

Manual Motherbox

#50502, #50504



Release

US 1.15 09/2013 PA

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This device contains software components which are subject to one or more Open Source licenses. Copies of these licenses are found in the Appendix to this document.

The associated source text can be downloaded at

<http://www.wut.de/e-5www-60-inde-000.php>

at no charge. You may also obtain the source text from us for a period of three years after the last shipment in the form of a data medium, also at no charge. Please contact us at

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This offer applies to any recipient of this information.

W&T

Use the Motherbox to collect measuring data from any number of Analog and Digital Web-IOs or Web-Thermographs. Set an individual interval for each measuring point available in the network during which the current data are automatically polled and need to be archived in the internal memory of the Motherbox. Combine archived measuring points into profiles to generate meaningful overviews matched to your application.

Use the Site-Creator for easy and quick drag'n'drop creation of interactive visualisations, which show as well current measuring values, and give the opportunity to switch outputs.

The cyclical polling of the Web-IOs results in a consolidated measurement database in the Motherbox. From here you can recall the history of measuring data profiles, individual measuring points and complete Web-IOs directly in your browser, or access the database directly via SQL to migrate the measuring data into your application.

Start C/C++-programs and PHP-scripts either time-, event-triggered or at startup, to quickly create quick solutions. Use the integrated Web-Server including PHP support as a server for your own Web-based visualizations and control functions.

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1 Interfaces, Indicators and Installation

Describes the connection and installation options for the Motherbox.

1.1 Power

1.2 Network connection

1.3 LEDs

1.4 Button

1.5 Installation

1.1 Power

The Motherbox can be powered either via PoE or from an external power supply.

1.1.1 Power via PoE

The Motherbox is designed for use in PoE environments according to IEEE802.3af. Power is brought in here over the network infrastructure through the RJ45 terminal. The Motherbox supports both phantom power on data pairs 1/2 and 3/6 and power on the unused wire pairs 4/5 and 7/8.

To provide the supplied components with power management, the Motherbox identifies itself as a device in Power Class 2 (power consumption from 3.84W to 6.49W).

1.1.2 External power

Alternative to PoE the Motherbox can also be powered externally using the plug-in screw terminal on the underside of the housing. The DC voltage must be in a range of

24 ... 48V DC (+/-10%)

When applying the power please note the correct polarity. The 2-pin power plug is correspondingly labeled.



Reversing the polarity will not harm the Motherbox.

1.1.3 Disconnect from suppl voltage

When disconnecting the Motherbox 3 (only #50504) from the supply voltage, the operating system gets shut down controlled. The energy for this process is taken from two capacitors. Especially the file system is protected from failure, which could lead to problems at the next start of the system.

The capacitors are charged while operating the Motherbox.

1.2 Network connection

The Motherbox includes an IEEE 802.3 compatible network terminal. The physical connection is made using TP copper cable

1.2.1 10/100BaseT on RJ45

The 10/100BaseT network interface uses a shielded RJ45 connector. The pin configuration and function corresponds to an Auto-MDI(X) interface. Connection to a hub, switch or other network device is made using a maximum 100m long shielded patch cable.

Because the send and receive lines on connected devices are automatically detected, use of any (straight and crossed) network cable is possible.

The network connection is galvanically isolated from the supply voltage for at least 500V.

The Motherbox uses **autonegotiation**. To prevent communication problems, caused for example by a duplex mismatch, we recommend operating the port on the switch or hub in this mode as well. Here both the transmission speed and the duplex procedure is automatically negotiated and correspondingly set in the devices.



Managable switches often have special protocols (spanning tree protocol, port trunking, ...) as needed for example for uplinks to other switches or broadband connection of servers. These protocols are not generally needed for connecting normal terminal devices like the Motherbox, and they may significantly slow down the opening of a connection after a restart. We recommend disabling these protocols and functions on the port used for the Motherbox. Please consult your responsible network administrator.

1.2.2 Power-over-Ethernet (PoE)

The Motherbox can obtain its power over the network interface according to IEEE802.3af (Power-over-Ethernet). The data pairs may be used or the wire pairs not used for 10/100BaseT (see section **Power**).

1.3 LEDs

Optical indication of the network status is provided by the Motherbox in the form of two LEDs integrated into the RJ45 jack. The device status is displayed by a multi-color indicator also on the front of the unit.

1.3.1 Network status

Two LEDs in the lower corners of the RJ45 jack indicate the current network status of the Motherbox. The green LED may assume the following states:

- Off: No link
- On: Link present
- Flashing: Active data communication

The orange LED indicates the current data rate:

- Off: 10MBit
- On: 100MBit

1.3.2 Multi-color indicator

The multi-color indicator on the front of the Motherbox is used to represent the current **system status**:

- Green: **Normal state** of the Motherbox. All services are started and the system is fully ready. An underlaid cyclical flashing indicates the system load. The faster this flashes, the greater the process load.
- Blue: **Booting**. All services are being booted up. At this time no connections to the Motherbox can be opened.
- Blue flashing: **Network traffic** to or from the Motherbox.
- White pulsing: Ongoing **firmware update**
- Red flashing (approx. 1Hz): **No link**
- Red, solid on: Serious system error. The system can no longer be properly started.

1.4 Button

The **mechanical button** integrated into the multi-color display can be used for manual triggering a **hardware reset**. When the button is held down the multi-color display changes from green to yellow to red. This process takes around 5 seconds. Then all connections are closed and the system is restarted.

After startup is complete the indicator comes on green again, including the underlaid pulsing which indicates the processor load.

2 Navigation and Configuration Concept

If valid IP parameters are set in the Motherbox, the complete configuration of the system is made using Web-Based Management (WBM). Any Web browser can be used for access.

2.1 Open configuration access

2.2 Logon, make and save changes

2.3 Navigation

2.1 Open configuration access

Address the Motherbox by entering the IP address from any Web browser, this takes you to Web-Based Management.

If you have configured your own Web page as the start page which is shown when invoking the IP address, the configuration access is reached as follows:

```
<ip-address>/home
```

If the ports used for HTTP and HTTPS differ from the standard values (HTTP: 80, HTTPS: 443), the port number is required as a standard component of the address:

```
http://<ip-address>:<port>
```

or

```
https://<ip-address>:<port>
```

After sending the request the start page for the Motherbox will be shown in the browser.

2.2 Logon, changes, saving

As shipped from W&T unless you log in with special access rights you are only allowed the guest privileges of opening authorized measuring-profiles, visualisations and viewing the device properties.

Clicking on **Login** in the configuration tree takes you to the Login dialog.

Login

Username	<input type="text"/>
Password	<input type="password"/>

Login-Dialog

For access with Administrator rights, log in with the user name **admin** and the assigned password. No password is assigned by factory default. An operator login is done using the stored user name and the associated password.

Users with Operator rights are allowed to view the measuring-profiles and visualisations approved for them by the Administrator. In addition, under

Home >> Configuration >> Web-IO Inventory

the list of inventoried Web-IOs can be opened and updated by scanning the network. Access with Operator rights also permits viewing the **Properties** of the Motherbox.

The Administrator has full access to the system and is authorized to manipulate all options.



Changes on pages which are in the Motherbox folder in the configuration tree take effect only after logging

out. Changes on pages outside this folder take effect immediately.

Beneath the Navigation tree the current level of access rights and the name of the currently logged in user account is displayed.



Logged in with Administrator rights, shown beneath the navigation

Use **Logout** to exit the system. Whereas an Operator can only log out here, the following options are provided for an Administrator:

- **Save:** Any changes made are saved in the non-volatile memory of the Motherbox. The services affected by the configuration change are then restarted.
- **Restart:** The system is restarted and all active connections are closed. No configuration changes are saved.
- **Factory defaults:** Restores the factory default settings. All user-defined setting are lost.
- **Logout:** Logs out the Administrator without changing the configuration.

2.3 Navigation

Navigation is accomplished mainly using the navigation tree on the left side of the page. It is always possible to jump back to higher level pages using the breadcrumb navigation in the upper screen area.

2.3.1 Configuration tree

The configuration tree at left allows you to reach all the changeable options for the Motherbox. The individual configuration pages are sorted by topic and stored in a folder structure.

Clicking on the icon for a closed folder expands the corresponding directory. Clicking on the circled minus sign in front of an opened folder closes it again.

If you click on a closed or opened folder, a table overview of all the options available in this folder appears in the right area of the browser window. The individual entries in the table are also associated with links, which enables jumping to the respective page by selecting the link.

2.3.2 Breadcrumb navigation

Breadcrumb navigation is shown in the upper section of each page. This shows the path of the root directory for the configuration tree, **Home**, up to the currently opened page. Clicking on one of the page titles takes you directly to the higher level page.

2.3.3 Navigation without JavaScript

It is recommended that you enable JavaScript for using the Motherbox configuration pages. If for security reasons you still prefer not to use JavaScript, you can navigate through the

Motherbox configuration using the breadcrumb navigation and the table overviews on the folder pages.

3 Assigning and changing IP parameters

After hardware installation of the Motherbox, the IP address needed for operation in a TCP/IP network as well as the subnet mask and gateway address must be entered. Please consult your responsible system administrator for the correct values of these parameters.

The IP address of the Motherbox as shipped is 190.107.233.110.

3.1 WuTility

3.2 Managing network parameters

3.3 Automatic address assigning using DHCP

3.4 Static mode

3.1 WuTility

The Windows tool WuTility version 4.02 and higher supports inventoring and management of the network basic parameters for the Motherbox:

- IP address
- Subnet mask
- Gateway address
- 2 x DNS-server address
- Switching between DHCP and Static

To assign these the PC and Motherbox must be in the same physical network, whereby the function is independent of the current address setting for the Motherbox. This means even if the current IP parameters for the Motherbox do not match the PC settings, you can always make a change using WuTility. Any system password set in the Motherbox must be known.

The fastest way to install WuTility is using the Install button on the start page, using the product CD included with the Motherbox.

Start WuTility then from

Start > Programs > W&T Software Toolkit > WuTility

The current version of WuTility can also be downloaded from our Web site:

<http://www.wut.de>

In addition to assigning parameters using WuTility, you can adjust the network configuration using the WBM in the Motherbox as well.

3.2 Managing network parameters

The Motherbox distinguishes between two modes with respect to its network-side basic parameters:

- Static
- DHCP

As shipped and after a factory default reset automatic address assignment per DHCP is enabled.

3.2.1 Static

The IP address, subnet mask and gateway are stored in the non-volatile setup of the Motherbox and DHCP is disabled. The parameters set in this manner remain intact even after power interruptions and resets, until they are changed using the WuTility inventoring tool or via WBM.

3.2.2 DHCP

If automatic address assignment using DHCP is enabled, the Motherbox attempts to obtain its IP parameters from a DHCP server located in the network. If no DHCP server is in the network or if the attempt to obtain an IP address is rejected, the Motherbox operates using the factory default IP address 190.107.233.110. When switching from Static to DHCP mode via WuTility or WBM, this default IP address is defaulted to until valid parameters are assigned.

3.3 Automatic assignment using DHCP

Many network use DHCP (Dynamic Host Configuration Protocol) for centralized and dynamic assignment of the network parameters. As shipped and after a reset to the factory default settings DHCP mode is enabled, so that in network environments with dynamic IP parameter assignment all you need to do is connect the Motherbox to the network. The following parameters can be assigned using DHCP:

- IP address
- Subnet mask
- Gateway address
- 2 x DNS-server address
- Lease time



After an unintended parameter assignment or a change via DHCP to an unknown address, the Motherbox can be found and identified from its unique MAC address using the WuTility management and inventoring tool. Changing the incorrect IP address as well as switching to Static mode while DHCP is deactivated can also be done via WuTility.

3.3.1 Enabling DHCP mode

DHCP protocol is enabled by switching from Static to DHCP mode using WuTility or the WBM on the Motherbox. The previous static IP address is deleted when DHCP is enabled. The Motherbox defaults to its IP address 190.107.233.110 until new parameters are assigned by a DHCP server.

To set a Motherbox to DHCP mode from WuTility, highlight the unit in the device list and click on the **IP-Address** button. In the following dialog window select the radio button **DHCP** and then click on **Next**.

To configure this option using WBM, log in to the browser using the configuration pages in the Motherbox and navigate to

Home >> Configuration >> Motherbox >> LAN

Select the option **Enable DHCP** and then click on the **Send**-button. Use **Logout** and **Save** to save the new setting in the Motherbox.



Switching from Static mode to DHCP causes the static set IP address to revert to the factory default setting 190.107.233.110. If the IP assignment using DHCP fails, for example because no DHCP server is available, the Motherbox may no longer be accessible, especially in routed network environments. Re-enabling Static mode using WuTility is then only possible from a computer within the same physical network.

3.3.2 Disabling DHCP mode

DHCP is disabled by switching from **DHCP** mode to **Static** mode using WuTility or WBM in the Motherbox. In both cases the new values for IP address, subnet mask and gateway address must be manually set.

To disable DHCP using WuTility, select the corresponding device in the inventory list of the program and click on the **IP-Address** button. In the resulting dialog window select the radio button **Static**. After entering the new IP address, subnet mask and gateway address, click on **Next**.

*In WBM and while logged in navigate to the configuration page for LAN-setting, unselect **Enable DHCP** and enter valid values for IP address, subnet mask and gateway address. After clicking on **Send** you can save the values by clicking on **Logout** and **Save**.*

3.3.3 System name

To support any possible automated updating of the DNS system by the DHCP server, the Motherbox identifies itself within the DHCP protocol with its system name. The factory setting for this name is MB2 / MB3 followed by the last three places in the Ethernet address. For example the factory set system name of

a Motherbox 2 having Ethernet address 00:c0:3d:01:02:03 is MB2010203. The system name of the Motherbox can be changed using WBM.

3.3.4 Lease-Time

The lease time determined and transmitted by the DHCP server specifies the term of the assigned IP address. After half the lease time has expired the Motherbox attempts to extend the term with the assigning DHCP server or to update the address. If this is not possible by the time the lease time has expired, for example because the DHCP server is no longer available, the Motherbox deletes its IP address and reverts to the factory set default IP address 190.107.233.110. At the same time the cyclical search for alternate DHCP servers is started in order to assign a new IP address.

After a reset of the Motherbox both the assigned IP parameters as well as the lease time associated with the IP address are deleted. The Motherbox starts up after a reboot with the default IP address and immediately begins DHCP requests.

In DHCP mode the remaining lease time together with the current IP address are displayed on the Web page

Home >> Properties.



If after expiration of the assigned lease time the DHCP server can no longer be reached, the Motherbox deletes the current IP parameters, reverts to its factory default IP address and starts the cyclical search for alternate DHCP servers. All open connections are thereby closed. To prevent this problem we recommend configuring the lease time assigned in the DHCP server to infinite if possible.

3.3.5 Reserved IP addresses

The Motherbox is designed as a TCP server and provides services which can be automatically made use of on the

computer side. To open a connection these need of course the IP address of the Motherbox, so that it makes sense to reserve a particular IP address for the Motherbox on the DHCP server. This is generally done by linking the IP address to be assigned to the unique Ethernet address, which can be found on the housing sticker.

3.3.6 Dynamic IP addresses

Fully dynamic address assignment, whereby the Motherbox gets a different IP address after every restart or after the lease time expires, is only practical in network environments with automated cross-linking between the DHCP and DNS services. This means that when a new IP address is assigned to the Motherbox, the DHCP server then also automatically updates the DNS system. The new address is thereby associated with the respective domain name. For detailed information about your network environment, consult with your system administrator.

3.4 Static mode

In **Static mode** the Motherbox uses **static network parameters**, and automatic address assignment via **DHCP is disabled**. To assign the static values for IP address, subnet mask and gateway address there are two options.

3.4.1 Assigning static parameters using WuTility

Be sure that both the Motherbox and the computer you are using are connected to the same physical network. At startup **WuTility** automatically searches the local network for connected W&T network devices and generates an inventory list. This search process can be performed as often as desired by clicking on the **Scan** button:



From the inventory list you can identify the desired Motherbox based on its MAC address. When first installing, the default address (190.107.233.110) is set.

 A screenshot of the WuTility software interface. The title bar reads "Unbenannt - WuTility". The menu bar includes "Datei", "Gerät", "Konfiguration", "Firmware", "Optionen", and "Hilfe". The toolbar contains icons for "Neu", "Öffnen", "Speichern", "Scannen", "IP-Adresse", "Telnet", "Browser", "Firmware", and "Hilfe". Below the toolbar is a table with the following data:

Ethernet-Adresse	IP-Adresse	Produktnummer	Produktname	Version
00c03d:aaaaac1	190.107.233.110	#50501	Motherbox	1.06

Motherbox scanned in WuTility

Select the desired Motherbox and click on the **IP Address** button:



In the resulting dialog window select the radio button **Static** and enter the desired values for IP address, subnet mask and gateway address.

Geräteeinstellungen: Netzwerkparameter

dynamisch (DHCP)

statisch

IP-Adresse (muss eindeutig sein): 10 . 40 . 27 . 98 Adressbereich: Netzwerk #0

Diese Adresse ist möglicherweise noch frei.

Subnetzmaske: 255 . 255 . 0 . 0 Vorgabe: Windows-Netzwerk

Standardgateway: 10 . 40 . 250 . 252

< Zurück Weiter > Abbrechen

IP parameter assignment using WuTility



Every IP address must be unique within the network.

After clicking on the **Next** button you are prompted for the system password. Then the entered parameters are saved in the Motherbox non-volatile memory.

All other settings are made using the Web Based Management of the Motherbox and an Internet browser. Select the desired Motherbox in the WuTility inventory list and click on the **Browser** button:



Changing network parameters is protected by the system password. To prevent misuse, we recommend assigning a system password for active devices.



If IP-Address, Subnetmask and Gateway doesn't match, these values will be replaced by the default-settings.

3.4.2 Assigning static IP parameters using WBM

As shipped and after a reset to the factory default settings, the Motherbox is in DHCP mode. As long as no DHCP server assigns an address, the Motherbox can also be reached at its default IP address 190.107.233.110. Switching to Static mode and assigning the new IP parameters can also be done from an Internet browser using WBM.



Always clarify all changes to the network settings on your computer ahead of time with your network administrator.

On the computer side the following conditions must be met:

- The IP address of the computer used is in the subnet 190.107.0.0 or is temporarily changed to an appropriate value. To change the IP address of the computer you need Administrator rights. Always clarify such a change in advance with your network administrator.
- On the computer used a fixed route is set which redirects the IP address 190.107.233.110 to the local network. To set up such a route you need Administrator rights on the system. The command line for creating a fixed route under Windows XP is:

```
route ADD 190.107.233.110 MASK 255.255.255.255 <IP-Address of the PC>
```

Then start your Internet browser and in the address line enter the target **http://190.107.233.110**. Log in to the Motherbox using Administrator rights and on the configuration page

Home >> Configuration >> Motherbox >> LAN

change the network settings to the new values.



If IP-Address, Subnetmask and Gateway doesn't match, these values will be replaced by the default-settings.

4 Configuring System Parameters

In the following section the configuration of system parameters is described. Access to these configuration options is through the Web Based Management (WBM) on the unit after you have logged in with Administrator rights (user name „admin“ and assigned password).

4.1 Edit device information

4.2 Select standard language

4.3 Set internal clock

4.4 Manage users

4.5 Configure services

4.6 Modify LAN parameters

4.7 Change manufacturer data

4.8 Measuring database

4.1 Edit device information

From the menu tree navigate to

Home >> Config >> Motherbox >> Info

- System name
- Description
- Device location
- Service contact

The **system name** directly affects the DHCP and DNS behavior. It can be used for example if these systems are appropriately configured to address the Motherbox in the browser.

The items **Description**, **Device location** and **Service contact** are only explanatory and are intended to help clarify the box in the application, make the installation location transparent, and indicate whom to contact when service is needed.

Using the option **Status-LED** the multi-color-LED in the front of the box can be switched on or off.

Apply your changes before leaving the page by clicking on the **Send** button. The **Reload** button fills in any changed fields with their original values. **Logout** takes you to the Logout dialog.



*The configuration changes copied to the buffer memory using the **Send** button only take effect when at the end of a configuration process you have stored them in the non-volatile setup by clicking on **Save** in the logout dialog. After any required restart all changes will be active.*

4.2 Select standard language

On the configuration page Language, which is reached from the menu tree at



Home >> Config >> Motherbox >> Language

you can select the standard language for the Motherbox. All Web pages are displayed in this language when opened by the Motherbox.

Available language profiles:

- German
- English

Language

Default-Language	<input type="radio"/>  <input checked="" type="radio"/> 	Defines the default-language.
Configuration will take effect at logout		
Send	Reload	Logout

Configuring the standard language

Select the desired language by clicking on the corresponding flag and apply your change by clicking on the **Send** button to the buffer memory.



*The configuration changes copied to the buffer memory using the **Send** button only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active.*

In addition to the fixed language selection using the method described above, you can also change the language profile so that it takes effect immediately. This is done by clicking on the

flag symbols located below the menu tree. The grayed out flag shows here the currently active language profile. You can always switch to the language profile whose flag is not grayed out.



Quick selecting the system language

This method of selecting the language is however only valid for the current session. If the browser is closed or outside pages opened, this setting is lost. The next time the original page is opened the device reverts to the configured standard language.

4.3 Setting the device clock

Internal clock settings are made on the Configuration page

Home >> Config >> Motherbox >> Device Clock

Device Clock

Time-Server Client	<input checked="" type="checkbox"/>	Activates the time-synchronisation with a time-server
Time-Server 1	<input type="text" value="de.pool.ntp.org"/>	A time-server's IP-address or hostname
Time-Server 2	<input type="text" value="europe.pool.ntp.org"/>	IP-address or hostname of an alternative time-server
Time-Server	<input checked="" type="checkbox"/>	Activates the time-server, which enables time-synchronisation for requesting clients
Ignore sync state	<input type="checkbox"/>	Replies with valid responses, although the Time-Server isn't synced. Helpful after power fail or without access to the internet.
Set date/time	<input type="checkbox"/>	Applies Date and Time (available when Time-Server Client is switched off)
Date	<input type="text" value="9"/> <input type="text" value="8"/> <input type="text" value="2011"/>	Formatted date: MM.DD.YYYY
Time	<input type="text" value="12"/> <input type="text" value="24"/> <input type="text" value="53"/>	Formatted time: hh:mm:ss
Timezone	<input type="text" value="Berlin"/>	Current timezone

Configuration will take effect at logout

Send

Reload

Logout

Device clock settings

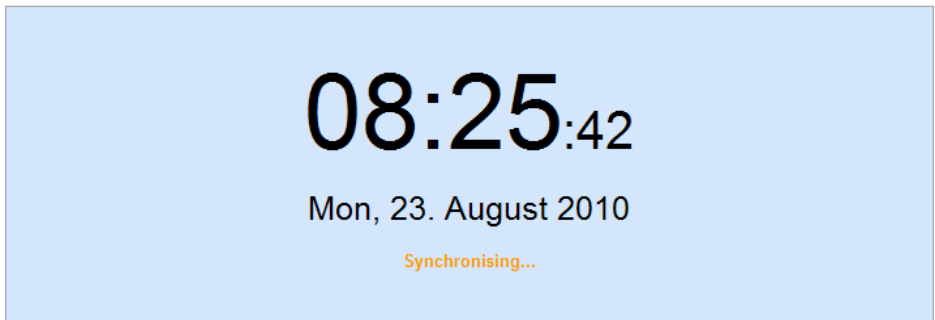
When you activate the option **Time-Server Client** the Motherbox automatically retrieves the current date and time using Network Time Protocol (NTP). The time servers entered for **Time-Server 1** and **Time-Server 2** are contacted.

Time-Server 1 and **Time-Server 2** are contacted at the same time during a synchronization cycle. The name resolution of the host names entered there, should you be using a public time server, normally returns multiple IP addresses. The more addresses are available to the process here, the faster the time will be calibrated.

The current status of the synchronization procedure can be seen on the Home page under the time and date information displayed there. The following status conditions are possible:

- Time synchronization disabled
- Deviceclock not synchronized!
- Synchronising...
- Deviceclock synchronized

Home



Time and status information for the time server client on the homepage

After starting synchronization, second-accurate time information will be available after just a very short delay. The target accuracy of the time synchronization is in the microsecond range. To reach this accuracy, the process takes several minutes. The **Synchronising...** status displayed on **Home** is replaced by **Deviceclock synchronized** after full synchronization has been completed. If an error occurs during the procedure, the system is set to **System time not synchronized!**. There are then cyclical attempts to synchronize the time and date.

Once the next synchronization takes place automatically depending on the discrepancy with the internal clock.

In addition to its ability to obtain the system time from higher level systems, the Motherbox itself can also function as a time server. This property is controlled by the option **Time-Server**. Network Time Protocol (NTP) and Simple Network Time Protocol (SNTP) are replied.

The condition for turning on the **Time-Server** option is that the Motherbox has automatic time synchronization with at least one higher level time server. Alternatively the option **Ignore sync state** can be set. Then each request is answered with a valid response.

When **Time-Server Client** is disabled, you can enable the option **Set date/time**. If this is active, transmitting the values with **Send** passes the time information set under **Date** and **Time** to the **Device Clock**. Regardless of whether using automatic or manual time setting, specify for **Timezone** the current location of the Motherbox. This selection control the offset to UTC as well as automatic adjustment of the time when changing from daylight savings to standard time and vice-versa.

Apply your changes on this configuration page by sending them to the buffer memory of the device: Click **Send**.



*The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active*

The internal clock of the Motherbox 2 is battery buffered. This means the set time information is not lost when disconnecting the unit from power. The battery used is a button cell with 3V and 125mAh. Due to the permissible ambient temperature of the Motherbox 2, please use only types designed for an extended temperature range (-30 ... 80°C) when replacing the

battery. The standard name for the battery is: BR1632. Please always properly dispose of used batteries.

The internal clock of the Motherbox 3 is supplied by two capacitors, after disconnecting from its power supply. The capacitors get charged while operating the Motherbox 3. They can run the clock up to one week.

4.4 Manage users

The Motherbox distinguishes between two types of users: the Administrator and the operators. The Administrator has full authorization for all settings and accesses, e.g. FTP for the device, and can configure them as desired. An operator on the other hand can only open and view the measuring-profiles and visualisations which the Administrator has authorized him for.

The Administrator account is already created when the unit is shipped. The user name for it is **admin**. No password is assigned, but for security reasons this should be done when starting up the system. In contrast to the operator accounts, the user name of the administrator cannot be changed. Deleting the Administrator account is likewise not possible.



Creating new operators, deleting existing operators and editing the Administrator or any Operator account are all done on the Configuration page

Home >> Config >> Motherbox >> User

The Administrator sees here in the overview the existing users always in first place.

User

Create, delete and edit a user

 Create user			
	Username	Permission	
	admin	Admin	
1 Operator			

User management from the Administrator account

You create a new operator in the dialog box, which you reach by clicking on the **Create user** button.

Enter here the desired user name and password. The password must be entered twice for verification purposes. Assigning a password is optional, but is recommended for security reasons.

Send the changes to the buffer memory by clicking on **Send**. Clicking on **Back** takes you to back to the overview of all user accounts. **Reload** restores the values that were in effect when the page was opened. **Logout** takes you to the Logout dialog.

To edit an existing account, click on the Edit icon at left in the line for the respective user account. The resulting dialog allows you to directly rename the account. If you also want to change the password, check **Change password** and enter the new password twice in the fields provided. The previous password is deleted when the two text fields for the password are activated and left blank.

Copy your changes to the buffer memory by clicking on **Send**.

Edit user

Username	<input type="text" value="Max Mustermann"/>
Change password	<input type="checkbox"/> Check here for modifying the password
Password	<input type="text"/>
Re-enter	<input type="text"/>

Configuration will take effect at logout

Send

Back

Reload

Logout

Changing an existing user account

A user account is deleted by clicking on the **wastebasket icon** to the right of the respective line.



The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the

*Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active.*

User names must be unique, i.e. a user name must occur only once. Passwords on the other hand may be assigned as often as desired, allowing different users the use of the same password.

Create user

The following errors occurred:

- The username already exists

Username	<input type="text" value="Max Mustermann"/>
Password	<input type="password"/>
Re-enter	<input type="password"/>

Configuration will take effect at logout

Send

Back

Reload

Logout

Error message when attempting to duplicate a user name

4.5 Configure services

Services, provided by the Motherbox, can be configured at

Home >> Config >> Motherbox >> Network-Service

Using **activate Web-Access** you can disable the WBM. At disabled WBM the reset of the box to the default settings is the only way to reactivate the WBM. Furthermore you can activate **HTTPS** to make the configuration-process more secure. Also the ports can be changed here and your own **HTTP-certificate** can be uploaded here.

As shipped the FTP-server in the box is disabled. By selecting the option **FTP-Server** you can access the user area with any FTP client through the configured TCP port. Log in using the user name **admin** and the currently assigned password.

To activate the TFTP-server, select **TFTP-Server**.

The device also offers access to the internally stored user files using SMB protocol. If you want this memory to be accessible in an MS Windows environment for example, select **Enable SMB-Server**. The system will then be displayed in the network environment, below the specified **Workgroup**, with the **System name**. To access this resource username (admin) and the currently configured password are required. The standard enabled login procedure can be disabled by deselecting **Login required**. In this case neither the user name nor a password are prompted when accessing the subfolder **userfiles**. Direct access to the file system is possible using:

```
\\<IP-Address>[userfiles]
```

For viewing error logs there can be a SSH-Server activated, using the option **SSH-Access**. Username admin and the assigned password is for login required.

If the option **Reset-Port** is enabled, the box carries out a warm start after opening **Reset-Port**. If an Administrator password has

been assigned, this must be sent to the system directly after opening the port.

The accessible management of the box can be controlled by **Allow Firmware-Update** and **activate WuTility-Management**



*The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup by clicking on **Save** in the logout dialog. After any required restart all changes will be active.*

4.6 Modify LAN parameters

Change the LAN configuration of the Motherbox under

Home >> Config >> Motherbox >> LAN

To use automatic address assignment using DHCP, select the option **Enable DHCP**. Otherwise you can manually configure the parameters **IP address**, **subnet mask** and **gateway** in the text field provided. The two possible DNS servers are always editable, but are overwritten by addresses, delivered via DHCP.

LAN

Enable DHCP	<input type="checkbox"/>	Activates automatic IP-settings via DHCP
IP-Address	<input type="text" value="10.40.27.245"/>	Scheme: xxx.xxx.xxx.xxx
Subnet Mask	<input type="text" value="255.255.0.0"/>	Scheme: xxx.xxx.xxx.xxx
Gateway	<input type="text" value="10.40.250.252"/>	Scheme: xxx.xxx.xxx.xxx
DNS-Server 1	<input type="text" value="10.40.250.252"/>	Scheme: xxx.xxx.xxx.xxx
DNS-Server 2	<input type="text" value="0.0.0.0"/>	Scheme: xxx.xxx.xxx.xxx

Configuration will take effect at logout

Send

Reload

Logout

Configuring the Motherbox network parameters



*The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active.*


4.7 Change manufacturer data

At

Home >> Config >> Motherbox >> Manufacturer

you can change the data for manufacturer and product name or select an alternate logo. These options are especially interesting for systems integrators using the Motherbox as part of a larger system..

Manufacturer

Name	<input type="text" value="Wiesemann & Theis GmbH"/>	Manufacturer information, which are displayed on the "Properties"-page.
Address	<input type="text" value="Porschestr. 12"/> <input type="text" value="42279 Wuppertal"/> <input type="text" value="Germany"/>	
Phone-No.	<input type="text" value="+49 (0)202 / 2680-0"/>	
Website	<input type="text" value="http://www.wut.de"/>	
Product-name	<input type="text" value="Motherbox"/>	
Logo	<input type="radio"/> No logo <input checked="" type="radio"/> Wiesemann & Theis logo  <input type="radio"/> Upload logo-file (max. 100KB) <input type="text"/> <input type="button" value="Durchsuchen..."/>	Logo displayed above the navigation.

Configuration will take effect at logout

Send

Reload

Logout

Modifying manufacturer data and logo

Under **Name**, **Address**, **Phone-No.**, **Website** and **Product-name** enter the information you want to be shown on the **Properties** page for viewing by all users.

If the protocol type is specified under **Website** (e.g. http:// or https://), addressing is absolute. In this case you can specify the Website which are on different Web servers. Omitting the protocol specification means addressing is relative to the root directory of the Motherbox. Relative addressing is recommended for specifying sites which are on the Motherbox itself.

Under the **Logo** option you can select the company or product logo that you want to appear in the header of the configuration tree. Here you can select from:

- No logo: No graphical company or product logo is shown in the configuration tree.
- Wiesemann & Theis logo: The company logo of the manufacturer of the Motherbox is displayed (factory default setting)
- User-defined logo: Any graphics file with a maximum size of 100kB can be loaded into the Motherbox and displayed above the configuration tree.



*The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active.*

4.8 Measuring database

Under

Home >> Config >> Motherbox >> Measuring Database

you can use the option **Archive measurement data** to start and stop the background service which carries out collection and archiving of Web-IO measurement data. If this option is enabled, the sensors configured under

Home >> Config >> Web-IO Inventory

are polled at their respective set interval. The measurement data obtained in this manner including the request and response time are stored in the **Measuring Database**.

Place the new configuration in the buffer memory by clicking on **Send**.



*The configuration changes copied to the buffer memory only take effect when at the end of a configuration process you have stored them in the non-volatile setup of the Motherbox by clicking on **Save** in the logout dialog. After any required restart of the Motherbox all changes will be active.*

In addition, you can find an overview of the current memory space. Here you are explicitly shown how much space is taken by the database file and the files the Administrator uploaded in the internal flash memory. The remaining available memory is also indicated.

5 Web-IO Inventory

The following sections describe inventoring of accessible Web-IOs as well as the configuration path for automatic saving of measurement data in the Motherbox database.

The steps described here require Administrator rights. Log in using WBM and the username „admin“ and the password associated with the Motherbox system.

5.1 Inventorize Web-IOs

5.2 Automatically polling measurement data

5.3 Measurement database size

5.1 Inventorize Web-IOs

The Motherbox contains a Windows-type tool called **WuTility**, a browser-based application for inventorizing Web-IOs.

After logging in with Administrator rights, navigate through the configuration tree to



Home >> Config >> Web-IO Inventory

There you will see the current inventory list. As shipped, after a factory default reset or after manually deleting the list elements, this list is empty.

The following information is shown for the listed Web-IOs:

- Ethernet-Addr.
- IP/Host
- Product ID
- Product name
- Version
- HTTP port
- System name

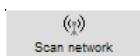
The IPs and hostnames shown are also hyperlinks. Clicking on them opens the start page of the respected Web-IO in a separate window or tab.

Scan network		Insert new device		Delete list			
Ethernet-Addr.	IP/Host	Product ID	Product name	Version	HTTP-Port	System name	
 00c03d:02f076	10.40.220.100	#57633	Web-IO 2xDigital, 10/100BT, 12-24V	1.57	80		

Inventory list with one Web-IO shown

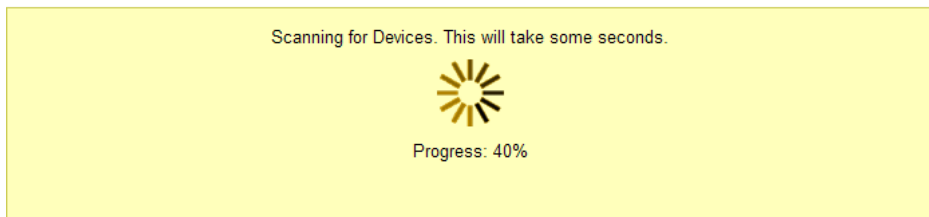
5.1.1 Start automatic inventorizing

To start an automatic inventorizing scan, click on the **Scan network** button:




This starts the scan process, which will take more or less time depending on how many Web-IOs are available.

Web-IO Inventory



Progress display for automatic inventoring

After the scan is complete, you are returned to the inventory list, which has now added all newly found Web-IOs.

 *Automatic inventoring only recognizes devices located in the same subnet. Likewise, Web-IOs with the IP address 0.0.0.0 (factory default setting or without a valid address assignment via DHCP) are not recognized.*

Newly found devices are marked with a light bulb:



Already known devices which following the latest scan are no longer accessible are marked by a question mark:



5.1.2 Insert devices

If a device cannot be located automatically because for example it is no located in the same subnet and cannot receive the inventoring broadcast, entries can also be made manually. To do this, click on the **Insert new device** button:



In the dialog which opens enter the **IP/Host**, the **HTTP port** and the **device password** for the new Web-IO.

By clicking on **Save** this Web-IO marked with a question mark is immediately part of the inventory list. The next time a scan is performed it will be directly accessed using the entered IP address and the missing data will be requested.

Insert device

Ethernet-Addr.	<i>Will be requested at next scan</i>	
IP/Host	<input type="text"/>	
Product ID	<i>Will be requested at next scan</i>	
Product name	<i>Will be requested at next scan</i>	
Version	<i>Will be requested at next scan</i>	
HTTP-Port	<input type="text" value="80"/>	
System name	<i>Will be requested at next scan</i>	
Device-Password	<input type="text"/>	Required to access the device's current measurement-data

Manually adding a device

5.1.3 Delete list elements

To delete individual elements click on the trash can icon for the entry you want to remove, all the way to the right in the inventory list:



To clear the entire list, click on the **Delete list** button in the table head:



Deleting one or more entries also removes stored measurement data from the internal database. If one or

more sensors from deleted devices are assigned to one or more measurement data profiles , these sensors are also removed from the profile.

4.1.4 Sorting and filtering

Entries in the inventory list can be sorted according to the following criteria:

- Ethernet-Addr.
- IP/Host
- Product ID
- Product name
- Version
- HTTP-Port
- System name

To select one of the above sorts, click on the corresponding column title in the list display. The data records for the Web-IOs listed are then rearranged in increasing order according to the selected criterion.

A modified view is not saved and is only in effect as long as the page is displayed in the browser. The next time the list is opened, the entries are again shown in increasing order according to their assigned **IP address**.

In addition to sorting the elements according to one of the column titles in the inventory list, you can also hide all Web-IOs for which no measurement data is saved in the internal database. Set this filter by checking the option **with measurement data** in the **Display filter** and then apply by clicking on **Set filter**.



Display-filter
with measurement
Set filter Delete filter

Setting the display filter

Clicking on **Delete filter** restores the original view. Just as with any selected sorting method, the filter setting is not saved and is no longer set the next time the Web page is opened.

5.2 Automatically polling measurement data

The Motherbox allows you to automatically and at prescribed intervals poll measurement data from inventorized Web-IOs. Requesting and saving is possible for:

- Digital input states
- Digital output states
- Counter states
- Values for analog inputs (current, voltage, temperature, relative humidity and air pressure)
- Values for analog outputs (current and voltage)

The measurement data gathered in this way are saved in the internal memory of the Motherbox in a MySQL-database. Any rejected measurement receives a time stamp whose source is the Motherbox system clock.

Data polling must be enabled manually for each measuring point. Automatic polling can be turned on and off centrally on the configuration page

Home >> Config >> Motherbox >> Measuring Database

under the option **Archive measuring data**.

5.2.1 Enable measurement data polling

To enable automatic measurement data polling for individual measuring points go to

Home >> Config >> Web-IO Inventory

and click on the Edit icon for the desired list entry to open the dialog for changing the configuration:



In addition to an overview of the known device parameters, you are able here to enter the **device password** for the Web-IO.

The device password is required for automatic data polling in order to access the current measurement data. Here you do not have to enter the Administrator password for the Web-IO, access with Operator rights is sufficient. If you have specified neither an Administrator nor Operator password for access to the Web-IO, the field **Device password** remains blank.

For Web-IOs with an older firmware version you can also change here the value for the currently set **HTTP port**. The **HTTP port** is required both for opening the start page of Web-IOs through the inventory list as well as for automatic polling of measurement data.

The available measurement points for the selected Web-IO are, depending on the model, listed under the headings

- Sensors
- Inputs
- Outputs
- Counters

Enable automatic data polling here for individual measuring points by checking the box in front of the respective **Name** of the measuring point.

Under **Interval** you define the timing of the data polling. The following intervals are offered:

- 5 seconds
- 15 seconds
- 30 seconds
- 60 seconds
- 5 minutes
- 15 minutes
- 30 minutes
- 60 minutes



The polling time point for all configured measuring points is always synchronized to the full hour. This ensures a uniform time grid, which makes displaying and analyzing gathered measuring data considerably easier.

Clicking on the **trash can icon** deletes already stored measuring data for the respective measuring point from the Motherbox memory. This procedure is secured with an additional security prompt and is carried out as soon as confirmed by the user.

Changes made to **HTTP port**, **Device password** and **Automatic data polling** are active as soon as you confirm by clicking on **Save**.

5.2.2 State of measurement data polling

The current status of automatic measurement polling is shown on the page **Configure measurement-polling**, which you reach from the inventory list by clicking on the **Edit** icon. The status is shown for each individual measuring point at far left in the table overview.

If data polling is deactivated without previously gathered measuring data, no additional information is shown.

If the measurement values are activated and error-free, a small colored chart with a history curve is shown:



If automatic measurement polling is disabled when there are already data in the measurement value memory, a grayed out history curve is shown:






If an error occurs when opening the measurement values, the chart symbol also includes a question mark:



The status for automatic measurement data retrieval is also displayed in the inventory list at

Home >> Config >> Web-IO Inventory

The icons shown here, likewise in the left column of the table, correspond in appearance and meaning to the previously mentioned icons. This is however always the collective status of all measuring points available under the IP address:

- No icon: Data polling is not enabled for any available measuring point and no archived data are stored in the database for any measuring point.
- : Active and successful data polling for at least one available measuring point. The polled measuring points are accessible.
- : Data polling for all available measuring points is disabled, but previously archived measurement data is contained in the archive for at least one measuring point.
- : Regardless of the configuration of the other measuring points the data polling for at least one measuring point could not be carried out according to the prescribed schedule.

As soon as one of the above icons is displayed, clicking on the icon takes you to a table overview in which the previously stored measurement values for the entire Web-IO or the individual measuring point are shown.

5.3 Database size

The measurement database is created and maintained in the Motherbox in the approx. 750MB user area. Available for the measurement database is the complete memory minus the space occupied by files which the user loaded on to the system (**userfiles** subfolder).

To always enable archiving of the most recent measurement data, the database uses a ring memory principle. If the available memory space falls below a limit of 64MB, the oldest 50,000 entries are automatically deleted. This frees up approx. 5 MB flash memory per deletion cycle.

5.4 Database structure

You can directly connect the MySQL-server on the Motherbox and access all measuring data in the MySQL-measuring database from Your own applications. The data is stored in the database wutdb. The configured TCP-port (default: 3306) is used for network connection to the database. Log in with **admin** and the assigned password.

By opening the database you are given access to the tables:

- **device**: Contains one line per inventoried device with detailed information about the hard- and software
- **sensor**: Information about the individual sensor end points
- **measurement**: Recorded measurements including a reference to the sensor source and time stamp

5.4.1 device table

The **device** table contains the following columns:

- **ID**: Unique identification number for the inventoried Web-IO. **DeviceID** in the **sensor** table refers to this ID.
- **Ethernet**: MAC address of the Web-IO
- **Host**: IP address or host name, enables addressing of the device.
- **IPAddress**: not used
- **ProductNr**: Product number
- **ProductName**: Official product name
- **Version**: Current firmware version of the Web-IO
- **SystemName**: System name assigned in the device, required in environments with configured DNS.
- **DevicePassword**: Operator or Administrator password, required for polling measurement data.
- **WBMPort**: Defines the port through which Web Based Managements is accessible.
- **OptionMask**: Meaning of the set bits:
 - Bit 1: Device newly found (light bulb is shown)
 - Bit 2: Device did not respond to the last poll
 - Bit 3: Device has no IP address

Bis 4: Web-IO was entered manually

Bit 5 / 6: Additional information for inventoring and display

5.4.2 sensor table

Columns in the **sensor** table:

- **ID**: Unique identification number for the sensor points. **SensorID** in the **measurement** table refers to this ID.
- **DeviceID**: Refers to the **ID** column in the **device** table, and so represents the relationship to the Web-IO which contains this sensor end point.
- **Slot**: Channel number of the measuring point in the Web-IO
- **Unit**: Channel units
- **Name**: Channel name
- **Period**: Determines the interval at which the measuring point is polled.
- **OptionMask**: Meaning of the set bits:
 - Bit 2: Device did not respond to the last poll
 - Bit 7: Automatic measurement polling active
- **ReadFunc**: Codes the permissible set of commands that can be applied to the measuring point:
 - 1: analog input
 - 2: digital input
 - 3: digital output with read- and write-access
 - 4: counter
 - 5: digital output, read-only function
 - 6: analog output
 - 5: Analog input and output
- **RecordCount**: Number of stored records for this sensor

5.4.3 measurement table

Columns in the **measurement** table:

- **ID**: Unique ID of the entry (no other function)
- **SensorID**: Reference to the sensor which provided the measurement.

- **Value:** Recorded measurement
- **AnswerDate:** local time of the response as unix-timestamp
- **RequestDate:** local time of the measurement poll as unix-timestamp

6 Measuring Profiles

Compilation of any measuring points into meaningful and application-specific overviews.

6.1 Create measuring profile

6.2 Edit profiles

6.3 Delete measuring profile

6.1 Create measuring data profile

A measuring data profile represents a grouping of any number of measuring points. It makes no difference whether the individual measuring points belong to one or more Web-IOs. Likewise the type of measuring point is immaterial. Analog and digital signals can be mixed.

By combining selected measuring points into one measurement data profile you can quickly and simply obtain overviews which are optimally tailored to the application. View these table views directly in the browser.

Before creating a measurement data profile you must first enable automatic measurement data polling for the desired sensors as described in section 5.2.

To create a measurement data profile, after logging in with Administrator rights navigate to the configuration page

Home >> Config >> Measuring profiles

Click on the **Create** button:



In the following dialog, under **Profilename** enter first the name of the measurement data profile. For **Description** you can write any text which explains the meaning of the profile in greater detail.

Under **Permission** you specify which users are allowed to view the measurement data profile in the menu tree and thereby have access. You can also define the profile as a **Homepageprofile**. Checking this option causes the profile to be shown in the browser when the Motherbox start page is opened. Display of a start page profile assumes of course that the required access rights are present.

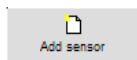
Store the setting directly in the non-volatile setup of the Motherbox by clicking on **Save**.

Create profile

Profilename	<input type="text" value="Test"/>	
Description	<input type="text" value="This is a sample profile."/>	
Permission	<input checked="" type="checkbox"/> admin <input checked="" type="checkbox"/> Guests	
Homepageprofile	<input type="checkbox"/> (Current homepageprofile: none)	There can only be one

Creating a measuring profile

Below the filled out dialog box a table now appears in which all the sensors associated with the profile are listed. When you first create the profile it contains no elements. Use the **Add sensor** button to assign new sensors to the profile:



Click on the IP address shown to display the sensor inventory for a device. Select the sensors you want to add to the profile. Apply your selection by clicking on **Save**. The selected sensors are now visible in the sensor overview of the profile. The measurement data profile is now created.

Accessing the Motherbox using the access rights given when the profile was created shows you the profile in the menu tree directly under **Home**. Clicking on this tree entry displays the profile.

6.2 Edit profiles

When accessing with administrator rights you will find the option **Measuring-profiles** under **Config**. This link takes you to a table overview in which all the configured profiles are listed. From here you can delete, modify and create new profiles.

In addition the entered profile description is displayed. The profile which is displayed when accessing the homepage of the Motherbox with the specified rights is marked under **Homepage**.

In the profile overview at

Home >> Measuring-profiles >> Edit profiles

click on the **Edit properties** icon of the measurement data profile you want to modify:



Changes you make in the following dialog box for **Profilename**, **Description**, **Permission** and **Homepageprofile** must then be applied by clicking on **Save**.

Proceed as described in the previous section to add a sensor to the profile.

Remove a sensor from a profile by clicking on the trash can symbol at far right in the sensor overview.



Removing a sensor from a profile does not delete any archived measurement data. Only the link to the measurement data profile is removed.

6.3 Delete measurement data profile

To delete an already created profile, click in the profile overview at

Home >> Config >> Measuring profiles

on the trash can symbol of the profile you want to remove, at far right in the overview.



Removing a profile does not delete any archived measurement data. Only the link from the sensors to the to the measurement data profile is removed.

7 My Documents

Setting up a user-defined start page and handling the user files in the directory „userfiles“, „programs“ and „websites“.

7.1 Accessible folders

7.2 Define individual start page

7.3 Time- and event-triggered file running

7.4 Open uploaded Web sites

7.1 Accessible folders

The **userfiles** folder on the Motherbox can be accessed via FTP, TFTP or network sharing. This folder or any subfolder can be used to store any files.

By default there are two subfolders contained in **userfiles** :

- websites
- programs

The websites folder is linked to the Web server.

```
<protocol>://<ip-address>/websites/
```

The second subfolder, **programs**, is intended as a save location for PHP scripts which can be run at startup, time- or event-triggered. Irrespective of this folder however all scripts contained in **userfiles** can also be run according to the above criteria.

Aside from the storage capacity occupied by the measurement database, the complete approx. 750MB capacity is available for user files.

7.2 Define individual start page

The **Start page** option at

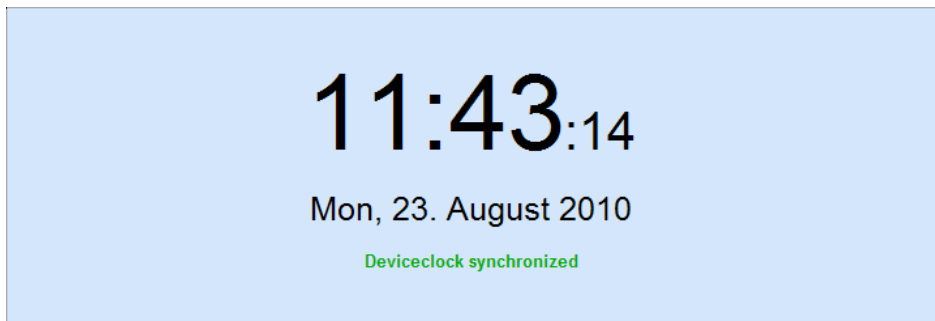
Home >> Config >> My Documents

specifies what the browser will display when invoking the IP address.

7.2.1 Measuring profile / deviceclock

If in the Motherbox configuration a measuring-profile or a visualization is associated with the current operator, guest or logged in user, this is displayed when opening the Motherbox basic address.

If no measuring-profile or visualization is stored for the start page for the current access rights level, only the Motherbox system clock is shown on the right side of the browser window.



System clock on the start page

7.2.2 Website

All the sites viewable in the browser which are stored in the **websites** folder can be defined as an individual start page. An individual start page is shown in the browser if the Motherbox is addressed only via the IP address.

To open a user start page when addressing the Motherbox, first select the option **Website** under **Homepage**. Save your changes by clicking on **Save**.

Then specify the start page by navigating on **My Documents** in the **websites** folder using the file browser, and click on the **Edit file properties** for the desired file.



Check the **Homepage** option in the following properties dialog:

Save the change directly to the non-volatile setup of the Motherbox by clicking on **Save**.

If a start page is configured on the Motherbox which differs from a standard page, the corresponding file is marked in the file browser on the **User files** page with the following icon:



If the folder with the specified start page is not opened in the file browser, the Start page icon is displayed in front of the closed folder symbol. Using this navigation aid you can always quickly find the set start page.

If you have defined your own start page but the option **Start page** is set to **Homepage**, the start page icon is grayed out.



Since only one file can be defined as a start page, the option **Homepage** is automatically disabled for a previously selected file if you select a new start page.

7.3 Time- and event-triggered file running

C/C++-programs and PHP-scripts in the **userfiles** folder and its subfolders can be run:

- ... at system startup
- ... time-triggered
- ... event-triggered

This functionality allows you to implement smaller applications on the Motherbox.

Thanks to the broad functionality of C/C++ and PHP, including file access, database access, network communication etc., simple solutions can be created very quickly.

Configure automatic running on the **Edit file properties page**, which you reach by clicking on the Edit icon for the respective file in the file browser under **userfiles**. Save your changes to the non-volatile setup of the device by clicking on **Save**.

Each program / script can be configured for several automatic executions. Each execution can have different parameters and initial events.



Please note that the maximum run time of a PHP script is 2 minutes. If the system requires longer to run it, the script is stopped after two minutes.

7.3.1 Running at system startup

If you want a file to run once whenever the Motherbox is started up, check the option **At system start**. The process is ended after the file has fully run.

7.3.2 Time-triggered running

If you want to specify that a script file run at certain times or certain intervals, check first the option Time triggered. The time is defined in the following fields:

- Seconds
- Minutes
- Hours
- Days of the month
- Months
- Days of the week

The values set here are directly entered in the CRON table. Valid characters are:

- *: Stands for all valid values in the respective field (e.g. all minutes or all hours).
- -: Indicates the range from ... to. Days of the week 2-4 for example stands for Tuesday to Thursday, whereas entering „*“ triggers the script on every day of the week..
- /: Interval within the entered range, e.g. minute „0-45/2“ triggers the script in the range between the 0th and 45th minute every two minutes (0, 2, 4, 6, ... 44).
- ,: Specifies the absolute value. For example minute „0,15,30“ triggers the script every hour on the hour, every quarter hour and every half hour.

7.3.3 Event-triggered

A script is run when the Motherbox receives data on the set TCP or UDP port. This is a way to implement simple server applications.

Check the option **Event triggered**. Select the desired **protocol**, TCP or UDP, and the **port**. Save your changes to the non-volatile setup of the Motherbox by clicking on **Save**.



Since port numbers smaller than 1024 are reserved for the system, you may only specify port numbers higher than 1023 for your application.

If a program / script is invoked when data are received, it can read the data through the standard input. Writing to the standard output sends data over the network back to the source.

7.3.4 Transmitting parameters

Under the heading **Parameters** you can specify static parameters you wish to append when running a PHP script according to the syntax of a Get request, otherwise according to the syntax of a command line call.




The parameters are read out e.g. using PHP as follows:

```
$my_var = $_GET["x"];
```

After reading, the value is available for further processing.

7.3.5 Marking in the file browser

If one or more automatic runs are set for a script file, you can see these directly in the file browser on the **My Documents** page. The files are then marked in the **Run** column with one or more of the following icons:

- : File is run at system startup
- : File is run according to specified time profile
- : Data receipt triggers run

7.4 Opening uploded Web sites

Web sites stored on the Motherbox in the **websites** folder can be opened and displayed directly from any browser. In addition to simple HTML pages PHP pages can also be opened. Interpretation of the PHP code takes place as is customary prior to sending to the browser.

The URL for addressing Web sites in the **websites** folder is constructed as follows:

```
<ip-address>/websites/<name of the site>
```

If the Web server on the Motherbox is set to HTTPS, the prefix **https://** is also required. If the port for the protocol used (http or https) is different from the standard value, it must be indicated after the IP address separated by a colon.

8 MySQL-database

Description of the MySQL-database, which keeps custom data.

8.1 Access the database

8.2 Permissions

8.1 Access the database

The Motherbox administrator may access the database **userdb** as well from custom applications as from the network. For example it can be accessed from PHP, any C/C++-program or via network using a MySQL-client.

The database can be connected using the configured TCP-port (default: 3306). MySQL allows several users being connected at the same time. MySQL coordinates multiple read/write-requests by itself.

To log into the database use always the username **admin** and the current password. If you log into the database from a program or script running on the box, **127.0.0.1** or **localhost** can also be used to address the database.

8.2 Permissions

The user **admin** is allowed to execute the following SQL-commands on the database **userdb**:

- CREATE
- DROP
- ALTER
- SELECT
- INSERT
- UPDATE
- DELETE

9 Appendix

9.1 Device reset

9.2 Restoring factory default settings

9.3 Firmware update

9.1 Device reset

In the following the methods for restarting the device are described. At a restart all active connections are closed. The current settings, as long as they have been actually saved, are not lost.

9.1.1 Reset using WBM

Logging in using WBM and Administrator rights offers you the option **Restart** in the navigation area under **Logout**. Click on this button and the system will perform a restart after brief confirmation dialog. This closes all active connections.

The following bootup procedure is indicated by blue pulsing of the Status LED.

9.1.2 Restart using the button

Use the button on the front panel to perform a restart by holding the button down for approx. 5 seconds. While the button is being pressed the color of the Status LED changes from green to yellow to red.

After approx. 5 seconds the blue pulsing of the Status LED indicates that the boot process is running.

9.1.3 Reset port

Alternately to resetting the device by clicking on the button in the logoff dialog or pressing the front panel button, the unit can also be restarted by addressing the Reset-Port (default: 8888). If no password is assigned, simply opening the port will trigger a warm start. If a password is set, this must be send to the unit as soon as the connection is opened.

The reset begins immediately, all active connections are closed or rejected. The device then begins to boot up, indicated by blue pulsing of the multi-color LED.



An explicit enabling of this option in the network settings is required in order to force the unit in this way into a warm start. This option is enabled in the factory default settings.

9.2 Restoring factory default settings

In some situations a reset of the Motherbox to the factory default settings may be necessary. If the system is still capable of running and accessible through WBM, the factory default reset can be performed from the browser. If the Motherbox is no longer accessible through software, the reset must be performed by closing jumpers inside the unit.

When resetting to the factory default condition the basic settings of the Motherbox are restored. The following user-defined configurations are deleted:

- Measuring-profiles
- Visualisations
- Operator accounts
- Inventoried Web-IOs

In addition, all files loaded by the user into the box or created by the user on the box in the **userfiles** folder, as well as its subfolders **programs** and **websites**, are deleted. Information linked to these files (e.g. time-triggered running of PHP scripts or an individual start page) are also lost.

9.2.1 Web Based Management

Log in to the Motherbox with Administrator rights using WBM and navigate to the logout dialog

Home >> Logout

Clicking on the **Factory defaults** button restores the device to its original factory default settings.

When this process is started the LED on the front panel begins to pulse blue. After the base configuration has been restored the system restarts. As soon as the LED turns green to indicate OK status, you can work with the Motherbox again.

9.2.2 Inserting the jumper

To reset the system to its factory default settings when software access is not possible, you must first open the housing. To do this, first remove the housing panel which is latched into the housing body on both long ends with two lugs each. Then you can remove the circuit board from the body.



You must first disconnect the device from any external power supply, since damage to the circuit board could otherwise occur.

Motherbox 2 (#50502): On the short side of the board where the network connector is also located you will find four contact pins. Jumper both the pins closest to the middle of the board using one of the jumpers provided and restore power.

Motherbox 3 (#50504): On the short side of the board where the network connector is not located you will find four contact pins. Jumper both the pins closest to the edge of the board using one of the jumpers provided and restore power.

As soon as you turn the unit on the system begins to restore its factory default settings. During this process the LED will pulse blue. As soon as the factory defaults are reconstructed, the LED will illuminate with a constant, weak blue. Now remove the jumper and place the circuit board back in the housing.

9.3 Firmware update

The Motherbox operating software is being continuously improved. The following section describes the procedure for uploading the firmware.

9.3.1 Where is the latest firmware available?

The latest firmware including the update tools and a revision history are published on our Web site at

<http://www.wut.de>

From there the best way to navigate is to use the search function located on the left side. First enter the model number of the Motherbox 2 (50502) or Motherbox 3 (50504). From the associated selection box choose **Firmware** and then click on the **Go** button.

9.3.2 Firmware update under Windows

No special preparation of the Motherbox is necessary for the firmware update.

The new firmware is transmitted to the Motherbox using WuTility. In the inventory list select the desired Motherbox and click on the **Firmware** button:



In the following dialog select only the firmware file you want to obtain (*.uhd) and then click on the **Next** button. After the file has been sent the Motherbox automatically performs a restart and is then ready to use.



Interrupting the update process may under some conditions result in a failure of the Motherbox. Therefore

ensure the stability of the power supply and network connection.

9.3.3 Update concept

To prevent a defect in the Motherbox caused by a failed firmware update, the loaded firmware is not installed on the current image but rather on an alternate image. Each time the unit is booted up the more current image is booted, which allows the last update to be used.

If an error occurs during the update process and the firmware cannot be completely installed, the Motherbox will still be operational due to the presence of the original and unmodified image.

9.3.4 Boot alternate image

If a firmware update cannot be successfully ended, for example due to an interrupted network connection, it can happen that the Motherbox will then no longer boot. In this case you can boot from the original image, which was active when the firmware load failed, by jumpering the two contact pins, which don't cause the factory-default-reset the next time the system is started. A new update of the firmware overwrites the inactive image containing the defective installation.



The jumper must be removed after you have successfully updated.