marXperts

marLiN$_2$ - User Manual

marLiN2 Electronic Scale and Liquid Nitrogen Refill System

User Manual

Version 1.2

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Written by Dr. Claudio Klein

1. How to use this manual

Before you start to operate the marLiN2 Liquid Nitrogen Refill System please read the User Manual and the Technical Documentation included in the documentation package carefully.

1.1 Address and support

Should you have questions concerning the system or its use, please contact us via phone or email.

marXperts GmbH
Werkstr. 3
22844 Norderstedt / Germany
Tel.: +49 (40) 529 884 - 0
Fax: +49 (40) 529 884 - 20
info@marxperts.com
marlin2.marxperts.com

1.2 Symbols used in the manual

Symbol	Explanation
	Caution. Carefully follow instructions in order to prevent damage to the equipment or personal injury.
	Low temperature hazard. Liquid nitrogen has a boiling point of -196°C and can rapidly freeze skin tissue and eye fluid. Brief exposure causes cold burns, frostbite and even permanent damage. Wearing proper protection (gloves, safety glasses, etc.) is mandatory when handling liquid nitrogen.
	Electrical current hazard.

Symbol	Explanation
	High voltage hazard.
	Temperature hazard. Device might be hot.
	Life threatening hazard. Obey all rules very carefully.
	Magnetic hazard.
	Emitter of electromagnetic waves.

1.3 Security and handling

When working with the marLiN2 refill system, observe the following security instructions in order to protect yourself and the instrument from harm.

Hazard	Description
	The marLiN2 refill system is intended for indoor use only.
	Do not install the instrument during an electrical storm.
	Never let liquids get inside the instrument. Otherwise, electric shocks or short circuits may result.
	Do not open the controller housing. The device contains hazardous components and should only be opened by authorized technicians.
	Place the instrument in a dry location that is free of dust and protected from moisture.
	Do not expose the controller to strong magnetic fields. They might corrupt the firmware. Strong magnetic fields may also have an impact on the scale readings.
	Do not expose the controller to strong emitters of electromagnetic waves, in particular microwaves in the range between 550 and 650 MHz.

Hazard	Description
	Make sure that the ventilation slits in the controller are unobstructed. The ventilation slits provide for air cooling of the controller box.
	Follow all safety instructions for handling liquid nitrogen, i.e. wear proper protection (gloves, glasses, etc.)
	If the solenoid valve for some unforeseen reason stays open, the LN2 refill dewar (see below) may start spilling liquid nitrogen because of an overflow of the receiving vessel. The spilled LN2 may damage the floor and/or equipment and may seriously harm people that are not aware of a lack of oxygen as a consequence of evaporating nitrogen. Any room where LN2 is handled MUST therefore be equipped with an oxygen monitor that produces a permanent alarm.

2. Overview

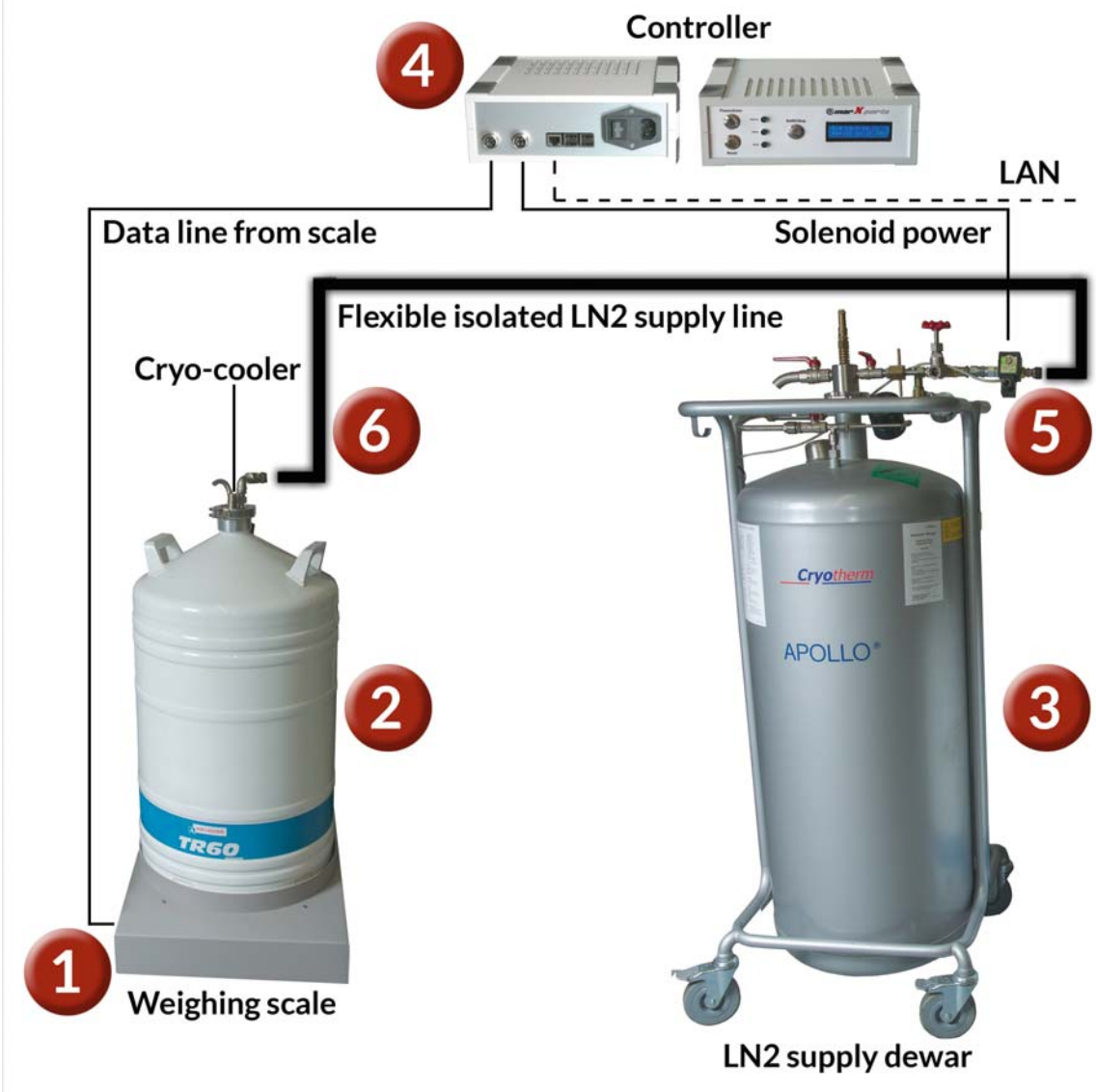


Figure 1: Schematic overview

2.1 Components

1. Weighing scale
2. Unpressurized LN2 dewar for feeding cryo-cooling device
3. Pressurized LN2 supply dewar
4. marLiN2 controller
5. Solenoid valve for refill of the dewar for the cryo-cooler
6. Isolated tube for refill of the dewar for the cryo-cooler (2)

2.2 Principle of operation

Liquid nitrogen (LN2) is stored in a large supply dewar (3). The supply dewar is connected via an isolated tube (6) to a smaller dewar (2) that feeds the cryo-cooling device. That dewar sits on a calibrated weighing scale (1) that is monitored by the marLiN2 controller (4). In order to ensure a continuous cooling, the LN2 in dewar (2) must never drop below a configurable minimum level. As soon as the low level mark has been reached, the dewar will be filled up from the LN2 supply dewar (3) up to a configurable upper level. For filling up dewar (2), the marLiN2 controller (4) opens a solenoid valve (5). The valve is closed automatically once the upper fill level has been reached.

The setup is easy to handle and allows for safe unattended operation. Provided that the refill line supplies LN2 at any time, the cooling system can be operated for many weeks without interruption.

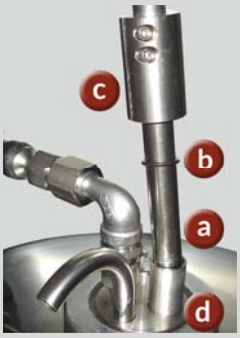
Technically, the weighing cells of the scale deliver a voltage strictly proportional to the weight. The voltage is fed into an A/D-converter that operates with an accuracy of 24 bits (1:16.777.215) and converts analog voltages into digital numerical values. The A/D-units (ADU) are converted to kilogram with a precalibrated fixed conversion factor. The zero-position is an arbitrary ADU and can be set to any value in the digitization range (see chapter 3.3 for more details).

3. Assembly

To hook up the marLiN2 refill system, please read this section carefully and follow the instructions accordingly. Pay special attention to the fittings of the LN2 supply lines to avoid spillage of liquid nitrogen.

3.1 Physical

	Description	Hazards
	Put the empty unpressurized LN2 dewar (2 in Fig. 1) on the weighing scale (1 in Fig. 1). The dewar has a weight of approx. 35 kg and should be handled by 2 persons in order to avoid damage to the weighing scale by dropping the dewar on it and also to reduce risk for personal injury. The dewar supplied by marXperts fits into the steel ring around the weighing cells. The weighing scale itself rests on 3 wheels that allow the scale to be easily moved around on a flat floor even when loaded with a full dewar. Move the weighing scale with the dewar in reach of your cryo-cooling device.	
	Put a 56x6 rubber O-ring on the mouth of the cryo-cooler dewar (2 in Fig. 1) and put the steel cap (see picture below) on top of it.	

Description	Hazards
 Secure the steel cap with a clamp.	
 Connect the isolated tube with the solenoid valve (6 in Fig. 1) to the LN2 supply dewar (3 in Fig. 1). The fitting towards the LN2 supply dewar is of type 3/4" JIC.	
 With a 22 mm wrench connect the isolated tube (6 in Fig. 1) coming from the LN2 supply dewar (3 in Fig. 1) to the matching fitting on the steel cap on the left hand side in this picture.	
 Fit the cylinder (c) onto the long rigid steel leg (a) of the cryo-cooler. Place the 16x2 O-ring (b) onto the transfer leg (a). Carefully insert the steel leg (a) into the matching hole (d) of the steel cap and slowly move the leg down to the bottom of the dewar. Do not push the steel leg any further since it might damage the dewar. After reaching the bottom, move the leg some 5 to 10 mm up. If not already in this position, move the steel cylinder (c) down until it touches the rim of the steel cap (d). In this position, tighten the M4 screws using a 3 mm Allen key on the cylinder (c), so the steel leg (a) cannot slip further down the dewar and does not directly touch the bottom of the dewar. The physical setup is now complete.	

3.2 Electrical

Description

 Connect the weighing scale with its D-Sub9 type of connector to the marLiN2 controller on socket (A).

	Description
	Connect the solenoid valve with its 4 pin connector to the marLiN2 controller on socket (B).
	Connect your local Ethernet cable to the Ethernet port of the marLiN2 controller on socket (C).
	Connect the power cable to the marLiN2 controller on socket (D).

3.3 Zeroing the weighing scale

While the device has been calibrated in the factory, it is mandatory to tare the weighing scale with an EMPTY dewar (2) mounted on top.

After hooking up the instrument with ALL physical (i.e. including steel cap with the isolated tube and the transfer leg of cryo-cooler attached to it) and electrical connections, turn on the marLiN2 controller using the power switch at the back panel. The controller boots within 10 seconds time and displays a weight on the LCD screen at the front panel. Please note, that only with an empty and dry dewar and all physical attachments a true tare can be carried out.

Once the weighing scale has been correctly zeroed, there is no need to repeat this procedure until the physical conditions change. The device stores the zero reading in non-volatile RAM and keeps it even after rebooting or powering off the instrument.

Zeroing the device can only be done via software, i.e. there is no tare/zero push button on the marLiN2 controller itself. This is on purpose in order to prevent accidental resetting of the scale with an already loaded dewar. For instructions on how to tare/zero the device by software, please see below. Technically, the zero position is just an arbitrary ADU value within the digitization range of the A/D-converter.

4. The marLiN2 controller box

4.1 Front panel

The front panel of the marLiN2 controller features the following elements:

- Powerdown/Reboot/Factory reset button
- Reset button
- Refill/Stop button
- Active LED
- Valve LED
- Auto/Alarm LED
- LCD screen

4.1.1 Powerdown / Reboot / Factory reset

The „Powerdown“ button is multi-modal, depending on the period of time the button is pushed:

- **< 3 sec:** triggers a controlled **shutdown** taking approx. 10 seconds
- **> 3 sec, < 10 sec:** triggers a controlled **reboot** taking about 20 seconds
- **> 10 sec:** triggers a **factory reset** of the controller and reboots the controller. For more details about the factory reset, please see chapter 5.2.4

The marLiN2 controller **MUST** be shut down before physically powering it off. The shutdown procedure does NOT power off the system and the LCD screen stays lit. To completely remove power for longer periods of inactivity, use the power button at the back panel of the controller.

4.1.2 Reset

The „Reset“ button has a similar function as the reset button on a conventional PC. It will make a hard reset on the operating system, i.e. the operating system will not follow a controlled shutdown protocol. As with other operating systems therefore there is a potential risk of losing data.
The „Reset“ button may be used, however, to boot up the system after it has previously been shutdown and not powered off completely. The only alternative to bring a powered down system back to life is to power cycle it, i.e. to operate the power button at the back of the instrument.

4.1.3 Refill/Stop

If the system is fully alive, by pushing the „Refill“ button a single refill procedure is triggered. I.e., the solenoid valve opens immediately and stays open until the (previously configured) upper fill level has been reached. After reaching the upper fill level, the system autonomously returns to its automatic level control.
When pushing the „Refill/Stop“ button while the „Refill“ procedure is active, the solenoid valve closes immediately. The system autonomously returns to its automatic level control, i.e. it will trigger the next refill cycle only after reaching the lower fill level.

4.1.4 Active LED

The „Active“ LED is lit permanently on an active system, i.e. if the system has been booted successfully and if the level control logic is running. When shutting down, the LED is unlit and remains unlit until the next boot cycle is completed.

4.1.5 Valve LED

The „Valve“ LED is lit if the solenoid valve is open and unlit if the valve is closed.

4.1.6 Auto/Alarm LED

The „Auto“ LED is permanently lit if the system is in automatic level control mode and unlit in manual mode. When an alarm condition is given, the LED will continue to blink until the alarm condition stays on. Alarm conditions are configurable and are given if the fill level drops below a minimum alarm level or if it exceeds the maximum alarm level.

4.1.7 LCD screen

The LCD screen display features 2 x 16 character lines. The lower line shows the current weight in kg and the fill level in percent (of the total capacity). The upper line shows several other messages like the current IP-address of the Ethernet adapter or the current CPU temperature.

5. Configuration

5.1 Factory IP-address and used ports

The factory setting of the IP-address of the marLiN2 controller is:

192.0.2.111

The address may be changed from the web interface (see below). The marLiN2 controller should be setup to become a full member of a local network. A full internet connection is desirable for accessing certain functions like contacting the firmware update server although this is not mandatory. For security reasons, only few ports to the outside world are open and the system may be considered to be properly protected from foreign intruders. The following ports are used by the system and must not be blocked by a firewall:

Port	Service	Description
67, 68	DHCP	Required for obtaining IP-address and other network parameters from DHCP server
80	HTTP	Required for access via the web interface
123	NTP	Optional for obtaining system time from public time/date servers
34542	SSH	For factory maintenance purposes only
34543	Custom	Required for access via desktop program “marlin2” and for mobile devices

For an initial setup, connect the marLiN2 box with a network cable to a computer and make sure that network 192.0.2.0 is visible from this computer. In order to verify that the marLiN2 controller is visible, open a command terminal on your PC.
On Windows 8 or 10, use the „Command Prompt“ app. One of the quickest ways to launch the Command Prompt is to use the Run window (press Win+R on your keyboard to open it). Then, type cmd or cmd.exe and press Enter or click/tap OK.
On Mac, use the Terminal app in /Applications/Utilities. On Linux, use the default command window of your window manager. In the command window, type:

```
ping 192.0.2.111
```

You should see a positive response like:

```
PING 192.0.2.111 (192.0.2.111): 56 data bytes
64 bytes from 192.0.2.111: icmp_seq=0 ttl=64 time=0.834 ms
```

If you are not getting a positive reply but something like:

```
Request timeout for icmp_seq 0
```

you are not seeing the marLiN2 controller and you will have to check the settings of your network card and/or your routing parameters. Please note, that if you use a patch cable to directly connect your PC with the marLiN2 box, it will have to be a so called „crossover“ cable. If you use plain 1:1 patch cables, you will have to connect both your PC and the marLiN2 controller to a hub or switch.

If you can ping the marLiN2 controller, you are ready to start the web interface from your favorite browser

5.2 Web user interface

The web user interface presents information about the marLiN2 refill system. This is where you configure all of the settings for operating the system. Desktop programs and mobile apps allow only for modifying fill level parameters but not IP-addresses, alarms, etc...

The user interface can be opened from any computer or mobile device connected with the marLiN2 box. The settings you configure are saved in the marLiN2 controller.

- Start a web browser on your computer.
- Enter „192.0.2.111“ in the address field of the browser and hit return
- The marLiN2 web user interface opens

5.2.1 Password protection

The marLiN2 user interface is protected from unauthorized and unwelcome access by a password. Only users who know the password can access the user interface. This protects all settings and all information in the marLiN2 box. The marLiN2 controller features 3 user levels for different purposes. All come with a separate password. As a factory setting all passwords are set to “marlin2”.

Level	Password	Description
default	**marlin2**	User can only monitor the current status of the system (weight, valve status)
standard	**marlin2**	User is allowed to open and close the valve and to trigger a refill cycle
admin	**marlin2**	User can fully configure the instrument

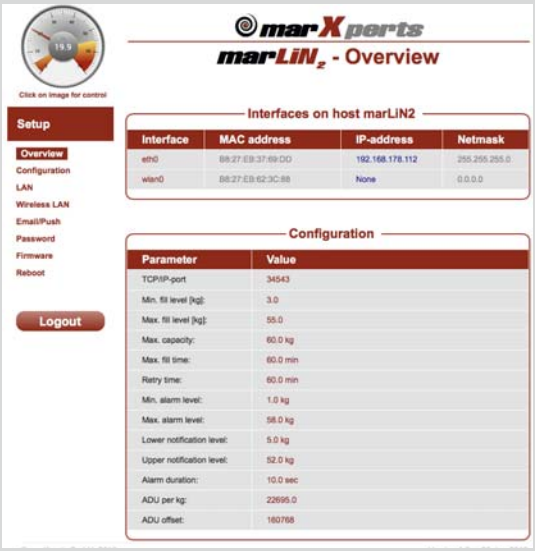
On the login page of the web user interface only the admin user is allowed to login, i.e. you must ALWAYS provide the password for the “admin” user on the password field.

After initial login, we strongly recommend changing the default passwords for all user levels on the corresponding page (see below). When leaving the configuration page, it is strongly recommended to logout, otherwise any person using the same web browser session will have access to the configuration parameters without being asked again for the password. After explicitely logging out, you will be asked again for a password to gain access to the configuration pages.

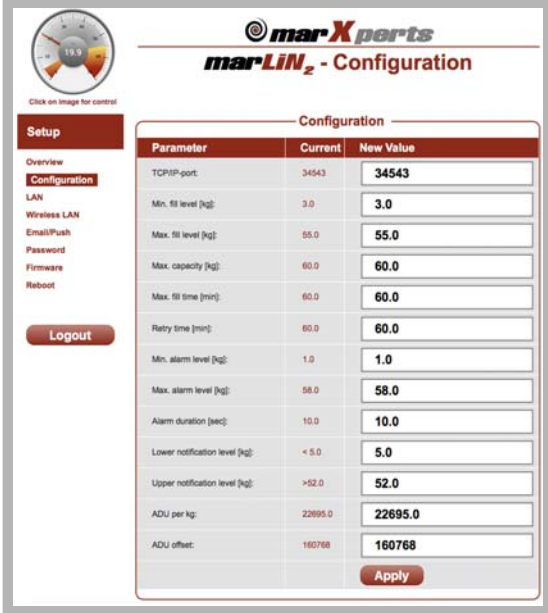
Be sure to use a password you can remember easily. If you forget the password, the only way to access the marLiN2 controller is to restore the factory settings. All settings made during operation will be overwritten. Then you can open the user interface again in order to reconfigure your settings or restore the settings you saved during previous operation.

5.2.2 Configuration

After logging in as user „admin“ the web user interface gives access to the following configuration pages:

Page	Description
	**Overview:** Shows the IP-address of the network adapter and the currently configured parameters for the weighing scale, in particular the minimum and maximum fill levels.

Page	Description



Configuration:

Set the following parameters here:

- **TCP/IP-port**: port to use for desktop and mobile apps
- **Min. fill level**: start refill when dropping below level
- **Max. fill level**: stop refill when reaching level
- **Max. capacity**: total weight when completely full
- **Retry time**: Retry a refill in given amount of minutes if the previous refill cycle did not succeed in filling up the dewar
- **Min. alarm level**: ring buzzer when dropping below level
- **Max. alarm level**: ring buzzer when reaching level
- **Alarm duration**: amount of seconds the buzzer stays on
- **Lower/upper notification level**: send an email or push message when dropping below/reaching level
- **ADU per kg**: calibrated conversion factor of A/D-units per kg. Do NOT modify this value!
- **ADU offset**: A/D-units after zeroing - automatically updated during a Zero/Tare procedure

LAN:

Configure your local network here. In case of doubt, get valid parameters from your local system administrator. The primary interface does not listen to a DHCP server and must be assigned a static IPv4 address and a matching netmask. Unless a gateway and DNS server is assigned, the marLiN2 box cannot contact the firmware update server and public NTP servers for obtaining its system time. Also, sending of emails is impossible.

- **IP-address**: valid static IPv4 address
- **Netmask**: e.g. 255.255.255.0 for class C networks
- **Gateway**: IP-address of gateway to internet
- **DNS server**: Name or IP-address for local or public domain name resolution server

WLAN:

Configure your (optional) Wifi card here.

- **IP-address**: static IPv4 address (or select DHCP)
- **Netmask**: e.g. 255.255.255.0, not required for DHCP mode
- **SSID**: Name of Wifi network to connect to or to create yourself
- **Security mode**: supported modes are WPA, WPA2, WEP and None
- **Wifi operation mode**: managed (= connect to existing Wifi network) or master (= access point for independent network)

Page	Description

Email/Push:

Settings here are entirely optional and work only if the marLiN2 box is fully connected to the internet. The box is using the given SMTP server and login credentials (user name and password) to send out emails on certain events.

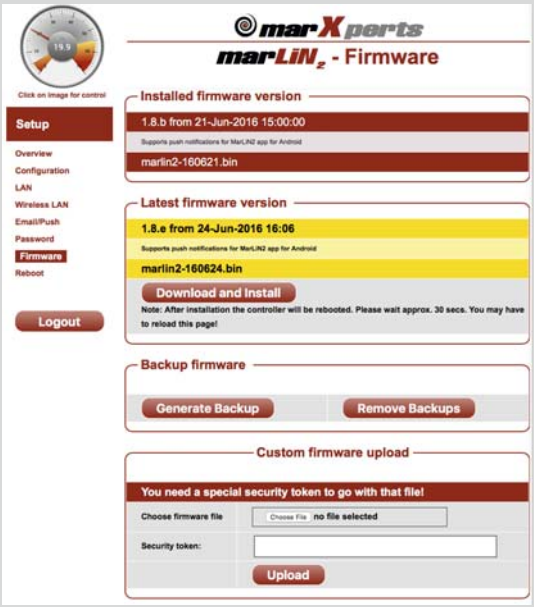
- **Send push/email on**: options to send a push message/email on reaching an alarm level, a notification level or the minimum or maximum fill level
- **Send email to**: provide the address where you want to receive email
- **Send email from**: the name given here only appears in the “From” field of the email program
- **SMTP server/credentials**: name of the email server used for sending out emails. If left empty, a default account from marXperts is used and there is no need to provide port, user and password. Otherwise, use the same credentials for port, user, password, authentication method and connection security as in your email programs.

Test the setup by pushing the “Send test push notification/mail” button. Push it only once and wait to get some feedback. The reaction time can be slow!

Password:

Here is where you can modify the individual password for the user levels “default”, “standard” and “admin”.

Please keep note of those passwords. If you lost them, the only way to recover is by doing a “Factory reset” which is going to reset all passwords to “marlin2”. See chapter 5.2.4 to learn more about the “Factory reset” which cannot be done by software but only on the instrument.

Page	Description
	**Firmware:** Here is where you can see the version of the firmware currently installed. If there is a full internet connection, you will see the latest firmware version that is available for download. If you want to make a safety copy of your firmware, press the “Generate Backup” button and the system will start to produce a backup file and present it for download. To see the list of backups, you will have to manually refresh the browser page. Only then, you will obtain a link for downloading the backup. Since disk space is limited in the controller you should not produce too many backups and remove the backup once it has been downloaded. The backup may be used under certain conditions to restore information of the device. The last section on this page allows for loading a custom firmware file for dealing with special situations. These custom firmware files require an individual security token and will be provided only if necessary.
	**Reboot:** On this page you can trigger a reboot or shutdown of the controller instead of using the push buttons on the front panel. It may be necessary under certain circumstances to reboot the device if network parameters have changed.

5.2.3 Control

The control page can be obtained even without logging in by clicking the gauge in the upper left corner of each page of the web user interface. Depending on the user level, the control page allows for monitoring and/or operating the marLiN2 refill system. If the user level does not allow for operating the valve or taring the scale, the corresponding buttons are either invisible or do not react.

User level	Available functions
default	see current weight and status of valve
standard	+ operate valve, trigger refill
admin	+ zero/tare weighing scale

5.2.4 Factory settings

The marLiN2 refill system comes with a reasonable set of preconfigured factory settings that may be tailored to your individual needs. If for any reason, you want to restore the system to its delivery state, push the „Powerdown“ button on the front panel of the controller box for longer than 10 seconds. The following defaults will be restored after reboot:

Parameter	Value
Networks parameters for LAN	
LAN: IP-address	192.0.2.111
Netmask	255.255.255.0
Gateway	192.0.2.1
Domain name server	8.8.8.8 (open Google DNS)
Network parameters for WLAN	
IP-address	10.11.11.1
Netmask	255.255.255.0
SSID	marlin2
WiFi password	marXperts
WiFi security mode:	WPA+WPA2
WiFi operation mode	Master (access point for SSID marlin2)
Email parameters	
Send push on	None
Send email on	None
Send email to	(empty)
Send email from	marlin2@marxperts.com
SMTP server name	(empty = default server of marXperts)
STMP server port	(empty)
SMTP server user	(empty)
SMTP server password	(empty)
Authentication method	Normal password
Connection security	STARTTLS
Weighing scale parameters	
TCP/IP-port	34543
Min. fill level [kg]	3.0
Max. fill level [kg]	36.0
Max. capacity [kg]	40.5
Max. fill time [min]	60.0
Retry time [min]	60.0
Min. alarm level [kg]	-1.0 (never)
Max. alarm level [kg]	999 (never)
Min. notification level [kg]	-1.0 (never)
Max. notification level [kg]	-1.0 (never)
Alarm duration [sec]	300.0
ADU per kg	22695.0
ADU offset	200.000

5.2.5 Recommendations for configuration and usage

If possible, make use of the following recommendations concerning configuration and usage of the marLiN2 refill system:

- **Networking**: Allow the system to connect to the internet by providing a gateway and domain name server and do not block port 80 (http) on your firefwall.
- **Email**: Feel free to make use of the marXperts SMTP server account for sending out alarm emails.
- **Passwords**: Since the default passwords for the user levels are written down in the user manual and the manual is available for download in the internet, it is strongly suggested to choose strong passwords for accessing the marLiN2 box. Keep them in a safe place, but do not loose them ...
- **Min. fill level**: choose a minimum fill level of 3-5 kg for starting a refill cycle.
- **Max. fill level**: choose a maximum fill level of 3-5 kg below the capacity for ending a refill cycle.
- **Capacity**: needs to be given in kilograms and must be rather accurate since you want to avoid overfilling the cryo-cooler dewar under all circumstances. Please note, that for many LN2 supply dewars the capacity is given in liters. However, the weighing scale measures kg, so make sure that you provide the correct capacity in kg. The dewar supplied with marμX systems is a smaller version of the Wessington ES-60 dewar with a capacity of 50 liter LN2 (instead of 60 liter). With a specific gravity of 0.812 kg/liter this makes a capacity of 40.4 kg for the small version of the ES-60 dewar and 48.5 kg for the original version of the ES-60 dewar with 60 liters capacity.
- **Max. fill time**: For safety reasons, a refill cycle should not stay on forever. If the refill of the cryo-cooler dewar (2 in Fig. 1) cannot be accomplished in a reasonable amount of time, the valve will be closed. This is to avoid infinite spillage of LN2 in case of some severe malfunctioning of the marLiN2 controller for whatever reason. The solenoid valve gets quite warm when energized (open). If the LN2 supply dewar (3 in Fig.1) itself is empty and cannot provide any more LN2 to the cryo-cooler dewar, it also does not make sense to leave the valve open all the time. A maximum fill time of 60 minutes or shorter should be appropriate to fill up a dewar of 40 kg capacity.
- **Min. alarm level**: if you don‘t want to get an audible alarm at all, you may provide a negative value. Otherwise, 1 kg is the recommended setting.
- **Max. alarm level**: if you don‘t want to get an audible alarm at all, you may provide a large positive value, Otherwise, 2-3 kg above max. fill level is recommended.
- **Alarm duration**: the audible alarm is going to be turned off after a given amount of seconds, even if the alarm condition persists. The only alarm signal then will be the blinking alarm LED (see chapter 4.1.6). This is because a system that has run dry (i.e. all LN2 has been consumed) is not such an unusual thing and might have happened on purpose. An alarm makes sense only if there really is a person around that can resolve the physical problem (e.g. LN2 supply dewar empty) and should not stay on longer than required for evaporating the remaining liquid nitrogen. Therefore the recommendation for the alarm duration is < 3600 sec (1 hour).
- **Lower/upper notification level**: if your device is fully hooked up to the internet you may want to receive some extra message when reaching a certain fill level. This is purely optional and may be turned off.
- **ADU per kg**: precalibrated in the factory. Do not modify!
- **ADU offset**: this value corresponds to the ADU reading after zeroing the scale and will automatically be updated. Hence, leave it alone.

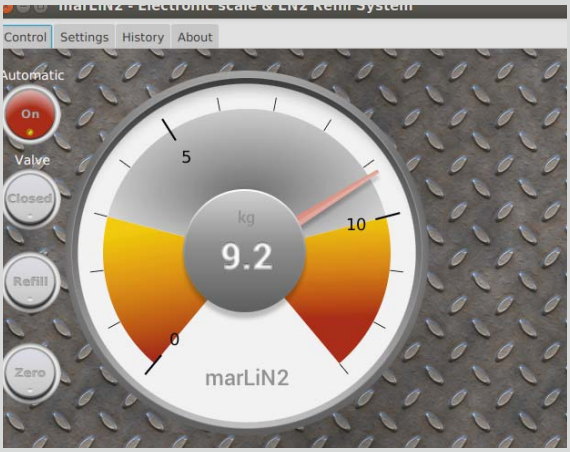
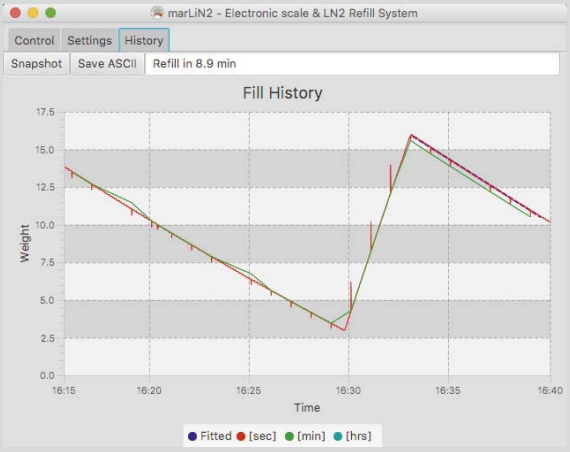
6. Software

6.1 Desktop app

The marLiN2 refill system can be operated from any browser from any PC provided that the controller box is member of your local network. While most configuration parameters are only available from the web interface, monitoring the current status of the system and doing basic operations like opening and closing the valve may be easier to do with a dedicated application. The program is called „marLiN2“. Executables are available for 64-bit versions of:

- Windows 7,8 & 10
- Mac OS X 10.11/12 (El Capitan, Sierra)
- Ubuntu & Redhat Linux

The GUI may depend on other system components. Please report errors and suggestions....

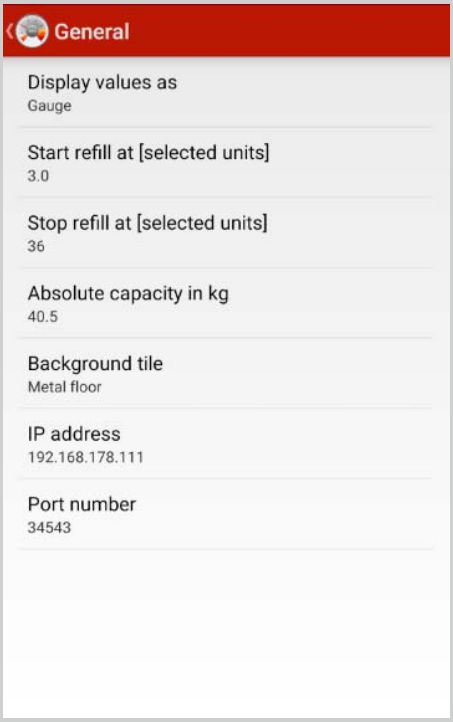
Page	Description
	**Main window:** Shows the current weight and the buttons for opening and closing the valve, triggering a refill cycle, zeroing the weight and turning from automatic fill mode into manual mode. Depending on the user level (see below) some buttons might be disabled.
	**Settings:** Here, you have to give the hostname or IP-address and other parameters explained previously. You have to choose a user role and the corresponding password. When changing the password or any other text field, hit the <Return> key in the text field in order to get accepted.
	**History**: If you leave the program running over longer periods of time it will accumulate some statistics about the consumption of LN2. From the plot you can easily see when the next refill is expected to happen. This utility is not available from the web interface.

6.2 Mobile apps

For Android versions >= 4.4 (Kitkat) and for iOS >= 8.0 there is a mobile app in the Google Play Store and Apple Store, respectively. Please search for „marLiN2“. Please note, that the mobile app can talk to the marLiN2 box only if the mobile device is connected to the same network as the marLiN2 box, i.e. the IP-address given in the mobile app (see below) must be visible by the mobile device. In case of doubt, ask your local network administrator how to achieve this.

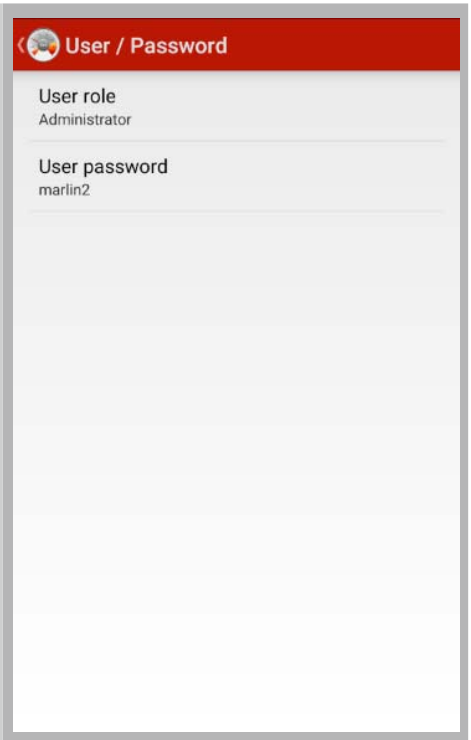
Main window (Android app):

Shows the current weight and the buttons for opening and closing the valve, triggering a refill cycle, zeroing the weight and turning from automatic fill mode into manual mode.
Depending on the user level (see below) some buttons might be disabled.



General settings (Android app):

Here, you have to give the IP-address of the marLiN2 box and other parameters explained previously.



User settings (Android app):

Here, you have to choose a user role and the matching password (which may have been configured via the web interface).

6.3 Manuals

Up-to-date versions of the manual and also of the software are available for download from

http://marlin2.marxperts.com

7. Specifications

Specifications	
Weighing scale	
Dimensions W x L x H	500 x 610 x 160 mm without dewar 500 x 610 x 840 mm with 50l version of Wessington ES-60 dewar
Dewar for use in marμX systems	50 l Wessington ES-60, 650 mm height, 460 mm diameter, 36.5 kg Max. capacity: 40.5 kg liquid nitrogen
Max. diameter of dewar:	465 mm
Space between wheels and ground	12 mm
Weight:	20.5 kg without dewar
Max. tonnage	150 kg (other types upon request)
Valve	
Solenoid valve	ASCO SCE263B206LT 24V AC
Fittings for LN2 supply dewar	JIC 3/4” female thread
Isolated tube	3 m metal wafe tube with insert Teflon tube with 3/8” male/female fittings
marLiN2 controller	
Input power	230 V or 110 V AC, depending on model (not switchable!)
Output power for solenoid	24 V AC / 2 A max. current
Measurement range	up to 700 kg
A/D accuracy	24 bits (1: 16.777.215)
Display accuracy	0.1 kg
Display type	2 x 16 character backlit LCD
Temperature range	0 - 35 C
Connectivity	RJ-45 Fast Ethernet, optional USB WiFi dongle
Alarms	Buzzer, LED, push-message to cell phone
Dimensions W x L x H	240 x 200 x 85 mm

Contents

EC Declaration of Conformity

marXperts GmbH
Werkstraße 3
22844 Norderstedt
Germany
+49 (40) 529 884- 0
+49 (40) 529 884-20
info@marxperts.com
www.marxperts.com

Manufacture Name:	marXperts GmbH
Address:	Werkstraße 3 D-22844 Norderstedt
Web:	www.marxperts.com

We hereby declare under our sole responsibility that the following apparatus:

Product Description:	Liquid level control systems
Model Name:	marLiN2
Model Number:	2011 027.070-00
Product Category:	Electrical equipment for measurement, control and laboratory use

Complies with the essential requirements of the following applicable European Directives:

Electromagnetic Compatibility (EMC) Directive 2004/108/EC (**2014/30/EU**)
Low voltage Directive 2006/95/EC (**2014/35/EU**)
RoHS Directive 2011/65/EU

Conformity is assessed in accordance to the following standards:

EN 61326-1:2006, Class A
EN 55011:2007, Class A
EN 61326-1:2006, Industrial
EN 61000-4-2:2001
EN 61000-4-3:2001
EN 61000-4-4:2001
EN 61000-4-5:2001
EN 61000-4-6:2001
EN 61000-4-8:2001
EN 61000-4-11:2001
EN 61010-1

Norderstedt, March 22th, 2016

Place and Date

Claudio Klein, Managing Director