Contents

1. The Ionometer IM806

You have decided on our Ionometer **IM806**.
Therefore thank you!

The portable Ionometer **IM806** was developed for the continuous measurement of the concentration of positively and negatively charged ion concentrations in the atmosphere.

Fig 1　The Ionometer **IM806**

The **IM806** distinguishes itself through:

▶ The simultaneous measurement of both ion polarities (positive and negative)

▶ A wide range of measurement from 0...1,000 ions/cm³ in the smallest range up to 40,000,000 ions/cm³ in the largest range

▶ Integrated SD memory card for the storage of measurement results

▶ Integrated FTP-Server to download the readings and a web-server to display readings via network

▶ Servomotor driven electrode sliding shutter

▶ Electrically isolated and configurable analog outputs 0...10 VDC and 0 ... 20 mADC for every polarity

2. Package Contents

Fig. 2　Package Contents

Package Contents:

1. Ionometer **IM806**
2. Fast battery charger (the picured unit is not equivalent the delivered unit)
3. Power supply unit for permanent operation with adapter plugs
4. Cable with terminal for charge balance
5. Serial Cable, 5m, SubMinD 9 Pin Plug
6. Network Cable (blue), 5m, for connection to the network (hub, switch, network socket, etc.)
7. Crossover-twisted-pair cable for connection to a PC network connector
8. Software for the **IM806** set up and data-processing, operating under Microsoft Windows 2000, XP, Vista; Windows 7
9. USB <-> serial adapter
10. Owner's Manual

Optionally available are the extension tube (Appendix A), a temperature and humidity sensor and transport case - light grey or anthracite .
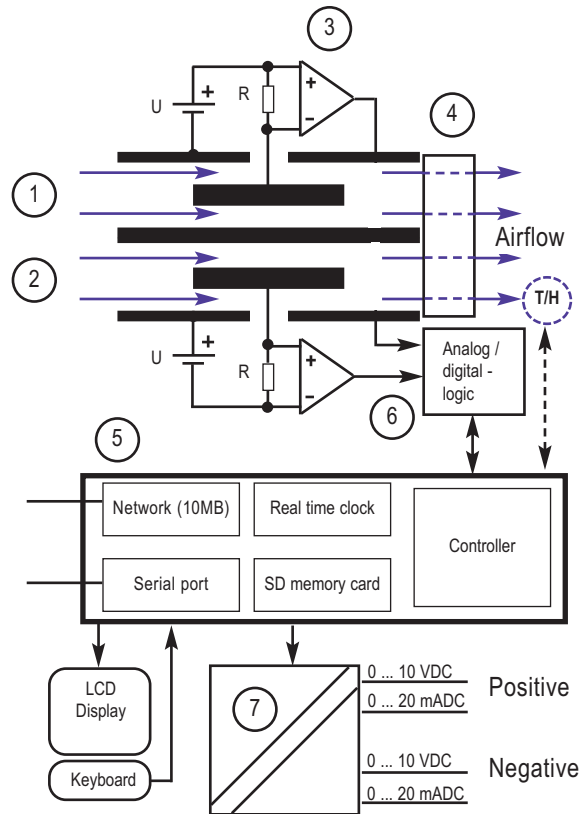
3. The Measurement Principle of the IM806

Fig. 3　The Measurement Principle of the **IM806**

The Measuring-System comprises two external tubular electrodes (1 and 2), with a smaller electrode centrically mounted and electrically isolated within each.

A DC potential is applied across the inner and outer electrodes, which creates an electric field between them. The ventilator (4) draws air continuously at a defined volumetric quantity through both tubes.

The electric field between the electrodes deflects the ions in the passing air to the inner electrodes. Because there are different polarities in the two tubes (positive and negative), the positively charged ions will be accelerated towards the inner electrode in the one tube and the negatively charged ions will be accelerated towards the inner electrode in the other. The flow speed of the air, the deflection voltage value and the geometry of the tubes are determined in such a way that the ions with a defined minimum mobility reach the inner electrode. Slower ions reach the inner electrode only partially.

The charging current generated by the charge neutralising will develop a defined voltage at the high impedance resistors R (up to 10^{11} Ohm), which can be measured with the fitted amplifier (3).

 This signal, which is proportional to the concentration of ions in the air, is then digitalised in the pre-amplifier.

The operation is controlled by a microcontroller (5) which also processes the LED, logic memory, Analog outputs (7), serial interface and network interface.

Optional is available a temperature and humidity sensor (T/H), mounted in the outlet of the air flow.

4. Control Elements
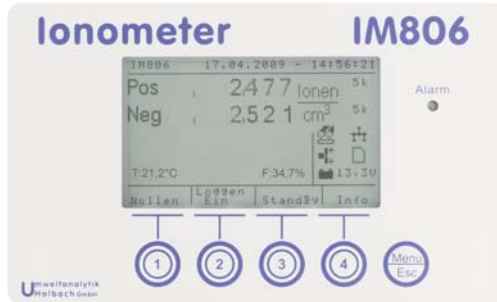
4.1 Front Keys and Display

Fig. 4　Keys and Display

The front panel includes a keypad, with 1 to 4 keys and Menu/Esc-key. The illuminated LCD-display is above the keys.

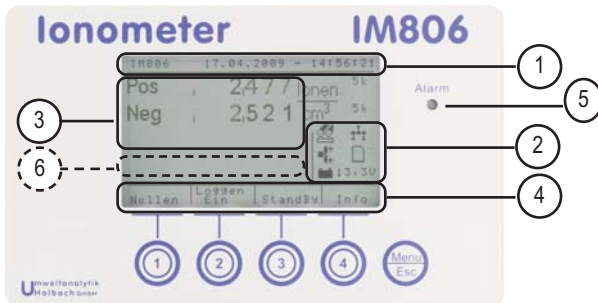The display is divided into 4 sections:

Fig. 5　Display Sections

1. The Header, with current system-date and time. A prompt will be displayed in the test-mode.

2. The Icon section for instant information on the state of the peripheral units (battery, electrode sliding shutter, network, etc.). The Icon section can also be blanked out (during the display of lists, zero point calibration, etc.).

3. The Display section with the chosen mode-display, for example operational mode measurement readings. Furthermore, during active data logging additional information will be displayed. The display section can cover the symbol section depending on the operating mode.

4. The key section, which displays the current function of the soft keys below. Both text and symbols are used.

The **Menu/Esc** has several functions. There is also a distinction between short operation (brief press) and long operation (prolonged press):

- In **list or sub-menues**, a brief press takes you one step back to the upper menu, or to the previous active main function (measuring, stand by, zero calibration).
- **During the main function** (warm-up, measuring and stand by), a brief press displays the set-up. The displayed set-up can be edited with the set-up program IM806.exe
- **During the main function** (warm-up, measuring and stand by), a prolonged press displays the set-up.

Hint: Press the keys positively and precisely

NEVER use sharp subjects for operating the keys - they might be damaged.

Alarms are indicated by a red (ultrabright) LED (5) to the right of the display. The LED provides indication of a program-update.
When the **IM806** is turned on, the LED illuminates until initialization of the device is complete. In stand-by-mode, the LED flashes intermittently.

Attention:
The LED is very bright - do not look directly into it!

The Icon section provides a symbol indication of the current operating condition and malfunction occurrences.

The following icons can be displayed:

Malfunction: Set-up incorrect
The set-up data is saved on a non-volatile memory (EEPROM). Errors can be identified by using a check sum. Check the set-up and save a set-up date.

The electrode sliding shutter is closed, or not fully opened.

The electrode sliding shutter is closing / opening

The electrode sliding shutter is fully opened

Malfunction: The electrode sliding shutter is defective
Ensure that the electrode sliding shutter is free, and not blocked.

Malfunction: The network interface could not be initialized.
No FTP-function, no web-function possible.

The network interface could be initialized correctly.

The automatic zero calibration has been activated. The **IM806** will carry out a zero calibration at pre-determined intervals.

Malfunction: The data in the real time clock is not consistent. Check date and time, carry out a zero calibration. If the malfunctions occur more frequently, the buffer battery has to be changed

Malfunction: The fan is not working.
Ensure that the rotor is not siezed.

The fan is turned off. The fan is turned of during the zero calibration and the stand-by mode.

The fan is turned on and the rotor is turning.

Malfunction: The SD memory card could not be mounted in the system during start-up.

The integrated SD memorycard could be initialized.

Data is logged on the SD card

Malfunction: The integrated battery is completely discharged. **Charge the battery immediately!**

The battery is partially discharged. Ca. 10 possible minutes of measuring operation remaining. Charge the battery.

The battery capacity lis sufficient for a further 1 to 2 hours of measuring operation.

The battery capacity is in the upper half. A further 3 to 6 hours of measuring operation can be achieved.

Note: Details on the operating time are reference values and are only valid if the battery was previously in a fully charged state.

6. If the temperature- and humidity ensor is mounted, the temperature (T:) and the air humidity (H:)are displayed in this area.

4.2 Rear Control Elements

The Main Switch is situated on the rear:
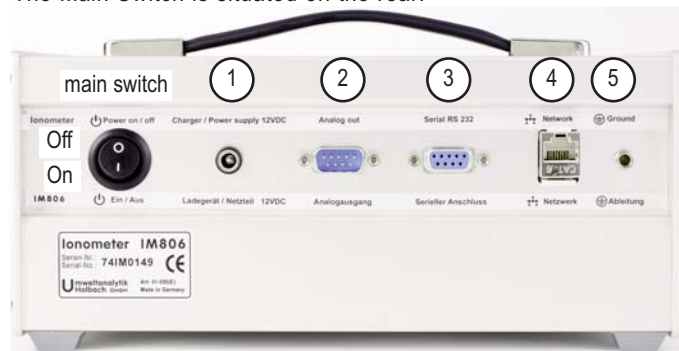
Fig 6 Rear Main Switch and Plugs

Hint: Put the device in stand-by mode before turning it off, in order to close the sliding shutter on the electrodes.

5. Rear Plug-Ins

The plug-ins are situated in a recess on the rear:

1. Charger plug-in for connection to the Battery Charger and Power Supply (2, 1 mm low voltage sockets, positive in the centre)
   Connect only the recommended devices and follow the safety instructions!
2. Analog output (9 pin SubMinD)
3. Serial Connector according to RS232, (9 pin SubMinD socket)
4. Network Connector (RJ45 socket)
5. Socket for discharging electrical static fields (4 mm socket)

The connector configuration of the sockets is explained on the following page.

5.1 Analog Output

The readings are also available as analog voltage signals for connection to a writer, a control device, or a data logger. The set-up is explained in the chapter "Set-Up".
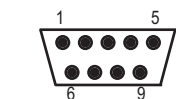
Layout of the connectors. Top view on the multi-pin connector

View on connector

Current: 0 ... 20 mA
max load resistor: 400 Ohm

Negative channel

Voltage: 0 ... 10 V
Ri: min 1 kOhm

Voltage : 0 ... 10 V
Ri: min 1 kOhm

Positive channel

Current : 0 ... 20 mA
max load resistor: 400 Ohm

Fig. 7 CAnalog Outputs - Connector Configuration

5.2 Serial Connector

The Serial Connector is for connection to a PC. The configuration is non-standard but permits the use of a 9 pin 1:1 cable
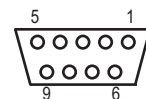
View on connector

Pin configuration:
Pin 2: TX (Transmitter)
Pin 3: RX (Receiver)
Pin 5: Ground

6. The tripod sockets

The Ionometer **IM806** has two tripod sockets on the underside of the device:
-     1/4 Zoll UNC (picture tripod)
-     3/8 Zoll UNC (microphone tripod)

Notes:
The screw-in depth of the tripod screws must not exceed 8 mm, since the screws project inside the device and can therefore cause severe damage.

Only use tripods that can support the weight of the device.

1/ 4 Zoll UNC   3/8 Zoll UNC

Fig. 8 The tripod sockets

7. Battery Charger and Power Supply

7.1 Battery Charger

The Battery Charger is intended exclusively for charging the integrated NiMH-battery (12 Volt/3000mAh).
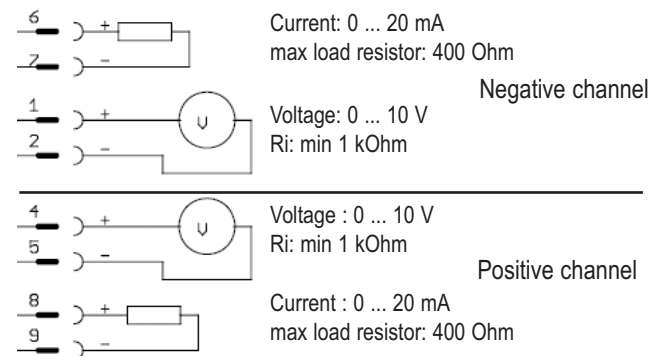
The Battery Charger can be operated over a voltage range of 100 volt to 240 volt and with a frequency from 50 Hz to 60 Hz. With the adapter plugs provided Euro, US, UK and Australia, the **IM806** can be used almost globally.

Connect the plug-adapter in the Battery Charger in accordance with paragraph 7. 1. 1.

Connect the low voltage plug of the Battery Charger to the charger socket of the **IM806**.

Fit the Battery Charger to the socket outlet. The red LED "Power" illuminates. After 3 seconds the LED "Charge" illuminates. After a further 3 seconds, the green LED "Ready" flashes for about 1 minute. During this time, the battery is being checked. The green LED then extinguishes for the duration of the charging process. If the LED "Charge" does not illuminate or flashes together with green LED "Ready", there may be a fault in the battery or in the polarity.

When the charging process is completed, the charger switches to pulse trickle charge automatically, and the green LED "Ready" illuminates steady for about 2 minutes and then starts to flash. The red LED "Charge" extinguishes. The charging condition is controlled by a microcontroller during the whole charging time. Safety measures (like voltage gradient control, delta-voltage-shut-down and security shut-down) are integrated in the Battery Charger.

Optionally, the battery may be fully discharged before the actual charging process by operating the yellow key. During the discharging process, the yellow LED "Discharge" illuminates.

If the battery is fully discharged, the charging process takes about 5 hours.

7.1.1 Changing of the Plug-Adapter

Unplug the low voltage plug from the **IM806** and remove the Battery Charger from the mains socket.
Push the latch labelled "Open" in the direction of the adapter (fig. 9). With the latch open, the adapter is pushed away from the Battery Charger by spring tension. The desired plug adapter may then be fitted on the Battery Charger. Now push the adapter into the device until the plug adapter clicks in with an audible "click".

Plug adapter

Latch-slide

Fig. 9 Changing the Plug Adapter

Notes::

To operate the Ionometer **IM806** during the charging process, discharge the electric field due to capacitive coupling, via the Battery Charger. Use the connector and the spiral wire with alligator clip to drain off the electric charges.

When the equipment is used for the first time, some smell might be noticed. Please ventilate the room accordingly.
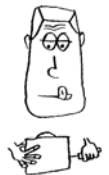
7.2 The Power Supply

When the indicated battery capacity is insufficient for the planned duration of the measurement, it will be necessary to use the Power Supply throughout the operation.

The Power Supply can be operated over a voltage range of 100 volts to 240 volts and with a frequency from 50 Hz to 60 Hz. With the provided plug-adapters Euro, US, UK and Australia, the **IM806** can be used almost globally

The output voltage is 12 volt. The maximum output current is 850 mA.

Notes: If the battery voltage by use of the Power Supply is higher than 12 volt, the battery will firstly discharge down to this voltage.

When you operate the Ionometer **IM806** with the Power Supply connected, discharge the electric field due to capacitive coupling, via the Power Supply. Use the connector and the spiral wire with alligator clip to drain off the electric charges.

7.2.1 Changing the Plug-Adapter

Unplug the low voltage plug from the **IM806** and remove the Power Supply from the mains socket.

Push the button below the Power Supply adapter and slide the Power Supply adapter upwards to the stop (ca. 3 mm). The Power Supply adapter may now be removed. Fit the desired plug adapter to the Power Supply adapter, and push the adapter into the device until the plug adapter clicks in with an audible "click".

7.3 Safety Instructions for the Use of the Battery Charger and the Power Supply

- **Only for use internally or in dry conditions!**
- **Do not use in areas with danger of explosions!**
- **Use the charger only for charging NiCd and NiMH batteries!**
- **Correct disposal of the battery is obligatory!**

8. Operation of the IM806

8.1 Turn-On Procedure

Select the rocker of the main switch to the down position.

In the activated program-update-function, a sound (or two short sounds) will be audible for about 0,5 seconds. The red LED illuminates. **IM806** appears in the display, with the initialization prompt. The display lighting is initially 5 (medium brightness). The SD memory card and the interfaces (network, serial interface) are initialized.

After ca. 5 seconds another signal sound is heard, and the brightness adjusts to the configured set up. Another graphic is displayed - this is configurable and is stored on the SD memory card.

The program versions of the Ionometer and of the operating system are shown at the foot of the display

After a further 5 seconds, the first operating mode "warm up" is initialized. This mode is only activated during the turn-on procedure and in cases of malfunction.

The warm-up takes 20 seconds. During the countdown of the remaining time towards zero, the following functions are possible:

Key 1: Starting the zero point calibrating (zeroing)

Key 2: Starting the measuring process

Key 3: Starting the stand-by mode

Key 4: Display of the system notices

Key Menu/Esc briefly: Display of the system information list

Key Menu/Esc prolonged: Opening the set-up menu

When the warm-up is completed with the activated function "zeroing at start-up" or "automatic zeroing", the zero point calibrating will actuate. Otherwise, the measuring process starts

8.2 Measuring

When starting the operational mode "measuring", the electrode sliding shutter open. When the sliding shutter is fully open, the ventilator turns on. Shortly after, the readings are shown in the display.

The keys have the following functions

Key 1: Starting the zero point calibrating (zeroing)

Key 2: Logging the readings on / off

Key 3: Starting the stand-by mode

Key 4: Display of the system notices

Key Menu/Esc briefly: Display of the system-info list

Key Menu/Esc prolonged: Opens the set-up menu

At this point, it is appropriate to consider some general information on measuring air ions.

Every electric (DC) field affects air ions and distracts them. If the Ionometer **IM806** is electrically isolated and has received a charge through coupling, it is possible that it can influence the surrounding air ionization. Accordingly, less ions get into the tube which results in a lower reading.

In order to avoid this effect, the electric charge should be drained off with the provided cable. Plug a 4 mm laboratory plug into the socket of the **IM806** and connect the other connector to an earth connected electrical connector.

Avoid plastics! Plastics can be charged electrostatically in the surroundings of the tube.

8.3 Data logging

The data logging can be activated:

- by the set-up of a date and enabled time control (paragraph "set-up")

- by operating key 2 ("Record on")

IA prompt is given in the display, below the readings.

The set-up logging intervals and duration are shown in the system notices (Key 4 "Info").

The readings are logged in the preset time intervals.

A set of data contains the following sections, separated by ";":

1. Date
2. Point in time of the logging
3. Minimal value of negatively charged ions during this interval.
4. Sliding average value of the negatively charged ions during this interval.
5. Maximum value of the negatively charged ions during this interval.
6. Minimal value of the positively charged ions during this interval.
7. Sliding average value of the positively charged ions during this interval.
8. Maximum value of the positively charged values during this interval.
9. System state (0 = no malfunction)

The filename consists of the following components:

IM_*MMDDhhmmss*.CSV

The characters in italics are placeholders and mean:

MM: Month,   *DD*: Day,   *hh*: Hour,

mm: Minute,   *ss*: Second

Example with mounted temperature and humidity sensor:

Date;Time;NegMin;NegAvg;NegMax;PosMin;PosAvg;PosMax;State
Date;Time;NegMin;NegAvg;NegMax;PosMin;PosAvg;PosMax;State;Temp;Humi
23.07.2007;23:54:26;   543;   543;   543;   748;   748;   748;0;224;345
23.07.2007;23:54:56;   298;   827;   1194;   427;   933;   1191;0;224;345

Example without temperature and humidity sensor:

Date;Time;NegMin;NegAvg;NegMax;PosMin;PosAvg;PosMax;State
23.07.2007;23:54:26;   543;   543;   543;   748;   748;   748;0
23.07.2007;23:54:56;   298;   827;   1194;   427;   933;   1191;0

The files can also be read out with an FTP-Client via the network.

A running data logging can be terminated:

- on arriving at the set-up logging duration
- by operating key 2 ("Record on")

Note: If you have more than 50 reading files on your SD memory card, the system takes up to 4 seconds to create a new file.

8.4 Zero point calibrating (zeroing)

In order to avoid offset values of the different parts in the input amplifier metrological, a zero point calibration is necessary. Because of the offset values' dependence on temperature, the warm-up should be completed before doing the zero point calibration.

Zero point calibration is activated:

- after the warm-up through the set-up "zeroing at turn-on procedure"
- In pre-determined time intervals, if "automatic zeroing" is activated.
- By operating Key 1 ("Zeroing")

Procedure of the zero point calibration:

The electrode sliding shutter is closed.

For each of the eight measurement ranges, the necessary offset voltage is set, checked and corrected, if necessary.

The offset values are shown in the display.

A zero point calibration can take between 2 and 5 minutes.

The zero point calibration interrupts the data logging, but does not end it.

Note: After about 30 minutes of operation, a new zero point calibration is necessary only at a measurement of a small concentration of ions (<500 Ions/cm³).

8.5 Stand-by Mode

The Ionometer **IM806** can be placed in stand-by mode during the time of the measurements or during the set-up.

The stand-by mode is activated:

- by operating key 3 ("Standby")

- automatically, when the battery has reached the lowest threshold

In stand-by mode:

- the fan is turned off

- the tubes are closed

- the display lighting is turned off

To avoid a mix-up with the turned off Ionometer **IM806**, the LED flashes every 5 seconds.

The number of flashes per interval gives information about the charging condition of the battery. If the battery is fully charged, there are only 4 flashes.

If the discharging threshold of the battery is reached, an additional acoustic signal sound every minute.

To terminate the stand-by mode:

Press any key. The display lighting illuminates. Choose the desired function within 6 seconds:

Key 1: Starting the zero point calibration
Key 2: Starting the measuring process
Key 3: Starting the stand-by mode
Key 4: Display of the system notices
Key Menu/Esc briefly: Display of the system-info list
Key Menu/Esc prolonged: Opening the set-up menu

If you do not press any other key within 6 seconds, the **IM806** remains in stand-by mode.

The stand-by mode is also terminated by starting a set-up data log.

Note: Always activate the stand-by mode before shutting down the Iononmeter **IM806**. The tubes are closed then and protected from any unnecessary dirt.

8.6 System-Messages

Events such as the end of a data logging or alarms are written into system message list.

This list contains the last 25 messages since program start.

The number of messages and alarms is given in the headline of the list.

Alarm messages are shown inverse.

The display of the list is activated by operating key 4 ("Info").

If there are more entries than can be shown on the display, you can use the keys 1 and 2 (arrows up and down) to scroll through the list. If the arrow is inverted, the end of the list is reached.

The keys perform the following functions:

Key 1: Scroll towards the top of the list
Key 2: Scroll towards the bottom of the list
Key 3: Delete all entries
Key 4: End list function
Key Menu/Esc briefly: End list function
Key Menu/Esc prolonged: No function

If no key is pressed in the list function within 60 seconds, this function ends.

8.7 Alarm-Messages

During operating, the peripheral units such-as fan and battery voltage are monitored continuously. In case of a failure, an alarm is activated.

The LED illuminates and, if the set-up "beep on event" is activated, an audible signal is activated until a key is pressed.

To end the alarm message, press key 3 ("continue").

The alarm event is entered in the message list.

If no key is pressed in the alarm message display within 3 minutes, the alarm message display turns off automatically.

9. The Set-Up of the IM806

9.1 Via PC Software changeable set-up

Certain set-up parameters are not very comfortably adjustable with the 4 possible keys.

Certain set-up parameters are not very easily adjustable with the 4 keys available.

That is why changing the set-up parameters on the Ionometer itself is not available as an option

These set-up parameters can be set easily with the provided software via the serial interface.

The actual set-up of these parameters is provided on the system info list.

Activate the system info list by operating briefly operating the key Menu/Esc.

The following system information and set-up parameter is shown:

Serial-Nr.	Systeminfo	
Operation time	Systeminfo	
IM806 Version	Systeminfo	Version of the control programs
OS-Version	Systeminfo	Version of the operating system
Hostname	Parameter	
IP-Address	Parameter	Network address
Netmaske	Parameter	Network mask
Gateway	Parameter	Address of the next Router
MAC-Adresse	Systeminfo	worldwide unique Network-Hardware-Adress
TFTP-Server-IP	Parameter	Networkadress of the Server from which the program update can be downloaded
Analog output Min Parameter		see paragraph 9.1.1
Analog output Max Parameter		see paragraph 9.1.1

TFTP Freigabe   Parameter   release for program update

Calibration on: Systeminfo   Date until the next calibration

Calibration in: Systeminfo   remaining available operation hours until next calibration

Calibration is necessary every 2 years or every 2000 hours of operation, whichever of these occurs first.

9.1.1 Set-Up Analog-output

For the analog output, 4 parameters are to be defined:

1. the lower voltage value in mV
2. the lower ion concentration value in 1000 Ions/cm³
3. the upper voltage value in mV
4. the upper ion concentration value in 1000 Ions/cm³

Every channel (positive ions/negative ions) has a resolution of 4000 increments (12 Bit) for a voltage of 0 … 10 volt respectively a current from 0 … 20 mA.
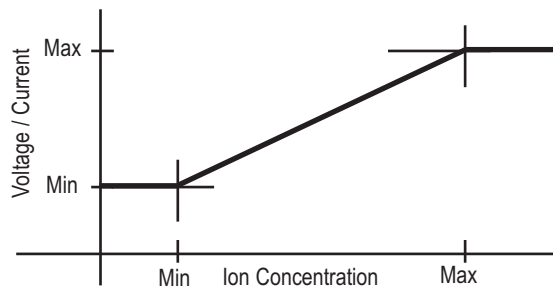

Fig. 10 Chart of the analog line out voltage

The setting counts for the negative and the positive channel.

Two examples of set-ups are provided on the following page.

Example 1:

Reference set-up: at 0 ions the discharge should be 0 volt, at 10,000 ions/cm³ the discharge should be 10 volts (equals 20 mA).

Do the following adjustment:

1. Lower voltage value: 0 mV
2. Lower ion concentration value: 0 Ions/cm³
3. Upper voltage value: 10,000 mV
4. Upper ion concentration value: 10,000 Ions/cm³

A resolution of 2.5 ions / increment is achieved.

Example 2:

The range of interest extends from 5,000 ions/cm³ up to 50,000 ions/cm³.

At 5,000 ions/cm³, 4 mA (equals 2,000 mV) should flow, at 50,000 ions/cm³, 20 mA (equals 10000mV) should flow.

Carry out the following adjustments:

1. Lower voltage value: 2,000 mV
2. Lower ion concentration value: 5,000 Ions/cm³
3. Upper voltage value: 10,000 mV
4. Upper ion concentration value: 50,000 Ions/cm³

A resolution of 14 ions / increment is achieved.

If less than 5,000 ions/cm³ are measured, 4 mA are discharged at the output. If more than 50,000 ions/cm³ are measured, 20 mA are discharged

9.2 The Set-Up Menu

Activate the system info list by prolonged press of the key Menu/Esc.

The following adjustments can be carried out:

1. Display brightness   selection screen from 0 to 10
2. Beep on key   selection screen On / Off
3. Beep on events   selection screen On / Off
4. System Date / Time   inputmask Date / Time
5. Logging mode: selection screen: Off/ Time / Time and Zero point calibration
6. Starting Datalogging: inputmask: Date / Time
7. Duration Datalogging: inputmask: Duration
8. Logging Interval: inputmask: Time
9. Automatic zeroing: selection screen: On / Off
10. Interval automatic zeroing: inputmask: Time
11. Zero point calibration after turn on procedure: selection screen: On / Off
12. Baud rate serial connector   selection screen
13. Language   selection screen: German / English

In order to change a parameter, place the selection bar (inverse shown line) with the keys 1 and 2 (arrowkeys) on the parameter text and press key 4 (return key).

In the selection menus, the choice can be made the same way. After the selection you return to the set-up menu.

If you do not want to make a selection, press the key Menu/Esc and you return to the set-up menu.

The date- and time-input can be changed by operating the keys 1 and 2 (arrowkeys). By pressing key 3 (arrow right), you reach the next section (month/ year/ hour, etc.). The current section is shown inverse. The changes are accepted by operating key 4 (return key). You return to the set-up menu without any changes of the parameters by operating the key Menu/Esc.

10. The Program IM806.EXE

You can easily set-up and comfortably operate your Ionometer **IM806** with the program IM806.EXE package included. The program runs under Microsoft Windows 2000 / XP / Vista and Win 7.

10.1 Installation

10.1.1 System requirements

For a successfull installation of the program IM806.EXE is necessary:
► PC system:
　▷ with Microsoft operating system Win 98, 2000, XP, Vista, Windows 7
　▷ a serial port, which is supported by the operating system (COM Port: COM1 up to COM32).
　　If the PC system doesn't support a serial port, an USB to serial converter can be used, depending on the operating system you need the admin rights.

► the software "Install_IM806_En.exe" to install the program
　　Install_IM806_En.exe is stored on the CD or can be down loaded from the web page (extract it from the zip archive).

► the serial cable (SubMinD 9 Pin Plug)

15.1.2 Installation

If a USB <-> Serial converter is used, install first the driver of the converter. You will find its installation instruction on the CD of the converter. Please check the COM Port number of the converter.

Switch on the **IM806**.

Connect **IM806** to the PC system via serial port.

Run the software "Install_IM806_En.exe" (double click). Depending on the version of the operating system a form pops up to confirmation of the installation. In this case choose „Allow" to continue the installation process (fig. 11).
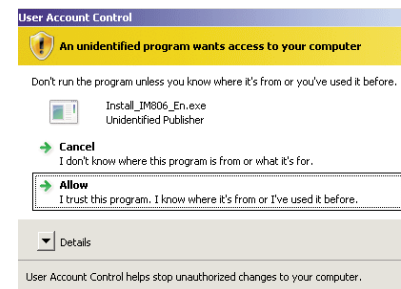
Fig. 11　Security form of some operating systems

Fig. 12　The installer program   Click „Next" to continue
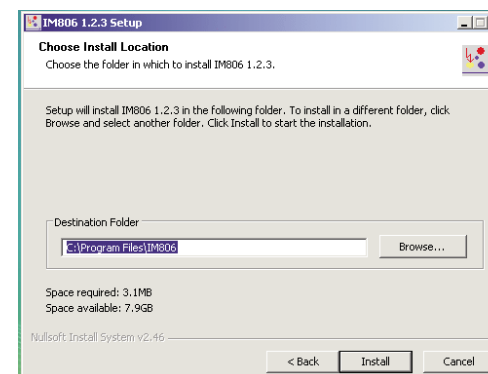

Fig. 13　Confirm or change the installation directory

Fig. 14   The program IM806.EXE ist installed

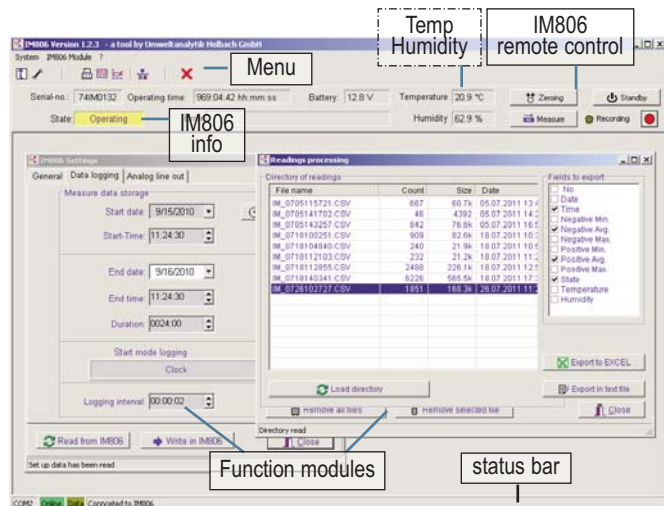Run the program IM806.EXE by clicking on the icon of the program.

Fig. 15   The program IM806.EXE

In order to set-up the program, activate the menu point "system -> program parameter or click the button
A form opens for the program settings:
The Baud rate must comply with the Baud rate of the Ionometer **IM806**. You can change the settings by clicking the small arrows. Confirm the changes by clicking button "Save and Close".
In the group "Serial interfacet" -> "Port" will be set the serial port no. which is connected to the **IM806**
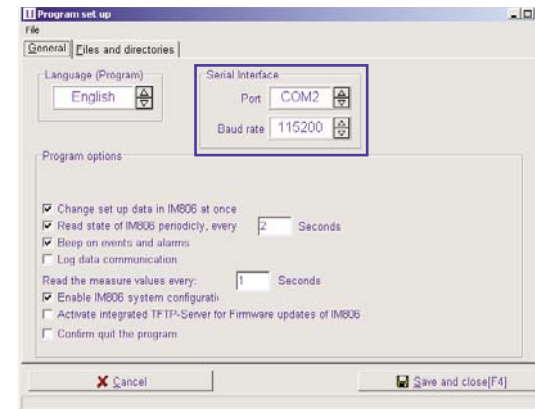

Fig. 16   Program Settings

A list with the available serial ports is displayed by the system device manager:
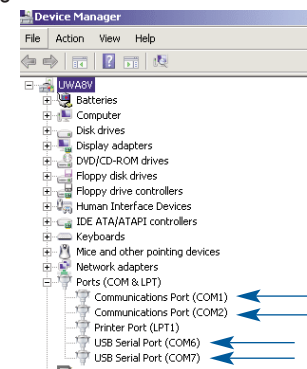

Fig. 17   Example: Display of the available serial ports in the device manager

If the connection is successful, the status bar shows the green online field. The serial-nr., the operating time, the battery voltage and the operating status of the connected **IM806** are shown in the IM806-Info section.

If the connection to the **IM806** fails, check the following:

1. Is the **IM806** turned on?

2. Is the connecting cable correctly plugged in the Ionometer's socket "serial socket" and in the serial socket on the PC?

3. Is the correct serial port turned on in the program settings?

4. Does the program baud rate correspond with the baud rate of the **IM806**?

10.2 Operation

System messages of the program or the **IM806** are displayed in a separate system message window. Following alarm messages, the window opens automatically. It can be faded in and out by operating the key F2.
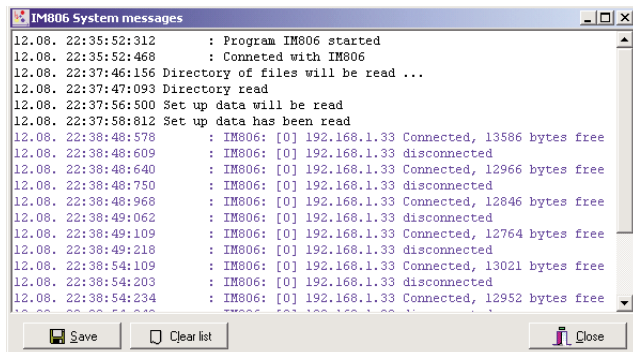
Fig. 18   System messages

Messages of the program are shown in black, messages from the **IM806** in blue and error messages of the program are shown in red.

You can save the messages in a text file, you can also delete them.

In the upper right area of the program form, you can remote control the **IM806** by operating the right keys.
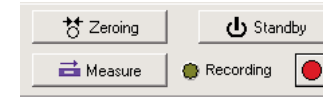
Fig 19   Remote control of **IM806**

You can activate 4 client modules for the settings and the data transfer via the menu point "IM806 Module".
Position and size of the client modules will be saved.

You can set in the module "IM806 Settings", all those settings which you can set on the **IM806**. Furthermore, you can also set-up the Analog output of the **IM806** here.
If the setting "perform set-up changes immediately in the IM806" in the program is activated, the new value is transferred to the IM806 and is effective after leaving the input field in the module (by operating the Tab or Enter key). This does not apply for the settings of date and time.
You can read the current set-up with the button "Read from IM 806" and transfer all settings to the **IM806** with the button "Write in IM806".

In all modules, operation of the buttons with the symbol [↻] results in reading the parameter and operation of the buttons with the symbol [➡] results in writing the parameter.
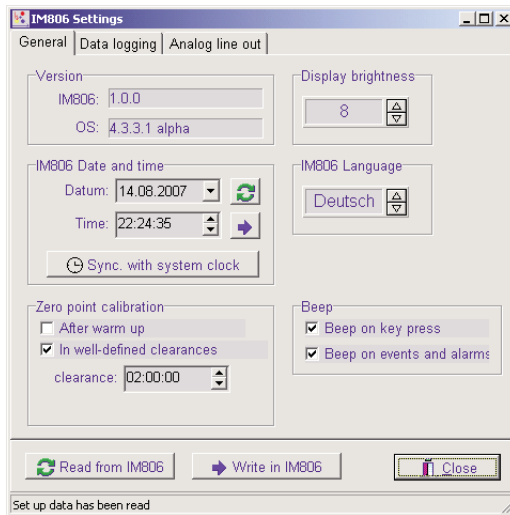
Fig 20 Module **IM806** Settings

The module "IM806 reading display" shows the actual reading of the **IM806**. If the module is changed in size, the display size changes, too.
The display only occurs in the operational mode "measuring", The display can be activated and deactivated by operating the key [F8].
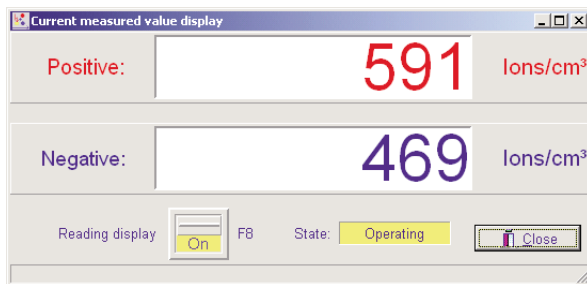

Fig. 21 Module **IM806** reading display

With the module "IM806 data export", saved data can be read in the **IM806** and then be exported to a text file or in an EXCEL file, and be presented as a diagram.
In the program settings, an EXCEL template file can be selected. After generating the diagram, the EXCEL-macro "IMStart" is opened, so that the data of the measurement can automatically be processed.
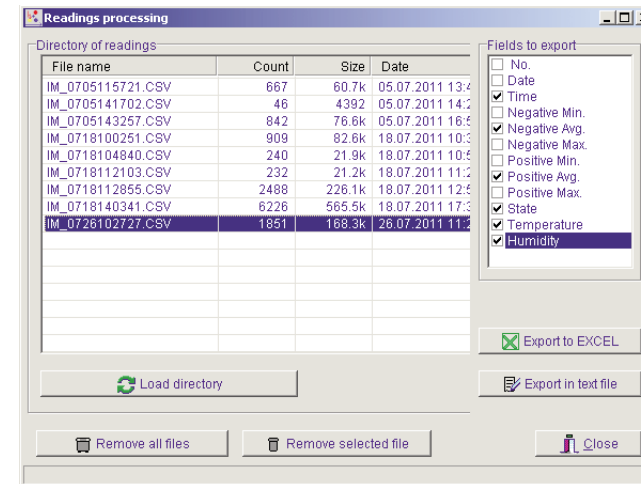

Fig. 22 Module **IM806** Data import

Load the reading directory first.
Select the reading file you want to export.
Choose the fields you want to export from the selection window.
Start the export to EXCEL or to a text document

Note: Large files (more than 500 reading sets) can be transferred faster via the FTP-Client.

In this module, you can also delete single reading files or all the reading files from the **IM806**.
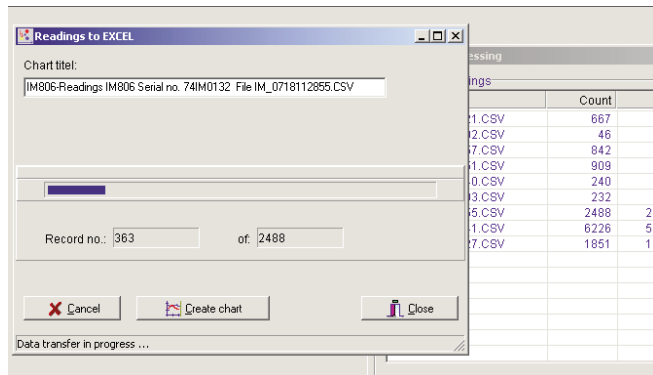
Fig. 23 Data export to EXCEL

The module "IM806 Set-up" must be enabled in the program settings.
The Module has 3 tabs.
In this module, you can:
- set the network settings of the **IM806**,
- change the baud rate,
- set-up the program update,
- change the calibration and set values,
- change the service intervals.

Changes in this module are not transferred to the **IM806** automatically.

Changes on these parameters may lead to system reboot of the **IM806**.

You can obtain the parameters for the network settings from your network administrator.

Note:
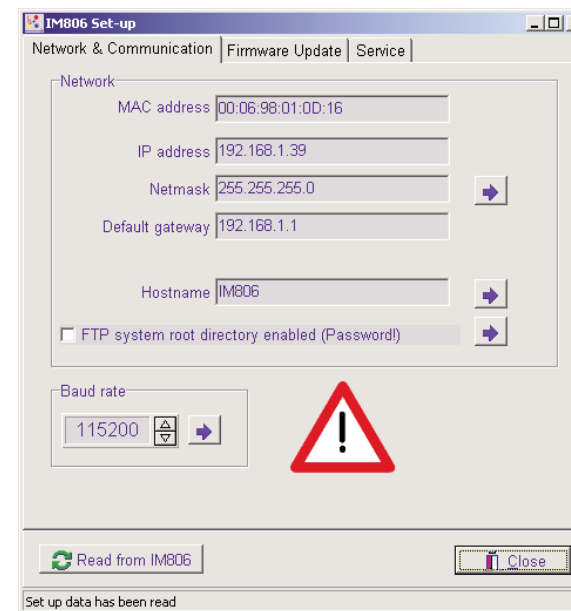**Changes in this module may affect the function of the IM806.**

Fig 24   **IM806** Set-Up

Hint for the usage of the FTP:
For access to the reading data files via FTP, no user name or password is required. The FTP root directory is the directory in which the reading data files are logged
When you activate the FTP-release, the root directory of the SD memory card is activated as FTP root directory. In this case, you need a user name and a password.
You will find user name and password for full access to the SD memory card on the label on the last page.

11. Firmware update of the IM806

The firmware of the **IM806** is under continuous development. New versions of the firmware can be downloaded from the manufacturer's web site ionometer.com and can be installed in the **IM806** via network and a TFTP-server. The program IM806.EXE includes a TFTP-Server function.

When using the integrated TFTP-Server the program IM806.EXE has to run.

11.1 Preparing

For the firmware update procedure, the following will be required:

- the Ionometer **IM806**
- a PC with the installed program IM806.EXE
- the serial cable (Pos. 5 figure 2)
- network crossover-twisted-pair cable with red plugs (Pos. 7 figure 2)
- the new firmware file IM806.BIN

When connecting the **IM806** to a network hub, network switch or router, the network patch cable (Pos. 6 figure 2) or other suitable patch cable must be used.
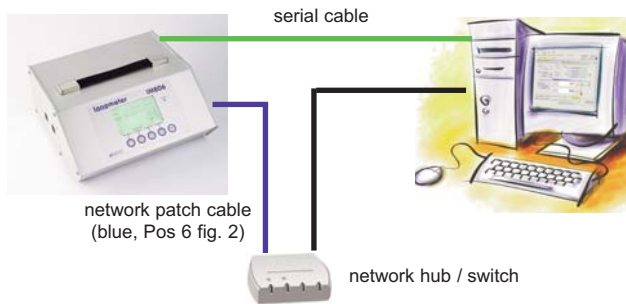

Fig 25 **IM806** network connecion to a hub / switch

For a direct network connection PC <-> **IM806** you should use the network crossover-twisted-pair cable with red plugs (Pos. 7 fig. 2).
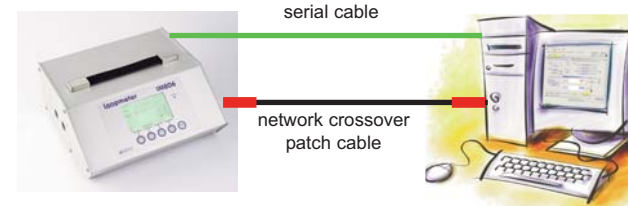

Fig 26 **IM806** network connection to the PC

Start the program IM806.EXE and open the module "IM806 Set-up" (page 34).

Check the set-up of the network addresses in the register "Network & Communication" (fig. 24).

Please ask your network administator for the valid data.

Note: The IP-address of the **IM806** has to be stored in the configuration memory of the **IM806**. If a DHCP server in the network is active, the IP-address will be displayed, but it is not stored. Therefore store the IP-address of the **IM806** with a click on the button with the blue arrow beside the input field "Netmask".

The **IM806** will reboot.

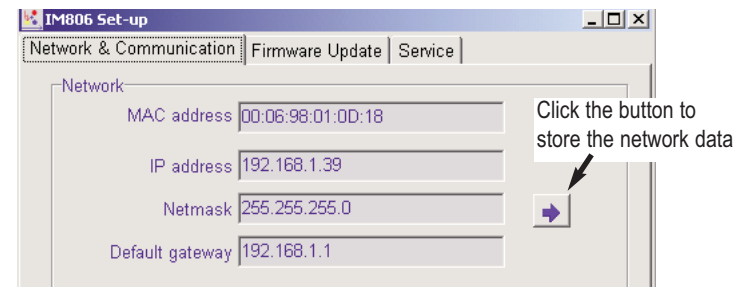TThe network configuration has to be carried out correctly if the firmware update is to be successful.

Fig 27 Store the network configuration

Check the network connection from the PC to the **IM806**:
Start on the PC the program CMD.EXE by "Start"->"Run"->"Cmd" **or** "Start"-> "All programs" -> "Acessories" -> Command
Input the command "ping <IP-address>". Replace the string <IP-address> with the real IP-Address of the **IM806**.
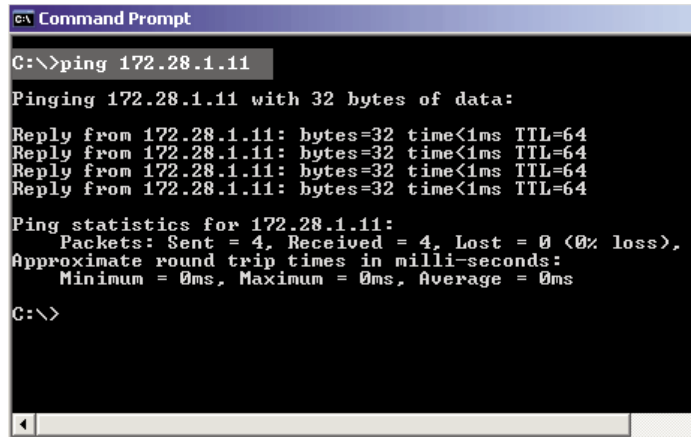sample:

Fig. 28 Network connection check to **IM806**

If the connection is successful, the program ping displays the replies of the ping requests and the required time.

If you use the IM806.EXE integrated TFTP-server then the TFTP-Server-address corresponds with IP-address of the PC.
These IP-Address is displayed on the button „Use system IP address >xxx.xxx.xxx.xxx<". Click the button to transfer the displayed IP address to the **IM806**.

Fig. 29 Set up the TFTP server address
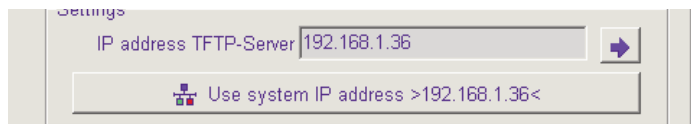
11.2 Update procedure

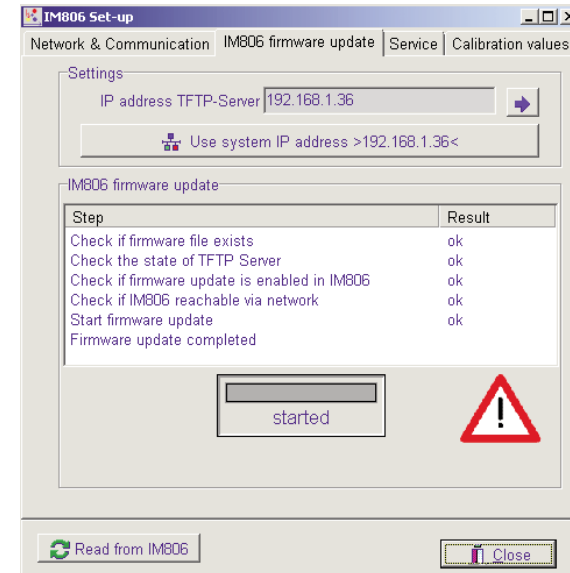To start the update procedure click the button „start" below the list.

Fig. 30 **IM806** Set-up -> **IM806** Firmware update

The update procedure checks:
1. Check if the firmware file exists. If the the firmware file does not exist, copy the firmware file IM806.BIN in the defined directory
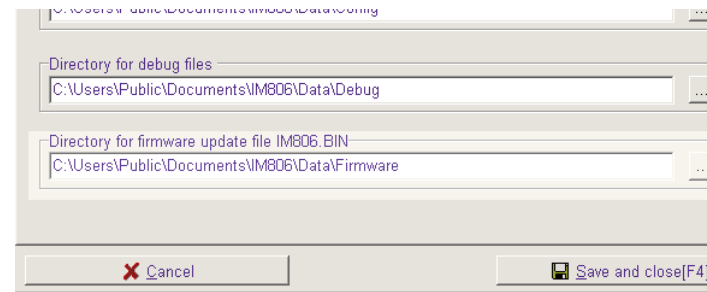

Fig. 31 The defined directory with the update file IM806.BIN

2. Check if the integrated TFTP-Server is activated. This check will processed only if the TFTP server of the program is used. If the result is failed, the TFTP server has to be enabled in the program set up form
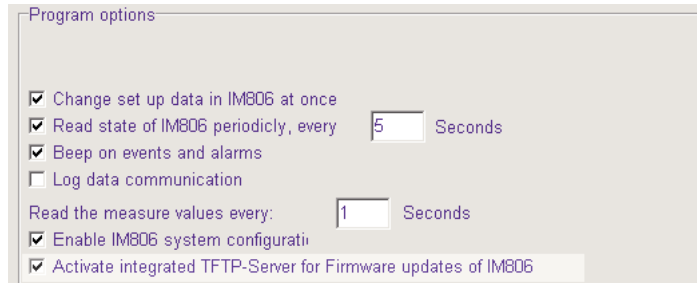

Fig. 32 Program settings: Activate integrated TFTP-server for Firmware updates of **IM806**

3. Check if the update process is enabled in the **IM806**. By default, the update process is enabled in **IM806** via a hardware jumper in the device.

4. Check if the **IM806** is reachable via network.
With the operating systems Windows 7 and Vista of the PC this check is only possible if the program runs with administrator right. Without the administrator rights the result of this check will ignored.

If all results of the checks are passed the update process will start.

The **IM806** closes the electrode sliding shutter and displays "Reboot".

The alarm LED illuminates and the beeper sounds twice briefly. After about a futher 5 seconds, the Alarm LED flashes. The new firmware is downloading from the TFTP-server. Depending on the network bandwidth this will take about 5 seconds, thereafter the **IM806** starts with the new version of the firmware.

Sometimes the SD memory card is not available after the restart. Turn off the **IM806**, wait 3 seconds and switch the **IM806** on again.

The procedure is logged in the system messages of the program IM806.EXE:

Fig. 33 System messages during the update procedure

DO NOT SWITCH OFF EITHER THE IM806 NOR THE PC DURING THE UPDATE!

Note:

If the firmware update procedure failed the update software flag in the **IM806** is permanently stored. After each system start the **IM806** tries to get an update via network. So it takes a long time til the update timeout and starting the operating system.

To reset the update software flag of the **IM806** retry the update procedure or click the button „Reset firmware update flag of IM806".
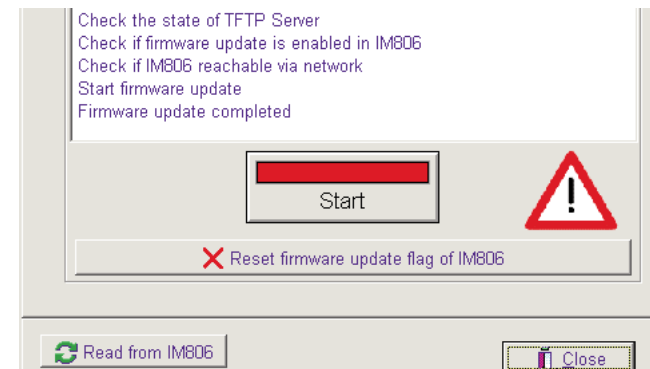

Fig. 34 Button reset firmware update flag

12. Safety instructions

Disregard of safety instructions might cause damage to the device or even personal injury!

- **Use the IM806 only for its intended purpose!**

- **Prevent fluids from entering the device, Battery Charger and Power Supply!**

- **The quality of the air must be dry and free from oil or other impurities which could affect dust particles in the air which in turn settle on the walls of the electrodes. Therefore avoid taking readings in an atmosphere that contains conductive dust particles such as graphite or similar materials.**

- **Avoid touching the membrane keyboard with sharp or pointed objects!**

- **Do not use in areas with danger of explosions!**

- **Use the Battery Charger and the Power Supply only in dry areas!**

- **Use the Battery Charger for charging NiCd and NiMH battery packs only!**

- **Deposits at the location of the highly insulated attachment of the inner electrode could make it conductive, reducing the sensitivity of the Measuring-System andd falsifying the readings.**

- **Condensation in the Measuring-System could falsify readings. The temperature of the IM806 should not be significantly lower than the surrounding air during the measuring process.**

- **Do not insert objects into the Measuring-System electrode)! Risk of crunching!**

- **Keep the devices away from children!**

13. Technical Specifications

Measuring System:	Open measuring system without absorbent parts and with two parallel arranged electrodes for simultaneous recording of negatively- and positively-charged air ions
Measuring scope:	Air ions with a ion mobility of 1.3 cm²/Vs (small ions) and more. Ions with lower mobility are partially detected.
Ion polarities:	Positively charged air ions and negatively charged air ions at the same time
Flow rate of sample air:	24.5 l/min per channel, via integrated fan
Measuring ranges:	Eight ranges of measurement 0 ... 1,000 Ions/cm³ up to 0 ... 40,000,000 Ions/cm³, auto range
Zero Point Calibration:	Automatic zero-offset adjustment via servo-driven lock, configurable after switching on and in freely definable time intervals
Warm Up:	min. 30 seconds, typically: 15 minutes
Operating Temperature:	0 ... 40 °C
Storage Temperature:	-10 ... 50 °C
Display of measured value:	Numeric display on backlit LCD display (240 x 128 pixels)
Temperature / humidity:	Optional detection of temperature and humidity with integrated sensor in the air channel
Storage of measured values:	In CSV format (date, time, max., min., and floating mean of each polarity) on an internal SD memory card (256 MB /

512 MB), starting time, duration and storage interval all freely definable. Recording of measured values via integrated FTP server and PC software

Self Monitoring:	Battery voltage, fan speed; optical and acoustic (switchable) fault message
Analogue output:	One output per channel 0...10 VDC / 0 ... 20 mA, lower and upper limiting value definable, both outputs are galvanically separated by the measurement device.
Voltage output:	min. input resistance of the follow-on device: 10 kOhm
Current output:	max load resistance of the follow-on device: 400 Ohm
Battery operation:	Internal NiMH battery pack, 12 V / 3 Ah, operating time: up to 6 hours
Mains Operation:	Plug in power supply 12VDC / 800mA, runs on AC supply from 100 Volt to 240 Volt, 50/60 Hz with mains plug adapters for EU, USA, UK and Australian
Charger:	Super-fast charger 1.8 A with an input voltage of 100 to 240 VAC inc. Euro power cable, charging time: approx. 3 hours

Connectors recessed on rear of device:

Charger / Power Supply:	2,1mm low voltage plug (positive terminal in the centre tip)
Serial Port:	D 9 way. female connector, Level: RS 232, 4800 to 115200 Baud,NoParity, 8 Databits, 1 Stopbit
Analog output:	D 9 way. male socket,
Network:	Ethernet 10MB / 8-pol. RJ45-socket
Grounding:	4 mm socket for discharging electric charges and fields

Device configuration	Partially directly via 5 touch keys, other wise with PC software (included in delivery) for Microsoft Windows via serial interface, German and English operator guidance
Buffer Battery for real time clock:	Lithium coin button CR2032
Network Servers:	FTP-Server Web-Server
Housing:	Anodised aluminium profile housing
Tripod Threads:	UNC 1/4 inch (photo) and UNC 3/8 inch (microphone)
Dimensions:	246 mm x 108 mm x 226 mm (BxHxD)
Weight:	3.5 kg (without accessories)
Guarantee:	24 months (limit of 12 months for battery and servo drive)
CE-Conformity:	according to EG-guidelines on electro-magnetic compatibility
Article-No:	01-020E
Options:	Temp. / humidity sensor (01-026E) Extension tube (01-026E) Transport case light grey (01-252E) Transport case anthracite (01-257E)
Note:	Subject to technical modifications

Microsoft und Windows are registered trademarks of Microsoft Corporation.

14. Conditions of Warranty

Umweltanalytik Holbach GmbH provides 24 month's guarantee (servo drive and battery: 12 months) on the Ionometer **IM806** from the date of purchase. Should faults occur in operation, please consult your dealer or supplier.

We reserve the right to repair or exchange the Ionometer **IM806**. The parts used for this are new or as new. Parts returned shall become the property of Umweltanalytik Holbach GmbH. The guarantee period shall not be extended for the replaced parts or for the Ionometer **IM806** for repair carried out under guarantee.

This guarantee shall not include damage caused by improper use, operating errors, misuse, external influences, flash of lightning/overload, modifications to the product and attachments. Also excluded are parts subject to wear (e.g. batteries, fuses), as well as damage caused by wearing parts (e.g. leaked batteries). The guarantee does not cover damage in transit, consequential damage, costs for down time and infrastructure. The guarantee claim shall lapse if repairs are carried out by unauthorised persons or if the serial number is removed or made illegible. Guarantee can only be granted upon presentation of a clear supporting document of purchase (invoice or sales receipt). In case of repair, please send the device with postage adequately pre-paid and carefully packed (if possible in its original packaging inside a cardboard box) together with a detailed description of the fault to your dealer or to Umweltanalytik Holbach GmbH.

Unfortunately, consignments that have not been prepaid cannot be accepted.

Appendix A: The Extension Tube

The optional Extension tube (Article no. 01-026E) makes it possible to aspirate air remote from the **IM806**. Due to the distance from the Ionometer it is possible to measure small air ion emitters without then influence of the Ionometer.

Fig. 35 The optional Extension Tube, length 19cm

Mounting the Extension Tube

Secure the extension tube to the side panel with the inlets (fig 36) using both knurled screws. Both tubes are conductive and are electrically connected to the casing when secured to the **IM806**. It is recommend to discharge the case via the spiral wire with alligator clip (fig. 2, item 4).
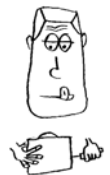
Fig. 36 Mounting the Extension Tube

The length of the extension tube is 19 cm.

**Safety instruction: Never touch live parts with the tubes!
Risk of short-circuit!**

Appendix B: The transport case

Transport cases (with blue PE foam including cut outs for the **IM806** and accessories) are available with in the colours light grey (01-252E) and anthracite (01-257E).

Fig. 37 Transport case open, cut out for acessories is visible

Fig. 38 Transport case open, with **IM806**

Note: In the transport case is no room for the network cable.

▶ Ionometer   IM806

Owners Manual

This is Mr. I. Meight He knows the **IM806** and assists you while reading this manual.

Please take your time reading the manual of the **IM806** carefully before putting it into operation.