User and Installation Manual

Measurement Plate

Part No.:
7901000

Doc ID: 900002-002 December 2021

INHECO Industrial Heating and Cooling GmbH reserves the right to modify their products for quality improvement. Please note that such modifications may not be documented in this manual.

This manual and the information herein have been assembled with due diligence. **INHECO GmbH** does not assume liability for any misprints or cases of damage resulting from misprints in this manual. If there are any uncertainties, please feel free to contact sales@inheco.com. → How to contact INHECO, page 5.

INHALT

1 IMPORTANT NOTES

1.1. General Information

Read the user instructions completely. The instructions for use explain the intended use of the INHECO Measurement Plate (IMP Unit). In case of failure to observe the manual‘s instructions, injury or product damage cannot be excluded.

Missing or insufficient knowledge of the manual leads to loss of liability against INHECO GmbH.

This manual is part of the IMP Unit and must be retained until the Unit is disposed and passed on to the new user when the Unit is sold or lent.

The IMP Unit meets the acknowledged rules of technology and complies with today‘s standards.

They must be followed in order to ensure safe handling of the unit.

Security-related warnings in this manual are classified into three hazard levels:

- The signal word WARNING indicates hazards which - without precautionary measures - can result in serious injury or even death.
- The signal word CAUTION is given to indicate hazards which - without precautionary measures - can result in minor to moderate injuries or could disturb functioning.
- The signal word NOTE stands for the general precautionary measures that are to be observed to avoid damaging the device when using it.

Please contact the manufacturer in case you do not understand something within this manual.

Your opinion about this manual provides us with valuable insights on how we can serve you better. Please do not hesitate to direct your comments to us:
→ How to contact INHECO, page 5.

1.2. Explanation of symbols

Symbol	Explanation
	A possible danger, leading to serious bodily harm is being pointed out to you.
	A possibly dangerous situation leading to material damage is being pointed out
·	Bullet points indicates an instruction.
-	Hyphens refer to enumeration.
→	indicates refer to

1.3. Warranty

The warranty period starts on the date of shipment. Any damage caused by operating the Incubator Device outside the specifications and guidelines leads to the loss of warranty. Broken seals on INHECO devices lead to the loss of warranty as well.

INHECO accepts only devices for inspection or repair which were not exposed to human or animal blood or fluids, chemical or biological fluids or radioactive or radiation materials except of devices which have been effectively decontaminated according to corresponding decontamination methods. → Cleaning and Decontamination, page 49.

Devices exposed to Biosafety level 3 and 4 Environments are not accepted by INHECO for return.

1.4. How to contact INHECO

INHECO GmbH	
Address	Fraunhoferstr. 11 82152 Martinsried Germany
Telephone - Sales	+49 89 899593 101
Fax	+49 89 899593 499
E-Mail – Sales	sales@inheco.com
E-Mail – Technical Hotline	techhotline@inheco.com
Website	www.inheco.com

Technical Support & Trouble Shooting Instructions:

http://www.inheco.com/service/technical-support.html

2 PRODUCTION DESCRIPTION

2.1. Intended use

The IMP Unit is designed specifically for use in Life Science and In Vitro Diagnostics. The IMP Unit is designed to verify temperature and shake settings of laboratory equipment.

When using the IMP Unit in a Biosafety Laboratory Environment, the user of the IMP Unit is responsible for labeling the device according to the WHO Laboratory Biosafety Manual (ISBN 92 4154650 6). The user is furthermore responsible for operating the IMP Unit depending on the biosafety level regulations according to the WHO Laboratory Biosafety Manual.

2.2. Components

Figure 1 presents a survey over the components included in the delivery.

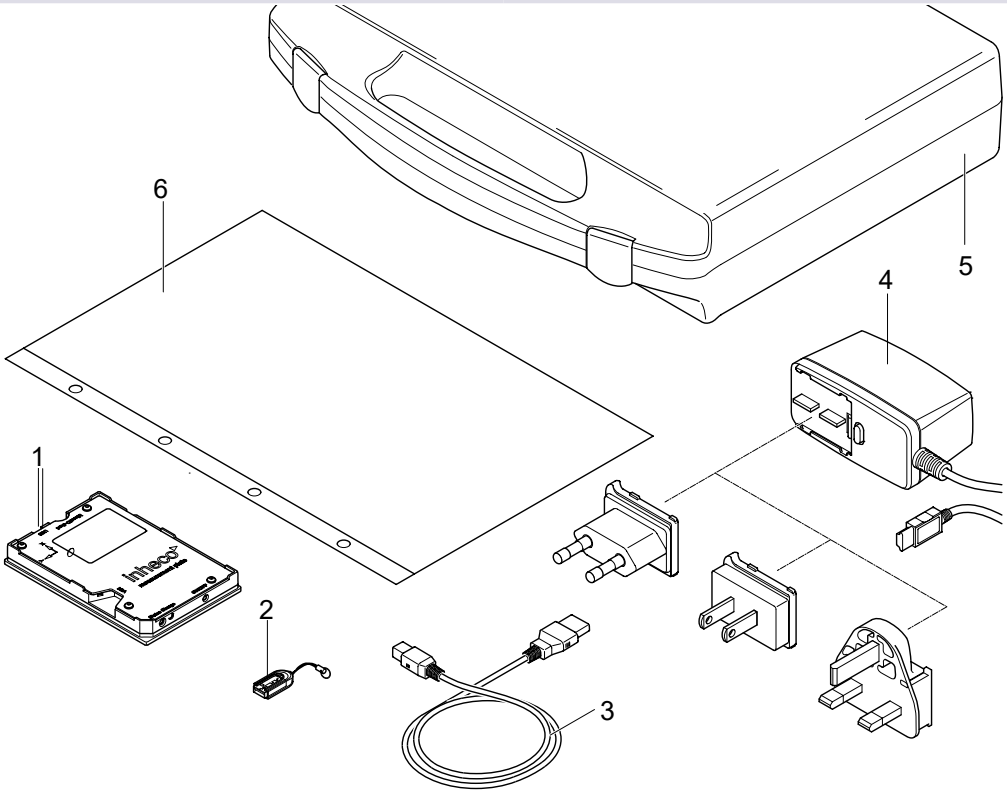


Fig.1: Components

(1) IMP Unit
(2) USB Memory Stick
(contains Software and Manuals)
(3) USB Cable
(4) Battery Charger
(incl. Adapter Euro, GB and US)
(5) Case
(6) Calibration Certificate

2.3. Functional Elements

Figure 2 introduces the terminology of the IMP Unit's functional elements of older IMP models with MicroSD-Card slot.

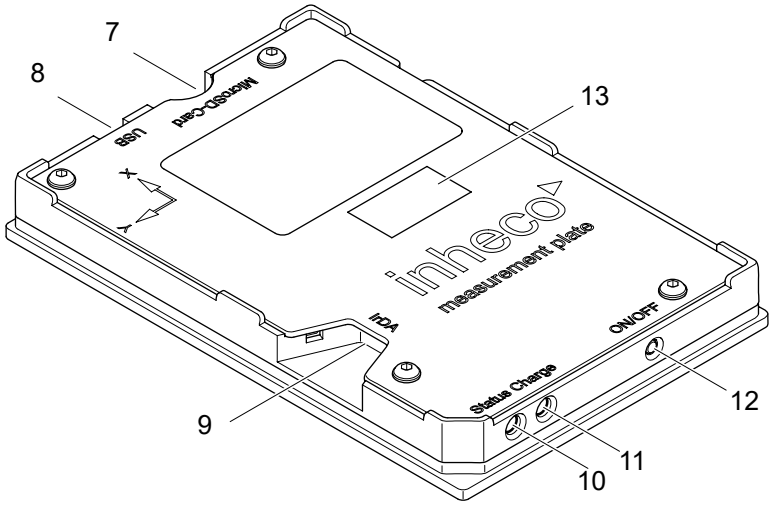


Fig.2: Functional Elements

(7) Micro SD-Card Slot
(8) USB Interface
(9) IrDA Interface
(10) Status LED
(11) Battery Charge LED
(12) ON/OFF Switch
(13) Calibration Mark

Figure 3 introduces the terminology of the IMP Unit's functional elements for models starting from September 2020 whithout Micro SD-Card slot.

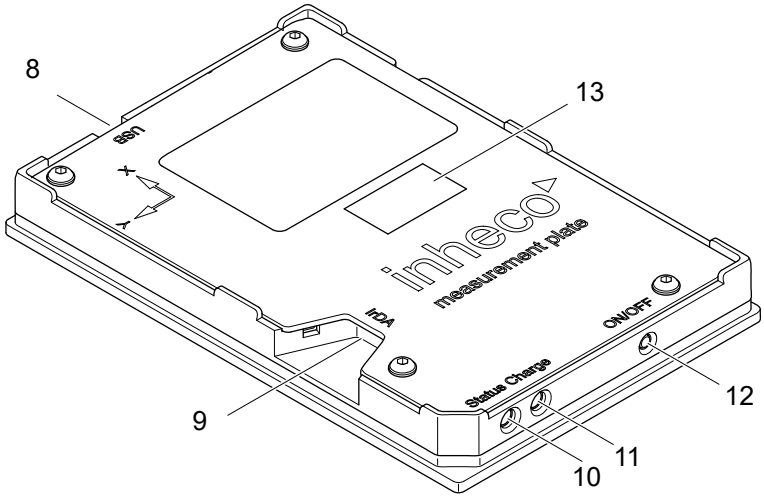


Fig.3: Functional Elements (numbers see Fig. 2)

Due to the discontinuation of the MicroSD card plug and no available adequate alternative for the MicroSD card plug INHECO will deliver from May 2021 on all IMPS without the MicroSD card slot.
The removal of the MicroSD card Slot has no effect on the functionality of the IMP as it was never possible to store data on the MicroSD card.

Labels

The labels on the IMP Unit and the Battery Charger contain important technical indications. The labels must not be removed. If a label has become illegible or falls off, it has to be replaced by a corresponding new label with matching information. New labels can be ordered from INHECO.

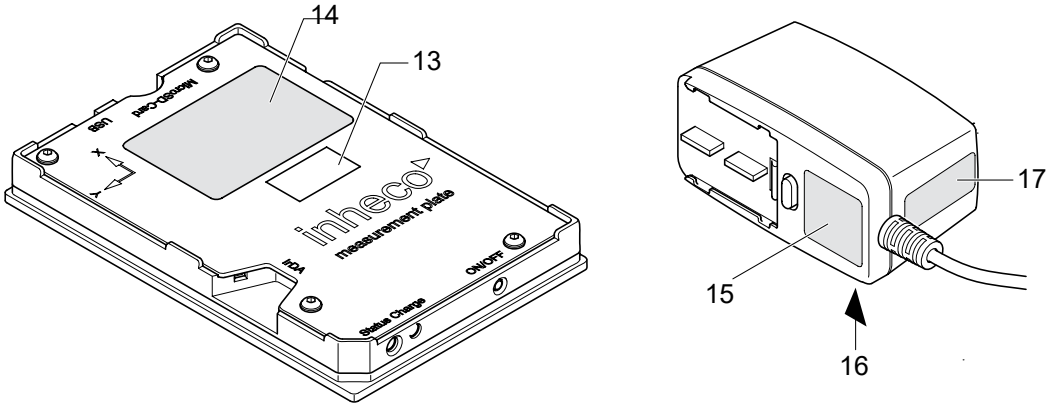
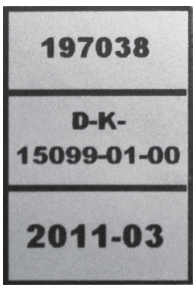


Fig.4: Labels

13

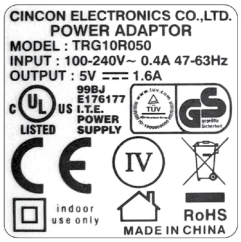


Calibration mark

14

Identification plate

15



Identification plate

16

Identification plate

17

Sealing

2.4. Technical Data

IMP Unit			
Dimensions	**Length**	128 mm	5.04 inch
	Width	86 mm	3.39 inch
	Height	15 mm	0.59 inch
Weight (excluding cables)		100 g	0.273 lbs
Input Voltage (USB-Connector)		5 Vdc, ±10%	
Input Current		0.2 A	
Fuse		internal	
Interface		USB 1.1 or 2.0	
		Micro-SD-Card	512 MB to 2 GB
		IrDA	
Protection Category		IP 20	
Temperature Sensors		10 digital sensors	
Shaker Sensor (3 axis)		max: ±6g	
Humidity Sensor		0-100% rel. humidity	

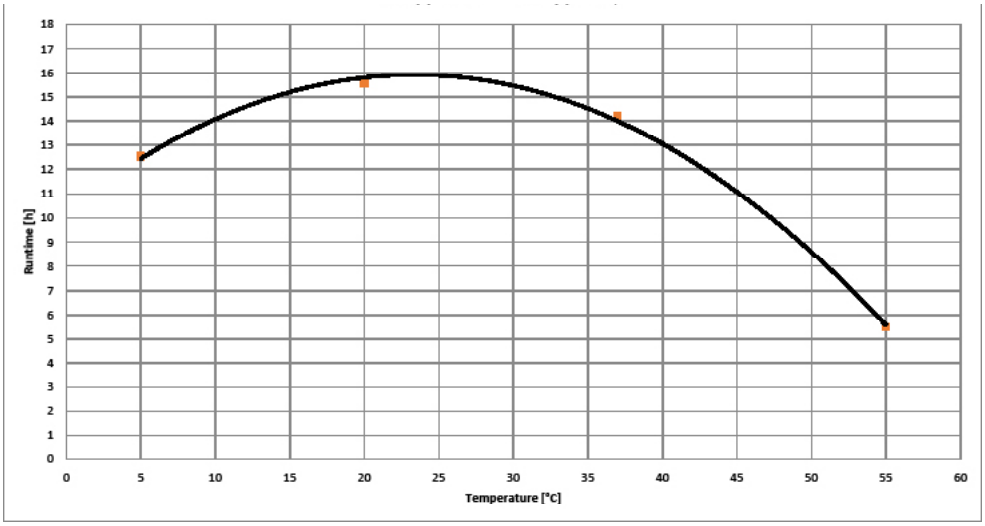
Battery Charger	
Input Voltage	100 to 240 V/AC
Output Voltage	5 Vdc
Input Current	0.4 A
Output Current	1.6 A
Safety Class	2
Power Frequency	47 to 63 Hz
Fuse	internal, resettable

Environmental Conditions			
Max. Operation Height		2000 m	6562 ft
Tolerable Relative Humidity	Operation	100 %, not condensing	
	Battery charging	80 %, not condensing	
	Transportation and storage	80 %, not condensing	
Temperature	Operation	+4 to +60°C	+41 to +140°F
	Battery charging	0 to +40°C	+32 to +104°F
	Transportation and storage	-10 to +60°C	+14 to +140°F
Temperature precision	Temperature precision	±0.1°C	
	Temperature accuracy	±0.1°C	
Movement precision	Frequence precision	±0.5 Hz	
	Frequence accuracy	±5 %	

2.5. Battery Lifetime and Runtime

At 23°C ± 5°C [73.4°F ± 9°F], the lifetime of the Li/Po battery lasts for at least 500 charging cycles. After that, the battery capacity can decrease to 60% of its original capacity. It is advisable to avoid unnecessarily long use of the IMP Unit at high temperatures during measurement.

The runtime of the IMP Unit depends on the charging level of the battery and the temperature during measurement. The following chart shows the relationship between temperature and runtime.



2.6. Battery Charging

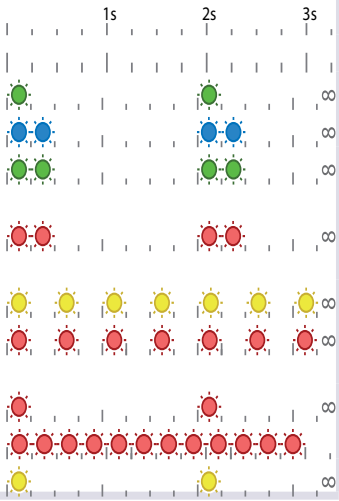
To charge the internal battery of the IMP Unit, connect the Unit to the power supply. The battery must be charged via the power supply. Do not charge the battery via the USB interface of a computer. During charging, the charge LED indicates constant green light. The LED blinks green when the charging process has finished.

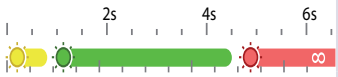
If the ambient temperature exceeds +40°C [+104°F], charging will stop automatically and the charge LED is blinking red.

In case of a battery charger malfunction the charge LED is shining red.

A nearly full discharge of the battery, e.g. after storing the IMP Unit for a long time with empty battery, causes a malfunction of the charge LED. After connecting the IMP Unit to charge the battery, the LED does not light. During a time of approx. 3 hours the IMP Unit is testing and conditioning the battery. When the charging process starts, the LED indicator turns back to constant green.

2.7. Status LED

Color	Type of flashing	Description
		
off		IMP Unit is off
green		IMP Unit is on
blue		IMP Unit is receiving or sending a message
green		Measurement is initialized. Measurement will start after delay time is expired.
red		Measurement is initialized, waiting to press the ON/OFF button.
yellow		ON/OFF is getting pressed.
red		ON/OFF button pressed for more then 5 seconds - blinks red just before switching off
red		Temperature measurement is running
red		Acceleration measurement is running
yellow		Measurement completed

Color	Timing	Description
yl, gn, r		ON/OFF Button getting pressed. Releasing the ON/OFF Button during yellow: no action Releasing the ON/OFF Button during green: Measurement will start after delay time is expired. Releasing the ON/OFF Button during red: IMP Unit is switched off

3 SAFETY INSTRUCTIONS

3.1. Product-specific Risks

WARNING
Follow the safety instructions given below in order to eliminate danger for user and device.

- The IMP Unit and its accessory must not come into contact with water or chemicals.
- The device must not be used in environments with risk of explosion.
- Never open the housing of the net adapter or the IMP Unit. There is no maintenance work within the units to be done by the user.
- Burning Hazard: Do not touch the Glass/Ceramic Plate at the bottom side after measuring. You could seriously burn your skin. The material's temperature can reach up to 60°C (140°F) depending on the measuring temperature! It takes a while to cool off after the unit has been used. Only touch the plate when it is cooled off.
- The device must not be used if the IMP Unit, the power adapter housing or the power cable show visible signs of damage.
- Original power supply and cables provided by INHECO have to be used to guarantee safe and proper operation.
- Make sure that the electrical specifications on the label at the rear panel of the battery charger meet your local situation.
- Always make sure that the unit is disconnected from the wall power outlet during measurement.
- Never connect or remove the power plug with wet hands.

3.2. Technical Alterations

- Do not alter the product. Any modification or change which is not approved by the manufacturer, leads to the loss of guaranty.
- The original parts are especially designed for the IMP Unit. Parts provided by other suppliers are not tested and can impair the functionality of the IMP Unit.
- For damages which may occur due to the usage of non original parts, liability is excluded by INHECO GmbH.

3.3. Malfunctions

- In case of a malfunction, switch off and disconnect the IMP Unit immediately.
  Make sure to inform the authorized person in charge.

4 SOFTWARE INSTALLATION

The following sections list the technical requirements and the stages of action for installing the IMP Server software. Please follow the instructions in the given order, depending on the used operating system. Ignoring the correct order may cause complications during installation. In case you have deviated from the correct process, we suggest you to deinstall the IMP Server software and to re-install it a second time.

4.1. System Requirements

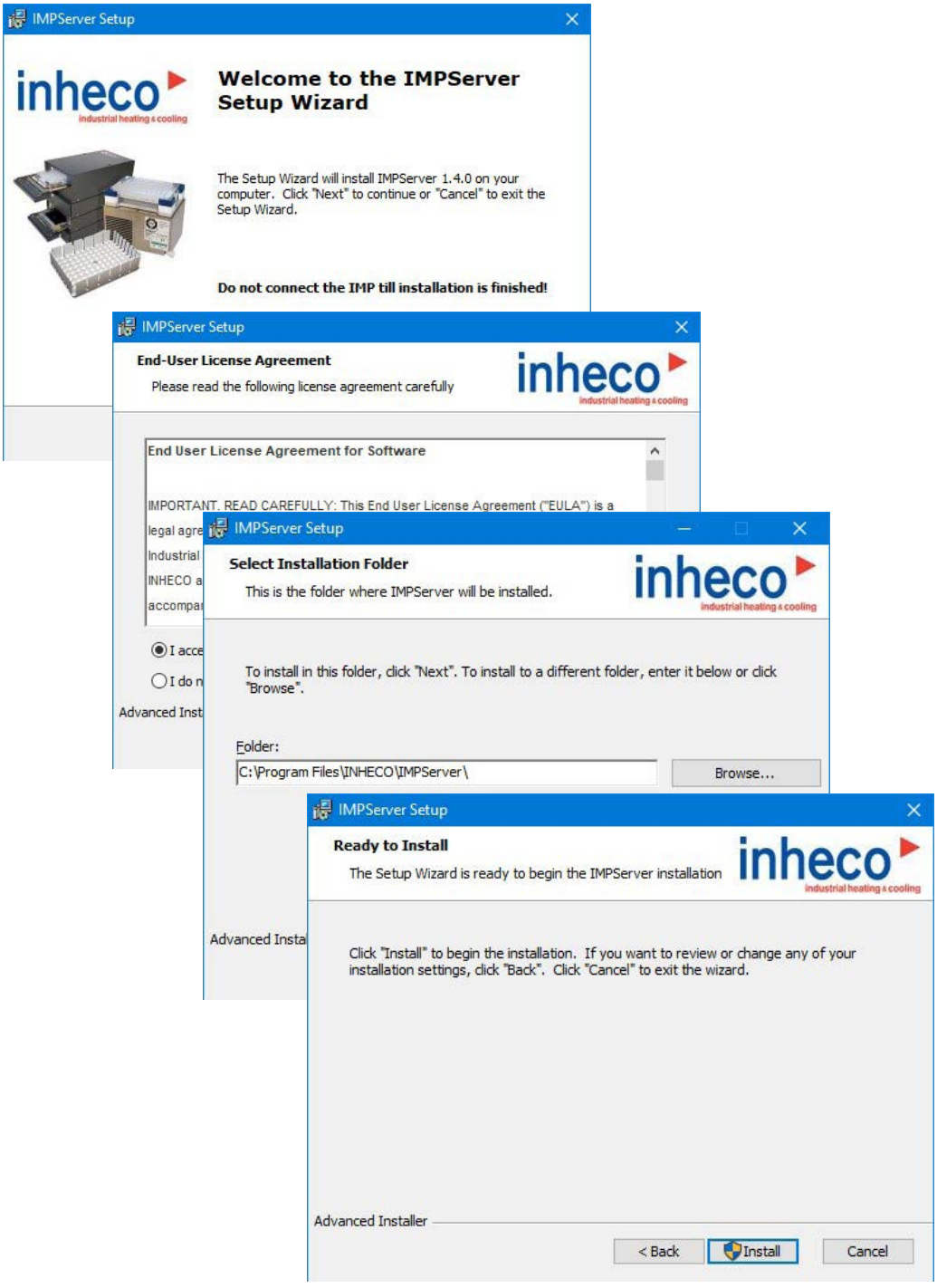
- Operating system: Windows 10
  Windows XP, Windows Vista or Windows 7 are still working but if you encounter problems not supported anymore
- Free USB port (USB 1.1 or 2.0)
- Minimal display resolution: 800 x 600 pixel

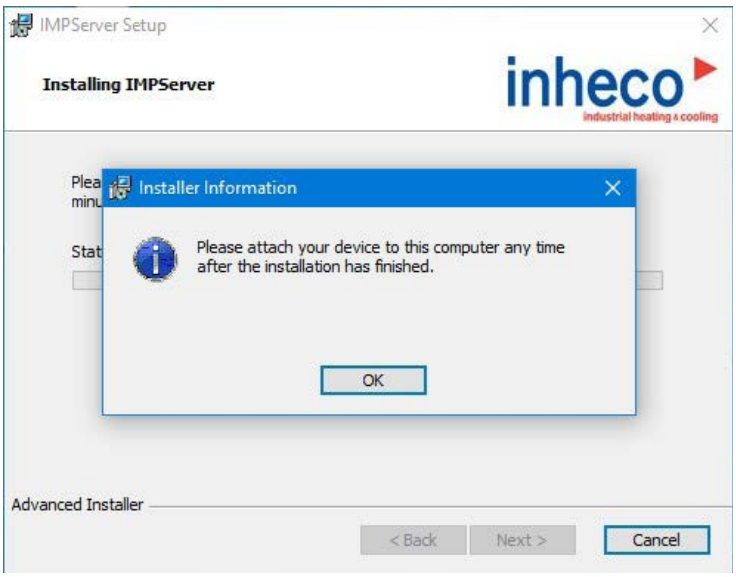
4.2. Windows 10

NOTE
Do not connect the IMP Unit to the computer before the installation routine asks you to do so.

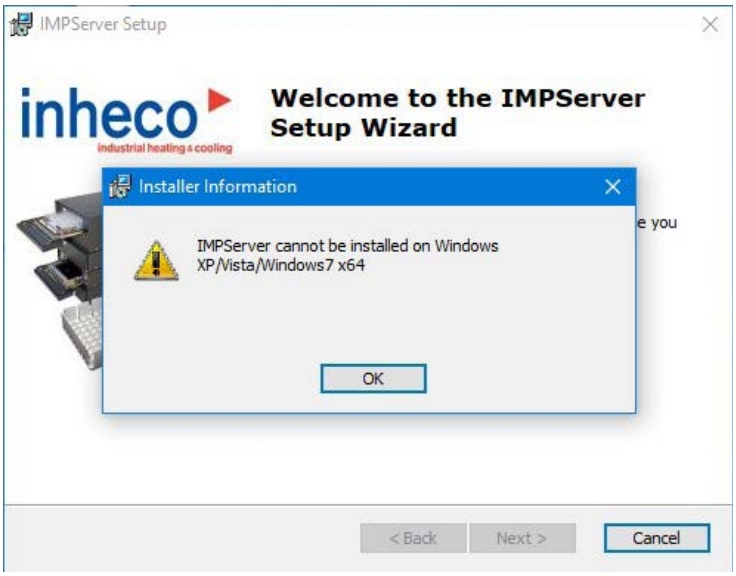
4.2.1. Installation

- Connect the accompanying USB Memory Stick to the PC and open the following file:
  IMPServer_Setup_x.x.x_Vista7
  The installation will start automatically.
- Follow the instructions in the dialogues given below.
  Additional dialogues could appear, depending on Windows configuration, user rights and firewall. For questions about these, please contact your administrator.



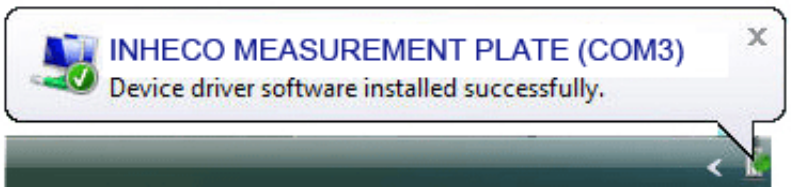


In case you have chosen the wrong installation (x64 instead of x32) file following error message will be displayed. In this case switch to the corresponding file for your system.



After the software and driver installation is completed, you can connect the IMP Unit to the PC. When connecting, the pre-installed driver will be loaded automatically.

Afterwards, the following Windows status message will appear at the lower right:

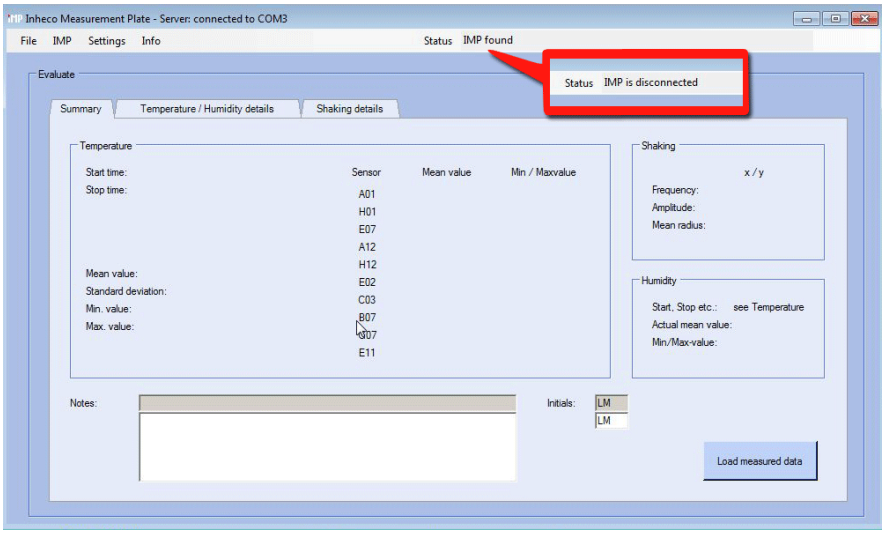


Then, the IMP Unit is given a free COM port by the operating system automatically. Before initialising the program, the connected COM port has to be known (→Tab „Connection“, page 41).

Then please continue with → Start IMP-Server Software, page 20.

4.3. Start IMP-Server Software

- Make sure that the IMP Unit is connected.
- Open the software by double-clicking on the icon shown here.
  After the installation, this icon appears on the desktop or under
  Start > All Programs > Inheco > IMPServer.
  The following screen is shown:



If the COM-Port cannot be identified (e.g. at initial installation or after modification of connected hardware), an error message is issued indicating that the COM port is not found.

In this case, make sure that the IMP Unit is correctly connected and assign the COM-Port → Tab „Connection“, page 41.

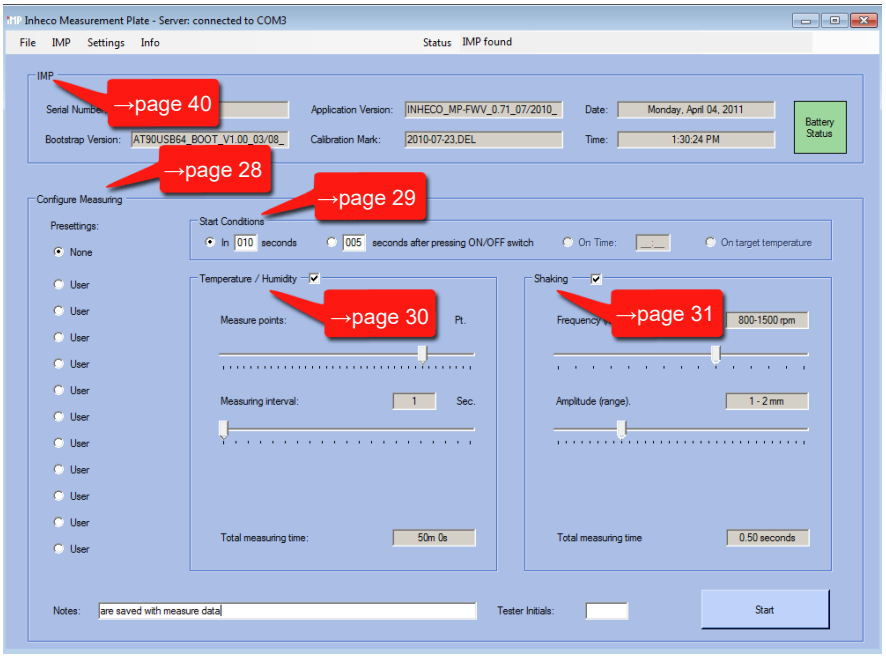
If the internal time settings of the IMP Unit and the computer‘s time settings do not correspond, a further dialog box will appear after connecting the Unit
→ Time and Date Settings, page 39.

4.4. Uninstall IMP Server Software

NOTE
The IMP Unit must be disconnected from the computer before deinstalling the IMP-Server.

- Click on Start > All Programs in the taskbar.
- Select IMP Server.
- Select Uninstall.
- Follow the instructions in the dialogue boxes.

5 DAILY USE



In this chapter, you will find a description of the most frequent working processes with the IMP Unit. The screen is divided in several areas that will be explained in detail in the following sections. The red text bubbles list the corresponding page for each section.

5.1. Collect Measurement Data

In the following, a typical measurement procedure with the IMP Unit is given.

- Connect the IMP Unit to the PC via USB cable.
- Start the IMP Server → Start IMP-Server Software, page 20.
- Select IMP > Configure.
- Select the required conditions for starting the measurement data acquisition under Start Conditions.
- Select in the checkboxes if you wish to measure Temperature / Humidity and/or Shaking.
- Set the required parameters for the measurement you wish to run:
  → Section „Temperature / Humidity“, page 30
  → Section „Shaking“, page 31
- If necessary, you can enter a comment concerning the measurement in the the Notes area.
- Enter your initials into the field Tester Initials (2-3 letters).
  Without tester initials the measurement cannot start.
- Click on the button Start.
- Disconnect the IMP Unit from the computer.
- Place the IMP Unit at the measuring location.

NOTE
The IMP Unit may only be operated in a flat and even position.

After the selected start delay, the measurement starts. If you selected a manual start, keep the ON/OFF button pressed for 1-2 seconds with an unpointed object (e.g. a pen or pencil), until the status LED lights green.

During measurement the status LED is flashing red → Status LED, page 11.

The termination of the measurement is indicated by an acoustic signal → IMP Unit Sounds, page 40, and blue light flashing on the status LED → Status LED, page 11.

5.2. Abort Measurement

If you don‘t wish to continue with an ongoing measurement, you can cancel it easily by overwriting it with a new one → Status LED, page 11.

It can also be stopped by switching the IMP Unit off or by reading the data previously recorded → Turn off the IMP Unit, page 25.

5.3. Load Measured Data from the IMP Unit

After completing the measurement, the data stored in the IMP Unit can be loaded as follows:

NOTE
Measurement should only be completed when the temperature and shaking has settled. From our experience this takes about 30 minutes.

- Connect the IMP Unit to the PC via USB cable.
- Start the IMP Server → Start IMP-Server Software, page 20.
- Select IMP > Evaluate.
- Click on the button Load measured data

While loading, the dialog with the number of measuring points to be loaded will appear. After the loading process, the dialog box will close and the area
Evaluate > Summary will display a summary of the collected data.

5.4. Save Measured Data

- Select File > Save File.
- Enter a filename and select the target file location.
- Click on the button Save.

The measurement incl. all data and diagrams will be saved; it can be retrieved at a later date.

5.5. Retrieve Stored Measurement Data

For the retrieval of stored data, the IMP Unit does not have to be connected to the PC.
- Double-click with the left mouse button on the IMP File you wish to view.
  The stored data collection is on display.

5.6. Print Measurement Data

When printing measurement data, you can select different settings (only the summary or together with charts) to be printed → Tab „Format“, page 42.

- Select File > Print Protocol.
- Click on the button Print.
- Select printer and required settings in the printing dialog.
  The protocol consists of 1 or 2 pages.

5.7. Export Measurement Data

- Select File > Export to csv-File.
- Enter a filename and select the target file location.
- Click on the button Save.

The measurement will be saved as csv file (i.e. comma-separated values) which can be opened with standard software, e.g. Microsoft Excel or a text editor.

5.8. Test of Temperature and Humidity Sensors

The sensors can be checked easily and quickly with a plausibility check under the menu item Real-Time view :

- Connect the IMP Unit to the PC via USB cable.
- Start the IMP Server → Start IMP-Server Software, page 20.
- Select IMP > Real-Time view.
  Real-Time view will open and the tab Temperature / Humidity is pre-selected.
  The online measurement will start automatically.
- Check if every single one of 11 sensors (10 temperature sensors and 1 humidity sensor) is being recorded and the values of the temperature sensors differ from each other only within a plausible range.

The legend on the right hand side lists all sensors. You can select them one by one by individual checkboxes. The sensors' positions can be displayed under the menu item Info > Sensor Positions → Sensor Positions and Shake Directions, page 47.

5.9. Test Shake Sensors

The sensors' funcionality can be checked easily and quickly
under the menu item Real-Time view:

- Connect the IMP Unit to the PC via USB cable.
- Open the IMP Server.
- Select IMP > Real-Time view.
  Real-Time view will open and the tab Temperature / Humidity is pre-selected.
- Select the tab Inclination.
- Put the IMP Unit to rest on each of its six sides and wait each time, until the display shows a stabilized measuring. For reasons of gravity, each of the sensors has to measure an acceleration of 1 g. This is shown by the fact that a value indicates +1g resp. -1g.
  Is this the case in all six directions, the shake sensors perform correctly.

5.10. Charging the Battery

To make sure that an ongoing measurement does not stop for lack of power capacity in the IMP, you should always check the state of charge before running a measurement. Pay attention to the information on the battery status → IMP Unit Info, page 40 display.

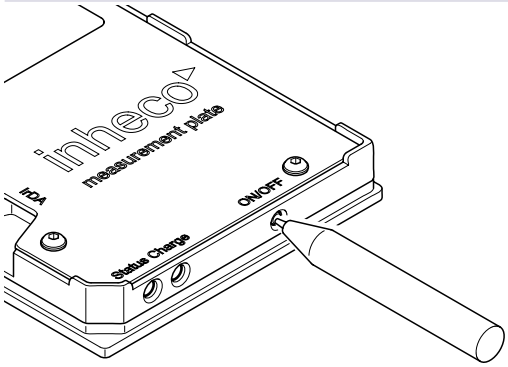
Charging:

- Connect the country-specific adapter to the Battery Charger.
  During charging, the charge LED shows permanent green light. When charging is over, the LED is flashing green.
  Note that charging the IMP via computer will be interrupted during energy-saving periods (Snooze or sleeping mode).
  Therefore, charging by mains plug is suggested.

5.11. Turn off the IMP Unit

- Keep the ON/OFF button of the IMP Unit pressed with an unpointed object (e.g. a pen) for at least five seconds, until the status LED lights red.

After releasing the switch, the status LED blinks red for another two seconds and then the IMP Unit switches off.



6 USER INTERFACE

In the following sections, menus and screens of the IMP Server software are explained in systematic order. The sections serve as a reference and provide details on the software's operating elements.

6.1. Menu „File“

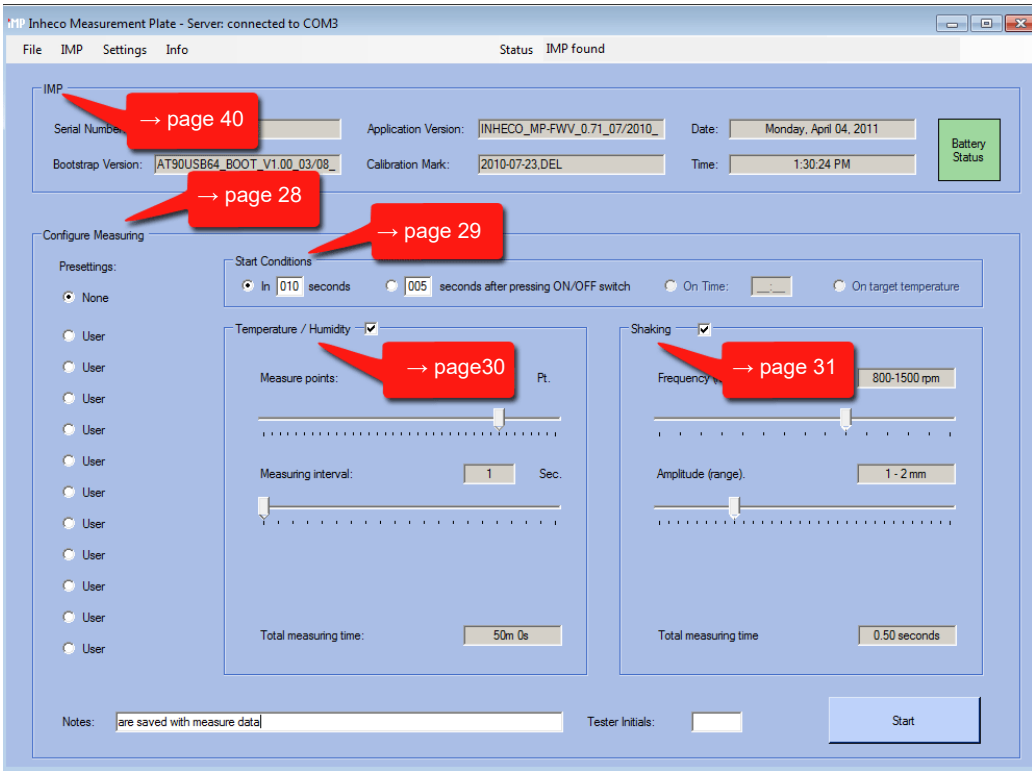
New IMP connection	If the IMP Unit was not connected to the computer when starting the software, or the connection has been cut temporarily, you can connect it using this menu item.
Open File	To retrieve stored measurement values.
Recent Files	To show a list of 9 files previously opened.
Save File	To save actually called data.
Export to csv-File	To export actually measured values (incl. all data for evaluation) to a csv file. This can be opened with standard software, e.g. Microsoft Excel or a text editor.
Print Preview	To show a print preview of the measured data set presently shown. The first screen displays the header, IMP information and summary, the second one temperature, humidity and/or shake charts. You can only see charts in the preview and print them, if the item *with details* under *Settings > Options* is activated ⟶ Tab „Connection“, page 41.
Print Protocol	To print the measurement presently called. The first screen displays the header, IMP information and summary, the second one temperature, humidity and/or shake charts. Charts are only included in the print, if you have activated the function *with details* under *Settings > Options* ⟶ Tab „Connection“, page 41.
Exit	To close the IMP Server.

6.2. Menu „IMP“

Configure	To set the measurement parameters and start measuring.	→ Screen „Configure“, page 27
Evaluate	To load and evaluate measurements.	→ Screen „Evaluate“, page 32
Real-time view	Real-time view is to check the functionality of temperature, humidity and shake sensors quickly and easily.	→ Screen „Real-time View“, page 37
Time and Date Settings...	To configure date and time settings and to handle time differences between IMP Unit and PC.	→ Time and Date Settings, page 39
Turn on IMP Sounds	To turn on or off the sounds of the IMP reporting the end of a measurement or a low state of charge.	→ IMP Unit Sounds, page 40
Show IMP Info	Displays the IMP Unit Info about the actually connected IMP, its time and date settings and state of charge.	→ IMP Unit Info, page 40

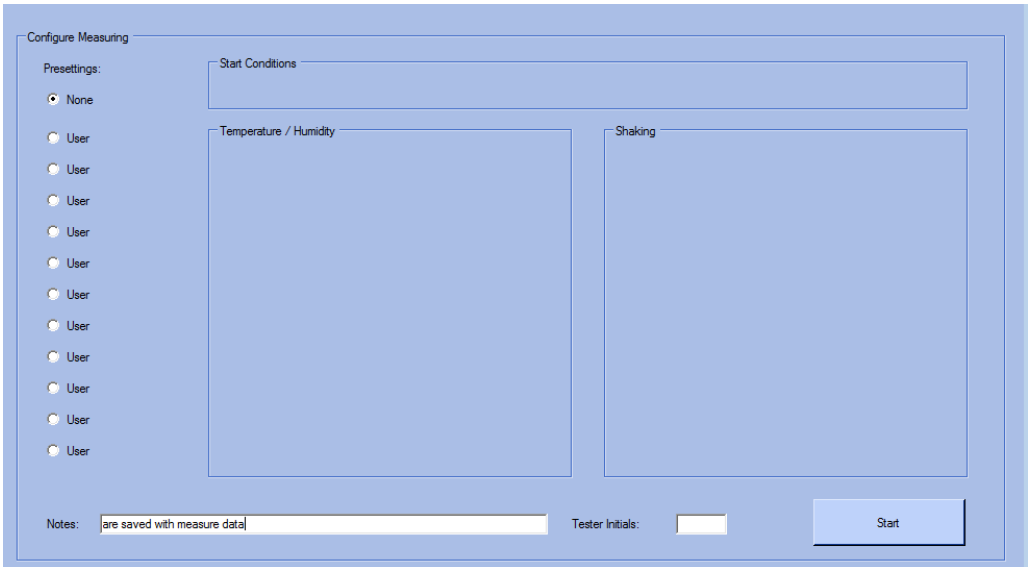
6.3. Screen „Configure“

- Select IMP > Configure (available only if an IMP Unit is connected).
  The following screen is displayed.



The screen is divided in several areas that will be explained in detail in the following sections. The red text bubbles list the corresponding page for each section.

6.3.1. Section „Configure Measuring“



Presettings	Radio buttons to set temperature and shaking conditions of a measurement.	
	None	To reload the settings of the last measurement from the connected IMP
	User Settings 1 User Settings 2 ... User Settings 10	To select from user-specific settings with individual measurement conditions. Settings are saved for subsequent use
Start Conditions	⟶ Section „Start Conditions“, page 29	
Temperature / Humidity	⟶ Section „Temperature / Humidity“, page 30	
Shaking	⟶ Section „Shaking“, page 31	
Notes	The tester can enter notes up to 50 characters. These notes are saved during the measurement process and will be part of the protocol.	
Tester Initials	To identify the person performing the measurement. Two or three characters have to be entered before the measurement can be started.	
Start	If the settings are complete, this button needs to be pressed starting the measurement according to the settings made in the *Start Conditions* ⟶ Screen „Configure“, page 27.	

6.3.2. Section „Start Conditions“

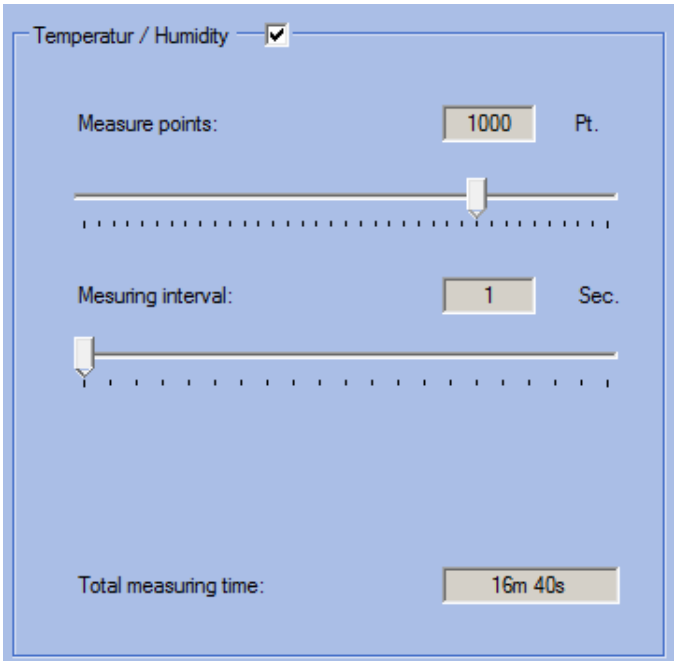
In this section, different ways to start an IMP measurement can be selected.

In ... seconds	After pressing the button *Configure and start,* the run starts after the selected number of seconds. Values between 1 and 999 seconds (about 16 minutes) can be entered.
... seconds after pressing ON/OFF switch	The measurement starts n seconds after the ON/OFF switch of the IMP Unit has been pressed for 1-2 seconds. Values between 1 and 999 seconds (about 16 minutes) can be entered.
On Time: ...	The measurement starts at the entered time. It refers to the intern time of the IMP Unit, which can be seen in the *IMP Info* ⟶ Menu Info, page 46.
On target temperature	The measurement starts when the entered target temperature has been achieved1).

1) Not yet available

6.3.3. Section „Temperature / Humidity“

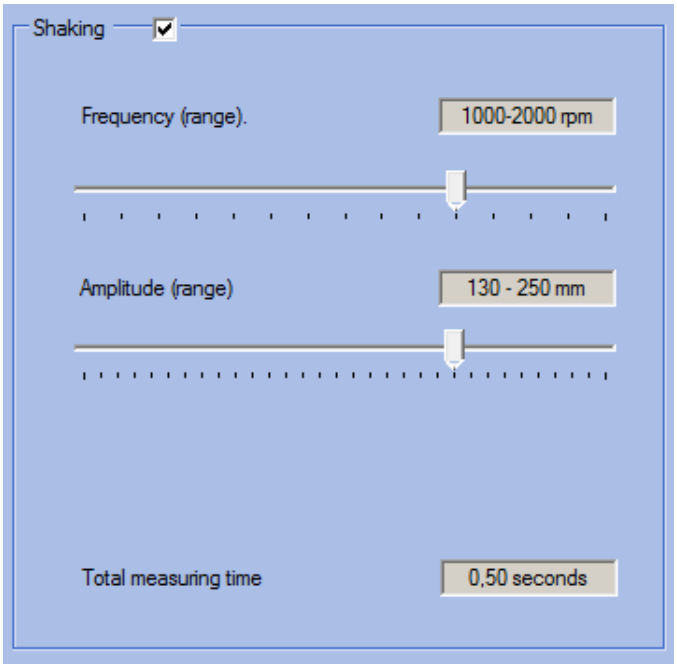
In this area, you can select the settings for temperature and humidity during measurement.



Checkbox	To activate the temperature and humidity measurement.
Measure points	Use the slide control to set the number of measuring points. The number is displayed in the box above the slide control.
Meauring interval	Use the slide control to set the interval (in seconds) between the measure points. The number is displayed in the box above the slide control.
Total measuring time	The total measuring time is the result of the chosen measurement points and intervals.

6.3.4. Section „Shaking“

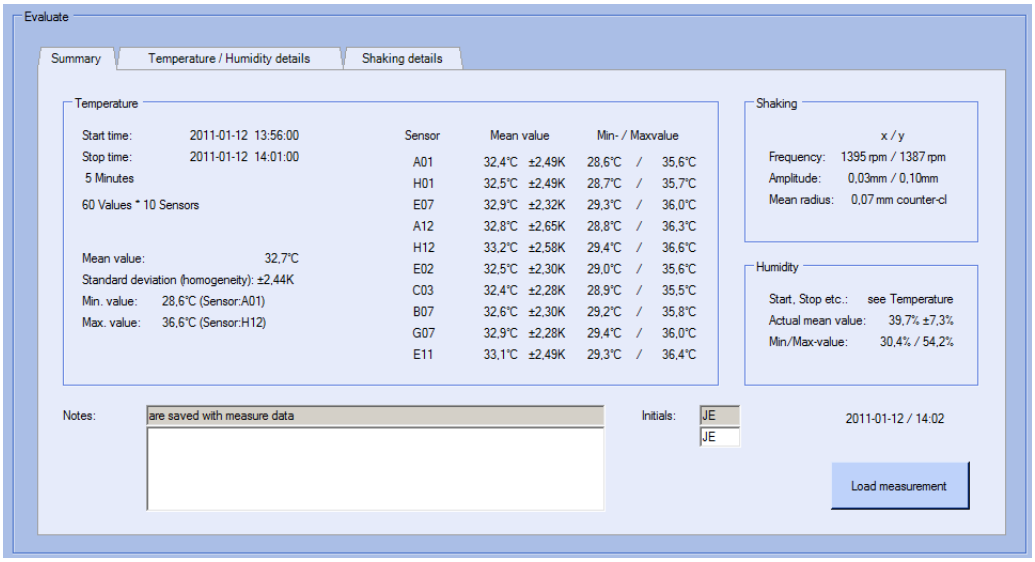
In this section, the settings of the shake measurement can be selected.



Checkbox	To activate the shake measurement.
Frequency (range)	Use the slide control to set the measuring range for the expected shake frequency.
Amplitude (range)	Use the slide control to set the measuring range for the expected shake amplitude.
Total measuring time	The total measuring time is calculated from the frequency range.

6.4. Screen „Evaluate“

- Select IMP > Evaluate



The screen Evaluate is used for importing and viewing actual measurement data in the IMP Unit or for viewing data stored in PC files. It can be selected via Menu > IMP > Evaluate. Initially, the summary is displayed. It gives an overview of the measurement results and additional information, such as starting and ending time, comments etc.

In the Temperature section at the top left, the starting and ending time of the measurement and the number of measuring points are shown. Further down, details on the mean values, standard deviation and minimum/maximum temperatures are given. Here, the values of all sensors are combined. The individual values of the 10 temperature sensors are visible on the right hand side of the Temperature section.

In the Shaking section, information on the measured frequency and maximum amplitude of movements in x and y directions and the mean radius is displayed.

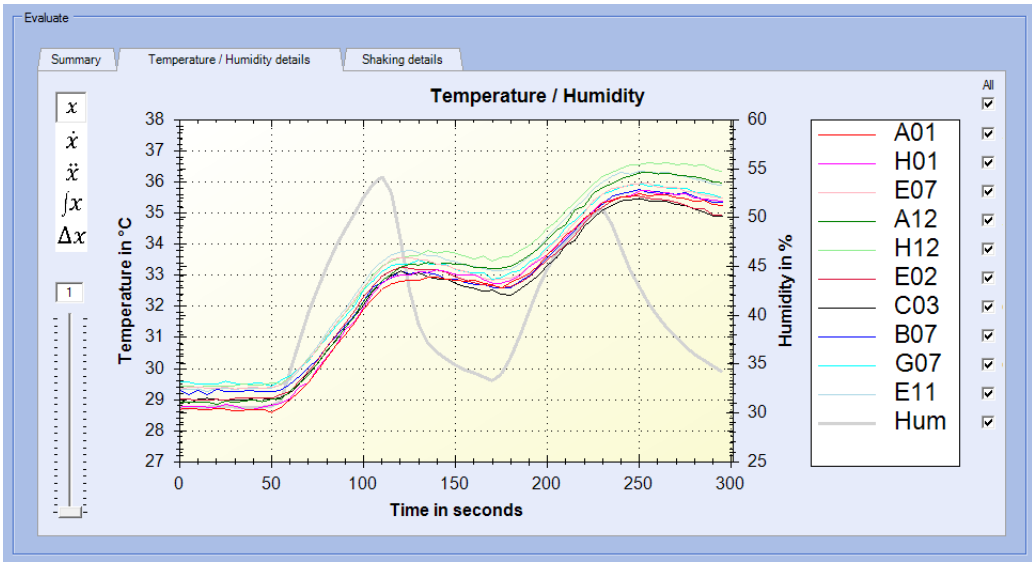
In the Humidity section, you can see the average value - with standard deviation - as well as minimum and maximum values.

In the field Notes, the notes entered before starting the measurement and, next to it, the tester initials are displayed. Moreover, the present time and date are indicated.

Details on temperature, humidity and shaking can be viewed by selecting the relevant tab.

By clicking on the button Load Measurement, data currently saved in the IMP can be read.

6.4.1. Tab „Temperature / Humidity details“



The Temperature/Humidity diagram shows the chronological course of all measured values of the 10 temperature sensors and the humidity sensor (gray, thicker line).

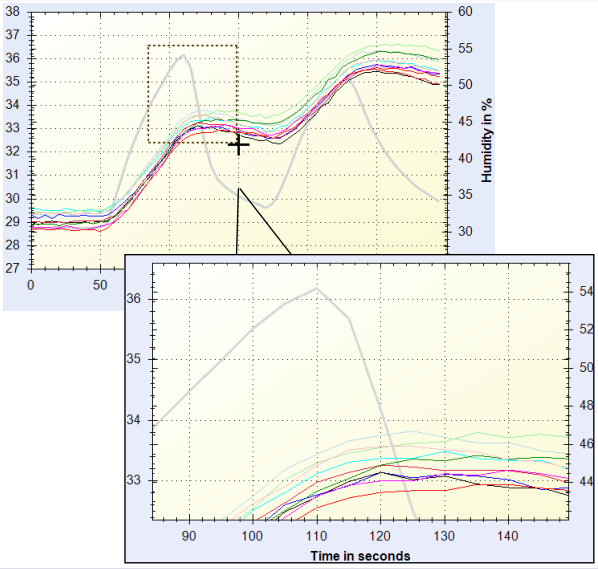
To zoom in, you can select a rectangular part of the chart by the left mouse button.

The chosen extract will be displayed in a chart-filling format after releasing the mouse button.

In the context menu (right mouse button), there is the item Un-Zoom.

By activating this, the chart gets back to its original size.

The zoom factor can be modified via mouse wheel.



NOTE
The temperature is shown in degree Celsius (°C). Shifting to Fahrenheit (°F) is possible in Settings > Options > Units.

On the right side of the chart, you can see the legend. This legend identifies all 10 temperature sensors and the humidity sensor (Hum) with their matching display colours in the chart. By clicking the checkboxes, they can be selected or deselected individually.

The sensor positions can be seen under the menu item Info > Sensor Positions or on page 47 in this manual.

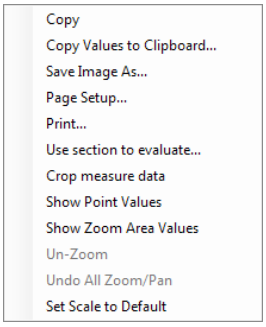
At the bottom left, there is a slide control to define the number of values that may form a moving average. In the sample chart, the set value is „1“. The standard settings are to be selected in Settings > Options... → Tab „Connection“, page 41.

At the top left, you can select other display features. These are summarized in the following table:

x	Normal View
$\dot{x}$	First time derivative
$\ddot{x}$	Second time derivative
$\int x$	Integral of the function
Δx	Average and sensors‘ deviation from mean value

The context menu of the chart provides additional features for the measurement data processing:

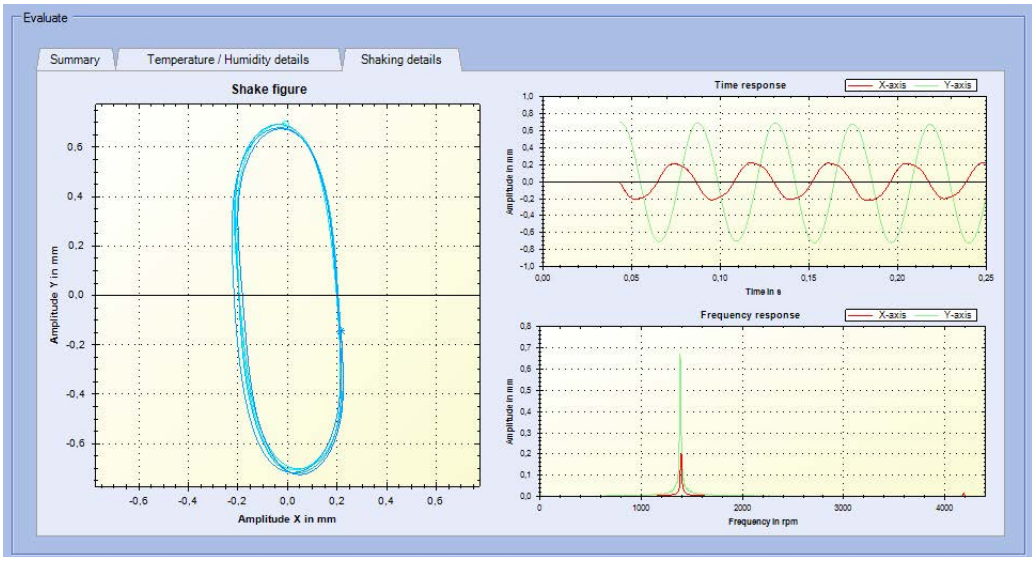
- Right mouse-click on a temperature and humidity chart.
  The following context menu is shown.



Copy	To copy the diagram to the clipboard.
Copy Values to Clipboard...	To copy the temperature values to the clipboard. A dialog is opened to select if the values are to be saved at the beginning or at the end of the selected section or both. Moreover, you can define how measured values should be separated from each other (*separator)*.
Save Image As...	To save the diagram as image file (emf file) to a user-defined location.
Page Setup...	To specify format settings for printing the chart.
Print...	To print the chart.
Use section to evaluate...	Customer-specific check of the measurement results.[1)]
Crop measure data	To crop measured data to the currently selected section or zoomed focus. This action cannot be undone.
Show Point Values	If this function is activated, you can view the measurement points‘ relevant time, temperature and humidity values on mouseover.
Show Zoom Area Values	To define the zoomed area of the chart exactly, its numerical values can be indicated here.
Un-Zoom	To undo the last zoom or shifting action.
Undo All Zoom/ Pan	To undo all zoom or shifting actions so far.
Set Scale to Default	This will set the most appropriate zoom or display area for the actual chart.

1) On customer's demand

6.4.2. Tab „Shaking details“



The Shaking area shows three diagrams.

In the chart Shake figure the shake movement is shown as figure (locus curve). Here, shape and regularity of the shake movement can be evaluated in its x and y directions.

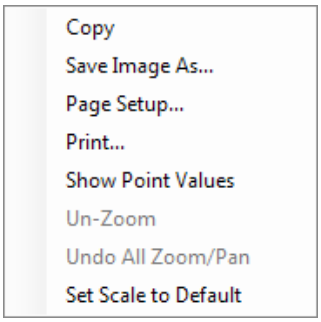
The chart Time response shows the amplitude of movement components in both axes on a timeline. The red line stands for the x axis movement, the green one for the y axis.

In the chart Frequency response you can see the components‘ range of the shaking movement. Again the red line stands for the x direction, green for the y direction.

To zoom in, you can select a rectangular part of the chart by the left mouse button.
The chosen extract will be displayed in a chart-filling format after releasing the mouse button.
In the context menu (right mouse button), there is a function Un-Zoom.
By activating this, the chart gets back to its original size. The size of the image can be modified. by clicking the mousewheel on the respective chart.

The context menu of the charts provides other functions for processing the measured data:

- Right mouseclick on a Shake chart.
  The following context menu is shown.



Copy	To copy the right-clicked chart to the clipboard.
Save Image As...	To save the right-clicked chart as image file (emf file) to a user-defined location.
Page Setup...	To specify format settings for printing the chart.
Print...	To print the right-clicked chart.

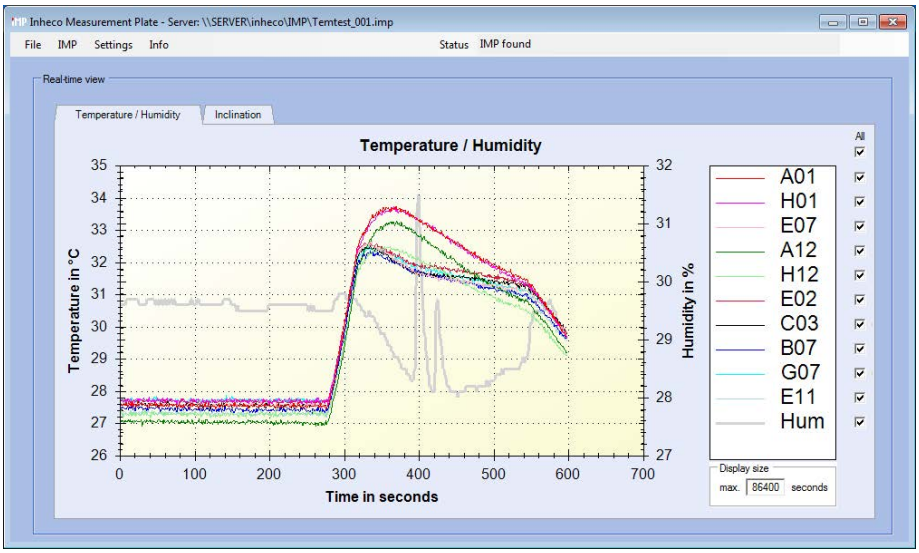
Show Point Values	Is this feature enabled, placing the cursor on a measurement point will show corresponding values in x and y axis. It has to be activated for each chart individually.
Un-Zoom	To undo the last zoom or shifting action.
Undo All Zoom/ Pan	To undo all zoom or shifting actions so far.
Set Scale to Default	This will set the most appropriate zoom or display area for the actual chart. This feature can be applied, for example, if a chart shows only a part of the measured values and you wish to view the entire measuring range.

6.5. Screen „Real-time View“

Real-time view helps to check the functionality of temperature, humidity and shake sensors quickly and easily.

6.5.1. Tab „Temperature / Humidity“

- Select IMP > Real-time view (available only if an IMP Unit is connected).
- Select the tab Temperature / Humidity.
  The following screen is displayed.



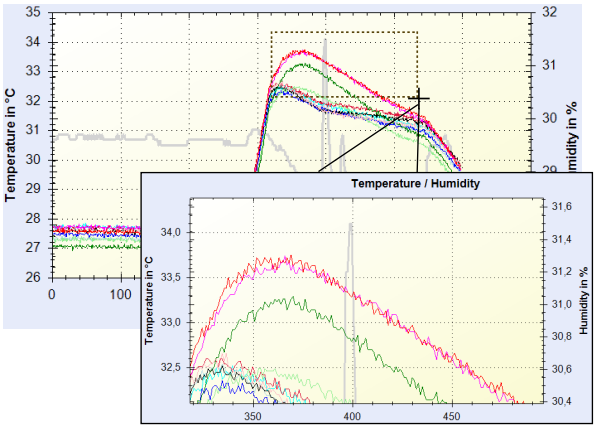
The sample chart shows the temperature scale on the left side and the humidity scale on the right side. The x axis displays the time in seconds during measurement. The time unit in Real-Time view is invariable.

To zoom in, you can select a rectangular part of the chart by the left mouse button.

The chosen extract will be displayed after releasing the mouse button in a chart filling format.

In the context menu, there is the item Un-Zoom.

By activating this, the chart gets back to its original size. The zoom factor can be modified via mouse wheel.



On the right side of the chart, you can see the legend. This legend identifies all 10 temperature sensors and the humidity sensor (Hum) with their matching display colours in the chart. By clicking the checkboxes, they can be selected or deselected individually.

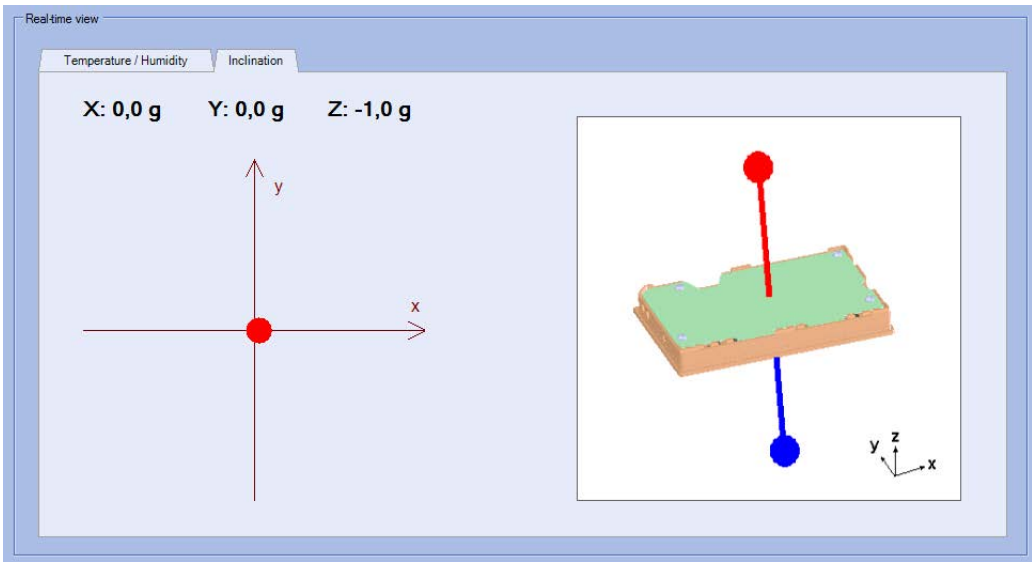
In the field below the legend, you can select the display‘s time slot in seconds.

To balance short-term fluctuations and to improve the display in the chart, a moving average may be formed from a arbitrary number of values.

In Real-Time view, the number of values can be modified only under Settings > Options > Other → Tab „Other“, page 45.

6.5.2. Tab „Inclination“

- Select IMP > Real-time view (available only if an IMP Unit is connected).
- Select the tab Inclination.
  The following screen is displayed.



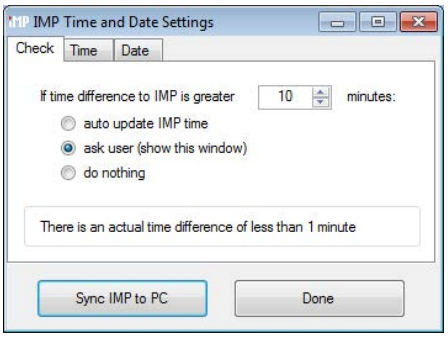
On the left side, the force actually acting on the sensors is shown. Is the IMP Unit positioned on its underside (e.g. like image right), so gravity acts on the z sensor with -1.0g.

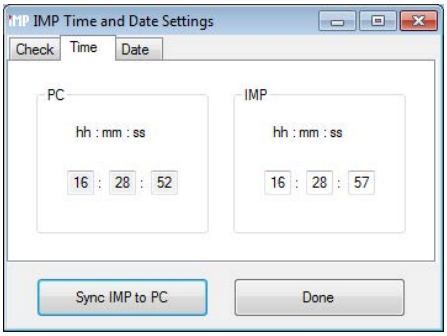
Since no force is acting on x and y sensors in resting position, the chart shows exact vertical, perpendicular position (red dot).

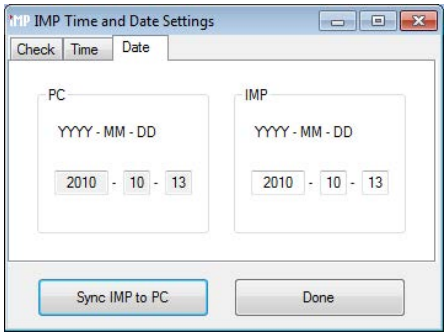
Further information → Test Shake Sensors, page 24.

6.6. Time and Date Settings

- Select IMP > Time and Date Settings... (available only if an IMP Unit is connected). Following dialogs can be selected by the relevant tab.



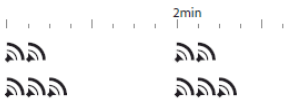




Check	To indicate a potential time difference between IMP Unit and computer. Chose from the possibilities offered to handle the situation. The actual time difference is shown below the radio buttons.	
	If time difference to IMP greater ... minutes	To specify a time difference for operating one of the following options.
	auto update IMP time	Is this option enabled and the pre-selected time difference has been exceeded, the IMP Server will synchronize time automatically to the PC time setting when it is connected. Time data belonging to measurements stored in the IMP is not affected.
	ask user (show this window)	Is this option enabled and the pre-selected time difference has been exceeded, the user will be asked upon connection of the IMP by opening this dialog -for further proceeding and -manual modification of time setting is possible
	do nothing	If the time difference between IMP Unit and computer is insignificant and can be ignored, this is the right option.
Time / Date	Indicates time / date settings.	
	PC	PC time / date. For comparison only (no data input).
	IMP	IMP Unit time / date for manual entry.
	Sync IMP to PC	Synchronizes the IMP Unit on the PC's time / date.
	Done/ Set IMP date / time	Time or date settings entered manually can be saved by clicking this button.

6.7. IMP Unit Sounds

The IMP Unit emits the following sound signals:

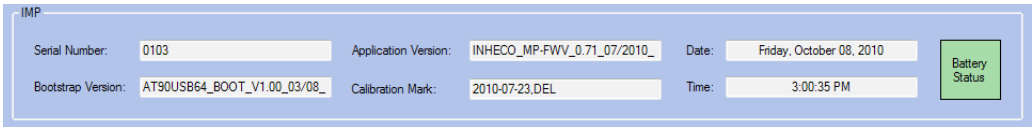
Sound timing	Description
	Measurement terminated. Battery charge state very low, IMP will switch off automatically after approx. 30 minutes.

IMP sounds are activated on default. Sounds can be switched on and off under the menu item „IMP“.

6.8. IMP Unit Info

This area shows specific information on IMP-Hardware, battery status, date and time of the IMP Unit.

- Select IMP > Show IMP Info (available only if an IMP Unit is connected).
  The following area is displayed on the main screen.



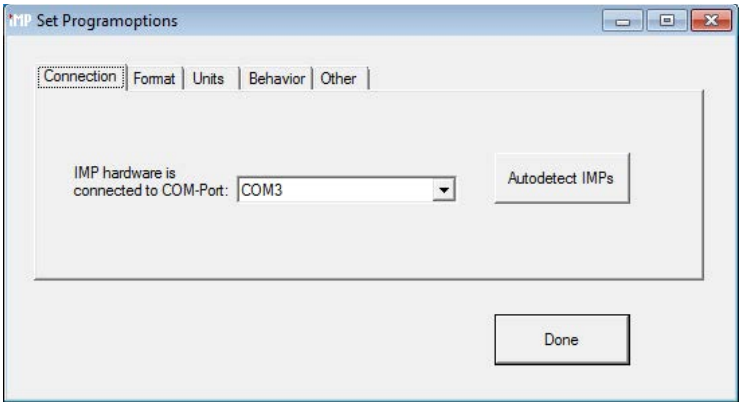
Serial Number	Displays the serial number of the connected IMP Unit.
Bootstrap Version **Application Version**	In case of questions or problems with the IMP Unit, please state these version numbers.
Calibration Mark	To display the last calibration date of the IMP Unit. For detailed information see calibration certificate contained in the shipment.
Date **Time**	To display the internal date and time of the IMP Unit. Please note that time and date settings may be different from PC settings ⟶ Time and Date Settings, page 39.
Battery Status	The color of this button (green, yellow or red) displays the state of charge of the IMP internal battery: Red: less than 40 % of the battery capacity Yellow: 40 % - 60 % Green: 60 % - 100 %

6.9. Menu Settings

Options...	Connection	⟶ Tab „Connection“, page 41
	Format	⟶ Tab „Format“, page 42
	Units	⟶ Tab „Units“, page 43
	Behavior	⟶ Tab „Behavior“, page 44
	Other	⟶ Tab „Other“, page 45
Service Menu	The service menu is password protected and for service staff only.	

6.9.1. Tab „Connection“

- Select Settings > Options... > Connection
  The following dialog is displayed.

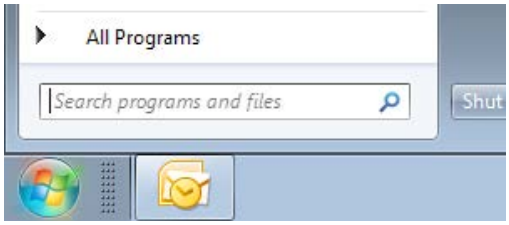


IMP hardware is connected to COM-Port	To show a list of available COM ports. Set the correct COM port of your IMP Unit here.
Autodetect IMPs	Scan all COM ports for connected IMP Units. Note: Other PC-connected USB devices may produce unexpected reactions to the scanning process.

At program start and in daily use of the IMP Unit, the assigned COM port should be known. Otherwise, you can use the following procedure in order to identify the assigned COM port.

6.9.1.1. COM port identification

- Connect the IMP Unit via USB cable to the PC.
- Click on Start in the taskbar.

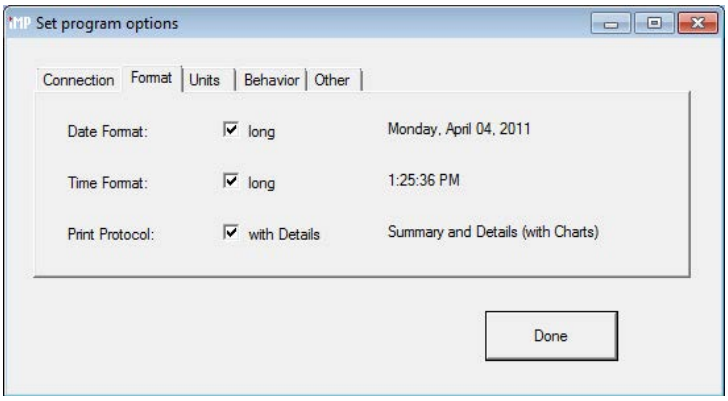


- Enter the following character string into the search field:
  devmgmt.msc
- Press Enter.
  The device manager is displayed.
- Select the subitem Ports (COM & LPT):
  The IMP Unit should be found in the list of assigned ports.
  Behind the IMP Units name, you can see the connected COM port.

- It is important to note the COM port for future operations; then the device manager may be closed.

6.9.2. Tab „Format“

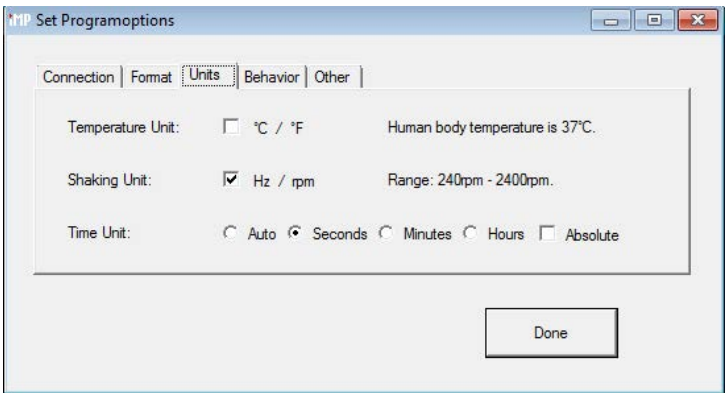
- Select Settings > Options... > Connection
  The following dialog is displayed.



Date Format	☑ long	Date is shown in long form. Example: Monday, April 04, 2011
	☐ long	Date is shown in short form (MM/DD/YYYY). Example: 04/04/2011
Time Format	☑ long	Long form: Seconds are displayed.
	☐ long	Short form: Seconds are not displayed.
Print Protocol	☑ with Details	Printout of measurement summary includes charts.
	☐ with Details	Charts are not included.

6.9.3. Tab „Units“

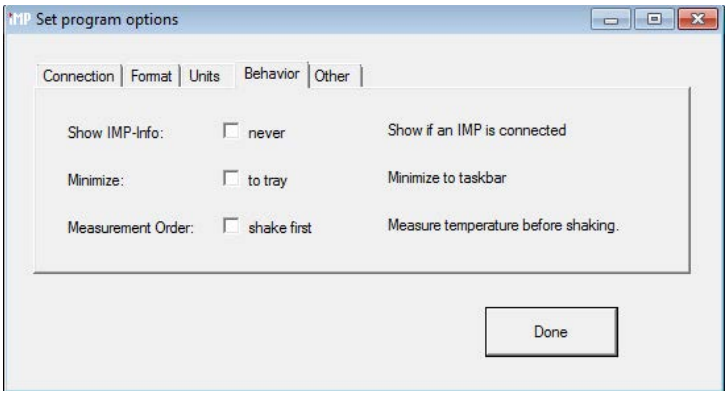
- Select Settings > Options... > Units
  The following dialog is displayed.



Temperature Unit	☑ °C / °F	The temperature is indicated in °F.
	☐ °C / °F	The temperature is indicated in °C.
Shaking Unit	☑ Hz / rpm	Shake frequency is indicated in revolutions per minute [rpm].
	☐ Hz / rpm	Shake frequency is indicated in Hertz [Hz].
Time Units	Auto	The timeline of the charts shows the relative time that passed since the start. You can chose whether the time unit will be adjusted automatically or manually.
	Seconds	
	Minutes	
	Hours	
	Absolute	The timeline of the charts shows the absolute time.

6.9.4. Tab „Behavior“

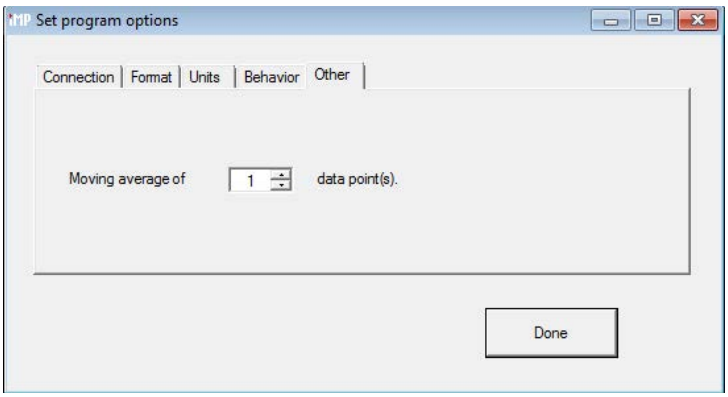
- Select Settings > Options... > Behavior
  The following dialog is displayed.



Show IMP-Info	☑ never	IMP-Info is not indicated.
	☐ never	IMP-Info is displayed when an IMP Unit is connected.
Minimize	☑ to Tray	Minimizing reduces the IMP program window to an IMP icon in the system tray.
	☐ to Tray	Minimizing reduces the IMP program window to an IMP icon in the taskbar.
Measurement Order	☑ shake first	Temperature and humidity are measured after the shaking.
	☐ shake first	Temperature and humidity are measured before the shaking.

6.9.5. Tab „Other“

- Select Settings > Options... > Other
  The following dialog is displayed.

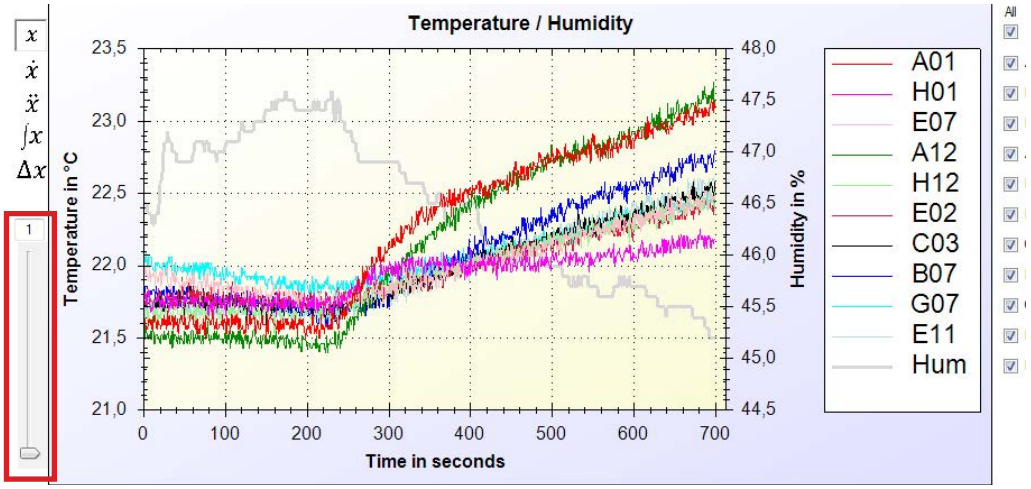


Moving average of	Determines the number of values for averaging. The average helps to get a better chart display. The value „1“ is set as default. With this setting, there is no averaging; measured values are displayed without the mean value ⟶ Tab „Other“, page 45.

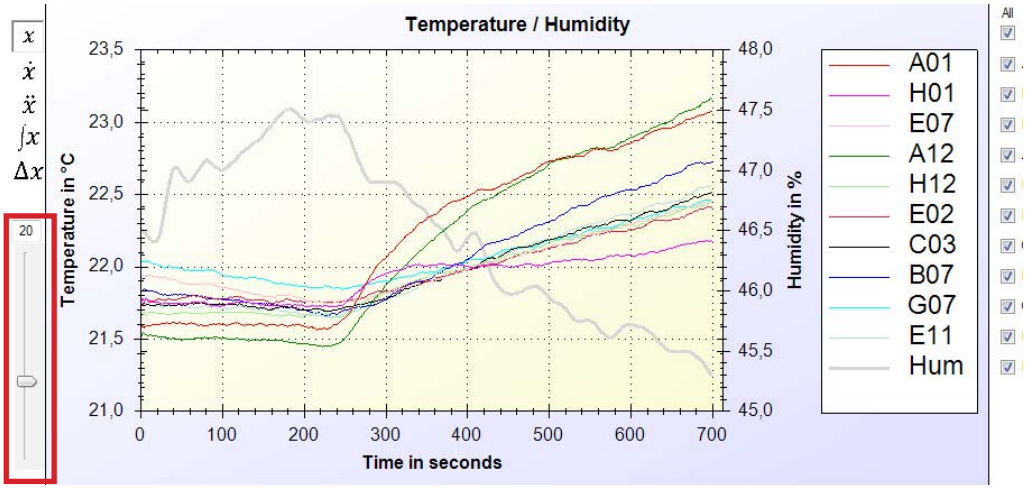
Moving average

The following sample measuring will illustrate the enhanced visualization based on a moving average. The number of values for averaging is displayed in the red frame.

Without moving average:



Moving average of 20 values:



NOTE
Excessive averaging leads to chronological distortion of the measurement signal.

6.10. Menu Info

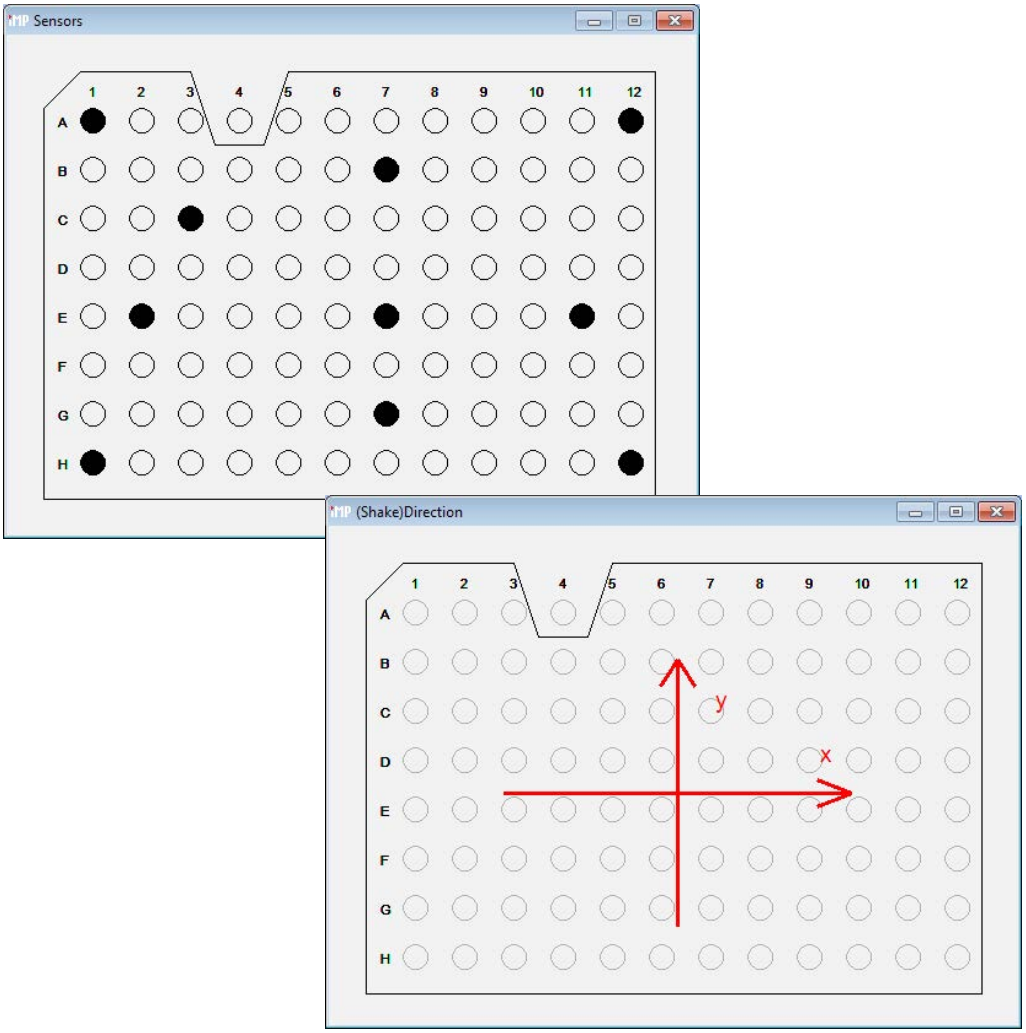
Help	To pop up a short instruction for using the IMP Unit.	
Sensor positions	Shows the location of the temperature sensors on the IMP Unit.	→ Sensor Positions and Shake Directions, page 47
Shake directions	To display the coordinate system underlying the evaluation of the shake measurement. The coordinate system is also printed on the IMP Unit's top.	
About	Gives information about the software version and copyright.	

6.11. Sensor Positions and Shake Directions

These menu items give a survey of the temperature sensors' positions and of the coordinate system which lies at the base of the evaluation.

- Select Info > Sensor positions bzw. Select Info > Shake directions

Following overviews are displayed.



7 MAINTENANCE

7.1. Decontamination and Cleaning

CAUTION
During cleaning and decontamination, the IMP Unit has to be disconnected from the wall outlet.

NOTE
Make sure that no liquid enters the inside of the IMP Unit.

The IMP Unit can be decontaminated by disinfection with formaldehyde or ethylene oxide gas. For cleaning the surface of the IMP Unit, ethanol (70 %) can be used.

7.2. Calibration

For proper thermal and shaker performance of the IMP Unit and the connected devices, it is recommended to re-calibrate the IMP once a year. Depending on the application, shorter calibration intervals may be required. Re-calibration should be done by accredited calibration laboratories only. Re-calibration by a calibration laboratory can be done via INHECO. INHECO offers firmware updates free of charge with each re-calibration via INHECO. The IMP unit initially comes only with a temperature calibration certification. Shaker calibration can be ordered separately.

7.3. Transportation and Storage

It is recommended to keep the original packaging and IMP Protection Case. The IMP Unit may only be transported and stored in its protection case with all accessories.

7.4. Repair

The IMP Unit must be repaired by INHECO only.

INHECO will only accept decontaminated IMP Units → Decontamination and Cleaning, page 49, returned in the original packing and IMP Protection Case, for repair, re-calibration, firmware update, or other maintenance.

Please ask sales@inheco.com for the return procedure before you return an IMP unit to INHECO.

Devices exposed to biosafety level 3 and 4 environments will not be accepted by INHECO for return.

7.5. Spare Parts

Spare Parts for the IMP Unit must be ordered from INHECO.

7.6. Trouble Shooting

To get rid of the blue light you need to power off the unit. Could you please remove the microSD for all the time and not use it all. Please try to measure without the SD card inserted. the measurement data are not saved on the MicroSD card with the general settings of the IMP Server. The data are always saved in the internal storage thus it does not make a difference whether the SDcard is inserted or not. We had planned to use the micro SD card for saving data but it was never implemented.

7.7. Software Updates

For updates of the IMP Server software, contact: sales@inheco.com → How to contact INHECO, page 5. INHECO offers software updates free of charge with each re-calibration via INHECO.

7.8. Disposal

The Unit has to be disposed of in accordance with environmental and biosafety directives. You have to arrange for correct electric waste disposal following actual safety regulations for your country.

The IMP Unit is RoHS and WEEE compliant.

8 APPENDIX

EC - Declaration of Conformity

EC - Declaration of Conformity

in accordance with Directive 93/68/EEC (CE), 2014/30/EU (EMC), 2014/35/EU (LVD) and 2011/65/EU (RoHS II)

Product:	INHECO Measurement Plate (IMP)
Part No:	7901000
Standards (Safety):	EN 61010-1:2010
Standards (EMC):	EN55011:2016 + A1:2017
	EN 60601-1-2:2007-12
	EN 61000-3-2:2014
	EN 61000-3-3:2013
	EN 61000-4-1:2007
	EN 61000-4-2:2009
	EN 61000-4-3:2006 + A1:2008 + A2:2010
	EN 61000-4-4:2012
	EN 61000-4-6:2014
	EN 61000-4-8:2010
	EN 61000-4-11:2004
	EN 61326-1:2013

This product complies with the essential requirements of the Low Voltage Directive (LVD) and Electromagnetic Compatibility (EMC) directive, when used for its intended use.

International Standards For international standards please see UL certificate U8 17 09 46515 025
Download UL certificat: http://www.inheco.com/service/certificates.html

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