Magnet Information and Control System (MICS)

- User Manual

Version 13

Innovation with Integrity

Accessories

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For further technical assistance on the Magnet Information and Control System (MICS), please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

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1 Introduction

The **M**agnet **I**nformation and **C**ontrol **S**ystem (MICS) supports the user to check the state of a magnet system and can give a reminder if a service operation is due (e.g. refill of cryogenic liquids).

1.1 Installation Requirements

The installation of MICS is done by Bruker Service personnel.

MICS can be used together with TopSpin 2.1 and newer (type 'mics' in the TopSpin command prompt). It is possible though to install MICS on a computer with a TopSpin Version prior to TopSpin 2.1. In these cases MICS can not be started from within TopSpin but must be started standalone (batch file / shell script or desktop shortcut).

To use the full MICS functionality, it is necessary to install MICS together with a BIS file (**B**ruker **I**dentification **S**ystem) that matches the magnet system.

1.2 Limitations

MICS is an information utility and not a system service. MICS does not automatically run in the background, but must be started by the user, either manually or via an autostart script. Note that MICS will be terminated if the user logs out.
Please be aware that MICS can only be started once. If multiple users are logged in at the same time (user switching), MICS can only be used by the user who started MICS and any message dialogs will appear on the screen of this user only.
The user cannot solely rely on MICS to ensure the safety of the magnet system. It is still important to observe and to check regularly the data of the magnet system.

1.3 Approved Persons

Bruker BioSpin AG identifies the following qualifications for personnel performing tasks on the magnet system or its components:

Approved Customer Personnel

As a result of professional training by Bruker Service personnel, experience and knowledge of applicable regulations these persons are qualified to perform the specific tasks on the magnet system and its components assigned to them in this manual. Approved Customer Personnel are qualified to identify possible hazards and risks associated with the tasks assigned to them and to perform all possible steps to eliminate or minimize these risks.

Bruker Service Personnel

These persons are qualified by appropriate qualification and professional training and experience (including all necessary knowledge of applicable regulations and regulatory requirements) to perform specific tasks on the magnet system and its components. Bruker Service Personnel are qualified to identify possible hazards and risks and to perform all possible steps to eliminate or minimize these risks.

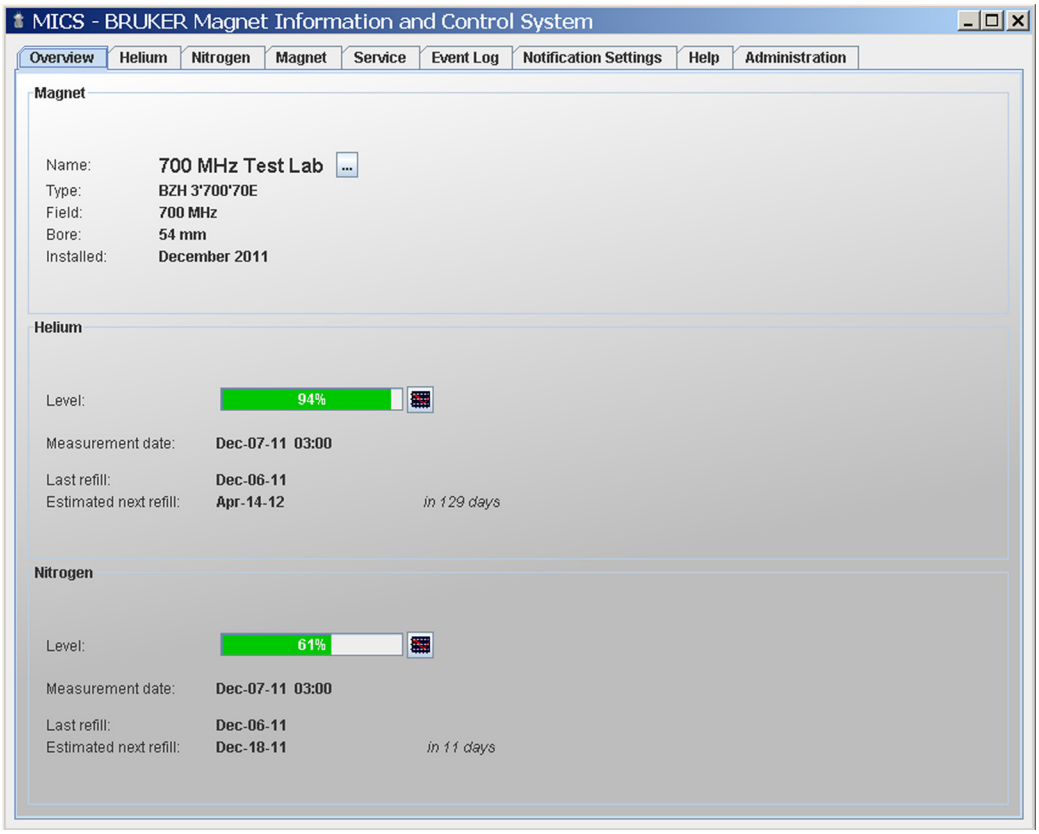
1.4 Intended Use

The Magnet Information and Control System (MICS) is an information utility, designed and intended for support of the user to check the state of a magnet system and its components.

Damage claims from damages caused by other than the intended use of the Magnet Information and Control System are excluded and the customer is held liable.

2 Main Functions

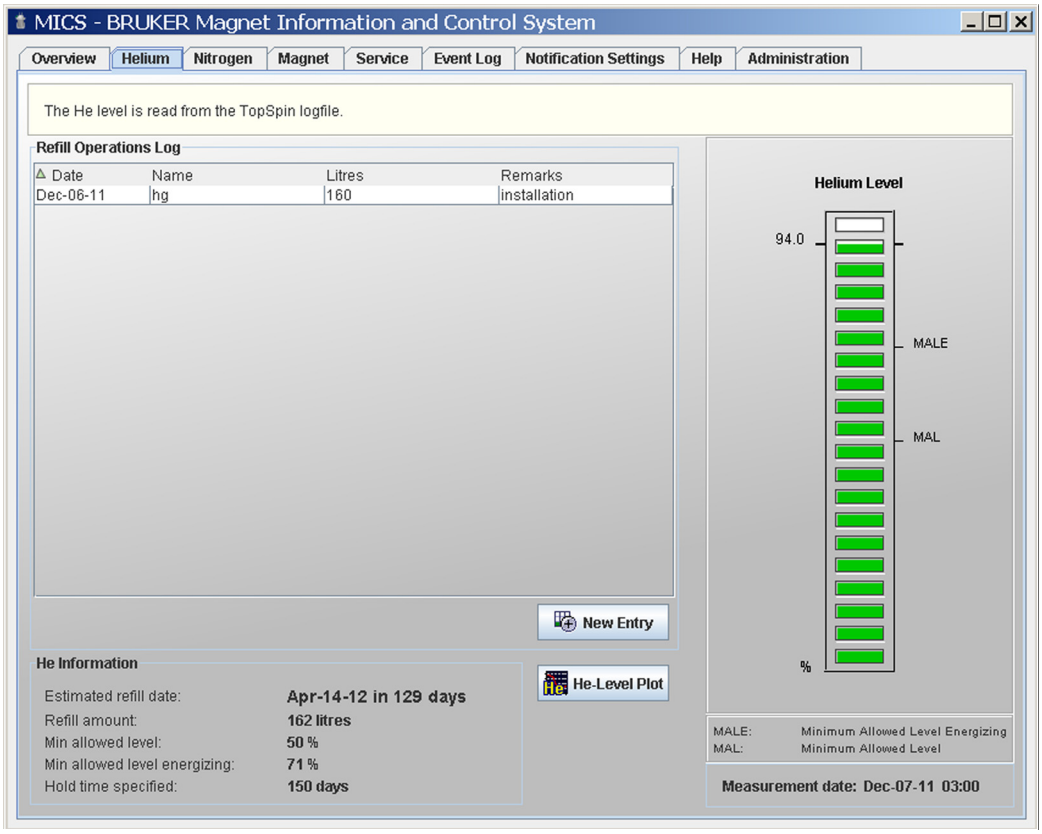
2.1 Overview



The “Overview” tab displays basic magnet information and an overall status of the cryogenic agents of the magnet system. It is possible to change the magnet name according to individual needs. This name will be used in email notifications and other MICS messages.

2.2 Helium

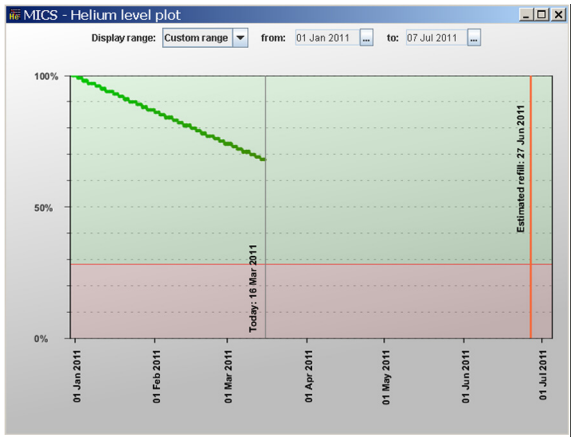
The “Helium” tab displays information about the current helium level, the refill history, the helium hold time and other important parameters related to the helium vessel of the magnet system.



After helium refill, the refill information needs to be entered on the “Helium” tab. Press the button “New Entry” to access the editor and to enter the helium refill information.

Press the button “He-Level Plot” to display an updated plot of the helium level as a function of time.

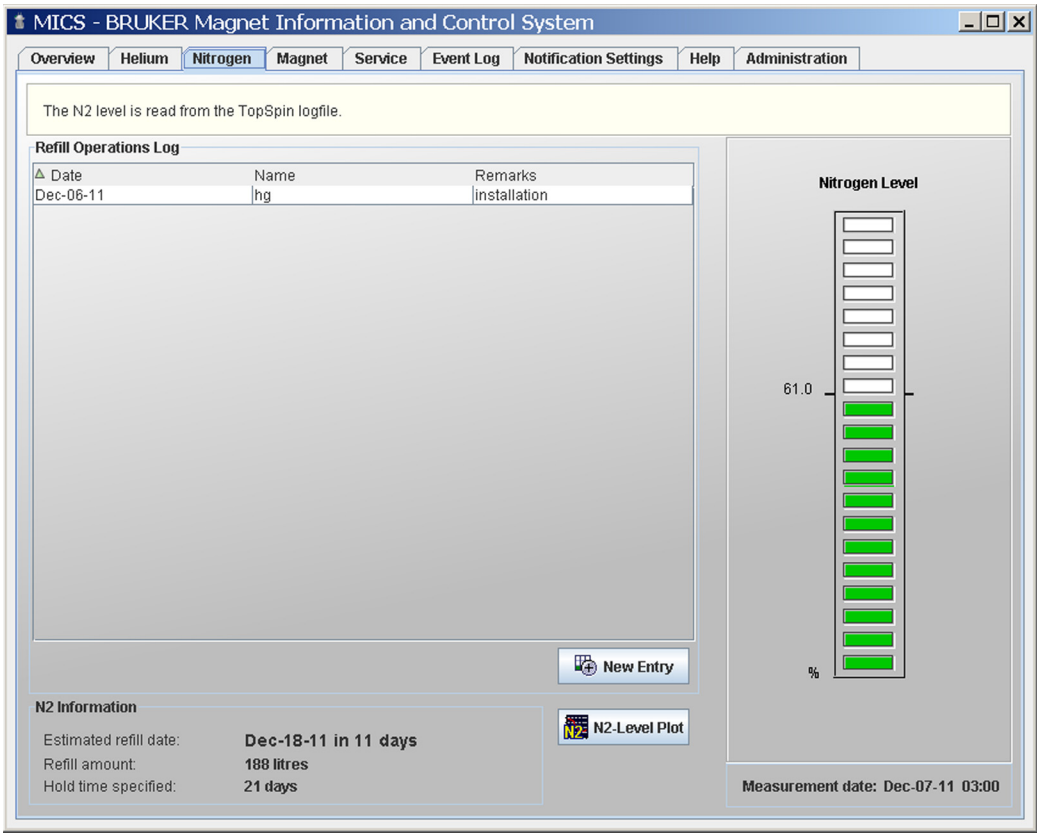
The next estimated refill date is calculated based on the present helium level and on previous helium levels. It is also displayed in the helium level plot.



2.3 Nitrogen

The “Nitrogen” tab displays information about the current nitrogen level (either calculated or measured), the refill history, the nitrogen hold time and the next scheduled nitrogen refill.

The “Nitrogen” tab does not exist for nitrogen free systems and for magnet systems equipped with a Bruker Nitrogen Liquefier (BNL).



Each time after refilling nitrogen, it is important to enter this information in MICS. Start MICS and select the “Nitrogen” tab. Update the refill table by pressing “New Entry”. This is particularly important if the magnet system is not equipped with a nitrogen level measurement device (see information below).

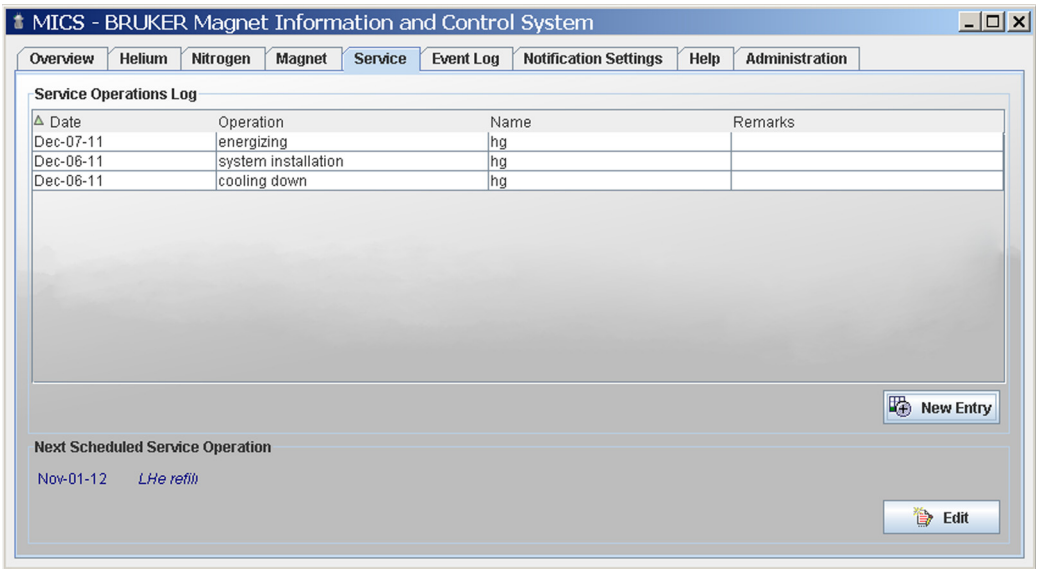
The nitrogen level displayed in the “Nitrogen” tab is a **measured** value only if the magnet system is equipped with a nitrogen level sensor. In magnet systems, that are not equipped with a nitrogen level sensor, the nitrogen level as well as the next pending refill date is a **calculated** value. It is based on the last refill date and on the known nitrogen loss rate of the cryostat.

2.4 Magnet Information

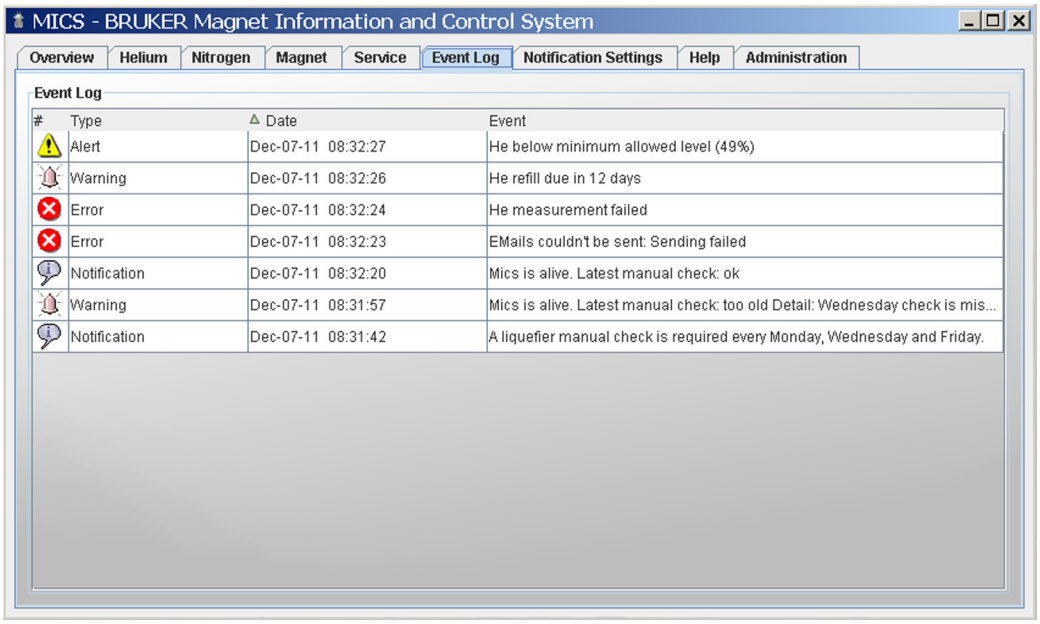
The “Magnet” tab gives detailed information about the magnet system and the cryostat. The section “Cryo Shims” provides data of the factory defaults and an editable table of the actual settings of the cryo shims.

2.5 Service

The “Service” tab lists all the performed service operations and announces the next scheduled service for the magnet system if any. New entries in the “Service” tab are typically generated only by Bruker Service personnel.



2.6 Event Log



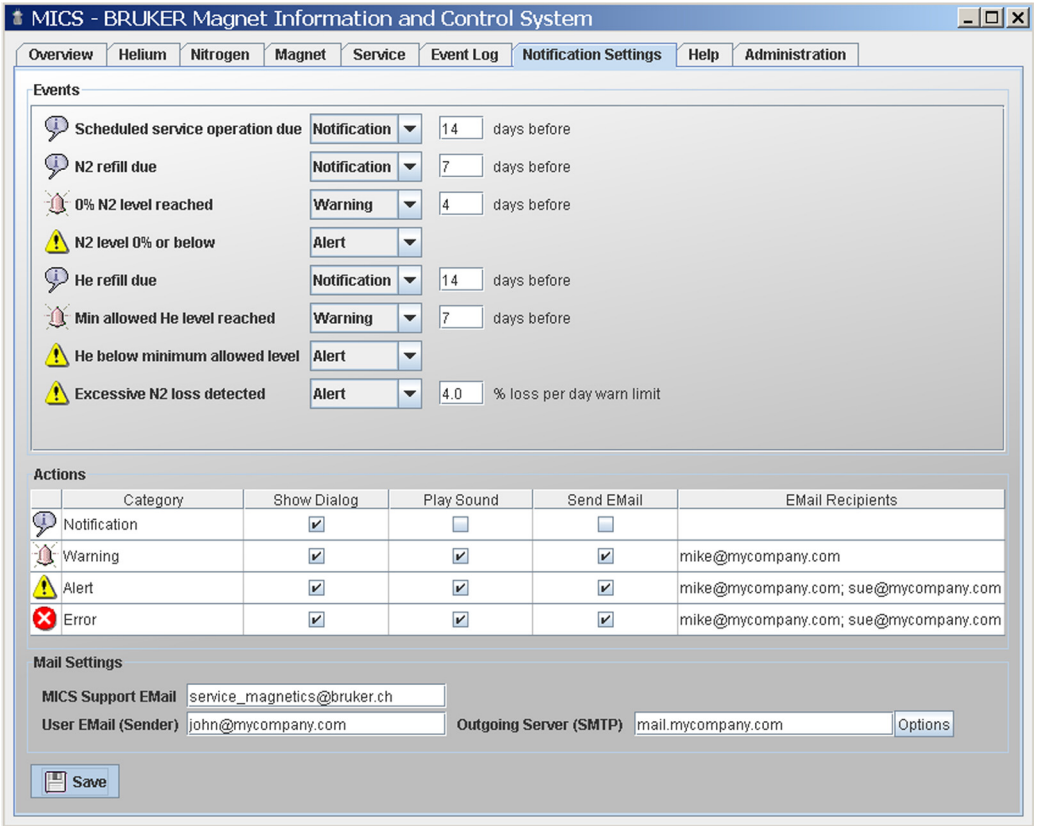
The tab “Event Log” displays the history of all Notifications, Warnings, Alerts and Errors.

2.7 Notification Settings

The “Notification Settings” tab allows the MICS behavior to be customized according to individual needs.

Select the event category and customize the actions to be taken by the system for each category (notification, warning, alert, error).

To change any of the settings on this tab, press the button “Edit” and insert the changes. The button will then change to “Save”. Press it again to save the changes.



2.7.1 Events

Every event is of a particular category: notification, warning, alert or error. This classification can be changed by the user. The event category defines the notification behavior of MICS (see chapter "Actions" on page 13).

For some of the events you can define how many days in advance of certain occurrences you want to be informed.

Certain events are raised only once, others are raised every day as long as the problem persists.

2.7.2 Actions

Here you define how you want to be informed if an event of a particular category (notification, warning, alert, error) occurs. To use the email function, an outgoing mail server (SMTP) must be defined (see chapter "Mail Settings" on page 13). It is possible to enter multiple email recipients on one line, separated by a semi-colon.

2.7.3 Mail Settings

Note that the email function is an important part of the notification concept in MICS. It should be configured carefully and it is recommended to send a test email after a configuration change. A test email can be sent in the “Notification Settings” tab of MICS via the “Options” button.

MICS Support Address

The MICS support address (service_magnetics@bruker.ch) is used to contact Bruker Service in case of problems with the magnet system or with MICS. Please refer to section "Help" on page 14 for additional information.

SMTP Server and Sender Address

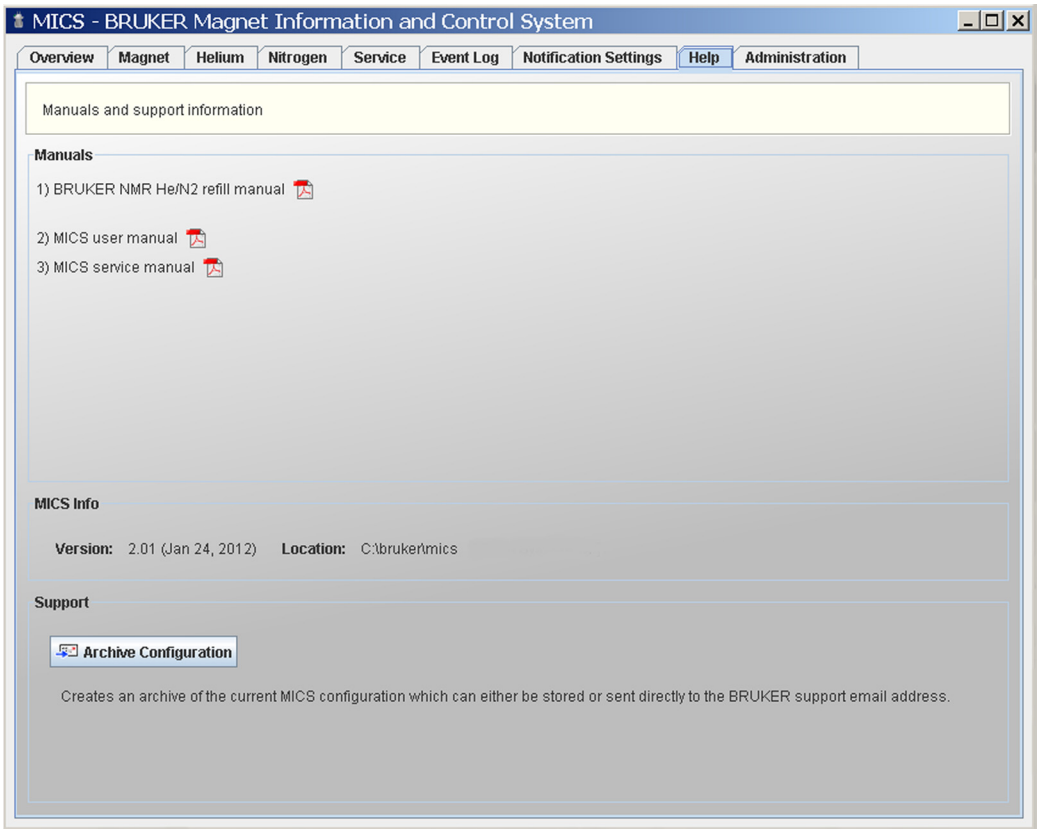
To enable MICS to send emails, an outgoing mail server (SMTP) needs to be configured as well as a valid sender address. Please ask your IT department for the proper configuration and whether authentication and/or encryption is required for SMTP or not.

MICS uses the standard SMTP port 25 to send emails and provides basic support for authentication (SMTP-Auth) and encryption (SSL/TLS).

If your IT environment requires to use authentication, it is recommended to use a designated email account for MICS. Do not use your personal account settings here, since password protection is only weak.

2.8 Help

This tab provides links to the He/N2 refill manual and to the MICS manual.



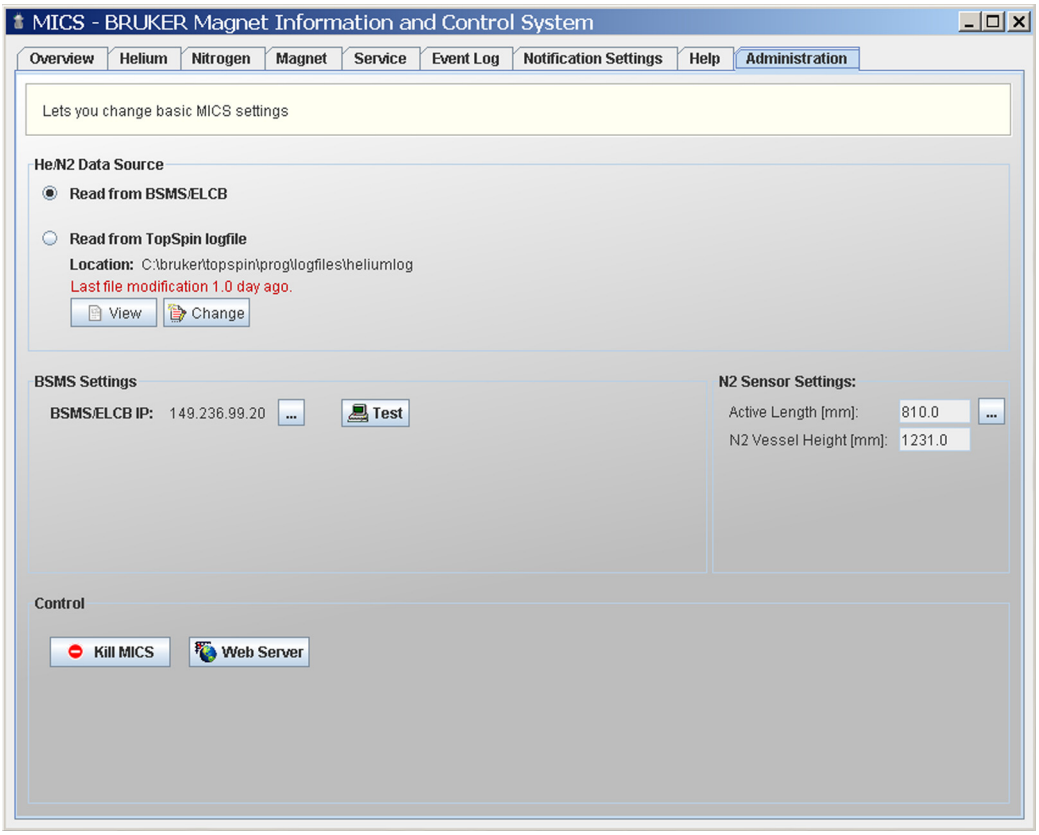
The “Support” section provides a tool to create a zip archive containing your MICS configuration and logfiles. Press the button “Archive Configuration” to create an archive containing the following data:

- Your system data as displayed by MICS
- Logfiles (N2, He, etc.)
- Configuration files

The generated archive can either be stored on the disk or can be sent directly to the support email address specified in the “Notification Settings” tab (see chapter "Mail Settings" on page 13). This is usually the email address of your Bruker Service representative. In addition please also write an email or make a phone call to describe your problem.

2.9 Administration

The “Administration” tab contains the basic settings for the MICS configuration. Settings in this tab are typically changed only by Bruker Service personnel.



3 Optional Functions

3.1 Nitrogen Free Systems

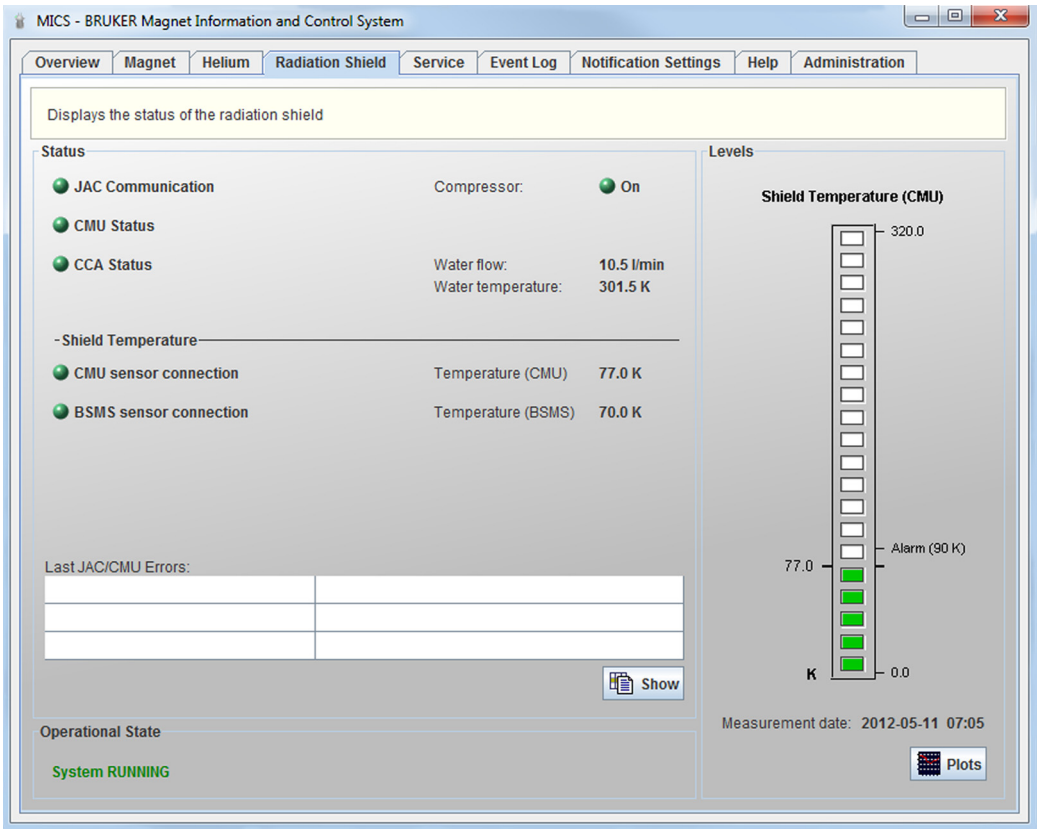
For nitrogen free systems, MICS displays a “Radiation Shield” tab instead of the standard “Nitrogen” tab.

3.1.1 Radiation Shield Temperature Monitoring with CMU

To activate the radiation shield temperature monitoring with CMU in MICS, a BSMS/2 system with BSVT is needed.

MICS relays messages from the CMU to the user. The MICS behavior for CMU messages can be configured in the “Notification Settings” tab.

Note that MICS is part of the redundant monitoring design and therefore needs to be running permanently in order to ensure mutual supervision between the CMU and MICS.



MICS displays the radiation shield temperature in Kelvin as a temperature gauge. The shield temperature and other parameters can also be displayed in a 2D plot, using the button “Plots”.

For operating the Ascend /R magnet refer to the supplied Ascend /R user manual.

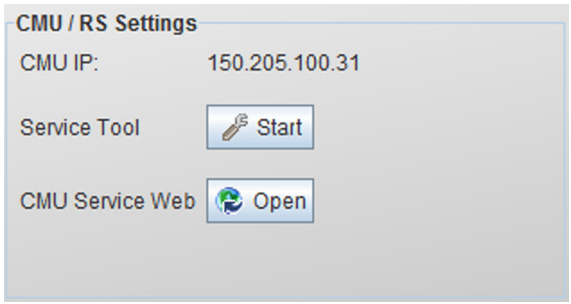
EMails

The Java Controller (JAC) of the CMU is capable of sending emails on its own. This is a fallback strategy and only used if the JAC detects that MICS is not running.

To configure the email configuration on the JAC device, use the button  “Configure JAC Device EMail” in the “Notification Settings” tab. Be aware that the email configuration of the JAC device is independent from the MICS email configuration.

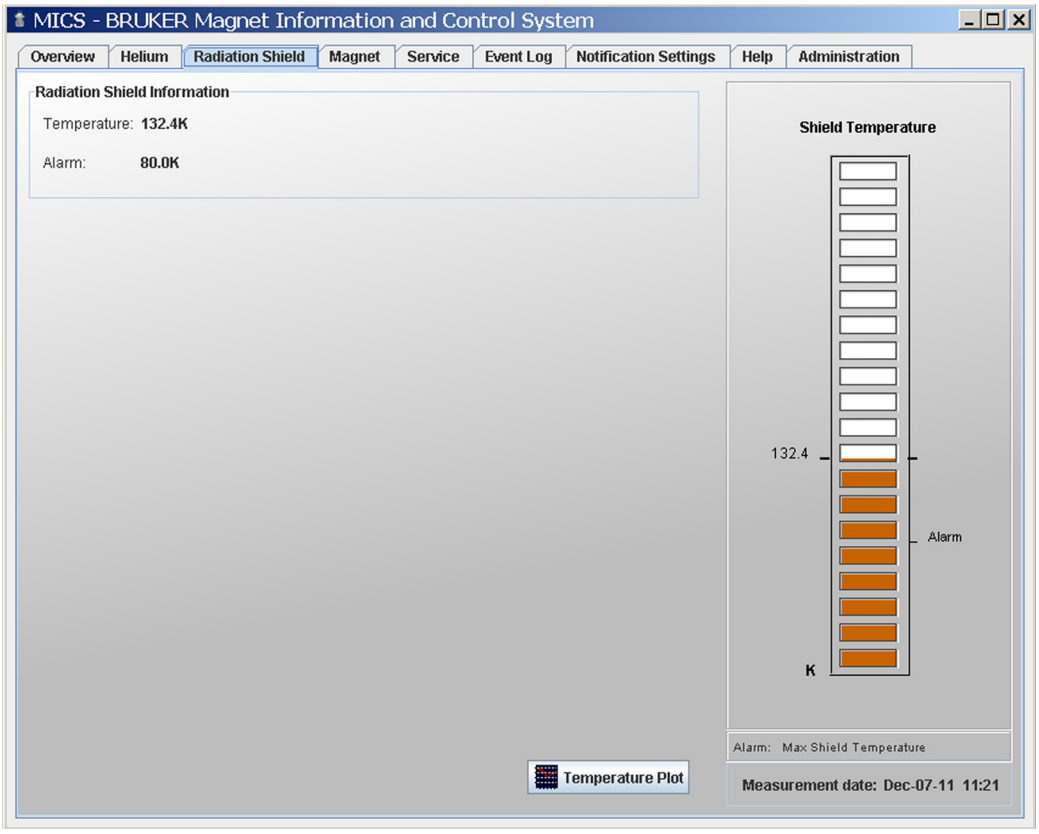
Administration

The MICS “Administration” tab provides a CMU/RS section, which displays the current IP address of the CMU device. It is also possible to open the CMU Service Web page or to start the CMU Service Tool from there.



3.1.2 Radiation Shield Temperature Monitoring without CMU

To activate the radiation shield temperature monitoring in MICS, a BSMS/2 system with ELCB and SLCB/3 is needed.

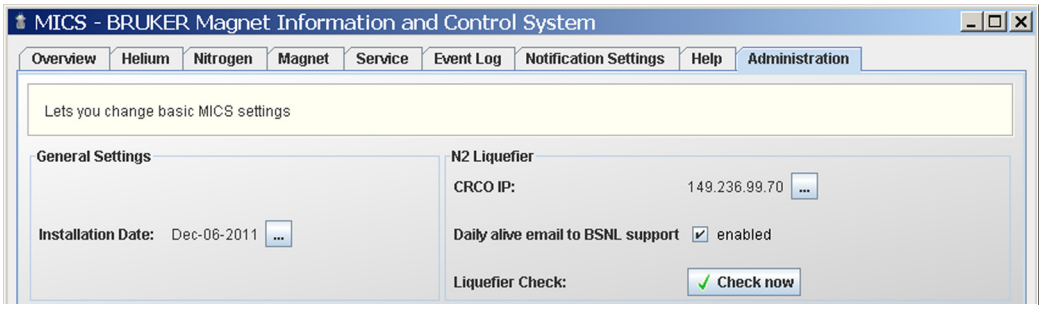


MICS displays the radiation shield temperature in Kelvin. The shield temperature can also be displayed in a 2D plot, using the button “Temperature Plot”.

An alarm temperature will be configured during the installation process by the Bruker Service personnel. If the alarm temperature limit is exceeded, the event “Shield temperature too high” will be raised.

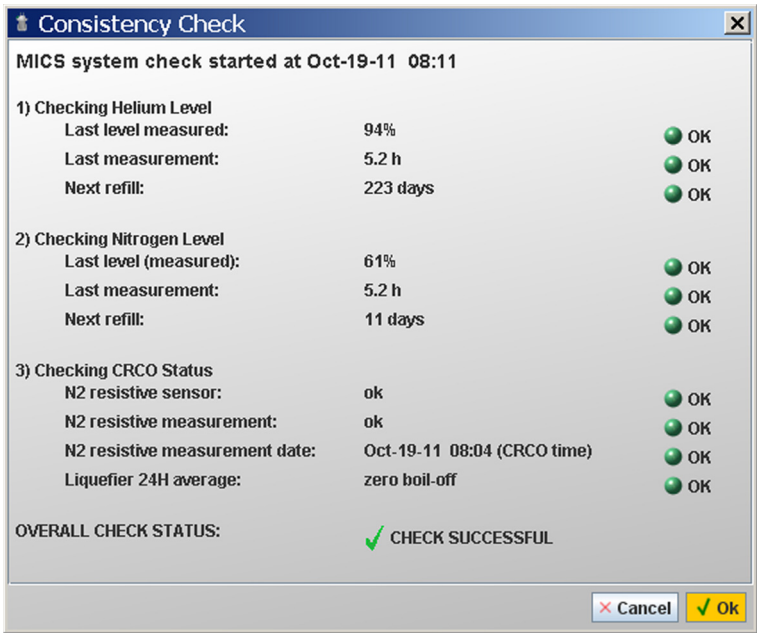
3.2 BSNL – Bruker Smart Nitrogen Liquefier

If the magnet system is equipped with a Bruker Smart Nitrogen Liquefier (BSNL), it is required to perform a system check within MICS every second day. This consistency check is necessary to detect whether the vital parts of the magnet system are working properly. It can be initiated using the Button “Check now” in the “Administration” tab.



The consistency check also connects to the Cryo Controller device (CRCO) to make a cross-check of the system status information.

After completion of the check, a summary dialog is displayed which informs about the current state of the magnet system:

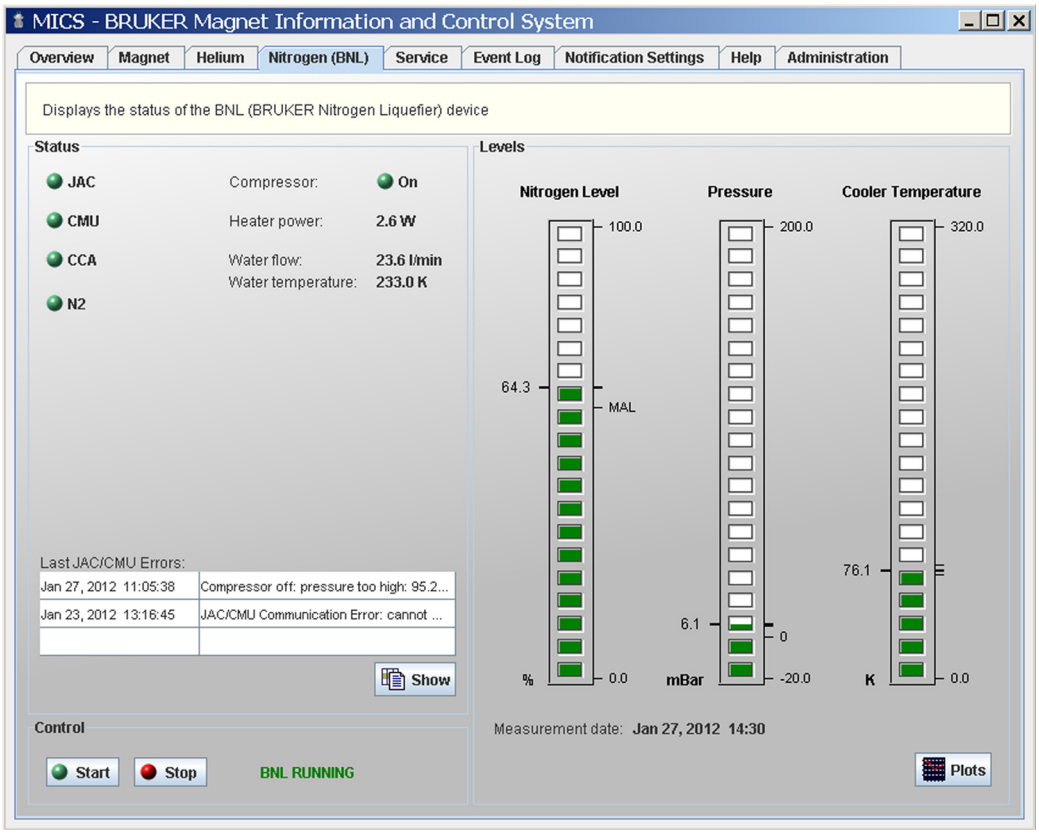


3.3 BNL – Bruker Nitrogen Liquefier

If the magnet system is equipped with a BNL nitrogen liquefier device, MICS displays a “Nitrogen (BNL)” tab instead of the standard nitrogen tab.

MICS relays messages from the CMU to the user. The MICS behavior for CMU messages can be configured in the “Notification Settings” tab.

i Note that MICS is part of the redundant monitoring design and therefore needs to be running permanently in order to ensure mutual supervision between the CMU and MICS.



i MICS can also be used to START or STOP the BNL device. Note that the Bruker Service Password is required to STOP the BNL device.

For operating the BNL refer to the supplied BNL User Manual.

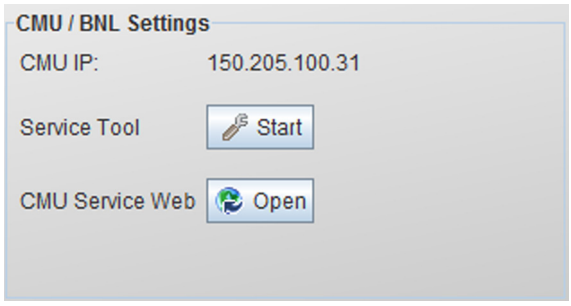
Emails

The Java Controller (JAC) of the CMU is capable of sending emails on its own. This is a fallback strategy and only used if the JAC detects that MICS is not running.

To configure the email configuration on the JAC device, use the button  “Configure JAC Device EMail” in the “Notification Settings” tab. Be aware that the email configuration of the JAC device is independent from the MICS email configuration.

Administration

The MICS “Administration” tab provides a CMU/BNL section, which displays the current IP address of the CMU device. It is also possible to open the CMU Service Web page or start the CMU Service Tool from there.



3.4 Web Overview

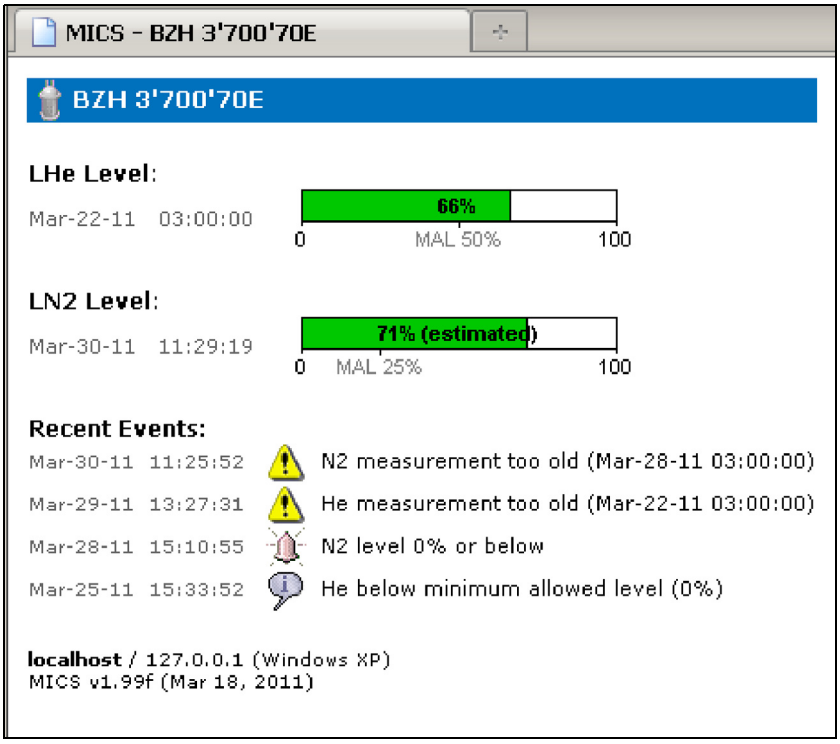
MICS contains an embedded webserver which lets you monitor your system state with a web browser from within your company's network.

It can be enabled in the “Administration” tab as an option. Make sure you specify a port that is available (e.g. 8080).

You might need to configure your firewall to allow http communication on the specified port.

The webserver provides the system status in an XML format, which is transformed into HTML and displayed by the browser.

Example Webpage



Optional Functions

4 Frequently Asked Questions

General:

1. How can MICS be started?

   MICS can either be started from within TopSpin or as a standalone application from the Start menu shortcut.

   - To start MICS from TopSpin, invoke the command `mics` in the TopSpin command prompt.

2. Is there any guaranty that MICS issues warnings and alerts if the TopSpin computer is running?

   No. MICS is a Java application designed for informational purposes and not a security tool. It does not run as a system device and therefore needs to be started by the user either manually or by means of a startup script.

Helium and Nitrogen Levels:

3. My system is not equipped with a nitrogen level sensor. How is the nitrogen level in MICS being calculated?

   MICS calculates the current nitrogen level based on the last refill date and the specified loss. The last refill date needs to be specified by the user in the *Nitrogen* tab. MICS always assumes a full nitrogen vessel after a refill.

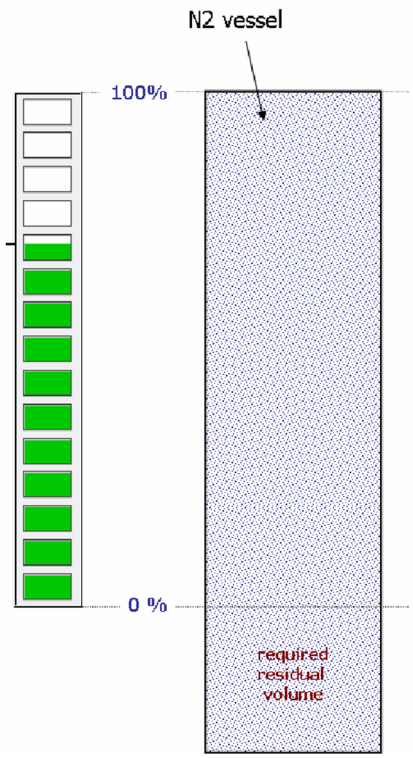
4. Why does the He/N2 level in MICS not correspond to the level displayed on the BSMS keyboard?

   MICS does no real time monitoring of the magnet system and does not trigger any He/N2 measurement by itself. The level data in MICS is updated once an hour. However the actual measurement might be older than that, depending on the measurement interval of the hardware and the TopSpin helium transfer background process.

   To get an accurate He/N2 level reading it is recommended to initiate a measurement manually (BSMS keyboard or service web).

5. How does the level on the MICS N2 gauge correspond with the vessel volume?

As of MICS version 1.74, the required residual volume, which is essential for a secure operation of the magnet system, will no longer be part of the volume covered by the level gauge.



BSNL (BRUKER Smart Nitrogen Liquefier):

6. Why am I required to perform a “manual check” in MICS every couple of days?

   This is a cross-check between MICS and the BSNL Laptop to verify that the various components of the BSNL system are up and running.

Installation Issues:

7. Why do I have to specify the location of my TopSpin installation?

   For older BSMS systems without ELCB hardware, MICS has to rely on the *helium-log* file which is written by the TopSpin background process and stored in the TopSpin installation directory.

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i To make sure MICS is provided with meaningful level data, it is essential to check and adjust the path to the TopSpin heliumlog file after each TopSpin installation. This can be done in the MICS Administration Tab.

If your system is equipped with an ELCB board, MICS can be configured to read the level data directly from the BSMS. This is the recommended setting for newer systems.

A Appendix

A.1 Abbreviations

Abbreviation	Description
BIS	Bruker Identification System
BNL	Bruker Nitrogen Liquefier
BSMS	Bruker Smart Magnet Control System
BSNL	Bruker Smart Nitrogen Liquefier
BSVT	Bruker Smart Variable Temperature System
CCA	Cryo Compressor Adaptor
CMU	Cryo Monitoring Unit
CRCO	Cryo Controller
ELCB	Enhanced Lock Control Board
JAC	Java Controller
MAL	Minimum Allowed Level
MALE	Minimum Allowed Level Energizing
MICS	Magnet Information and Control System
RS	Radiation Shield
SLCB	Sample and Level Control Board

Table A.1: Abbreviations

Abbreviations

Revision History List

Index:	Date:	Alteration Type:
01	Nov 11, 2006	MICS user manual release
02	Jan 12, 2007	Release of MICS version 1.1; added security
03	April 27, 2007	Added description of events
04	June 19, 2007	Release of MICS version 1.3.3; added support for LN2 measurement and N2 liquefier
05	March 17, 2009	Release of MICS version 1.8.8; added support for RS temperature monitoring
06	April 31, 2010	Release of MICS version 1.9.3; adapted for new BSMS firmware
07	July 12, 2010	Minor changes (email addresses, screenshots)
08	Sept 10, 2010	Changed support email address
09	Febr 08, 2011	Completed help section, added new chapter structure
10	March 03, 2011	Added web overview
11	Oct 19, 2011	Added BSNL
12	Febr 02, 2012	Manual layout according to Bruker Corporate Design Guidelines. Added description of “Nitrogen (BNL)” tab.
13	May 25, 2012	Added “Radiation Shield Temperature Monitoring with CMU” chapter, updated BNL chapter, included new cover page layout.

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