

**Annex acc. to FCC Title 47 CFR Part 15
relating to
Hammer-IMS nv
Rio**

Annex no. 5

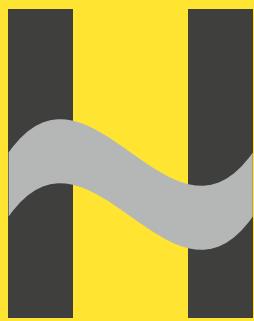
User Manual

Functional Description

**Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart C – Intentional Radiators
ANSI C63.4-2014
ANSI C63.10-2013**



User Manual / Functional Description of the test equipment (EUT)



HAMMER-IMS

Technical manual for the Marveloc-CURTAIN product family

Version August 2021

Hammer-IMS

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1. Declaration of conformity



EC DECLARATION OF CONFORMITY FOR THE MACHINERY (according to annex II.1.A of the machinery directive)

Hammer-IMS nv
Kempische Steenweg 293, bus 36
B-3500 Hasselt
Belgium

declares that the machinery as described:

DENOMINATION:	Marveloc-CURTAIN
FUNCTION:	Measuring system
MODEL:	MARVELOC-CURTAIN-T-22008-O
SERIAL NUMBER:	MACURTAIN202107023073
CONSTRUCTION YEAR:	2021

is in conformity with all relevant provisions of the following directives:

Machinery Directive 2006/42/EC (and 89/392/EG and 98/37/EG)

and declares that the following harmonized standards have been applied:

**EN ISO 12100:2010
EN 62311, EN 301 489-1,-3 and EN 305 550-1,-2**

Person authorized to compile the technical documentation: Bram Iliaens

Place: Hasselt

Date: August 11, 2021

On behalf of Management Hammer-IMS:

Position & Name:	General Manager Deferm M&C bv rep. by Noël Deferm, zaakvoerder (manager)	Technical and Product Manager Red Ant Consult and Design bv rep. by Tom Redant, zaakvoerder (manager)
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Signature:

A handwritten signature in black ink, appearing to read 'Noël Deferm'.

A handwritten signature in blue ink, appearing to read 'Tom Redant'.

2. Declaration of FCC conformity



FCC DECLARATION OF CONFORMITY FOR THE MACHINERY

Hammer-IMS nv
Kempische Steenweg 293, bus 36
B-3500 Hasselt
Belgium

declares that the machinery as described:

DENOMINATION:	Marveloc-CURTAIN
FUNCTION:	Measuring system
MODEL:	MARVELOC-CURTAIN-T-22008-O
SERIAL NUMBER:	MACURTAIN202107023073
CONSTRUCTION YEAR:	2021

For the US:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

For Canada:

Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC/IC Conformity:

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. This equipment complies with FCC RF radiation exposure and IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with the minimum distance 20cm between the radiator and your body. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. Cet équipement est conforme aux limites d'exposition aux radiations de les normes FCC RF et RSS-102 de l'IC, établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre le radiateur et votre corps.

Person authorized to compile the technical documentation: Bram Iliaens

Place: Hasselt

Date: August 11, 2021

On behalf of Management Hammer-IMS:

Position & Name:	General Manager Deferm M&C bv rep. by Noël Deferm, zaakvoerder (manager)	Technical and Product Manager Red Ant Consult and Design bv rep. by Tom Redant, zaakvoerder (manager)
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Signature:



3. Technical specifications

All systems of the Marveloc-CURTAIN product family satisfy the following technical specifications:

SPECIFICATION	VALUE
General	
Product family	Marveloc-CURTAIN
Model (generic name)	MARVELOC-CURTAIN-T-XXXY-C
Power characteristics	
Power inlet	230 V (AC) / 120 V (AC)
Frequency	50 Hz / 60 Hz
Max. power consumption	< 1000 W
Weight	
Marveloc-CURTAIN	< 1800 kg
Noise characteristics	
Noise level	very low (<75 dB)
Environment restrictions	
Operating temperature	15 - 35 °C
Measurement geometry	
Measurement gap	maximum 40 cm
Depth of focus	unlimited
Measurement spot (diameter)	~ 30 mm
Radiation characteristics	
Electromagnetic radiation	from 47 MHz up to 144 GHz

4. Introduction

4.1 Indications for the use of the technical manual

Thank you for having chosen one of our Marveloc-CURTAIN products. You are advised to read this manual carefully and pay special attention to the general safety prescriptions. The manual contains all the information you need to use your selected product of the Marveloc-CURTAIN product family safely, correctly and in the most satisfactory manner.

4.2 Marveloc-CURTAIN measurement systems

The Marveloc-CURTAIN is a millimeter wave (or M-Ray) based measurement system by Hammer-IMS. Millimeter waves are favored in situations where conventional technologies such as optical technologies, nuclear or radioactive radiation, ultrasound waves, inductive or capacitive measurement systems fail, are undesirable or provide an unreliable output. The integrated robust M-Ray technology is clean and safe. The Marveloc-CURTAIN is a machine-wide scanning solution providing near 100 percent coverage of a produced material for a variable range of materials: nonwovens (needlepunching, bonding, tufting, etc.), textiles (lamination, coating, etc.), physical and chemical foaming processes, plastic films and sheets...

The Marveloc-CURTAIN is designed to perform thickness measurement, basis-weight measurement or anomaly detection. It uses a sensor concept based on one or multiple sensor-head pairs. Each sensor-head pair consists of a transmit antenna, which transmits millimeter waves onto the material of which the thickness or basis-weight needs to be measured, and a receive antenna, which captures the transmitted millimeter waves. Depending on the exact realization of the Marveloc-CURTAIN, the position of the receive antenna in the system might differ. Marveloc-CURTAIN's transmit antenna(e) are always contained in the upper part of the Marveloc-CURTAIN frame. However, Marveloc-CURTAIN systems exist either with the receive antenna(e) mounted in the lower part of the Marveloc-CURTAIN frame or either with the receive antenna(e) mounted in the upper part of the frame. In the latter case, instead of a receive antenna, a metal reflector sheet is foreseen in the lower part of the frame. In both cases, a 'measurement gap' is defined in which the material is fed.

The Marveloc-CURTAIN systems are typically applied in the following setting. The material is fed in the measurement gap. The presence of the material causes the waves to be slowed down. The concept is straightforward: the longer the M-Rays travel through the material, the thicker or heavier the material. Accurately timing the trajectory of the millimeter waves enables to extract the thickness or the basis-weight of the material. Accurate timing is indispensable, and key in the Marveloc-CURTAIN measurement systems.

5. Product description

The measurement system consists of the following subparts: the Marveloc-CURTAIN measurement machine and a stand-alone panel pc containing the Connectivity 3.0 software suite. Optionally, some add-ons such as an automatic feeder system or a sample holder are available on request.

5.1 Marveloc-CURTAIN measurement machine

The Marveloc-CURTAIN itself is installed in the production line. The machine is either powered by the panel pc with a mains power cable or directly powered through a separate mains power supply socket. Interfacing the Marveloc-CURTAIN either occurs through a set of USB busses or through an Ethernet wire. Using the USB busses is preferred for optimized measurement latency and for lab situations, whereas using the Ethernet connection is favored for industrial situations and long ranges between the measurement machine and the connected pc.



If there is an isolator switch present on the cabinet of the machine, the power of the machine can be turned on and off with this isolator switch. In case there is no isolator switch present on the machine, the isolator switch on the panel pc controls both the power of the panel pc as well as the power of the machine.

In the remainder of this technical manual, the "Marveloc-CURTAIN measurement machine" will often be abbreviated to "CURTAIN". Both namings refer to this part.

5.2 Panel pc or alike

Hammer-IMS provides two HMI (Human-Machine Interface) technologies. The preferred one is an industrial rugged panel pc. The panel pc is a stand-alone unit which contains the

Hammer-IMS Connectivity 3.0 software suite to control and display the measurement. Alternatively a desktop pc is provided, fulfilling the same job as the panel pc, but coming with more flexibility. The desktop pc option is preferred when using Marveloc-CURTAIN systems in a lab environment e.g. for R&D purposes.

Both panel pc and desktop pc contain a front USB connector to allow uploading new recipe books and downloading measurement log files if these features come along with the system.



The figure above shows a picture of a possible panel pc. The isolator switch to the left of the panel pc controls the power of the panel pc. In case no isolator switch is present on the cabinet of the machine, the panel pc distributes the power to the machine and therefore the isolator switch of the panel pc controls the power of the machine as well.

In the remainder of this technical manual, there will be made no difference between a setup with a single or multiple isolator switches. Whenever "isolator switch(es)" is mentioned this refers to all present isolator switches.

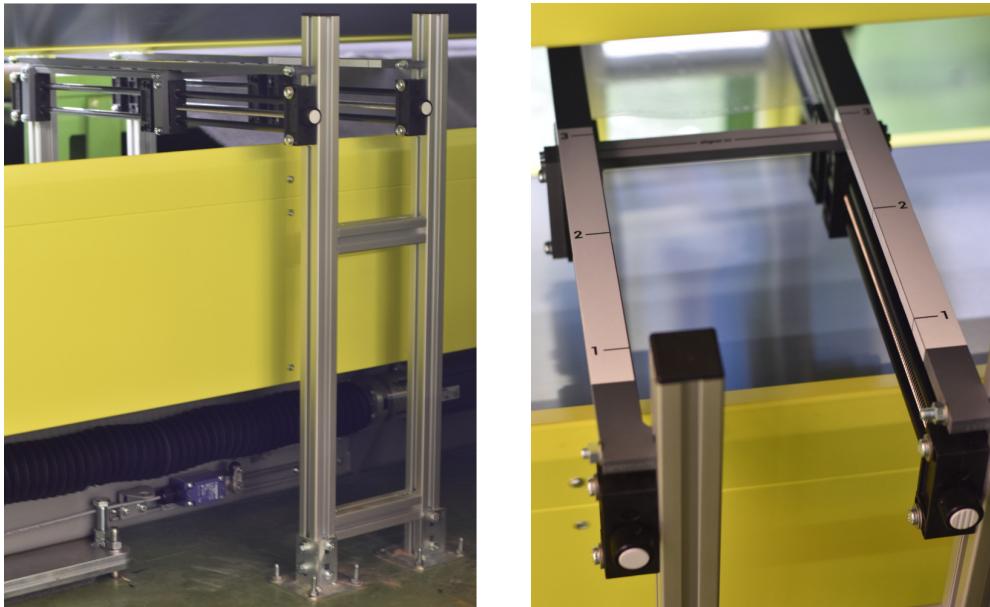
5.3 Add-ons

5.3.1 Automatic feeder system

When used in a lab environment, a logical choice is to install an automatic feeder system. Hammer-IMS provides these systems under the brand name FEEDER-XXXX. Such a feeder is not a stand-alone machine, it can only work when combined with systems of the Marveloc-CURTAIN type.

5.3.2 Sample holder

For the case when using the Marveloc-CURTAIN systems for a broad span of material thicknesses or basis-weight values, a sample holder can be installed inside the measurement gap of the Marveloc-CURTAIN. In the case of using a Marveloc-CURTAIN system in an R&D setting, when new and unknown materials would regularly be applied to the system, such a sample holder could introduce flexibility to work with these new and unknown materials. A sample holder uses a set of reference samples, and it enables each of these samples to be used as a calibration sample whenever necessary. Using a sample holder has the additional advantage to boost up the Marveloc-CURTAIN's measurement accuracy. The figures below show pictures of a possible sample holder.



When the Connectivity 3.0 software is equipped with a recipe selector, it will automatically tell which sample to be used as calibration sample for a certain measurement task. Make sure calibration samples are accurately set in the required position.

5.4 Interfaces

There are several external interfaces:

1. Mains power connection: a 230 V 50 Hz or alternatively 110 V 60 Hz wire .
 - (a) Isolator switch present on the cabinet of the machine: a power plug originating from the Marveloc-CURTAIN and a power plug originating from the panel pc or alike. When working with a desktop pc, a secondary wire containing a power plug which originates from the LCD display is available.
 - (b) No isolator switch present on the cabinet of the machine: a power plug originating from the panel pc or alike. The panel pc distributes the power to the Marveloc-CURTAIN.
2. Internet connection: an Ethernet cable providing internet connection allows remote software updates and remote assistance.
3. Dedicated customer-specific add-on connection cables: e.g. for connection of one or more feeders or for feedback to a production line. For more information: please consult any available specific manual on this.

6. Installation and commissioning

A Marveloc-CURTAIN measurement system may only be installed and/or moved by authorized Hammer-IMS personnel.

Dedicated transportation mechanisms (fixing transport brackets) as designed by Hammer-IMS are required (if shipped along) to install and move the measurement machine. These dedicated transportation mechanisms are tailor-made steel blocking bars, not allowing the machine to move freely around during transportation. Moving the CURTAIN without these transportation mechanisms will damage the machine and therefore voids warranty. Also, there is a risk that the machine will fall and damage itself or the environment or cause injuries to human beings when not using these right mechanisms. In some cases, the spindle screw should be detached from the machine, not allowing any torsion on the spindle. Contact Hammer-IMS if this is needed for your Marveloc-CURTAIN.

Hammer-IMS is solely responsible for the installation in case it remains unchanged. Unauthorized technical adjustments will void warranty.

6.1 Mechanical constraints

The machine can be moved by means of a hoist. 2 to 4 locations are foreseen on the frame in which crane hooks can be attached. The locations are indicated by means of the following symbol. The dedicated transportation mechanisms (fixing transport brackets as depicted further in this section) should always be applied when lifting up the machine.



Moving or relocating the system after commissioning is only allowed when the Marveloc-CURTAIN contains a dedicated platform on wheels. In all other cases, only authorized Hammer-IMS personnel may move the Marveloc-CURTAIN after commissioning.

6.2 Electrical constraints

To avoid hazards due to electrostatic phenomena, the product must be properly grounded. Therefore, the power supply cable supplying the full measurement system needs to provide a proper ground connection.

6.3 General constraints

Under all conditions, the material or any other items may not touch the yellow parts of the CURTAIN, since this reduces its measurement precision.

After installation, a test to verify the correct functionality of all emergency stop buttons needs to be performed.

B

Operation

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7. Operating the machine

Operating the machine depends on whether the CURTAIN is equipped with a panel pc HMI or desktop pc HMI.

7.1 Using a panel pc HMI

When the CURTAIN is permanently installed in an inline measuring situation, a panel pc is attached to it. This panel pc has the Connectivity 3.0 software suite preinstalled.

7.1.1 Starting

Turn on the isolator switch(es), in case one is present on the machine turn this isolator switch on first. Possible isolator switches that come with the CURTAIN systems are shown below.

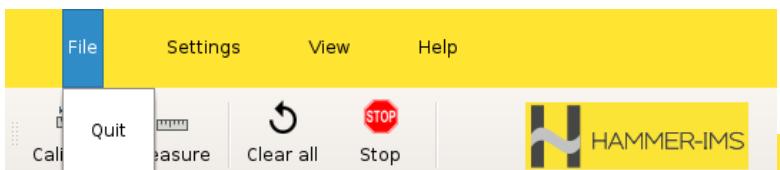


The measurement machine will typically heat up for 20 minutes. The duration of the heat-up time might be case-specific. Afterwards, the software can be operated and the measurement can be started.

7.1.2 Stopping

It is recommended to always keep the software and the machine running. The software should not be shut down when there is no production. When the production stops, the operator can stop the movement of the machine by pausing the measurement (press on the button *Pause*, as explained in section 8.2).

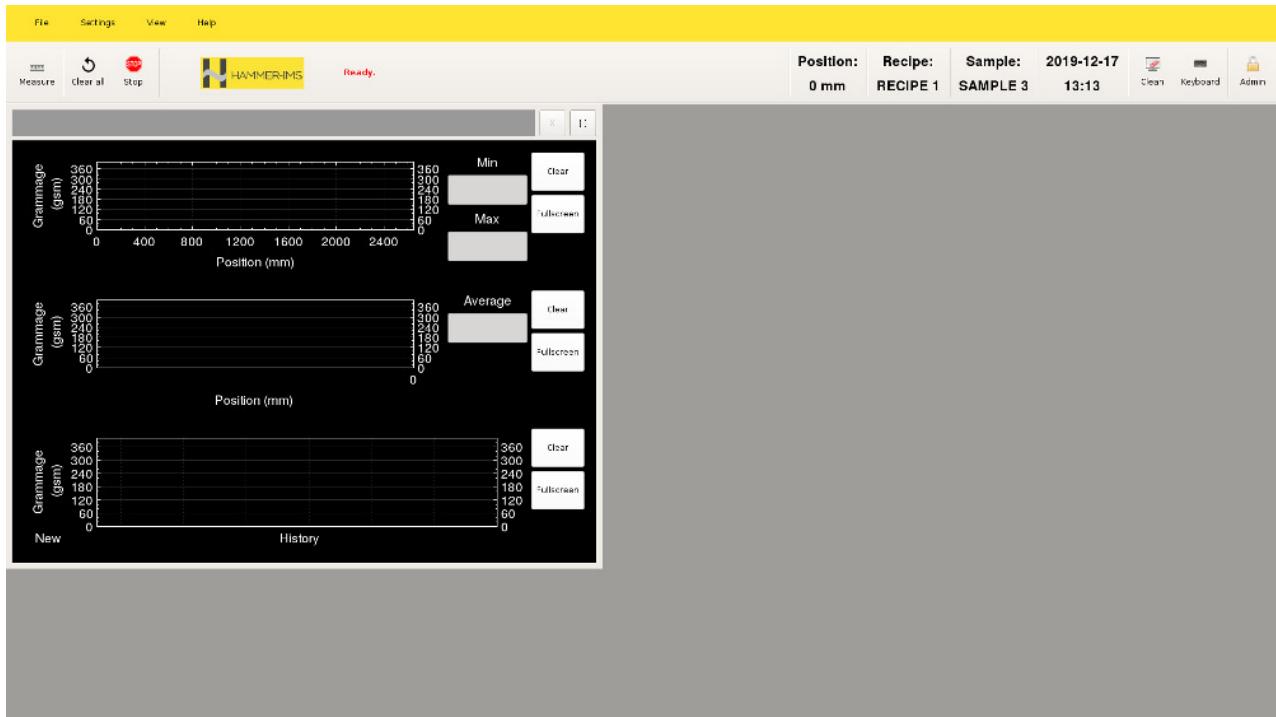
In the rare case you do want to stop the software, press *File* in the menu bar and then press *Quit*. Be aware that this will stop the software and possibly powers down the panel pc. The measurement machine will still have power and will therefore keep running. All isolator switches should be turned off to fully shut down the measurement machine as well.



8. Measurement

8.1 Main window

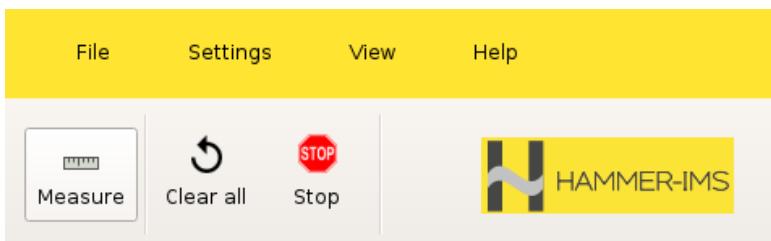
The main window of the Connectivity 3.0 software looks as follows.



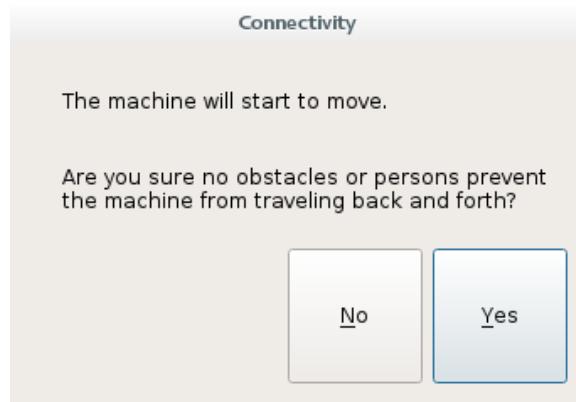
8.2 Start, pause or stop the measurement

8.2.1 Start the measurement

After the initial heat-up period of typically 20 minutes, the measurement can be started by pressing on the button *Measure*.

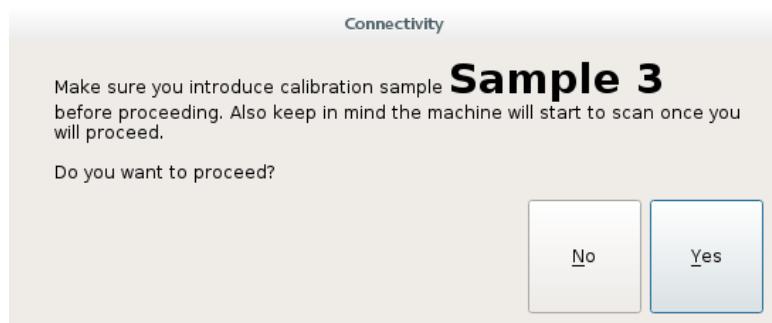


When the Marveloc-CURTAIN contains a scanner linear drive, a message follows, warning that the machine will move.



8.2.2 Sample holder

If your setup has a sample holder as add-on, it is important to have the correct calibration sample active. Therefore, the software will give a message stating which calibration sample to use.

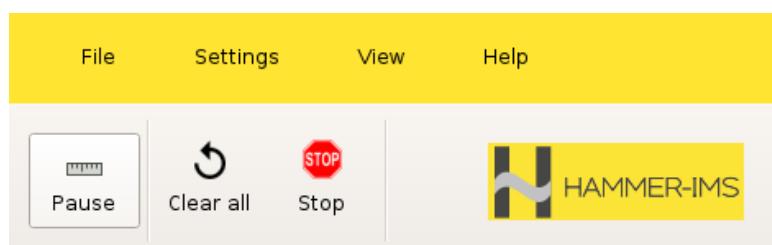


Make sure calibration samples are accurately set in the required position. When using a wrong sample, the measurement output of the Marveloc-CURTAIN will be unreliable.

When the Marveloc-CURTAIN contains a scanner linear drive, it is important that the calibration sample always remains in place. In normal operation mode, the Marveloc-CURTAIN will measure the sample every scan, performing a latent form of calibration. Therefore it is important to keep the sample in the same position during the entire production batch. Changing the sample or its position during a production batch may result in non-optimal measurements. When the Marveloc-CURTAIN does not contain a scanner linear drive, the calibration sample can be removed after calibration has finished.

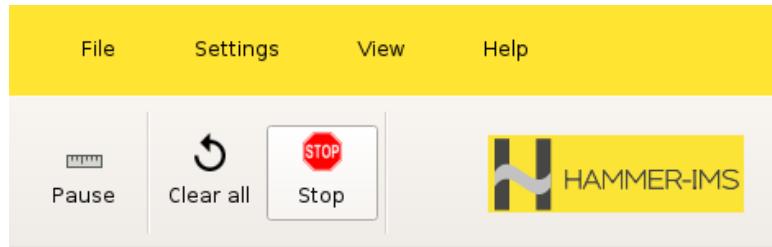
8.2.3 Pause the measurement

When measuring, the measurement can be paused by pressing on the button *Pause*. The machine will continue its current scan and the movement will stop at the end of this scan (this can either be right or left). Pausing the measurement is the recommended way to stop the movement of the machine.



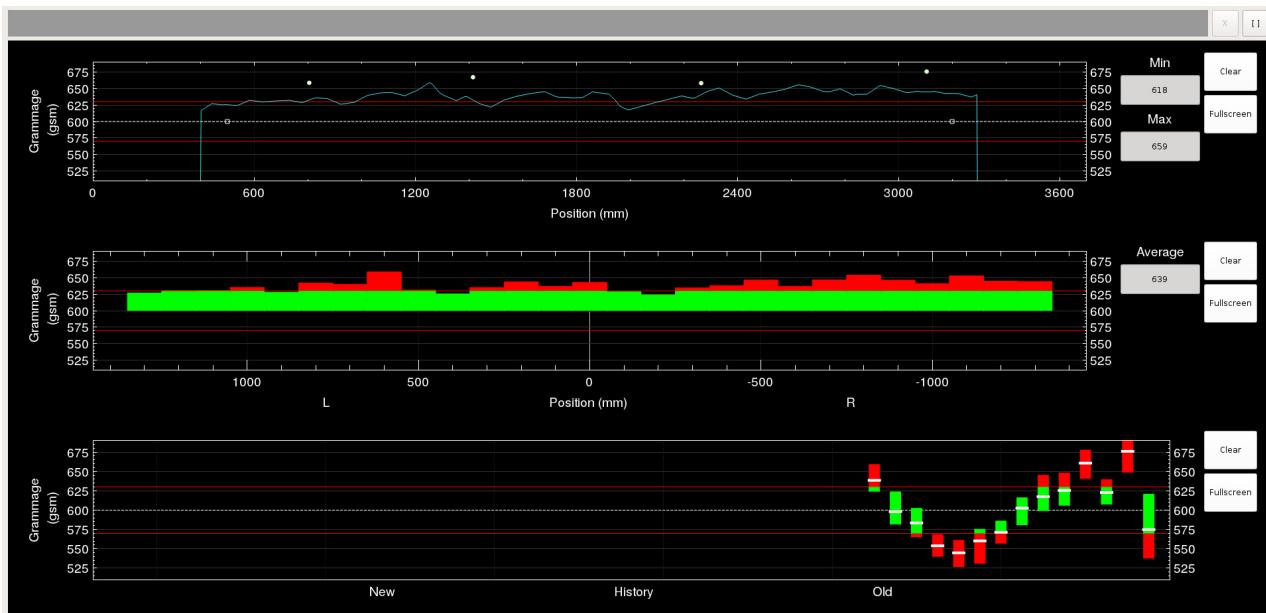
8.2.4 Stop the measurement

The measurement can be rapidly stopped by pressing on the button *Stop*. Please note that this stop button will not result in an immediate emergency stop. Emergency stop button(s) are positioned on one or both sides of the Marveloc-CURTAIN.



8.3 Display of the measurement

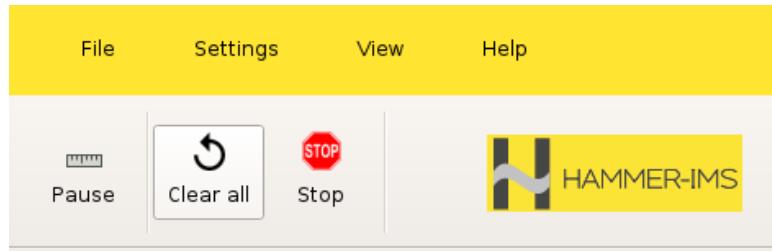
After the measurement is started, the measured basis-weight (or thickness) will be shown on the graphs in the middle of the software window. Many different graph options are available. Please note that the graphs as shown below can differ from the ones that you use in your application.



The image above shows a typical graph setup. The upper and middle graphs display the basis-weight or thickness profile in the cross-machine direction. The upper graph shows a line graph, while the middle graph divides the profile into bars. The lower graph shows the trend, displaying maximum, minimum and median values of the last scans. Red areas represent values outside the specified tolerance levels. Statistical data can also be displayed numerically, e.g. minimum, maximum, average, median, ... as shown next to the two upper graphs.

A graph can be shown fullscreen by pressing on the button *Full screen*. Press on the button *Exit* on the top right of the screen to stop showing the graph in fullscreen mode.

A graph can be cleared by pressing on the button *Clear*. All graphs can be cleared simultaneously by pressing on the button *Clear all* on top.



8.4 Tolerances

Depending on which graphs are loaded, tolerances can be set. If measured values are beyond the tolerance values, certain graph visualizations can turn red, notifying the operator. The upper and lower tolerances can be set in text inputs as shown here:



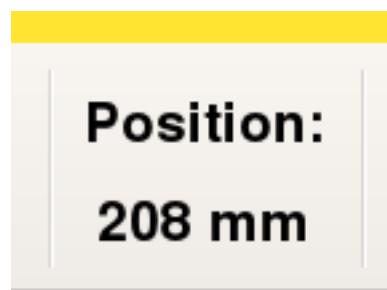
The tolerances function as follows. Say the nominal basis-weight (or thickness) of the current product is 300 and both tolerances are 50. If the measured value is below the nominal value minus the lower tolerance ($300-50=250$), the displayed number will turn red. If the measured value is above the nominal value plus the upper tolerance ($300+50=350$), the displayed number will turn red. If the measured value is within the wanted range around the nominal value, the displayed number stays green.

The tolerances can be changed by pressing on the *keyboard* icon next to the numbers. After changing the tolerances, press on the button *Apply* to apply the change.

The tolerances are independent of the recipe and will not change for a new recipe. They can only be set in this screen.

8.5 Scan position info

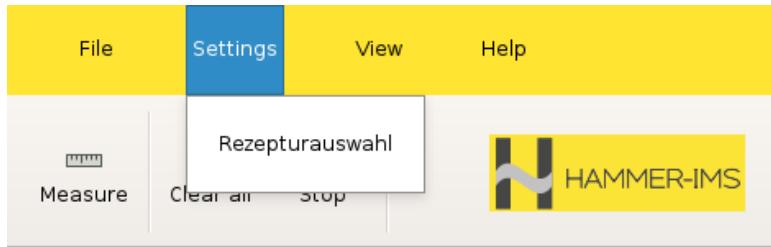
When the Marveloc-CURTAIN contains a scanner linear drive, the scan position of the machine is displayed in the top right corner of the main window. The unit of the scan position is millimeters.



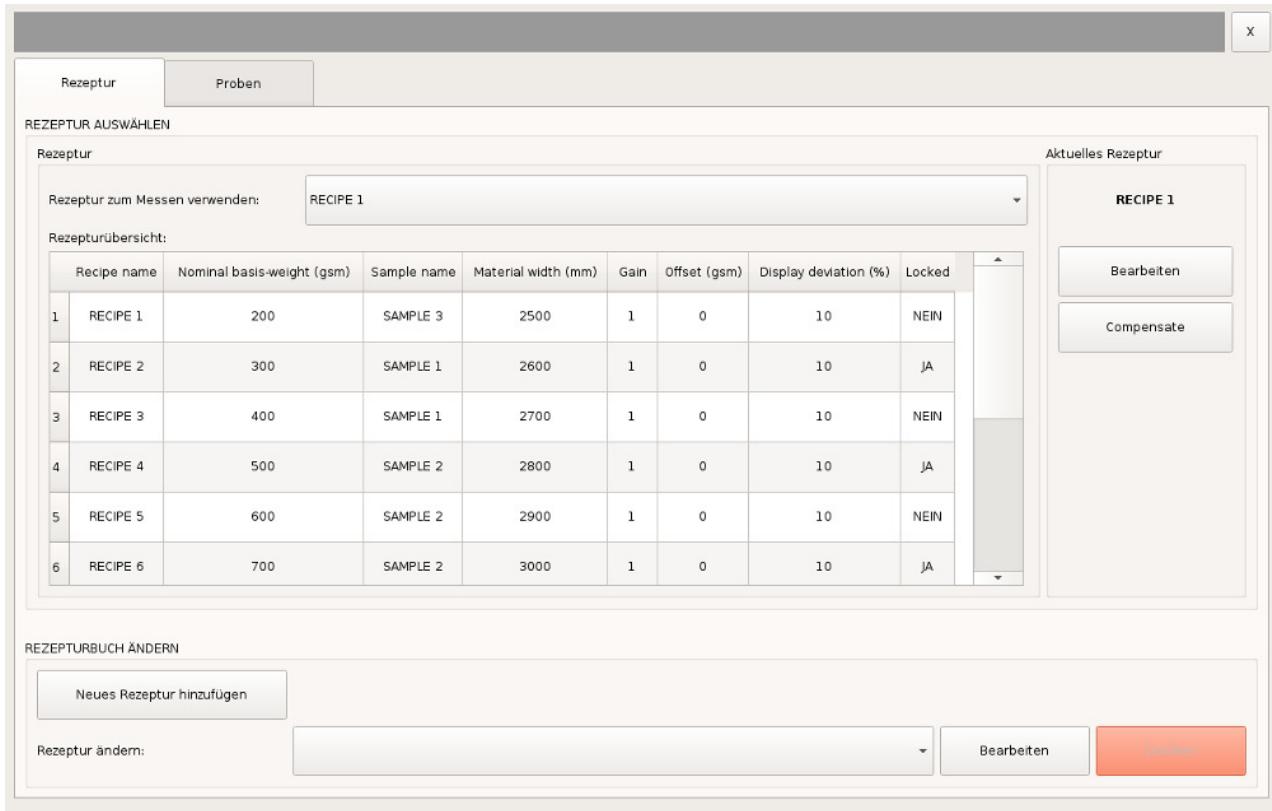
9. Recipe selection

9.1 Opening the recipe selection window

In case recipe selection is present, the recipe selection window can be opened by pressing *Settings* in the menu bar, followed by *Rezepturauswahl*.



The window looks as such:



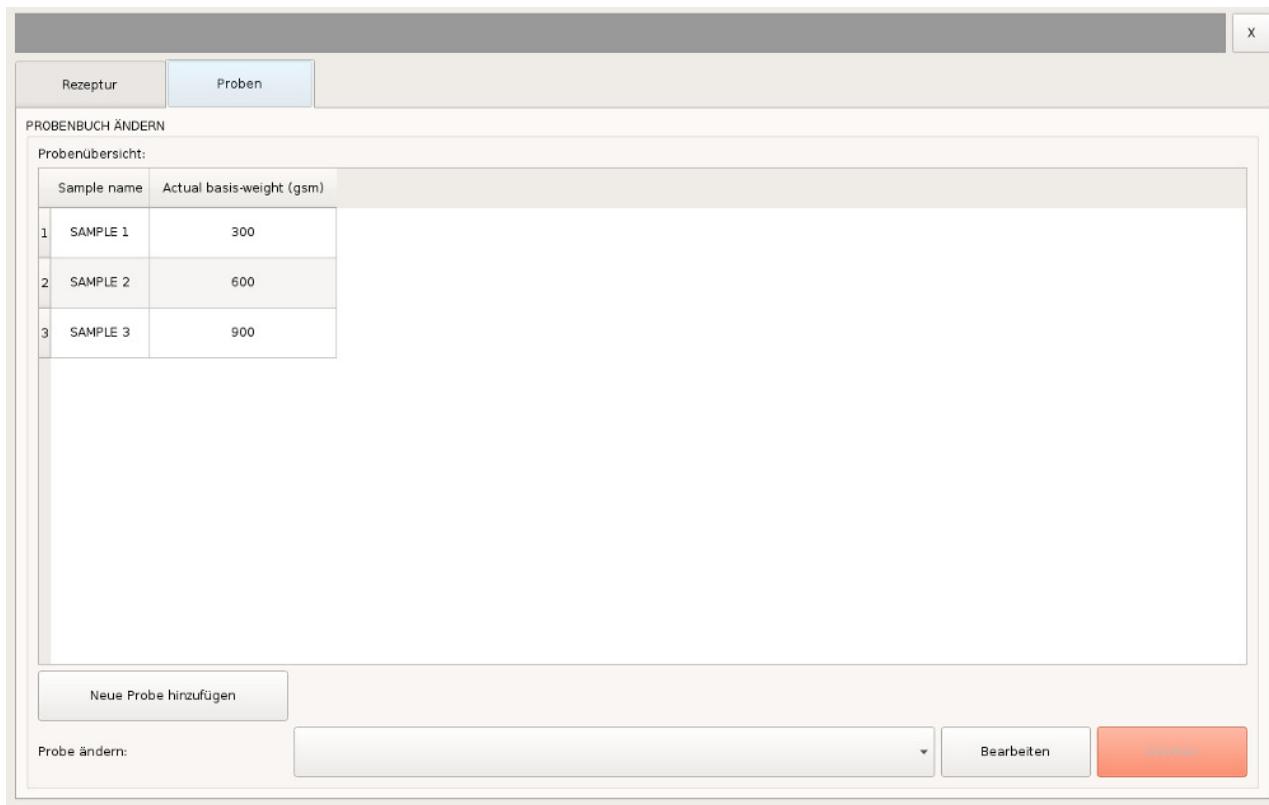
The main tab is the *Rezeptur* tab. If a sample holder is present as an add-on, there is a second tab *Proben* available.

There are two functionality groups available in the *Rezeptur* tab:

- **REZEPTUR AUSWÄHLEN:** Here, the current recipe can be selected or edited and the recipes overview table is visible. This functionality group is shown at the top of the *Rezeptur* tab. In the left part, the available recipes and their parameters are displayed and the current recipe used for production can be changed. In the right part, certain parameters of the current recipe can be edited by pressing *Bearbeiten*. Depending on your setup, more options for the current recipe are available, for example to perform compensation.

- **REZEPTURBUCH/PROBENBUCH ÄNDERN:** Here, you have full access to the recipes and the samples. This functionality group is shown at the bottom of the *Rezeptur* tab, as well as in the *Proben* tab. Recipes can be added by pressing *Neues Rezeptur hinzufügen*. A recipe selected in the drop-down menu next to *Rezeptur ändern* can be edited (*Bearbeiten* button) or removed (*Löschen* button). In case an admin mode is present in your setup, the *Löschen* button is disabled when admin mode is not activated. All parameters of the recipes can be changed here, except for the recipe name. The same options are available for samples in the *Proben* tab.

The *Proben* tab looks as such:



9.2 Display of the current recipe

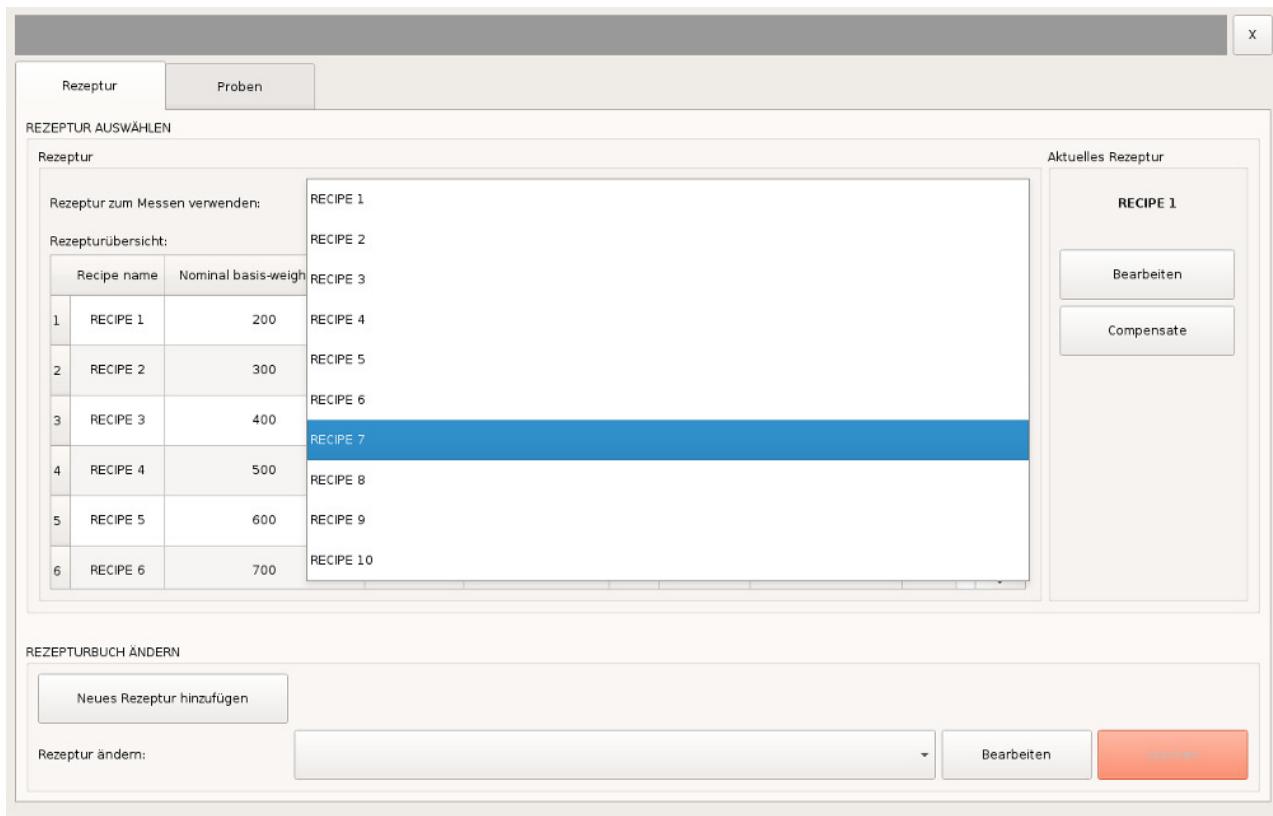
The recipe which is currently selected is shown on the top right of the screen, as for example visualized below for "RECIPE 1".



If a sample holder is present as an add-on, the current calibration sample is visible right next to the current recipe. Here, the current calibration sample is "SAMPLE 3".

9.3 Selecting another recipe

When producing another product, a different recipe can be selected in the list of available recipes by pressing right next to the text *Rezeptur zum Messen verwenden* as shown:



9.3.1 Sample holder

In case a sample holder is present as an add-on, the software will ask to use the right calibration sample whenever a new recipe is selected.

Make sure calibration samples are accurately set in the required position. When using a wrong sample, the measurement output of the Marveloc-CURTAIN will be unreliable.

When the Marveloc-CURTAIN contains a scanner linear drive, it is important that the calibration sample always remains in place. In normal operation mode, the Marveloc-CURTAIN will measure the sample every scan, performing a latent form of calibration. Therefore it is important to keep the sample in the same position during the entire production batch. Changing the sample or its position during a production batch may result in non-optimal measurements. When the Marveloc-CURTAIN does not contain a scanner linear drive, the calibration sample can be removed after calibration has finished.

9.4 Editing a recipe

The *Rezepturübersicht* table lists the available recipes and their parameters. Certain parameters of the current recipe can be altered manually by pressing on the *Bearbeiten* button at the upper right of the recipe selector window. All values are accessible to edit by pressing on the other *Bearbeiten* button(s), except for the recipe name. A pop-up window appears,

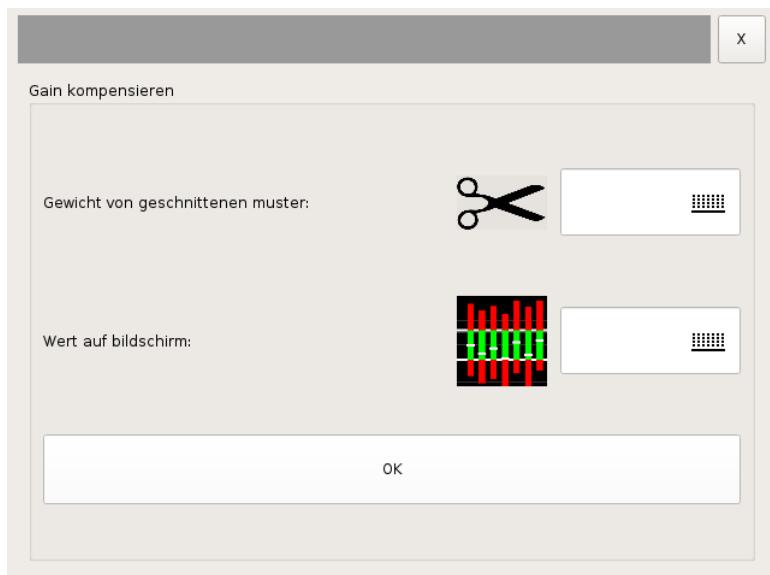
displaying all parameters of the selected recipe. Change the wanted parameters by pressing on the *keyboard* icon next to them and press *Bearbeiten*. When the Marveloc-CURTAIN contains a scanner linear drive, a change of recipe parameters will only become active after the Marveloc-CURTAIN has finished its current scan.

9.4.1 Gain or offset compensation

Gain or offset compensation is present in your software version if there is a button *Kompensieren* visible in the *Aktuelles Rezeptur* part at the upper right of the window.

Gain or offset compensation is used to define the correct gain or offset for each recipe in the recipe book. The gain or offset is determined by comparing the currently measured basis-weight or thickness value to the actual known value.

When pressing on the *Kompensieren* button, the following window appears:



Enter the correct values in the window:

- Gewicht von geschnittenen muster: this is the known basis-weight or thickness value that the production line is currently producing. Note that it should not be the theoretical, wanted value. It is the real, currently produced value. This can for example be determined by taking a sample from the production line.
- Wert auf bildschirm: this is the basis-weight or thickness value that the measurement machine is currently displaying. Make sure your production line is producing stable results when performing compensation. Determine the mean value currently measured by the machine by reading it out from the displayed graphs.

Press *OK*. The window closes and the gain or offset is automatically recalculated.

9.5 Editing a sample

The *Probenübersicht* table lists the available samples and their parameters. All values can be altered by pressing on the *Bearbeiten* button. A pop-up window appears, displaying all parameters of the selected sample. Change the wanted parameters by pressing on the *keyboard* icon next to them and press *Bearbeiten*. When the Marveloc-CURTAIN contains a scanner linear drive, a change of recipe parameters will only become active after the Marveloc-CURTAIN has finished its current scan.

9.6 Searching for a recipe

In case you are using a significant amount of recipes, the recipe search functionality can be enabled. A third functionality group, called *SUCHE NACH REZEPTUR*, is then present at the bottom of the recipe selector window.



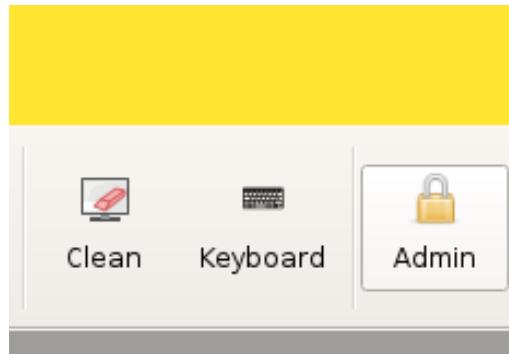
You can start typing in part of a recipe name in the field at the left, and the possible recipes will then be listed in the list right next to it. Select the recipe you want by clicking on it in the list, and then choose the wanted functionality: use this recipe for measuring, edit this recipe or remove this recipe.

10. Admin mode

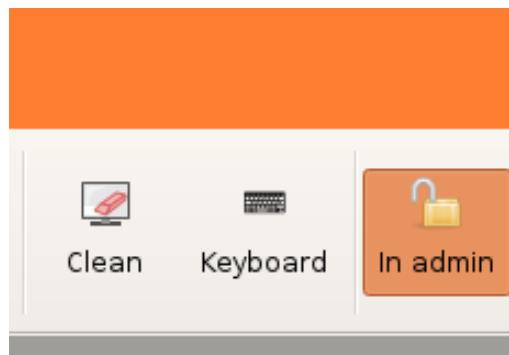
Admin mode is an optional feature to lock certain functionality within the software. The locked functionality can only be unlocked by activating admin mode. For example, the *Löschen* button to remove recipes or samples inside the recipe selector is disabled when not in admin mode.

10.1 Activating admin mode

The admin mode can be activated by pressing on the *Admin* button at the top right of the screen.

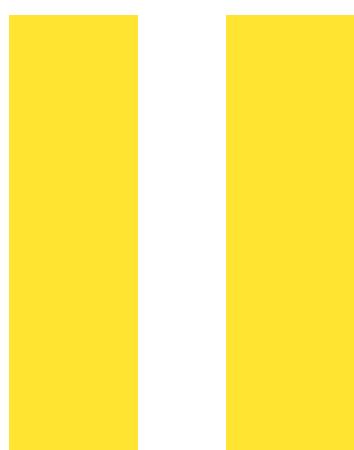


A new window opens where a password has to be entered. If the password is correct, the admin mode is enabled. This is visualized by highlighting the orange-colored *In admin* button, as well as by the orange-colored menu bar.



10.2 Deactivating admin mode

The admin mode can be deactivated by pressing again on the *In admin* button. The orange colors from both the button and the menu bar then disappear.

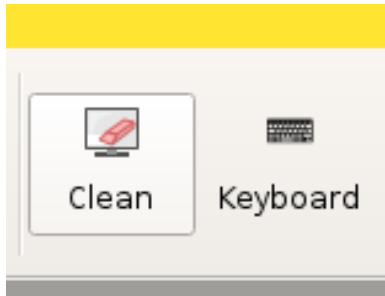


11. Explanation of other functionality

11.1 Buttons

11.1.1 Cleaning the display

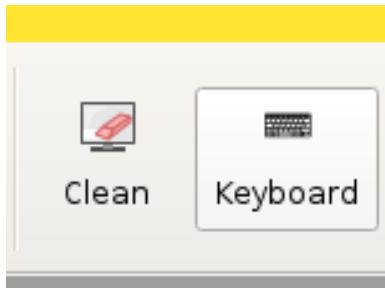
It is possible to disable the touch screen so that the display may be cleaned by pressing on the button *Clean* on the right of the screen.



The touch screen will be fully disabled for a limited amount of time.

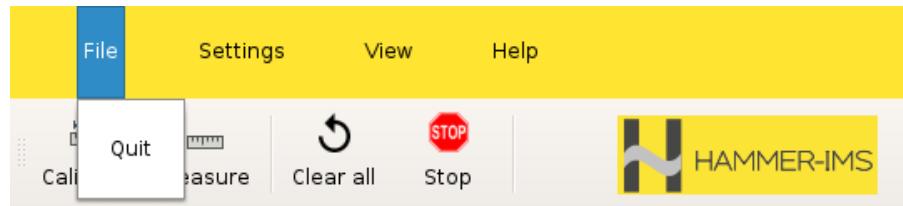
11.1.2 Showing the keyboard

The keyboard will be shown when pressing the button *Keyboard* on the right of the screen.



11.2 Menu bar

11.2.1 File

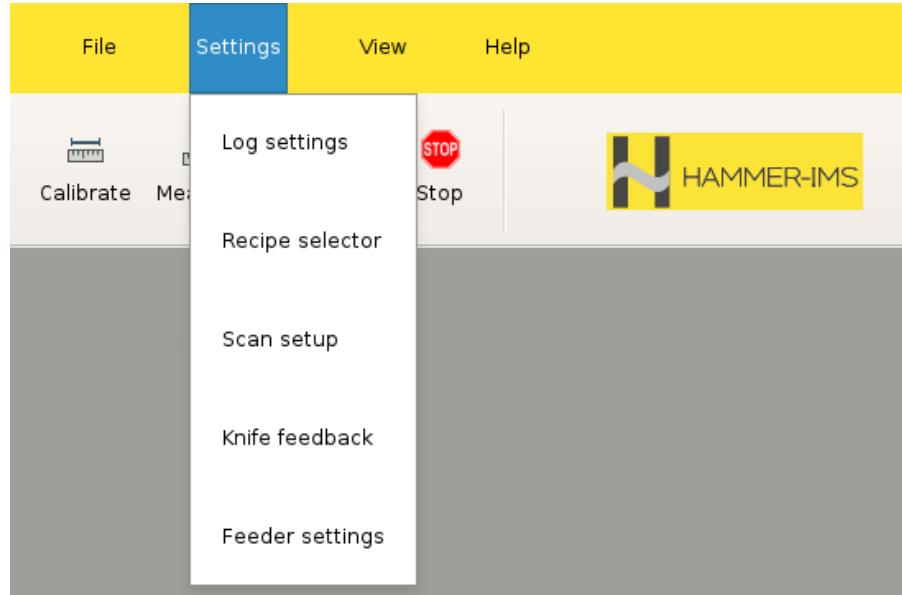


The following items can be selected in the menu bar option *File*:

- **Quit**

Stops the software and possibly powers down the panel pc, but not the measurement machine, as explained in chapter 7.

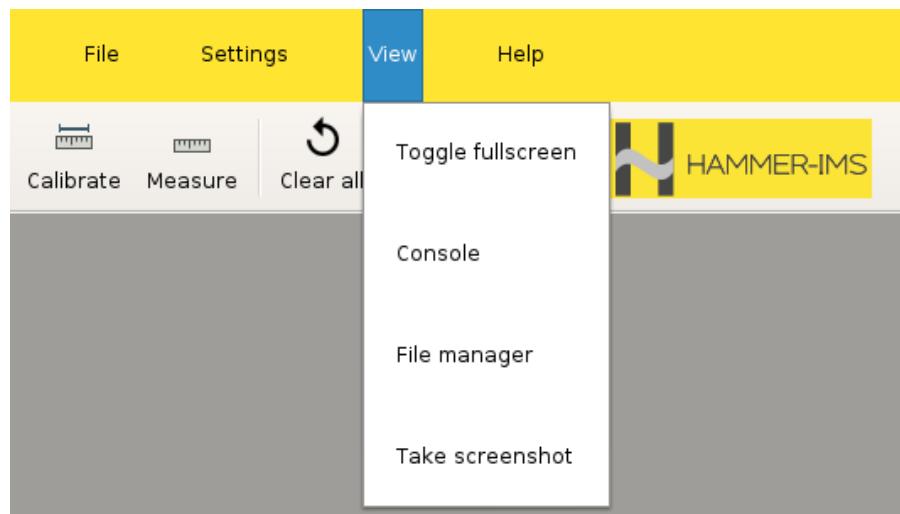
11.2.2 Settings



The following items can be selected in the menu bar option *Settings*. Note that depending on your configuration of the Connectivity 3.0 software, the available options may differ.

- Log settings
Opens the log settings window in case log settings are present.
- Recipe selector *Rezepturauswahl*
Opens the recipe selection window in case recipe selection is present.
- Scan setup
Opens the scan setup window in case scan setup is present.
- Knife feedback
Opens the knife feedback settings in case a knife feedback loop is present as an add-on.
- Extrusion feedback
Opens the extrusion feedback settings in case an extrusion feedback loop is present as an add-on.
- Feeder settings
Opens the feeder settings in case a feeder mechanism is available as an add-on.
- Change time
Opens the dialog to change the date and time of the system. Only visible in admin mode.

11.2.3 View



The following items can be selected in the menu bar option *View*. Note that depending on your configuration of the Connectivity 3.0 software, the available options may differ.

- Toggle fullscreen

Visualizes the software in normal or fullscreen mode.

- Console

Opens the console window. This window shows all messages that have been displayed on the main screen during this software session.

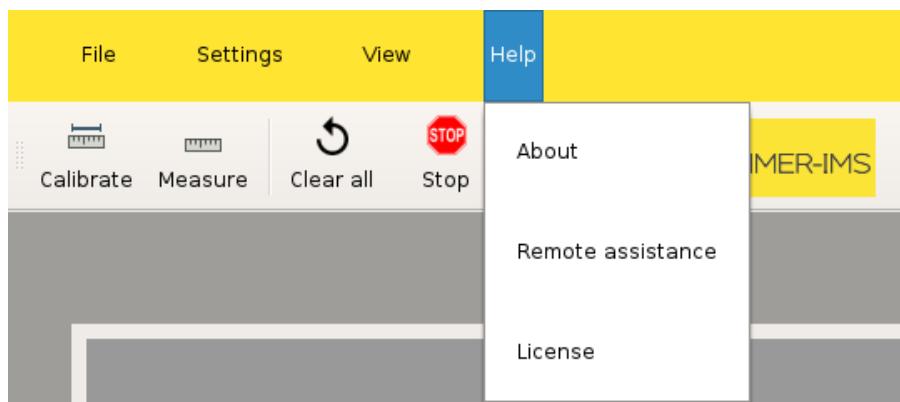
- File manager

Opens the file manager of the operating system in case this option is available. The file manager can be used to manage for example log files or screenshots.

- Take screenshot

Takes a screenshot of the current screen. This screenshot is saved with a timestamp in the folder *Pictures*. This folder can be accessed through the file manager.

11.2.4 Help



The following items can be selected in the menu bar option *Help*:

- About

Opens the about window.

- Remote assistance

Opens the current remote assistance window. This remote assistance connection allows Hammer-IMS to perform software updates and to offer support and maintenance.

- License

Opens the license window, which provides more information about software licensing.

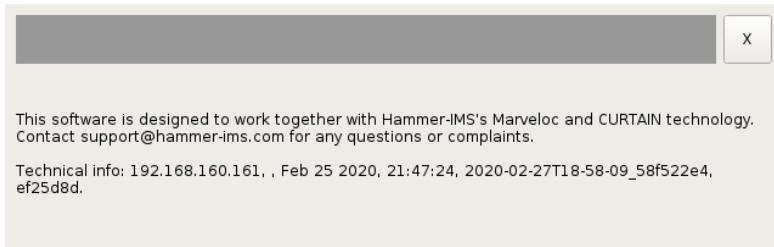
11.3 Obtaining measurement data

There are two main methods to get measurement data from the HMI for offline validation.

11.3.1 Through an FTP link

In some cases the HMI contains a running FTP server, which allows the user to obtain measurement data directly from the HMI from within a corporate network. In order to connect

to this FTP server you will have to find out the IP address of the HMI in the corporate network. Press *Help* and then *About* to find out the IP address.



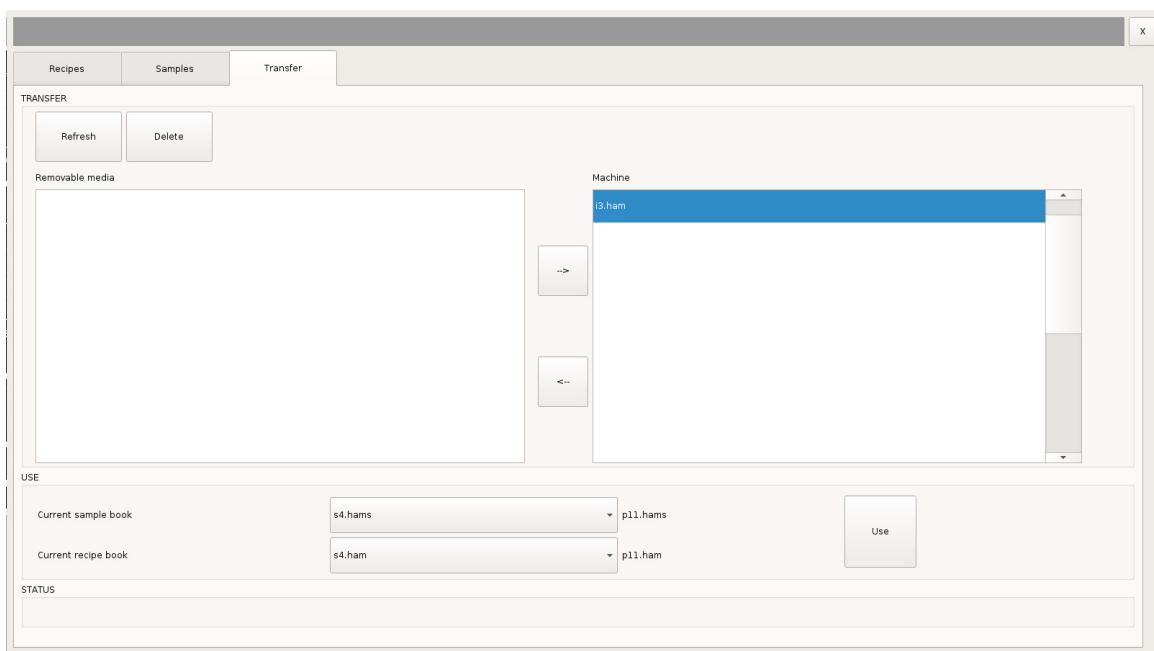
The IP address is listed under *Technical info*. Note that the IP address 192.168.0.1 is an internal IP address and is not the one you will typically need. You can connect using any commercially available FTP client. The login credentials are: username 'hammer' and password 'hammer123'. You will now see the directories in which the measurement results have been stored. Make sure you manage the disk space of the system by periodically deleting log files in this directory. Typically, measurement systems can generate up to 1 GB of measurement data per day and the available disk space is 10 GB. When the disk is full, data will no longer be stored. Furthermore, when having deleted measurement files you will have to restart the measurement system before logging is active again.

11.3.2 Through an industrial Profinet link

Hammer-IMS can provide output over a Profinet link. Note that information regarding this is project-specific and not part of this technical manual.

11.4 Recipe file backup and loading

Hammer-IMS can provide the option to backup recipe data files (referred to as recipe books or .ham-files) and optionally sample data files (referred to as sample books or .hams-files) to an external USB device. Furthermore, this option also enables you to load recipe and sample books from the external USB device onto the Marveloc-CURTAIN machine. When this option is enabled, you will see an additional tab in the recipe selector, labeled as *Transfer*. The window looks as depicted next.



Note that only FAT32-formatted USB devices are supported. Therefore it is incompatible with USB devices having a total size of more than 32 GB.

You will be able to interact with this tab only if the measuring system is paused.

The contents of any available removable media are shown in the left part of the *TRANSFER* functionality group at the top of the window. Press the *Refresh* button when having inserted a USB device. The right side represents the contents of the recipe and sample book directory on the Marveloc-CURTAIN machine. You can transfer recipe book files (.ham-files) and sample book files (.hams-files) from left to right and vice versa. The dialog does not allow you to overwrite any existing files. Instead, the file name will be modified so that it will be unique after the transfer. Deletion of recipe book files and sample book files (through the *Delete* button) is only allowed if the corresponding file is currently not in use by the system.

Note that the left and right file browsers only display .ham-files and .hams-files. Any other files present in both folders will not be shown.

To define which of the available recipe and sample book files are in use, look at the *USE* functionality group in the middle. Press the *Use* button once you have selected a valid pair of books.

Check the *STATUS* functionality group at the bottom of the window for status messages, errors or warnings.

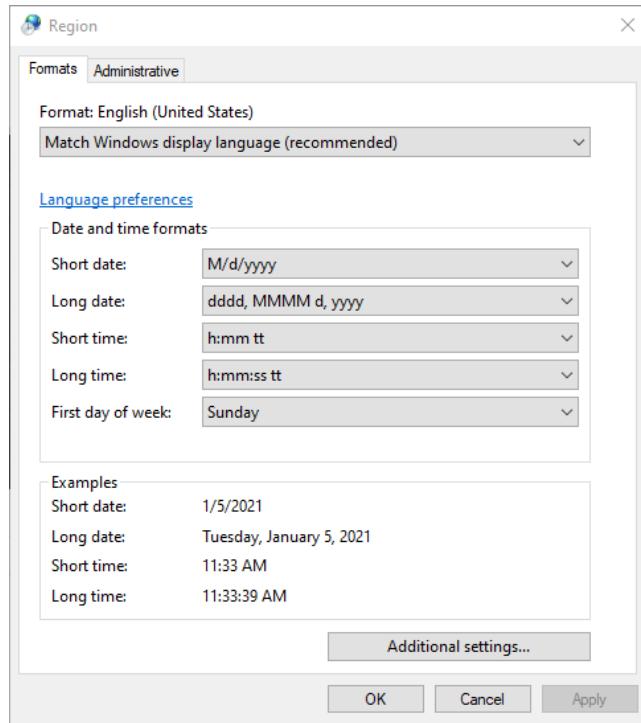
11.4.1 Using Microsoft Excel to edit/add recipes

Since you can import and export recipe books and sample books to and from the machine you can use a personal computer to edit recipes or add new recipes. Before being able to do so, you will first have to set up the environment on your Windows computer. The following screenshots were taken from a Windows 10 operating system and from the 2020 version of Microsoft Excel 365 to help you setting up the environment.

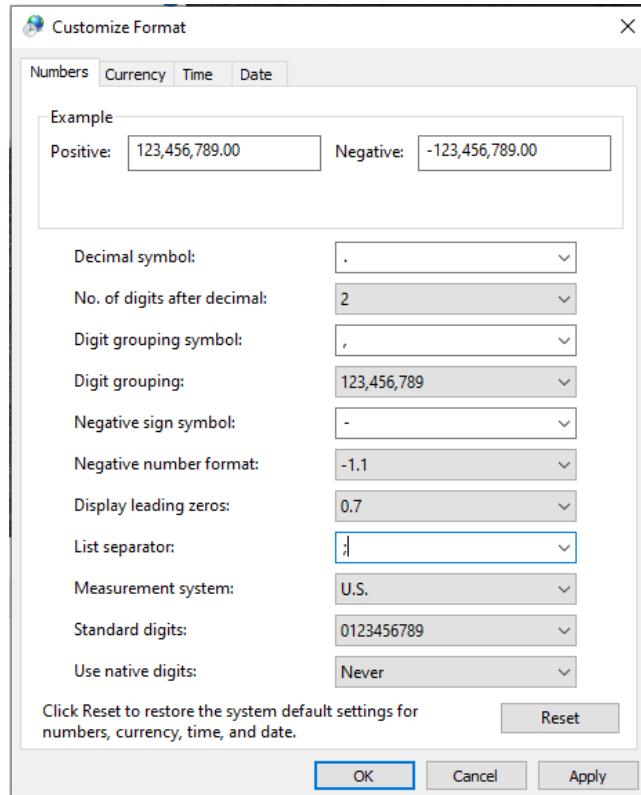
Setting up the environment

It is very important to prepare your personal computer for dealing with the .ham and .hams file types. Not doing so, the Marveloc-CURTAIN system could fail to load the files or could come to an unknown state.

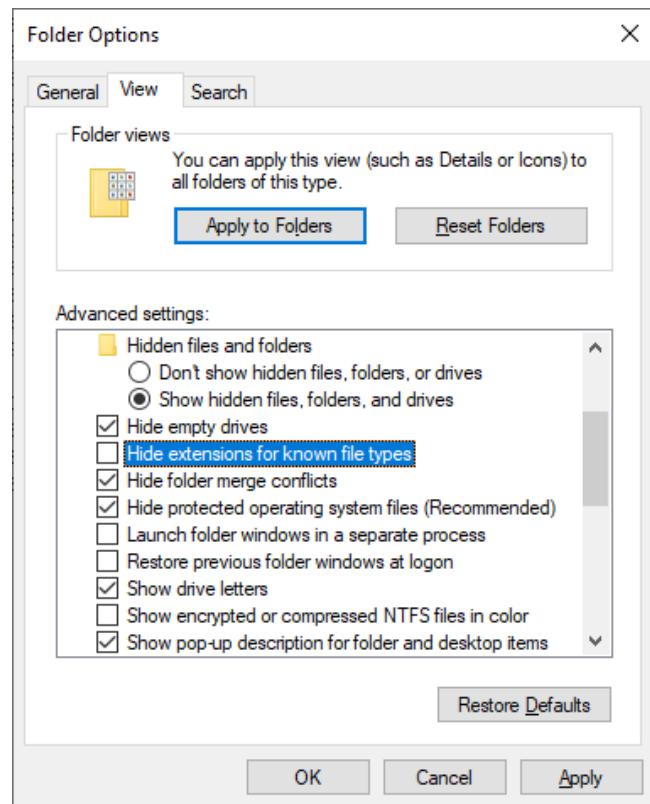
Go to the Region settings window of your Windows installation. You will find this in the Windows Control Panel under *Region*.



Click *Additional settings...*. Make sure to adopt the settings as shown below, especially paying attention to the *Digit grouping symbol* and *List separator* (;) value.



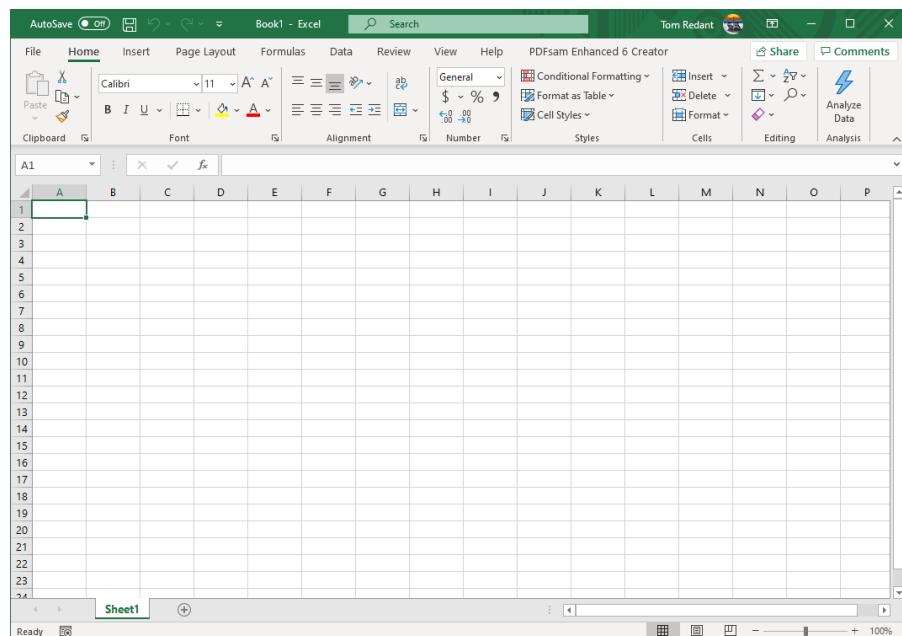
Next, open a file browser in Windows. Click on *View*, next *Folder options*. On the *View* tab, make sure to uncheck *Hide extensions for known file types*.



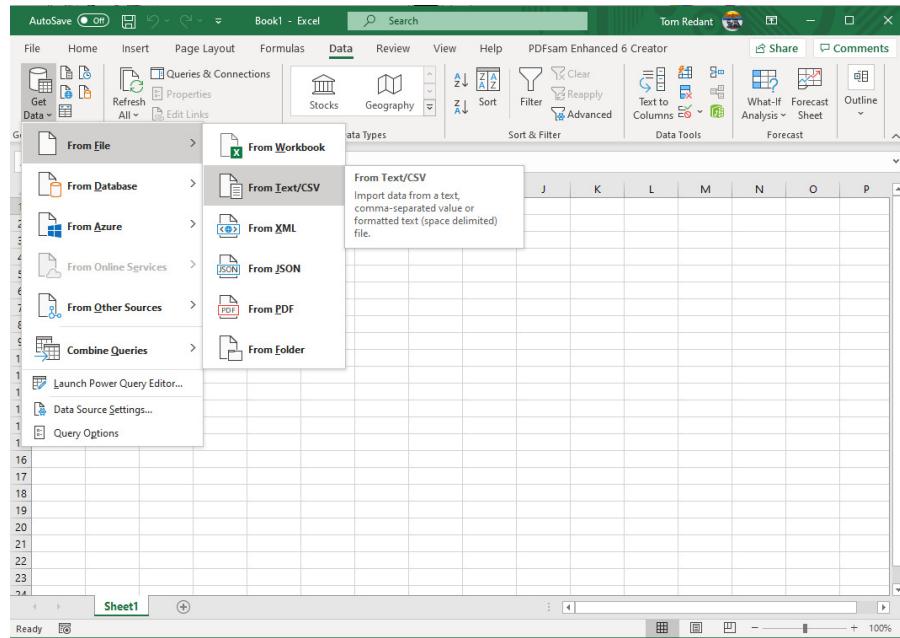
Click **OK**. Your computer is now ready to handle the .ham and .hams files.

Editing the book files

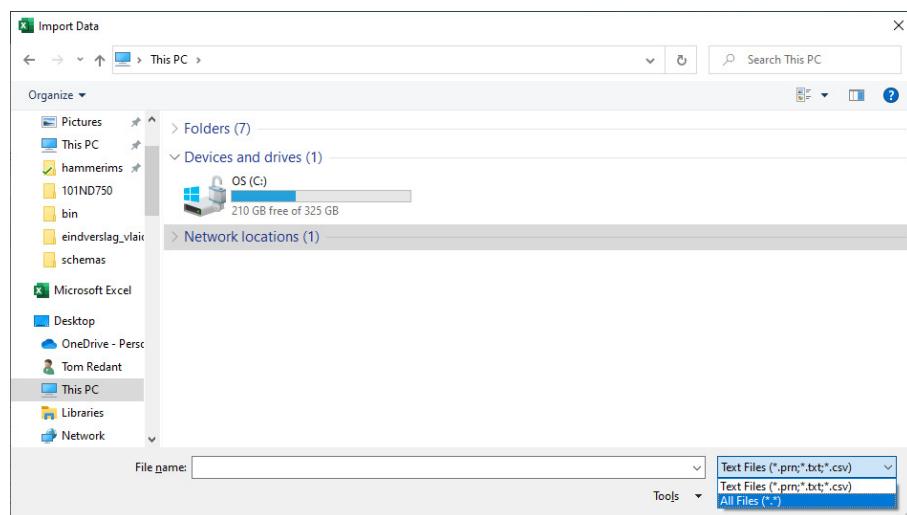
Insert the USB device containing the files into the computer. Next, open Microsoft Excel.



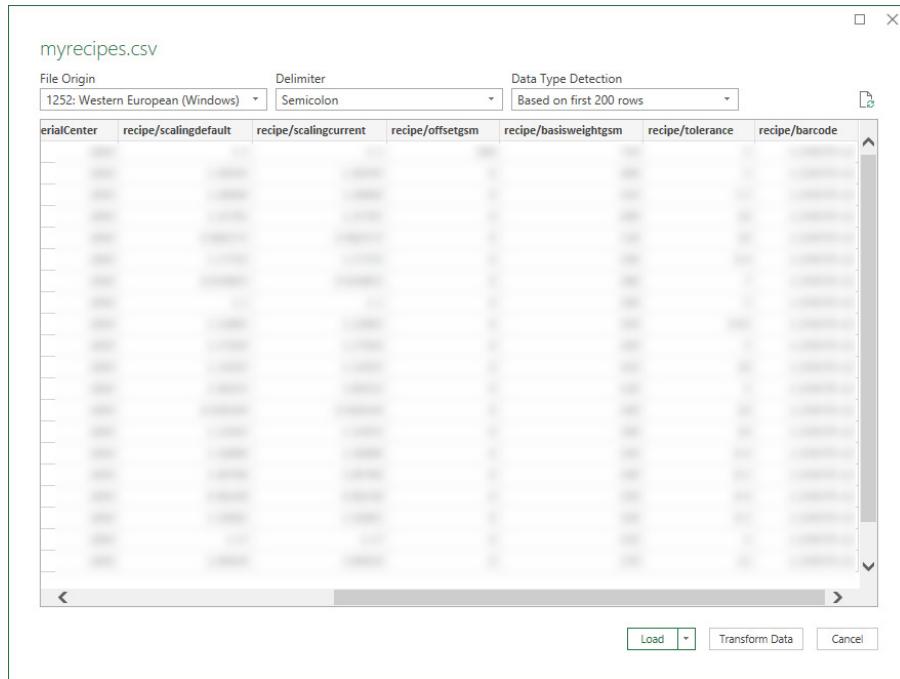
Go the *Data* tab. Click *Get data*, then *From file*, then *From Text/CSV*.



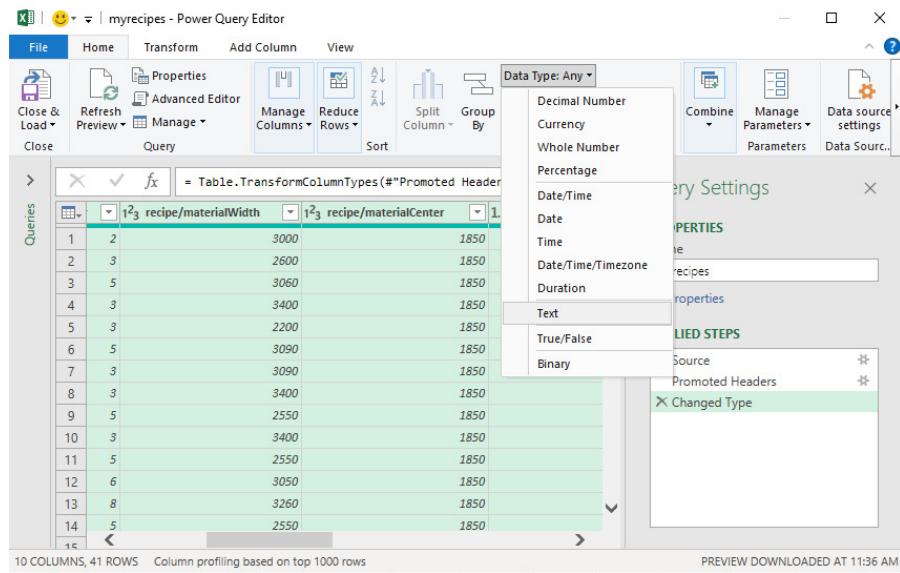
Make sure to list all file types.



Go to the USB device and double click the .ham or .hams-file of your interest. You will now see the following screen.

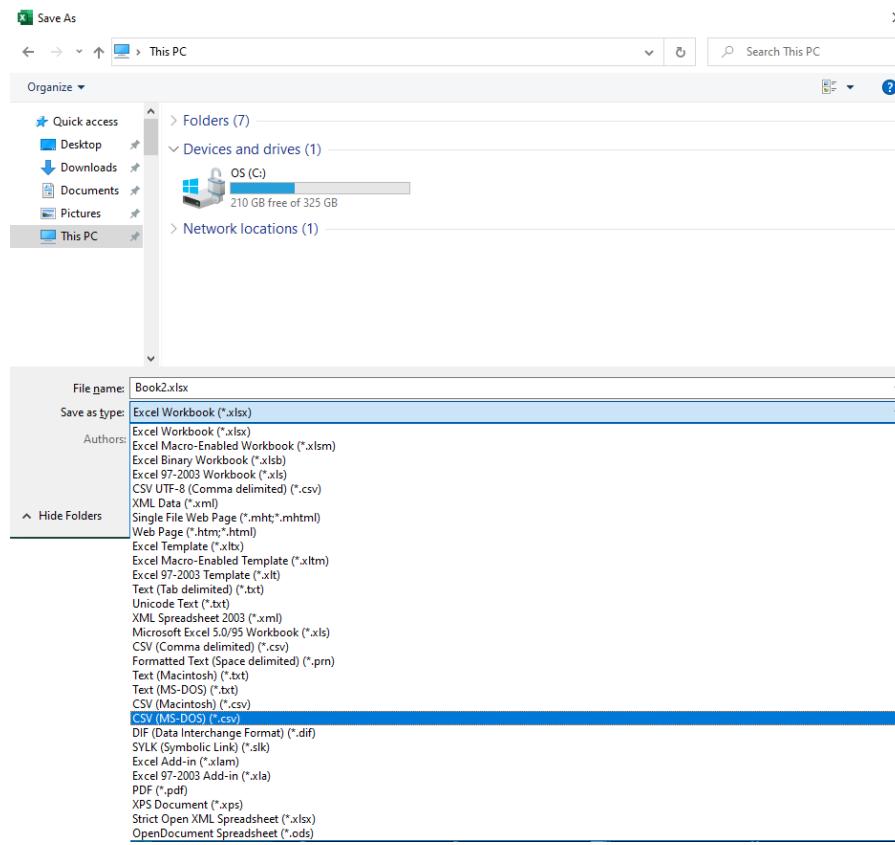


Make sure all data types for all columns are set to *Text*. In the latest versions of Microsoft Excel, you are able to do this by selecting all columns at once. In some older versions you will have to do this one by one.

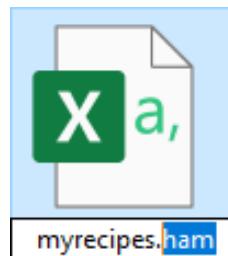


Click *Close & load* in the upper left corner of the window. You will now be able to edit the recipes and add new ones. Make sure never to modify the contents of the first line in the file, since this would corrupt the recipe book or sample book.

After having added/edited your file, you will have to save it again on the USB device. It is important to save this as *CSV (MS-DOS)* file. Make sure to use a unique name. Furthermore, you will have to save this in the root of the USB device (meaning, not in any new or existing folder on the USB device).



Last, go to the USB device by means of the Windows file browser and rename the extension of the file to either .ham or .hams, replacing the .csv-extension.



The book file(s) can now be uploaded to your Marveloc-CURTAIN.

C

Safety

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12. General safety prescriptions

Read and comply with the following safety instructions before attempting to operate one of the products as part of the Marveloc-CURTAIN product family.

The warranty will expire if damage is incurred resulting from non-compliance with the safety instructions. Hammer-IMS does not assume any liability for consequential damage.

12.1 Warnings

12.1.1 General warnings and environmental hazards

- For indoor industrial use only.
- Do not install this system in a moist or wet location. Do not expose this system to rain or moisture.
- Do not use any spray or liquids on the system.
- Ensure proper ventilation, so that air flows freely around the system.
- The installation always needs to be firmly anchored to make sure it can not fall over.

12.1.2 Electrical hazards

- To avoid hazards due to electrostatic phenomena, the product must be properly grounded. Therefore, the power supply cables and sockets supplying power to the measurement system and any pc systems need to provide a proper ground connection.
- Disconnect power before servicing by switching off all present isolator switches.
- All electrical cabinets must be locked at all times with the supplied key to avoid contact with live parts. Electrical cabinets are only accessible by authorized personnel of Hammer-IMS.
- Do not open either the CURTAIN or the pc as it imposes risk for electrocution.
- Do not interact with the system during electrical storms.

12.1.3 Mechanical hazards

It is strictly forbidden to open or disassemble the outer shell of the CURTAIN since this increases mechanical hazards.

The following mechanical hazards are present when the system is in normal operation or in idle position:

- There exists a risk of trapping or crushing between the moving parts of the machine and the environment. It is important to foresee enough clearance around the CURTAIN such that walls, furniture or other objects do not allow this trapping or crushing to happen.
- There is a risk that the CURTAIN machine hits someone during its movement or that someone gets grasped by rotating or moving parts of the axis, spindle or belt system. You are advised not to approach the machine too closely.
- There is a risk that the CURTAIN will fall over when leaning against the sides of the CURTAIN. Do not lean against the CURTAIN since this might degrade or tear off the rubber joints connecting the upper and lower part of the CURTAIN.
- There is a risk of trapping when someone puts his/her foot in the scanner mechanics. You are advised not to approach the machine too closely.
- There exists a hazard due to rotating elements inside the CURTAIN. Do not put your hands or any other part of your body inside the CURTAIN.

- There exists a risk of being struck by moving parts inside the CURTAIN. Do not put your hands or any other part of your body inside the CURTAIN.
- There exists a risk of trapping or crushing by moving parts inside the CURTAIN. Do not put your hands or any other part of your body inside the CURTAIN.
- Sharp edges are present inside the CURTAIN. Wearing safety gloves is recommended.

12.1.4 Thermal hazards

- Do not touch the measurement machine because the surface may be hot.
- Allow the system to cool down before servicing.

12.2 Caution

- Never open each of the devices as part of the product package. These devices may only be opened by authorized specialist staff.
- Adjustments, replacement of parts, maintenance and repair may be performed only by authorized personnel of Hammer-IMS.
- Any significant mechanical impact on the measurement machine will affect the measurement. This will result in having to re-tune the recipe in case recipe selection is present.
- Use the system in a clean and dust-free environment.
- Do not expose the system to temperatures higher than 45 degrees Celsius for a time period longer than 15 minutes.
- Do not expose the system to temperatures lower than 5 degrees Celsius for a time period longer than 15 minutes.
- Do not expose the system to lit candles, cigarettes, open flames, etc.
- Only connect cables in the specific configuration as indicated in this manual.
- Cables should not be exposed to mechanical stresses, strains or cyclic loading.
- Cables' radiiuses of curvature should not be below 10 centimeters.

12.3 Explanation of symbols

The following safety labels or informative symbols are used on the products to warn against risks and dangers:

Symbol	Explanation
	General danger location, observe product documentation
	Danger, do not touch. Access to electrical cabinet is only allowed for educated staff authorized by Hammer-IMS.
	Danger for being caught by moving parts of the machine.
	Annotates the location for attaching a crane hook.
	Hazard due to rotating elements inside
	Do not walk under hanging load
	Hazard due to live parts, risk of electric shocks

Symbol	Explanation
	Object can slide or fall, danger of crushing
	Sharp object, danger of cuts
	Object or surface may be hot
	Indication of grounding terminal location

12.4 Stopping the machine

The Connectivity 3.0 software suite of Hammer-IMS operates the machine during normal functionality. When facing situations of danger, some parts of the machine can be shut down in order to bring the machine in a safe condition.

12.4.1 Soft stop



A soft stop of the CURTAIN machine can be achieved by pressing the STOP button in the software. This action stops all moving parts of the machine, if any present, directly from the software.

12.4.2 Emergency stop



When moving parts are visibly present, emergency stop buttons are available to limit or prevent pending or occurring dangers for humans, environment, the machine and tools. In case of an O-frame, two emergency stop buttons are available on both sides of the machine. In case of a C-frame, at least one emergency stop button is available at the accessible side of the frame.

When pressing any emergency stop button, energy is instantaneously removed from the scanning system, resulting in an instantaneous stop of the movement of the scanner.

The state of emergency can be cleared as follows:

1. Unset the emergency stop button by either pulling the button or pulling the button and slightly rotating it at the same time. The button will release. The machine will not start to move when performing this operation.
2. A triggered state of emergency implies that the Connectivity 3.0 software needs to be restarted. Depending on the presence of a panel pc or a desktop pc this is as follows:
 - In case the software runs on a panel pc: switch off the isolator switch of the panel pc. Wait for 30 seconds to re-enable the isolator switch. The system will reboot after which normal operation can occur.
 - In case the software runs on a desktop pc: shut down the software if it is still active. Restart the software by selecting the shortcut from the operating system's application menu. The software will reboot after which normal operation can occur.

Test correct functionality of the emergency stop button(s) before the first use of the machine. Testing correct functionality of all emergency stop buttons should happen at least once a

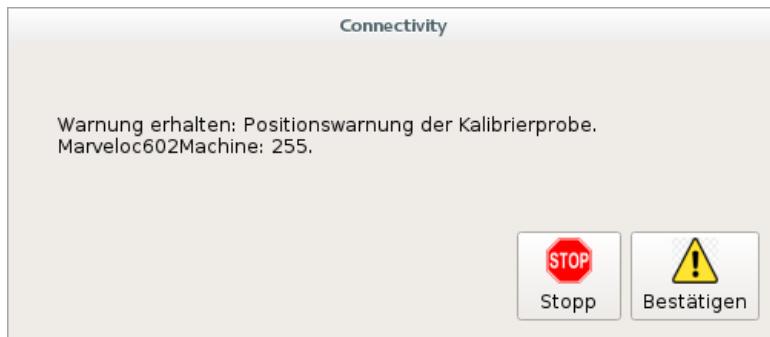
year.

The emergency stop buttons only work for the CURTAIN system. They do not have any effect on any other machines or components of the production line in which CURTAIN systems are typically installed.

12.5 Errors and warnings in the software

The software will alert the operator when certain issues occur. Issues are divided into warnings and errors. Warnings are non-critical issues that the operator is made aware of. Errors are critical issues that interfere with the correct operation of the measurement machine.

An example of a warning message is shown in the figure below. The operator must acknowledge having read this message by pressing on the button *Bestätigen*.



An example of an error message is shown in the figure below. This message alerts the operator which error occurred. The software must be shut down after receipt of an error to allow finding the cause and solving it. This happens automatically when pressing on the button *Beenden*.



The *Stopp* button in both message types only serves as a soft stop button in case the movement of the machine should be stopped. Please note that this stop button will not result in an immediate emergency stop. Emergency stop button(s) are positioned on one or both sides of the Marveloc-CURTAIN.

12.6 Energy interruption

Interruption of the energy or a significant variation of the energy supply will result in an immediate stop of the measurement system. After an energy interruption, the machine can be put back into its normal working conditions by restarting the Connectivity 3.0 software.

D

Maintenance

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13. Maintenance

13.1 Caution

The product may only be opened by authorized, specially trained personnel. All electrical cabinets must be locked at all times with the supplied key. Electrical cabinets are only accessible by educated staff authorized by Hammer-IMS. Any other parts of the product package are accessible only by authorized personnel of Hammer-IMS.

13.2 Maintenance procedure

Before any work is performed on the product, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock. Therefore, switch off all present isolator switch(es). The pictures below show two different variants of isolator switches which are typically used by Hammer-IMS.



Allow the system to cool down before servicing.
Wearing safety gloves is recommended.

13.3 Scanner linear drive

Lubrication depends on the setup of the Marveloc-CURTAIN and is only necessary when the Marveloc-CURTAIN contains a scanner linear drive. In any case, disregarding the time intervals as specified below, should the linear drive produce unusual noises in the form of squeaking or grinding, always perform the lubrication steps described below.

13.3.1 Spindle-based linear drive

In case the Marveloc-CURTAIN comes with a spindle-based linear drive, proper and frequent lubrication of the parts is required.

Hammer-IMS recommends the following type of lubricants:

- Mineral oil based
- Grease suitable for lubrication of rolling bearings
- Quality K2K according to DIN51825

The time periods mentioned below assume the production line is running 24/7. If this is not the case, time periods can be extended proportionally to the down time of the production line, with a minimum of one lubrication per year.

Option 1

In case the Marveloc-CURTAIN comes with the following linear drive with the spindle located in the center and the spindle visible:



- The ball screw needs a re-lubrication once a month. Apply a quantity of 2 cm³ of lubricant to the grease nipple, located on the ball screw housing.
- The guides or rails need re-lubrication once every two months. Apply a quantity of 0.7 cm³ of lubricant to each grease nipple. It is strongly discouraged to apply any spray on the rails themselves.

Option 2

In case the Marveloc-CURTAIN comes with the following linear drive with the spindle located at the side, protected by a bellow:



- The ball screw needs a light re-lubrication once a week through the grease nipple shown on the right.
- The guides or rails need re-lubrication once every two months. Apply a quantity of 0.7 cm³ of lubricant to each grease nipple. It is strongly discouraged to apply any spray on the rails themselves.

Option 3

In case the Marveloc-CURTAIN comes with the following linear drive with the spindle located at the side, protected inside an enclosure:



- The ball screw needs a re-lubrication once every 20 days. Apply a quantity of 4 cm³ of lubricant to the grease nipple on the carriage, as shown on the right.
- The two guide rods of the linear actuator should remain clean. If this cannot be guaranteed, e.g. in case of a dusty or harsh environment, lubricate the guide rods once every 20 days using a teflon-based spray.
- The guides or rails need re-lubrication once every two years. Apply a quantity of 0.7 cm³ of lubricant to each grease nipple. It is strongly discouraged to apply any spray on the rails themselves.

13.3.2 Belt-based linear drive

In case the Marveloc-CURTAIN comes with a belt drive, no lubrication is needed. However, once a year, the liners of the linear drive need to be replaced. Contact Hammer-IMS to assist with this. When the Marveloc-CURTAIN comes with a belt drive, the state of the belt needs to be visually inspected on the presence of cracks or wear every month.

13.4 Sample mover linear drive

Inside the Marveloc-CURTAIN there is a linear drive that moves product samples of a variety of ranges under the measuring heads, this is called the sample mover. The sample mover linear drive can be a belt based or a spindle based linear drive.

Working inside the Marveloc-CURTAIN is only allowed after being specifically allowed by a Hammer-IMS employee. Furthermore everyone working inside the Marveloc-CURTAIN is required to have followed a maintenance training of Hammer-IMS before doing so. To work on this linear drive, open the yellow panels covering the machine. It is not allowed to touch the measuring heads or the samples when working on the inside of the machine. Doing this will negatively impact the functionality of the machine.

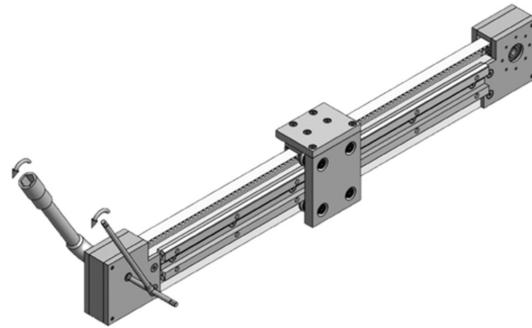
Don't open the yellow panels without prior consent. Altering the components inside the Marveloc-CURTAIN has a heavy impact on the measurement.

13.4.1 Belt based sample mover

The belt drive of the sample mover does not need any form of lubrication. However, maintenance checks have to be performed to ensure the correct functionality of the system.

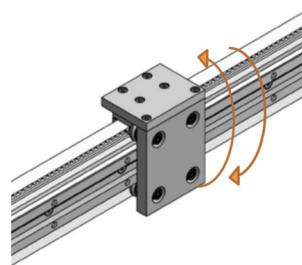
Belt tension

Once per year, check if the belt of the linear drive is under enough tension. This is the case if the belt doesn't slip. Should the belt require to be tightened, tighten the eccentric bolt at the side of the linear drive where there is no motor.

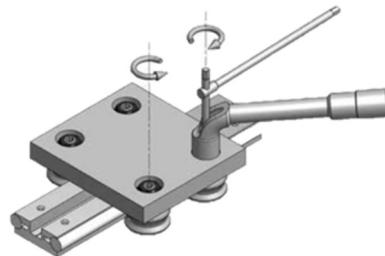


Carriage tension

Once per year, check if the carriage is still tightened around the drive. Do this by carefully wiggling the carriage by hand. Slight movement is acceptable, but the carriage should never feel loose.



If the carriage is too loose, tighten the eccentric nuts at the bottom of the carriage to fixate. It is not necessary to tighten the nuts too hard.



13.4.2 Spindle based sample mover

If the sample mover comes with a spindle, in a protected enclosure, the ball screw needs a re-lubrication once every 2 months. Apply a quantity of 4 cm³ of lubricant to the grease nipple on the carriage, as shown on the picture.



13.5 Periodical maintenance

Periodically, the filter mats in the outlet filters in the Marveloc-CURTAIN and the panel pc have to be replaced. It is advised to open the outlet filters once a year to check whether

the filter mats need replacement. If your industrial conditions are harsh or extreme, replacement may have to be carried out more often.

Testing correct functionality of all emergency stop buttons should happen at least once a year.

If present, the rubber shock mounts located on the carts of the linear drive shall be inspected visually each 12 months for signs of wear and alignment. If significant wear is noted on the rubber, the shock mounts shall be replaced for an identical part.

14. Cleaning

Periodical cleaning is recommended. Depending on your industry, cleaning is necessary once in a year up to each week. The following sections explain which cleaning procedures are allowed by Hammer-IMS for the different subparts.

It is advised to clean in a gentle way. Be aware that any significant mechanical impact on the measurement machine will affect the measurement. This will result in having to re-tune the recipe if recipe selection is present.

14.0.1 Marveloc-CURTAIN measurement machine

It is only allowed to clean the outside of the Marveloc-CURTAIN measurement machine.

The cleaning procedure of the Marveloc-CURTAIN measurement machine is as follows:

1. Disconnect power before cleaning. This can be done by switching off all present isolator switch(es).
2. Allow the system to cool down before cleaning.
3. Use a dry, soft, non-linting cloth to clean the outside of the product. Never use sprays, liquids or chemical cleaning agents.
4. Only apply gentle pressure to minimize mechanical impact.

The possibility exists that cleaning will result in having to re-tune the recipes if recipe selection is present.

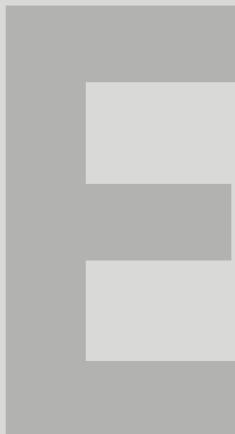
If your measurement machine contains reflector(s) at the bottom of the frame which are used for a reflective measurement, it is strongly recommended to remove dust (or other dirt) from each reflector once a month. Cleaning the reflector(s) must only be performed with no or minimal mechanical impact.

Periodically, the filter mats in the outlet filters on the side of the CURTAIN have to be replaced. Generally, it is advised to open the outlet filters once a year to check whether the filter mats need replacement. If your industrial conditions are harsh or extreme, this check may have to be carried out more often.

14.0.2 Panel pc or desktop pc

It is allowed to clean the pc with a dry, soft, non-linting cloth. The power does not have to be switched off to clean the screen of the pc. To allow cleaning, touch screens can be fully disabled for 1 minute by pressing on the cleaning button on the screen, as explained in section 11.1.1.

Periodically, the filter mats in the outlet filters on the side of the panel pc have to be replaced. Generally, it is advised to open the outlet filters once a year to check whether the filter mats need replacement. If your industrial conditions are harsh or extreme, this check may have to be carried out more often.



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15. Troubleshooting

This chapter introduces some common problems that could occur while operating your Marveloc-CURTAIN measurement system.

15.1 General concerns

In case unexpected behavior is noticed, the user/operator should contact Hammer-IMS immediately. Neither Hammer-IMS, neither its resellers, do allow their customers to open-up or disassemble the preassembled modules as part of the Marveloc-CURTAIN product package. The Marveloc-CURTAIN measurement system is high-precision measurement equipment and such an operation could damage some critical parts, reduce performance, make it mal-functional or void warranties.

15.2 Common events of malfunction and how to resolve them

Notwithstanding the above, there are a few situations that can easily be resolved by the user/operator. The user/operator is free to undertake the actions as described in the table below in case one of the following problems occurs.

In case any other unexpected behavior is noticed, the operator should contact Hammer-IMS immediately. Contact your first-line support, see chapter 16 for more information.

Problem	Possible solution
The software is turned on but no measurement value is visible or the measurement value does not change.	Press on the button to (re)start the measurement.
When using recipes: the measured value is too low or too high for the current recipe.	Reselect the correct recipe, ensuring the material which is present in the measuring gap of the measurement machine belongs to that recipe. If there is a sample holder present, make sure the right calibration sample is used. Next, tune the recipe if necessary.
The entire screen is filled with 1 graph making the menu bar unaccessible.	Press on the button on the top right of the screen to stop showing the graph in fullscreen mode.
The pc has a black screen and/or is not responsive.	Turn off the isolator switch(es). Check if the cabling (either USB busses or Ethernet wires) between the pc and the CURTAIN is still connected. Wait for 30 seconds before turning the isolator switch(es) back on. When using a panel pc, the software will automatically start. When using a desktop pc, please read the operator manual on how to start the pc. Please also inform Hammer-IMS of the malfunctioning.
The software is not fully responsive.	Try to stop the software. Then, turn off the isolator switch(es). Check if the cabling (either USB busses or Ethernet wires) between the pc and the CURTAIN is still connected. Wait for 30 seconds before turning the isolator switch(es) back on. When using a panel pc, the software will automatically start. When using a desktop pc, please read the operator manual on how to start the pc. Please also inform Hammer-IMS of the malfunctioning.

Problem	Possible solution
The pc starts, however the software does not start fully.	Check the state of the emergency button(s). If at least one of them is triggered, make sure you first eliminate all possible dangers. Then, deactivate all emergency buttons. Make sure the mains wire(s) are connected to a powered socket. Check if the cabling (either USB busses or Ethernet wires) between the pc and the CURTAIN is still connected. Then, turn off the isolator switch(es) and wait for 30 seconds before turning them back on. When using a panel pc, the software will automatically start. When using a desktop pc, please read the operator manual on how to start the pc. Please also inform Hammer-IMS of the malfunctioning.
The software shows an error message.	There are two possible causes for error messages. The first cause is an emergency stop. Check the state of the emergency button(s). If at least one of them is triggered, make sure you first eliminate all possible dangers. Then, deactivate all emergency buttons. The second cause is a general failure. Make sure the mains wire(s) are connected to a powered socket. Check if the cabling (either USB busses or Ethernet wires) between the pc and the CURTAIN is still connected. In both cases, after the issue has been resolved, turn off the isolator switch(es) and wait for 30 seconds before turning them back on. When using a panel pc, the software will automatically start. When using a desktop pc, please read the operator manual on how to start the pc. Please also inform Hammer-IMS of the malfunctioning.

16. Support

16.1 Contact

Hammer-IMS's support department is available through email at support@hammer-ims.com. Hammer-IMS is also reachable by phone during business hours, see www.hammer-ims.com for details.

16.2 Remote assistance

Connectivity 3.0 is remotely interfaceable by means of an embedded TeamViewer installation. TeamViewer allows Hammer-IMS to remotely connect to the measurement system to diagnose the possible problem and to perform software updates. This TeamViewer installation also enables Hammer-IMS staff to monitor the installation's behavior as part of training and servicing activities. This remote assistance service is included in all Hammer-IMS's products from the Marveloc-CURTAIN product family and helps reduce downtime.

16.3 Replacement parts and repairing

Refer to the Standard Terms and Conditions of Hammer-IMS issued with the purchase documentation for information on repair or part replacement during the warranty period.

Contact your first-line support in case of malfunctioning.

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Rio Installation Manual

Hammer-IMS Internal Manual

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Overview

The Rio module is the mm-wave basis-weight measurement device developed by Hammer-IMS. The board is equipped with a 60 GHz measurement transceiver. The measurement data is available on a proprietary RS485 interface.

Caution: Electrostatic sensitive device: Observe precaution when handling!



Installation should only be performed by Hammer-IMS personnel.
The module is not intended for resale.



A minimum distance between the device and any person should be kept at all time.

FCC Compliance statement

USA

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Kanada

“Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC/IC Requirements

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This equipment complies with FCC RF radiation exposure and IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with the minimum distance 20cm between the radiator & your body.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet équipement est conforme aux limites d'exposition aux radiations de les normes FCC RF et RSS-102 de l'IC, établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre le radiateur et votre corps.



FCC ID: 2A2S2-RIO

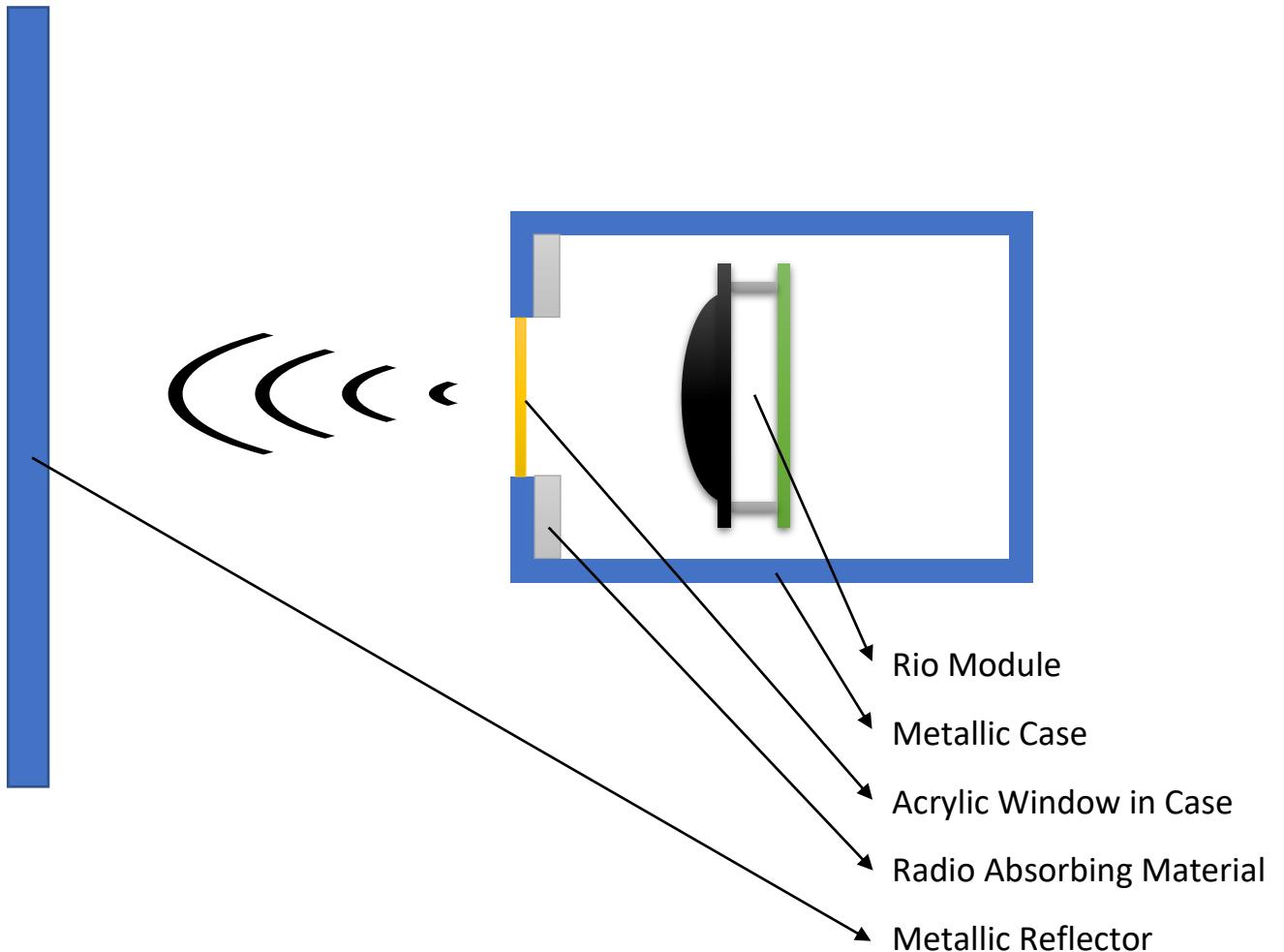
Mechanical Installation



The Rio module should never be used without proper reflector plate.



Modification or replacement of the lens antenna is never allowed. Proper operation or safety is not guaranteed if the lens is changed.



Mount the Rio module inside a closed metallic case. This can either be a cabinet like the OEM module or a closed tube as used in many O-frame or C-frame machines.



An opening should be made in front of the Rio lens to allow the measurement waves to leave and re-enter the cabinet. An acrylic sheet can be used to cover the window in order to make the machine less prone to dust.

Parallel to the Rio module, a metallic reflector needs to be placed to reflect the radiated electromagnetic waves back into the module. Recommended size is 250mm x 250mm minimum and it can be placed at a distance between 100mm and 1000mm.

To optimize performance and measurement spot, radio absorbing material can be placed at the inside of the case reducing the window size. This eliminates unwanted reflections of the waves inside the case.

Label

A label must be attached to the outside of the case indicating the machine contains one or more Rio modules:



Switches and Jumpers

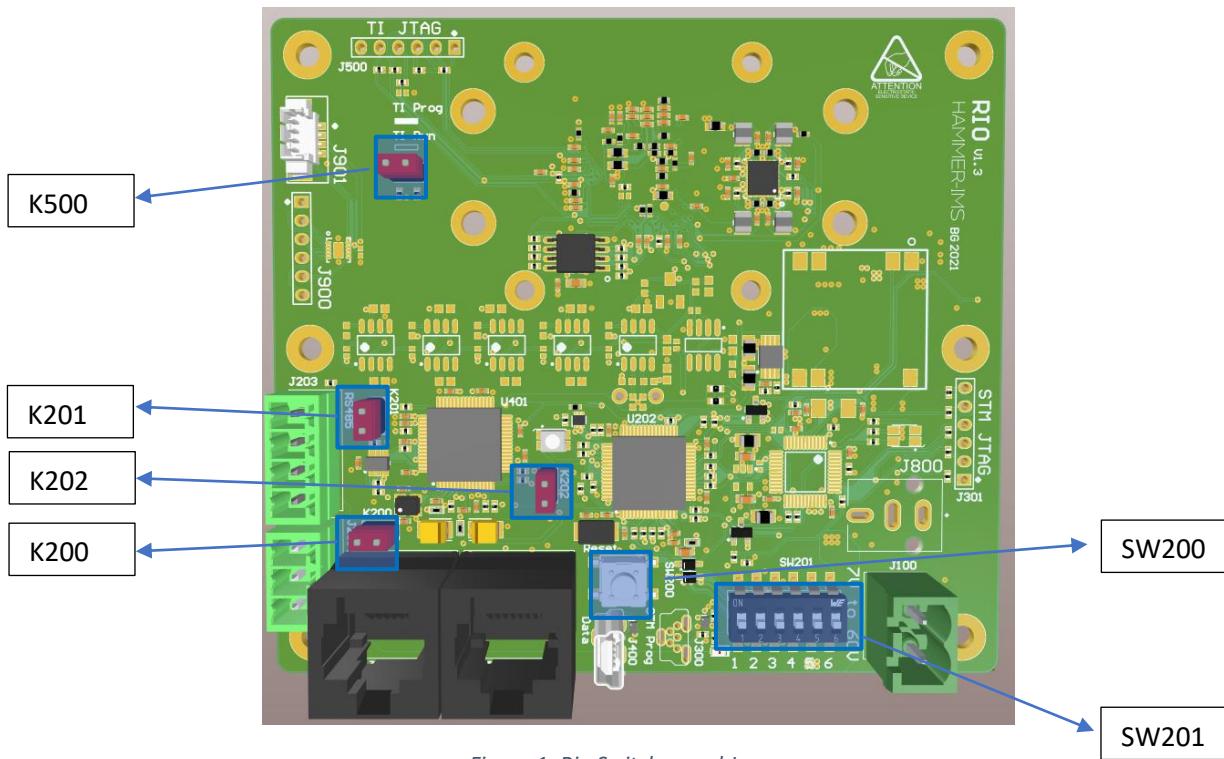


Figure 1: Rio Switches and Jumpers

DIP switch SW201

The 6-switch dip-switch can be used to control some of the software settings of the Tokyo board.

Switches 1 to 4:

Control the head address of the board. When a system using multiple heads is built, it is important to have a different identification address for all heads.

The address is calculated in the following way:

Address = 0xFF – SW

where SW is the four bit representation of switches 1 to 4 of SW201.

Address	Switch 4	Switch 3	Switch 2	Switch 1
0xFF	OFF	OFF	OFF	OFF
0xFE	OFF	OFF	OFF	ON
0xFD	OFF	OFF	ON	OFF
0xFC	OFF	OFF	ON	ON
0xFB	OFF	ON	OFF	OFF
0xFA	OFF	ON	OFF	ON
0xF9	OFF	ON	ON	OFF
0xF8	OFF	ON	ON	ON
0xF7	ON	OFF	OFF	OFF
0xF6	ON	OFF	OFF	ON
0xF5	ON	OFF	ON	OFF
0xF4	ON	OFF	ON	ON
0xF3	ON	ON	OFF	OFF
0xF2	ON	ON	OFF	ON
0xF1	ON	ON	ON	OFF

0xF0	ON	ON	ON	ON
------	----	----	----	----

Switch 5:

Future use. The function of this switch is currently undefined and should be kept to the OFF position.

Switch 6:

Selection of the frequency tap on which the measurement is performed.

Tap	Switch 6
15	OFF
16	ON

Reset switch SW200

The reset pushbutton SW200 when pushed will reset the STM32 processor U202 and IWR6843AOP transceiver U500.

Jumper K200: main RS485 Termination

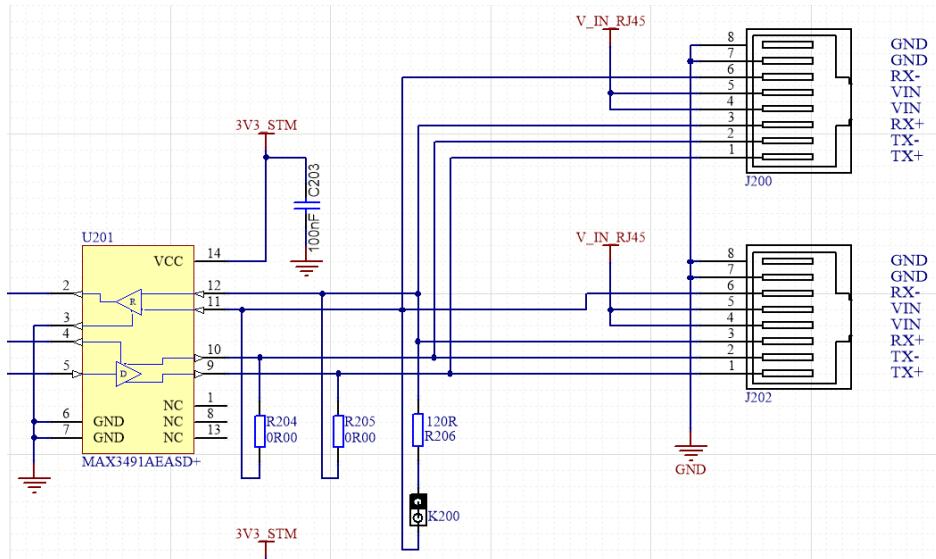


Figure 2: RS485 Interface

When jumper K200 is equipped, a 120 Ohm termination resistor is enabled between the RX- and RX+ terminals of the main RS485 bus. This jumper should be equipped when the Rio bord is connected to the RS485 bus using long wires and this particular board is the physically last one connected to the daisy chain bus.

Jumper K201: aux RS485 Termination

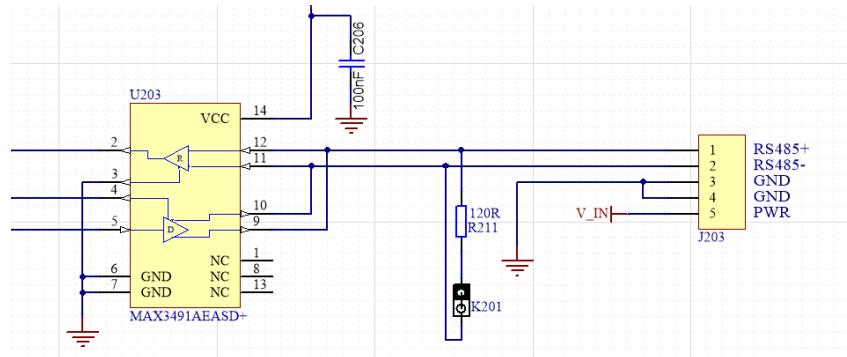


Figure 3: Aux RS485 interface

When jumper K201 is equipped, a 120 Ohm termination resistor is enabled between the RX- and RX+ terminals of the main RS485 bus. This jumper should be equipped when using long cables to connect a device to the aux RS485 bus.

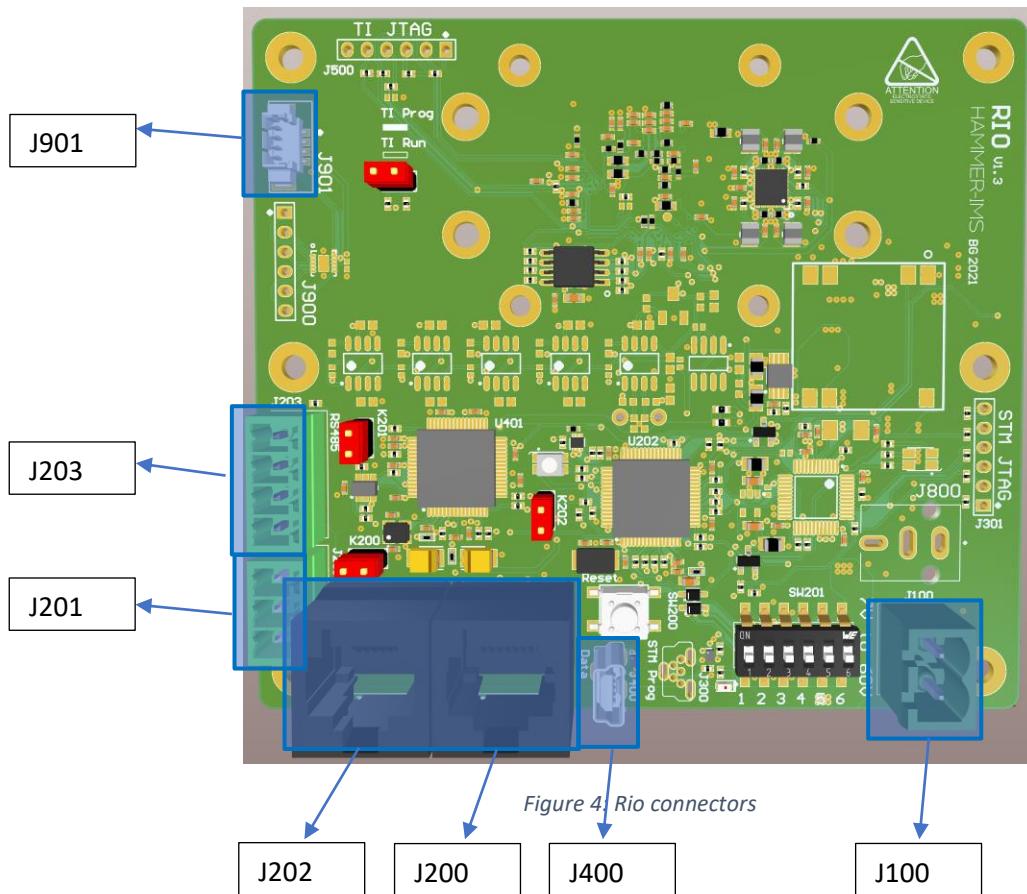
Jumper K500: IWR6843AOP programming mode

When a jumper is present on K500, the IWR6843AOP will boot in programming mode. In this mode, new firmware can be uploaded to the IWR6843AOP processor using the Uniflash tool. Programming needs to be performed using the USB bus.

Jumper K202: STM32F303RE programming mode

Jumper K202 selects the boot mode of the STM32F303RE. Without jumper, the processor will be in normal RUN mode. When a jumper is present, the STM32F303RE will boot in programming mode. Programming can then be done using the RS485 bus with the STM32CubeProgrammer tool.

Connectors



J100: Power supply

The Rio board must be powered by an external DC power supply. The voltage of this supply should be between 7V and 60V while the board consumes approx. 4W.

J400: Maintenance USB port

The USB port is used for diagnostics and reprogramming purposes. The port should be left unconnected in normal use.

J200/J202: RS485 port

These RJ45 connectors are used for the data connection of the Rio module. Please check the user's manual for detailed information on the data protocol.

J200 and J202 are internally connected to each other to make daisy chaining the data connection of the Rio boards. Pinning of both connectors are identical so they are exchangeable.

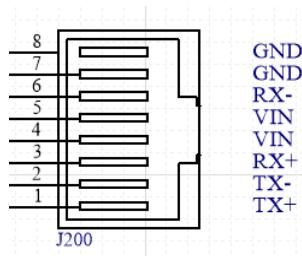


Figure 5: Top view of RS485 socket

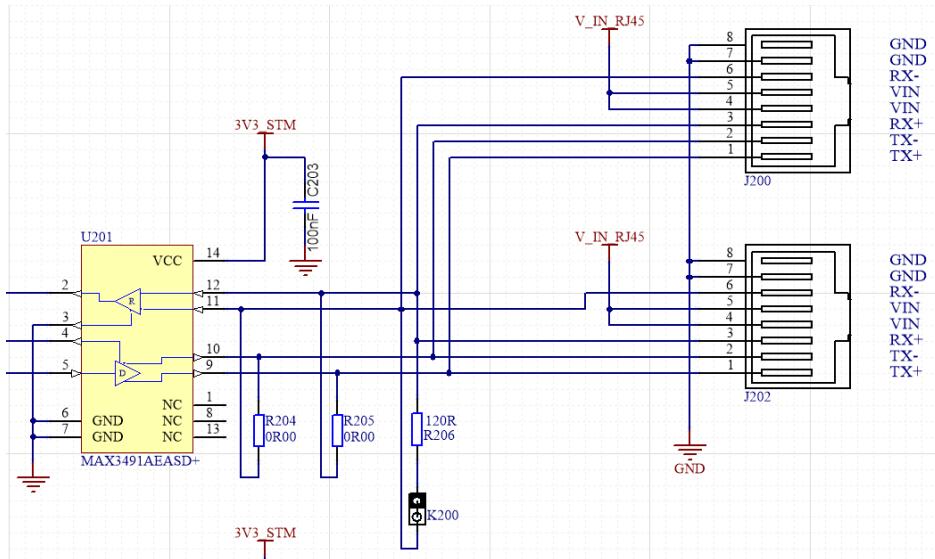
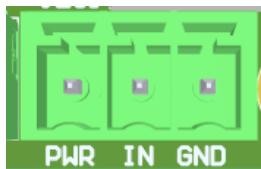


Figure 6: RS485 Interface

J201: Analog Input

The Rio board has an analog 0-10V input. The three pole connector also carries a power output (connected to power input) to power an external analog sensor.



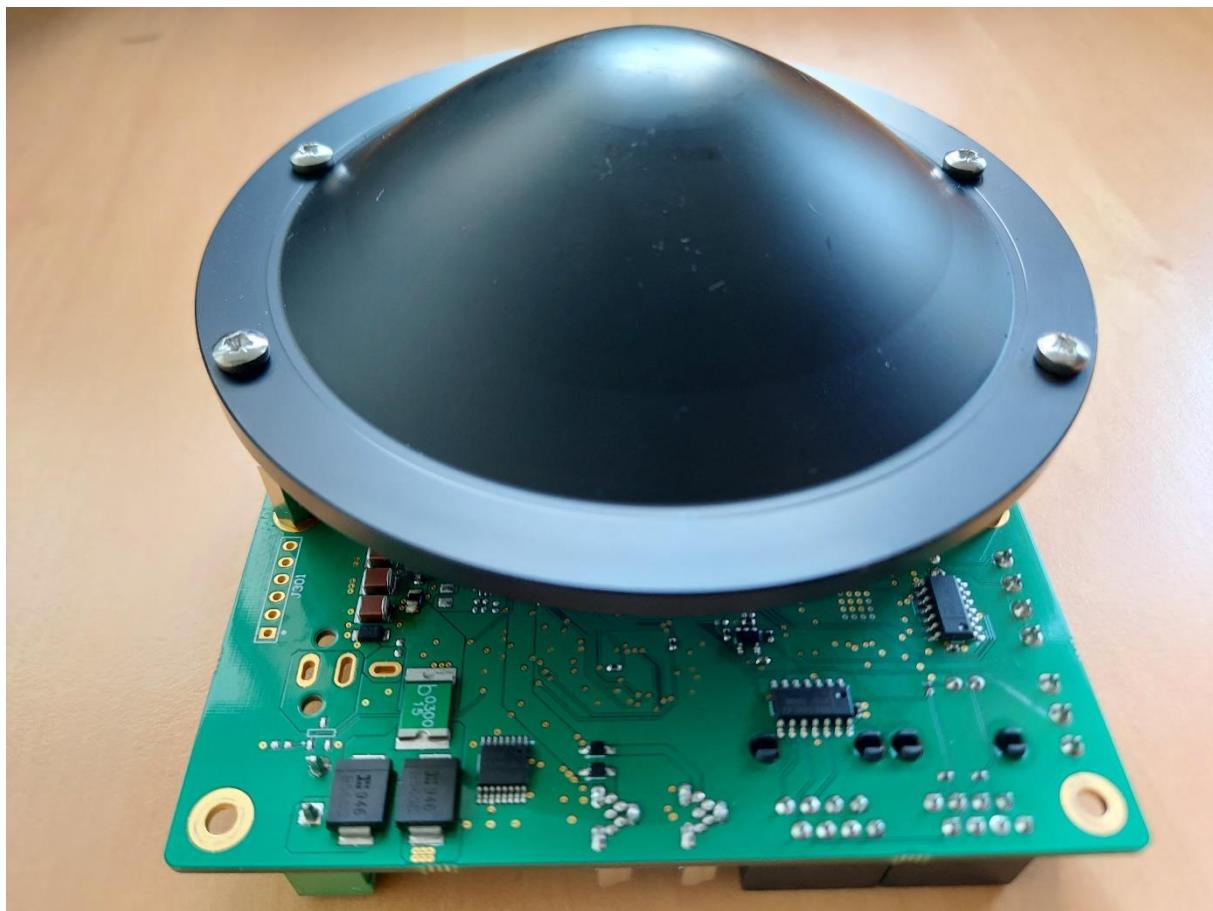
J203: Aux RS485

The auxiliary RS485 port is currently unsupported and should be left unconnected.

J901: Capacitive Measurement Interface

This connector is used to connect the optional Hammer-IMS capacitive measurement module. If the module is not installed, please leave this connector unconnected.

Lens Antenna



The Rio module comes equipped with a lens antenna. The user should never remove this antenna from the board. Operation and safety is not guaranteed when the antenna is not present.