Helium Level
Measurement Unit

HLMU
User Manual

Version 002

The information in this manual may be altered without notice.

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Introduction *1.1*

This manual is included with the delivery of the Helium Level Measurement Unit (HLMU). It provides instructions on how to:

- Install and wire the HLMU unit.
- Configure and operate the unit.

Intended Usage *1.2*

The HLMU is designed to measure the level of liquid helium in Bruker dewars independently of the BSMS.

The HLMU should always be installed in conjunction with an NMR dewar and is not for use in publicly-accessible areas.

The 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*

Please read the following information carefully. It provides important instructions on safety, usage and maintenance of the device.

- Never use the device if it is damaged in any way.
- Use the device only for the intended purpose.
- Check if the voltage indicated on the device corresponds to the local mains voltage before you connect the device.
- Use a grounded wall socket.
- Keep the device and cables away from heat, moisture, sharp edges, etc.
- Do not use the device outdoors.
- Site the device in an open area to allow adequate ventilation.
- Always operate the device in a safe and dry place.
- The HLMU should only be operated by qualified personnel.
- Service or maintenance work on the unit must be carried out by qualified personnel.
- The HLMU may only be used with original manufacturer accessories.

- The ambient temperature is defined by BRUKER (refer to the Avance site planning manual).

- Read this manual before operating the unit. Pay particular attention to any safety related information.

Important Information   *1.4*

- The HLMU measures the helium level and triggers an alarm when the level is below the designated level. However, the HLMU does not provide any capability for helium refilling. Helium refilling must be carried out separately by qualified personnel.

- The HLMU checks the time interval between two consecutive nitrogen refilling and warns if the time exceeds a certain period. The nitrogen refilling itself must be performed by qualified personnel and then confirmed on the HLMU.

- The helium level and nitrogen refill monitoring works only if the HLMU is on, the helium level sensor is properly calibrated, and the alarm limits and measuring currents are set correctly. The HLMU functionality must be verified at a regular interval.

- Set the alarm limits carefully, preferably through consultation with the manufacturer. The helium alarm level must be set high enough so that service has enough time to refill the helium before a dewar quench occurs.

Warnings and Notes   *1.5*

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.

Note: Indicates important information or helpful hints

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

Contact for Additional Technical Assistance *1.6*

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

BRUKER BioSpin GMBH
am Silberstreifen
D-76287 Rheinstetten
Germany

Phone: + 49 721 5161 0
FAX: + 49 721 5171 01
E-mail: nmr-software-support@bruker-biospin.de
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Introduction

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Terms and Definitions

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The following terms and definitions are applicable for this manual:

HLMU: **H**elium **L**evel **M**easurement **U**nit

EWS: **E**mbedded **W**eb **S**erver

BIS: **B**oard **I**nformation **S**ystem

BSMS: **B**ruker **S**mart **M**agnet control **S**ystem

NMR: **N**uclear **M**agnetic **R**esonance

Terms and Definitions

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HLMU General Information

3

Introduction *3.1*

The HLMU is designed to measure the level of liquid helium in Bruker dewars independently of the BSMS. The HLMU can be controlled by hand (with the help of buttons on the device), via a Web interface, or by the HLMU control software. This manual describes how to control the HLMU with the help of buttons and the Web interface. For instructions on how to control the device through software, refer to the HLMU software user manual.

Functional Characteristics *3.2*

The functional characteristics of the HLMU unit include:

- Manual and automatic helium level measurement.
- Continuous helium level measurement during helium refilling.
- Monitoring of nitrogen refilling.
- Quick and easy setting of the He-level probe type
- The use of visual and acoustic alarms (low helium level and/or nitrogen refill period overrun).
- A history of the last measurements, nitrogen refills, alarms, and various other events.
- Dewar identification.
- A Web server for remote control and data acquisition via ethernet / internet.

Shipping List *3.3*

The HLMU is delivered with the for following components:

- HLMU unit
- Line cord
- Probe cable
- Ethernet cable (optional)

Inspect the package for any missing parts before putting the HLMU into service for the first time.
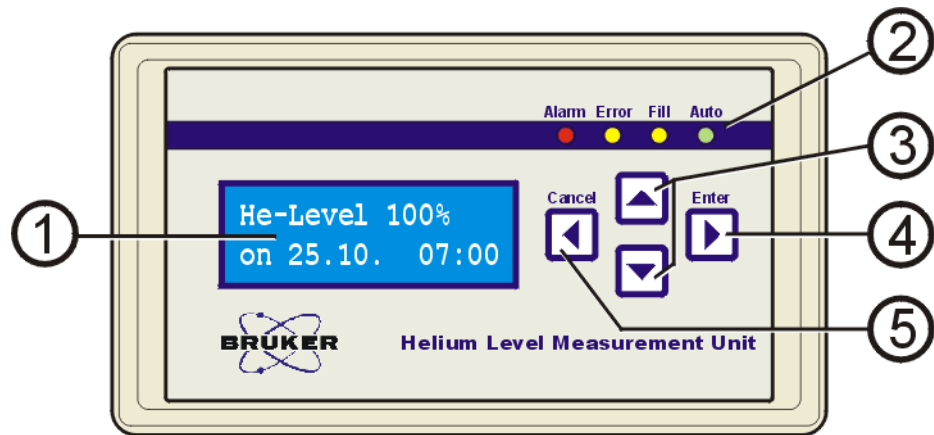
Figure 3.1. HLMU Front Panel

1 **Display**

The display on the HLMU front panel shows the last measured helium level, as well as the date and time of the last measurement in standby mode.

2 **LED diodes**

- **Alarm** (red): Blinks in the event of an alarm (low helium level or nitrogen refill period exceeded).

- **Error** (yellow): Blinks in the event of an error (e.g. probe not connected, probe wrong calibrated, etc.).

- **Fill** (yellow): Indicates that the HLMU is in "Fill Mode".

- **Auto** (green): ON indicates that helium level auto measurement is on, BLINK indicates that a helium level measurement is being performed, OFF indicates that the helium level auto-measurement is off.

3 **UP/DOWN buttons:** Allows you to scroll up and down in the menu, submenus and lists; allow you to change values, etc.

4 **ENTER button:** Opens the menu and submenus; allows you to select and start a function, confirm, or skip forwards.

5 **CANCEL button:** Back up one level, clears current value, skip backwards, or returns to standby mode.
In standby mode: Press and hold the button to display the IP address and firmware version.
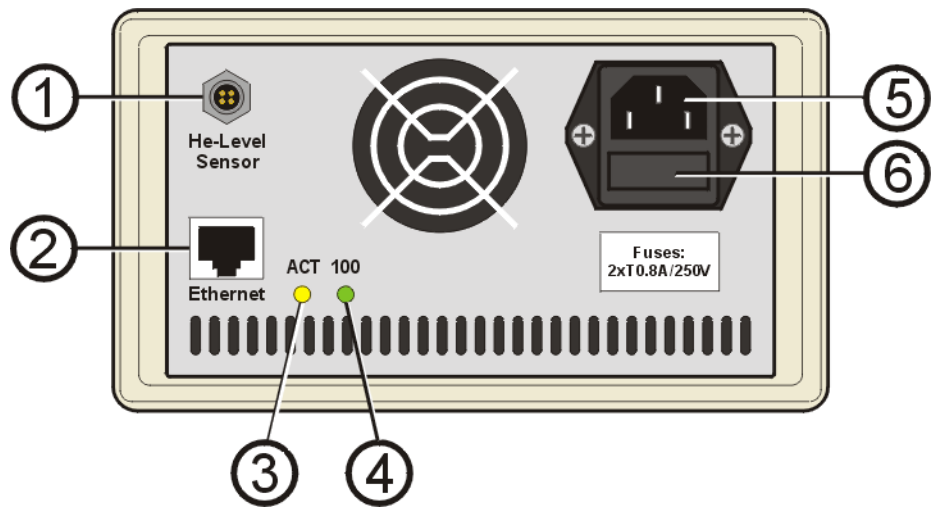
Figure 3.2.   HLMU Rear Panel

1   Connection for the helium level sensor.

2   Ethernet: Connection for Ethernet, up to 100 MBit/s, RJ-45 connector.

3   LED ACT: Indicates activity.

4   LED 100: Indicates 100 MBit/s connection.

5   Connection for mains power cord.

6   Fuses.

General Instructions   *3.5*

Standby Mode   *3.5.1*

The HLMU is in standby mode and is ready for use when the last measured helium level, as well as the date and time of the last measurement appear on the display.

Hold the Cancel button down to return to standby mode from any situation.

If an alarm occurs, the red LED **Alarm** blinks and the alarm message appears on the display in standby mode. For example:

The menu allows you to easily access the many functions in the HLMU. These functions are arranged in menus and submenus.

 In the standby mode press the **Enter** button to access the menu.

 Press the **UP/DOWN** buttons to scroll to the desired function or submenu, e.g. Settings.

 Press the **Enter** button to select the function or submenu.

Example: Setting the date and time:

- Open the **menu** by pressing the Enter button
- Scroll to **Settings** and press the Enter button
- Scroll to **Date and Time** and press the Enter button

Some functions and settings are protected by a 4-digit security code PIN. The factory setting for the PIN is 0000.

PIN Control:

UP/DOWN buttons: Edit number

ENTER button: Next number, confirm

CANCEL button: Back

Change PIN: (see *page 38*)

> **Keep the PIN in a safe place where you can access it again if required.**

Preparation Before First Usage

<div align="right">

4

</div>

The HLMU should be placed as far as possible outside of the 5 gauss line of the magnet stray field.

Be careful when connecting a cable to the helium level sensor connector on the helium turret, as this can be very cold!

Connect the cables in the following order, see *Figure 4.1.*:

1. Cable to helium fill-in port.

2. Line cord (this switches the HLMU on).

3. If you will operate the device with an ethernet connection, first set all the network parameters (IP address, subnet mask and standard gateway) before you connect it to the ethernet. See *page 22*.
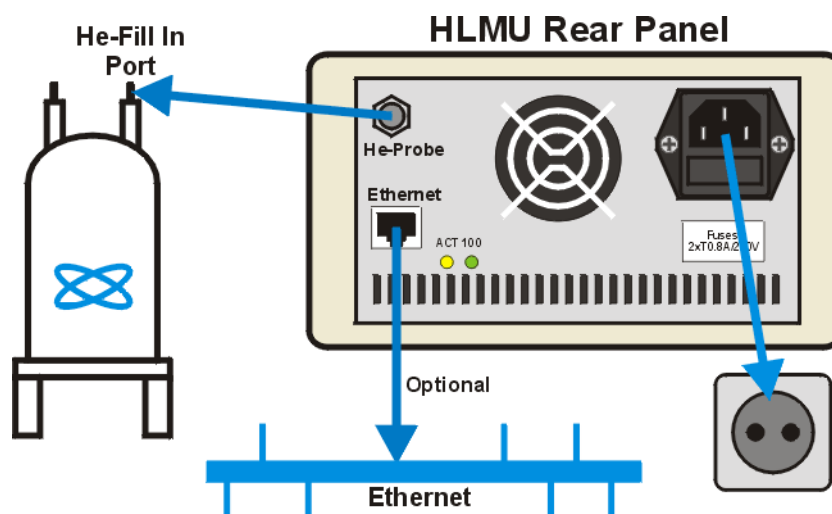
Figure 4.1. Typical Installation

Switching the HLMU On or Off   *4.2*

The HLMU is intended for continuous use and therefore has no mains switch. To switch the HLMU **on**, plug the mains cord into the mains supply (wall socket).

Wait approximately 25 seconds until the HLMU boots.

When booting the LED's are first tested (all four LED's are on for 6 seconds) and then a loading status window appears on the LCD.

The HLMU enters standby mode after booting. The last measured helium level and the date & time of the last measurement appear on the display. If the "Loaded default values" message appears, it means that all user settings have been set to the factory default. In this case it is recommended that you check all settings.

To switch the HLMU **off**, unplug the mains cord line from the wall socket. All settings, measurements, history, date & time, etc. will be saved.

Initial Settings *4.3*

The following initial setting must be made before you can use the device:

- Network parameters (when using the HLMU with an Ethernet connection).
- The type of helium probe (sensor) used in a dewar.
- The date & time.

This section describes how to make the initial settings in the device (without Ethernet connection). If you are using the device with an Ethernet connection, go to _**page 22**_.

Setting the Helium Level Probe Type *4.3.1*

The properties of the helium level probe (sensor) are represented by two resistances:

- Probe resistance at a 100% helium level.
- Probe resistance at a 0% helium level.

These two values are used to calculate the helium level. For easier calibration these resistances are represented by so-called dummies (_**Figure 4.2.**_). The dummies are connectors with the same resistance as the probe at either 0% or 100% helium. If you know the color of the dummy for your dewar you can easy calibrate the helium level probe by choosing the color of the dummy directly in the menu. If you don't know the color of the dummy you must first measure the resistance manually.

Figure 4.2.   Various Dummy Connectors for Calibration

This section describes probe calibration through use of the HLMU menu _**Figure 4.3.**_. If you have an Ethernet connection you may prefer to calibrate with the help of a web browser (see section _**"Setting the Helium Level Sensor Type" on page 24**_).

The probe calibration is protected with a PIN (see section _**"Security" on page 14**_).
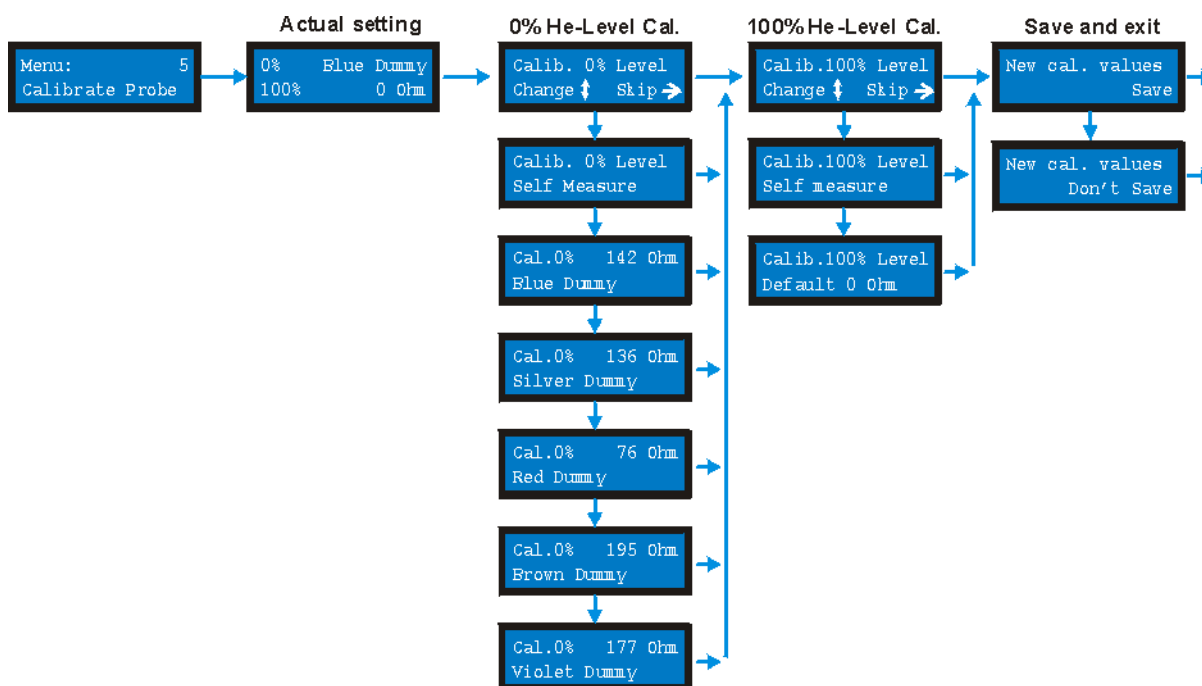
Figure 4.3.   The HLMU Probe Calibration Menu

Use the UP/DOWN buttons to scroll within the menu.

Use the ENTER button to select a dummy, self measure resistance, skip forward or to save the settings.

Use the CANCEL button to skip backward or to cancel.

Checking the Actual Probe Setting:

Displaying the actual probe setting:

Example: Probe resistance at 0% helium level is calibrated with a blue Dummy and the resistance at 100% helium level is calibrated to 0 Ohm.

To exit press the **Cancel** button.

Probe Calibration With the Help of a Dummy

The "dummy" is a colored connector which represents the probe resistance at a 0% (blue, silver, red, brown and violet) or a 100% (black - common for all types of probes) helium level. The dummy connectors are delivered as a accessory with a dewar (***Figure 4.2.***).

If you know the color of the dummy for a probe used in a dewar you can set the probe type without any measurement.

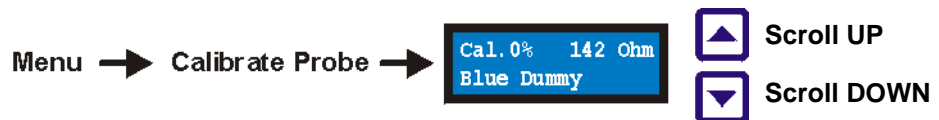**Step 1:** With the Up/Down buttons choose the dummy for 0% helium level

Menu ➔ Calibrate Probe ➔ | Cal.0%   142 Ohm | Blue Dummy | ▲ **Scroll UP**   ▼ **Scroll DOWN**

Step 2: Press the Enter button to continue

| Cal.0%   76 Ohm | Red Dummy | Enter ▶

Step 3: Calibrate resistance for 100% helium level

| Calib.100% Level | Change ↕ Skip➔ | ▲ **Scroll UP**   ▼ **Scroll DOWN**

With the Up/Down buttons select the ***Default 0 Ohm*** resistance by 100% or you can skip this step by pressing the Enter button.

Step 4: Press the Enter button twice to save and exit

| Calib.100% Level | Default 0 Ohm | Enter ▶ | New cal. values | Save | Enter ▶

Probe Calibration Without The Dummies

If the dummy connectors are not available, the 0% and 100% resistances can be measured using a partially empty and a completely filled He dewar:

For the **0% calibration**, start with a partially empty dewar. Adjust the probe so that the lower end of the probe is approximately 1 cm above the liquid helium.

- In the menu go to **Calib. 0% Level.**

Menu ➡ Calibrate Probe ➡ "Actual calibration" ➡ | Calib. 0% Level
Change ↕   Skip➡ | ▲ ▼
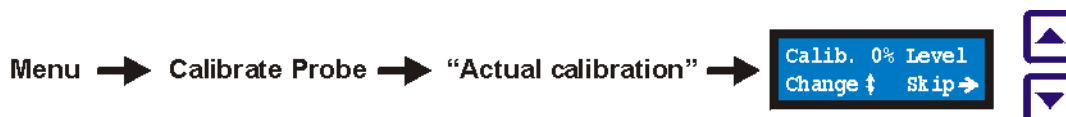
- Using the UP/DOWN buttons select the **Calib. 0% Level - Self Measure**
- Press the ENTER button to measure resistance.

Calib. 0% Level
Self Measure   **Enter** ▶

After approximately 10 seconds the measured resistance will be displayed for a short time on the display.

For the **100% calibration**, fill the dewar completely.

- Using the UP/DOWN buttons select the **Calib.100% Level - Self Measure** and press the ENTER button to measure the resistance.

Calib.100% Level
Self Measure   **Enter** ▶

After approximately 10 seconds the measured resistance will be displayed for a short time on the display.

- Press ENTER to save.

Setting the Date and Time *4.3.2*

The HLMU has an internal real-time clock which is used for measurement and event logging, checking nitrogen refilling, etc. Check if the date and time are set correctly before using the unit.

To display the actual date and time:

Menu ➤ Settings ➤ **Date and Time**
20.01.2005 17:04

To change the date or time press the **Enter** button.

Set Date:
20.01.2005 ➤ **Set Time:**
17:04:00 ➤ **Press Enter to update date and time**

Use the following buttons to change the values:

UP/DOWN: Change values

ENTER: Move cursor to the right

CANCEL: Move cursor to the left

Initial Settings Via the Ethernet Connection *4.4*

This section describes how to do the initial settings via ethernet. If you are using the device without an Ethernet connection, see the instruction ***"Initial Settings" on page 17***.

Setting the Network Parameters *4.4.1*

If you have not done so you must first set the network parameters (IP address, subnet mask and standard gateway). Check with your network administrator for the required network parameters.

Tip: To display the current IP address (and firmware version) press and hold the Cancel button while in standby mode.

Hold 2 seconds
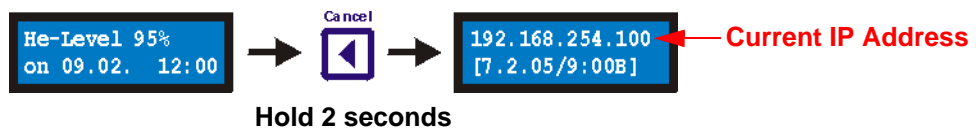
You will need to know the PIN number in order to set the network parameters. The default PIN is 0000.
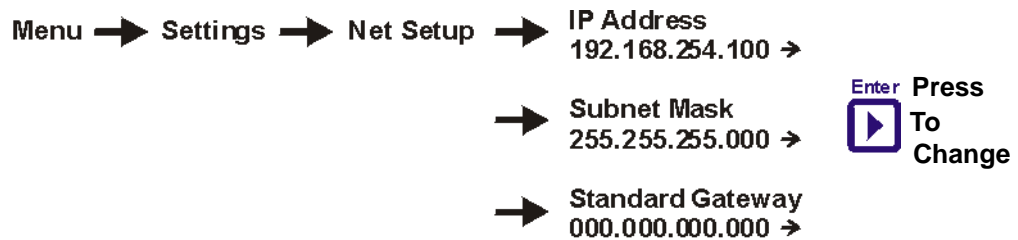
In the menu navigate to Settings -> Net Setup -> IP Address, Subnet Mask or Standard Gateway. Press the Enter button to edit the parameter.

Use the following button to change the parameters:

- UP/DOWN: To change the values.
- ENTER: To go to the next number, to save and to exit.
- CANCEL: To navigate backwards.

After you finish editing the network parameters, reset the unit by unplugging the mains cord for a few seconds and then plugging it in again!

You can now connect the HLMU to the Ethernet. Enter the new IP address in your Web browser Address filed to start HLMU Service Web (see *__Figure 4.4.__*).
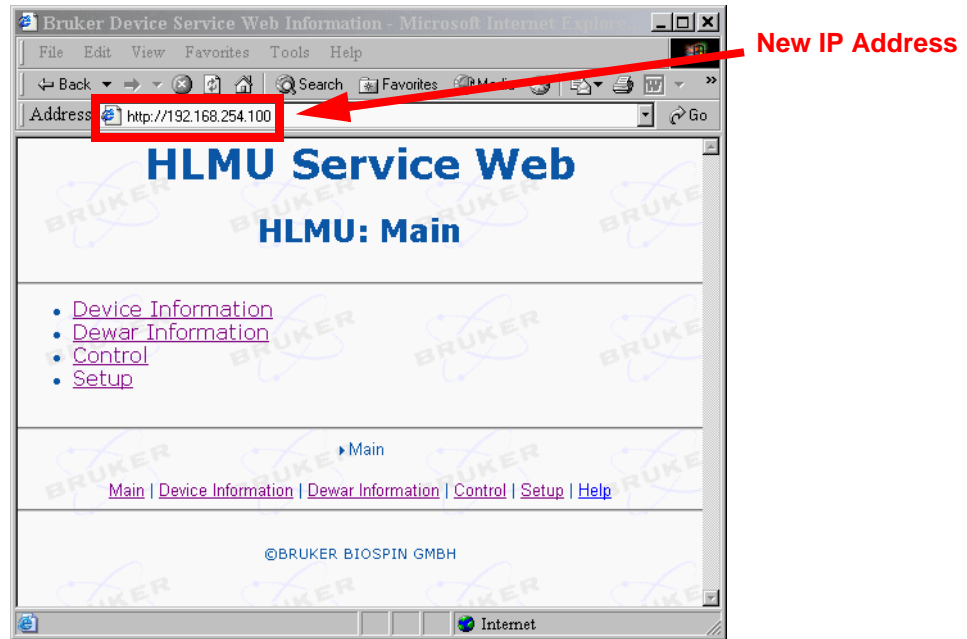

Figure 4.4.   The HLMU Service Web

The main page of the HLMU Service Web contains four main links:

- **Device Information:** A link to information about the HLMU and it's components (e.g. serial number, firmware version, BIS, etc.)

- **Dewar Information:** A link to information identifying the dewar which is connected to the HLMU (e.g. dewar part number, serial number, coil number, ID, description and place of installation).

- **Control:** A link to the helium level measurement data (a list of the last 20 automatic helium level measurements, a list of the last 5 nitrogen refills, a list of the last 5 alarms, and a list of the last 5 events).

- **Setup:** A link to the HLMU setup data (e.g. date, time, alarms, currents, auto measurement period, etc.).

This section describes the sensor calibration by the help of a web browser.

The properties of the helium level probe (sensor) are represented by two resistances:

- Probe resistance at a 100% helium level.
- Probe resistance at a 0% helium level.

These two values are used to calculate the helium level. For easier calibration these resistances are represented by so-called dummies (***Figure 4.2.***). The dummies are connectors with the same resistance as the probe at either 0% or 100% helium. If you know the color of the dummy for your dewar you can easy calibrate the helium level probe by choosing the color of the dummy directly in the menu. If you don't know the color of the dummy you must first measure the resistance manually.

- Click **Setup** on the HLMU Service Web Main page (see ***Figure 4.4.***).
- Click **He-Level Sensor Calibration** on the HLMU Setup page.

HLMU Main Page ➡ **Setup** ➡ **He-Level Sensor Calibration**

When the window "*Enter Network Password*" appears, enter:

User Name: **user**

Password: Your **PIN** (default PIN is set to 0000)

Figure 4.5.   Enter Network Password
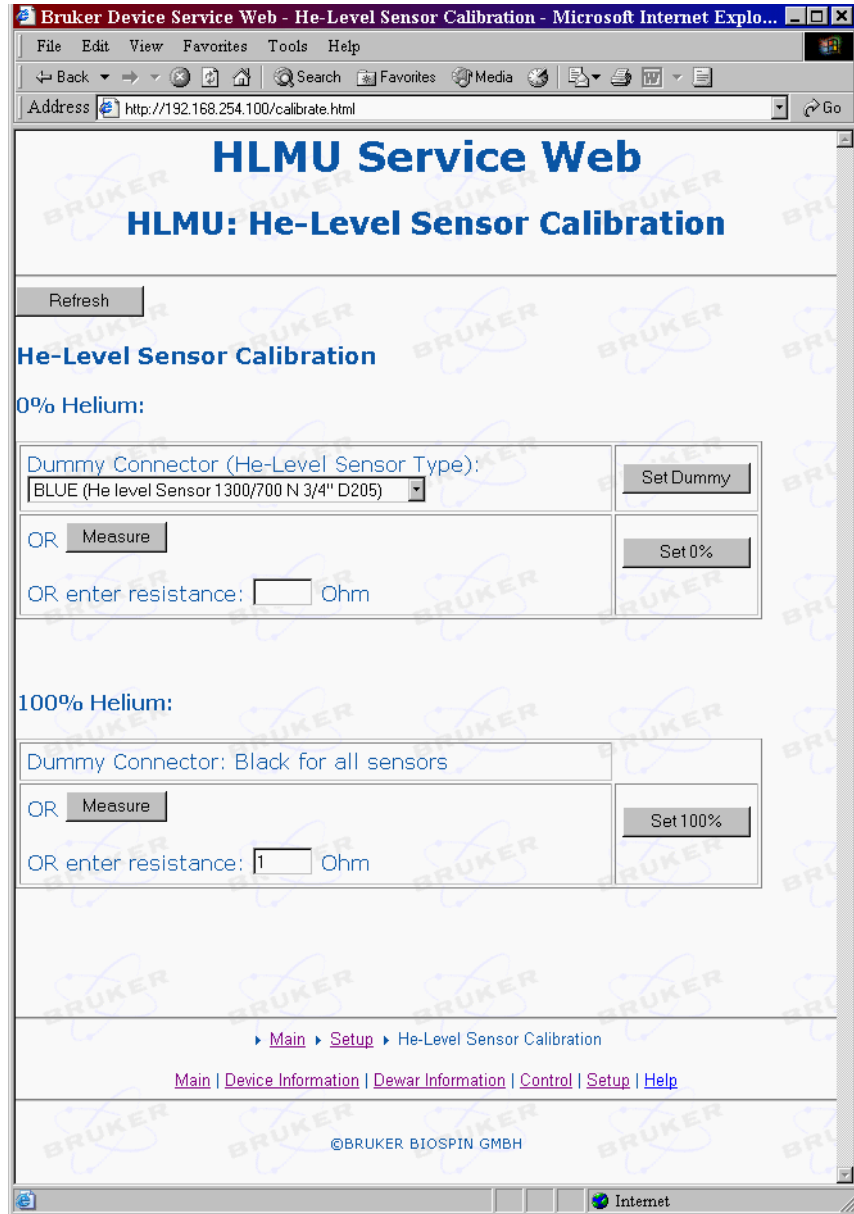
The following page should appear:

Figure 4.6.   HLMU Web: He-Level Sensor Calibration

Sensor Calibration with the Use of Dummies

Sensor calibration at 0% helium level:

Choose the dummy or type of sensor from the list and click on the **Set Dummy** button:

Sensor calibration at 100% helium level:

Default for all types of sensors is a black dummy (0 Ohm). You do not need to do anything.

Sensor Calibration When the Resistance Values are Known

When you know the resistance value of the probe at the **0%** helium level, enter this in the edit box and click on the **Set 0%** button. The dummy connector in the list will be automatically be set to "Other type".

When you know the resistance value of the probe at the **100%** helium level, enter this in the edit box and click on the **Set 100%** button:

Sensor Calibration When the Resistance Values are NOT Known

When the dummy connectors and the resistance values are not available, the 0% and 100% sensor resistances can be measured on a partially empty and a completely full dewar:

For the **0% calibration**, start with a partially empty dewar. Adjust the sensor so that it's lower end is approximately 1 cm above the liquid helium.

- Click on the **Measure** button in the frame **0% Helium**. The measurement will finish after 10 seconds and the measured resistance will be displayed in the edit box below the Measure button.

For the **100% calibration**, fill the dewar completely.

- Click on the **Measure** button in the frame **100% Helium**. The measurement will finish after 12 seconds and the measured resistance will be displayed in the edit box below the Measure button.

This section describes how to set the date and time with the help of a Web browser.

- Click **Setup** on the HLMU Service Web Main page (see ***Figure 4.4.***).

- Click **HLMU Setup** on the HLMU Setup page.

HLMU Main Page ➡ Setup ➡ HLMU Setup

When the "*Enter Network Password*" window appears (***Figure 4.5.***), enter:

User Name: **user**

Password: your **PIN** (default PIN is set to 0000)
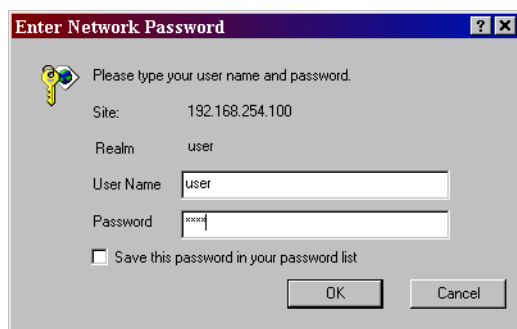
Figure 4.7.   Enter Network Password

- Find this frame on the HLMU Setup page:

- Enter the date and click on the Set button.

- Enter the time and click on the Set button.

To refresh the actual date and time use the ⎡ Refresh ⎤ button on the Webpage, not the Refresh button from Web browser tool bar.

Operating Instructions

5

Introduction *5.1*

This chapter provides instructions on how to operate the HLMU with help of the front panel menu and four navigation buttons (Enter, Cancel, Up and Down). To operate the HLMU via an Ethernet connection and standard Web browser, see *"Operating Instructions for Web Interface" on page 43*.

Helium Level Measurement *5.2*

The helium level can be measured manually or automatically. The following sections will describe these procedures.

Manual Helium Level Measurement *5.2.1*

The unit must be switched on (standby mode) for this measurement.

Press the Enter button **twice**, or **press and hold** the Enter button for two seconds.
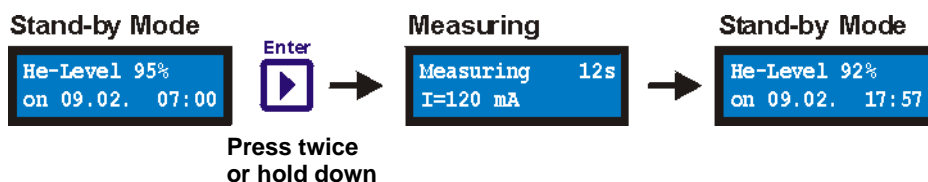
The helium level measurement takes 12 seconds, whereas the green LED **Auto** will blink.

During the first 4 seconds a higher sensor current (I_{thaw}) is used to thaw the ice on the upper part of the sensor. Then a smaller sensor current (I_{meas}) is used for the next 8 seconds to run the measurement itself. The currents I_{thaw} and I_{meas} can be changed as described in *"Current Settings" on page 37*.

The actual level and the date and time of the measurement appear on the display after the measurement.

The manual helium level measurement is not stored in the history.

The HLMU allows for the automatic measurement and routine monitoring of the helium level at predefined intervals. The available intervals are 0 (off), 6, 12, or 24 hours.

The green LED **Auto** indicates when the helium level auto measurement is on.

All automatic measurements are saved to the history.

You can change the interval and the initial time of the automatic measurement by performing the following procedure. You will need to know the PIN number in order to change the interval.

Changing the Automatic Measurement Interval

Select:

Menu ➜ **Settings** ➜ **He Auto meas. every 24h Edit➔** ➜ **Edit He-Automeas. 24h** ↕

UP/DOWN: Used to set the new interval: 24h - 12h - 6h - Off

ENTER: Used to save and exit

CANCEL: Back

Changing the Automatic Measurement Initial Time

Select:

Menu ➜ **Settings** ➜ **He Auto meas. starts at 7:00** ➔ ➜ **Edit init. time Hours: 8:00** ➔ ➜ **Edit init. time Mins: 8:15** ➔

UP/DOWN: Used to change the hours and minutes

ENTER: Used to save and exit

CANCEL: Back

If you set the initial time for example to 8:15 hours then the automatic measurement runs in relation to the period so:

- 24 hour interval (once a day):   at 8:15

- 12 hour interval (twice a day):   at 8:15 and 20:15

- 6 hour interval (4 times a day):   at 8:15, 14:15, 20:15 and 2:15

Frequent measurements will result in higher liquid helium consumption!

Nitrogen Refill Confirmation *5.3*

The HLMU monitors the time between two consequent nitrogen refills in order to provide a warning (an alarm occurs) when a nitrogen refill interval has been exceded. When the nitrogen refill has been made it must be confirmed manual on the HLMU:

Confirming the nitrogen refill:

Menu ➡ Nitrogen Refill ➡ `Nitrogen Refill: Update now →` Enter ▶ **Press to confirm N-refill**

To display the date and time of the last nitrogen refill:

Menu ➡ Nitrogen Refill ➡ `Last N Refill 21.02.    14:20`

To display the nitrogen refill interval and number of remaining days to the next refill:

Menu ➡ Nitrogen Refill ➡ `Period    11 days Due in    2 days`

Alarms *5.4*

There are two kinds of alarms:

Low helium level alarm and ***Nitrogen refill period overrun*** alarm.

The alarm is always indicated by the red flashing LED **Alarm**, a message on the display, and a beeping signal (optional,).

Low Helium Level Alarm *5.4.1*

This alarm occurs if the helium level in a dewar sinks lower than the preset value.

`ALARM Low He-Level 17%`

The **date** and **time** of the alarm and the **helium level** are saved in the alarms section of the history. The alarm is saved in the history each time a helium level measurement is made (manually or automatic).

Nitrogen Refill Period Overrun Alarm *5.4.2*

This alarm occurs if the nitrogen hasn't been refilled within the preset time interval.

The **date** and **time** of the alarm and the **number of days** are saved in the alarms section of the history. The alarm information is saved into the history once a day.

Clear Alarm Tone *5.4.3*

You can temporarily deactivate the alarm tone if desired. While in standby mode hold down the **Cancel** key and then choose Yes.

1.   **Hold down**

2.   **Press**

The alarm tone is reactivated with the next helium level measurement or 24 hours after the last nitrogen refill alarm.

Setting the Alarm Boundaries *5.4.4*

For expert users only!

You can also change the alarm boundaries for the helium level and nitrogen refill interval if you are not satisfied with the default setting. Considerable care should be used when setting the new values.

- When the helium alarm level is set too low it may result in a **quench**. Set the alarm boundary so that service personnel have enough time to refill the helium before the alarm occurs.

- When the helium alarm level is set too high for the nitrogen refill interval it may result in complete nitrogen evaporation and extremely liquid helium consumption.

A PIN number is required to change these settings.

Changing the Helium Level Alarm

Menu ➡ Settings ➡ **He-Level Alarm**
20%   Edit → ➡ **Edit He-Alarm**
20%   ↕

UP/DOWN: Used to change the level value

ENTER: Used to save and exit

CANCEL: Back

The default helium level alarm is 30%.

Changing the Nitrogen Refill Interval Alarm

Menu ➡ Settings ➡ **N Refill Period**
11 days   Edit→ ➡ **Edit N-Fill Per.**
11 days   ↕

UP/DOWN: Used to change the days value

ENTER: Used to save and exit

CANCEL: Back

The default nitrogen refill period is 11 days.

Measure Helium Level During Helium Filling **5.5**

The HLMU allows continuous helium level measurements to monitor the helium level during helium filling. To start the "Fill Mode" scroll to the menu option Fill Helium and press the **Enter** button.

Menu ➔ Fill Helium | Enter ▶ |
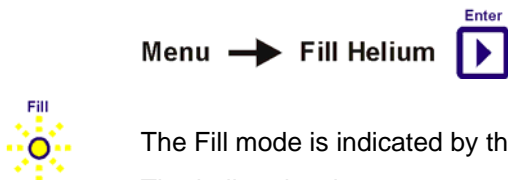
The Fill mode is indicated by the flashing yellow LED **Fill**.

The helium level measurement will run 10 seconds, then the actual helium level and measuring current will appear on the display. When the level value is updated, a short beep sounds. If you want to change the update interval, see ***"Period of Measurements During Helium Filling" on page 49***.

To prevent inaccurate measurements due to turbulence of the vapor helium (whereas the measured helium level jumps to a certain value and doesn't change) you can change the measuring current during Fill mode using the UP/DOWN buttons. This setting doesn't affect the default Fill mode current setting.

He-Fill Mode
He:33%   I=130mA

▲ **+ 5 mA**

▼ **- 5 mA**

When the helium refill is finished press the **Enter** button to exit. This event will be saved into the history as *"He Filled"* and will contain the final helium level, date and time. If you want to exit without saving the data into the history press the Cancel button.

You can change the default measuring current while in Fill mode, see ***"Current Settings" on page 37***. It is recommended that only expert users perform this task. The setting is protected with a PIN number.

To help prevent large helium loss the Fill mode is automatically switched off after 30 minutes.

History *5.6*

The HLMU stores the following information in the history:

- The last 30 automatic helium level measurements.
- The last 5 nitrogen refill dates.
- The last 5 alarms.
- The last 5 events (helium refill, reset, errors, setting changes etc.).
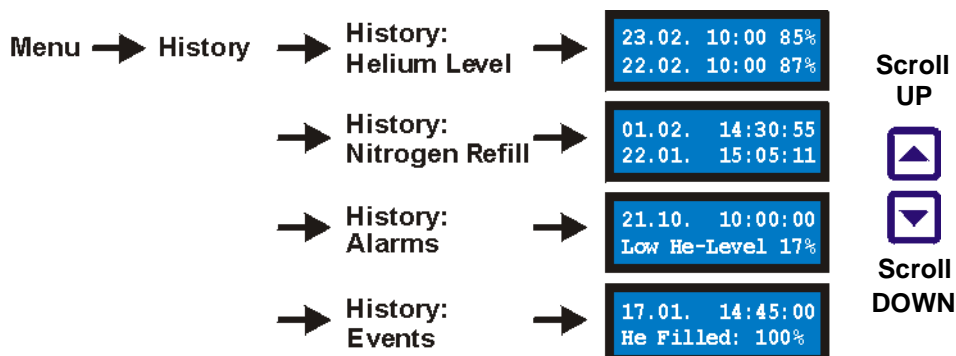
Dewar Identification *5.7*

The HLMU stores the following information to assist the HLMU in identifying its position and to which dewar it is connected.
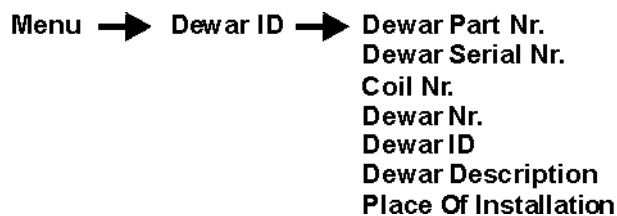
To change these values, refer to the section ***"Dewar Identification Setup" on page 50***.

Settings *5.8*

Overview *5.8.1*

To access the HLMU settings, scroll to **Settings** in the menu and press the **Enter** button.

Menu ➡ Settings ➡ Enter ▶

The following settings can be changed from the Settings overview:

- Helium level alarm (see ***page 32***)
- Nitrogen refill period (see ***page 32***)
- Period of the automatic helium level measurement (see ***page 30***)
- Initial time of the automatic helium level measurement (see ***page 30***)
- Currents: Thaw current (see ***page 37***)

  Measuring current (see ***page 37***)

  Current for helium refill mode (see ***page 37***)
- Network: IP Address (see ***page 17***)

  Subnet mask (see ***page 17***)

  Standard gateway (see ***page 17***)
- Date and time (see ***page 21***)
- HLMU: Change PIN (see ***page 38***)

  Display contrast (see ***page 38***)

  Beep (see ***page 38***)

  Temperature monitoring (see ***page 39***)

  Firmware version (see ***page 39***)

Most of these settings are protected with a PIN number.

For expert users only! A PIN number is required to change these settings.

The current setting affects the accuracy of the helium level measurement. Too low of a measuring current causes insufficient thawing of the upper part of the sensor and hence the measured level will be too high. Likewise, too high of a current can cause not only the upper part of the sensor, which is plunged into liquid helium, to thaw, but also the part over the liquid helium level, and thus the measured level will be too low.

You can change the settings for the following currents:

I thaw: Current used during the sensor thaw (default 120 mA) - flows first 4 second of the helium level measurement.

I meas: Current used during the measurement (default 110 mA) - flows for the next 8 seconds of the measurement, following the I thaw.
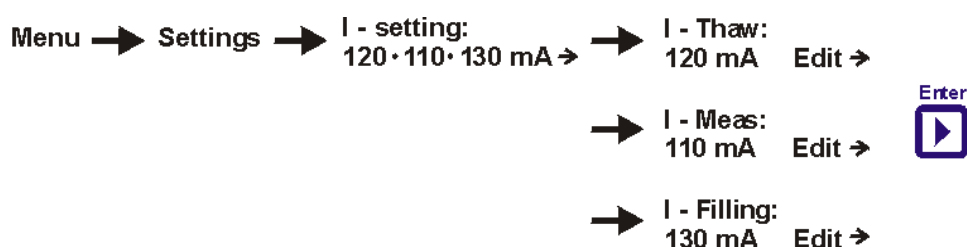
I filling: Current used during helium filling (default 130 mA).

Displaying the Actual Current Settings

Changing the Current Values

(to a maximal value of 150 mA):

UP/DOWN: Used to change the values.

ENTER: Used to save and exit.

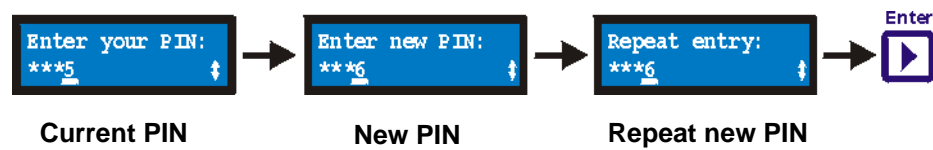CANCEL: Back.

Change the PIN Value   *5.8.3*

You can change the PIN to any 4-digit number that you find easier to remember.

Menu ➡ Settings ➡ HLMU Setup ➡ Change PIN Code   **Enter** ▶

UP/DOWN: Used to change the number.

ENTER: Used to move to the next number and/or confirm.

CANCEL: Used to move to the previous number and/or escape.

Enter your PIN: ***5 ↕	➡	Enter new PIN: ***6 ↕	➡	Repeat entry: ***6 ↕	➡	**Enter** ▶
Current PIN		**New PIN**		**Repeat new PIN**		

Setting the Display Contrast   *5.8.4*

You can change display contrast to 10 different levels:

Menu ➡ Settings ➡ HLMU Setup ➡ | Display Contrast
4   Edit ➔ | ➡ **Enter** ▶

Press the UP/DOWN buttons repeatedly to adjust the contrast, then press the **Enter** button to confirm.

Setting the Beep Tone   *5.8.5*

You can choose one of three beep settings:

- **On** (default): All of the signal tones are on.
- **Off**: All of the signal tones are off.
- **Alarms**: All of the signal tones except the alarm tone are off.

Menu ➡ Settings ➡ HLMU Setup ➡ | Beep
On   Edit ➔ | ➡ **Enter** ▶

UP/DOWN: Used to select one of the modes from the list: On - Off - Alarms.

ENTER: Used to select, save and exit.

CANCEL: Back.

Monitoring Temperature Inside the HLMU   *5.8.6*

Displaying the actual temperature of the heat sink and air inside the HLMU:

Menu ➡ Settings ➡ HLMU Setup ➡

```
Heatsink:   42°C
Air-in:     45°C
```

Firmware Version   *5.8.7*

Displaying the firmware version:

Menu ➡ Settings ➡ HLMU Setup ➡

```
Firmware Version
[7.2.05/9:00B]
```

Tip: You can also display the firmware version and the IP Address by holding down the **Cancel** button while in standby mode.

```
He-Level 95%
on 09.02.  12:00
```
➡ **Cancel** ◀ ➡
```
192.168.254.100
[7.2.05/9:00B]
```
Hold 2 seconds

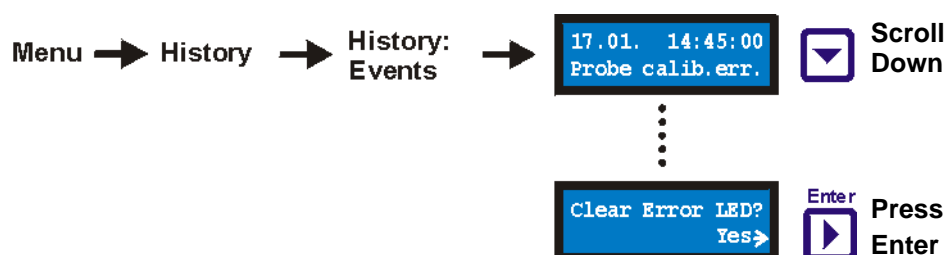## Error Messages   5.9

An error state is indicated by a blinking yellow **Error** LED. The error messages are stored under History - Events.

Menu → History → History: Events → `17.01.  14:45:00` `Probe calib.err.`

Clearing and Error LED   5.9.1

The LED can be cleared only if there are no more errors present and you have listed the error messages in History - Events.

Menu → History → History: Events → `17.01.  14:45:00` `Probe calib.err.` ▼ **Scroll Down**

`Clear Error LED?` `Yes` ▶ **Press Enter**

List of Error Messages   5.9.2

Table 5.1.   List of Error Messages

Message	Description	Possible solution
AutoMeas. failed	HLMU was busy when it was time for an automatic He-level measurement.	Set the time for the automatic measurement so it doesn't collide with another activity on the HLMU (e.g. He Refilling).
Wrong Setup Val.	Attempted to save incorrect setup values.	Pay particular attention to format, max. allowed values etc. when entering values
ERROR 2 Current set err.	Measured current doesn't match the required current.	
	Resistance of the He-probe is >200 Ohm.	Change the He-probe.
	Contact problem.	Check the connection to the He-probe.
ERROR 3 Probe Not Conn.	Probe not connected.	Connect the probe.
	Contact problem.	Check the connection to the probe.

Table 5.1.   List of Error Messages

Message	Description	Possible solution
ERROR 4 Overheated	Temperature inside the HLMU is > 65°C.	Provide better ventilation to the HLMU. Check functionality of the fan on the rear side.
ERROR 5 Power Supply Err	HLMU power supply is probably improperly set or damaged.	Contact Bruker service.
ERROR 7 Current disabled	Measured current = 0 mA. Contact problem.	Check the connection to the probe.
ERROR 8	HLMU internal error (ADC Time-out)	Try again. If the error reoccurs, contact Bruker service.
ERROR 9	The input voltage too high. Resistance of the He-probe is >200 Ohm.	Change the probe or reduce the measuring current.
ERROR 10 Probe calib. err.	Measured resistance > probe resistance set for 0% helium level	Check the probe calibration (e.g. correct color of dummy) or re-calibrate the probe
ERROR 12 Current disabled	Current is disabled (electronic fuse blown).	Measure the helium level one more time (fuse is automatic reset before each measurement).
3x wrong PIN!!! PIN blocked	The PIN code was entered incorrectly 3 times. Functions which require the PIN are blocked.	Contact Bruker service.

Operating Instructions

Operating Instructions for Web Interface

<div style="text-align: right; font-size: 3em; font-weight: bold;">6</div>

Introduction 6.1

This chapter describes how to operate the HLMU with the help of a Web browser via an Ethernet connection. To operate the HLMU with help of a menu and buttons, see *page 29*.

All the functions of the HLMU are accessible also through a Web interface except the nitrogen refill confirmation, fill mode and clear alarm tone. You will need an Internet or Ethernet connection and a Web browser (Internet Explorer, Netscape, Firefox etc.) to use this interface. The HLMU has own Web server and own IP address.

Displaying the HLMU Main Page:
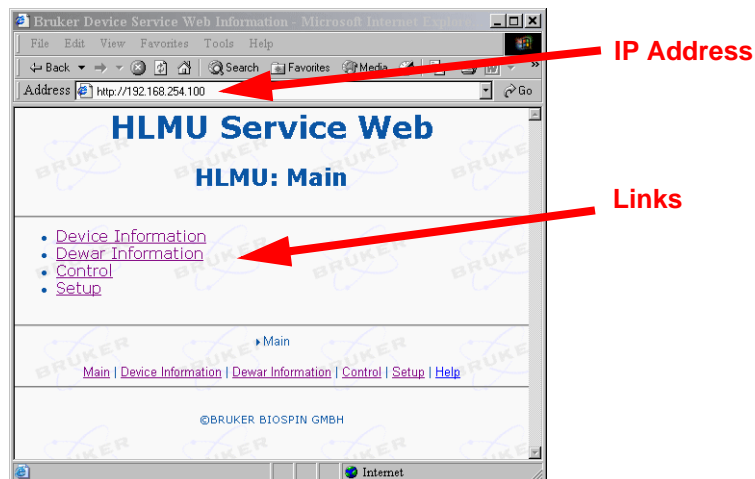
In an Web browser navigate to the HLMU IP address
(e.g. http://192.168.254.100).

Figure 6.1. HLMU Web: Main page

There are four links on the main page, see ***Figure 6.1.***:

- **Device Information:** A link to information about the HLMU and it's components (e.g. serial number, firmware version, BIS, etc.)

- **Dewar Information:** A link to information identifying the dewar which is connected to the HLMU (e.g. dewar part number, serial number, coil number, ID, description and place of installation).

- **Control:** A link to the helium level measurement data (a list of the last 20 automatic helium level measurements, a list of the last 5 nitrogen refills, a list of the last 5 alarms, and a list of the last 5 events).

- **Setup:** A link to the HLMU setup data (e.g. date, time, alarms, currents, auto measurement period, etc.).

Security *6.2*

Some functions and settings are protected by 4-digit security code PIN.
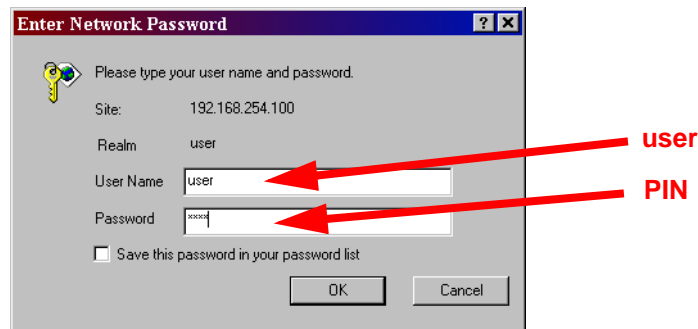

Figure 6.2.   HLMU web: Enter Network Password

User Name: **user** (Note: The user name is always "user")

Password: Your **PIN** (default 0000)

All protected pages became "unlocked" after entering the PIN. This is a feature of the Web browser. The PIN is deactivated when you close your browser.

Changing the PIN Number:

You can change the PIN to any 4-digit number you find easier to remember.

HLMU Main Page → Setup → Change PIN

1. Enter old PIN:	
2. Enter new PIN:	
3. Repeat Entry:	
4. Confirm:	OK
Status:	

Enter **current** PIN.

Enter **new** PIN.

Repeat **new** PIN.

Press OK button.

HLMU Main Page ➡ **Control**

Figure 6.3.   HLMU Web: Measure Helium Level

Click on the **Measure Now** button on the HLMU Control page. After 15 seconds the actual helium level will be displayed in the same frame:
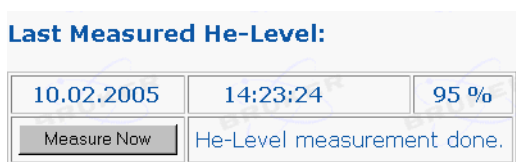

Figure 6.4.   HLMU Web: Last He-Level Measurement

The last 20 automatic helium level measurements, history of nitrogen refill, alarms and events will also be displayed on this page.

HLMU Setup Using the Web Interface   *6.4*

You can set the HLMU parameters quickly and comfortably using the Web inter-face. From the main page, click on the **Setup** link to navigate to the Setup page:

Figure 6.5.   HLMU web: Setup

Table 6.1.   The HLMU Setup Page

Link	Configuration Use
HLMU Setup:	Date and time, alarms (helium level alarm, nitrogen refill period), cur-rents, settings for automatic helium level measurement, see **_page 48_**.
He-Level Sensor Calibration:	Setting the type of the helium level sensor in a dewar, see **_page 24_**.
Net Setup:	Setting the network parameters (IP Address, Subnet Mask, Standard Gateway), see **_page 50_**.
Dewar Identification Setup:	Dewar Serial Nr., Coil Nr., Place of Installation etc.
Change PIN:	Change PIN via ethernet, see **_page 44_**.

Refer to read all previous chapters (especially **_"Setting the Alarm Boundaries" on page 32_** and **_"Current Settings" on page 37_**) for detailed information on the functions and settings.

HLMU Unit Setup   6.5

The HLMU Unit Setup page allows you to set the date and time, alarms (helium level alarm, nitrogen refill period), currents, and settings for automatic helium level measurement.
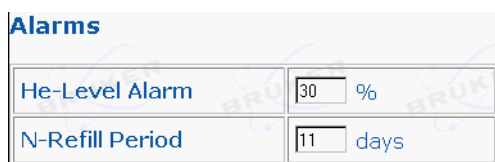
To display this page click on the **HLMU Setup** link on the Setup page.

Alarms   6.5.1

You can set two alarm limits in this frame:

- He-Level Alarm: 1 - 99%
- N-Refill Period: 1 - 30 days.

Alarms

He-Level Alarm	30	%
N-Refill Period	11	days

When done, click on the Save Changes button.

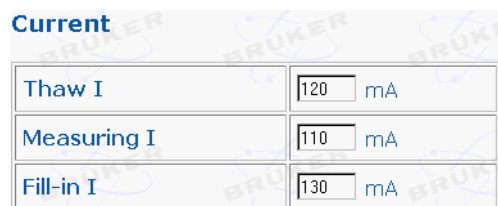See also **"Setting the Alarm Boundaries" on page 32**

Current   6.5.2

You can set three different currents in this frame:

- Thaw I: Current during sensor thaw (10 - 150 mA).
- Measuring I: Current during measurement (10 - 150 mA).
- Fill-in I: Current during helium filling (10 -150 mA).

Current

Thaw I	120	mA
Measuring I	110	mA
Fill-in I	130	mA

When done, click on the Save Changes button.

See also **"Current Settings" on page 37**

Helium Level Auto Measurement   *6.5.3*

You can set the automatic helium level measurement interval and the initial time of the measurement in this frame.

Interval: 24 hours - 12 hours - 6 hours - 0 (0 means that the auto measurement is OFF)

He-Level Auto Measurement

Interval	12 ▾ Hours
Initial Measurement	hh:mm 7 : 00

When done, click on the Save Changes button.

See also *"Automatic Helium Level Measurement" on page 30*

Period of Measurements During Helium Filling   *6.5.4*

You can set how often will be helium level measured during the Fill Mode (during helium refilling).

Fill-in Mode Measurement Period

Interval	30 ▾ Seconds

Interval: every 60 seconds, every 30 seconds (default), 0 - He-Level is measured continually (bigger consumption of liquid helium).

When done, click on the Save Changes button.

Load defaults   *6.5.5*

When you click on the Load Defaults button, the defaults settings will be loaded and saved.

Net Setup 6.6

The Net Setup page allows you to set the network parameters (IP Address, Subnet Mask, Standard Gateway).

To display this page click on the **Net Setup** link on the Setup page.

When done, click on the **Save Values** button, and then the **Press to Reset** button. After a reset the HLMU operate with the new net parameters.

Dewar Identification Setup 6.7

The Dewar Identification Setup page allows you to set the Dewar Serial Nr., Coil Nr., Place of Installation, etc..

To display this page click on the **Net Setup** link on the Setup page.

The HLMU stores information used to better identify it's position and the dewar that the HLMU is connected to.

When finished with editing, click on the **Save All** button.

Product Data

7

Declaration of Conformity 7.1

Bruker BioSpin hereby declares that the HLMU described in this user guide is in compliance with the essential requirements and other relevant provisions of European Directive 89/336/EEC and 73/23/EEC. The declaration of conformity concerned has been signed and is available from Bruker. If you require a copy of the original please contact your nearest Bruker BioSpin representative.

IEC 61010 - 1 : 2001 (2nd Edition)

EN 61010 - 1 : 2001 (2nd Edition)

DIN EN 61010 - 1 : 2002

EN 61326:1997 + A1:1998 + A2:2001 + A3:2003 - Class A

Technical data 7.2

Input Voltage:	AC: 100 - 240 V, single phase, variation max. +/- 10%
Input Frequency:	50 - 60 Hz
Current:	0.8A max at 100V AC input, full load condition
Power Consumption:	Standby: 16 VA
	Full load: 30 VA
Fuses:	2 x T250V~, 0.8A
Output Voltage:	DC: 0 - 35V
Output Current:	DC: 0 - 150mA
Resistance measurement range:	0 - 200 Ohm at 150 mA
Degree of pollution:	2
Over voltage category>	2

Physical data 7.3

Height:	98mm
Width:	155mm
Depth:	270mm
Weight:	1,8 kg

Operating Environment 7.4

Altitude:	Maximum 2000 m.
Temperature:	5 ~ 40 °C
Air humidity:	Maximum 80% for temperatures up to 31°C, linearly decreasing to 50% humidity at 40 °C.
Storage:	5 ~ 40 °C.
	Air humidity maximum 80% for temperatures up to 31°C, linearly decreasing to 50% humidity at 40 °C.

Care and Maintenance 7.5

The HLMU should be treated with care:

- Protect the HLMU from moisture and humidity.

- Do not store the HLMU in dusty, dirty areas.

- Do not store the HLMU in hot areas. High temperatures can shorten the life of electronic devices.

- Do not drop, knock or shake the HLMU. Rough handling can damage components inside the device.

Cleaning 7.6

Clean the device according to following instructions.

1. Unplug the power cord and the Ethernet cable.

2. Wipe the case with a dry or damp cloth.

> **Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the device.**

3. Let the device completely dry before you plug in the power cord.

Figures

Figures

Tables

Tables

Notes: