the following steps need to be carried out in sequential order:

- Switch the BMPC II to Monitor Only Mode, so that an alarm is not released during the service work.

- Switch the BMPC II to manual pump mode. Use the intact pumps and the associated valve to pump on the magnet.

- Loosen the 4 locking screws on the pump cabinet a quarter turn to the left and remove the front cover.

- You should now see the P1 pump on the left side and the P2 pump on the right side.

⚠️

Warning: The surface of the pumps can be extremely hot! Contact with this surface can result in a serious burn. Wait until the pump surface cools down before continuing.

⚠️

Be sure that the valve from the pump you want to exchange is closed!

- Loosen the two small flange screw connections that attach the evacuating hoses to the pump.

Figure 9.3.   Remove the Small Flange Screws
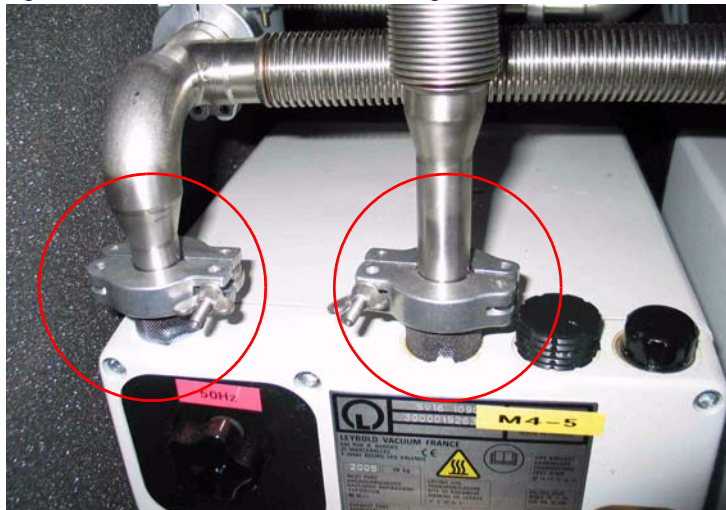
- Remove the flange screw connections and the associated seals.
- Remove the.mains connection from the backside of the pump.
- Unscrew the screws holding the pump unit. You will need an 8 mm open-end wrench.
- Move the locking mechanism so that the pump tray with the defective pump can be freely moved.

Figure 9.4. Pump Tray Locking Mechanism

Loosen the screws and move the locking-mechanism
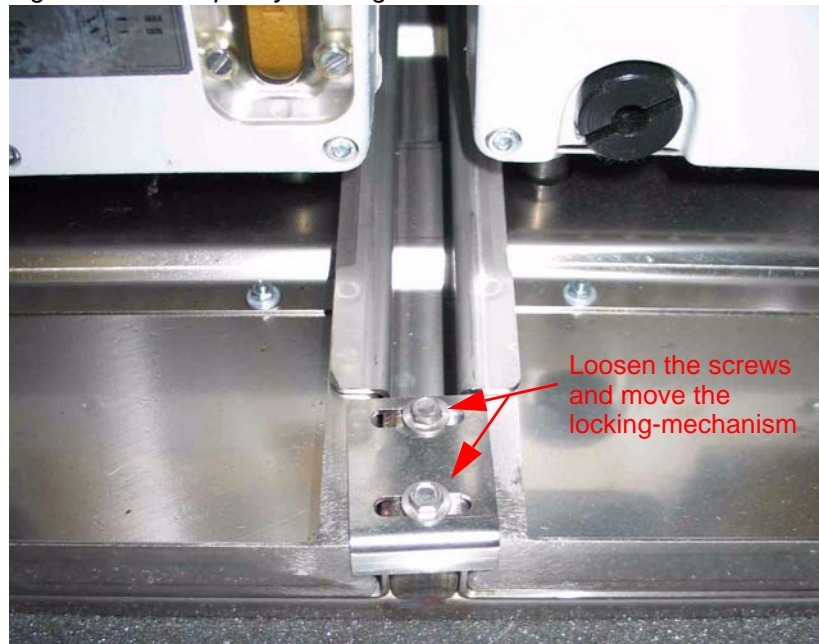
- Pull the pump forward on the pump tray. The tray can not be pulled out all the way, which prevents it from falling out.
- Exchange the defective pump with a new one.

Check to make sure the new pump is ready for use before mounting it. This includes checking and refilling the oil level as required in the manual of the vacuum pump.

- Push the pump tray back to its original position and reconnect the locking mechanism.
- Mount both of the small flange screws including the seals on the new pump. Proceed carefully, the connections need to be completely sealed!
- Plug in the mains cable on the pump and turn on the pump switch (directly beside the mains connection).
- Test the new pump by turning the pump on manually (P1 or P2 On).
- Test the new pump for function, whereas you compare pressure P1 and Helium Flow Fl established by the new pump with the values of the old pump. These values should be nearly identical. It is possible you will need to wait one hour until the temperature of the pump has settled before the values stablilize.
- Mount and close the front cover.
- Place the BMPC II in Automatic Pump mode and in Monitor & Alarm mode.

The NMR Console Switches Off Too Fast 9.6

The voltage supply for the NMR console takes place over the BMPC II. The NMR console is attached to terminal X3 of the BMPC II line control unit (see *"Line Control Unit" on page 75*). Since the NMR console may be supplied only for a short time by the batteries of the USP during a power failure, it is automatically switched off by a time delay relay after a preset time.

The preset time can be adjusted anywhere between 1.5 minutes and 30 minutes. The following section explains how to adjust the time delay.

Adjusting the NMR Console Turn-off Time 9.6.1

The adjustment of the turn-off time is made through the KM3 relay. To access the relay open the upper back cover, the KM3 relay is found almost exactly in the middle of the line control unit.

To change the time you need to move the yellow turning wheel. Turn the wheel downwards to shorten the time (minimum of 1.5 minutes), upwards to lengthen the time (maximum of 30 minutes).

Figure 9.5.   Adjusting the NMR Console Turn-off Time

Increase Time

Decrease Time
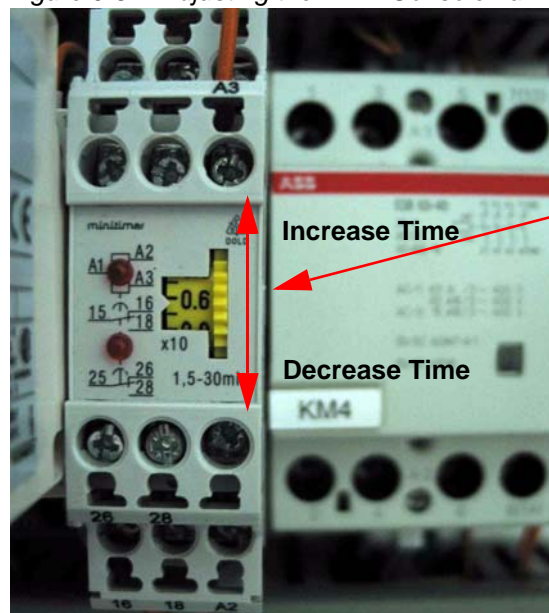
Shown is an adjustment of ca. 6 minutes.

In the event of a power failure, the longer the console remains on the UPS, the shorter will be the time that the vacuum pumps will be powered. A favorable value is within the range of a maximum of 5 minutes.

Turning on the NMR Console After a Power Failure 9.7

When the NMR console switches off due to a power failure there are two different ways to restart it:

- Restarting the console through the software.
- Restarting the console using the mains switch.

Restarting the NMR Console Through the Software 9.7.1

In the menu Tools you will find the options Enable NMR Console and Disable NMR Console. When you are logged in as Administrator you can use these functions to turn the NMR console on or off.

Figure 9.6.   Restarting the NMR Console Through Software

Turn-on the Console
Turn-off the Console
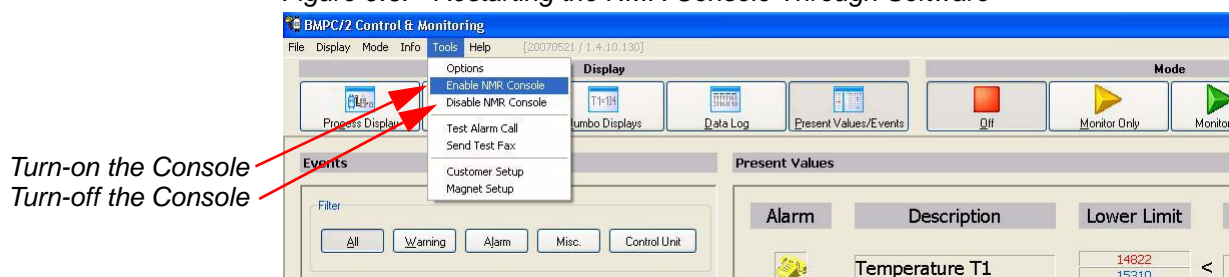
Restarting the NMR Console Using the Mains Switch 9.7.2

If you cannot switch on the console using the software, you can use the S4 switch as an alternative. The S4 switch is found behind the rear cover, roughly in the middle. As soon as you turn on this switch the KM4 protection will be activated and the console will be provided with power.

Figure 9.7.   Restarting the NMR Console Using the Main Switch

The S4 switch is used to turn on the NMR console.
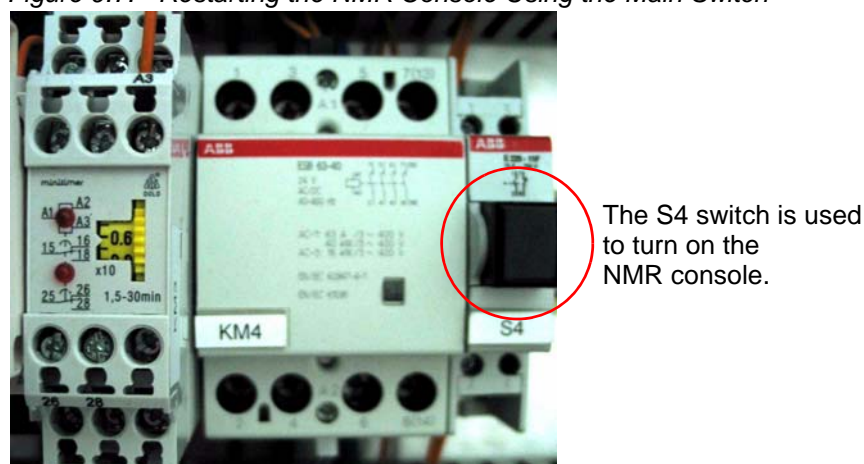
The console can only be switched on if the following conditions are fulfilled:

- The UPS must not be running under battery power.
- The status interface to the UPS must be attached.

Exchanging Fuses *9.8*

Several fuses are used within the BMPC II. The following sections contain detailed instructions on how to change these fuses.

Exchanging the Pump Cabinet Ventilator Fuse *9.8.1*

In the pump cabinet are a total of 3 ventilator fans. Each of these fans is protected by its own fuse.

The following fuse type is required for the pump cabinet fans:

Cartridge fuse 5 x 20 mm 0.1 A time lag. The Bruker part number is 2241.

To replace a fuse open the upper back cover of the BMPC II. The fuse for the fans are located on the upper right side, marked as FU5, FU6 and FU7.

Figure 9.8.   Exchanging the Ventilator Fuses
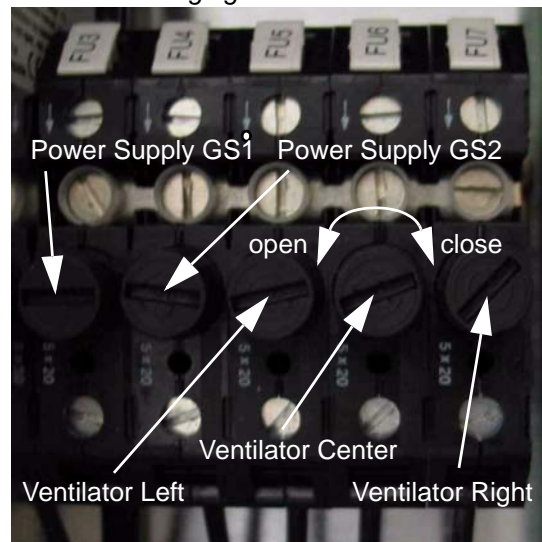
The FU6 fuse is found on the left side, the FU7 fuse in the center, and the FU8 fuse on the right side as shown in the figure above. To exchange a fuse you will need to unscrew the fuse caps with a flat-head screwdriver. Remove the fuse and insert a new one, then use the screwdriver to replace the fuse cap.

Exchanging the GS1 or GS2 Power Supply Fuses *9.8.2*

There are two power supplies in the BMPC line control unit. Each of these power supplies has its own safety fuse.

The following fuse type is required for the power supplies:

Cartridge fuse 5 x 20 mm 0.8 A time lag. The Bruker part number is 2250.

The fuse for power supply GS1 is FU1 and the fuse for power supply GS2 is FU2. See the previous section (9.8.1) for instructions on how to exchange the fuse.

The BMPC II control unit utilizes two safety fuses.

The following fuse type is required for the control unit:

Cartridge fuse 5 x 20 mm 0.8 A time lag. The Bruker part number is 2250.

To exchange a fuse in the control unit you must first remove the upper rear cover. To access the back of the control unit, unscrew the left and right side screws securing the line control unit using a cross-tip screwdriver and tilt the unit outwards.

Figure 9.9.   Tilt Open the Line Control Unit

Remove the power supply plug from the control unit and open the fuse holder as shown in the figure below. Remove the fuse insert and exchange both safety fuses. Reassemble the unit in reverse order.

Figure 9.10. Replacing the Control Unit Fuse

Maintenance and Cleaning

10

Maintenance Work   10.1

To prolong the life of the BMPC II, Bruker recommends that the maintenance work in this chapter be carried out on a regular basis.

Exchanging the Internal UPS Battery   10.1.1

The batteries for the internal UPS (Uninterruptable Power Supply) are subject to wearing out. After a lifetime of around 4 to 6 years the capacity normally is reduced significantly.

Bruker recommends that the batteries be exchanged every 5 years. Please call Bruker service for assistance.

Exchanging the batteries must be done by trained personal. There is high voltage present inside the UPS, even when the UPS is switched off or disconnected!

When the „Battery Fault" indicator appears during operation, refer to the appropriate chapter in the UPS manual for troubleshooting instructions.

Cleaning   10.2

No special cleaning has to be carried out. Impurities can be cleaned using a standard household cleaner and cleaning tissues.

Don't use strong cleaning solvents, because they could damage the surface of the BMPC II.

To clean the LCD panel use a special LCD detergent manufactured for this purpose.

Technical Data

11

Voltage Supply Requirements 11.1

Input Voltage:	208 -230 VAC (fluctuations of less than $\pm$ 10%)
Input Frequency Range:	50 - 60 Hz
Pollution Scale:	2
Over Voltage Category:	2

Site Conditions 11.2

The BMPC II should only be used:

- in a standard laboratory environment
- up to a maximum elevation of 2000 meters
- at a temperature between 15-35 °C
- at a relative humidity of a maximum of 80% for temperatures up to 31°C, linearly decreasing to 67% at a temperature of 35 °C.

Noise Level 11.3

The measured noise level for the BMPC II is less than 45 dBA.

Power Input Safety Fuse 11.4

The power input safety fuse for the BMPC II is a 50A dual-element time delay fuse Class J 600V. The Bruker part number for this fuse is 87570. Two fuses of this type are used in the unit.

Technical Data

Setup Tool

12

Introduction   *12.1*

The BMPC II Setup Tool is needed to:

- Download new firmware.

- Recalibrate the temperature sensors for T1 and T2.

- Do CAN bus diagnostics.

If you want to use the setup tool, you first need to stop and close the BMPC II control program.

Figure 12.1. Setup Tool Start Window

Default Com port
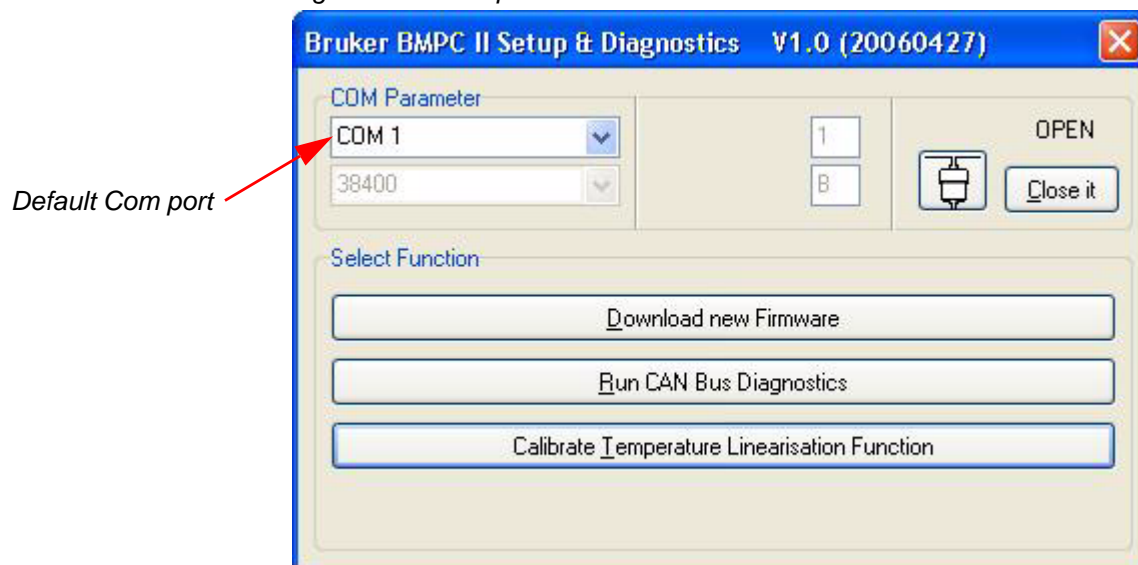
Starting the Setup Tool   *12.2*

If you are logged in as Windows Administrator you can start the setup tool by clicking the corresponding setup tool icon. If you are logged in as a standard Windows user then use the Windows XP Start feature to start the program.

Downloading New Firmware 12.3

This function is used to download a new firmware version to the BMPC II Control Unit. The firmware download typically requires around 10-12 minutes.

After selecting this function, browse for the actual firmware file which should be stored before in the directory:

c:\program files\bruker\bmpc2\Firmware\bmpc*.h86

After selecting the actual version, you can start the download by pressing the key *Start Download*.

Figure 12.2. Setup Tool - Download
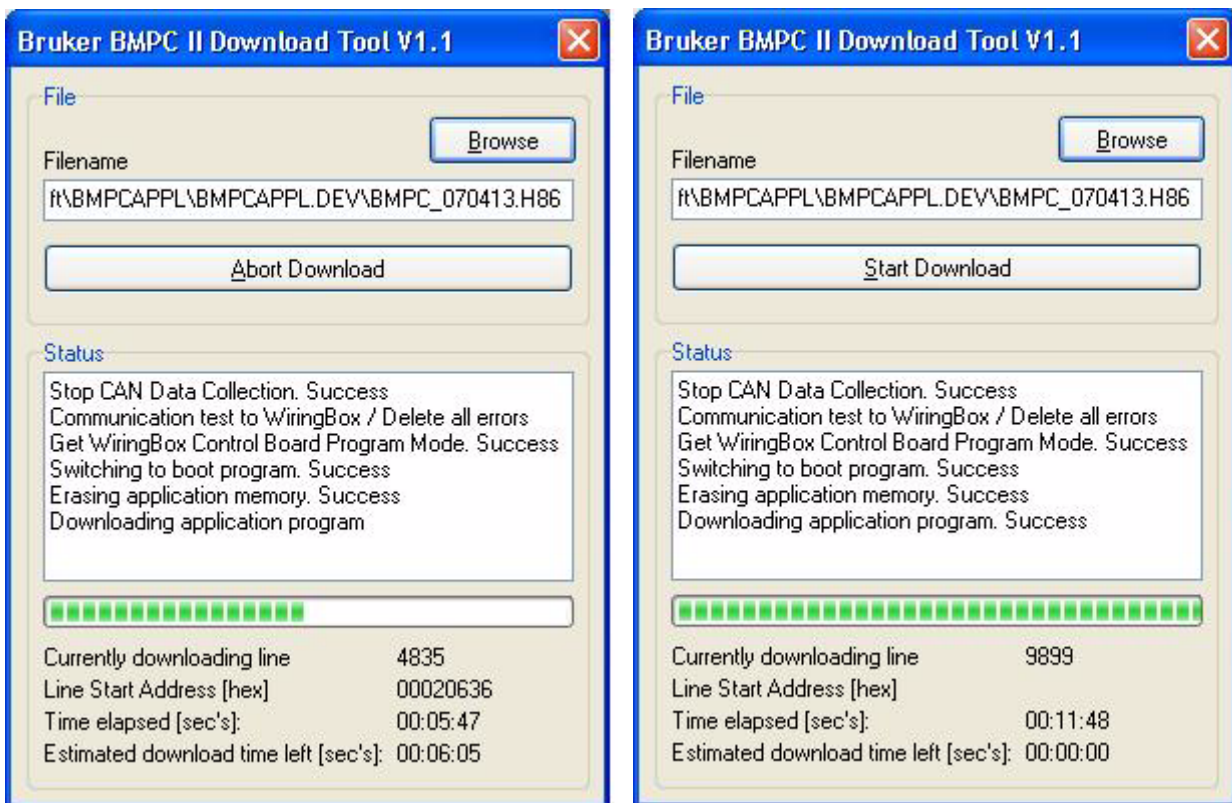
Download in progress   *Download finished*

If a Download terminates without finishing the download, in which case an error message is displayed, try again. Should the download fail a second time, please call Bruker service for assistance.

Run CAN Bus Diagnostic 12.4

If there are functional problems with the CAN Bus, you can use the CAN Bus Diagnostics to search for the problem. After starting this function, all CAN BUS functions will be checked to see if they operate correctly.

Figure 12.3. Setup Tool - Can Bus Diagnostic
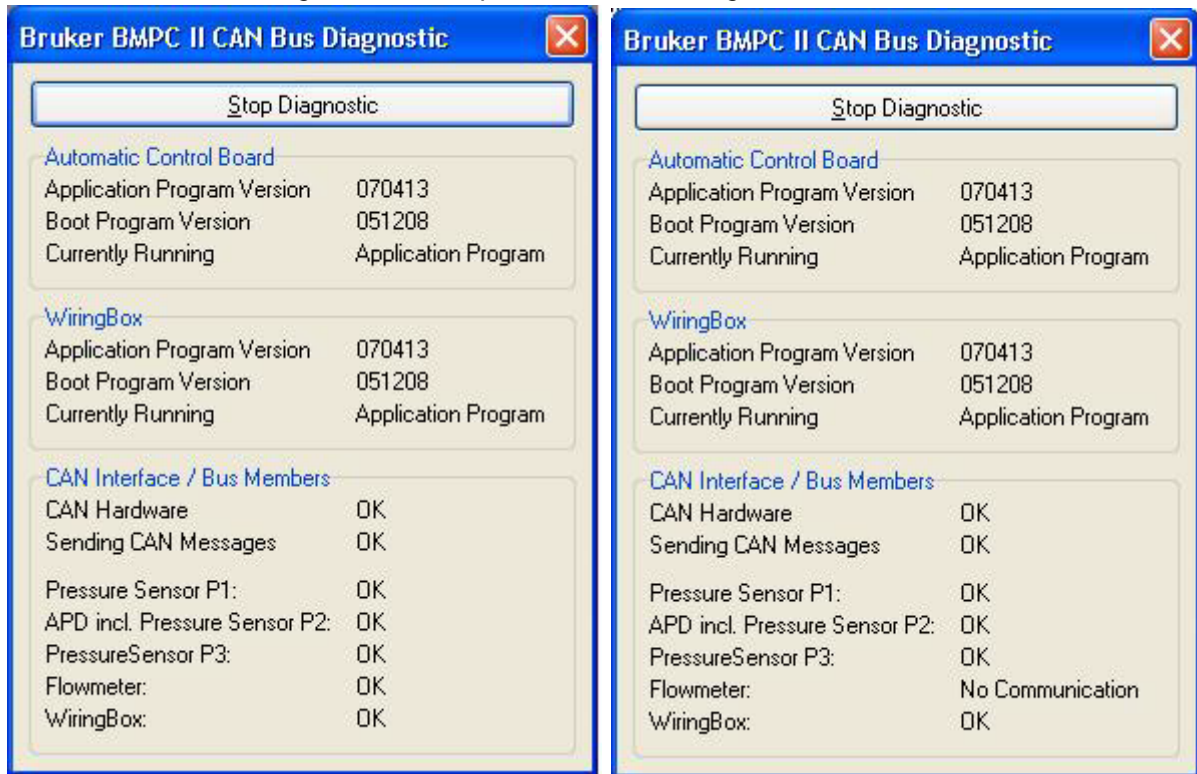
Test finished CAN BUS OK   Test finished flow meter failed

In the above example you can see that a communication problem with the flow meter was detected.

If the test fails, read the section ***"When the Value of a Parameter is Displayed as NAN" on page 88*** for tips on handling this problem. If this does not help please contact Bruker service for assistance.

Calibrate Temperature Linearization Function 12.5

This function is used to recalibrate the temperature sensors for T1 or T2. To use this function you need both calibration connectors BMPC II T1/T2 Calibration Connector High (P/N HZ13703) and BMPC/2 T1/T2 Calibration Connector Low (P/N HZ13704).

Start the calibration by selecting the Calibrate Temperature Linearization Function.

Figure 12.4. Setup Tool - Calibrate Temperature
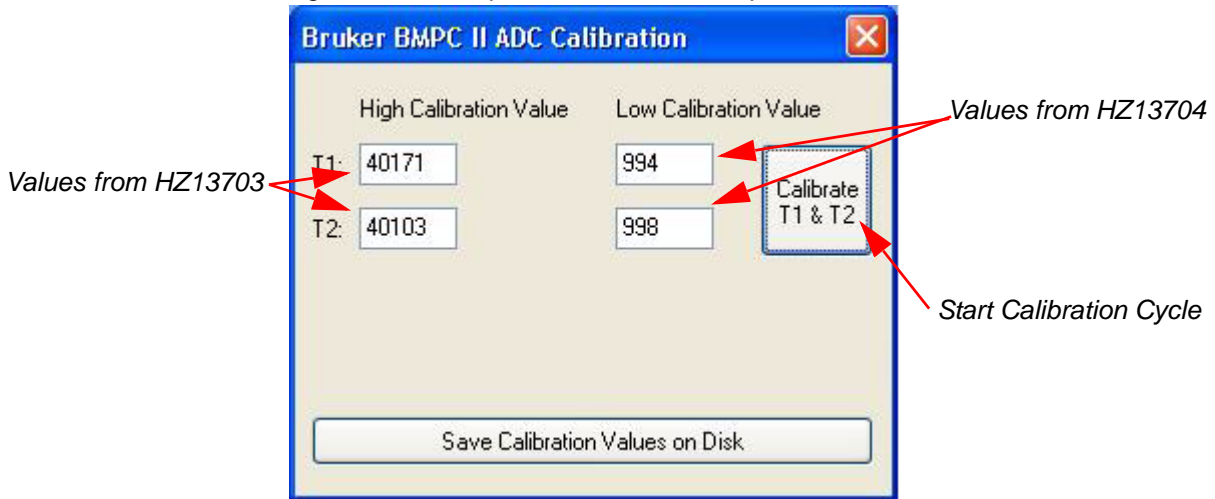
First input the values of both calibration connectors in the fields shown in the figure above and press the **Save Calibration Values on Disk** button. These values are printed on a small label on the calibration connector. If you need this function at a later time then you do not have to input the values again as they will be stored on the hard disk.

Press the key „Calibrate T1 & T2" and follow the instructions that will be displayed.

Please store the calibration connectors very carefully. Without these parts it is not possible to recalibrate the BMPC II.

Administration of Passwords

13

Changing Passwords

To change a password please use the menu

Tools - Options - General - Passwords & Codes

Figure 13.1. Administration of Passwords

The codes shown in the above figure are the default passwords which are valid after a new installation of the software.

Changing a password is only possible if you are logged in as administrator.

After a software update the codes you have changed are still valid. After a complete software reinstallation, the passwords are changed back to the defaults.

If you have changed a password which was used by another person, do not forget to inform them about the changes!

Administration of Passwords

User Password

When you are logged in as a normal user you are able to control the BMPC II. You are also allowed to change between the different displays and to select between the operating modes.

Administrator Password

In addition to the user functions, the Administrator can also change the configuration of the BMPC II.

Service Password

The service mode is restricted to Bruker Service personnel.

Alarm Confirm Code

The Alarm Confirm Code is needed during an alarm cycle to control the voice box system. Entering this code using a DTMF telephone will stop the alarm cycle.

Request Fax/Poll Code

This code is needed if you want to poll the actual status of the BMPC II or if requesting a status fax, using a DTMF telephone.

Tables

Tables

Figures

Figures

Index

Index

Notes:

Bruker BioSpin
your solution partner

Bruker BioSpin provides a world class, market-leading range of analysis solutions for your life and materials science needs

Bruker BioSpin Group

info@bruker-biospin.com
www.bruker-biospin.com