

Magnet Information and Control System (MICS)

- Service Manual

Version 06



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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 Limitation of Liability

The information in this manual will take into account the current state of the technology. The manufacturer assumes no liability for damages resulting from:

- non-compliance with the instructions and all applicable documentation,
- use for purposes not intended,
- not sufficiently approved persons,
- arbitrary changes or modifications and
- use of not approved spare parts or accessories.

2 Safety

2.1 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.

2.2 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.



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 auto-start script. Note that MICS will be terminated if the user logs out.

Note 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.

3 Installation

The installation of MICS is done by Bruker Service personnel.

3.1 Prerequisites

3.1.1 Installation Requirements

In order to install MICS, you need the MICS CD which will be shipped together with the Magnet System or a TopSpin DVD (v3.1 or later) which includes MICS as part of its installation. It is also possible to download the content of the MICS CD as an archive from the MICS Web site (refer to section "[Standalone Installation](#)" on page 11).

To use the full MICS functionality, it needs to be installed together with a magnet description file (BIS file) that matches your system. The BIS file is part of the MICS CD of the magnet system. It is also possible to let the MICS installer download the BIS file during the installation process (refer to section "[Providing the Magnet BIS File](#)" on page 13).

3.1.2 Supported Platforms

The current MICS version has been tested with Windows XP, Windows 7 and CentOS 5.

3.1.3 Compatibility

MICS is backward compatible to previous MICS versions.

3.1.4 TopSpin

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).

3.1.5 Limitations



MICS was designed for informational purposes only and is neither a realtime monitoring nor a security tool. It does not run as a system service and therefore needs to be started by the user, either manually or by means of a startup script.

MICS will be terminated if the user logs out.

Note 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.

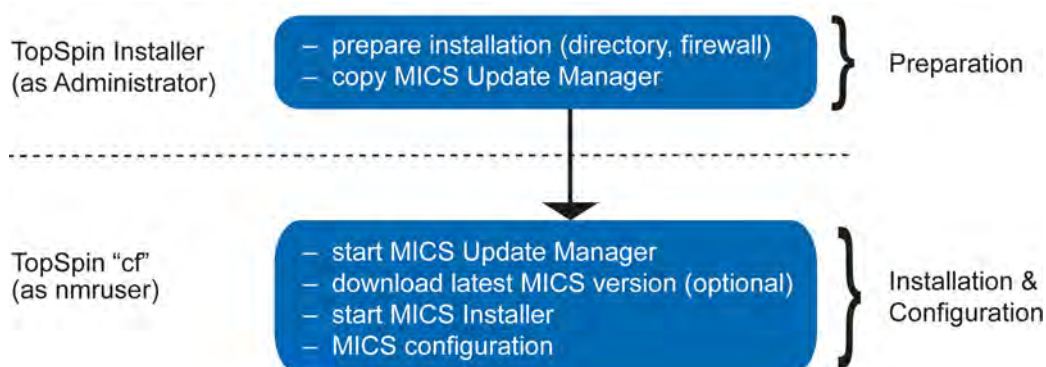
3.2 TopSpin Installation

As of TopSpin 3.1, MICS can be preinstalled via the TopSpin Installer and can be installed and configured using TopSpin's `cf` command. In addition to that, a standalone installation which works independent of TopSpin is also supported (refer to section "[Standalone Installation](#)" on page 11).



Do NOT install MICS within the same directory as TopSpin. Install MICS in a separate directory, e.g. `c:\bruker\mics` or `/opt/bruker/mics`.

The following steps will be performed by the TopSpin Installer (v3.1 and newer):



3.2.1 Preparation

The TopSpin installation has to be performed as administrator. During the installation you will be asked for the MICS directory. It is strongly recommended NOT to install MICS within the TopSpin directory. Use a separate directory for MICS (e.g. `c:\bruker\mics` or `/opt/bruker/mics`). Once the MICS directory has been defined, the TopSpin Installer will perform the necessary steps to prepare the MICS installation.

3.2.2 Installation and Configuration

During the configuration of the magnet system using TopSpin's `cf` command, the MICS Update Manager will be started. It offers the download of the newest version of MICS from the Bruker server. If your system does not have internet connection, the Update Manager will suggest to install the MICS version provided by the TopSpin Installer. Alternatively, you can use the Bruker Service login to download MICS from the MICS Web site below and provide the MICS Update Manager with the downloaded archive from a memory stick or CD (<http://mics.bruker.com/micsapp>).

The MICS Update Manager then starts the MICS Installer which will lead through the configuration of MICS. Details of the configuration options are described in section "[The MICS Installer](#)" on page 12.

3.3 Standalone Installation

Prior to TopSpin 3.1, MICS needs to be installed standalone. A standalone installation **must be run as an administrator** and can be started from the MICS CD shipped with the magnet system or from a downloaded MICS archive at:

<http://mics.bruker.com/micsapp>

Windows

1. Log in as administrator.
2. Run the MICS Installer by double-clicking the `install.bat` file located at `[CD Drive]/install/windows/`.
3. Choose the MICS installation directory. Do not install MICS within the TopSpin directory. Use a separate directory for MICS, e.g. `c:\bruker\mics`.
4. Follow the installation steps of the MICS Installer as described in section "[The MICS Installer](#)" on page 12.

Linux

1. Use the command `su -` in a terminal or login as root.
2. Change to the directory `[CD Drive]/install/linux` where `[CD Drive]` is the mount path to the CD drive e.g. `/media/cdrecorder`.
3. Start the MICS Installer using the command `./install`.
4. Choose the MICS installation directory. Do not install MICS within the TopSpin directory. Use a separate directory for MICS, e.g. `/opt/bruker/mics`.
5. Follow the installation steps of the MICS Installer as described in section "[The MICS Installer](#)" on page 12.

3.4 The MICS Installer

If you choose a MICS directory which already contains a MICS installation, the MICS Installer will automatically import the existing settings.

Check the options according to the magnet system configuration. A detailed description of the configuration options is given in the next sections.

MICS Installation [2.05a_a3]

MICS Installation Settings

Installation Folder: c:\Bruker\mics

General Settings

Installation Date: 2014-06-10

BIS File

- Keep already installed BIS file
BZH 3'850'70A
- Select BIS file:
- Download BIS file:
- No BIS file (viewer only)

Options

- N2 level sensor installed
Sensor active length [mm] 700.0
- BSNL liquefier installed
- BNL liquefier installed
- Gyrotron CF magnet installed
- Aeon RS (N2 free)
- Aeon RZ (N2 free, He liquefier)
- Aeon 2K (N2 free, He liquefier)

He/N2 Data Source

- BSMS (recommended, requires ELCB)
- TopSpin (specify [TS]\prog\logfiles folder)

Network Settings

BSMS/ELCB IP: 149.236.99.20 [Test]

SMTP Server: mail.yourdomain.com [Options]

Sender Email: nmradmin@yourdomain.com
appears as sender address in emails sent by MICS

Email recipient(s): john@yourdomain.com; bob@yourdomain.com
separated with semicolon ;

[Cancel] [Start Installation]

3.4.1 Providing the Magnet BIS File

The magnet BIS file is a file that is specific for the magnet system and that contains vital technical information to run MICS.

It can be obtained by one of the following ways:

- **Keep already installed BIS file.**

This option is only available if a MICS version is already installed.

- **Select BIS file.**

Specify the BIS file from an external location (memory stick, CD).

- **Download BIS file.**

Download the BIS file by specifying the magnet systems serial numbers. The numbers can be found on the type label of the magnet system:

Please note that magnet systems from Bruker Switzerland and from Bruker Germany have different numbering schemes of the serial/system numbers.

- **No BIS file (viewer only).**

without a BIS file, MICS can only be used in a limited fashion and act as a viewer for existing He levels.



A particular BIS file can also be downloaded from the MICS website below, by specifying the serial number of the magnet system.

<http://mics.bruker.com/micsapp>

3.4.2 Choosing the He/N₂ Data Source

The recommended data source for MICS to read helium (and maybe nitrogen) level information from is the BSMS. This option is supported on all systems equipped with a BSMS/ELCB board. However for old systems MICS can also be configured to read the level information from TopSpin's *heliumlog* logfile.

3.4.2.1 BSMS Mode

To let MICS read the level directly from the BSMS, the IP address of the BSMS device has to be specified.

The level information is read on an hourly basis. However MICS does not trigger any measurements itself. The actual age of a measurement depends on the measurement interval of the corresponding component (usually 24h for helium and 1h for nitrogen).

3.4.2.2 TopSpin Mode

To let MICS read the level from the TopSpin log file, the path to the folder containing the file *heliumlog* has to be specified.

In TopSpin Version prior to 3.1 the file *heliumlog* is located in the directory [TOPSPIN]/prog/logfiles. Since this folder depends on the TopSpin installation directory, you might need to update this setting in MICS after every TopSpin installation.

As of TopSpin Version 3.1p10 the [DISKLESS]/prog/logfiles directory will be used for storing logfiles.

The levels in the TopSpin logfile are normally updated every 24 h by TopSpin's *helevtransfer* daemon.



The TopSpin mode is supported for compatibility reasons and should not be used unless the system is not equipped with a BSMS/ELCB board.

3.4.3 Equipment Options

Choose the appropriate equipment options depending on the system:

| | | |
|---|---|---|
| N2 level sensor installed | | Select this option if the magnet system is equipped with a nitrogen level sensor. |
| | Sensor active length | Insert the active length of the nitrogen level sensor in mm. |
| BSNL liquefier installed | | Select this option if the magnet system is equipped with a BSNL device. |
| BNL liquefier installed | | Select this option if the magnet system is equipped with a BNL device. |
| | BNL EMail recipient(s) | Recipients for BNL for error messages. Separate multiple addresses by semicolon. |
| Gyrotron CF magnet installed | | Select this option if a CF (cryogen free) magnet for gyrotron applications is present. |
| Aeon /RS (N2 free) | | Select this option for nitrogen free magnet systems. |
| | Alarm temperature [K] | Maximum allowed temperature limit of the radiation shield in [K]. |
| | CMU/MAG-RS MAG-RS RS-N2-Converter | CMU/MAG-RS should be selected for all new systems with a JAC (Java Controller). Do not change it unless you know exactly it is an old system. |
| Aeon /RZ (N2 free, He liquefier) | | Select this option for nitrogen free magnet systems with a helium liquefier. |
| Aeon 2K (N2 free, He liquefier) | | Select this option for 2K subcooled, nitrogen free systems with a helium liquefier. |

For magnet systems equipped with a BSNL refer to the Technical Manual "BSMS/2 Systems with ELCB".

For magnet systems with a BNL installed refer to the supplied BNL User Manual.

3.4.4 Network Settings

BSMS/ELCB IP

If you operate MICS in the BSMS mode (recommended, refer to section "[BSMS Mode](#)" on page 14), you need to specify the IP address of the BSMS device.

CRCO IP

The IP address of the CRCO client must only be specified for magnet systems equipped with a BSNL device.

SMTP Server

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.

Sender EMail

The email address that appears as sender address in emails sent by MICS.

Email Recipients

The default recipients for alert/error emails sent by MICS. Multiple addresses can be separated by a semi-colon. This can be changed later anytime by the user in the "Notification" tab of MICS.



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" tab of MICS via the "Options" button.

4 Updating MICS

4.1 Updating MICS via CD-ROM

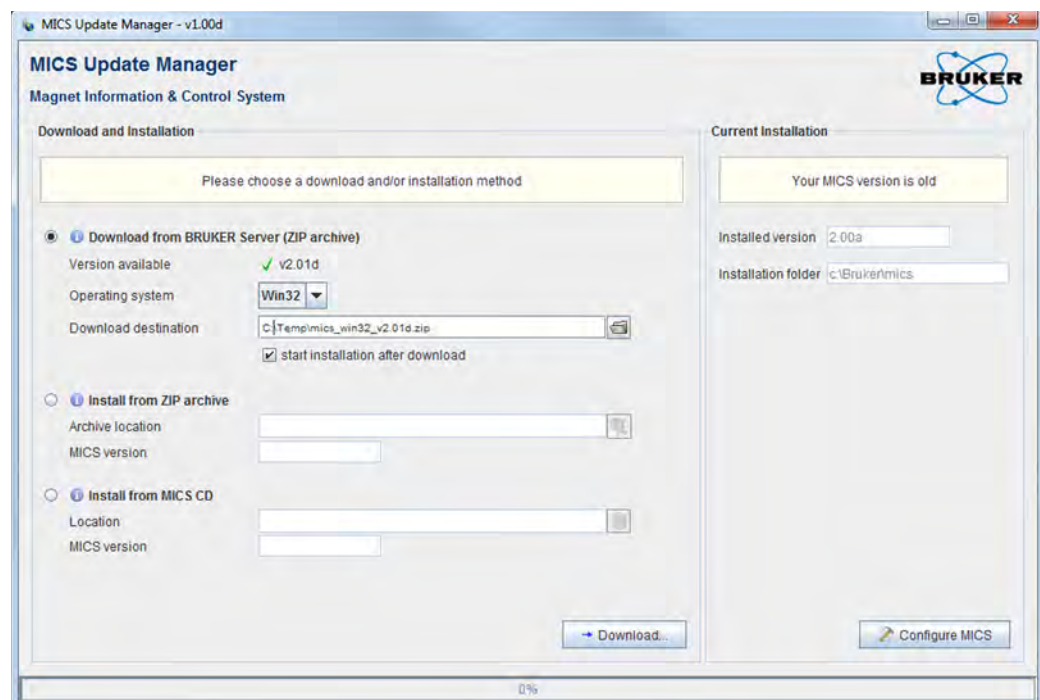
A newer version of MICS can be installed at any time by running the MICS Installer (refer to section "[Standalone Installation](#)" on [page 11](#)) from an official MICS CD or a downloaded MICS archive. The MICS setup will detect an already installed MICS and will import existing settings.

4.2 MICS Update Manager

As an alternative, MICS 2.0 and newer comes with a MICS Update Manager which lets you conveniently update your MICS installation.

The MICS Update Manager can be started with the script located in [MICS_HOME]/micsupdate(.bat).

If the MICS Update Manager is used to update an already installed MICS, it does not need to be run as an administrator.



The MICS Update Manager offers several ways to install/update a MICS installation:

a) Download from BRUKER Server (ZIP archive)

Lets you download a platform dependent ZIP archive containing the newest MICS version. The archive can either be installed directly on the current system or stored on an external media in order to perform offline updates of systems without internet connection.

b) Install from ZIP archive

Installs MICS from a previously downloaded, platform dependent ZIP archive.

c) Install from MICS CD

Installs MICS from an official MICS CD delivered with the magnet system.

5 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.

4. What is the update interval of the He/N2 level displayed in MICS?

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 or the TopSpin helium transfer background process.

If MICS is configured to read the level data directly from the BSMS (recommended), it displays the actual date of the measurement as indicated by the hardware.

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

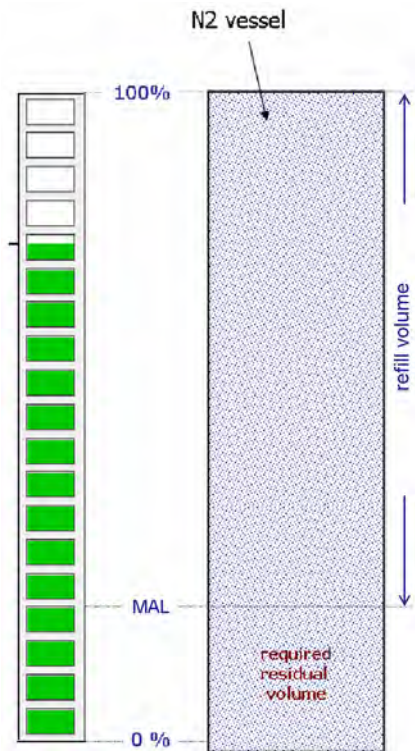
Frequently Asked Questions

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

Systems with Nitrogen Level Sensor:

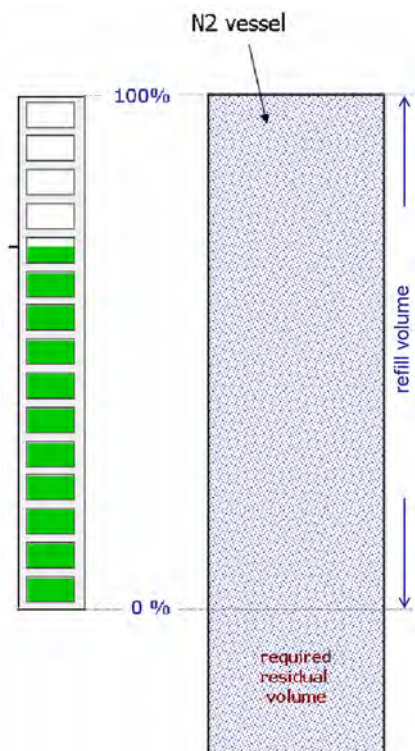
For systems with nitrogen sensor, the minimum allowed level (MAL) and therefore the refill and residual volume depend on the information in the magnet BIS file.

As of MICS version 2.03, the MAL is indicated on the nitrogen gauge.



Systems without Nitrogen Level Sensor:

As of MICS version 1.74, the required residual volume, which is essential for safe 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.



To make sure MICS is correctly provided with 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.

8. E-Mailing in MICS is not working. What can I do?

Check the settings according to the following procedure:

- 1) ask your IT department to confirm the following settings:

- a) SMTP server (e.g. mail.yourcompany.com)
- b) Port (e.g. 25, 465 or 587)
- c) is authentication (Login with username + password) required?
- d) is encryption required (SSL or TLS)?

- 2) based on the information above, check whether a connection to the given server and port on the network layer can be established:

use the command 'telnet smtpserver port' from the commandline to connect to the server (note that on Windows 7 you might need to activate the telnet client first).

⇒ If no connection with telnet is possible, the problem seems to be on the network or configuration side. In this case your IT needs to check on this (e.g. security restrictions or wrong settings). If you see the welcome prompt from the mailserver, then quit the telnet connection.

- 3) if the above test was successful, start MICS, configure it accordingly and try the testmail function.

- 4) if the testmail fails, select the MICS help tab and create an archive of your configuration (logfiles, etc.). Send the files with the configuration to Bruker Support for further analysis.

A Appendix

A.1 Abbreviations

| Abbreviation | Description |
|--------------|---|
| BIS | Bruker Identification System |
| BMPC/2 | Bruker Magnet Pump Control 2 |
| 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 |
| CF | Cryogen free |
| CMU | Cryostat Monitoring Unit |
| CRCO | Cryo Controller |
| ELCB | Enhanced Lock Control Board |
| JAC | Java Controller |
| MAL | Minimum Allowed Level |
| MALE | Minimum Allowed Level at Energizing |
| MICS | Magnet Information and Control System |
| RS | Radiation Shield |
| /RS | 1-stage cooled (N2 free) |
| /RZ | 2-stage cooled (N2 free, He reliquefaction) |
| SLCB | Sample and Level Control Board |

Table A.1: Abbreviations

Revision History List

| Index: | Date: | Alteration Type: |
|---------------|--------------------|--|
| 01 | Oct 21, 2011 | MICS service manual, first release. |
| 02 | April 2, 2012 | Manual layout according to Bruker Corporate Design Guidelines. Added "Nitrogen (BNL)" tab. |
| 03 | May 25, 2012 | Added "Radiation Shield Temperature Monitoring with CMU" chapter, updated section MICS Update Manager, included new cover page layout. |
| 04 | September 27, 2013 | Added monitoring of Aeon /RZ magnet systems. |
| 05 | June 12, 2014 | Added monitoring of Aeon 2K subcooled, nitrogen free magnet systems. |
| 06 | November 7, 2014 | Added description of "Gyrotron" tab. |

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