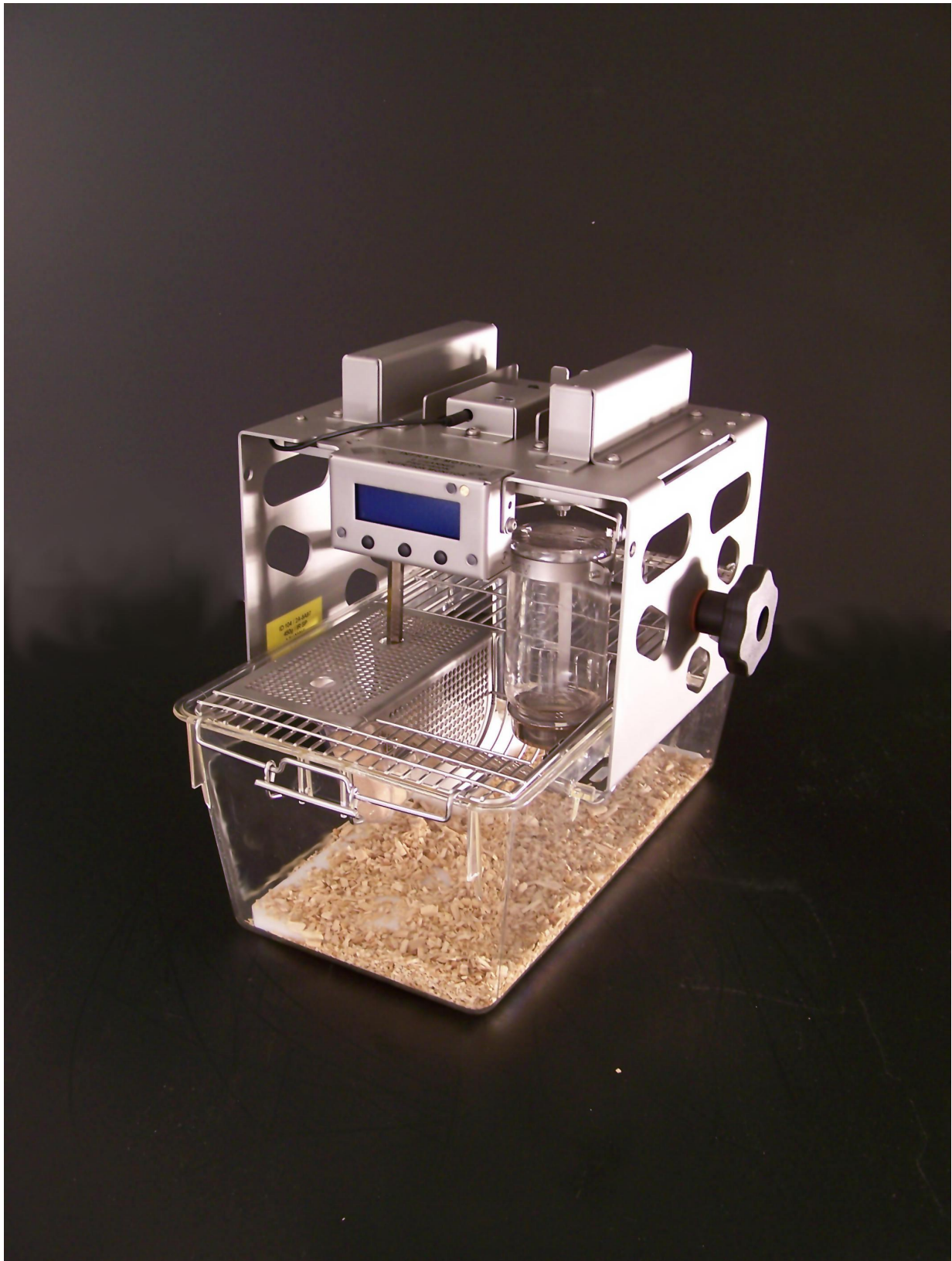


Infra-e-Motion GmbH

Nutrition Monitor Manual

How to install and operate the IEM Nutrition Monitor



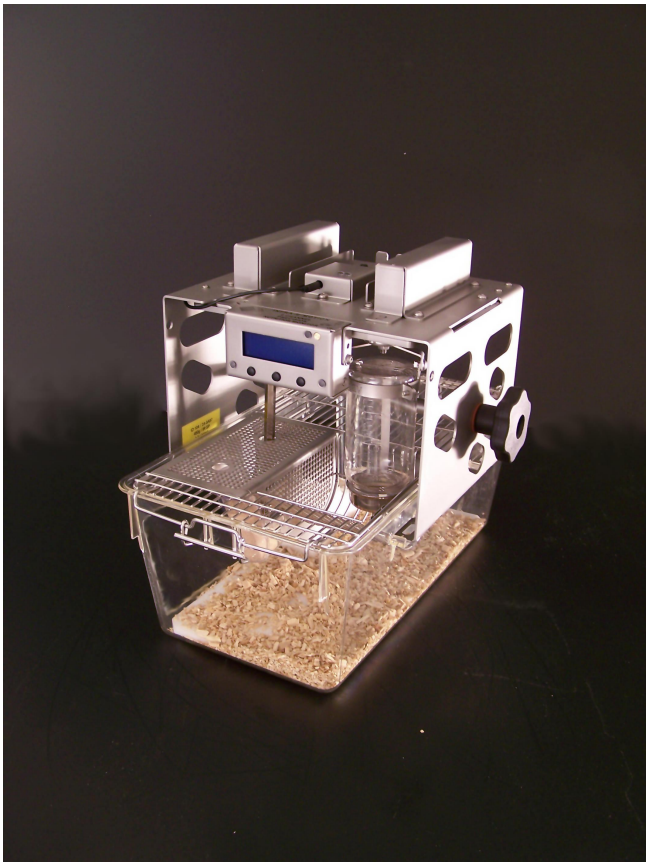
IEM
01.09.2012

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1.0 Introduction

IEM Nutrition Monitor



The IEM Nutrition Monitor is a high precision scale for consumption measurement of food- and liquids of mice and rats and comparable rodents in individual enclosures/standard cages.

Even smallest consumption is recorded at the very minute in high resolution.

As a dual scale the Nutrition Monitor serves with two separate recording units. Each unit can be configured either for liquid or food consumption.

Additionally parameters like activity per defined time unit, temperature, humidity and lighting conditions can be gathered/recorded.

All data collected/recorded can be saved to a PC by means of the included IEM software.

Multiple devices can be joined simply and clear in serial connection with a single cable to a single computer.

Each device can be set up everywhere fast and flexible and is immediately “ready to record”. The device can be used easily and requires no maintenance.

A calibration security check once every 3 years is recommended nevertheless.

Stable and high resolution measurement and recording

Electronic measuring equipment

With the IEM Nutrition Monitor it is possible to record even slightest amounts of consumption at the very time of consumption.

This offers recording of behavioral patterns of food/liquid consumption of the test animal.

Measurement/recording intervals range from a minimum of 30 seconds to a maximum of 60 minutes.

When used in combination with a PC and recording interval set to 1 Minute, recording duration is unlimited. Depending on the type of storage medium, values recorded can be saved almost limitless.

The high degree of fineness and precision of the electronic measuring equipment offers recordings in a range between 20mg to 100mg.

The IEM Nutrition Monitor can be equipped either with maximum weighing range of 450g using a resolution of 10mg or with a maximum weighing range of 900g using a resolution of 20mg. In case a resolution of 10g is used (a hundredth gram) a consumption of 10µl (10mg) can be recorded.

A drop of water weights around 50mg. 30mg to 50mg of water is usually consumed by a mouse when drinking (session). The IEM Nutrition Monitor captures each session's liquid weight change.

2.0 Specifications

Monitor:

Case: stainless steel

Sensor:

Resolution & Operating Sensor Weights & Limits				
Monitor Type:	450g	900g	2250	Remarks
Maximum Operating Weight (g):	530	1150	2200	Weight Limit (Range): Maximum weight on sensor plane
Technical Resolution (mg):	10	20	50	Measurement Interval 1 Minute
Effective Resolution (mg):	20	40	100	Measurement Interval 1 Minute
Abs. Weight Limit + (g):	550	1200	2250	Maximum Weight on sensor plane
Touch up Limit + (g):	-300	-950	-1500	Weight Limit (Range): Touch sensor plane up
Touch up Limit - (g):	-150	-1200	-750	
Temperature dependency (mg/°C)	20-60	40-120	100-300	
Long term-fluctuation >12h (mg)	100	200	500	

2.1 Specifications

Bottle & Feeding Appliance:

Drinking bottle volume 150ml or 250ml

Feeding Appliance Variations:

- For Mouse (animal up to 50g Bodyweight)
- For Rat (animal 50 – 150g Bodyweight)
- For Rat (animal 150 – 300g Bodyweight)
- For Rat (animal 300 – 600g Bodyweight)

Software:

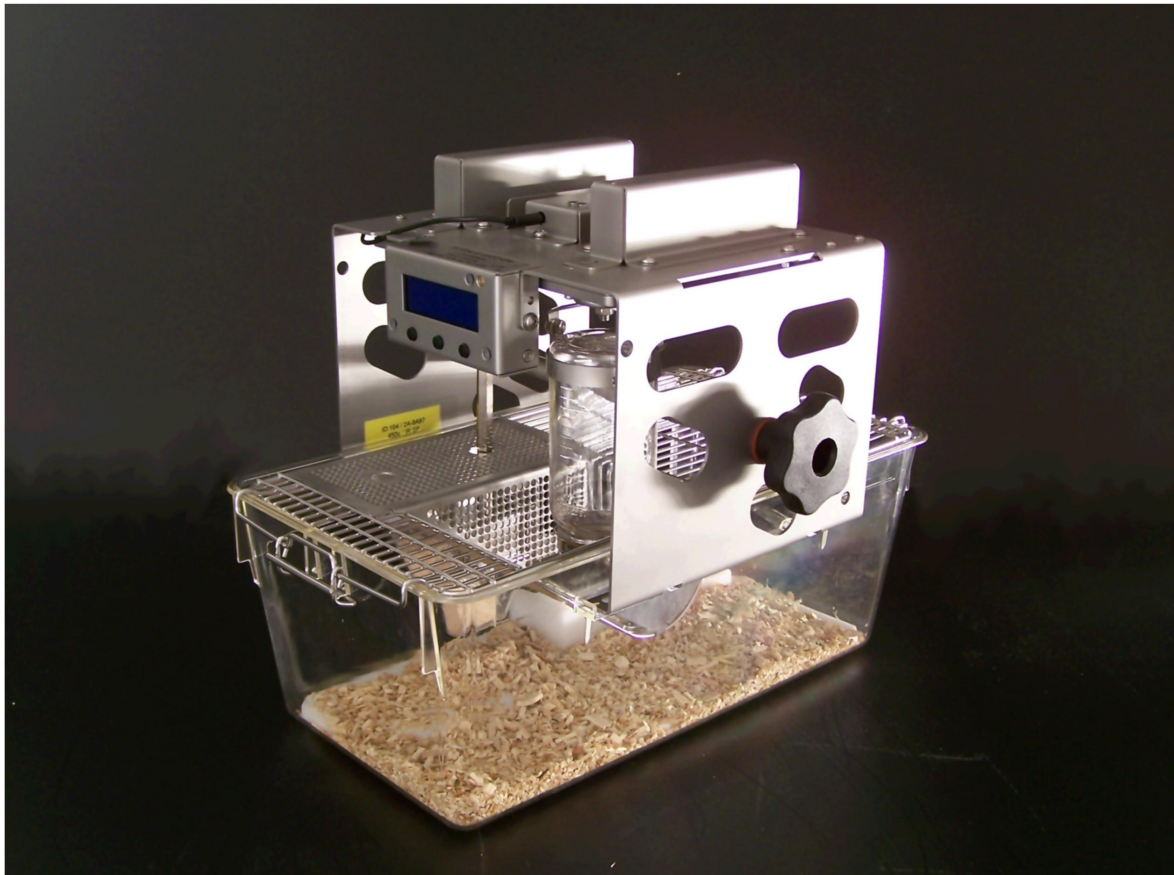
For Microsoft XP, 7

Run time: Endless with Power Supply (Networkmode)

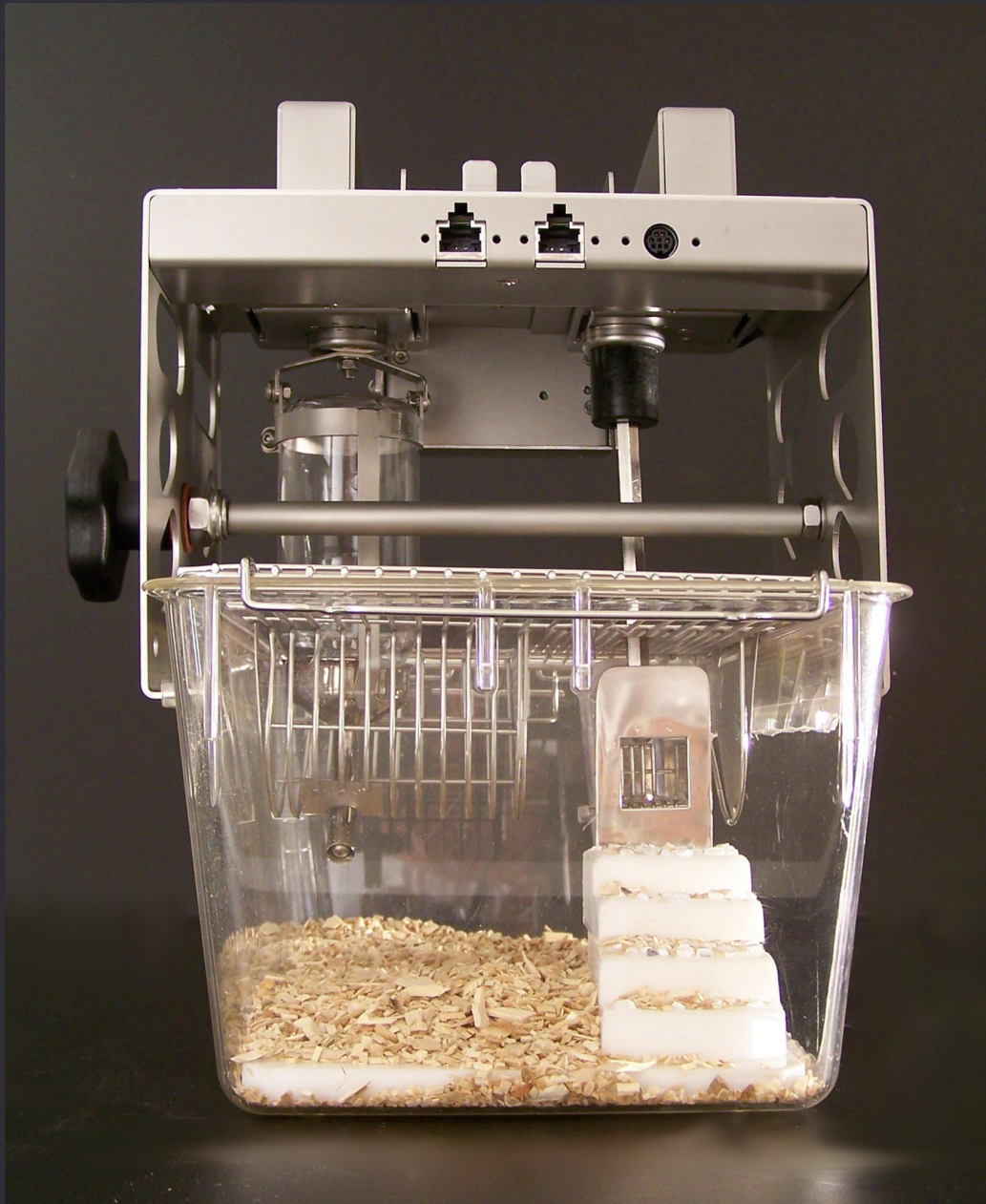
3.0 Description of Elements (1)

IEM Nutrition Monitor:

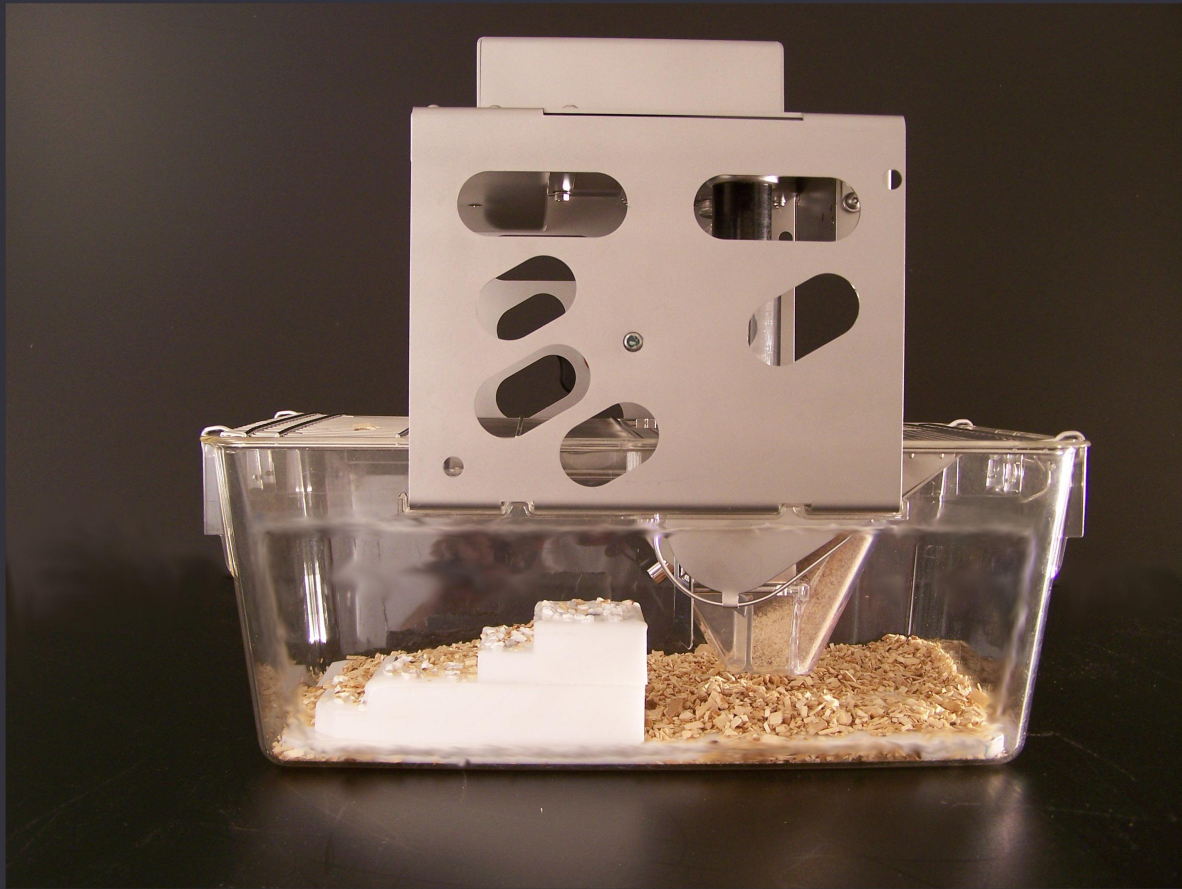
- Feed & Drink
- Activity Sensor
- Cage Tecniplast 2L



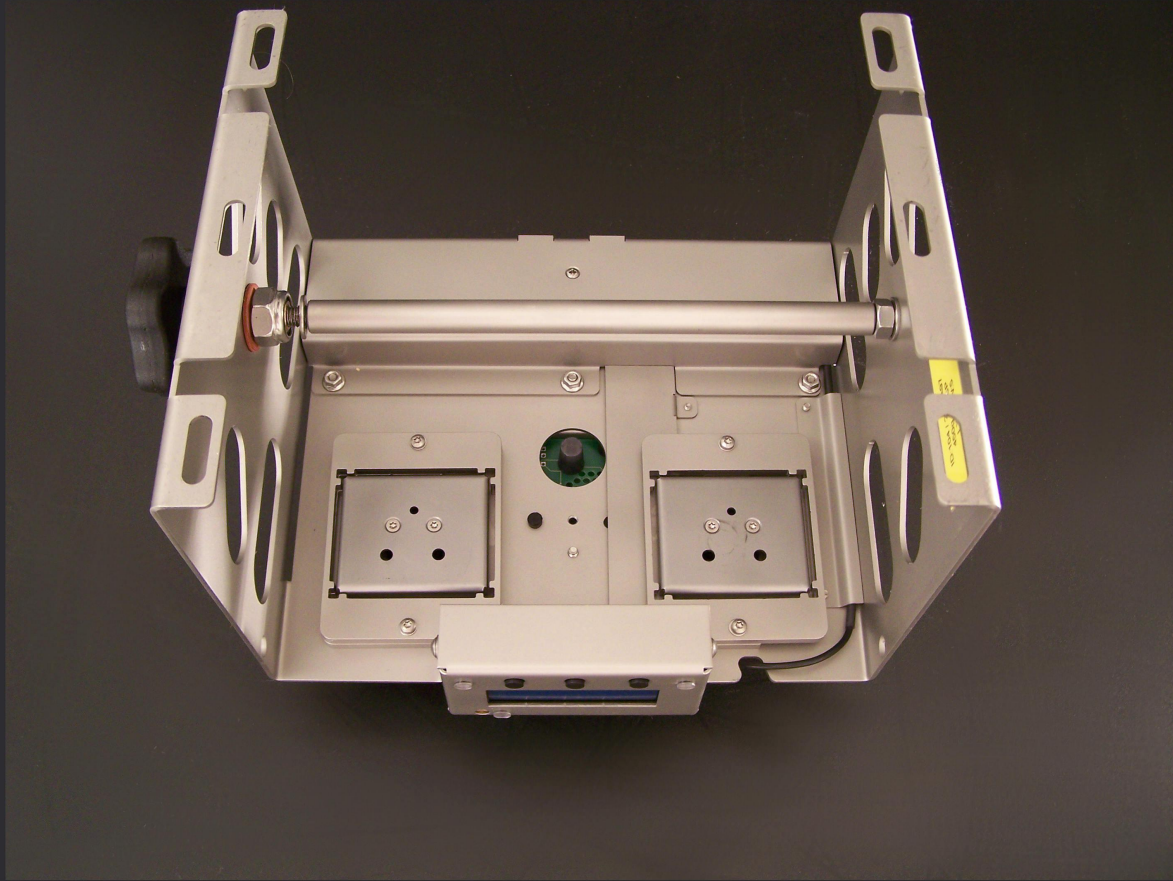
3.0 Description of Elements (2)



3.0 Description of Elements (3)



3.0 Description of Elements (4)



4.0 Install monitor software (1):

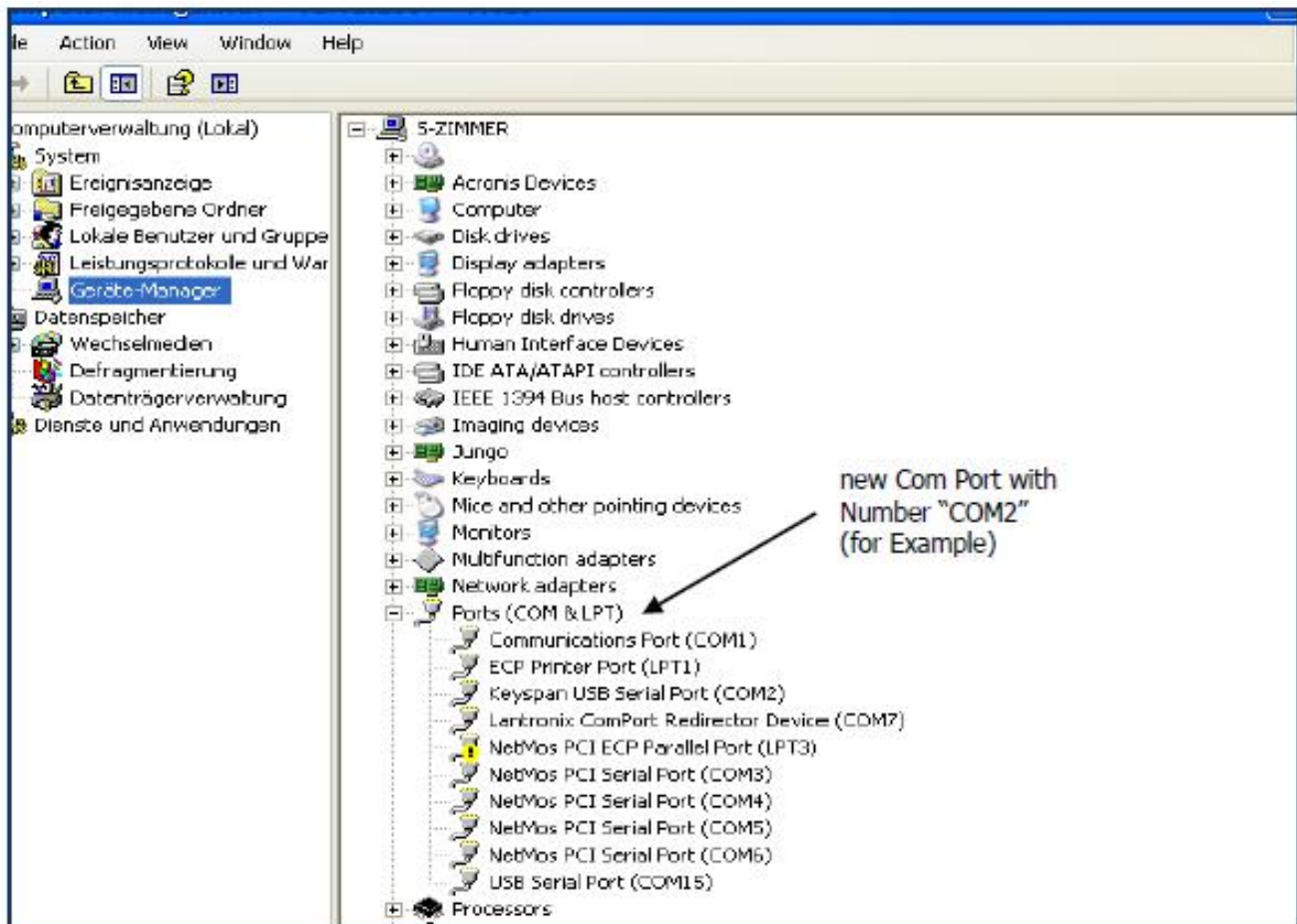
Install monitor software for Feed & Drink monitoring

The .Net Framework 2.0 has to be installed upon the PC

In order to transfer data to the PC, you need to use the adapter USB-to-RS485.

Once connected, installation of USB FTDI High Speed USB Serial adapter is being started (only on first time of usage). Follow the instruction of the installation wizard.

Software required either attached or downloadable via <http://www.ftdi.com>

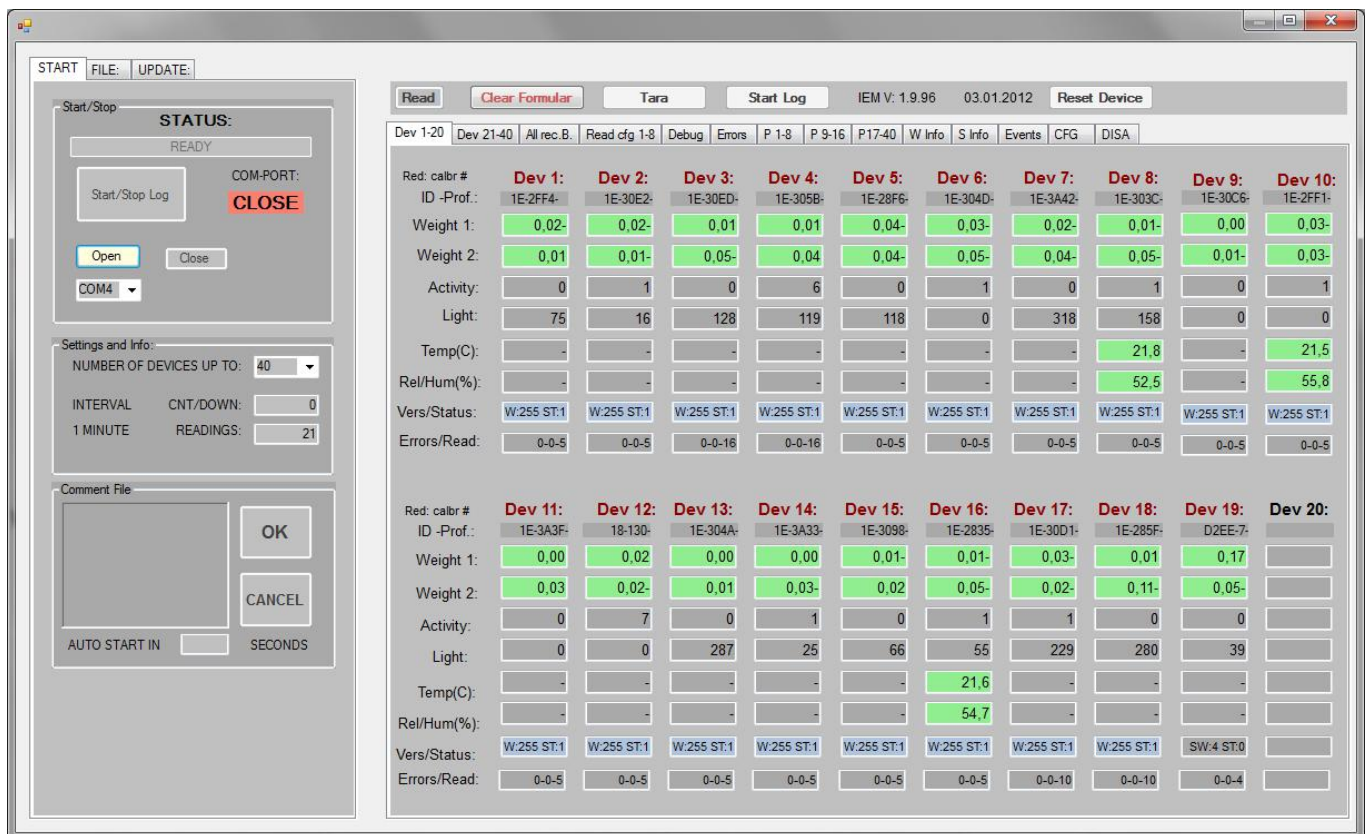


4.0 Install monitor software (2)

Install monitor software for Feed & Drink monitoring

Install the IEM-Monitor Software (Setup.exe or separate Folder with program files).
 Download from Infra-E-Motion Web-Site (www.infra-e-motion.de/download) or from CD or via e-mail.

In case set-up file not part of the delivery, program can be started even without prior installation. In order to do so, copy file "IEM Monitor" - which is always part of the delivery - to a place defined by you on your local hard drive.



The screenshot displays the IEM Monitor software interface. On the left, there is a 'Start/Stop' section with a 'STATUS: READY' indicator, a 'COM-PORT: COM4' dropdown, and 'Open' and 'Close' buttons. Below this is a 'Settings and Info' section with 'NUMBER OF DEVICES UP TO: 40', 'INTERVAL 1 MINUTE', 'CNT/DOWN: 0', and 'READINGS: 21'. At the bottom left is a 'Comment File' section with 'OK' and 'CANCEL' buttons, and an 'AUTO START IN' field.

The main area shows a table of device data for 20 devices (Dev 1 to Dev 20). The table includes columns for Red. calbr #, ID -Prof., Weight 1, Weight 2, Activity, Light, Temp(C), Rel/Hum(%), Vers/Status, and Errors/Read. Data is displayed for each device, with some values highlighted in green (e.g., Weight 1, Weight 2, Activity, Light, Temp(C), Rel/Hum(%)) and others in blue (e.g., Vers/Status, Errors/Read).


Dev 1-20	Dev 21-40	All rec.B.	Read cfg 1-8	Debug	Errors	P 1-8	P 9-16	P17-40	W Info	S Info	Events	CFG	DISA
Red. calbr #	Dev 1: 1E-2FF4	Dev 2: 1E-30E2	Dev 3: 1E-30ED	Dev 4: 1E-305B	Dev 5: 1E-28F6	Dev 6: 1E-304D	Dev 7: 1E-3A42	Dev 8: 1E-303C	Dev 9: 1E-30C6	Dev 10: 1E-2FF1			
ID -Prof.	1E-2FF4	1E-30E2	1E-30ED	1E-305B	1E-28F6	1E-304D	1E-3A42	1E-303C	1E-30C6	1E-2FF1			
Weight 1	0.02	0.02	0.01	0.01	0.04	0.03	0.02	0.01	0.00	0.03			
Weight 2	0.01	0.01	0.05	0.04	0.04	0.05	0.04	0.05	0.01	0.03			
Activity	0	1	0	6	0	1	0	1	0	1			
Light	75	16	128	119	118	0	318	158	0	0			
Temp(C)	-	-	-	-	-	-	-	21.8	-	21.5			
Rel/Hum(%)	-	-	-	-	-	-	-	52.5	-	55.8			
Vers/Status	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1			
Errors/Read	0-0-5	0-0-5	0-0-16	0-0-16	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5			

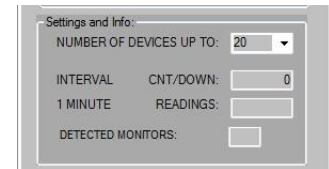
Dev 11	Dev 12	Dev 13	Dev 14	Dev 15	Dev 16	Dev 17	Dev 18	Dev 19	Dev 20
Red. calbr #	Dev 11: 1E-3A3F	Dev 12: 1E-130	Dev 13: 1E-304A	Dev 14: 1E-3A33	Dev 15: 1E-3098	Dev 16: 1E-2835	Dev 17: 1E-30D1	Dev 18: 1E-285F	Dev 19: D2EE-7
ID -Prof.	1E-3A3F	1E-130	1E-304A	1E-3A33	1E-3098	1E-2835	1E-30D1	1E-285F	D2EE-7
Weight 1	0.00	0.02	0.00	0.00	0.01	0.01	0.03	0.01	0.17
Weight 2	0.03	0.02	0.01	0.03	0.02	0.05	0.02	0.11	0.05
Activity	0	7	0	1	0	1	1	0	0
Light	0	0	287	25	66	55	229	280	39
Temp(C)	-	-	-	-	-	21.6	-	-	-
Rel/Hum(%)	-	-	-	-	-	54.7	-	-	-
Vers/Status	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	SW:4 ST:0
Errors/Read	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-10	0-0-10	0-0-4

5.0 Start monitor software:

Start monitor software and connect Monitor

By double-clicking on “IEM_Monitor.exe” you will initiate the program.

- Select Comport:
- 
- Select max Number of Devices on Bus:
- (max.: 8 / 20 / 40)



If the right com-port selected and open, the yellow ComPort LED shines yellow and the USB Control LED shines permanently green.

If it doesn't work at the first time, toggle the “Open” and “Close” Button until yellow Comport LED permanently shines.

Now, you are connected with all monitors. To get data (one time) from monitors click the “Read” Button

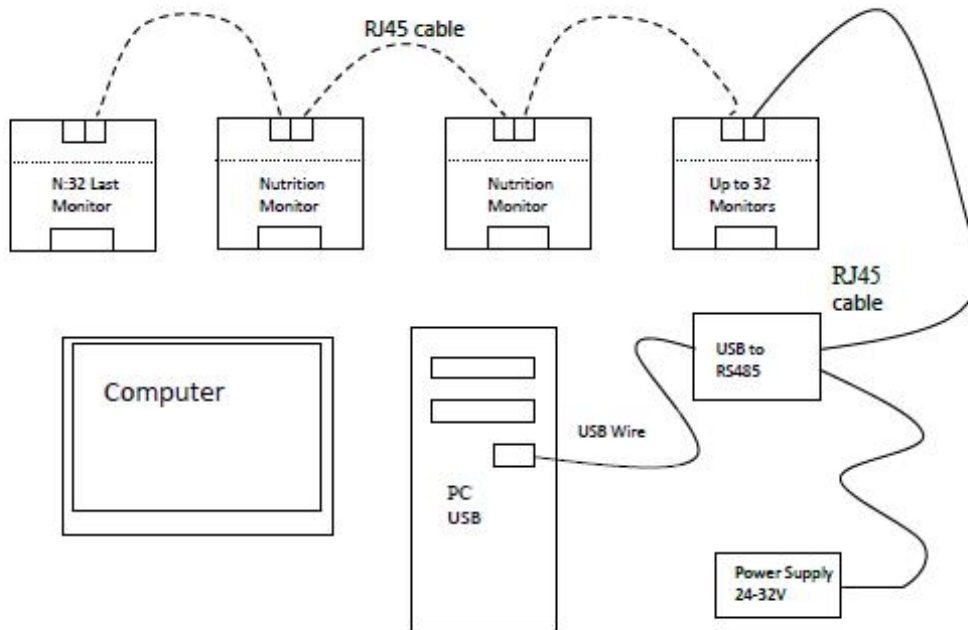
If many monitors in use it takes one or two minutes to get ready for all Monitors. After this you should get data from all Monitors (Picture).

6.0 Connection Diagram

Connect USB- RS485 adapter, Power Supply and Monitors

- Connect RS485-USB adapter with PC
- Connect RS485-USB adapter with Monitors

IEM Nutrition Monitor Connection Diagram:




Connect USB- RS485 adapter and start the IEM-Monitor Software

- Connect RS485-USB adapter with Power Supply. Monitor is now switched on
- Green USB Control LED in the top of the adapter blinks slowly. Yellow comport LED is off

7.0 Troubleshooting

Errors at installation or configuration can be avoided by data access control.

The yellow LED of the RS485-USB-adapter starts shining once correct comport has been selected. In case no light, select the correct Com-Port. Still no result, toggle the “Open” and “Close” button until yellow LED shines permanently. Once data are pulled from monitors, red LED of the RS485-USB-adapter starts blinking. Click “Read” and notice the red LED briefly flashing. Data transfer to the PC is being signaled by the green LED of the RS485-USB-adapter. Click “Read” and notice the green LED shining. A maximum of 40 monitors can be connected.

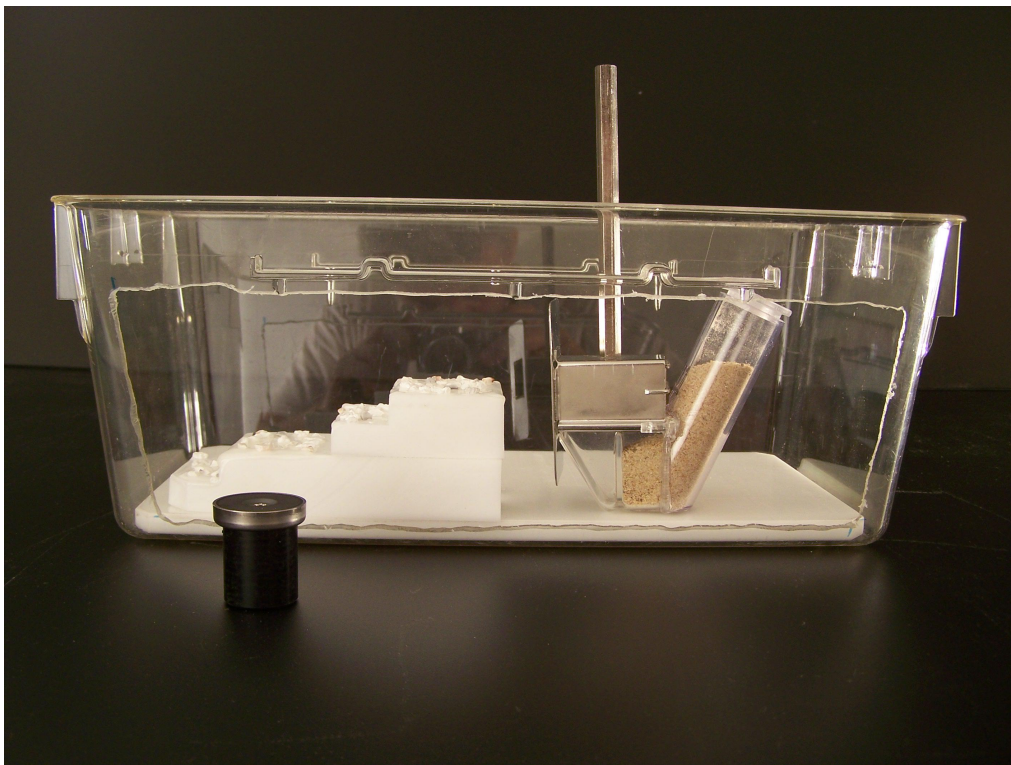
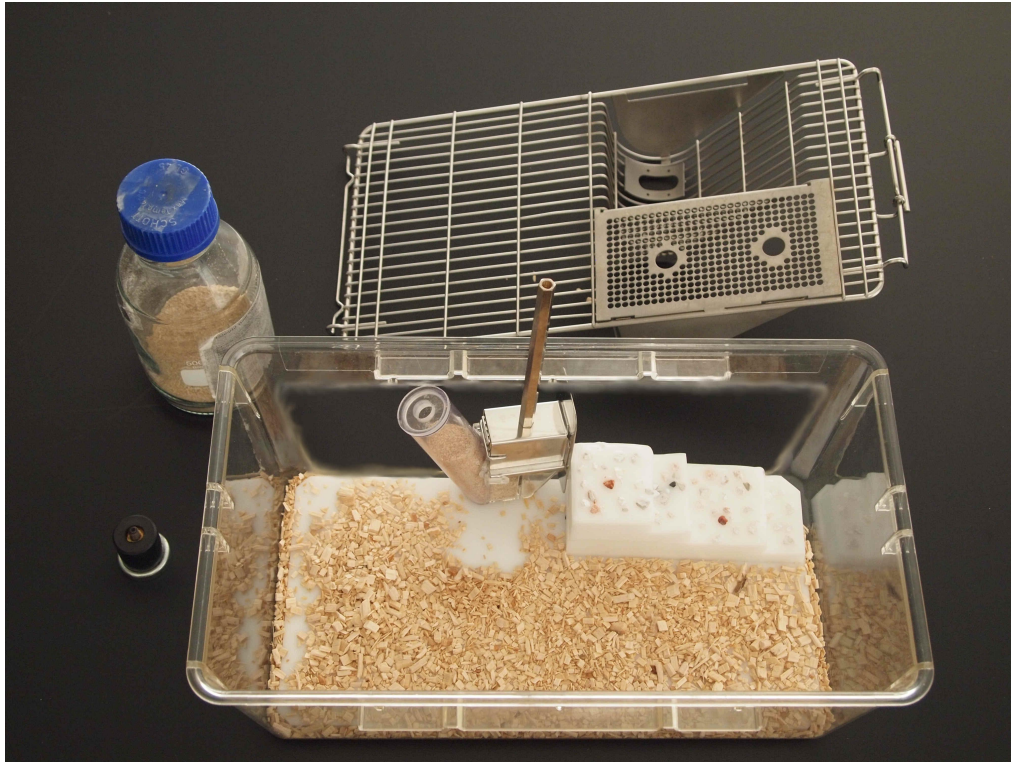


The screenshot displays the IEM Nutrition Monitor software interface. On the left, there is a control panel with a 'Start/Stop' section showing 'STATUS: READY' and a 'COM-PORT:' dropdown set to 'COM4'. Below this is a 'Settings and Info' section with 'NUMBER OF DEVICES UP TO: 40', 'INTERVAL 1 MINUTE', and 'CNT/DOWN: 0'. A 'Comment File' section with 'OK' and 'CANCEL' buttons is also present. The main area shows a grid of 20 device data points, each with a 'Read' button and a 'Clear Formulas' button. The data points are organized into two rows of 10 devices each. The first row (Dev 1-10) shows data for 'Red: calbr #', 'ID -Prof.', 'Weight 1', 'Weight 2', 'Activity', 'Light', 'Temp(C)', 'Rel/Hum(%)', 'Vers/Status', and 'Errors/Read'. The second row (Dev 11-20) shows similar data. The interface also includes a top menu bar with 'START', 'FILE', and 'UPDATE' options, and a bottom status bar with 'IEM V: 1.9.96' and '03.01.2012'.

Dev 1-20	Dev 21-40	All rec. B.	Read cfg 1-8	Debug	Errors	P 1-8	P 9-16	P17-40	W Info	S Info	Events	CFG	DISA
Red: calbr #	Dev 1:	Dev 2:	Dev 3:	Dev 4:	Dev 5:	Dev 6:	Dev 7:	Dev 8:	Dev 9:	Dev 10:			
ID -Prof.:	1E-2FF4-	1E-30E2-	1E-30ED-	1E-305B-	1E-28F6-	1E-304D-	1E-3A42-	1E-303C-	1E-30C6-	1E-2FF1-			
Weight 1:	0.02-	0.02-	0.01	0.01	0.04-	0.03-	0.02-	0.01-	0.00	0.03-			
Weight 2:	0.01	0.01-	0.05-	0.04	0.04-	0.05-	0.04-	0.05-	0.01-	0.03-			
Activity:	0	1	0	6	0	1	0	1	0	1			
Light:	75	16	128	119	118	0	318	158	0	0			
Temp(C):	-	-	-	-	-	-	-	21.8	-	21.5			
Rel/Hum(%):	-	-	-	-	-	-	-	52.5	-	55.8			
Vers/Status:	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1			
Errors/Read:	0-0-5	0-0-5	0-0-16	0-0-16	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5			
Red: calbr #	Dev 11:	Dev 12:	Dev 13:	Dev 14:	Dev 15:	Dev 16:	Dev 17:	Dev 18:	Dev 19:	Dev 20:			
ID -Prof.:	1E-3A3F-	18-130-	1E-304A-	1E-3A33-	1E-3098-	1E-2835-	1E-30D1-	1E-285F-	D2EE-7-				
Weight 1:	0.00	0.02	0.00	0.00	0.01-	0.01-	0.03-	0.01	0.17				
Weight 2:	0.03	0.02-	0.01	0.03-	0.02	0.05-	0.02-	0.11-	0.05-				
Activity:	0	7	0	1	0	1	1	0	0				
Light:	0	0	287	25	66	55	229	280	39				
Temp(C):	-	-	-	-	-	21.6	-	-	-				
Rel/Hum(%):	-	-	-	-	-	54.7	-	-	-				
Vers/Status:	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	W:255 ST:1	SW:4 ST:0				
Errors/Read:	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-5	0-0-10	0-0-10	0-0-4				

8.0 Recording Preparation (Hardw.) (1.0)

Fill the fodder chamber and the tube with powder fodder. If necessary, use a stairway with baseplate. Stairway and baseplate are washable and autoclavable (131°C)
Remove the magnet from the fodder chamber.

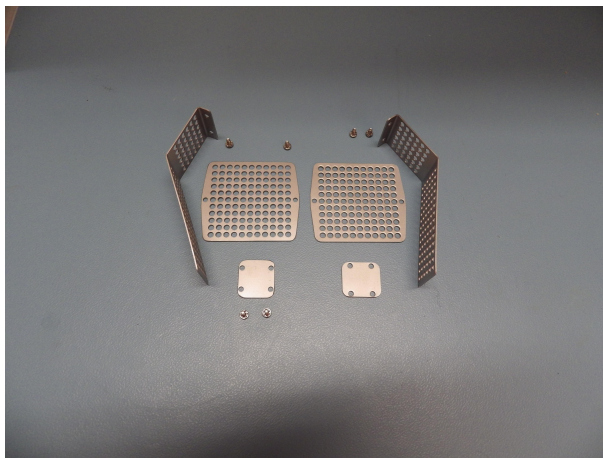


8.0 Recording Preparation (Hardw.) (1.1)

With the new (2013) Universal Grid

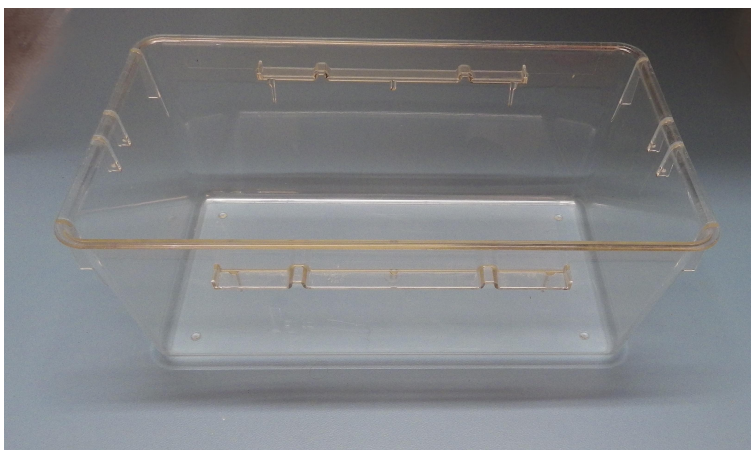


IEM Universal Grid with
Removable Cover for cage
Eurostandard Typ 2 L



Mouse-Stairs,
Reduction Plate (or
Cover Plate) for
Universal Grid.

Screw A2 M3*6 with
toothed locked washer,
Head i6kt - 2mm



Cage Info:

Tecniplast Order No:
1274L

Dimension:
265 x 207 x 140mm

Base Area (total):
265 x 207 = 530cm²

Area for Animal:
140 x 207 = 289cm²

8.0 Recording Preparation (Hardw.) (1.2)

Tighten the cage cover. Fill the bottles. Put the correct lid upon the bottles (depending on whether you use alcoholic or non-alcoholic liquids).

⚠ Fill the bottle already 1 day prior recording start in order to harmonize temperature of liquid. This helps to prevent leakage.



Types of bottle lids:



Cap for hydrous solution: Opening 1,2 – 1,5mm (Picture)
 For alcoholic solutions: Opening of 0,5mm.

Orientation of Bottle Caps (old Bottle):

In order to ensure correct installation of bottles, bottle lid MUST be installed as shown in the picture.

Orientation of Bottle Caps (new Bottle with Clip):

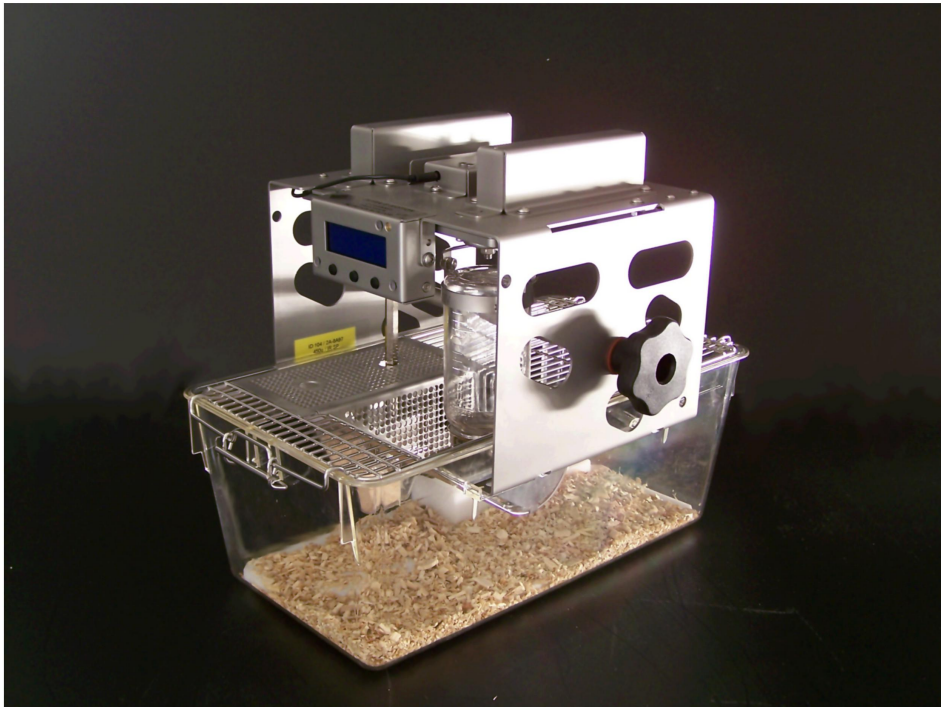
With Clip: Red Mark at the Front



8.0 Recording Preparation (Hardware) (3)

Fix the monitor to the cage using the tightening-knob.

Please avoid squeezing of the cage. The monitor should be firmly attached to the cage so that no moving of the monitor is possible.

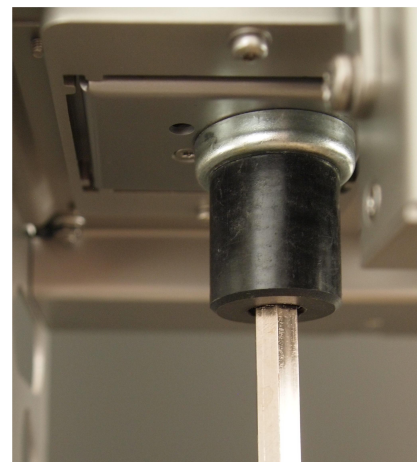
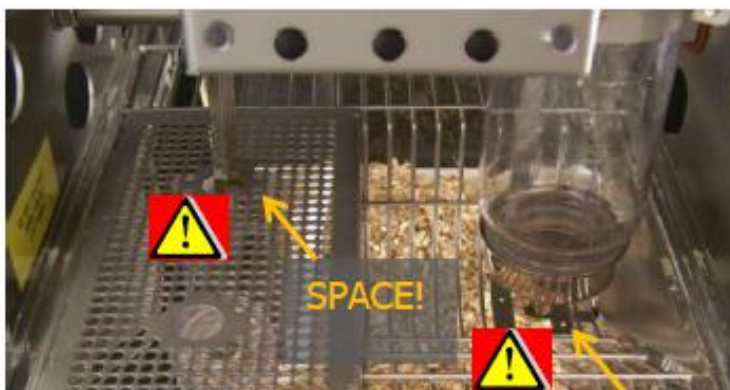


Adjustment of magnet, fodder-chamber and bottle

Adjust bottle and fodder-chamber.

Please leave some millimeters between grip bar and b

A non-centric adjustment of the magnet is fine.



9.0 Recording control (fodder chamber and bottle)

Please take care that also during the recording some millimeters between grip bar and bottle-tip are always safeguarded.

If necessary, empty the trash-chamber from time to time



Please take care that the fodder chamber is not emptied totally.

Minimum tube filling approximately 25%. See photo'



Powder fodder is not always sliding down into the fodder chamber as desired. In this case, use a stick to convey the fodder into the chamber.

In case of need, use the feed hopper to refill the fodder chamber.

Mind this action when later reviewing the recorded data.



10.0 Interpretation of LEDs during recording (display off)

Control LEDs (Channel 1 & 2) are blinking green or red:

Green: Measurement last second was fine

Red: Last measurement was not error-free (e.g. vibration)

Since 60 single measurements are added, there shouldn't be a problem. Only a permanent red blinking indicates an error.

Control LEDs (Channel 1 & 2) are permanent red:

Red & Red: No request from monitor software

(Timeout approx. 2 minutes)!

Start recording mode. Control connection.

Control LED (Device Control LED above LCD):

Green: Data pull request from PC has been received.

Red: Heavy error at latest recording (Hardware)

Actions during recording (display off):

Monitor consumption display:

By pressing the middle button, the most recently created data can be displayed. Actual weight reduction from beginning of the recording is displayed.

Unplugging and On & Off switching and reset during recording:

Should one or more monitors be disconnected during a recording session (cable unplugging), recording will restart as soon as monitors are connected again (or in case the reset button is pushed). This will cause a new taring of the starting weights (0,00g)

Note:

This needs to be regarded during data evaluation!

11.0 Macro data evaluation (Excel)

A macro for data evaluation can be downloaded from the IEM website

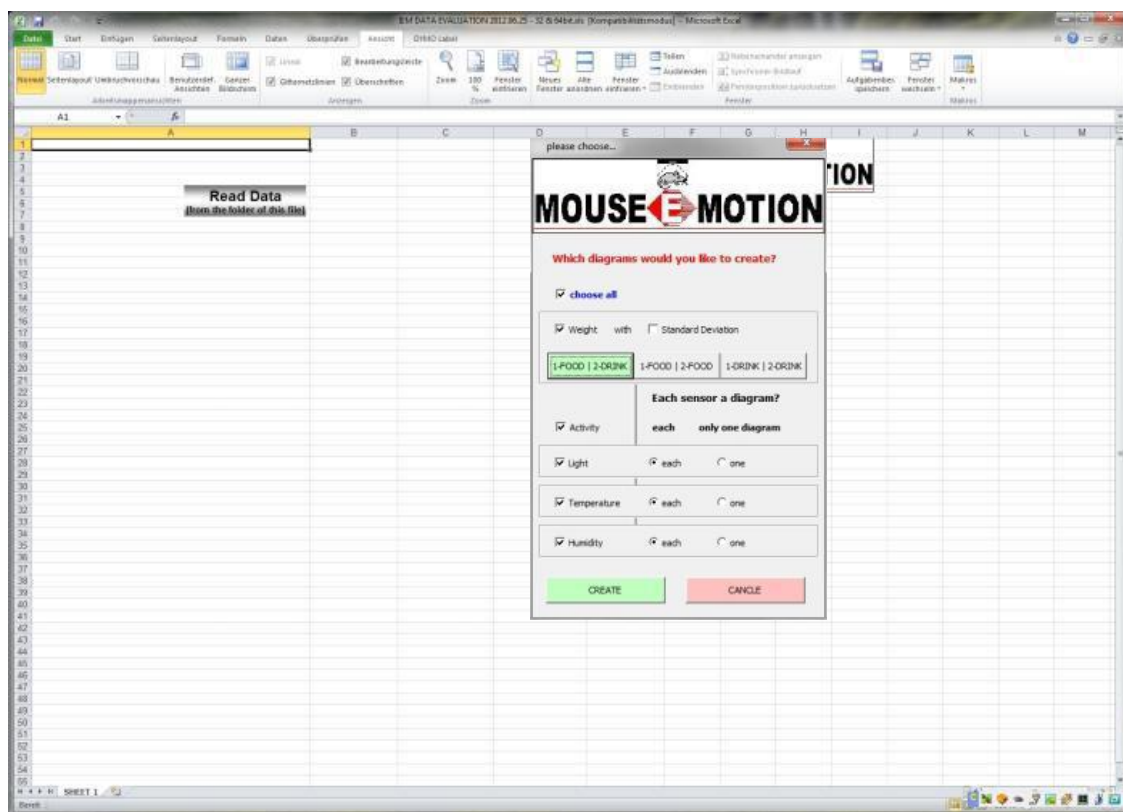
(www.infra-e-motion.de/downloads).

The macro creates a workbook with various tabs for each monitor saving the txt data received from the monitor in diagrams (Activity, Light, food intake, etc.)

Example file name: **Device1 (ID-17-FC15-0) IEM DATA Date 11-17-2011 Time 10-05-03.txt**

- Monitor-ID: ID-17-FC15-0 ;Network Number: 1
- Beginning of recording: Nov 17th 2011 (M:D:Y) 10:05:03 (H:M:S)

Copy macro „IEM DATA EVALUATION 2012.06.25 - 32 & 64bit.xls“ into the folder containing the recorded txt-file from the monitor. Execute the macro (PC security allows macro execution?). Use the dialog to expand your evaluation. These parameters are stored within the folder and need to be defined only once.



You can start the macro already during the recording session in order to get interim results. Each time the macro is executed, a separate file is being created, which can be identified by the suffix sequence.

Macro data evaluation (Excel)

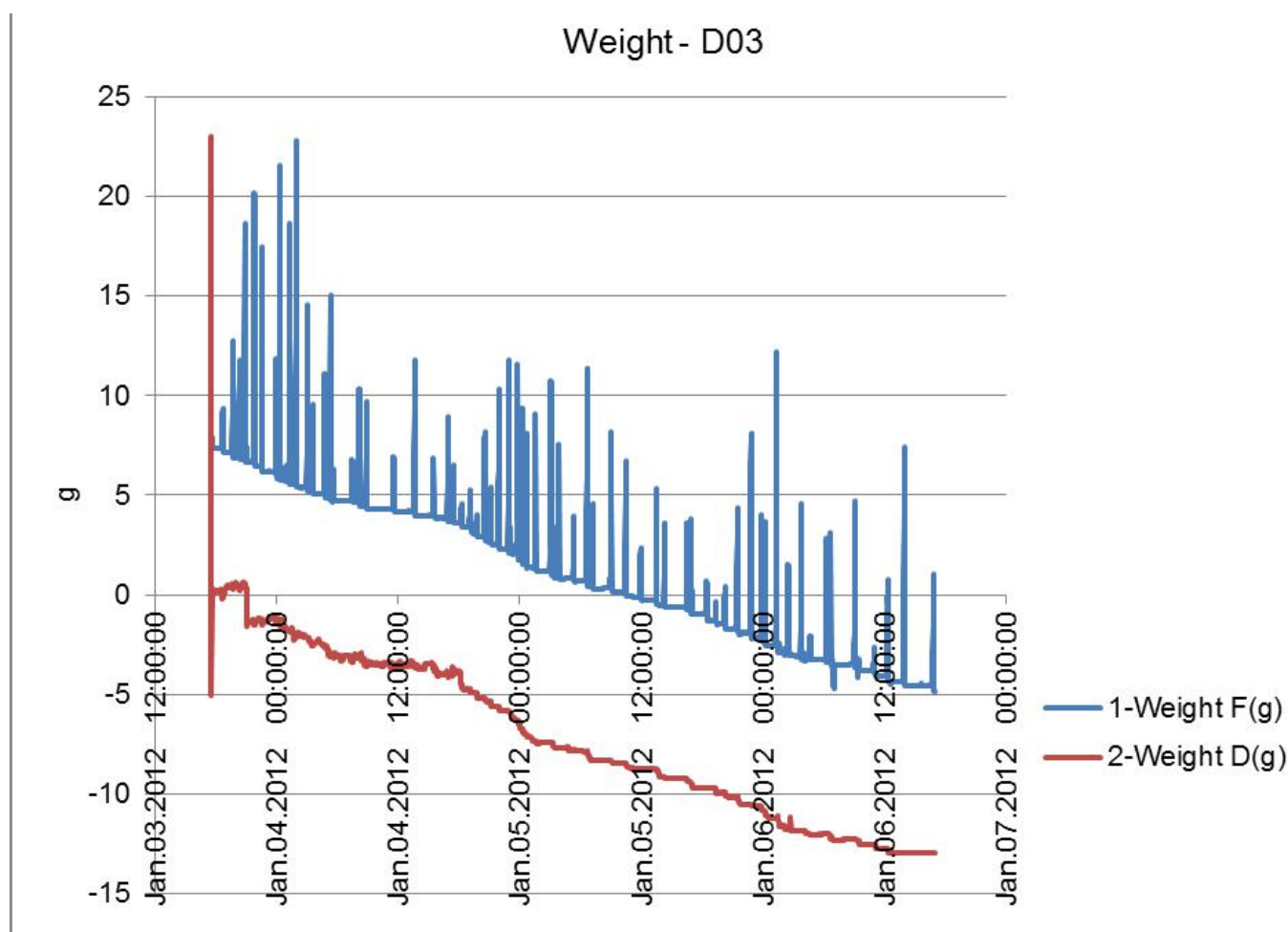
Example data after Excel macro execution:

For better understanding of your recorded data, please find following a typical diagram:

You'll see: Start weight taring. Channel 1 had been tared to exactly 0,00g Channel 2 had been tared to +13g since the test animal caused errors during the taring process which – in turn – made it impossible to reach an exact taring of 0.00g.

Crawling into the food chamber. The food chamber weight is temporarily added by the mouse weight (Spikes). The declining graph shows the reduction of fodder weight due to consumption by the test animal.

Similarly, the water intake is being shown by the declining graph.



Firmware Update (1)

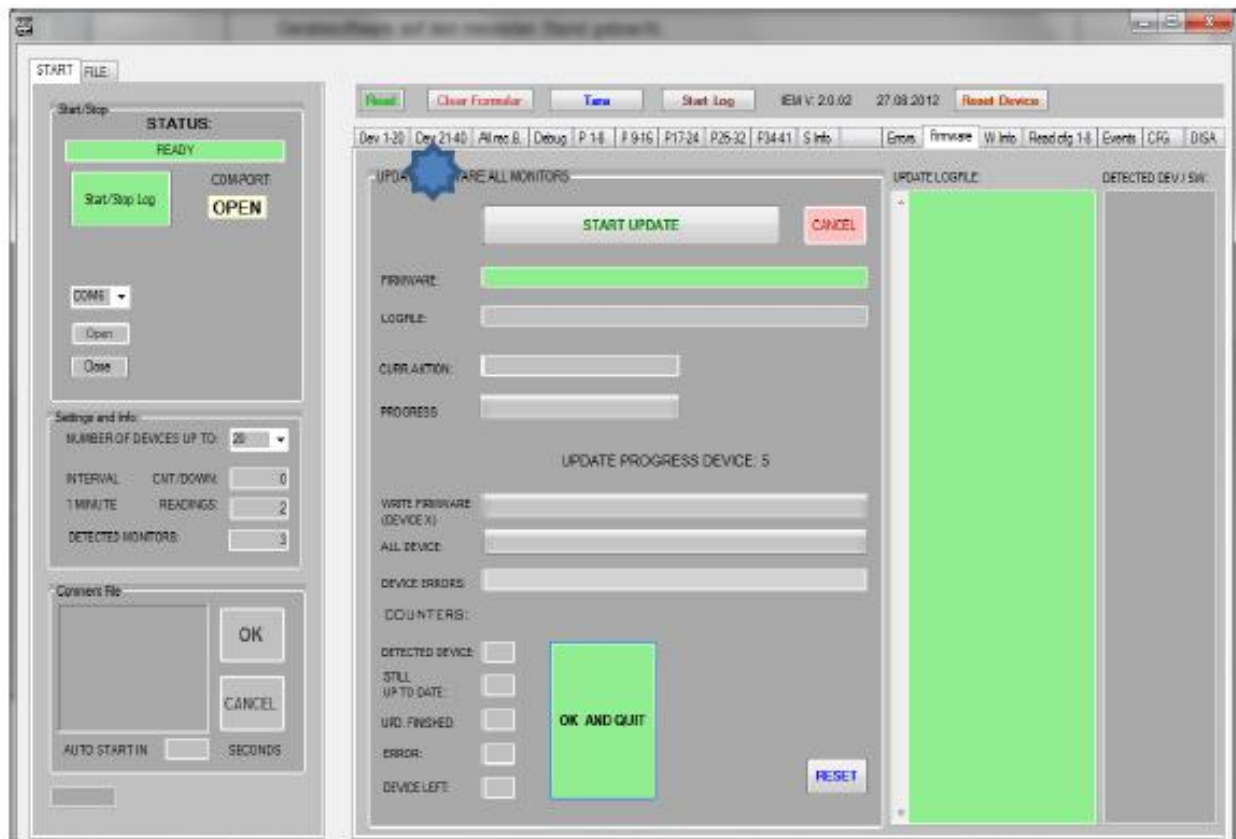
Firmware of the single monitor can be updated using the PC software. From Bootloader V 16 onwards all monitors will automatically be updated one after another. Should the monitor use Bootloader V 15 and lower, bootloading needs to be triggered manually. All further updating is being done by the machine automatically. Chose the new monitor software. File Format is: IEM MONITOR FIRMWARE V44492.BIN



Actual Version

- Choose tab Firmware
- Press “Start Update” to trigger the update

All connected monitors are switched to suspend-mode subsequently and are updated with the new software one after another. A dialog on the PC-screen informs about the update progress. During the update, a logfile recording every step is created



Firmware Update (2)

Screen after Update:

