Meteohub - User Manual

Version 4.6

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What is Meteohub about?

Meteohub is a software that makes a NSLU2 or x86 platform a device that can read, store and evaluate weather data from a Oregon Scientific WMR928/968/918N, WMR100/200, WMRS200, RMS300, Mebus/Irox/Honeywell TE923 and Nexus, WH-1080 or Davis Vantage weather station. So the Meteohub software makes a small, quiet, low-power dedicated weather server out of a NSLU2 or tiny x86 platform. With Meteohub you get a full blown weather server minimal in the size and cost. Meteohub supports these platforms:

- Linksys NSLU2: First Meteohub releases did only support NSLU2. After NSLU2 being discontinued by Linksys at the beginning of 2008, alternative x86 platforms were selected to be supported by Meteohub. Meteohub supports 266MHz and 133MHz versions of NSLU2. You need an USB stick with 2GB or 4GB of capacity.
- Fit-PC Slim ("http://www.fit-pc.com"): Both versions with 256MN and 256MB RAM are supported. Meteohub software and data is stored on a 2,5" SSD with a capacity of at least 4GB (recommended: Transcend SSD TS4GIFD25). Rs232, USB and WLAN features of Fit-PC Slim are fully supported by Meteohub.
- ALIX.1D, ALIX.3D2 ("http://www.pcengines.ch/alix1d.htm"): When you mount an ALIX. board into the available metal closure and connect it to the power adapter, the result is a reasonable priced Meteohub platform. Storage media is a 4GB CF card. USB and integrated RS232 interface are supported by Meteohub, WLAN is optional (via miniPCI).
- ebox 3300/4300 (MicroClient Sr. "http://www.norhtec.com"): All versions with 256/512MB and 1GB RAM are supported. Meteohub is installed on CF card with 4GB capacity. USB and optionale RS232 and optional WLAN features are supported by Meteohub.
- SheevaPlug ("http://www.marvell.com/products/embedded_processors/kirkwood/plugcomputer.jsp"): This is still experimental with Meteohub

Meteohub on NSLU2 is based on OpenSlug operating system (Version 4.8). Information about OpenSlug can be found at "http://www.nslu2-linux.org/" . OpenSlug is Open Source and covered by a variety of Open Source licenses including GPL. The Meteohub application is no Open Source software. Meteohub application is a new development and has not been derived from Open Source software components. Therefore, Meteohub has not to comply to Open Source/GPL. The parts of a Meteohub system (apart from the Meteohub application) that are Open Source/GPL are listed in the appendix. The Meteohub application was compiled and linked with the original tool chain of OpenSlug 4.8.

x86 variant of Meteohub is based on Debian "etch-and-a-half" from an operating system point of view. Beside pre-configured Images, that allow to directly install Meteohub on a suitable x86 machine, the whole process to setup the Linux operating system with all needed packages is described, so that someone familiar with Linux can pot Meteohub to most x86 systems available. Please keep in mind, that the author of Meteohub will not give active support on this beside the available documentation. Actively supported are just the above selected x86 platforms.

SheevaPlug variant is based on Debian lenny (kirkwood). Meteohub on SheevaPlug is Debian lenny plus some additional packages installed plus some system settings plus Meteohub application. More details are available in the separate installation documentation for the SheevaPlug.

To make Meteohub working you need:

- a Linksys NSLU2 with free available OpenSlug Firmware and a USB stick (2GB or 4GB) with the Meteohub software installed
- or an ALIX.1D, ALIX.3D2 or ebox 3300/4300 with Meteohub software installed on CF card
- or a Fit-PC Slim with Meteohub installed on SSD
- or a SheevaPlug with Meteohub software on a SD card
- a USB-RS232 adapter to connect a weather station with RS232 connector (not necessary with ALIX.1D, ALIX.3D2 or ebox with RS232 option installed). Meteohub supports RS232/USB chip sets from FTDI, CP2101 and PL2303.
- a supported weather station. At the moment WMR928/968/918N, WMR100/200, WMRS200, RMS300, Mebus/Irox/Honeywell TE923 (HW 3-4) and Nexus, WH-1080, Vantage Vue/Pro2/Pro with firmware "B", Peet Bros Ultimeter 100/800/2100, RainWise Mk III, ELV WS300PC/444/500, LaCrosse WS2300, RFXCOM, or WS500 clones like WS550, WS777, WS888, WS550-Technoline, WS550-LaCrosse-US, WS550-US, WS300PC-US, WS550-LaCrosse-2)
- a LAN to make use of Meteohub by means of a browser. Even when Meteohub can be used with WLAN on Fit-PC Slim and ebox or ALIX.1D, ALIX.3D2 (optional) the initial setup has to be done via LAN.

Why based on a Linksys NSLU2?

The NSLU2 is a very cheap embedded Linux system, that has a large community of supporters and developers. Although the NSLU2 was originally designed as a proprietary hardware device to connect USB disks to a LAN, Linksys looks to have some interest to passively support all the projects that try to squeeze new functionality out of this small box.

Nevertheless Linksys clearly states that the moment you flash a non Linksys firmware onto the box you completely void your warranty. You have to take this into consideration when going the Meteohub way. All you do is at your own risk. Neither the author of Meteohub neither the SlugOS developer group is giving you any warranty that the software will work. So you have decide for yourself if you accept to take the risk of "bricking" your NSLU2 by installing Meteohub on it. Having a hardware invest of about 70 Euro for a NSLU2 most people decide to take this risk, but it is up to you. I cannot say, how seriously Linksys is checking if a defective NSLU2 sent to them has an alien firmware on it. As long as the NSLU2 is working properly, you can flash it back to the original firmware. Information about how to do this can be found here: "http://www.nslu2-linux.org/wiki/HowTo/RevertToLinksysFirmware"

Why based on Fit-PC Slim, ebox or ALIX?

NSLU2 is hard to beat in terms of price ($100, 70 Euro) but has some limitations in terms of availability, capability and long-term stability.

Availability: Despite end-of-life notification from Linksys at the beginning of 2008 in some geographies there are still online shops that can deliver brand new NSLU2 units, but these stocks will run empty sooner or later. The option remains to get used NSLU2 systems, but in the long-term Meteohub needs a new platform to go with.

Capability: Meteohub takes care of moderate use of resources but some features (like USB cam support) could not be implemented because of lacking computational power. Additional annoying limits of the NSLU2 are

- no WLAN support
- no native RS232
- no out-of-band Access by monitor/keyboard to get issues solved when login via LAN fails.

The selected x86 platforms deliver all these features, a NSLU2 couldn't provide and they have about 3 times the computational punch of a NSLU2 at comparable power consumption and similar form factor.

Long-term Stability: NSLU2 tends to have production tolerances from unit to unit. Many systems run stable over long periods of time while others do fail from time to time. One of the problem zones of NSLU2 is the USB stick interface. Some combinations of NSLU2 unit and USB stick don't work satisfactory on the long run, while others do a perfect job without any errors. Problems in the USB stick connection do sometimes result in damaged file systems which includes the risk of loss of logged data. Doing regular data backups can mitigate the risk of loosing data. Having a scenario in mind where increased reliability is more important than the cheapest price or when aiming at installations where it is hard to reach the unit physically to do any manual maintenance, Meteohub has been ported to Fit-PC Slim, ALIX and ebox platforms. These platforms provide significant advantages:

- no externally plugged USB stick that had to cope as system and data hard drive, but an internally installed, reliable SSD (Fit-PC Slim) or a slot-in mounted CF card (ALIX, ebox) that be of industrial type specs. Both types of storage are much better suited for non-stop operation.
- Systems are capable to reboot after a power failure, when you set BIOS parameters accordingly.
- Ebox, ALIX and Fit-PC Slim don't loose manufacturer warranties when installing Meteohub on it (You void Linksys warranty on the NSLU2 when you install Meteohub firmware on the unit).

Why based on SheevaPlug?

SheevaPlug can be seen as the successor of NSLU2. It has very low power consumption, small form factor, and prices are expected to drop significantly from the $99 it was launched at. When using high-speed SLC SD cards (150x and better) stability of the storage media should be fine, but only time will tell for sure.

How do I migrate from NSLU2 to x86 platform or SheevaPlug?

Migration from a running NSLU2-Meteohub to a x86 or SheevaPlug platform can be done without help from outside and without any license costs.

1. Update NSLU2-Meteohub to version 3.0 (or newer).
2. Save Data from runnning NSLU2-Meteohub via "Application Data Backup" (page "Maintenance"). Wait until message "full backup done" appears in "meteohub log" (page "log files"). Copy generated file "/public/meteohub.backup" to your PC.
3. Write down the following pieces of information:
   - MAC (page "System Information")
   - System ID (page "System Information")
   - Activation Code (page "Maintenance")

4. Setup a new x86-Meteohub as demo version.
5. Transfer activation code for NSLU2 to the new Meteohub
    - Goto "www.meteohub.de" select sub-menu "License" with option "Transfer (NSLU2 -> x86)".
    - Type in MAC, System ID and activation code of NSLU2-Meteohub and System ID of new x86-Meteohub.
    - The tool returns an activation code for your x86-Meteohub. Insert this activation code on the "maintenance" page of your x86-Meteohub.
    - Please store System ID and activation code of the new Meteohub at a secure place. You might need this data when doing a future migration..
6. As a side effect of this procedure the old NSLU2-Meteohub gets deactivated and falls back into demo mode (blacklisted). This unit cannot be reactivated by an activation key unless you contact "info@meteohub.de".
7. Provide the backuped application data to the x86-Meteohub at "/public/meteohub.backup". Restore these data by pressing "Application Data Restore" (page "Maintenance")..

What is Meteohub capable of?

Meteohub connects your weather station with your LAN and provides the following services:

1. **Web Administration:** Meteohub has a web interface. All settings and customization are done interactively with the web interface. If you set your router accordingly Meteohub can be reached and administrated remote from the Internet.
2. **RS232-LAN Bridge:** Meteohub reports the incoming serial data from the weather station 1:1 onto a TCPIP socket connection. If your LAN is connected to the Internet by a router and if the router allows for tcpip connections from the Internet, then the weather data can be reached world wide via Internet. This allows remote access to live weather data.
3. **Data Logging:** Meteohub stores incoming weather data on a USB stick. The standard 2 GB stick can hold weather data of about 4 years. Data gets time-compacted and recomputed by Meteohub and can directly be exported to WSWIN or Weather Display. As Meteohub provides PS network shares in your LAN, the import of WSWIN or Weather Display data to your PC application is extremely convenient and simple. No fussing with RS232 protocols as with standard data loggers. Furthermore, all recorded data can be accessed by a special HTTP interface that allows receiving data from Meteohub over a LAN or via Internet.
4. **E-mail Notification:** Meteohub can send you e-mails on certain alarm conditions like failure of a sensor, low battery of a sensor, FTP upload failure, connection to a weather network on the Internet fails etc.
5. **User-defined Graphs:** Metohub provides a capable and simple way of defining weather graphs. The definition is done by the web interface. You mainly choose from display types, diagram types, measurement units, etc. The user defined graphs and their ease of definition is something that makes Meteohub quite special even among full-blown PC weather programs. Each defined graph can be used by http requests from the LAN or Internet to generate weather graphs based on the actual weather data. This allows to include weather graphs very easily into web pages. As the graphs are computed when requested, they are always 100% up to date. Weather graphs can be of type line graph (with up to 2 y-axis, wind direction diagrams, 3D graphs to see changes between days, min/max charts and histograms.
6. **Automatic Graph Upload:** Beside the generation of a weather graphs on demand by a http request, Meteohub can also generate graphs by a user-defined time schedule. Graphs generated by time schedule can be transferred to a web server via FTP. This is especially useful if the Meteohub system should not be reached directly from the Internet because of security or performance issues. Graphs generated by time schedule can have time stamp information in their file name. This allows to generate whole families of graphs.
7. **Automatic Transfer of live weather data to Weather Networks on the Internet:** Meteohub supports the upload of weather data to the following networks: Awekas, Wedaal, Wetterpage24, Wetterpool, Wetterspiegel, Wetterarchiv, Weather Underground, Citizen Weather Observer Program (CWOP), WeatherBug, Meteoclimatic, HamWeather/Weather4You, Hetweeractueel.
8. **Flash and HTML dashboard that includes actual weather data into your homepage:** Meteohub provides a configurable flash dashboard that allows you an easy integration of weather data on your homepage. In addition to that Meteohub can process user-defined HTML templates where actual weather data will be

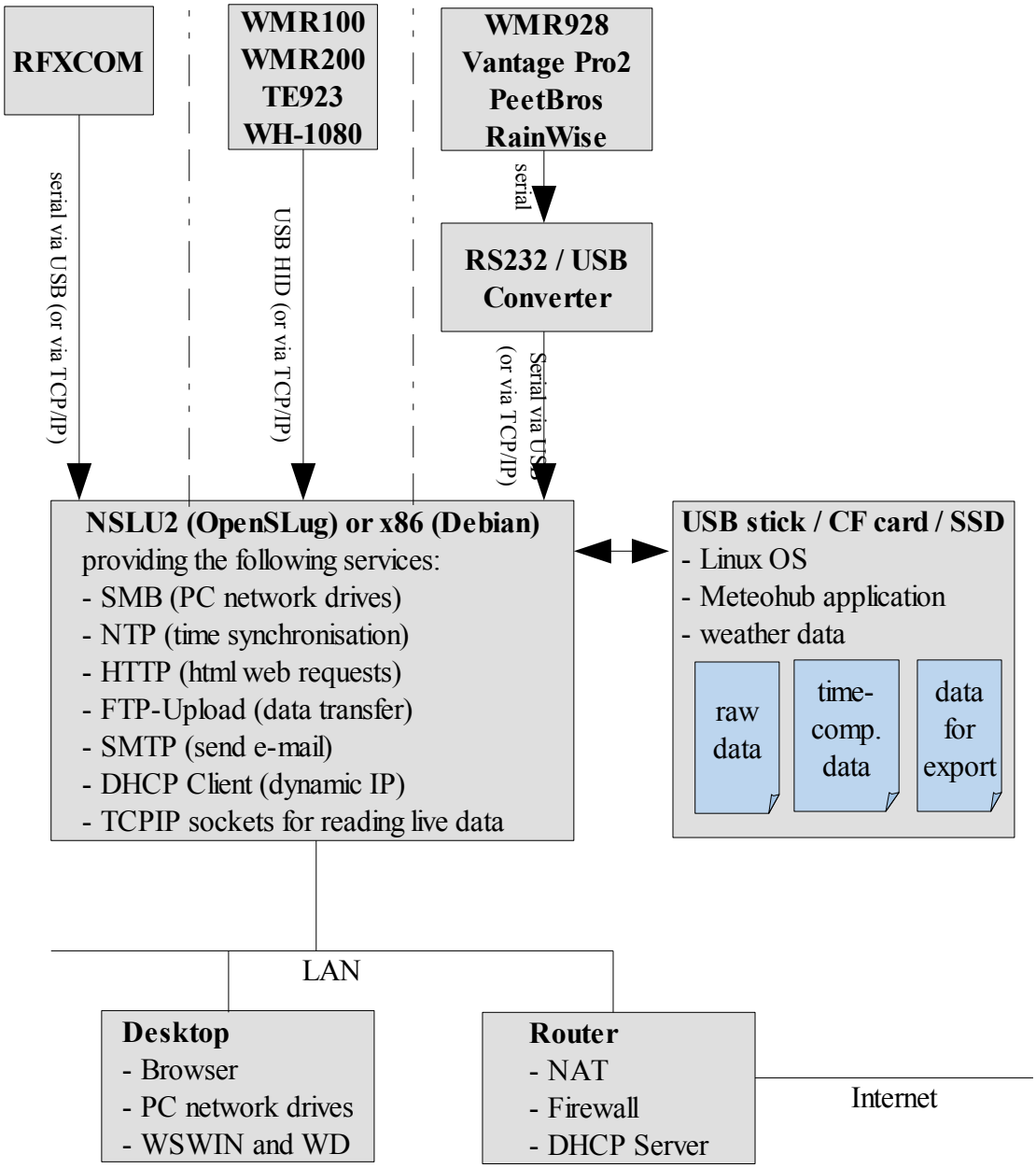
inserted automatically.

9. **Weather Display Live support:**
   Meteohub can upload WD Live compatible data onto a web server, where WD Live can pick up the data and display it. Update interval is limited to every 5 minutes

Meteohub performs like a complete PC with special weather software on it, but does this with minimal hardware costs, very low power demands, noise less and frees your PC from logging and reporting weather information 24/7.

Architecture of Meteohub System

Meteohub acts as a bridge between weather data provided as a serial RS232 stream from your weather station (WMR-928/968/918N, WMR-100/200, RMS300, TE923, Vantage Vue/Pro or RFXCOM receiver) and your LAN.



Meteohub can be directly connected to a supported weather station via USB or via RS232/USB converter or via native RS232 connection (ALIX, ebox). Linux operating system, necessary applications and weather data are stored on USB stick (NSLU2), CF card (ebox, ALIX) or SSD (Fit-PC Slim). Incoming weather data are stored in the directory "/data/weather/YYYYMM/" with filename "raw" (YYYY stands for the recording year, MM for the month). Received sensor data records are stored as a line of data in the "raw" file. Appendix C describes data format of these lines in detail.

Meteohub computes time-compacted data in defined time intervals of "5 minutes", "10 minutes", "30 minutes", "1 hour", "6 hours", "1 day" or "1 month" from raw data . Meteohub regularly generates a file in "/data/weather/" for each sensor and each time interval. The filename consists of the name of the sensor (for example "th0" for "thermo-hygro-sensor number 0" and the time interval (for example "min5" for 5 minutes interval). A data record in time-compacted files holds the average, minimum and maximum of the sensor's readings during the time interval. See Appendix D for details.

Weather graphs are constructed based on time-compacted data. Raw weather data is marked with UTC time stamps, but the time-compacted weather data can be equipped with time stamps based on local time, which makes it much more convenient to read the graphs. The graphs can also make use of non-ISO measurement units (like °F, mph, etc). The use of time-compacted data makes the generation of graphs much more simple than based on the original weather data as received from the weather station. Usually the time-compacted data is computed incrementally and graphs can be generated from these all the time. However, if you decide to do a complete rebuild of time-compacted weather data (because of a software update or as a consequence of a shutdown), then during this time the generation of graphs may fail, because data that has been deleted is not yet completely recomputed.

Time-compacted data is also used for data export to WSWIN or Weather Display. You find import data in the directory "/data/export/". Each file represents the weather data of a single month. WSWIN file names follow the schema "EXPmm_yy.csv" with mm = month and yy = year. The file "EXP01_00.csv" contains all weather data of all months and can be used for an import of all weather data into WSWIN with one single import step. Weather Display files are separated into "mmyyyylg.txt" for data of primary sensors and "mmyyyyextralog.csv" for additinal sensors.

Customization of Meteohub is done by its web interface. Beside other things you can define user specific weather graphs there. Each weather graph definition is stored in dedicated file that can be used for generation of a graph by http request. For example, a graph definition called "temp-today" generates a graph based on actual weather data by the http request "http://...../meteograph.cgi?graph=temp-today". This request call a program "meteograph.cgi" which reads the specified graph definition, reads the corresponding time-compacted weather data and triggers the gnuplot package to draw a corresponding graph. The graph is in PNG format and is send back (of course with correct HTML content type header) to the requesting browser, where the graph will be displayed. Graphs are computed on-demand, each time a browser is requesting this. If your router is configured accordingly, Meteohub can deliver graphs not just in your LAN but also can answer on requests from the Internet. As Meteohub is quite limited in terms of processing power and your Internet upstream might be very limited as well, you can also let Meteohub store pre-computed graphs via FTP onto your web server. Meteohub provides a time scheduler that allows to rebuild weather graphs at certain times. It is also possible to give the resulting PNG files a time stamp in their filename, so that you can generate whole series of weather graphs automatically. Furthermore Meteohub has a FTP upload facility that can also be controlled by time schedules. This allows a fully automated generation of weather graphs (according to user-defined graph definitions) and allows for an automated upload of these to your external web server via FTP.

If you make use of a RFXCOM receiver instead of the WMR base station, you can make use of a whole lot of different weather sensors from the Oregon Scientific sensor family (see Appendix G for details). Meteohub's web interfaces allows you to configure which sensors to take into account and how to name them. Meteohub gives you information, which sensors have not been received during the past and what the battery status of the sensors is. If you like, Meteohub will send you emails on alert conditions like sensor failure,

low battery status of a sensor, FTP upload failure, etc. The configuration of FTP and email push services is also done with Meteohub's web interface.

Meteohub reports received weather data 1:1 via socket connection to your LAN. If a program is listening to this (port 5557), it can also decode the data like Meteohub does. In that way Meteohub acts like a serial-to-TCP/IP bridge to give other programs a socket connection type of access to the raw serial data as it comes in.

1. Installation

Installation of Meteohub for NSLU2 is different from installation on x86 platform. Chapter 1.1 describes install on NSLU2, Chapter 1.2 describes installation on x86 and Chapter 1.3 describes some final installation steps valid for all platforms. Installation on SheevaPlug is described in a separate document (http://www.meteohub.de/joomla/index.php?option=com_docman&task=doc_details&gid=275&Itemid=29).

1.1 Installation NSLU2

Installation on NSLU2 is done in 4 steps.

1.1.1 Setup of unmodified NSLU2 in your LAN

You can setup a NSLU2 in your LAN in two ways. If you have a Windows Desktop in your LAN, you can make use of the NSLU2 installation CD provided by Linksys. Just follow the steps on the Linksys manual in your box. (Remark: You have to deactivate the Windows firewall of the Desktop you are using, otherwise the setup software on the Linksys CD will not be able to find the NSLU2 in your LAN). If you don't have a Windows PC in your LAN you can do the initial NSLU2 setup by these steps:

1. Connect the NSLU2 to the mains adapter and connect the Ethernet connector of the NSLU2 with a patch cable with your switch or router in your LAN. Alternatively you can also directly connect the NSLU2 with your PC's Ethernet connector (this time use a crossed Ethernet cable).
2. The NSLU2 has the static IP 192.168.1.77 as factory default. To reach the NSLU2's web interface with your Browser, you have to switch your desktop/laptop to the same sub network (192.168.1). Therefore, give your desktop/laptop temporarily a satic IP in the same sub network, for example 192.168.1.1. If your LAN already operates in the 192.168.1 sub network, this step can be omitted.
3. Now NSLU2 should be reached from your desktop's/laptop's browser at "http://192.168.1.77". The password is "admin".
4. Having access to NSLU2's web interface you have to give it an IP in the sub network you are usually using with your LAN. You can do that by naming a free IP address in your LAN's sub network or by setting the NSLU2 to DHCP mode, where the router will give the NSLU2 a free IP address on the next boot. Please make use of the web interface to set the new static IP or to set the NSLU2 to dynamic IP via DHCP option. Set net mask to "255.255.255.0". Gateway-IP can be left empty or you provide the IP of your router. After that, please reboot your NSLU2 and set your desktop/laptop to its former IP values and sub network and restart your desktop/laptop as well..

1.1.2 Flashing OpenSlug Firmware

1. NSLU2 can be reached at the new IP provided in step 1. If you choose DHCP for your NSLU2 you have to inspect your router to get the IP address of the NSLU2 known. Most modern router do allow to give devices on the LAN fixed dynamic IP addresses based on their MAC. The NSLU2's MAC is printed on the outside of the box the NSLU2 was in when it was delivered to you. it is the colon separated number just below the serial number. To know the MAC is also useful to find the IP that the router has given to your NSLU2 in the router log files.
2. When you have the IP, type it in your browser and go to the NSLU2's web interface.

Choose "Administration" (user name "admin", password "admin") and select the sub menu "Advanced" And there the item "Upgrade". Here you find a section to flash a new firmware to the NSLU2. In order to make a Meteohub from your NSLU2 use the firmware image "meteohub-firmware-2.3.bin" from the download section (category "NSLU2 Firmware and Packages")of the meteohub homepage (www.meteohub.de). Please notice that by flashing this non-Linksys image to your NSLU2 you will void your warranty. So all you do from this step on will be at your own risk. Neither the author of Meteohub nor the authors of the OpenSlug firmware can be made accountable if your NSLU2 might turn into a useless brick caused by a bad flash or what so else. If you don't accept this risk, don't flash the image and forget about OpenSlug and Meteohub.

3. Press "Start Upgrade" and wait until the firmware upgrade is completed. This may take about 5 minutes. After completion of the firmware flash, a message appears and the NSLU2 is rebooting, now with OpenSlug firmware in it. If you get the error message "not enough memory" when trying to flash, please shut down the unit. Disconnect all USB devices from the NSLU2 and restart again. Go directly to the firmware update Menu. Now it should do. If not, please look for Linksys firmware V2.3R63 on the web, as this version is known to do the job.

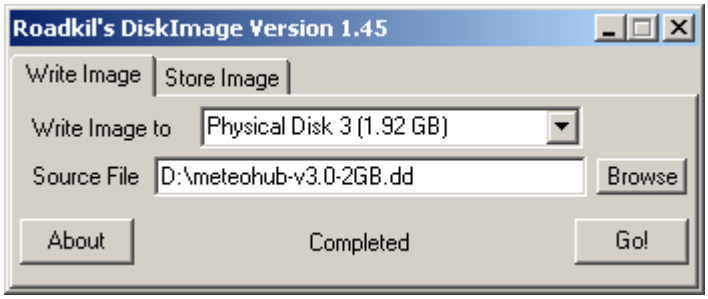
1.1.3 Copy Meteohub Runtime Environment on a USB Stick

You find the Meteohub runtime environment in the download section "Meteohub USB Stick Images" on "www.meteohub.de". Use the package named "Meteohub Software" with the highest version number. Choose between a 2GB or 4GB version, depending on your USB stick's size. Download this software as a compacted RAR archive ("meteohub-v4.6-xGB.rar").

1. **independent from your desktop's operating system:**
   When you have Meteohub firmware 2.1 or newer installed, you can build the Meteohub runtime environment on an USB stick with the help of a second small USB stick but without further interaction with your desktop.
   - Copy the RAR file that contains the runtime environment image ("meteohub-v4.6-2GB.rar" or "meteohub-v4.6-4GB.rar") onto a small USB stick (256 MB will be fine). The stick has to be formated as FAT32.
   - Turn off the NSLU2, disconnect all units from the USB slots of the NSLU2 and put the small USB stick into one of the USB slots of the NSLU2. Turn on the NSLU2. After about 20 seconds the yellow LED disappears.
   - Short time after that the LED "Disk 2" will start blinking slowly. That indicates to plug-in the big USB stick that you want to use with Meteohub. Put it into the free USB slot of Meteohub. When "Disk 2" LED does not start blinking, the application image on the small USB stick is not correct.
   - When LED "Disk 2" starts faster blinking the data transfer to the big USB stick has started. Transfer will take quite some time (about 20 minutes for a speedy 2GB stick).
   - When transfer has finished, Meteohub shuts itself down. Now you can remove the sticks. The big stick is now ready to go.
   - You will find a short protocol on the small USB stick in a file named "log".

1. **Windows Vista, XP, 2000:**
   If you have a Windows desktop/laptop, you can use the free software "DiskImage" from "www.roadkil.net", unzip and install.

- Recommendation: First of all, make a complete backup of your PC before going on. When something goes wrong with the following steps you can restore your PC and don't loose any data.
- Extract the downloaded RAR archive to a location on your drive you like. The resulting dd file is from now on called "meteohub-v4.6-xGB.dd".
- Insert target USB stick to the PC.
- Start downloaded program "DiskImage", switch to tab "Write Image".



- Select the "Physical Disk" from drop-down list that corresponds to target USB stick.
- Check if you really got the "physical disk" entry, otherwise USB stick won't do.
- Select USB stick image "meteohub-v4.6-4GB.dd" as "Source File". To see files with extension ".dd" in dialog box, select option to see all files, first.
- Press "Go!". Warning: Selected drive will be erase. Don't select one of your PC's hard drives! Please double check the selected drive is the right one. Acknowledge to continue. When writing USB stick has been finished, USB stick can be removed.

3. **Linux:**
   If you are using Linux on your desktop, you already have dd. The steps are:
   - Extract the downloaded RAR archive with "unrar". The resulting dd file is from now on called "meteohub-v4.6-xGB.dd".
   - Plug-in the USB stick. It will be recognized as a pseudo SCSI device and should be accessible as "/dev/sda" or "/dev/sdb" or similar. An inspection of "/var/log/messages" will help you to see how the USB stick has been mapped to pseudo SCSI device. For the next steps we do assume that it has been mapped to "/dev/sdb".
   - Use the command "dd if=meteohub-v4.6-xGB.dd of=/dev/sdb bs=1M" to copy the Meteohub partitions to the USB stick. Before you do this please make a complete backup of your linux system. If you use a wrang target drive (of=), data on this drive will be erased completely. If you don't have a backup of them, you will be in trouble. But you already know - all you do here is at your own risk.
   - When the copy process is finished (this will take a few minutes, depending on the type of USB stick) you can remove the USB stick.

1.1.4 Start Meteohub

1. Plug the USB stick into the upper USB port of the NSLU (named "Disk 2"), connect the RS232-USB connector to your weather station and the lower USB port of the NSLU2 (named "Disk 1") and switch on the NSLU2. During boot the ready/status LED is flashing green or orange. When boot is done, the LED changes to more or less constant green.
2. You can now reach the Meteohub system by your desktop's/laptop's browser at the emergency IP 192.168.1.77 ("http://192.168.1.77") and if you have a DHCP server in

your LAN you also can find your Meteohub at the address given by the DHCP server (if you have a pre-2.3 firmware, Meteohub might be accessable at 192.168.123.87 in the beginning). User name is "meteohub", password is "meteohub". To reach the emergency IP with your browser you probably have to do reconfigure the IP address of your desktop/laptop as described at Chapter 1.1. (explains how to bring you desktop into the same subnet as Meteohub). Having reached the Meteohub web interface you can set the IP persistently, chapter 2.3 explains how.

3. Furthermore, the Windows tool "ipscan" (can be downloaded from the tools section of the Meteohub web pages) might be helpful to examine the IP that the router has given Meteohub via DHCP, if Meteohub is configured to make use of a dynamic IP via DHCP.
4. About a minute after reboot Meteohub signals its IP by specific beeps. Appendix F explains how to read these beeps and how to get rid of it.

1.2 Installation x86 Platform

Meteohub installation makes use of a bootable USB stick (minimum capacity 512 MB) that transfers necessary data to CF card of ebox or ALIX or to SSD of Fit-PC Slim. For Fit-PC Slim SSD has to be configured as "Master" with the jumpers attached to the SSD. For ebox the micro-switch inside the CF card slot has to be set to "Master", if present. ALIX needs some manual work to mount system board and CF card into the case. Appendixes N and O give details on this.

1. Download zipped USB stick image "meteohub-v4.6.zip" (or newer) from download section of "www.meteohub.de" (category: "x86 Meteohub Images") and unzip the image with a tool of your choice. Result is "meteohub-v4.6.img".
2. **Linux:** Insert USB stick into PC and get attached device name by calling "dmesg" (we assume it might be "/dev/sdh" as an example). Copy USB stick image by "cat meteohub-v4.6.img > /dev/sdh" to the USB stick.

   Windows: First of all make a complete backup of your PC before going on. When something goes wrong with the following steps you can restore your PC and don't loose any data. Insert USB stick into PC. Download program "DiskImage" from "www.roadkil.net", unzip and install. Select on tab "Write Image" the USB stick to write the image to. Scroll down to the list of "Physical Disk" and select the physical disk that matches your USB stick (can easily be determined by its size). As "Source File" select downloaded USB stick image "meteohub-v4.6.img" and press "Go!". Warning: Selected drive will be erase. Don't select one of your PC's hard drives! Please double check the selected drive and acknowledge the process to continue. When writing USB stick has been finished, USB stick can be removed.
3. Just for ALIX.3D2: If you have ALIX.3D2 you need to prepare the CF card with your PC and cannot use the USB stick based install explained in step 4. Mount USB stick to your PC. You will find a file called "meteohub-x86-4GB.gz" on the USB stick. Extract the file "image.bin" from this archive. Put the CF card into your PC's CF card reader. Use the tool DiskImage to copy the file "image.bin" onto the CF card (you have to copy it onto the "Physical Drive" of your CF card. Be careful not the write to your PC's hard drives. Having done that your CF card is ready to be mounted onto the ALIX.3D2 board. See appendix O, how to setup the hardware.
4. Start ebox, ALIX.1D or Fit-PC Slim with attached monitor and keyboard, with installed SSD (Fit-PC Slim) or CF card (ebox, ALIX.1D) and with USB stick (generated in step 2) plugged in. Hold the "Del-key pressed during start, to enter

BIOS setup mode.

- ebox: Select "boot" tab and select sub menu "Boot Device Priority". Choose USB stick (displayed as "USB:") as "1st Boot Device". Press "F10" to save configuration and restart system. Appendix K, L, L2 provide some screen dumps.
- ALIX.1D: Select "Advanced BIOS Features" tab and choose "Removable" as "First Boot Device". Select "Hard Disk" as "Second Boot Device". Press "F10" to store this configuration and to restart. Appendix M gives some more details on BIOS settings.
- Fit-PC Slim: Select menu "Basic CMOS Configuration" and choose in the area "Drive Assignment Order" setting "Nand Flash" for "Drive C" and "Ide 0/Pri Master" for "Drive D". Goto "Boot Order" and select "Drive C" as "Boot 1st" device. Leave menu via "Esc" and reboot system by choosing "Write to CMOS and Exit". Appendix J provides some screen dumps.

5. System boots a Debian Linux from USB stick and starts Meteohub setup procedure for CF card or SSD. Data already stored on the media will be erased without further warming!
6. Installation process ends with asking you to remove USB stick and to restart the system once again. Please press "Del" key during boot to enter BIOS setup mode.
   - ebox: Select "boot" tab and select sub menu "Boot Device Priority". Choose CF card (displayed as "HDD:"). Press "F10" to save configuration and restart system.
   - ALIX.1D: Select "Advanced BIOS Features" tab and choose "Hard Disk" as "First Boot Device". Press "F10" to store this configuration and to restart. Don't forget to insert the paper clip bridge at the VGA connector when booting ALIX.1D without connected monitor later on (see appendix N for details)
   - Fit-PC Slim: Select menu "Basic CMOS Configuration" and choose in the area "Drive Assignment Order" setting "Ide 0/Pri Master" for "Drive C" and "(none)" for "Drive D". Goto "Boot Order" and select "Drive C" as "Boot 1st" device. Leave menu via "Esc" and reboot system by choosing "Write to CMOS and Exit".
7. Meteohub is installed on x86 platform. After having finished boot the IP of the system is displayed. Further configuration can now be done by Meteohub's web interface at the given IP. Monitor and keyboard can be disconnected now.

   Remark: Meteohub tries to receive an IP from the router via DHCP. If that fails, Meteohub switches to backup IP address 192.168.1.77. If you have monitor and keyboard connected to Meteohub system, you can login (user "root", password "meteohub") and give command "setip" to manually give Meteohub an IP that fits to your LAN. This IP gets immediately valid without need of a reboot.

1.3 Internet Access

Meteohub needs access to the Internet to fully make use of its functionality. This also includes that the Meteohub system is available from the Internet. If your router holds a constant connection to the Internet you should configure your router in a way that allows to reach Meteohub from the Internet as well. The following settings might be useful for that:

- Open the firewall to allow for web access from the Internet to port 80 of your Meteohub system. Do this by opening port 80 on your router and by forwarding TCP/UDP traffic on port 80 to Meteohub. This allows Meteohub to...

    - generate weather graphs and live weather data on demand if requested from a browser in the Internet.
    - be administrated remotely from the Internet. The administration web pages are protected by a password, so you don't have a security break.
- If you already have a web server running in your LAN that can be reached from the outside on port 80, you can configure your router to forward requests on port 7777 to Meteohub on port 80. As port 7777 is defined In this case Meteohub's administration web interface can be reached from the Internet like this "http://.....:7777/admin.html". Most routers support these kind of port forwarding.
- To make Meteohub constantly available from the Internet you should make use of one of the many free dynamic domain name services (dynamic DNS), like "dyndns.org". Most routers do support automated login to these services, once you have created an account at these. Each time your router establishes a connection to the Internet, the router registers the IP provided by your Internet provider at the dynamic DNS. If you have created a dynamic domain name account like "jondoe.dyndns.org", your router and all the systems your router does portforwarding to cann be reached at "jondoe.dyndns.org". Meteohub might be reached at "jondoe.dyn.dns.org:7777/admin.html" if you setup the port forwarding for Meteohub as explained in the example in the previous paragraph.
- Meteohub's web interface can also be reached at port 7777. This might come handy when you misconfigured the HTTP port of Meteohub.

2. Administration

One of the key features of Meteohub is, that it can be administrated completely from its web interface. Of course you also can login as user "root" via SSH (password is "meteohub") but normally you won't need to do this. Meteohub protects the web administration with user name and password and allows just for one administrator session a time. In the current version Meteohub does not block login of a second administrator, but it is strongly recommended to take care that only one person is using the web interface for administration at the same time. Otherwise settings might be corrupted an the might force you to go back to factory defaults and to loose your individual settings.

At first login you have to authorize yourself by user name and password. After that you can choose from the menu functions on the left.

2.1 System Information

Meteohub's start page shows the actual Linux kernel version, the processing power in BogoMIPS, size of RAM, hardware platform, the installed version of Meteohub, the activation code and if not activated how long the demo version will do without being activated. Activation codes are hardware specific and must be bought as a license from the author (information on this can be found on "www.meteohub.de"). When end of life of the demo version has been reached, you will just be able to use maintenance functions of Meteohub, where you can drop an activation code that brings Meteohub to full life again. The user gets informed on the termination dates when downloading Meteohub and on this information page of Meteohub's administration interface.

The field "Network" displays

- Hostname, that can be used to reach Meteohub in a Windows network
- the Windows work group Meteohub should belong to
- MAC address of the Ethernet adapter (and WLAN adapter, if present)
- IP of Meteohub
- IP of the gateway to the Internet (usually IP of your router)
- IP of DNS servers that does name resolution
- Internet IP (WAN IP)

Next field displays the size and percentage of usage on swap partition, system partition and data partition. You should have an eye on the data partition, a percentage of usage will grow while Meteohub will record weather all day long. System load indicates how heavy your Meteohub is working at the moment. Values above 4 will slow down the web interface significantly.

Field "Date and Time" shows time in UTC, defined time zone and local time. Furthermore you can see the uptime of Meteohub since last reboot/shutdown and the system load in Linux notation.

The "Process" field reports status of the main processes. If data logging is running, you also see when the last data record from the weather station has been recorded. Big values are marked in red and might be an indication that there are some problems in respect to the connection to the weather station.

The "System Information" start page will be automatically refreshed every 30 seconds.


MeteoHub
System Information
15:12 18.10.2008
System Info
Log Files
Inspect Data
Sensors
Settings
Weather Station
Dashboard
WD Live
Maintenance
Define Graphs
Manage Graphs
Setup Push Services
Graph Uploads
Weather Networks
WSWIN Data Export
WD Data Export
License
Software
Linux Kernel: 2.6.21.7 266 BogoMIPS, 30 MB RAM, NSLU2 (266 MHz)
MeteoHub: Version 2.8f ©2008 by Boris Pasternak, info@meteohub.de
System ID: unqS1 activated
Network
Hostname: meteohub
Workgroup: HOME
MAC: 00:1D:7E:AA:17:DE
IP: 192.168.123.89
Gateway: 192.168.123.1
DNS: 192.168.123.1
WAN IP: 139.92.92.202
Storage
Swap: 3MB of 127MB used (2%)
System: 225MB of 402MB used (55%)
Data: 105MB of 1322MB used (8%)
Date and Time
UTC: 18.10.2008 13:12:53
Time Zone: Europe/Berlin
Local Time: 18.10.2008 15:12:53
Uptime: 10 days, 1 hours, 27 minutes
System Load: 0.46, 0.65, 0.70
Process
Weather Data Recomputation: completed
Weather Data Logging: running (last data: 2 sec)
SSH Login: running
SMB Shares: running
Time Synchonization: running

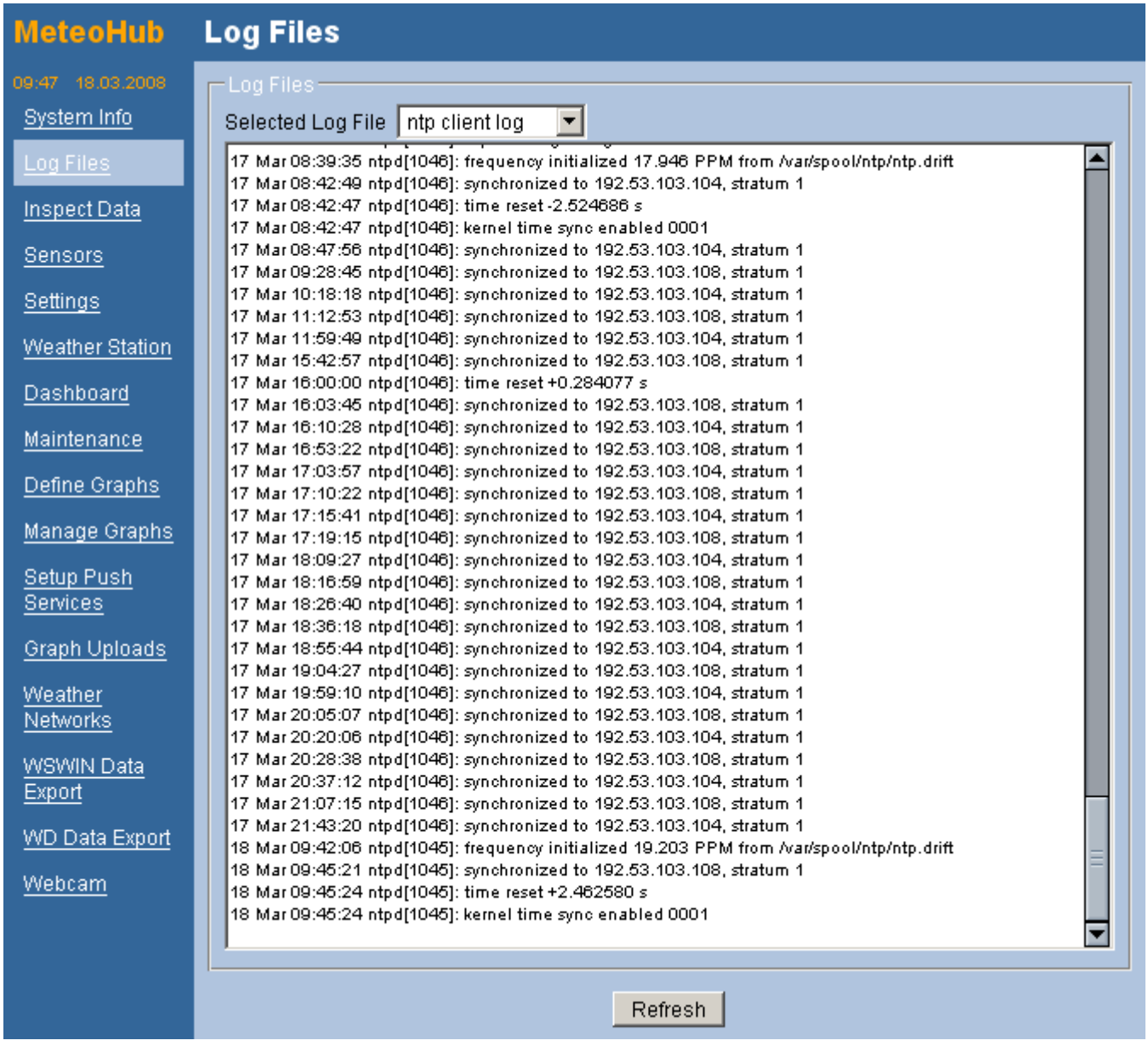
2.2 Log Files

Meteohub writes errors or messages in log files. All log files are limited to a maximum of 1000 rolling lines and can be inspected from the web interface.

Log file "alarm log" displays events Meteohub likes to inform the administrator about. These notifications can also be sent by e-mail to the administrator (chapter 2.10 covers this in detail). The following event categories are defined at the moment:

- sensorfail: A certain sensor could not be received for more than 120 minutes.
- lowbat: One of the sensors reports low battery status.
- weathernet: Connecting to one of the weather networks fails. This can temporarily happen as weather networks are sometimes down over short periods.
- upload: A scheduled FTP upload failed.
- email: An e-mail sending failed.

Log file "system log" displays messages of the boot process, of the HTTP service, of the CRON scheduler and all messages the syslog service has to report.



Log file "meteohub log" shows messages in regard to the data reception from the weather station. While in RFXCOM mode Meteohub logs non identified RF signals and sensor readings with checksum errors.

Log file "smb server log" holds messages about the samba component for PC network share services.

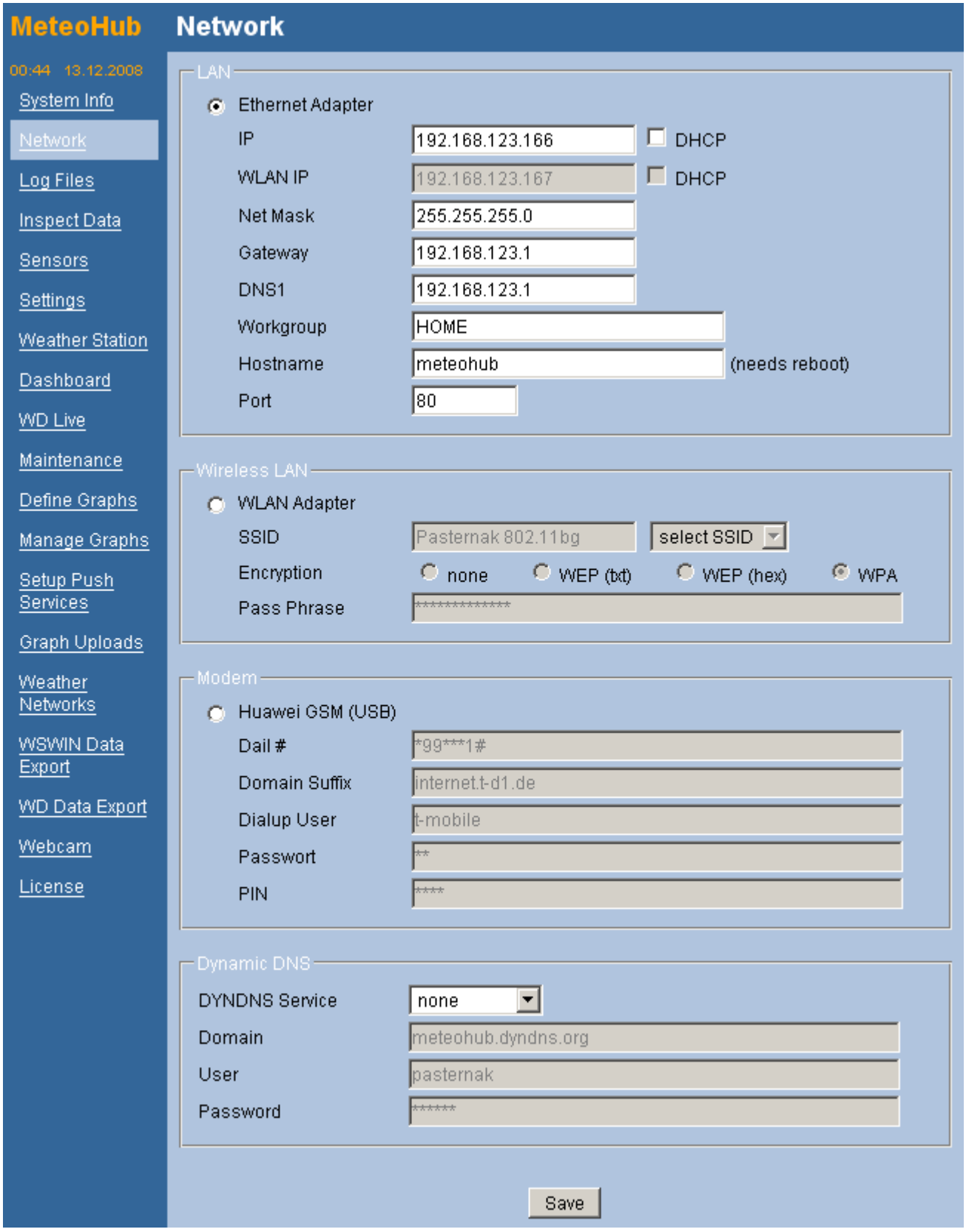
"ntp client log" logs information around the network time protocol daemon (NTP) that tries to connect to a time server in your LAN or in the Internet in order to keep Meteohub's date and time up to date. Without this the clock of Meteohub will show a significant variation over time.

Pressing the button "refresh" displays the actual log data.

2.3a Network

Network page holds fundamental network related settings of Meteohub. Changes are only taken into account when the button "Save" has been pressed. When changes are not taken into account after "save", just reboot, that will make these active.

Section "Modem" is available on x86 systems only. Section "Wireless LAN" is available on x86 systems with a WLAN adapter recognized by Meteohub. Sheevaplug does not have "Modem" or "WLAN".



Network settings allow for manual specification of IP, Net Mask, Gateway and DNS or for an automated setting of these values by selecting DHCP. Please be aware that changing the IP of Meteohub will cause your browser to loose connection to Meteohub. However, Meteohub can then be reached at the new IP. If things go wrong, Meteohub should always be reachable at 192.168.1.77.

If your Meteohub is WLAN enabled you can activate WLAN adapter. Doing so will enable the field WLAN IP, where you can specify an IP that should be different from the LAN IP. I strongly recommend no to use DHCP with WLAN activated, as receiving DHCP info via WLAN can fail on a number of occasions, which results in you system no longer being avail via WLAN. Providing a static WLAN IP eliminates this risk from the beginning. To make your Meteohub being connected to your WLAN network, you also have to specify an SSID. You can do that manually or select one Meteohub has already seen in the air by using drop down selection "select SSID". Select the encryption type you use and type in the pass phrase. When you press "save" network settings are stored. As long as you Meteohub is connected via LAN, this connection will be used. To make use of the WLAN option, reboot Meteohub and disconnect the LAN cable from it. When Meteohub reboots and does find it's LAN adapter unconnected it switches to WLAN operation. Now Meteohub should be available at the WLAN IP you specified. If you cannot reach it there, simply shut down the unit (power button), connect LAN cable again and start again. Meteohub will be reachable at the LAN IP after reboot. This kind of fail-safe operation takes care that you do not cut yourself off forever by a wrongly configured WLAN adapter.

Workgroup and Hostname settings are needed to make Meteohub's data directories accessible from your desktop/laptop through your LAN as PC network shares Please choose the workgroup name accordingly to your other Windows PCs to make Meteohub to be widely seen from all your Windows PCs in the LAN. Meteohubs Web-Server is configured to the standard HTTP port 80. In addition the the port you do specify here, Meteohub's web interface is also always available at port 7777.

In modems section Details of your GSM provider have to be placed. Meteohub allows the use of Huawei USB modems with product ID 1003. To activate modem settings a restart of Meteohub without a LAN cable connection is necessary. When a LAN cable is plugged in during restart, Meteohub will enable this as primary network connection. This takes care, that you always can gain a connection to your Meteohub after reboot, even if WLAN or modem connection do not work as expected.

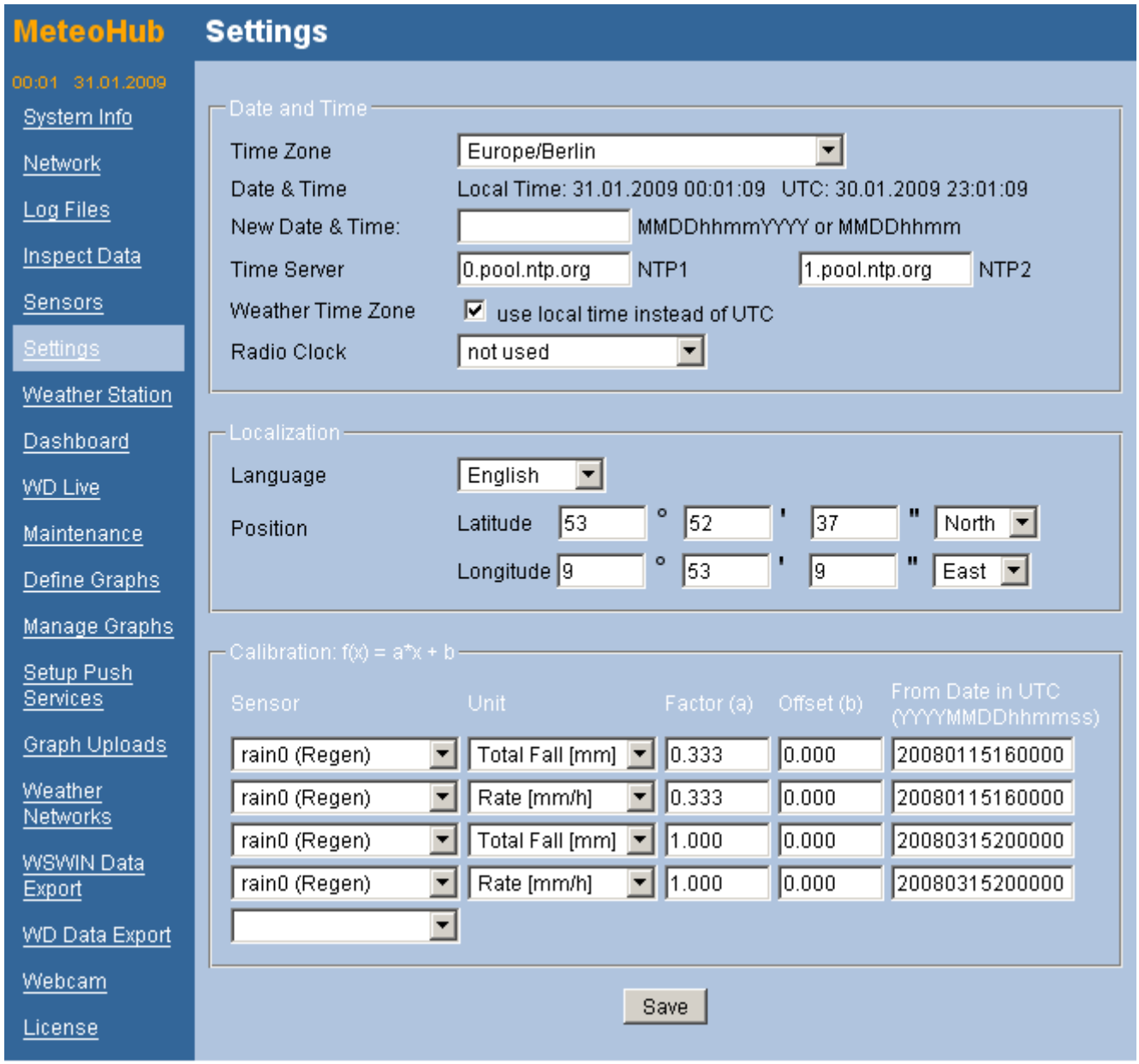
Meteohub supports dynamic domain name service "dyndns.org". Please use this service only in combination with a modem connection or if your router does not provide dyndns services itself.

2.3b Settings

The administration page holds the fundamental settings of Meteohub. Changes are only taken into account when the button "Save" has been pressed.

Information about date and time can be managed by definition of a time zone and should be entered manually when you start Meteohub for the first time. If Meteohub has a connection to the Internet it makes a lot of sense to specify one or two time servers to keep Meteohub via NTP in sync with the correct time. If Meteohub does not have an Internet connection, you can choose that Meteohub should get date & time information from the connected weather station. Please don't use this, if there is an Internet connection, because time synchronization via Internet by NTP provides a much better and smooth time adaption without jumping time stamps. When logging weather data in raw format Meteohub does a time stamping based on UTC to the data. If you prefer to have the time-compacted data and all the graphs generated from this time stamped with local time, you have to select the corresponding check box.

In the localization section you can select the language that is used in the web interface and in the weather graphs. English and German is provided as default, more languages can be



added by language files as explained in Appendix I.

You should also provide the position of your weather station in terms of height and degrees, minutes and seconds of longitude and latitude.

Meteohub supports calibration of sensors. Each measurement unit of each sensor can be calibrated individually by a linear polynom, where you can specify a factor and an offset. If you provide a date, the polynom will be effective from the given date on. In the example the rain gauge has been added with a funnel having three time the area of the original rain gauge entry at 2008/01/15 16h. The funnel was removed at 2008/03/15 12h. Calibrations can be changed any time, even for time frames in the past.

2.4 Weather Station

At the moment Meteohub supports the WMR-928/968/918N and WMR100/200, WMRS200, RMS300, TE-923, WH-1080 and Vantage Vue/Pro weather stations and the RFXCOM RF-receiver module (http://www.rfxcom.com/), that can receive weather data from a broad range of Oregon Scientific sensors.

Depending on your Meteohub license, you can connect just one or more weather stations to Meteohub. You can add a weather station be selecting one from the "add weather station" drop-down list. These weather stations are supported:

- Oregon WMR-928/968/918N
- RFXCOM Receiver
- Oregon WMR-100
- Oregon WMR-200
- TE-923/821X
- Davis Vantage
- WH-1080
- Oregon WMRS-200
- Oregon RMS-300/600
- Plug-in
- Peet Bros Ultimeter 100/800/2100
- RainWise MkIII
- ELV WS300PC
- ELV WS444
- ELV WS500
- La Crosse WS2300
- more WS500 clones like WS550, WS777, WS888, WS550-Technoline, WS550-LaCrosse-US, WS550-US, WS300PC-US, WS550-LaCrosse-2
- System Data

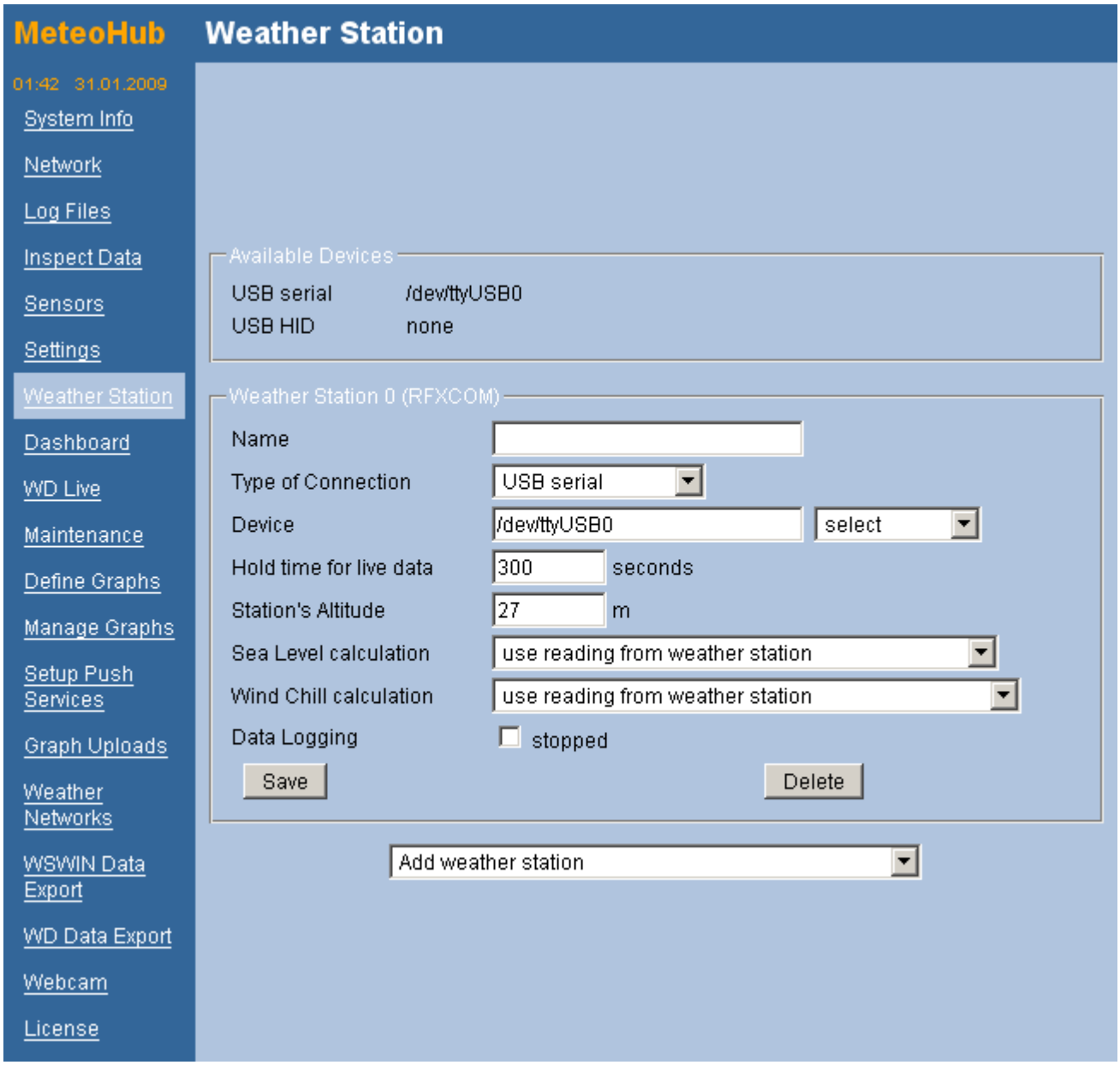
The generic Plug-in weather station allows to connect Meteohub to an alien weather data logging program. When Meteohub starts data logging, the specified program gets started as well and Meteohub listens to "/dev/stdout" of the alien logger program. When the logger has reported a line of data (terminated by a LF and/or CR character) this line of data is added to the Meteohub data logging and stored in the raw data files. The format of incoming data is explained in Appendix B. Example: When the alien program returns "th17 209 52" Meteohub adds a line "20090131120034 th17 209 52 0110" to the raw data, which means: Sensor th17 has reported 20.9 °C, 53% relative humidity and a dew point of 11.0°C at 12:00:34 31th Jan 2009. In order to make the data evaluated, sensor "thermo/hygro #17" has to be mapped to a sensor ID on Meteohub's sensor page (see also chapter 2.5).

Each weather station can be given an Name.

Type of connection can be:

- serial: directly connected to a RS232 port of your Meteohub. Stations: WMR-928, serial Vantage, PeetBros Ultimeter, RainWise MkIII, La Crosse WS2300.

- usb-serial: weather station with USB connector that gets connected by a RS232/USB converter to Meteohub. USB Vantage and USB-RFXCOM receiver have a simple RS232/USB converter included and therefore connect in this mode. Stations: USB-RFXCOM, USB-Vantage, and other serial weather stations with RS232/USB converter).
- usbhid: weather station with modern USB interface. As a disadvantage of this mode, there can only one station of a certain kind being connected to Meteohub. WMR-100, WMR-200, WMRS-200, RMS-300/600 look the same to Meteohub, so just one of these stations can be connected. USB HID connected stations must be connected directly, without having a USB hub in between. Stations: WMR-100, WMR-200, WMRS-200, RMS-300/600, TE-923, WH1080, WS300PC, WS444, WS500.
- TCP/IP: this is for weather stations that are connected via TCP/IP. Stations: IP-Vantage, IP-RFXCOM
- Meteohub TCP/IP: Meteohub reflects the data of a connected weather station on a TCP/IP socket (starting with first connected weather station at port 5500). If you want to connect to another Meteohub via TCP/IP you have to choose this option. Stations: all stations connected to a Meteohub



The device field needs the name of the device that gives access to the weather station. available devices are listed on the top of the page. The select drop-down box helps you to copy devices names into this field. Please make sure that you don't use USB-serial devices names when in serial connection mode and vice versa. When you have chosen a TCPIP connection the field needs the IP address followed by a colon, followed by the port number (i.e.: "192.168.10.77:5500" or "rfxcom:10001").

Hold time defines how long the reading of a sensor should be echoed, when new new sensor readings drop in. Standard value is 300 seconds. That means, if a sensor does not send new data for more than 5 minutes the sensor is regarded to fail and no will be shown to follow-on processes or live data like dashboard, WD live or weather network upload. When half of specified hold time (but at least 150 seconds) has passed Meteohub tries a restart of logging for that particular station. When hold time and additional 30 seconds have passed (but at least 300 seconds), data logger is restarted completely, which will affect all connected weather stations.

A station's altitude is important for correct sea level pressure computation. Concerning the computation of sea level pressure you can rely on the values your weather station computes or you can have Meteohub to do this computation. Meteohub can do the computation solely based on the weather stations height or by taking also the actual air temperature into account (based on readings from sensor "th0").

Wind chill computation can also be done by the weather station or by Meteohub.

If a station should not be read at the moment, please mark it stopped and press "save". Unmarking that and pressing "save" will start data logging for that station again.

"System Data" is not a weather station but provides virtual sensors that provide system information that can be used for display in graphs or HTML pages.

Pressing "Delete" removes the selected station definition. Settings become valid after having pressed "Save".

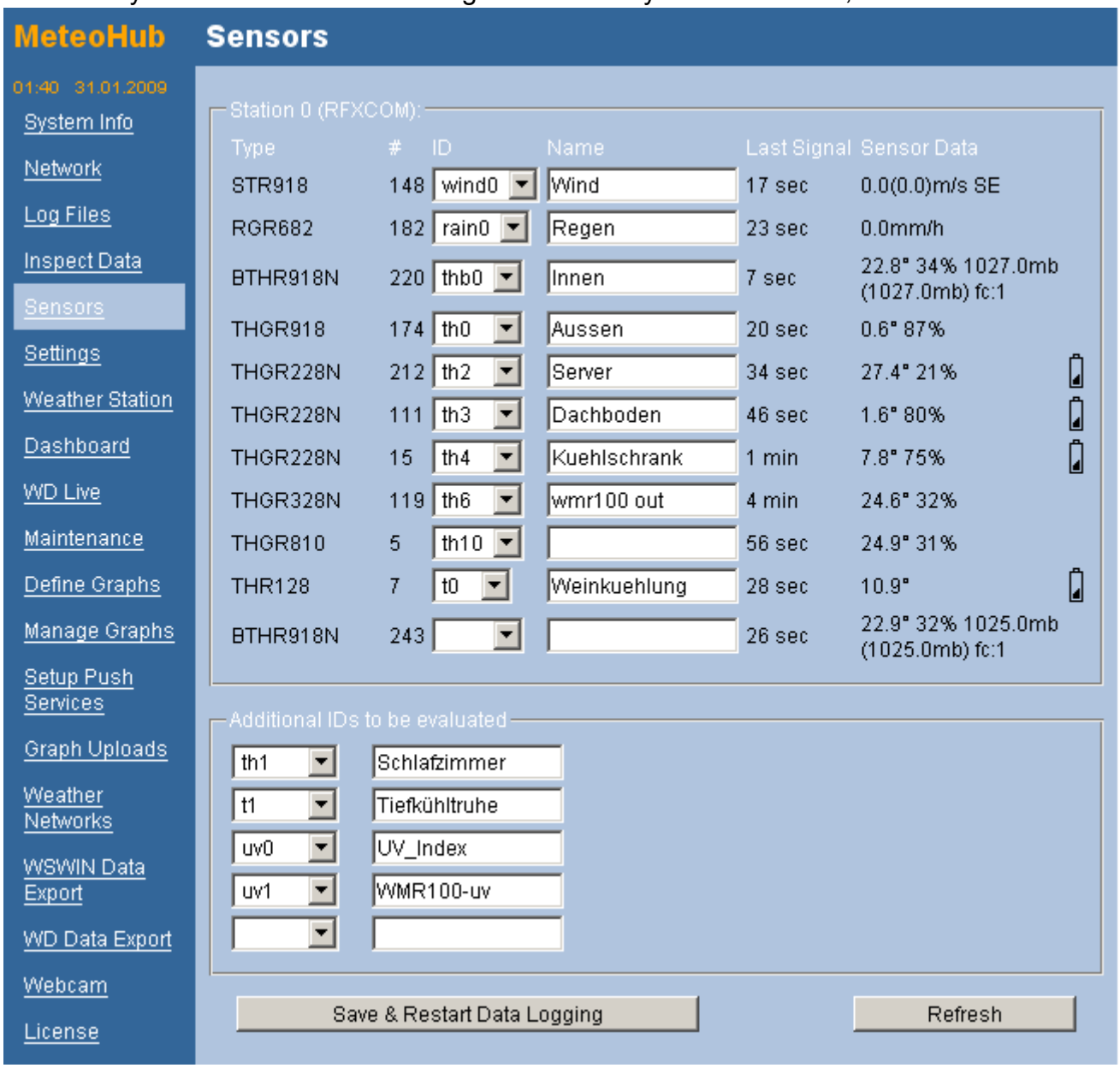
2.5 Sensors

In order to make use of data from sensors of a connected weather station Meteohub needs to define a unique ID for each sensor (column ID). You can also give sensors a name, which makes it more easy to identify the sensor in further dialogs (column name). Received sensors can be recognized by their type (column type), their original channel id (column #), and current sensor data (column sensor data).

Pressing "save" makes the definition of ID and name valid and restart data logging and initiates a recomputation of aggregated data.

Sensors that have not been given an ID have a blank ID field. Data of these sensors will not be recorded by Meteohub. So you have to assign IDs before Meteohub can go to normal operation. You can remove an ID assignment of a sensor by simply selection the blank ID and pressing "save". IDs have to be unique. If you give two sensors the same ID Meteohub will throw an error when you try to save these settings.

When using a RFXCOM receiver you should know that the original channel id is determined as a random number by the sensor, each time the sensor gets a reset signal or batteries are changed. As a result, you have to reassign the Meteohub ID for an Oregon sensor received by RFXCOM each time change batteries. If you don't do that, Meteohub will not



recognize the sensor as the original channel ID does not match to the number Meteohub expects for ID mapping. Meteohub supports these numbers of IDs:

- Pure temperature sensors can have IDs "t0" until "t39".
- Sensors that feature temperature and humidity can have IDs from "th0" to "th39". The primary outdoor sensor should always be named "th0" to keep it compatible to the WMR-928 naming.
- Triple sensors that report temperature, humidity and pressure can have IDs "thb0" to "thb9". The primary indoor sensor should always be "thb0".
- Rain gauges can have IDs "rain0" to "rain9", anemometers can have IDs "wind0" to "wind9".
- A UV meter can have IDs "uv0" to "uv9".
- A solar radiation sensor can have IDs "sol0" to "sol9".

Beside the IDs that are mapped to received sensors, you can also define IDs that have been mapped to sensors in the past, that might not send any data today. Section "Additional IDs to be evaluated" allows to specify IDs without receiving data for them at the moment. To keep these ID assignments is necessary to instruct the computation process for aggregated data to take this into account as well. Data mapped to IDs not specified on the sensors page will not be accessible for Meteohubs data evaluation.

Column "Last Signal" shows how old the last received packet from the sensor is. Column "Sensor Data" display the last sensor reading, which makes it more easy to recognize the position of the sensor (indoor, outdoor, attic, ...). A sensor reports low battery condition by this icon: 

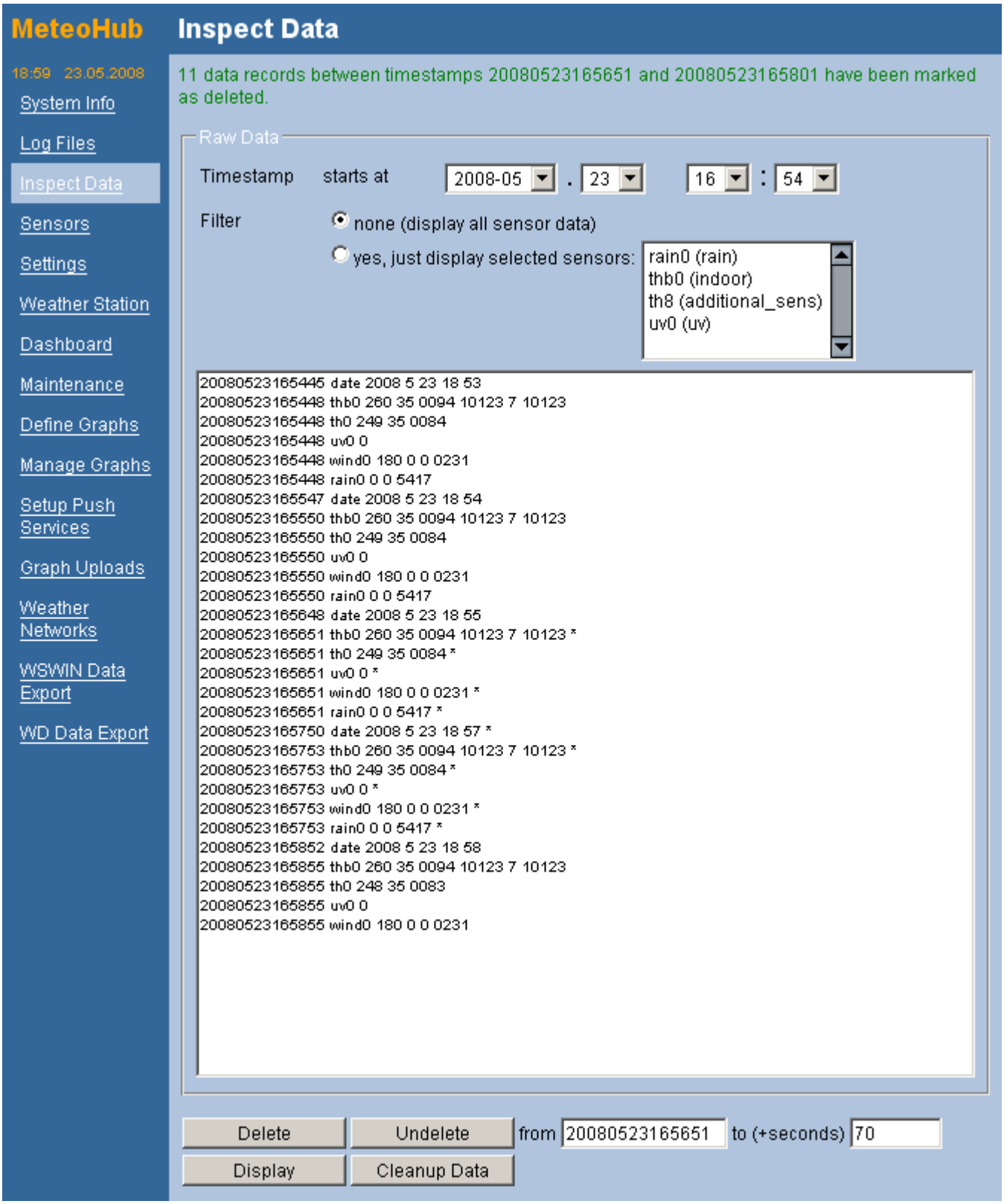
Weather station "System Data" defines these virtual sensors:

- System Load
- Uptime: runtime of system in seconds [sec]
- Data used: used space on data partition (in percent) [0-1]
- System used: used space on system partition (in percent) [0-1]
- Swap used: used space of swap (in percent) [0-1]
- Processes: number of processes running
- Signal Gap: time in seconds since last weather sensor update [sec]
- Heart Beat: reports a value of 1.0 every minute (this allows to compute system availability)

2.6 Inspect Data

This allows to inspect recorded raw sensor data. After having selected a start time you can choose if you want all sensor readings listed or just the ones from selected sensors. You can choose from all assigned sensors (see chapter 2.5 for how to assign a sensor), multiple selections are allowed. Please note that the recorded raw sensor data is time stamped according to UTC not according to local time.

The number at the beginning of each line is the UTC time stamp. Format is



YYYYMMDDhhmmss (year, month, days, hour, minute, second). Next is the unique id that identifies the sensor followed by sensor specific data as described in appendix C.

Beside displaying raw data this page also allows for deletion and undeletion of raw data. This might be necessary when your sensors have caught faulty data and you want to get rid of these. For cumulative data like the total rainfall, Meteohub notices the increase of total rain during the deleted period and subtracts this from further computations. This comes handy, when you have false rainfall readings because you are cleaning the rain sensor with water and thereby the sensor registers rainfall. By deleting these data records you also get rid of the false rainfall the sensor has given to Meteohub by an increase of total rainfall value. Deletion is done by giving the records a mark (* at the end). This allows to undelete records later on, when you decide so.

When pressing the "delete" button Meteohub deletes data with the time stamp specified in the "from" field. In the "seconds" field on the right of the "from" field you can specify the size of the time frame. A positive number in seconds will delete data up to the point in time ahead of the given time stamp. A negative number of seconds will delete data starting from time stamp minus these number of seconds until reaching the time stamp.

Example: When you put "20080523165651" in the "from" field and give "+70" into the "seconds" field, then raw data from 23.5.2008 16:56:51 to 16:58:01 will be deleted when pressing the "delete" button (see example). When you input "20080119003000" and "-30" all raw data from 23.5.2008 16:56:51 to 16:58:01 will be deleted. If you don't specify any seconds only data matching exactly the time stamp will be deleted. If no filter has been specified, deletion will be done for all sensor data. If a filter is defined, only data for selected sensors will be deleted. Undelete works exactly the same but removes the deletion mark from the records. Please notice that you can only delete, undelete and display data of the selected month.

To delete raw data the data logging process has to be halted before (see chapter 2.7 on this).

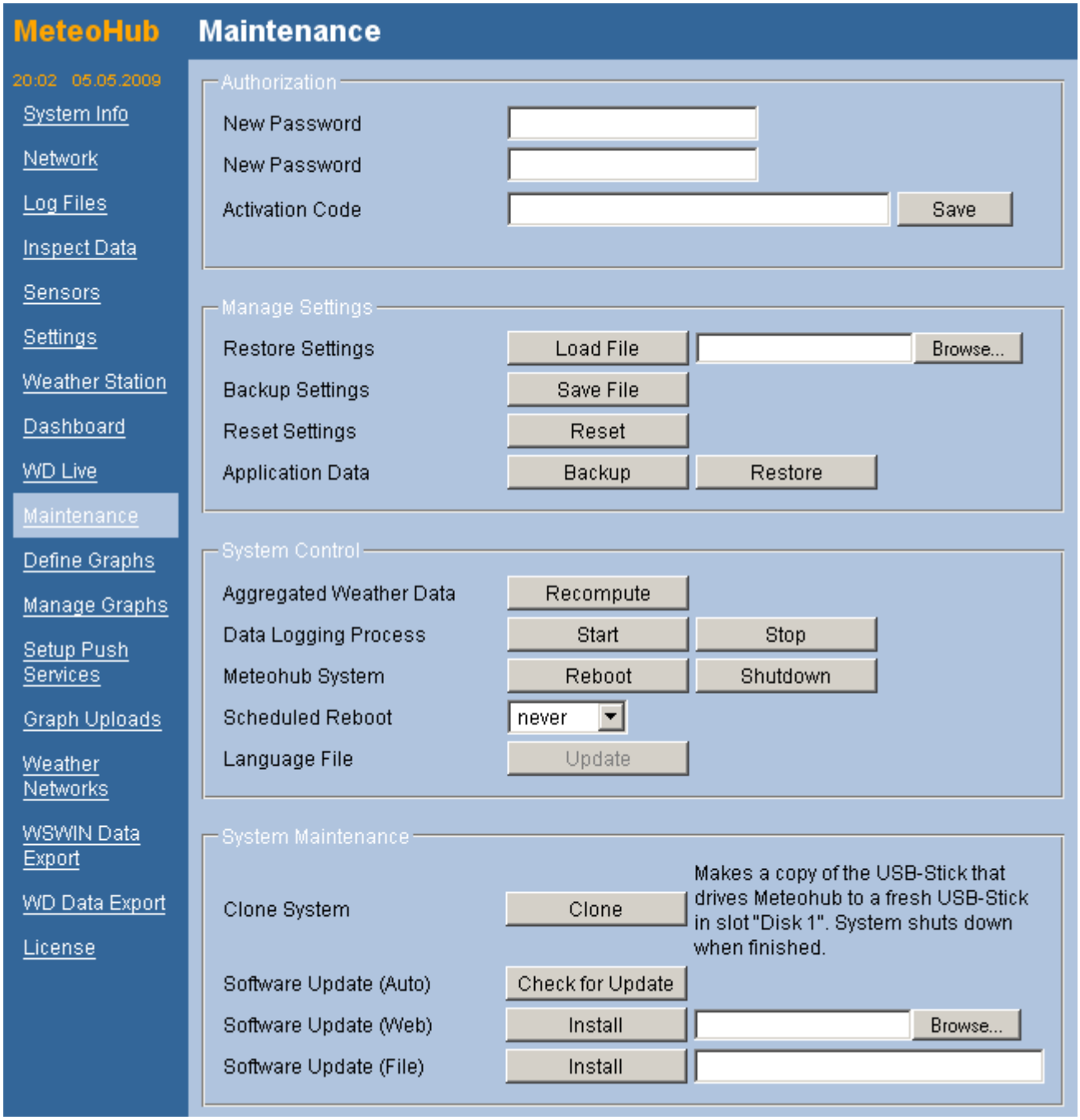
The "Cleanup Data" button allows to repair a monthly data collection that suffers from wrong formated entries.

2.7 Maintenance

The Meteohub password ("meteohub" by default") for the web interface can be changed by typing in a new password and repeating it. If you forget your web interface password, you have to login via SSH as user "root", password "meteohub". Then (a) change to the corresponding directory via "cd /srv/www/cgi-bin" and reset the password file by "echo 'meteohub:' > .htpasswd" or (b) if you have a Meteohub version post 4.3, you can just give command "reset-htpasswd" after having logged in via ssh. This sets http password to "meteohub" again. Now you can use the web interface again with the empty string (a) or "meteohub" (b) as password. Please set a new valid password as your first action when having access to the so far unprotected web interface.

The activation code is needed, if you decide to use Meteohub beyond the evaluation period that is displayed on the system information page as lined out in section 2.1..

You can save your settings with the "Save File" button on your desktop/laptop. The "Load File" button allows you to load a previously stored settings file. It is recommended to store



the settings from time to time to have a backup, if something goes wrong with Meteohub's settings. Stored settings include sensor definitions. Via "Reset" you can revert settings to factory defaults.

The button "Backup" allows to create a complete Backup of all weather and user data in a files on pc-network folder "/public/meteohub.backup". This can take quite a while. When finished a line "full backup done" is prompted into the meteohub log file. A generated backup can be restored by placing the file "meteohub.backup" into the pc network folder "/public" and by pressing "Restore".

Time-compacted weather data are incrementally computed from the raw weather data. If these computed data should be invalid be any reason, or if you doubt they might not be correct, you can recompute them completely from scratch by pressing the button "Recompute". Depending on the amount of weather data to recompute this can take up to 20 minutes. During that time the display of weather graphs might fail, if one of the time-compacted files needed for the graph is not yet reconstructed. Don't worry, this is just a temporary problem that fades when the recomputation has finished. This has no effect on logging of raw data, so Meteohub does not loose a single data record during reconstruction of time-compacted data. The web interface will be a bit slow, because of the heavy workload.

The "Stop" button allows to hold recording of raw weather data. Normally this should not be done, because you now loose incoming data from your weather station. With "Start" you can restart the data recording process. After reboot power-up data recording is always running. If there is no weather station connected, data recording stops. You can see the status on the system information page as described in section 2.1.

"Reboot" reboots the Meteohub, "Shutdown" brings it in power-off mode. To start Meteohub from power-off mode you have to press the start button on the NSLU2. If you press this Button during operation of Meteohub it will also shut down. To increase long-term stability you can make use of a scheduled reboots. You can choose from daily, weekly and monthly reboot schedules, selecting day of week (on weekly reboot), day of month (monthly reboot) and time of reboot (all reboot options). These reboot will not initiate a recomputation of data.

When you have a language other than German or English selected, the translation is taken from a language file. As Meteohub's web interface will further develop over time, you can update the currently selected language file. This update adds new terms to translate to the language file. As long as no translation is given there, English is used instead for these terms. As support for German and English is hard coded, you cannot change these texts/translations. Appendix I explains how language files can be constructed.

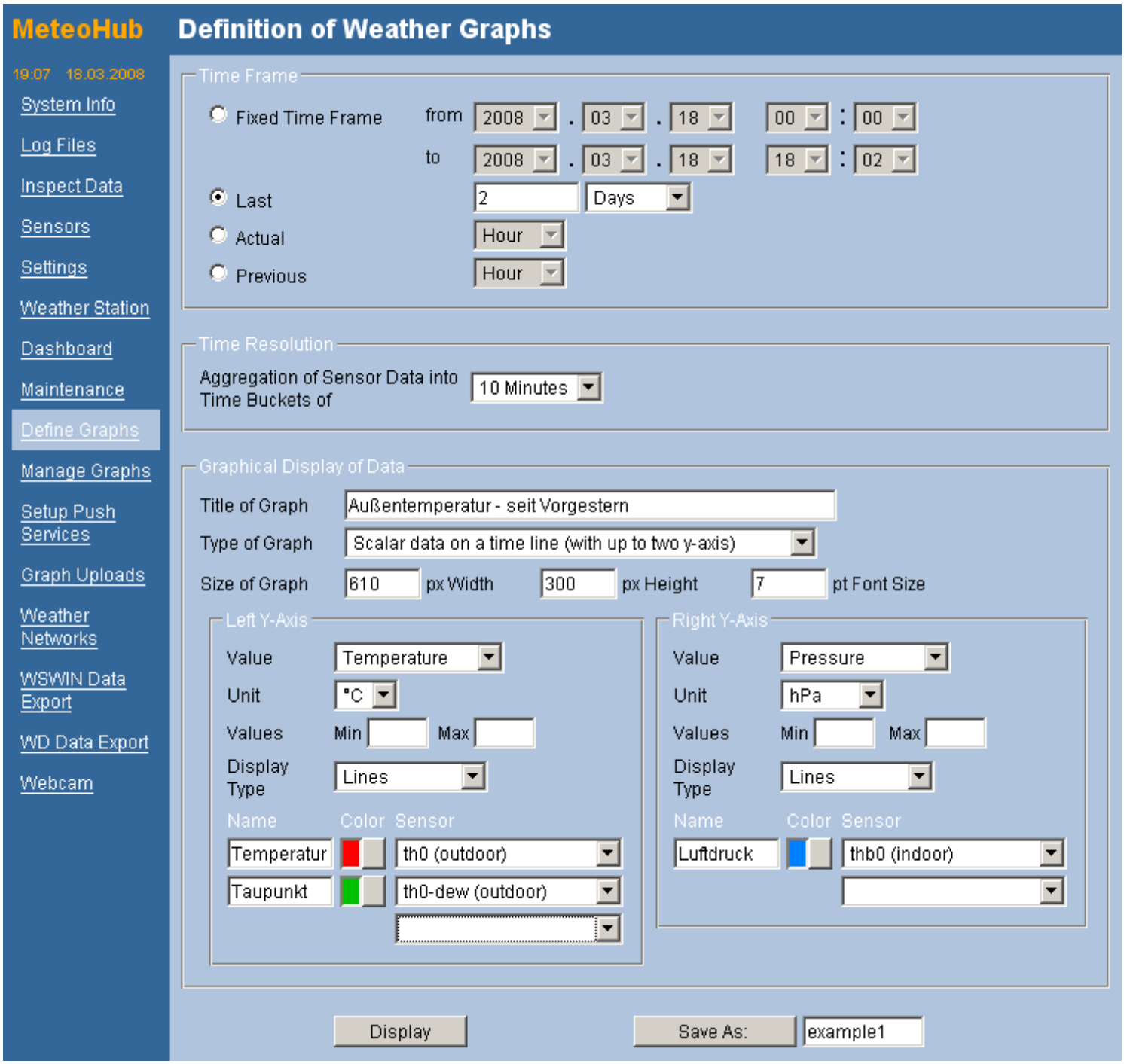
As a special feature you can clone your USB stick with all data, the operation system and the Meteohub applications on it onto another USB stick that must have the same or bigger capacity. To do this you have to pull out the weather station from the Meteohub's USB port "Disk 1" and plug the new USB stick into this port. Now press the "Clone" button on the web interface. Meteohub starts to copy all the necessary data onto the new stick If the new stick has more capacity this will be assigned to the data section, so you get more head room for incoming weather data. After a couple of minutes Meteohub will shut down. Now you can remove the inserted USB stick from the USB port ("Disk 1"). If you like you can replace the old USB stick by the new one, connect the weather station to the port "Disk 1" and power-up Meteohub.

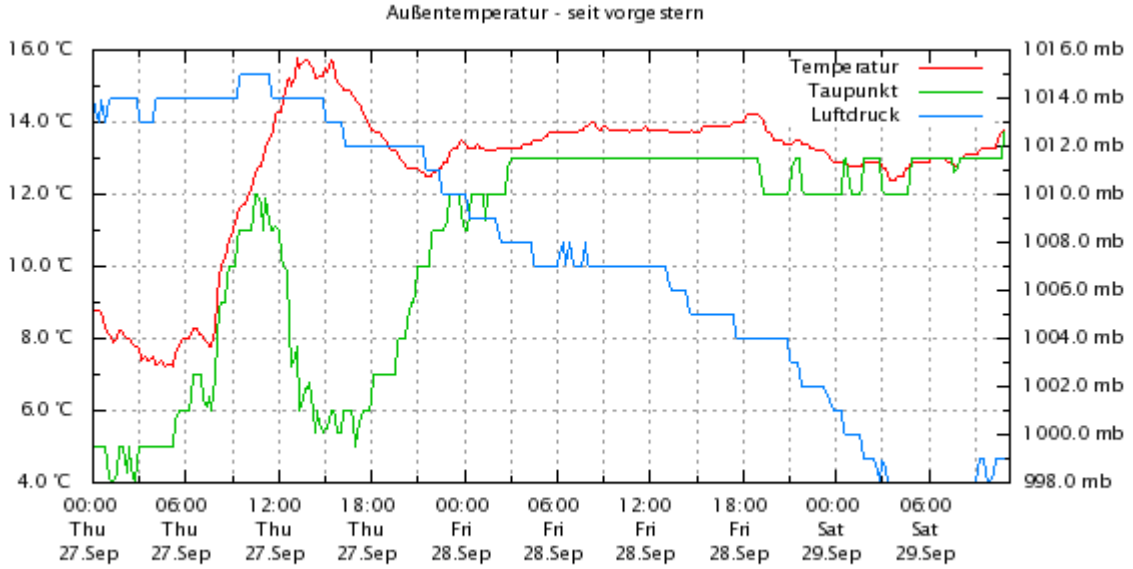
You can install software updates in three ways. The most convenient ways is to use "Check for Updates" button. This initiates a request to "meteohub.de" asking if there is an update available for your actual running version of Meteohub. If so, the update is downloaded in

the background. When download and check for integrity was successful it can be installed by a single Click. As an alternative updates can be installed manually. When doing this by method "Web" you have to "browse" to the update you want to install and then press "Install". As this method does not work reliable for larger updates it is recommended to use method "File". This requires the update file being located on the Meteohub system. If the file "update.new" is located in the transfer folder of the pc network drive of Meteohub, then "/data/transfer/update.new" must be specified in the input field for file based software update. It is recommended to use the auto install option as described before.

2.8 Definition of Weather Graphs

The generation of weather graphs is done in two steps. First you have to construct a weather graph definition. In the second step you can create a weather graph based on a definition and actual weather data. The definition of weather graphs is done by the web interface. To test your definition you can press the "Display" button. This generates a graph according to your definition and the current weather data. If you are fine with the definition, give it a name and store it by pressing "Save as". When you want to generate a graph based on a definition outside the webinterface you simply have to direct your browser to "http://...../meteograph.cgi?graph=name" where "name" is the name you gave the graph definition. In the following chapters Meteohub's features to define and generate graphs will be explained.

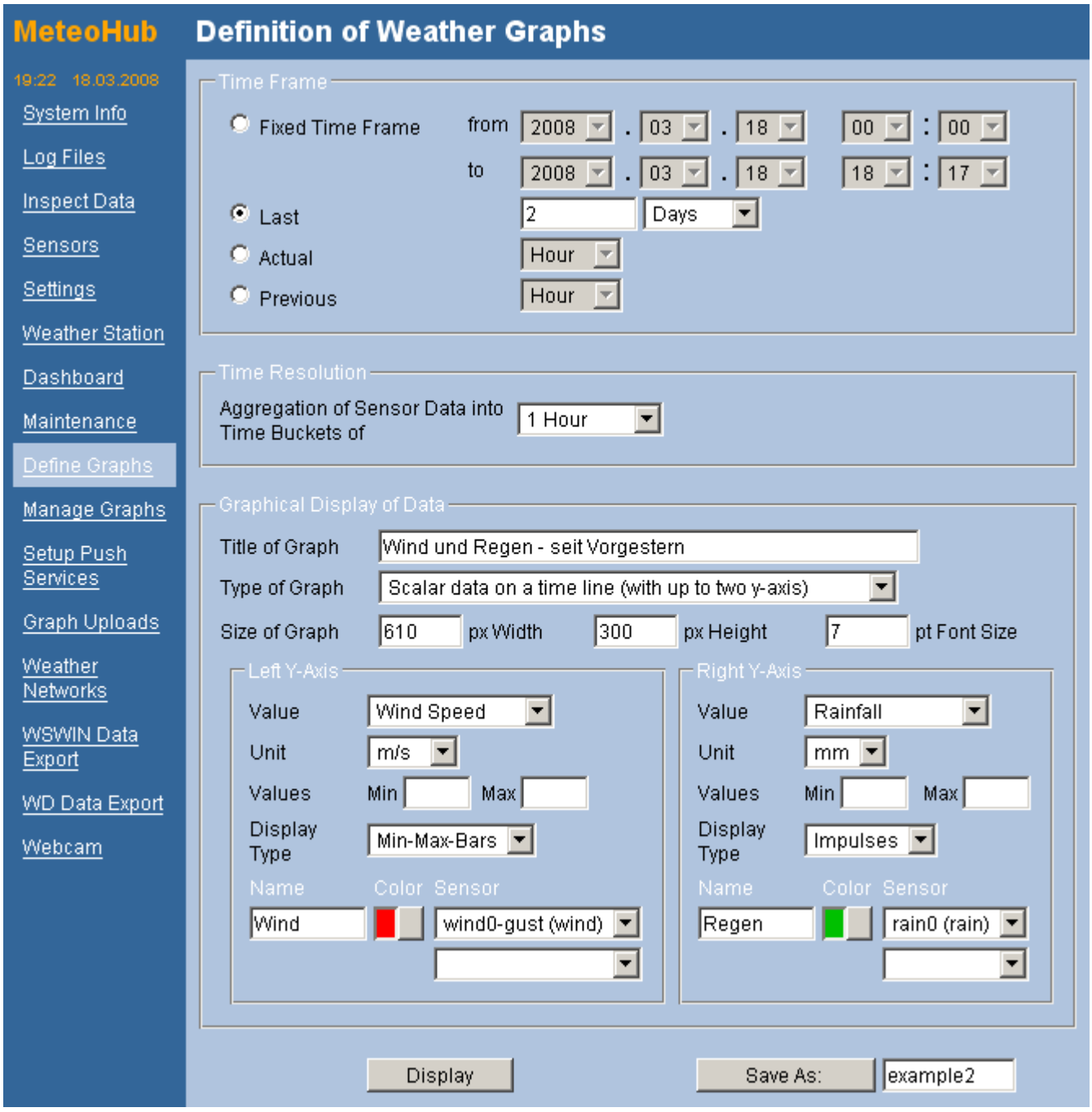



Außentemperatur - seit vorgestern
Temperatur
Taupunkt
Luftdruck
16.0 °C
14.0 °C
12.0 °C
10.0 °C
8.0 °C
6.0 °C
4.0 °C
1016.0 mb
1014.0 mb
1012.0 mb
1010.0 mb
1008.0 mb
1006.0 mb
1004.0 mb
1002.0 mb
1000.0 mb
998.0 mb
00:00 Thu 27.Sep
06:00 Thu 27.Sep
12:00 Thu 27.Sep
18:00 Thu 27.Sep
00:00 Fri 28.Sep
06:00 Fri 28.Sep
12:00 Fri 28.Sep
18:00 Fri 28.Sep
00:00 Sat 29.Sep
06:00 Sat 29.Sep

2.8.1 Time Frame

The time frame from that weather data will be used for the graph can be specified by 4 different techniques.

- **Fixed Time Frame:** Time frame ist specified by a fixed start and end date.
- **Last:** This determines a time frame that ends with the actual date when the graph will be generated. The start date is computed relatively to the end date and can be specified in terms of minutes, hours, days, weeks, months or years. The example ("Last 2 Days") specifies a time frame from 0:00 at the day before yesterday and ends at the actual date and time.
- **Actual ... :** This specifies a time frame covering the actual hour, day, week, month or year..
- **Previous... :** This specifies the past hour, day, week, month or year.



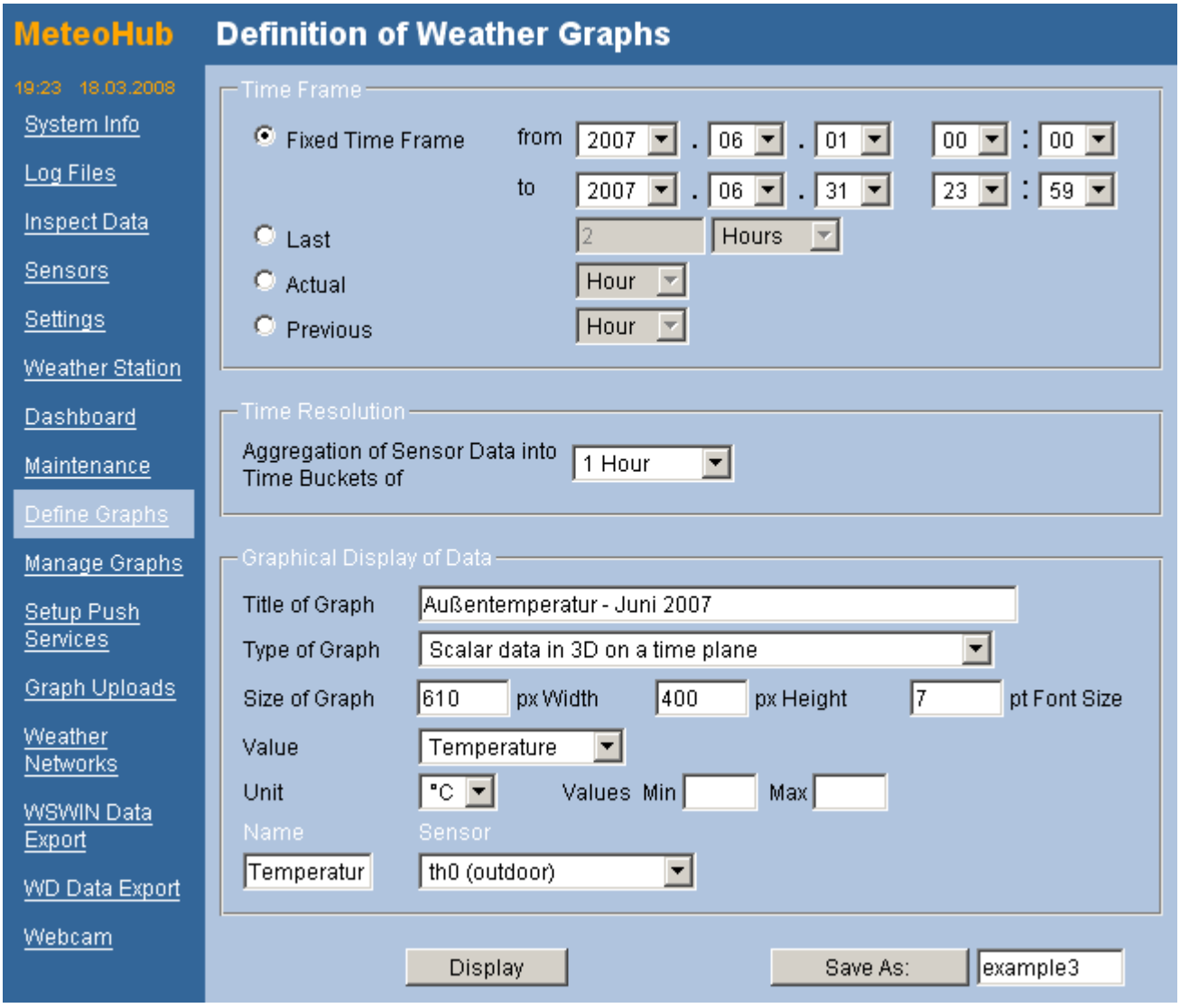
- If there a no weather data in the defines time frame, Meteohub will throw an error or will not show a graph.

2.8.2 Time Resolution

As explained before Meteophub computes time-compacted data from the raw weather data. These time-compacted data is computed for different time scales: 5 minutes, 10 minutes, 30 minutes, 1 hour, 6 hours, 1 day, 1 month. If time frame and time resolution do not fit nicely and produce more than 2000 data points to be used for graph generation, a warning message is displayed that asks for reducing time resolution or reducing time frame. Graphs with more than 2000 values for x-axis normally don't make sense and should be avoided as they have a potential of overloading a Meteohub system.

When you define a weather graph you can choose with time scale should be used for the graph. If you do produce a line graph you might choose a tight time scale to get a smooth graph. If you want a bar graph, it might be more suitable to show values in a more stretched time scale. For example, if you plan to show the minimum, average and maximum temperature of each day of a month you will choose a time resolution of "1 day" and a time frame of the month under consideration.

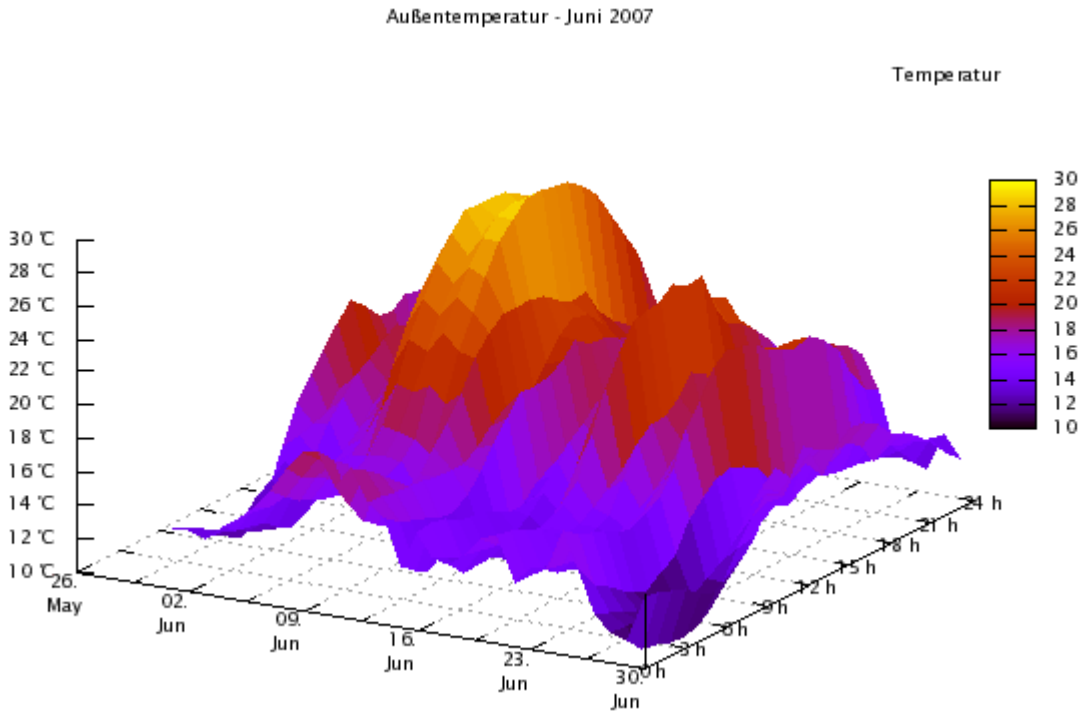
As there a some graphs just make sense with certain time resolutions, the choices might be restricted.

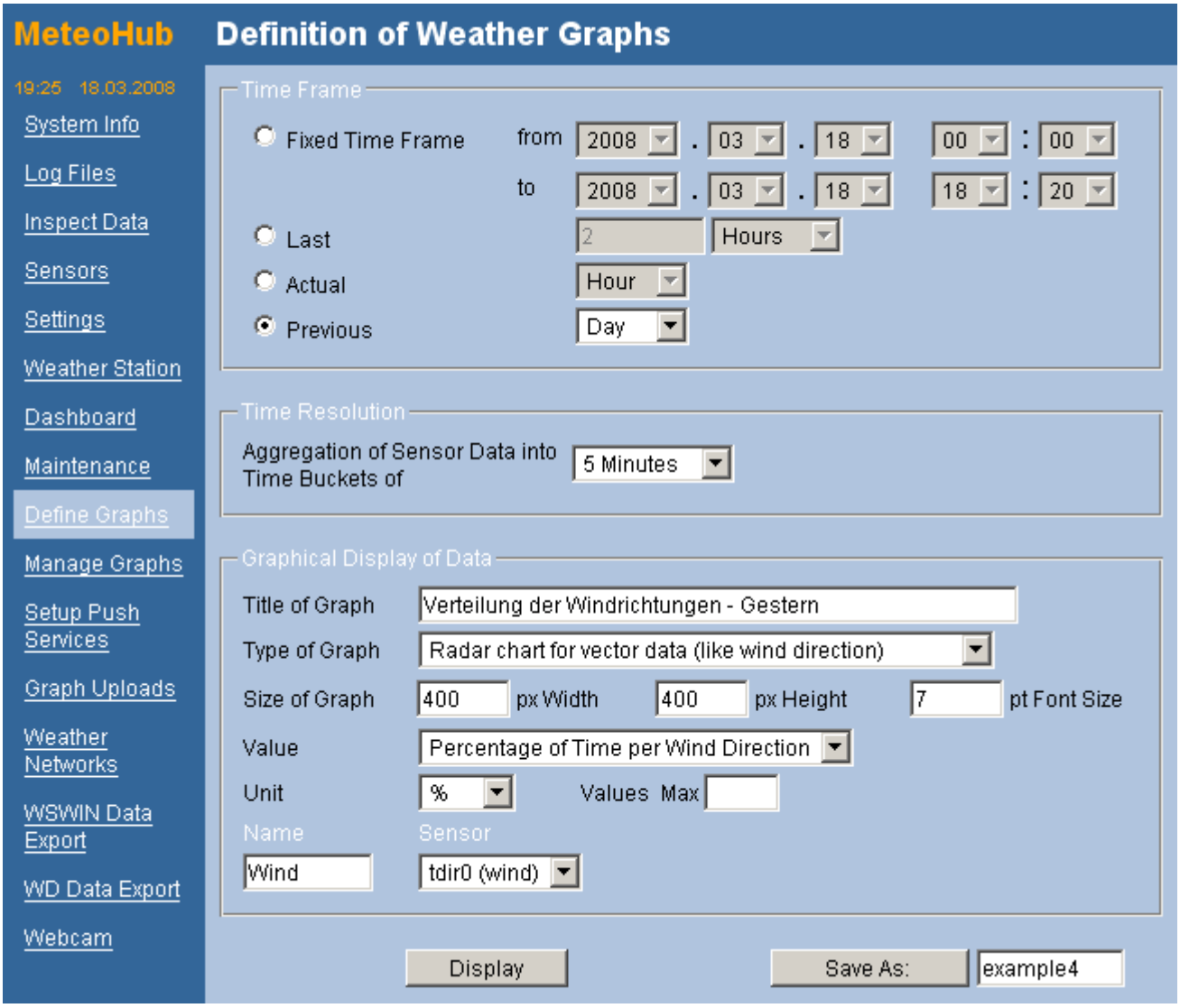


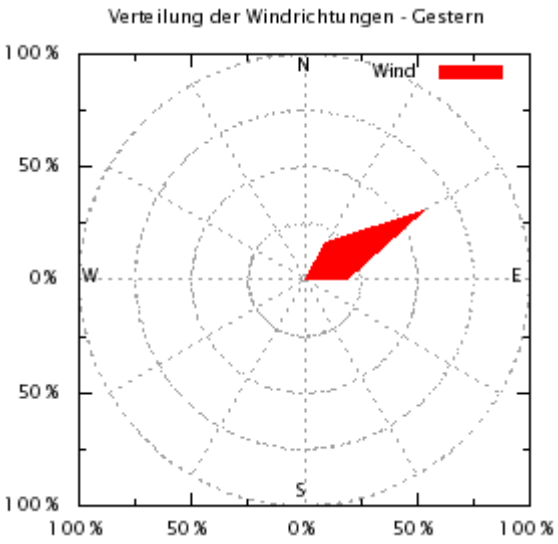
2.8.3 Type of Graph

At the moment Meteohub supports four types of graphs.

- **Scalar data against time (with up to two y-axis):** In this mode Meteohub writes down the weather data in an x-y-diagramm, where the x-axis represents the time line and the y-axis represents the values at a certain point in time. By making use of the second y-axis you can draw a graph with values of two different physical units (for example, temperature in °C and pressure in hPa). Per y-axis you can choose the physical value ("Temperature", "Humidity", "Pressure", "Wind Speed", "Rain Rate", "Rainfall", "UV Index", "Wind Direction", "Solar Radiation", "Numerical Value"), the measurement unit according to the selected value and a minimum and maximum value that is used for the graph. If you make use of both y-axis, the grid lines will be oriented to the left y-axis.
  Display types can be "Lines", "Impulses", "Bars", "Min-Max-Bars" or "Points". The example graph shows outdoor temperatures since the day before yesterday as a line graph based on the definition outlines before.
  The second example "Wind und Regen – seit Vorgestern" shows wind speed as hourly min-max-bars and the rainfall in mm. The graph shows that Thursday morning starts with some gusty wind (big differences between min and max values). When rain starts in the night from Friday to Saturday the wind has been going down. The hourly rain maximum has been 4 mm, maximum wind speed was 7 m/s at max and about 4 m/s as average.
- **Scalar data in 3D on days and hours of day:** This display type allows to plot scalar data as a plane on the axis day and hour of day. This type of graph does line out the differences between days at a certain hour. The example "Außentemperatur – Juni 2007" shows that in the beginning of June there has been a 3 day warm period with a constant temperature increase and decrease during the hours of the day. As time resolution there should always be selected "1 hour".



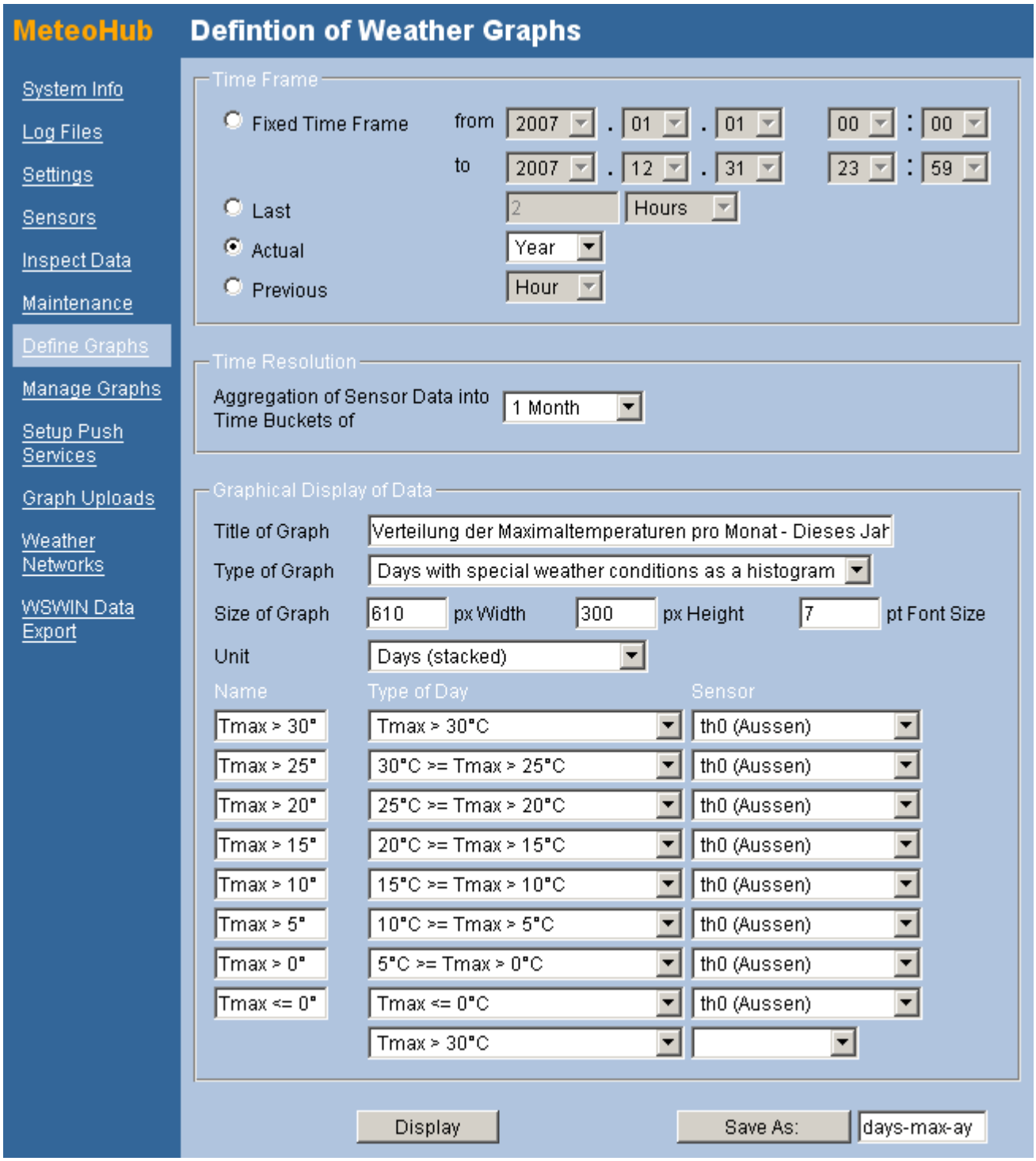




- **Vector data (wind direction) as radar chart:** This graph displays vector data in terms of a radar chart. Meteohub supports two display modes:
  - wind speed sorted into 12 directions
  - distribution of wind directions during the evaluation time period sorted into 12 directions

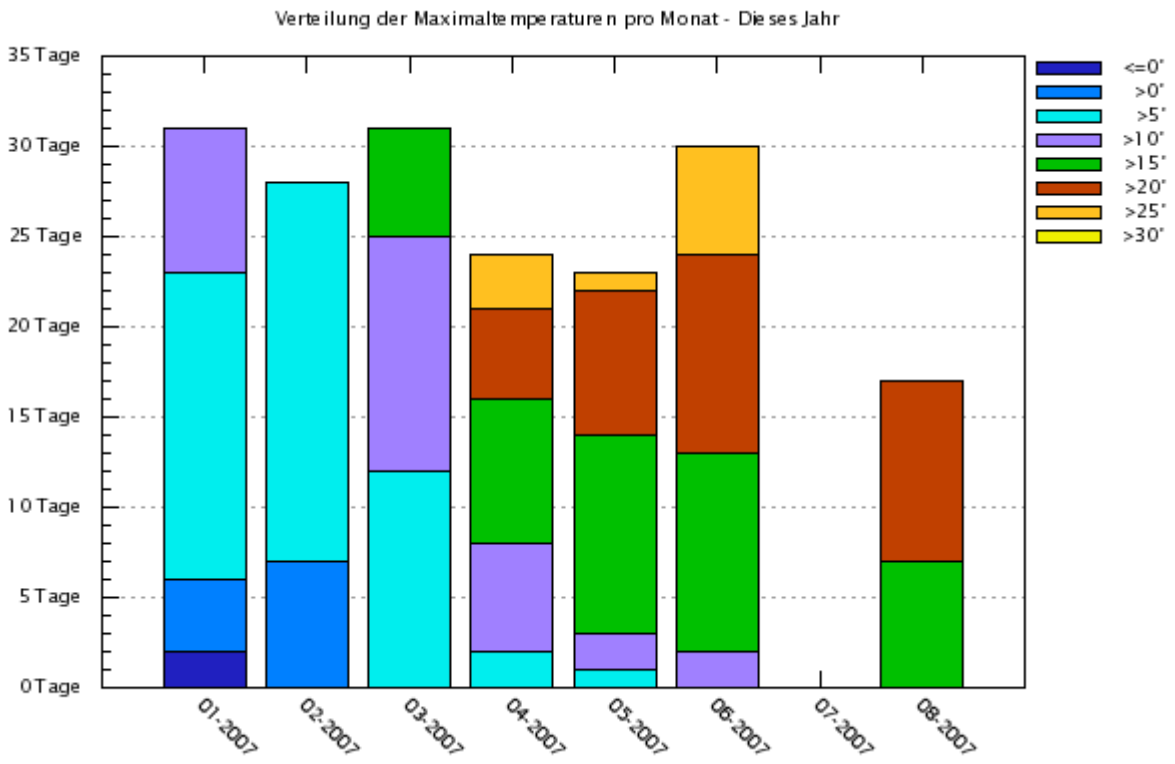
In the example yesterdays distribution of wind directions shows the main wind directions has being NNE to E.

- **Days with special weather conditions:** This display type outlines days of a certain month that have a special weather condition, as bars side by side or as a histogram. When displayed as a histogram, the y-axis can be number of days or percentage according to the total amount of days under consideration.
  Meteohub defines categories of days as follows:
  - Rain Days: Days with more than 0 mm rainfall
  - Days with a defined maximum temperature:
    - Tmax > 30°C
    - 30°C >= Tmax > 25°C



- Tmax > 25°C
- 25°C >= Tmax > 20°C
- Tmax > 20°C
- 20°C >= Tmax > 15°C
- Tmax > 15°C
- 15°C >= Tmax > 10°C
- Tmax > 10°C
- 10°C >= Tmax > 5°C
- Tmax > 5°C
- 5°C >= Tmax > 0°C
- Tmax > 0°C
- Tmax <= 0°C

- Days with a defined minimum temperature:
  - Tmin >= 20°C
  - 20°C > Tmin >= 15°C
  - Tmin >= 15°C
  - 15°C > Tmin >= 10°C
  - Tmin >= 10°C
  - 10°C > Tmin >= 5°C
  - Tmin >= 5°C
  - 5°C > Tmin >= 0°C



- Tmin >= 0°C
- 0°C > Tmin >= -5°C
- Tmin >= -5°C
- -5°C > Tmin >= -10°C
- Tmin >= -10°C
- Tmin < -10°C

○ Days with some special meaning:

- Frost Days: Tmin < 0°C
- Cold Days: Tmax <= 10°C
- Summer Days: Tmax > 25°C
- Hot Days: Tmax > 30°C
- Tropical Nights: Tmin >= 20°C

2.8.4 Size of the Graph

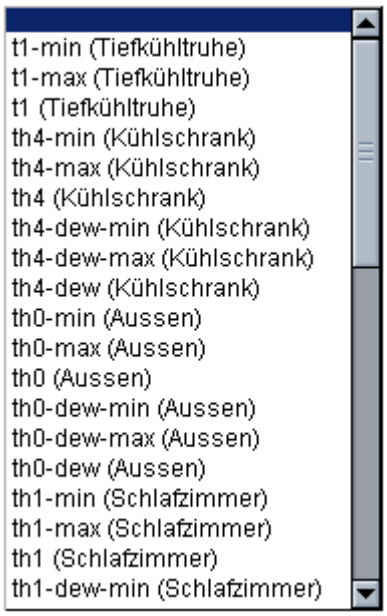
The size of the graph can be defined in horizontal and vertical pixels. Radar charts are of quadratically size. Depending on the size of the graph it might be appropriate to change the font size as well. Font size is defined in pt.

2.8.5 Units

The Units you can choose from depend from the selected type of graph. Meteohub just presents units to you that are compatible with the selected type of graph. So you can't do anything wrong here.

2.8.6 Sensors

Graphs are generated from sensor data. During definition of sensors each sensor is given a unique id that also specifies the type of the sensor. Furthermore you can give each sensor a name to remember more easily where the sensor is located. Section 2.5 describes sensor definition for WMR-928/968/918N, WMR100/200, RMS300, TE923, WH1080 and RFXCOM in detail.



When you define a weather graph you must specify which measured data of which sensor to take into account. During graph definition you can choose between all assigned sensors an all sensor data that is compatible to the selected type of graph and value type. As the time-compacted weather data that is used for generating graphs provides a minimum, average and maximum value for all data, you can also select a min or max sensor value instead of the average one. Sensors that provide temperature and humidity (type "th" oder "thb") also have a dew point temperature (dew) that can be selected as well. Wind sensors provide a wind chill temperature ("chill") based on the temperature as reported by the standard out-door sensor "th0".

Meteohub only provides sensor data that is compatible with the selections already done. If

you specified a name for a sensor, this name is also included in brackets and make selection of the right sensor more easy. In a graph definition each selected sensor can be given a name that will be used for the legend of the graph to explain the data.

When generic unit "Numerial Value" is selected you can choose from this list of sensor extensions:

- default is average value
- minimum value (-min)
- maximum value (-max)
- sum (-sum)
- sum per minutes (-sum/min)
- sum of increments (-deltasum)
- number of rising edges (-rise)
- number of falling edges (-fall)

The column color allows for definition of a color used for plotting the sensor data in the graph.

2.8.7 Display and Save

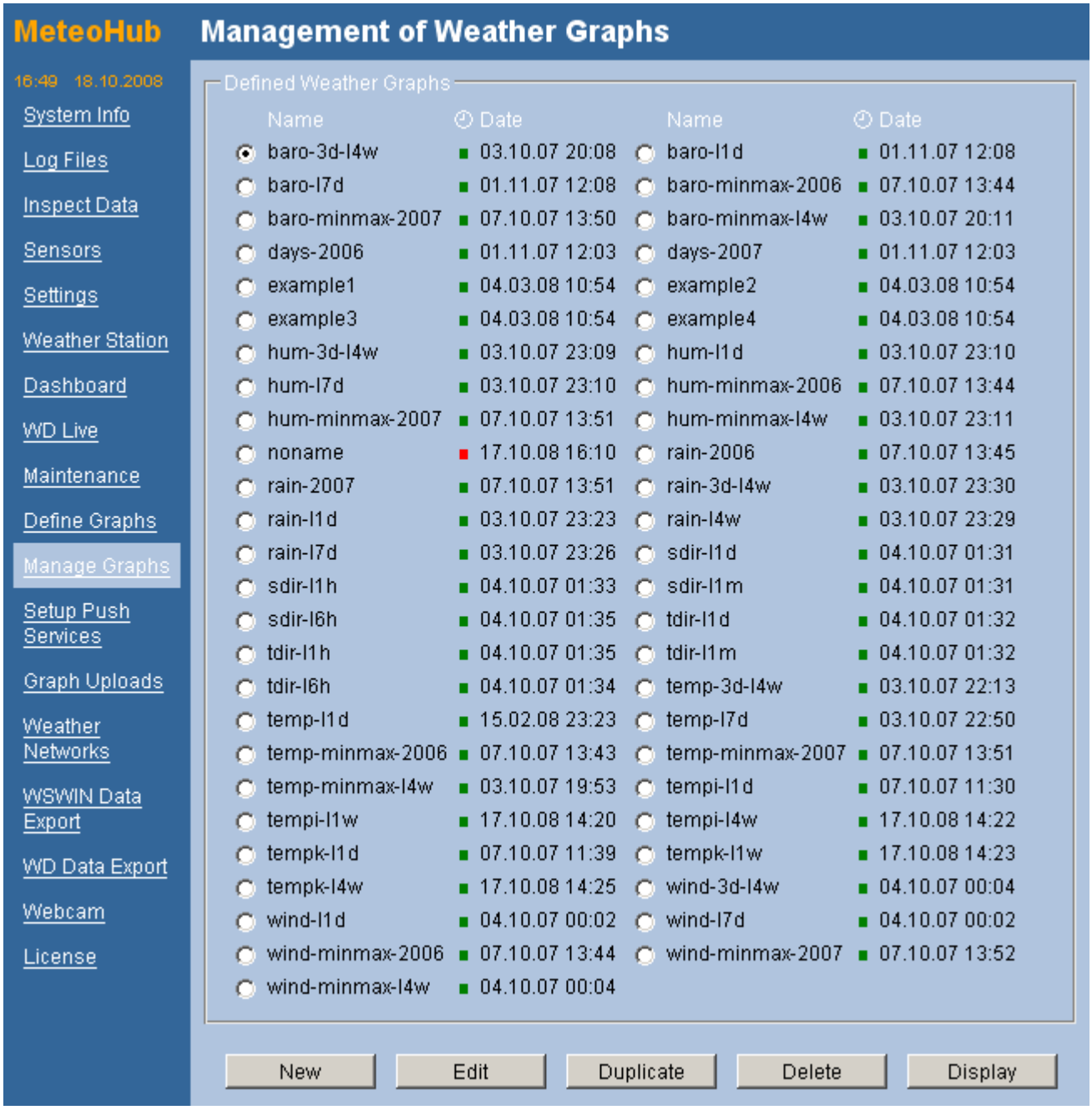
When a graph has been defined this can be saved at a given name. This allows to continue editing of the definition later on and is necessary to make use of the definition outside the Meteohub We-Interface. When you press "Save As" the definition will be stored at the given name, regardless, if the definition already exists.

The "Display" button allows to test a graph definition with current weather data without leaving the graph definition page. This is very convenient to check if the definitions make sense. The generated graph is displayed in separate pop-up window. To make this happen, Javascript has to be enabled on your browser and the pop-up blocker has the be disabled (at least for the Meteohub URL),

2.9 Manage Graphs

Graphs defined and saved according to the previous section are listed by name in two columns. You can select one of the graph definitions and do the following operations on it..

- "new" creates a new graph definition and changes to the graph definition mode. There the graph can be defined, tested and saved.
- "Edit" takes the selected definition and opens this definition for editing. Changes have to be made permanent by pressing "Save As".
- "Duplicate" makes a copy of the selected graph definition.
- "Delete" deletes the selected graph definition.
- "Display" generates a graph based on the selected definition and current weather data. The graph will be displayed in a pop-up windows. Please make sure that Javascript is activated in your browser and that the pop-up blocker is deactivated for the Meteohub URL.



All graph definitions are stored in the directory "/data/graphs/". You can easily backup these as this directory can be reached as a PC-network share from your windows PC.

Color marks in the column with a clock-symbol indicate if the graph definition addresses less than 1000 data points (green), less than 2000 data points (yellow) or more (red). The number of data points determines the computation time for graph generation. Graphs with more than 1000 data points on the x-axis usually don't make sense, as these amount of data does not provide a better graph resolution but demands additional processing power (see also chapter 2.8.2).

2.10 Setup Push Services

Meteohub can send e-mails in case of certain events. In order to do this, Meteohub must have a SMTP server at reach. Beside SMTP host there must also be a destination address specified, to send the e-mail to, and a source address, that should get replies of the mails sent (Some provider require a valid email address given as source address!). Depending on your SMTP host, you might additionally need a user name and password for authentication. Please select this option when needed.

After that you can choose the actions Meteohub should take, when certain events occur. You can choose between

- immediate e-mail response
- e-mail notification once a day
- no e-mail notification at all

Press "Save" to make the definitions valid. If you press "Save & Test" a test e-mail is sent to the specified address. This is very handy to check if the e-mail configuration has been done correctly.

Meteohub allows to upload generated weather graphs via FTP to servers in the Internet. To make this happen, you have to specify the FTP server's URL, the port the FTP server is listening on (usually port 21), and optionally a user name and password if it is not an FTP server with anonymous login. If the files should not be placed in the root directory on the server, you have to specify a directory. Please don't forget the "/" at the end of the directory name, other wise the files will not be stored correctly. The check box "FTP-Upload activated" tells Meteohub if automated upload of weather graphs is activated or not.

Press "Save" to make the definitions valid. If you press "Save & Test" Meteohub starts an FTP upload of a small test file, called "meteohub-upload.test", to the defined directory on the FTP server.

Mark "FTP-Upload activated" to start running upload of graphs specified in the following section.

2.11 Graph and Data Uploads

The upload of weather graphs and data to a web server instead of directly requesting this information from Meteohub per request from the Internet can have two major advantages.

1. Meteohub cannot be buried under a large amount of requests that neither the NSLU2 nor your limited DSL upstream might be able to handle properly
2. Meteohub doesn't need to be directly reachable from the Internet, which might have security benefits.

A prerequisite for doing FTP uploads is, that the push services have been setup correctly (see section 2.10). An FTP Upload is done by a time scheduler every minute. Apart from that for each data to be uploaded it can be specified how often this data should be generated (a generation more often than every 5 minutes is not making sense in most cases). Generation schedules can be selected from a pre-defined drop-down list of schedules or can be individually defined in Unix CRON syntax. In order to make define an individual CRON schedule, the CRON schedule has to be typed in the "individual schedule" field at the bottom and has to be selected for a given graph definition by selection "individual" from its time schedule drop-down list. When pressing "Save" the CRON schedule is applied to the selected graph uploads.

A CRON schedule is defined by five fields separated by empty space. The fields have meaning as follows:

1. minute: 0 - 59
2. hour: 0 - 23
3. day of month: 1 - 31
4. month: 1 - 12
5. day of week: 0 – 7 (0 and 7 represent Sunday)

Beside fixed numeric values the fields can specify value ranges like this:

- value lists, separated by comma. For example: "1,2,3,6"
- value ranges, specified by min and max with a "-" in between. For example: "2-4"
- any value, specified by an asterisk "*".
- any n-th value, specified by "*/n". For example: "*/3" means "every third" (0, 3, 6, ...)

For example, a CRON schedule "*/10 * * * 1-5" has the meaning "on working days every 10 minutes". If needed a graph definition can be subject of multiple CRON schedules. A selection from multiple FTP servers is not supported.

The generated data will be stored on the FTP server at the in section 2.10 defined directory. The file name can be a fixed name or a time stamped name. For time stamping the date&time variables of the gnu c "strftime" function can be used. This allows to incorporate the date and time of the graph upload into the file name. You find an explanation of the date and time variables in appendix E. In the example ("%F_%R.png" the file name is constructed from the date (in format "year-month-day"), followed by an underscore and the time (in format "hour:minute") plus the file name extension ".png". During upload the file name will be expanded to "2007-09-23_15:10.png", for example.

Meteohub compares each schedule for graph generation with the time resolution of the graph definition. The column marked with a clock symbol indicates of upload schedule and time resolution of the graph definition look consistent. When a graph is at least two times as often generated as data the graph relies on is updated the indicator has red value. When

the graph is more often (but not two times as often) generated than data it relies on is updated, the indicator turns yellow, otherwise green. This indicator should guide the user to reduce schedules for graph generation to minimize situations where graphs are generated and uploaded while the data the graph is built from has not changed. Having this sorted out carefully can reduce system load significantly.

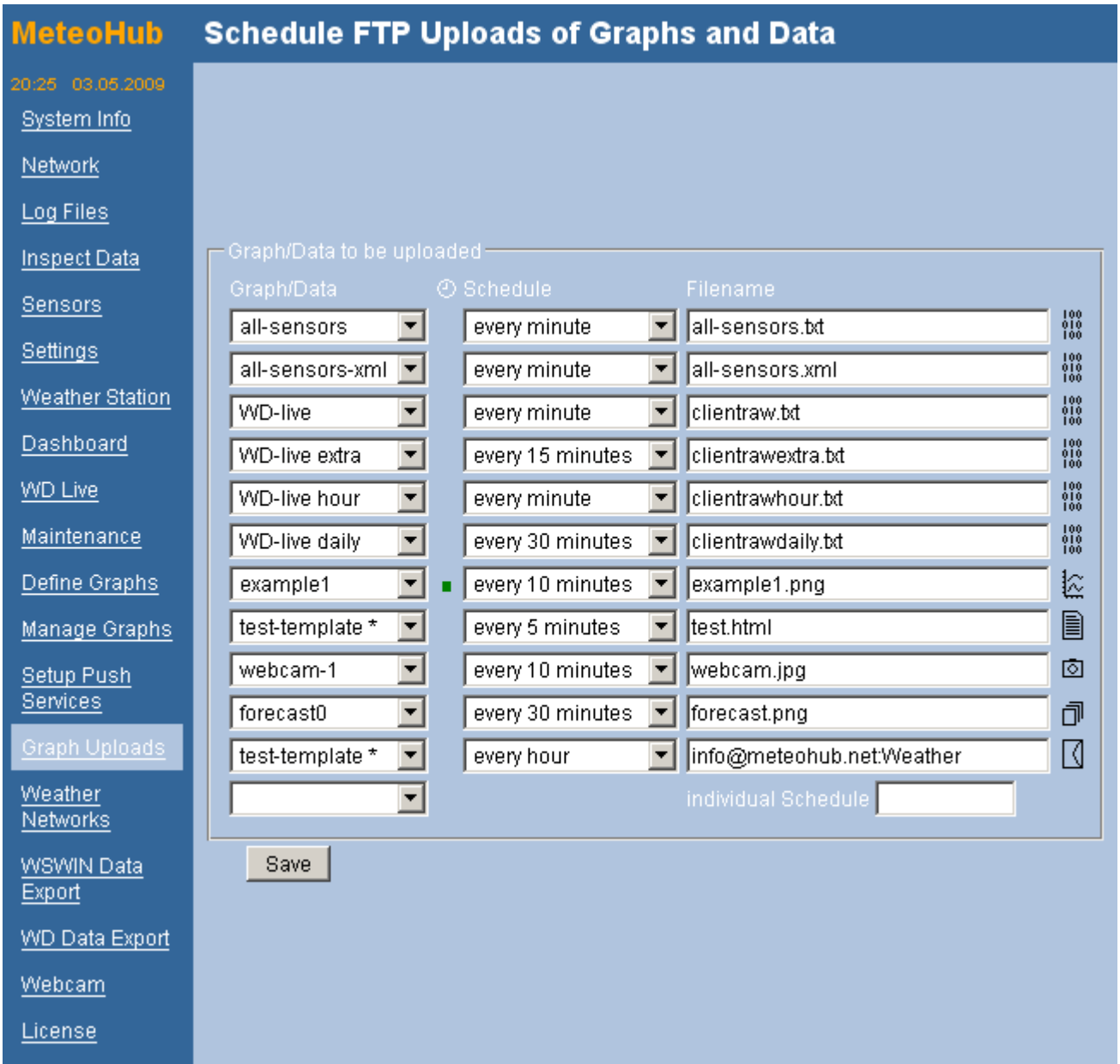
Data generated for upload is also copied into PC network folder "/public/myweb/uploads" for local use. Meteohub provides five basic types of data for FTP upload.

2.11.1 Icons

Meteohub provides two types of icons for upload. Forecast icons and moon phase icons. How Meteohub can generate icons when asked via http request is described 3.3. When you intend to upload the actual forecast icon via FTP you have to select "forecast#" from the graph/data selection, where # indicates the sensor id of the thb sensor under consideration ("forecast0" corresponds to sensor "thb0"). To upload the actual moon phase icon select "moonphase". In the name field you can give the generated icons the name used for uploading.

2.11.2 Data

Meteohub allows to upload weather data in a format defined in Section 4.4 and 4.5 via FTP. This can be done in two styles. When you select "all-sensors" a plain text file with weather data (see section 2.4 for details) is uploaded. When you select "all-sensors-xml" an xml file



with weather data is uploaded (see section 2.5 for details). You can give the files to upload individual names. The dashboard needs the xml file names "all-sensors.xml".

2.11.3 Graphs

Meteohub can generate graphs based on graph definitions. To do this there must be graphs defined (section 2.8) and the FTP upload service must be correctly setup (section 2.10). To schedule a graph generation and upload you simply have to choose a graph definition and have to define a CRON schedule and a target name.

2.11.4 HTML Templates

HTML templates which are located in the Meteohub's PC network folder "/public/graphs/" can be automatically processed by Meteohub. These templates must have an extension ".html". Meteohub takes these and replaces weather data names enclosed by square brackets (for example "[actual_th0_temp_c]") with the corresponding data (for example "23.3"). All names as introduced in section 4.4 can be used. HTML templates are marked with a "*" in the upload selection list in order to make these distinguishable from graph definitions. In the folder "/public/graphs" is an example file "test-template.html" that realizes a very simple HTML dashboard. Details about HTML-Templates can be found in section 3.4. The templates don't have to be valid HTML, but can be any text as long as the filename extension is ".html".

2.11.5 HTML-Templates via E-Mail

Apart from uploading files HTML templates via FTP Meteohub can also send filled templates as plain text e-mail. To make this happen, field "filename" has to be filled with an e-mail address followed by a colon (":") followed by the subject text. The example above sends an e-mail to "info@meteohub.net" with subject "Weather".

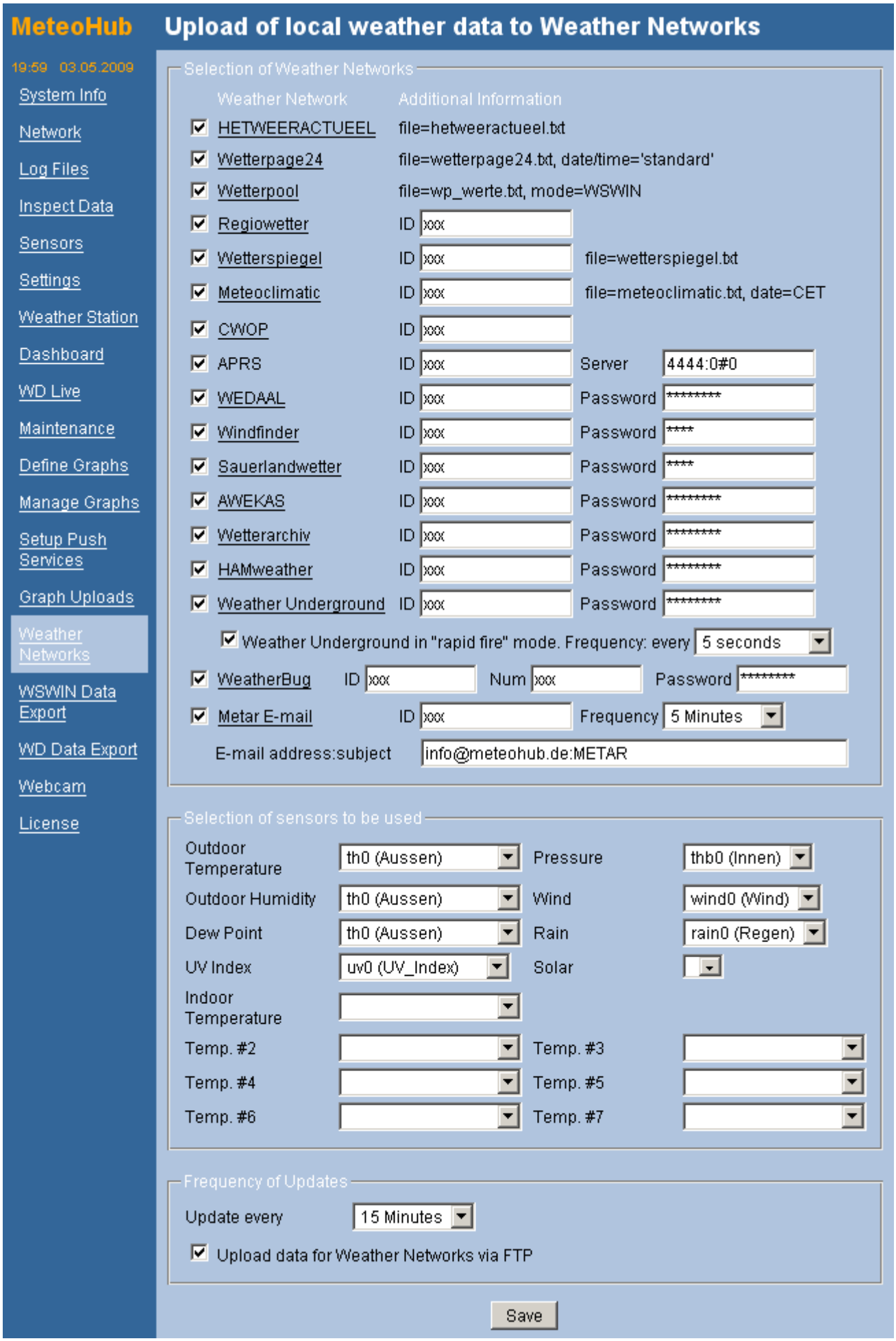
2.11.6 WD Live

Meteohub can upload the files needed for display of weather data with WD Live. To enable this, just select all four "wd live" entries in the selection box. Each of the options "wd-live", "wd-live extra", wd-live hour", wd-live daily" has a time schedule and an upload filename predefined. In order to have your WD live setup up and running the easy way, just keep these default settings and select all four "wd-live" elements. If you are not interested in historical data, the option "wd-live" (omitting the other three wd-live options) might be enough. Don't forget to have the corresponding sensors selected on the "WD Live" page as explained in section 2.17.

2.12 Weather Networks

Meteohub can deliver weather data to a series of Internet weather networks. This data delivery can be done in push mode, where Meteohub connects to the corresponding weather server and transfers the actual weather data to this server, or it can be done in pull mode, where Meteohub just provides the data in a local directory accessible via HTTP request from the Internet and it is up to the the server of the Internet weather network to connect to Meteohub and to read the data via HTTP request. Meteohub supports these Internet weather networks:

- HETWEERACTUEEL, pull mode: You have to configure your account at "hetweeractueel.nl" in a way, that hetweeractueel is looking for a file "hetweeractueel.txt" in at your Meteohub system or the web server where Meteohub has uploaded the file to.
- Wetterpage24, pull mode: You have to configure your Wetterpage24 account in a way, that Wetterpage24 is looking for a file "wetterpage24.txt" with date format "date/time='standard'" at your Meteohub system.
- Wetterpool, pull mode: You have to configure your Wetterpool account in a way, that Wetterpool is looking for a file "wp_werte.txt" in mode "WSWIN" at your Meteohub system.
- CWOP (Citizen Weather Observer Program), push mode: CWOP is a weather network of radio amateurs. Meteohub identifies itself with an ID (usually the ID of the amateurs radio station). A password is not required. Communication is not based on a HTTP request but on a TCP/IP socket connection.
- Regiowetter, Push mode: Meteohub can provide data for weather network "regiowetter.ch". Weather station has to identify itself by an ID provided by Regiowetter.
- Wetterspiegel, pull mode: You have to configure your Wetterspiegel account in a way, that Wetterspiegel is looking for a file "wetterspiegel.txt" at your Meteohub system. Please provide your Wetterspiegel ID, as this is required to be in the "wetterspiegel.txt". You get the ID when you register for an account at Wetterspiegel..
- Meteoclimatic, pull mode: Please configure your Meteoclimatic account that it reads a file named "meteoclimatic.txt" with CET date format from Meteohub. You get your Meteoclimatic-ID during registering manually with Meteoclimatic.
- WEDAAL, push mode: WEDAAL can be fed in pull mode as Meteohub constructs a file "wedaal.txt" (using date format "DD.MM.YYY") and uploads this onto your web server. In addition to this, Meteohub can directly connect the WEDAAL http server and submit data to it, when a correct ID and password is specified.
- Windfinder, push mode: Meteohub can feed the windfinder.com network. In order to make this working you need an ID (mostly the station name) from Windfinder. Password is momentarily not used by Windfinder. When Windfinder is selected, update interval for all networks is set to "15 minutes".
- AWEKAS changed from pull to push mode: The help section of AWEKA describes how to make this work with Meteohub: (http://www.awekas.at/forum/viewtopic.php?t=2613)


MeteoHub
Upload of local weather data to Weather Networks
19:59 03.05.2009
System Info
Network
Log Files
Inspect Data
Sensors
Settings
Weather Station
Dashboard
WD Live
Maintenance
Define Graphs
Manage Graphs
Setup Push Services
Graph Uploads
Weather Networks
WSWIN Data Export
WD Data Export
Webcam
License
Selection of Weather Networks
Weather Network
Additional Information
HETWEERACTUEEL
file=hetweeractueel.txt
Wetterpage24
file=wetterpage24.txt, date/time='standard'
Wetterpool
file=wp_werte.txt, mode=WSWIN
Regiowetter
ID xxx
Wetterspiegel
ID xxx
file=wetterspiegel.txt
Meteoclimatic
ID xxx
file=meteoclimatic.txt, date=CET
CWOP
ID xxx
APRS
ID xxx
Server 4444:0#0
WEDAAL
ID xxx
Password ********
Windfinder
ID xxx
Password ****
Sauerlandwetter
ID xxx
Password ****
AWEKAS
ID xxx
Password ********
Wetterarchiv
ID xxx
Password ********
HAMweather
ID xxx
Password ********
Weather Underground
ID xxx
Password ********
Weather Underground in "rapid fire" mode. Frequency: every 5 seconds
WeatherBug
ID xxx
Num xxx
Password ********
Metar E-mail
ID xxx
Frequency 5 Minutes
E-mail address:subject info@meteohub.de:METAR
Selection of sensors to be used
Outdoor Temperature th0 (Aussen)
Pressure thb0 (Innen)
Outdoor Humidity th0 (Aussen)
Wind wind0 (Wind)
Dew Point th0 (Aussen)
Rain rain0 (Regen)
UV Index uv0 (UV_Index)
Solar
Indoor Temperature
Temp. #2
Temp. #3
Temp. #4
Temp. #5
Temp. #6
Temp. #7
Frequency of Updates
Update every 15 Minutes
Upload data for Weather Networks via FTP
Save

- Wetterarchiv, push mode: Meteohub transfers weather data via HTTP-Request to the Wetterarchiv server on the Internet. Meteohub authentificates itself with an ID and password that you have received when you registered an account at Wetterarchiv.
- HAMWeather/WeatherForYou (not displayed) is also supported in latest Meteohub releases.
- Weather Underground, push mode: Meteohub transfers weather data via HTTP-Request to the Weather Underground server on the Internet. Meteohub authentificates itself with an ID and password that you have received when you registered an account at Weather Underground. Meteohub supports "rapid fire" mode of "Weather Underground" down to an update frequency of every 5 seconds.
- WeatherBug, push mode: Meteohub transfers data via HTTP request. For identification you need an ID, num and password.
- Metar, e-mail mode: Meteohub sends an e-mail message with METAR info as body to a given e-mail address using the subject specified after the colon (":"). In the example above the METAR e-mail will be send to "info@meteohub.de" with subject "METAR".
- Bordervejr, e-mail mode: Meteohub sends a weather notification e-mail to Danish weather network "Borgervejr". Authentification is done by checking the e-mail's from field. Address listed there must be registered at "Borgervejr".

As Meteohub supports a whole bunch of sensors you have to decide which sensors should be used for a report to the weather networks. In most situations this will be the primary outdoor sensors ("th0", "wind0", "rain0"). Some weather networks like "Weather Underground" expand the sensors they are capable of reading data for. Therefore, Meteohub provides a broad range of additional temperature sensors to select from.

For the frequency of update you can select ranges from 5 minutes to 24 hours. Normally, something in the range of 5 to 30 minutes will make sense. You should know that "Weather Underground"does not allow for update intervals of less than 15 minutes. Therefore, Meteohub automatically takes care that this weather network does not get updates in too short intervals. All the other networks in pull mode are fine with update intervals up to every 5 minutes.

When you don't want the weather networks that operate in pull mode to directly contact your Meteohub system, you can upload the data records via FTP on a web server. In this case you have to tell the weather networks to get the data from this server instead of connecting directly to your Meteohub system. Details on setting up the FTP upload service have been explained in section 2.9.

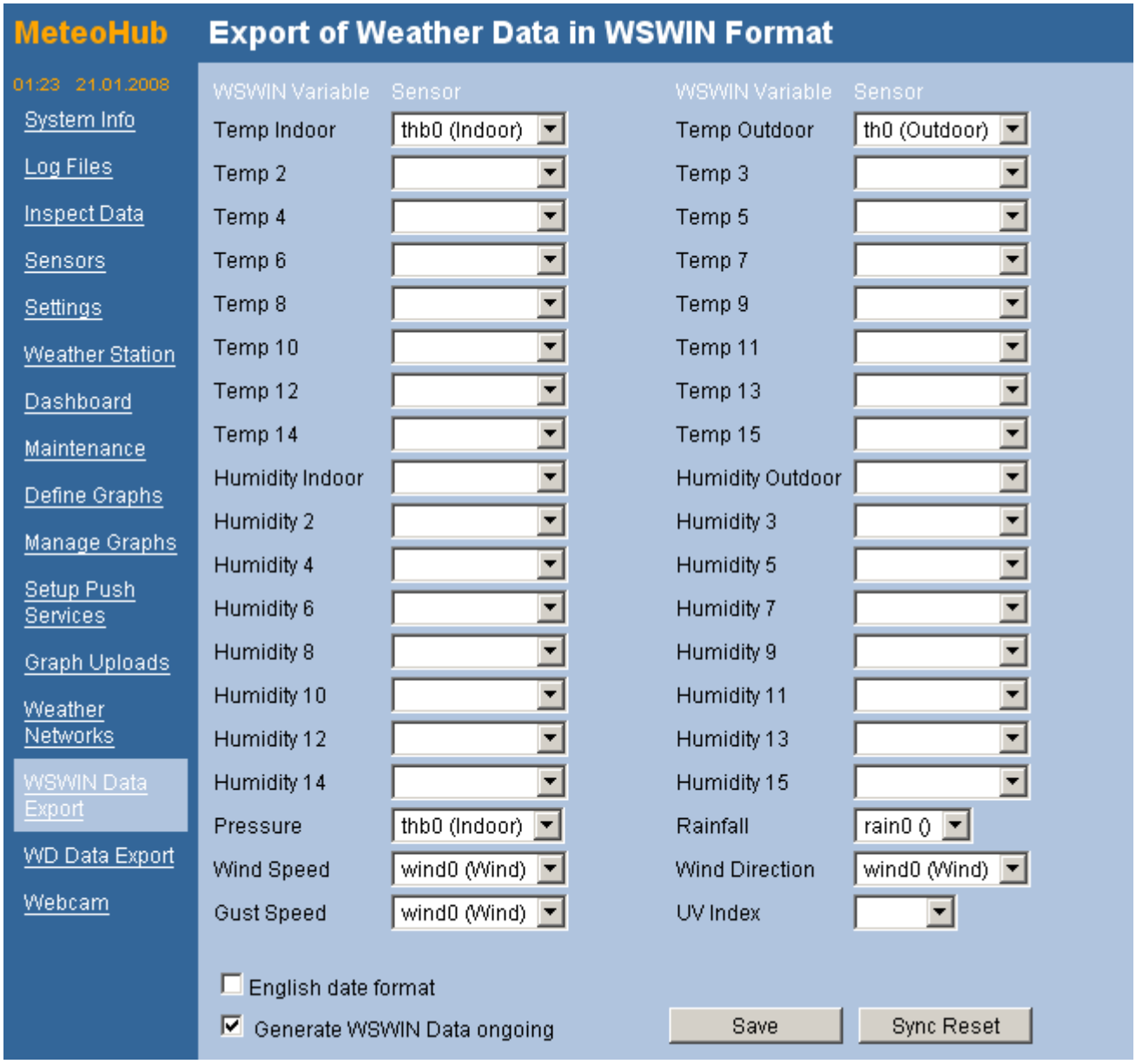
When you press "Save" your input will be saved and taken into account.

2.13 WSWIN Data Export

Meteohub supports the data import format of WSWIN. This allows you to import Meteohub's time-compacted weather data to WSWIN. When you select the check box "Generate WSWIN Data ongoing" the time-compacted data of Meteohub is ongoing converted to WSWIN compatible files. These files are located in the directory "/data/export/" that you can easily access as a PC network share from your Windows PC. Meteohub provides import data to WSWIN in two flavors. "EXP01_00.csv" holds all the weather data in one file. The files "EXPmm_yy.csv" (where "yy" represent the year and "mm" represent the month") are monthly files, that only contain data for the month specified in the file name. The file "EXP01_00.csv" is updated every 5 minutes, the monthly files are all updated/generated during mid night.

In WSWIN you can import the data with function "Wetterdaten Importieren", "CSV-Textdatei" with option "Nur neue Daten". If this data import collides with Meteohub's new computation of this data and the data import aborts/freezes, you should simply retry a few moments later.

WSWIN knows a defined array of sensors. Before Meteohub can build import files for WSWIN, Meteohub has to know what Meteohub sensors to map on what WSWIN sensors.



Therefore, the web interface allows you to map your sensor readings to the WSWIN sensors. For each sensor Meteohub restricts the selection of sensors to the ones that fit in the right category.

Press "Save" to make your settings valid. To make use of the imported weather data in WSWIN, please consult the WSWIN manual.

Since Version 1.8 Meteohub supports the ongoing file control feature of WSWIN which allows for steady reading of new sensor data from WSWIN. To make this happen, select the following file from Meteohub network folder "/public/export/import.csv" for ongoing file control. Meteohub will write all new WSWIN data into this file and WSWIN will read data from there. After having setup WSWIN please press the "Sync Reset" button on the WSWIN configuration page of your Meteohub. Pressing this button initializes some files that are necessary to start the communication with WSWIN. Meteohub provides every 10 minutes new data for WSWIN. If the data transfer gets halted for some reason, please press the "Sync Reset" button again to restart communication with WSWIN.

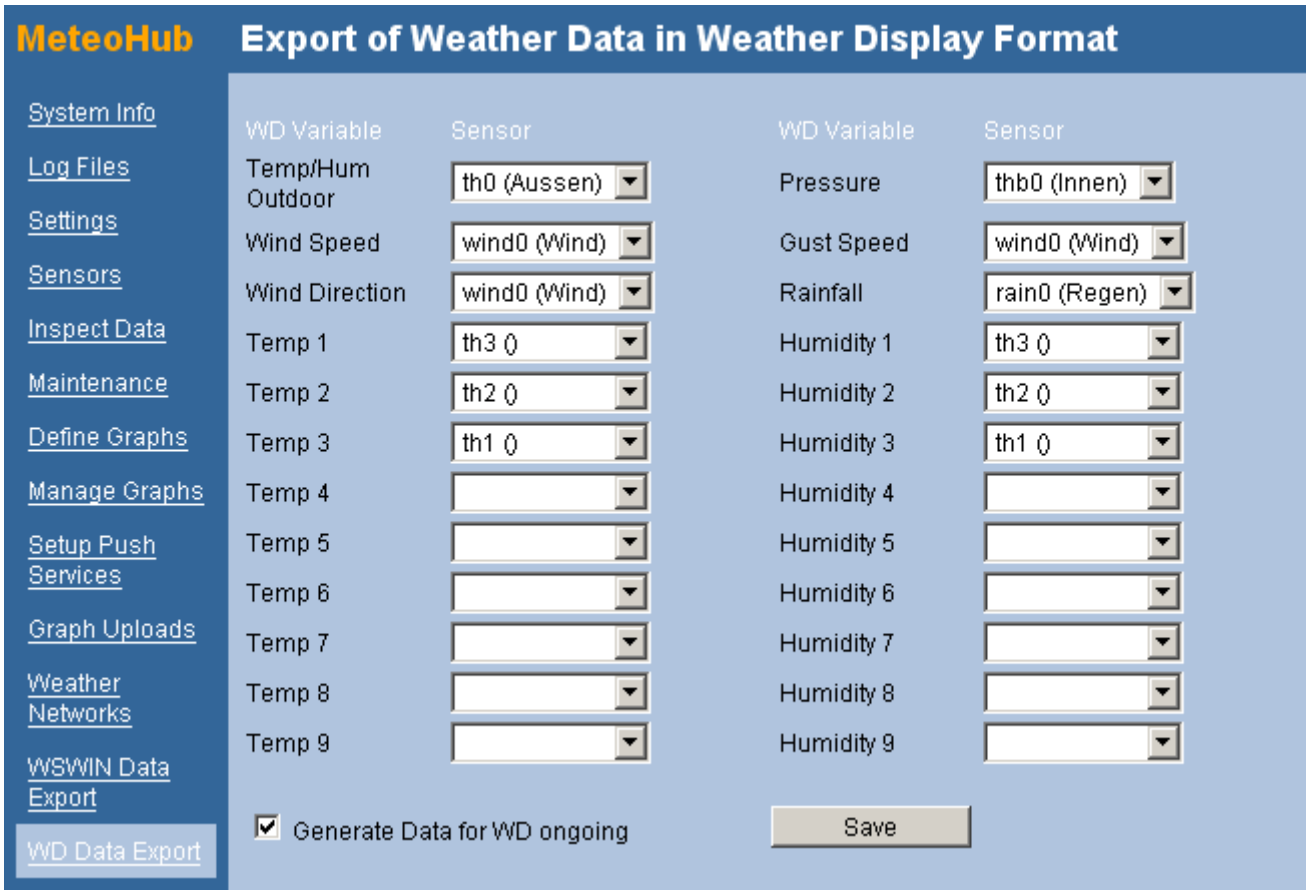
2.14 Weather Display Data Export

Meteohub supports the universal import format for monthly organized data of Weather Display. Data of primary sensors is located in fields named "mmyyyylg.txt" where mm=month, yyyy=year) and the data of additional temp/hygro sensors is located in "mmyyyyextralog.csv". Meteohub reports data in metric units and generates the files above automatically in the directory "/data/export". The data is recorded in 1 minute intervals.

In the file "mmyyyylg.txt" the heat index is not computed but replaced with the actual temperature. Further on, just the rainfall in the last minute is recorded (for every minute) but rainfall for the day, month or year is not reported. All not reported values (sensors not there or information not supported by Meteohub) is marked with value "-999".

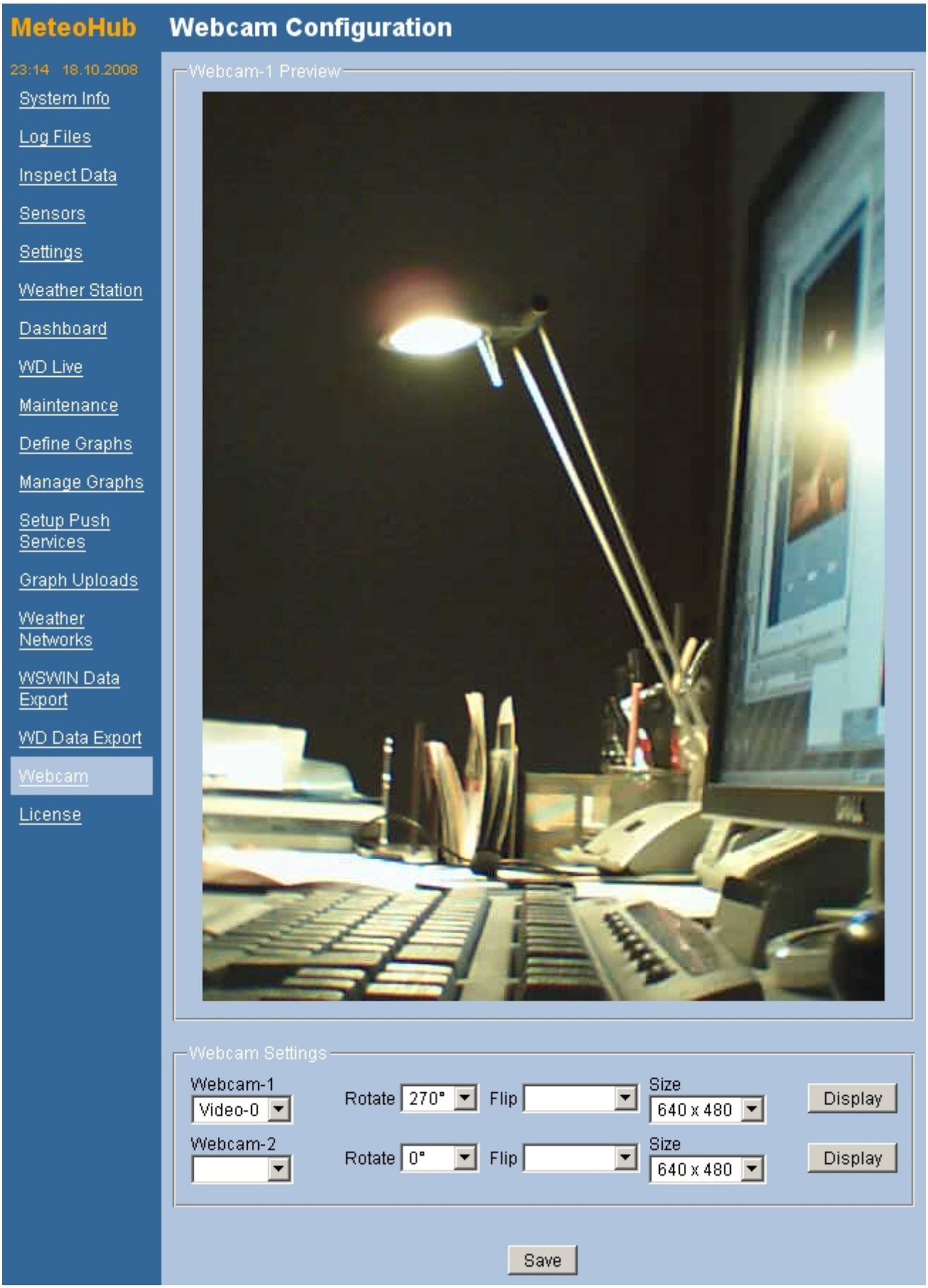
To make use of the generated weather data in Weather Display, you have to copy the files for the primary sensors (mmyyyylg.txt) into the "logfiles" directory of your Weather Display Installation. To generate a graph for these log files, you have to use the Weather Display menu "action -> Convert Log Files to Graphs". This generates a graph for each of the selected import files from Meteohub.

At the moment Weather Display does not support to make use of the additional sensor information. I do expect Weather Display to support this soon.



2.15 USB Cam (only available as experimental feature on x86 platform)

While USB cam support failed for NSLU2, x86 platform Meteohub supports USB cams as an experimental feature as lined out in compatibility list (appendix H). Meteohub supports



up to two USB cams in various resolutions (up to 640 x 480) and with flip and rotate options.

Meteohub's USB cam features don't convert a $20 USB cam into a Motobix or Axis web cam, but it can at least make cheap USB cams available for grabbing pictures up to every minute and to send these into the Internet. Most USB cams have severe problems handling outdoor light conditions, so it remains questionable if a USB cam can be used as a weather cam. Tweaking with optical filters might help.

Webcam support is not reliable and it might even result in system hangups on some systems.

2.16 Weather Dashboard

Meteohub supports a weather dashboard that acts as a rich media client and receives weather data in XML format from Meteohub.

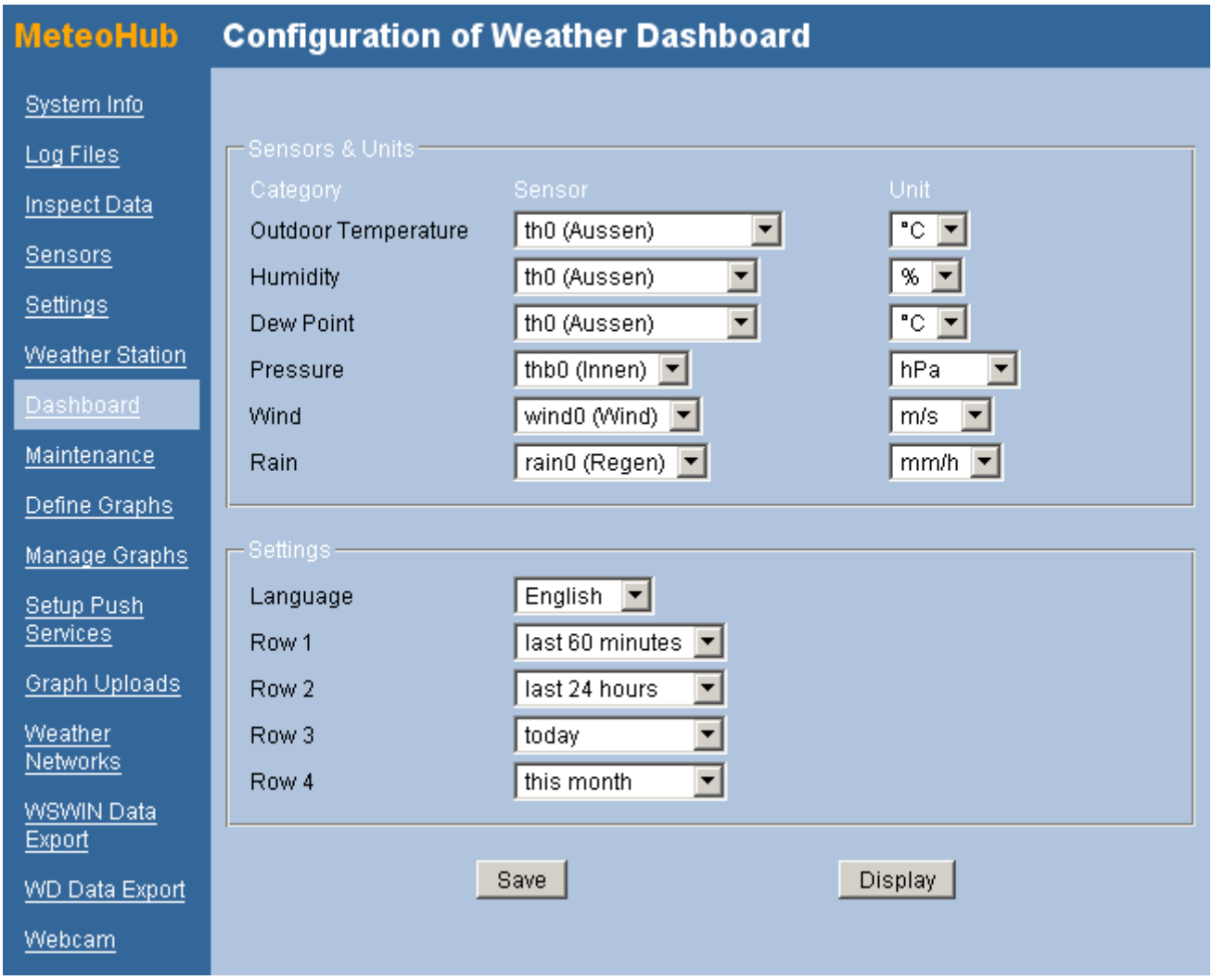
The dashboard can be configured from the Meteohub web interface.

First you have to select the sensors that should be displayed on the dashboard and what physical units of measurement should be applied to them.

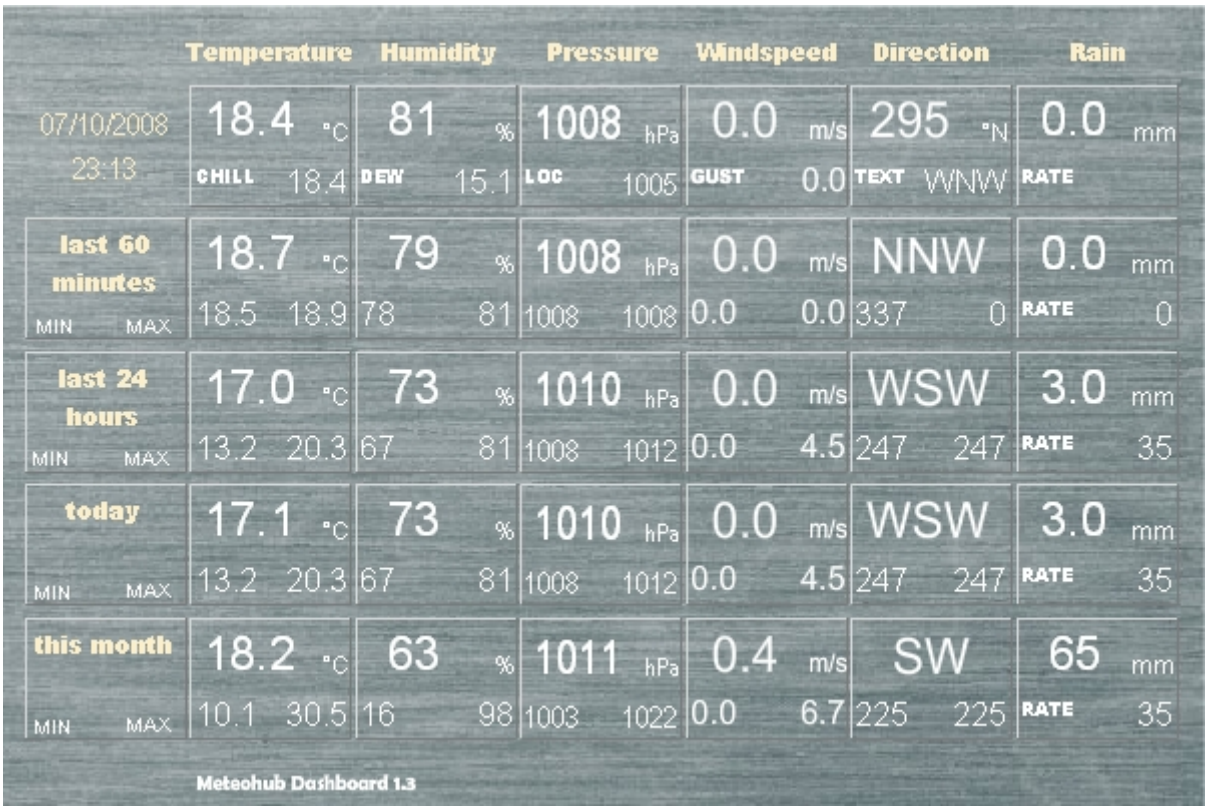
The dashboard shows actual data but also has access to some data from the past. Beside the actual data there is also average, min and max data from the last 60 minutes, the last 24 hours, data of the actual hour, data of today, and data of the actual month available to choose from.

At the moment the dashboard is still very limited in functionality, but this will improve over the next releases. The rich media client is available as executable and as source code from the download section. It is published under GPL, so everyone who likes can make use of it and can improve its functionality. GPL takes care that any changes you make must be again provided under GPL to the public - without license costs.

Meteohub has a "dashboard.html" on it's web server that has the necessary HTML code to activate the flash module "dashboard.swf", that reads XML data from Meteohub and displays these. At the moment your Meteohub needs to be contacted directly from the Internet or has to upload the XML weather data onto a web server in the Internet via FTP. You can reach the dashboard of your Meteohub as "http://<meteohub-ip>/dashboard.html"



from your LAN or from the Internet if you configured your Router accordingly. The dashboard looks like this (please notice that my wind sensor is not working right now, caused by low batteries and low temperatures outside):



The dashboard reloads automatically about every minute.

If you want to include the dashboard in your web presence, you have to include the following HTML-code. Please change the marked text into the IP address or dynamic domain name service address of your Meteohub, that allows to reach your Meteohub from the Internet:

```
<object
    classid="clsid:d27cdb6e-ae6d-11cf-96b8-444553540000"
    codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=9,0,0,0"
    width="600" height="400" id="dashboard" align="middle">
    <param name="allowScriptAccess" value="sameDomain" />
    <param name="allowFullScreen" value="false" />
    <param name="movie"
        value="http://<your_meteohub>/dashboard.swf?myURL=/meteograph.cgi" />
    <param name="quality" value="high" /><param name="bgcolor" value="#ffffff" />
    <embed
        src="http://<your_meteohub>/dashboard.swf?myURL=<your_meteohub>/meteograph.cgi"
        quality="high" bgcolor="#ffffff" width="600" height="400" name="dashboard" align="middle"
        allowScriptAccess="sameDomain" allowFullScreen="false" type="application/x-shockwave-flash"
        pluginspage="http://www.macromedia.com/go/getflashplayer" />
</object>
```

As an alternative this code can also be used to work with XML data uploaded to your web server. This time the flash applet as well as the XML data is located on your web server. The following example assumes that the data names "all-sensors.xml" and the flash applet "dashboard.swf" are both located in the directory "/uploads" on your web server:

```
<object
    classid="clsid:d27cdb6e-ae6d-11cf-96b8-444553540000"
    codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=9,0,0,0"
    width="600" height="400" id="dashboard" align="middle">
    <param name="allowScriptAccess" value="sameDomain" />
    <param name="allowFullScreen" value="false" />
    <param name="movie"
          value="/uploads/dashboard.swf?myURL=/uploads/all-sensors.xml" />
    <param name="quality" value="high" /><param name="bgcolor" value="#ffffff" />
    <embed
          src="/uploads/dashboard.swf?myURL=/uploads/all-sensors.xml"
          quality="high" bgcolor="#ffffff" width="600" height="400" name="dashboard" align="middle"
          allowScriptAccess="sameDomain" allowFullScreen="false" type="application/x-shockwave-flash"
          pluginspage="http://www.macromedia.com/go/getflashplayer" />
 </object>
```

Flash applets can be scaled in height and width. This allows you to make the applet to fit very well in your web presence.

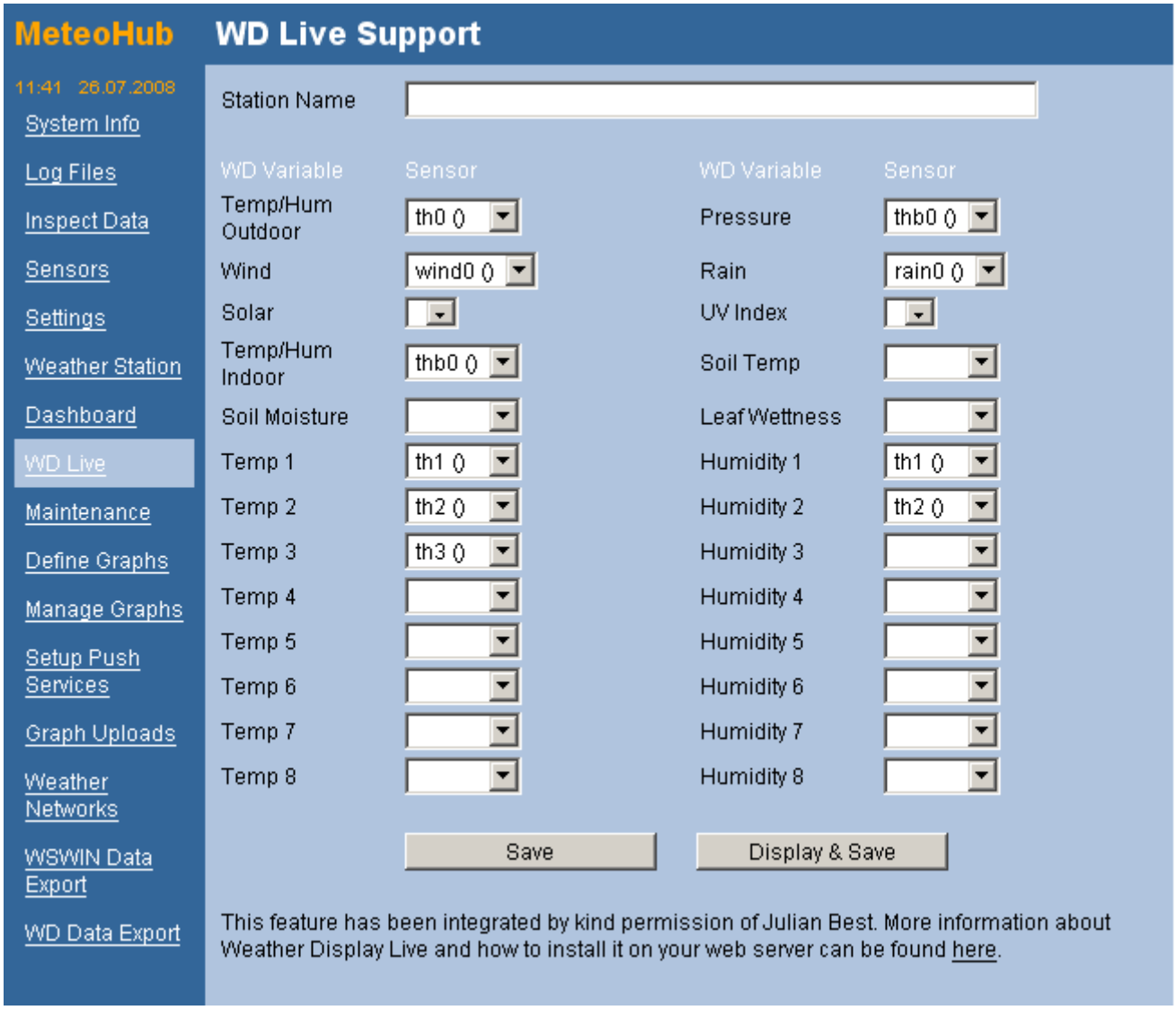
2.17 "Weather Display Live" Support

Meteohub can generate the files "clientraw.txt", "clientrawextra.txt", "clientrawdaily.txt", "clientrawhour" that WD Live does need to display so called live weather data as a flash application in the Internet. On Meteohub's page "WD Live" the user can specify which sensor readings should be used for reporting of data.

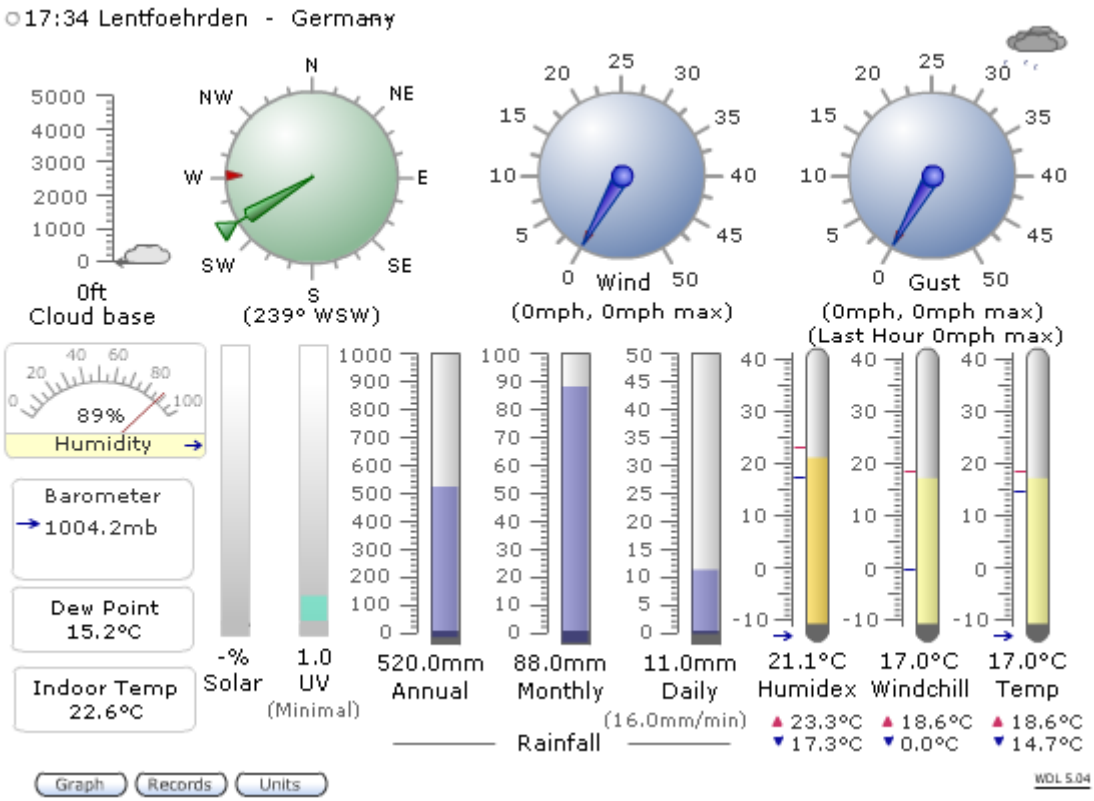
After having pressed "Save" the selected sensors will be used when specifying FTP-upload of the WD Live files as explained in section 2.11.5. Pressing "Display & Save" opens a pop-up window in your browser (just works when your browser does not block this pop-up) and displays a WD Live Screen with an evaluation sticker on it.

When using the WD Live application on your homepage, you have to place the files "swfobject.js", "wdlconfig.xml" and "wdlv5_04.swf (or the wd live version you are using) from your wd live distribution in the same folder where the data files are uploaded to by Meteohub. To get the wd live application running you have to place the following HTML code on your home page. Please change the marked path information to the directory structure appropriate in your situation.

Please check this Link for more details on WD Live: http://www.weather-display.com/wdlive.php



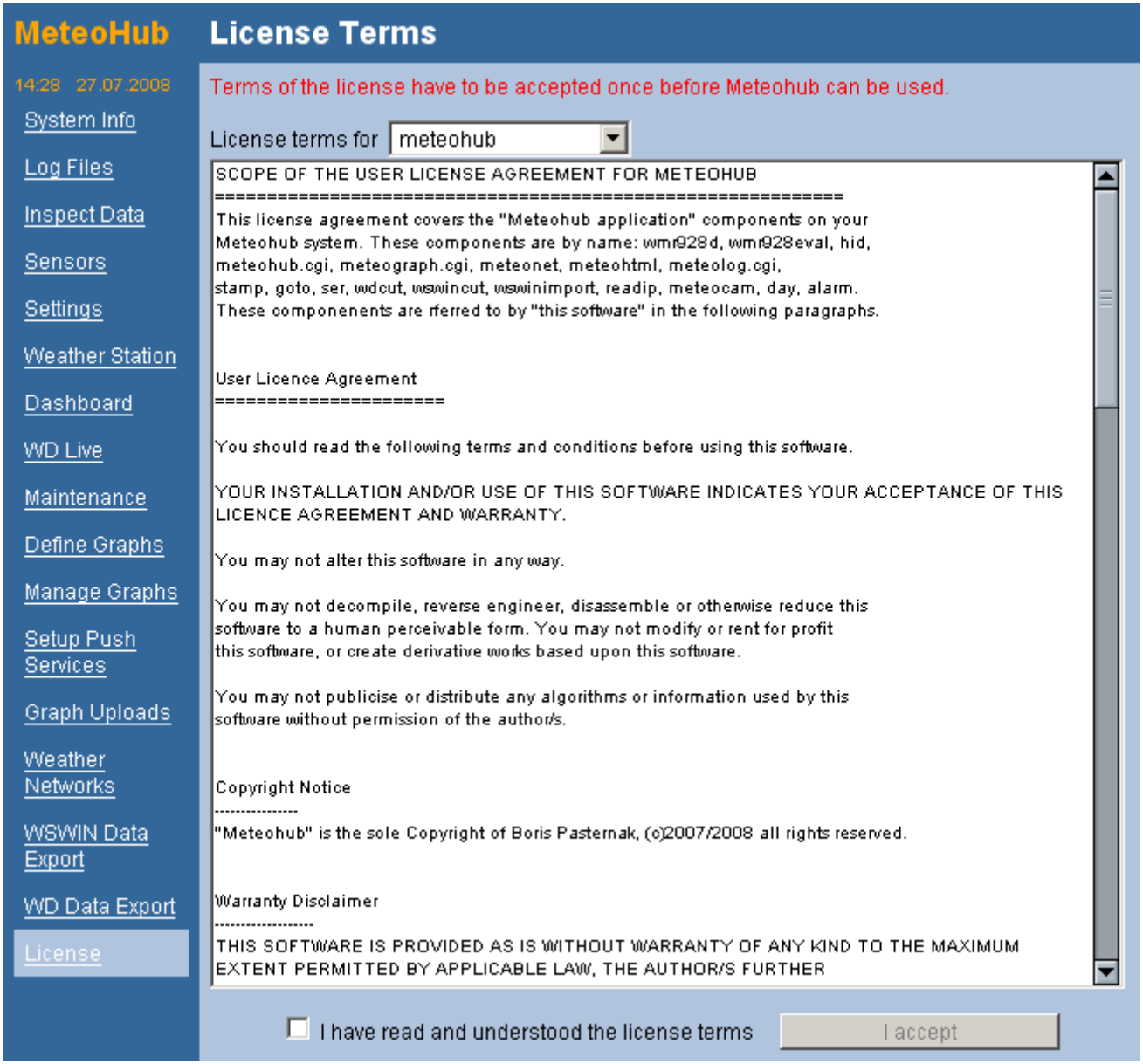
```
<object
    classid="clsid:d27cdb6e-ae6d-11cf-96b8-444553540000"
    codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=9,0,0,0"
    width="600" height="400" id="dashboard" align="middle">
    <param name="allowScriptAccess" value="sameDomain" />
    <param name="allowFullScreen" value="false" />
    <param name="movie"
        value="/uploads/wdlv5_04.swf?/uploads/wdlconfig.xml" />
    <param name="quality" value="high" /><param name="bgcolor" value="#ffffff" />
    <embed
        src="/uploads/wdlv5_04.swf?/uploads/wdlconfig.xml"
        quality="high" bgcolor="#ffffff" width="600" height="400" name="dashboard" align="middle"
        allowScriptAccess="sameDomain" allowFullScreen="false" type="application/x-shockwave-flash"
        pluginspage="http://www.macromedia.com/go/getflashplayer" />
</object>
```



2.18 License Terms

A Meteohub system consists software side of SlugOS 4.8 beta, that is licensed under Open Source/GPL and can be used and distributed as stated by GPL, and a Meteohub application and a "Weather Display Live"application. To use Meteohub and "Weather Display Live" you have to accept the license terms as requested by the authors. Acceptance of Meteohub license is necessary to have the Meteohub application to work. License terms of "Weather Display Live" have to be accept to make use of the "Weather Display Live" features.

Once the license terms have been accepted this is not required again until the IP changes or an update has been installed that might require acceptance of eventually modified license terms.



3. Display Weather Data

3.1 Graphs

Meteohub allows to generate graphs based on user-defined graph definitions. You can generate such a graph via HTTP request to the Meteohub system "http://..../meteograph.cgi?graph=test" where test is the name of the graph definition.

3.2 Values

Meteohub can report actual sensor readings as HTML text. This text can then be included by an iFrame into a web site. To get numeric sensor readings you have to make a HTTP request "http://..../meteograph?text=sensor" where "sensor" stands for the sensor name you what to have a value from. You can find a list of valid names in Section 4.4:

HTML code to embed the outdoor temperature into a web page:

```
<iframe src="http://.../meteograph.cgi?text=actual_th0_temp"
frameborder="0" scrolling="no" width="40" height="12" marginwidth="0"
align="right" marginheight="0">n.a.</iframe>&deg;C
```

3.3 Icons

Meteohub can give you a weather icon that corresponds to the forecast the WMR-928/968/918N is giving. You can receive the forecast icon by "http://..../meteograph.cgi?pict=actual_thb0_fc". With „http://..../meteograph.cgi?pict=actual_lunar_phase_segment“ you get a png that shows the lunar phase as an icon.

Icons are stored as "fc?.png" (weather) and "mp?.png" (moon) in the directory "/data/graphs/", that you can reach as a PC network share. Feel free to replace the default icons by icons you like.

The weather icons that come along with Meteohub are from Roman Attinger, who gave his ok to make use of these free of a license fee with the Meteohub system (Thank you, Roman!). If you are interested to make use of these outside Meteohub, please contact webmaster@limmattalerwetter.ch (http://www.limmattalerwetter.ch).

3.4 HTML Templates

HTML templates in the PC network folder "/public/graphs" can be uploaded with Meteohub's FTP function or can be directly delivered to a requesting browser. For example, "http://..../meteohtml.cgi?file=test-template" takes the HTML template "test-template.html", replaces the included variable names with actual weather data and delivers the resulting HTML document to the requesting browser. Variable names can be any from section 4.4 and are enclosed by square brackets. "blank_the_unknown" is a variable that is purged from the input and tell Meteohub that any variables that cannot be converted to data should be removed from the output text. Otherwise these variable names do remain in the output unchanged. Instead of using "[blank_the_unknown]" you also can specify what should be copied in, when a specific variable could not be found. For example: `[actual_sol0_radiation:0]` returns the actual solar radiation or "0" if there is no data from a solar sensor.

The section below shows the "test-template.html" with the used variable names highlighted:

```
<html>
        <head>
                <meta http-equiv="content-type" content="text/html;charset=iso-8859-1">
                <title>Meteohub HTML Mini-Dashboard</title>
        </head>
        <body bgcolor="#ffffff">
                <table border="1" cellpadding="0" cellspacing="2" width="200">
                        <tr>
                                <td>Temperature</td>
                                <td>[actual_th0_temp_c] &deg;C</td>
                        </tr>
                        <tr>
                                <td>Humidity</td>
                                <td>[actual_th0_hum_rel] %</td>
                        </tr>
                        <tr>
                                <td>Pressure</td>
                                <td>[actual_thb0_sealevel_hpa] hPa</td>
                        </tr>
                        <tr>
                                <td>Wind Speed</td>
                                <td>[actual_wind0_speed_kmh] km/h</td>
                        </tr>
                        <tr>
                                <td>Rain Rate</td>
                                <td>[actual_rain0_rate_mm] mm</td>
                        </tr>
                        <tr>
                                <td>Forecast Text</td>
                                <td>[actual_thb0_fc_text:none]</td>
                        </tr>
                </table>
        </body>
</html>
```

Variables can have special control characters at the end:

- ":" specifies a replacement string, for situations where the variable is empty and does not provide any value. Example: "[actual_uv0_index:0]" returns the actual uv index or "0", if the sensor is not there or does not provide any data.
- "@" selects a word from a list of words. Assume that variable "actual_thb0_fc_text" contains "Mostly_clear_and_cooler.". With "[actual_thb0_fc_text@2]" the second word ("clear") is selected. A negative index would specify to start counting for the desired word from the end. Example: "[actual_thb0_fc_text@-2]" returns "and". Control character "@" can be combined with ":". For example, "[actual_thb0_fc_text@2:none]" returns "clear" when the variable has a least two words or will return "none" if there is no data at all or there is no second word to return.
- "#" allows to specify a sub string. Assume that variable "actual_thb0_fc_text" contains "Mostly_clear_and_cooler.". With "[actual_thb0_fc_text#CE]" a substring starting at position 3 (C is the third character in the alphabet) and ending at position 5 (E is the fifth character in the alphabet) is returned: "tua". A blank as position marker would point to the beginning resp. ending of the string. "#" can be combined with other control characters. Example: "[actual_thb0_fc_text@4#AD:none]" returns the first 4 letters of the fourth word in the sentence: "cool" (or "none" if there is the selected string is empty for any reason).
- "&" specifies that underscores in strings should not be replaced by blanks. This might be useful if a a sentence about weather conditions (like Davis vantage gives as forecast) should not be separated into words, but should be kept tied together by

underscores between the words. In the example above the [actual_thb0_fc_text&] would result in the original text "Mostly_clear_and_cooler." including the underscores, while [actual_thb0_fc_text] will result in "Mostly clear and cooler.".

- "*" multiplies a numerical value by 10 (can only applied once in a variable, has to be the first special character in a variable definition), result is a float with two two decimals.
- "/" divides a numerical value by 10 (can only applied once in a variable, has to be the first special character in a variable definition), result is a float with two decimals.

After replacement of all variables the result will be checked for existence of math formulas. These will be resolved as follows in a second parse. Result type of math formulas is always a float with two decimals.:

- "{mathmax val1 val2 ... valn}" computes the maximum of enclosed values and returns the result. For example, "{mathmax 2 4 8 4 6 }" results in "8.00".
- "{math+ val1 val2 ... valn}" adds enclosed values from left to right. For example, "{math+ 2 5 -1}" returns "6.00". Computation: (2 + 5) + -1
- "{math- val1 val2 ... valn}" subtracts enclosed values from position two on from number at position 1. For example, "{math- 2 5 -1}" returns "-2.00". Computation: (2 - 5) - (-1)
- "{math* val1 val2 ... valn}" multiplies enclosed values from left to right. For example, "{math* 2 5 -1}" returns "-10.00". Computation: (2 * 5) * -1
- "{mathlrot count1 count2 val1 val2 ... valn}" rotates the values (val1, val2, ..., valn) by the sum of the counter (count1, count2) to the left. Result is a list of rotated values. Sum of count1 and count2 has to be positive, val1 to valn have to be numerical values. Example: "{mathlrot -3 5 6 7 8}" returns "8.00 6.00 7.00". Computation: count1 + count2 = 2, values "6 7 8" two-times rotated to the left result to "8 6 7".

4. Actual Weather Data via Socket Communication

Meteohub's weather data logging daemon provides actual weather data by means of socket communication.

4.1 Port 5555: Sensor Status

This port is used by the Meteohub web interface to get information about the sensors and their data. The "Sensors" web page needs that kind of data, otherwise it will show an error.

Each line represents a sensor and gives the following information per column (from left to right):

- station number
- type of sensor: 0 = wind, 1 = rain, 2 = thermo/hygro/baro, 3 = thermo/hygro, 4 = thermo, 6 = uv, 7 = solar
- original channel id of sensor (in RFXCOM mode: binary identification of the sensor type and random channel id determined after last sensor reset)
- assigned ID number
- Linux times tamp (GMT) of most recent received sensor data
- Battery status: 0 = ok, 1 = low bat
- weather data as recently reported from the sensor (multiple values are separated by underscore)

Example:

```
0 4 675079 0 1233391707 1 11.2&#176;
0 1 2760118 0 1233391712 0 0.0mm/h
0 3 1715567 3 1233391693 1 1.7&#176;_82%
0 3 1719726 0 1233391702 0 0.8&#176;_89%
0 2 5926387 -1 1233391726 0 22.4&#176;_33%_1024.0mb_(1024.0mb)_fc:1
0 3 1715471 4 1233391700 1 7.9&#176;_76%
0 3 1715668 2 1233391694 1 27.7&#176;_21%
0 0 3804564 0 1233391725 0 1.2(0.0)m/s_OSO
0 2 5926364 0 1233391707 0 22.3&#176;_35%_1026.0mb_(1026.0mb)_fc:1
0 3 16394245 10 1233391700 0 24.3&#176;_31%
0 3 10144887 6 1233391440 0 24.0&#176;_32%
```

4.2 Port 5556: Sensor Status – Raw Data

no longer available in Version 4.0

4.3 Port 5500: Copy of Sensor Data

On this port Meteohub provides an exact copy of the serial data that Meteohub receives from the weather station WMR-928/968/918N and RFXCOM. Data of the other weather stations is also provided but reduced by the data necessary to keep the data communication running. By reading this port another Meteohub system or another weather program can get virtually connected to the data stream from the weather station Meteohub is connected to. The port just allows for one connection. The first weather station provides data on port 5500, the second on port 5501 and so on.

4.4 Port 5558: List of Sensor Data

Reading from port 5558 returns a list that contains actual sensor readings and sensor data for the last 60 minutes, for the actual hour, for the last 24 hours, for the actual day and for the actual month and year. All sensor readings are given in terms of the most usual measurement units. Data is reported as name-value pairs, line by line with name and value separated by a blank character.

The format of the name is as follows: <time frame>-<sensor>-<dimension>[-<unit>]

- <time frame> can be one of
  - "actual" reports data last seen from the sensor
  - "hour1" reports data of the actual hour (including min/max values)
  - "day1" reports data of the actual day (including min/max values)
  - "month1" reports data of the actual month (including min/max values)
  - "last24h" reports data of the last 24 hours (including min/max values)
  - "last60m" reports data of the last 60 minutes (including min/max values)
  - "year1" reports data of the actual year (including min/max values)
  - "seq????" reports lists of data that are used by WD Live to generate weather graphs
- <sensor> can be one of
  - "wind#" reports data of wind sensor with id #
  - "rain#" reports data of rain sensor with id #
  - "thb#" reports data of thermo/hygro/baro sensor with id #
  - "th#" reports data of thermo/hygro sensor with id #
  - "t#" reports data of thermo sensor with id #
  - "uv#" reports data of uv sensor with id #
  - "sol#" reports data of solar radiation sensor with id #
  - "data#" reports system data with id #
  - "utcdate", "utcdate2", "localdate", "localdate2" report the date and time when the data has been grabbed (Format: YYYYMMDDhhmmss, in the "2" version format is: DD.MM.YYYY hh:mm:ss) in UTC and local time.

- "date0" reports actual time as local time or UTC broken down into year, month, day, hour, minute, second.
- "lunar" reports the fullness of the moon in percent (0% = new moon, 100% = full moon) and also reports the moon phase (0 = new moon, 1-3 = growing moon: quarter, half, three quarters, 4 = full moon, 5-7 = shrinking moon: three quarter, half, quarter). It also provides a textual representation in German and English.
- "station" reports the weather stations position as decimal longitude and latitude.
- "daylength" reports the length of the actual day in different kinds (standard, civil-twilight, nautical-twilight) and different measurement units (hours:minutes, decimal hours, minutes).
- "sunrise" and "sunset" reports the point in time when sun rises and sets in regard to different kinds of measurement (standard, civil-twilight, nautical-twilight) and in respect to local time or UTC..

- <dimension> depends on the sensor type. For each sensor is a subset of dimensions available
  - "temp", "tempmin", "tempmax" give average, min and max temperatures
  - "dew", "dewmin", "dewmax" give average, min and max dew temperatures
  - "hum", "hummin", "humax" give average, min and max humidities
  - "heatindex", "heatindexmin", "heatindexmax" give average, min and max heat index temperatures
  - "humidex", "humidexmin", "humidexmax" give average, min and max humidex temperatures
  - "press", "pressmin", "pressmax" give average, min and max air pressures
  - "sealevel", "sealevelmin", "sealevelmax" give average, min and max air pressures computed to sealevel.
  - "index", "indexmax" give average and max uv index
  - "radiation", "radiationmax" give average and max solar radiation
  - "speed", "speedmax" give average and max wind speeds
  - "gustspeed", "gustspeedmax" give average and max gust speeds
  - "dir", "maxspeeddir", "maindir" give wind direction, direction of maximum gust speed and main wind direction.
  - "chill", "chillmin", "chillmax" give the average, min and max wind chills
  - "rate", "ratemax" give average and max rain rate (rainfall in one hour)
  - "total" gives total rain fall
  - "fc" reports the station's weather forecast (0 = rainy, 1 = cloudy, 2 = some clouds, 3 = sunny, 4 = snowy, 5 = clouds at night, 6 = clear night)
  - "days" gives number of days with rain
  - "lowbat" indicates that the sensor is running on low battery power (value 1)
  - "sensorfail" indicates that the sensor has sent no signal for at least 30 minutes.
  - "value" indicates a generic numeric value as delivered from "data" sensors. This also comes as "valuemin", "valuemax", "valuerise", "valuefall", "valuesum",

"valunesumpermin", "valuedeltasum".

- <unit> depends on sensor type and chosen dimension. These units are available
  - "c" is Celsius, "f" is Fahrenheit
  - "rel", "abs" is relative humidity in percent and absolute humidity in gram's of water in a cubic meter air (not fully supported yet).
  - "hpa", "psi", "mmhg", "inhg" are hekto pascal (equal to millibar), pound per square inch, millimeter of mercury and inch of mercury
  - "ms", "kmh", "mph", kn", bft" are meters per second, kilometers per hour, miles per hour, knots and Beaufort
  - "mm", "in" are millimeter and inch
  - "deg", "en", "de" are wind direction in degrees, direction text in English (example: NNE) and in German (example: NNO)
  - "wqm" are solar radiation values in watts per square meter. "rel" reports relative radiation measured in percent of the theoretical radiation maximum of the day.
  - "time" represents date and time of the sensor reading (min/max) in local time (YYYMMDDhhmmss).
  - "int" indicates an integer number, without decimals.
  - "num" indicates a number with two decimals.

When accessing port 5558 all data is sent.

As an alternative you can use each of these names to get the corresponding value by means of an http request "http://..../meteograph.cgi?text=name" where name stands for one of the sensors' names ("day1-th0-tempmin" for example). If you specify "all" as name, then you get all data, exactly like being connected to port 5558, but with a leading HTML content type header in order to make your Browser happy.

Example of name-value pairs as reported on port 5558:

actual_utcdate 20090929172443
actual_utcdate2 29.09.2009 17:24:43
actual_date0_puredate_utc 29.09.2009
actual_date0_time_utc 17:24:43
actual_date0_year_utc 2009
actual_date0_month_utc 09
actual_date0_day_utc 29
actual_date0_dayofweek_utc 2
actual_date0_hour_utc 17
actual_date0_min_utc 24
actual_date0_sec_utc 43
actual_localdate 20090929192443
actual_localdate2 29.09.2009 19:24:43
actual_date0_puredate_local 29.09.2009
actual_date0_time_local 19:24:43
actual_date0_year_local 2009
actual_date0_month_local 09
actual_date0_day_local 29
actual_date0_dayofweek_local 2
actual_date0_hour_local 19
actual_date0_min_local 24
actual_date0_sec_local 43
actual_lunar_phase_percentage 81.4
actual_lunar_phase_segment 3
actual_lunar_phase_de Dreiviertelmond_(zunehmend)
actual_lunar_phase_en Waxing_Gibbous
actual_lunar_phase_es Gibosa_Iluminante
actual_station_longitude_decimal 9.885833
actual_station_latitude_decimal 53.876944
actual_daylength_standard_hours 11.72
actual_daylength_standard_minutes 703
actual_daylength_standard_hhmm 11:43
actual_daylength_civiltwilight_hours 12.89
actual_daylength_civiltwilight_minutes 773
actual_daylength_civiltwilight_hhmm 12:53
actual_daylength_nauticaltwilight_hours 14.26
actual_daylength_nauticaltwilight_minutes 856
actual_daylength_nauticaltwilight_hhmm 14:16
actual_sunrise_standard_utc 05:19
actual_sunset_standard_utc 17:02
actual_sunrise_standard_local 07:19
actual_sunset_standard_local 19:02
actual_sunrise_civiltwilight_utc 04:44
actual_sunset_civiltwilight_utc 17:37
actual_sunrise_civiltwilight_local 06:44
actual_sunset_civiltwilight_local 19:37
actual_sunrise_nauticaltwilight_utc 04:03
actual_sunset_nauticaltwilight_utc 18:19
actual_sunrise_nauticaltwilight_local 06:03
actual_sunset_nauticaltwilight_local 20:19
actual_t0_temp_c 10.9
actual_t0_temp_f 51.6
actual_t0_lowbat 1
actual_th0_temp_c 12.1
actual_th0_temp_f 53.8
actual_th0_hum_rel 55
actual_th0_hum_abs 5.9
actual_th0_dew_c 3.3
actual_th0_dew_f 37.9
actual_th0_heatindex_c 12.1
actual_th0_heatindex_f 53.8
actual_th0_humidex_c 10.8
actual_th0_humidex_f 51.4
actual_th0_cloudheight_m 1100
actual_th0_cloudheight_ft 3520
actual_th0_lowbat 1
actual_th10_temp_c 22.7
actual_th10_temp_f 72.9
actual_th10_hum_rel 43
actual_th10_hum_abs 8.7
actual_th10_dew_c 9.5
actual_th10_dew_f 49.1
actual_th10_heatindex_c 22.7
actual_th10_heatindex_f 72.9
actual_th10_humidex_c 23.8
actual_th10_humidex_f 74.8
actual_th10_cloudheight_m 1650
actual_th10_cloudheight_ft 5280
actual_wind0_dir_deg 239
actual_wind0_dir_de WSW
actual_wind0_dir_en WSW
actual_wind0_gustspeed_ms 1.8
actual_wind0_gustspeed_kmh 6.5
actual_wind0_gustspeed_mph 4.0
actual_wind0_gustspeed_kn 3.5
actual_wind0_gustspeed_bft 1.7
actual_wind0_speed_ms 0.0
actual_wind0_speed_kmh 0.0
actual_wind0_speed_mph 0.0

actual_wind0_speed_kn 0.0
actual_wind0_speed_bft 0.0
actual_wind0_chill_c 11.8
actual_wind0_chill_f 53.2
actual_th2_temp_c 26.5
actual_th2_temp_f 79.7
actual_th2_hum_rel 30
actual_th2_hum_abs 7.5
actual_th2_dew_c 7.5
actual_th2_dew_f 45.5
actual_th2_heatindex_c 26.5
actual_th2_heatindex_f 79.7
actual_th2_humidex_c 26.7
actual_th2_humidex_f 80.1
actual_th2_cloudheight_m 2375
actual_th2_cloudheight_ft 7600
actual_th2_lowbat 1
actual_thb0_temp_c 21.5
actual_thb0_temp_f 70.7
actual_thb0_hum_rel 47
actual_thb0_hum_abs 8.9
actual_thb0_dew_c 9.7
actual_thb0_dew_f 49.5
actual_thb0_heatindex_c 21.5
actual_thb0_heatindex_f 70.7
actual_thb0_humidex_c 22.6
actual_thb0_humidex_f 72.7
actual_thb0_cloudheight_m 1475
actual_thb0_cloudheight_ft 4720
actual_thb0_press_hpa 1021.0
actual_thb0_press_psi 14.81
actual_thb0_press_mmhg 765.8
actual_thb0_press_inhg 30.16
actual_thb0_sealevel_hpa 1024.2
actual_thb0_sealevel_psi 14.85
actual_thb0_sealevel_mmhg 768.1
actual_thb0_sealevel_inhg 30.26
actual_thb0_fc 2
actual_thb0_fc_wdlive 19
actual_thb0_lowbat 1
actual_solar_irradiance_wqm 503
actual_rain0_rate_mm 0.0
actual_rain0_rate_in 0.00
actual_rain0_total_mm 3325.0
actual_rain0_total_in 130.91
actual_th6_temp_c 22.3
actual_th6_temp_f 72.1
actual_th6_hum_rel 43
actual_th6_hum_abs 8.5
actual_th6_dew_c 9.1
actual_th6_dew_f 48.4
actual_th6_heatindex_c 22.3
actual_th6_heatindex_f 72.1
actual_th6_humidex_c 23.2
actual_th6_humidex_f 73.8
actual_th6_cloudheight_m 1650
actual_th6_cloudheight_ft 5280
actual_data0_value_num 1.80
actual_data0_value_int 2
actual_data1_value_num 70008.00
actual_data1_value_int 70008
actual_data3_value_num 0.77
actual_data3_value_int 1
actual_data2_value_num 0.91
actual_data2_value_int 1
actual_data4_value_num 0.00
actual_data4_value_int 0
actual_data5_value_num 71.00
actual_data5_value_int 71
actual_data6_value_num 1.00
actual_data6_value_int 1
actual_data7_value_num 1.00
actual_data7_value_int 1
alltime_utcdate 20090929033108
alltime_localdate 20090929053108
alltime_wind0_maxspeeddir_deg 225.0
alltime_wind0_maxspeeddir_de SW
alltime_wind0_maxspeeddir_en SW
alltime_wind0_maindir_deg 225.0
alltime_wind0_maindir_de SW
alltime_wind0_maindir_en SW
alltime_wind0_gustspeed_ms 1.1
alltime_wind0_gustspeed_kmh 4.0
alltime_wind0_gustspeed_mph 2.5
alltime_wind0_gustspeed_kn 2.1
alltime_wind0_gustspeed_bft 1.2
alltime_wind0_gustspeedmin_time
20060903173306
alltime_wind0_gustspeedmin_ms 0.0
alltime_wind0_gustspeedmin_kmh 0.0
alltime_wind0_gustspeedmin_mph 0.0
alltime_wind0_gustspeedmin_kn 0.0
alltime_wind0_gustspeedmin_bft 0.0
alltime_wind0_gustspeedmax_time
20061231033252
alltime_wind0_gustspeedmax_deg 228
alltime_wind0_gustspeedmax_ms 18.8
alltime_wind0_gustspeedmax_kmh 67.7
alltime_wind0_gustspeedmax_mph 42.1
alltime_wind0_gustspeedmax_kn 36.5
alltime_wind0_gustspeedmax_bft 8.0
alltime_wind0_speed_ms 1.0
alltime_wind0_speed_kmh 3.5
alltime_wind0_speed_mph 2.2
alltime_wind0_speed_kn 1.9
alltime_wind0_speed_bft 1.1
alltime_wind0_speedmin_time
20060903173306
alltime_wind0_speedmin_ms 0.0
alltime_wind0_speedmin_kmh 0.0
alltime_wind0_speedmin_mph 0.0
alltime_wind0_speedmin_kn 0.0
alltime_wind0_speedmin_bft 0.0
alltime_wind0_speedmax_time
20071227060120
alltime_wind0_speedmax_deg 353
alltime_wind0_speedmax_ms 40.0
alltime_wind0_speedmax_kmh 144.0
alltime_wind0_speedmax_mph 89.5
alltime_wind0_speedmax_kn 77.8
alltime_wind0_speedmax_bft 13.2
alltime_wind0_chill_c 10.3
alltime_wind0_chillmin_time
20080103051050
alltime_wind0_chillmax_time
20090820160739
alltime_wind0_chillmin_c -17.0
alltime_wind0_chillmax_c 33.2
alltime_wind0_chill_f 50.5
alltime_wind0_chillmin_f 1.4
alltime_wind0_chillmax_f 91.8
alltime_rain0_rate_mm 0.4
alltime_rain0_rate_in 0.01
alltime_rain0_ratemin_time 20060903193433
alltime_rain0_ratemin_mm 0.0
alltime_rain0_ratemin_in 0.00
alltime_rain0_ratemax_time
20071108165006
alltime_rain0_ratemax_mm 999.0
alltime_rain0_ratemax_in 39.33
alltime_rain0_total_mm 4685.50
alltime_rain0_total_in 184.47
alltime_rain0_total_time 20090929044628
alltime_rain0_days 421
alltime_thb0_temp_c 22.8
alltime_thb0_temp_f 73.0
alltime_thb0_tempmin_time 20081009072533
alltime_thb0_tempmax_time
20090824172054
alltime_thb0_tempmin_c 8.3
alltime_thb0_tempmin_f 46.9
alltime_thb0_tempmax_c 27.8
alltime_thb0_tempmax_f 82.0
alltime_thb0_temp_trend -1
alltime_thb0_dew_c 9.1
alltime_thb0_dew_f 48.4
alltime_thb0_dewmin_time 20080308174234
alltime_thb0_dewmax_time 20080911183416
alltime_thb0_dewmin_c -4.3
alltime_thb0_dewmin_f 24.3
alltime_thb0_dewmax_c 21.4
alltime_thb0_dewmax_f 70.5
alltime_thb0_dew_trend 1
alltime_thb0_heatindex_c 22.8
alltime_thb0_heatindex_f 73.0
alltime_thb0_heatindexmin_time
20081009072533
alltime_thb0_heatindexmax_time
20080727153211
alltime_thb0_heatindexmin_c 8.3
alltime_thb0_heatindexmin_f 46.9
alltime_thb0_heatindexmax_c 28.0
alltime_thb0_heatindexmax_f 82.4
alltime_thb0_heatindex_trend -1
alltime_thb0_humidex_c 23.8
alltime_thb0_humidex_f 74.9
alltime_thb0_humidexmin_time
20080308174234
alltime_thb0_humidexmax_time
20080911183416
alltime_thb0_humidexmin_c 5.4
alltime_thb0_humidexmin_f 41.7
alltime_thb0_humidexmax_c 34.5
alltime_thb0_humidexmax_f 94.1
alltime_thb0_humidex_trend 1
alltime_thb0_hum_rel 42.3
alltime_thb0_hummin_time 20070429183449
alltime_thb0_hummax_time 20080911183416
alltime_thb0_hummin_rel 24.0
alltime_thb0_hummax_rel 77.0
alltime_thb0_hum_trend 1
alltime_thb0_press_hpa 1019.7
alltime_thb0_press_psi 14.79
alltime_thb0_press_mmhg 764.8
alltime_thb0_press_inhg 30.12
alltime_thb0_pressmin_time
20090123151708
alltime_thb0_pressmax_time
20070630072621
alltime_thb0_pressmin_hpa 966.0
alltime_thb0_pressmin_psi 14.01
alltime_thb0_pressmin_mmhg 724.5
alltime_thb0_pressmin_inhg 28.54
alltime_thb0_pressmax_hpa 1050.0
alltime_thb0_pressmax_psi 15.23
alltime_thb0_pressmax_mmhg 787.5
alltime_thb0_pressmax_inhg 31.02
alltime_thb0_press_trend -1
alltime_thb0_sealevel_hpa 1022.8
alltime_thb0_sealevel_psi 14.83
alltime_thb0_sealevel_mmhg 767.1
alltime_thb0_sealevel_inhg 30.22
alltime_thb0_sealevelmin_time
20090123151708
alltime_thb0_sealevelmax_time
20070630072621
alltime_thb0_sealevelmin_hpa 969.2
alltime_thb0_sealevelmin_psi 14.06
alltime_thb0_sealevelmin_mmhg 726.9
alltime_thb0_sealevelmin_inhg 28.63
alltime_thb0_sealevelmax_hpa 1053.2
alltime_thb0_sealevelmax_psi 15.27
alltime_thb0_sealevelmax_mmhg 789.9
alltime_thb0_sealevelmax_inhg 31.11
alltime_th0_temp_c 10.5
alltime_th0_temp_f 50.8
alltime_th0_tempmin_time 20090106052302
alltime_th0_tempmax_time 20090820160739
alltime_th0_tempmin_c -11.2
alltime_th0_tempmin_f 11.8
alltime_th0_tempmax_c 33.2
alltime_th0_tempmax_f 91.8
alltime_th0_temp_trend 1
alltime_th0_dew_c 4.7
alltime_th0_dew_f 40.5
alltime_th0_dewmin_time 20090106052302
alltime_th0_dewmax_time 20070823125214

alltime_th0_dewmin_c -14.4
alltime_th0_dewmin_f 6.1
alltime_th0_dewmax_c 19.0
alltime_th0_dewmax_f 66.2
alltime_th0_dew_trend 1
alltime_th0_heatindex_c 10.5
alltime_th0_heatindex_f 50.8
alltime_th0_heatindexmin_time
20090106052302
alltime_th0_heatindexmax_time
20090820160739
alltime_th0_heatindexmin_c -11.2
alltime_th0_heatindexmin_f 11.8
alltime_th0_heatindexmax_c 33.2
alltime_th0_heatindexmax_f 91.8
alltime_th0_heatindex_trend 1
alltime_th0_humidex_c 9.9
alltime_th0_humidex_f 49.9
alltime_th0_humidexmin_time
20090106052302
alltime_th0_humidexmax_time
20090820150559
alltime_th0_humidexmin_c -15.6
alltime_th0_humidexmin_f 3.9
alltime_th0_humidexmax_c 33.1
alltime_th0_humidexmax_f 91.6
alltime_th0_humidex_trend 1
alltime_th0_hum_rel 70.5
alltime_th0_hummin_time 20080608133544
alltime_th0_hummax_time 20061006065933
alltime_th0_hummin_rel 14.0
alltime_th0_hummax_rel 98.0
alltime_th0_hum_trend 1
alltime_th2_temp_c 26.1
alltime_th2_temp_f 79.0
alltime_th2_tempmin_time 20070818065040
alltime_th2_tempmax_time 20070611152320
alltime_th2_tempmin_c 14.1
alltime_th2_tempmin_f 57.4
alltime_th2_tempmax_c 33.2
alltime_th2_tempmax_f 91.8
alltime_th2_temp_trend 1
alltime_th2_dew_c 6.4
alltime_th2_dew_f 43.5
alltime_th2_dewmin_time 20081231103723
alltime_th2_dewmax_time 20070620173325
alltime_th2_dewmin_c -4.3
alltime_th2_dewmin_f 24.3
alltime_th2_dewmax_c 18.0
alltime_th2_dewmax_f 64.4
alltime_th2_dew_trend 1
alltime_th2_heatindex_c 26.1
alltime_th2_heatindex_f 79.0
alltime_th2_heatindexmin_time
20070818065040
alltime_th2_heatindexmax_time
20070611152320
alltime_th2_heatindexmin_c 14.1
alltime_th2_heatindexmin_f 57.4
alltime_th2_heatindexmax_c 33.2
alltime_th2_heatindexmax_f 91.8
alltime_th2_heatindex_trend 1
alltime_th2_humidex_c 26.1
alltime_th2_humidex_f 79.0
alltime_th2_humidexmin_time
20080216083849
alltime_th2_humidexmax_time
20060904063659
alltime_th2_humidexmin_c 13.7
alltime_th2_humidexmin_f 56.7
alltime_th2_humidexmax_c 36.8
alltime_th2_humidexmax_f 98.2
alltime_th2_humidex_trend 1
alltime_th2_hum_rel 28.8
alltime_th2_hummin_time 20080108172207
alltime_th2_hummax_time 20070818090607
alltime_th2_hummin_rel 16.0
alltime_th2_hummax_rel 67.0
alltime_th2_hum_trend 1
alltime_th3_temp_c 13.8
alltime_th3_temp_f 56.8
alltime_th3_tempmin_time 20090106092222
alltime_th3_tempmax_time 20090703165815
alltime_th3_tempmin_c -6.2
alltime_th3_tempmin_f 20.8
alltime_th3_tempmax_c 44.5
alltime_th3_tempmax_f 112.1
alltime_th3_temp_trend 1
alltime_th3_dew_c 6.1
alltime_th3_dew_f 43.0
alltime_th3_dewmin_time 20090106092222
alltime_th3_dewmax_time 20070823143707
alltime_th3_dewmin_c -10.1
alltime_th3_dewmin_f 13.8
alltime_th3_dewmax_c 23.0
alltime_th3_dewmax_f 73.4
alltime_th3_dew_trend 1
alltime_th3_heatindex_c 13.8
alltime_th3_heatindex_f 56.8
alltime_th3_heatindexmin_time
20090106092222
alltime_th3_heatindexmax_time
20080807143410
alltime_th3_heatindexmin_c -6.2
alltime_th3_heatindexmin_f 20.8
alltime_th3_heatindexmax_c 44.6
alltime_th3_heatindexmax_f 112.3
alltime_th3_heatindex_trend 1
alltime_th3_humidex_c 13.8
alltime_th3_humidex_f 56.8
alltime_th3_humidexmin_time
20090106092222
alltime_th3_humidexmax_time
20090703162307
alltime_th3_humidexmin_c -10.2
alltime_th3_humidexmin_f 13.6
alltime_th3_humidexmax_c 51.4
alltime_th3_humidexmax_f 124.5
alltime_th3_humidex_trend 1
alltime_th3_hum_rel 63.5
alltime_th3_hummin_time 20080515183434
alltime_th3_hummax_time 20081220075327
alltime_th3_hummin_rel 17.0
alltime_th3_hummax_rel 94.0
alltime_th3_hum_trend -1
alltime_th4_temp_c 7.1
alltime_th4_temp_f 44.8
alltime_th4_tempmin_time 20090629194305
alltime_th4_tempmax_time 20070819231018
alltime_th4_tempmin_c 0.3
alltime_th4_tempmin_f 32.5
alltime_th4_tempmax_c 22.6
alltime_th4_tempmax_f 72.7
alltime_th4_temp_trend -1
alltime_th4_dew_c -0.0
alltime_th4_dew_f 32.0
alltime_th4_dewmin_time 20080528220123
alltime_th4_dewmax_time 20070820090803
alltime_th4_dewmin_c -6.9
alltime_th4_dewmin_f 19.6
alltime_th4_dewmax_c 15.0
alltime_th4_dewmax_f 59.0
alltime_th4_dew_trend 1
alltime_th4_heatindex_c 7.1
alltime_th4_heatindex_f 44.8
alltime_th4_heatindexmin_time
20090629194305
alltime_th4_heatindexmax_time
20070819231018
alltime_th4_heatindexmin_c 0.3
alltime_th4_heatindexmin_f 32.5
alltime_th4_heatindexmax_c 22.6
alltime_th4_heatindexmax_f 72.7
alltime_th4_heatindex_trend -1
alltime_th4_humidex_c 5.0
alltime_th4_humidex_f 41.0
alltime_th4_humidexmin_time
20090629194305
alltime_th4_humidexmax_time
20070819231018
alltime_th4_humidexmin_c -2.8
alltime_th4_humidexmin_f 27.0
alltime_th4_humidexmax_c 24.9
alltime_th4_humidexmax_f 76.8
alltime_th4_humidex_trend 1
alltime_th4_hum_rel 61.1
alltime_th4_hummin_time 20081225195846

4.4 Port 5559: XML-Data

With Version 1.6 Meteohub is capable to deliver XML data for further processing. XML data can directly be received on port 5559 via TCP/IP socket connection. Furthermore the data can be provided by Meteohub's web server. Simply call "http://..../meteograph.cgi?text=allxml" and you receive the xml data with a corresponding content type header (text/xml). If you prefer no to directly call your Meteohub you can also make use of Meteohub's FTP upload function to place a corresponding XML file on your regular web server.

The XML data contains exactly the information as the data available on port 5558 plus some configuration information in the "config" section of the xml data. This configuration is needed to control the new Meteohub dashboard.

Remark: Please notice that the xml feature is brand new and still in an experimental status. This means, there will be bugs and the format might change slightly in the future.

Here you can see, how the xml data looks like. It should be quite easy to understand:

```
<meteohub>
 <config>
  <language>de</language>
  <temp_sensor unit="c" print="°C">th0</temp_sensor>
  <hum_sensor unit="rel" print="%">th0</hum_sensor>
  <dew_sensor unit="c" print="°C">th0</dew_sensor>
  <baro_sensor unit="hpa" print="hPa">thb0</baro_sensor>
  <wind_sensor unit="ms" print="m/s">wind0</wind_sensor>
  <rain_sensor unit="mm" print="mm">rain0</rain_sensor>
  <row number="1">last60m</row>
  <row number="2">hour1</row>
  <row number="3">month1</row>
  <row number="4">last24h</row>
 </config>
 <data timeframe="actual">
  <item sensor="date0" cat="date" unit="utc">20090929173048</item>
  <item sensor="date0" cat="date2" unit="utc">29.09.2009 17:30:48</item>
  <item sensor="date0" cat="puredate" unit="utc">29.09.2009</item>
  <item sensor="date0" cat="time" unit="utc">17:30:48</item>
  <item sensor="date0" cat="year" unit="utc">2009</item>
  <item sensor="date0" cat="month" unit="utc">09</item>
  <item sensor="date0" cat="day" unit="utc">29</item>
  <item sensor="date0" cat="dayofweek" unit="utc">2</item>
  <item sensor="date0" cat="hour" unit="utc">17</item>
  <item sensor="date0" cat="min" unit="utc">30</item>
  <item sensor="date0" cat="sec" unit="utc">48</item>
  <item sensor="date0" cat="date" unit="local">20090929193048</item>
  <item sensor="date0" cat="date2" unit="local">29.09.2009 19:30:48</item>
  <item sensor="date0" cat="puredate" unit="local">29.09.2009</item>
  <item sensor="date0" cat="time" unit="local">19:30:48</item>
  <item sensor="date0" cat="year" unit="local">2009</item>
  <item sensor="date0" cat="month" unit="local">09</item>
  <item sensor="date0" cat="day" unit="local">29</item>
  <item sensor="date0" cat="dayofweek" unit="local">2</item>
  <item sensor="date0" cat="hour" unit="local">19</item>
  <item sensor="date0" cat="min" unit="local">30</item>
  <item sensor="date0" cat="sec" unit="local">48</item>
  <item sensor="lunar" cat="phase" unit="percentage">81.4</item>
  <item sensor="lunar" cat="phase" unit="segment">3</item>
  <item sensor="lunar" cat="phase"
unit="de">Dreiviertelmond_(zunehmend)</item>
  <item sensor="lunar" cat="phase" unit="en">Waxing_Gibbous</item>
  <item sensor="lunar" cat="phase" unit="es">Gibosa_Iluminante</item>
  <item sensor="station" cat="longitude" unit="decimal">9.885833</item>
  <item sensor="station" cat="latitude" unit="decimal">53.876944</item>
  <item sensor="daylength" cat="standard" unit="hours">11.72</item>
  <item sensor="daylength" cat="standard" unit="minutes">703</item>
  <item sensor="daylength" cat="standard" unit="hhmm">11:43</item>
  <item sensor="daylength" cat="civiltwilight" unit="hours">12.89</item>
  <item sensor="daylength" cat="civiltwilight" unit="minutes">773</item>
  <item sensor="daylength" cat="civiltwilight" unit="hhmm">12:53</item>
  <item sensor="daylength" cat="nauticaltwilight" unit="hours">14.26</item>
  <item sensor="daylength" cat="nauticaltwilight" unit="minutes">856</item>
  <item sensor="daylength" cat="nauticaltwilight" unit="hhmm">14:16</item>
  <item sensor="sunrise" cat="standard" unit="utc">05:19</item>
  <item sensor="sunset" cat="standard" unit="utc">17:02</item>
  <item sensor="sunrise" cat="standard" unit="local">07:19</item>
  <item sensor="sunset" cat="standard" unit="local">19:02</item>
  <item sensor="sunrise" cat="civiltwilight" unit="utc">04:44</item>
  <item sensor="sunset" cat="civiltwilight" unit="utc">17:37</item>
  <item sensor="sunrise" cat="civiltwilight" unit="local">06:44</item>
  <item sensor="sunset" cat="civiltwilight" unit="local">19:37</item>
  <item sensor="sunrise" cat="nauticaltwilight" unit="utc">04:03</item>
  <item sensor="sunset" cat="nauticaltwilight" unit="utc">18:19</item>
  <item sensor="sunrise" cat="nauticaltwilight" unit="local">06:03</item>
  <item sensor="sunset" cat="nauticaltwilight" unit="local">20:19</item>
  <item sensor="t0" cat="temp" unit="c">11.0</item>
  <item sensor="t0" cat="temp" unit="f">51.8</item>
  <item sensor="t0" cat="lowbat" unit="">1</item>
  <item sensor="th0" cat="temp" unit="c">11.9</item>
  <item sensor="th0" cat="temp" unit="f">53.4</item>
  <item sensor="th0" cat="hum" unit="rel">56</item>
  <item sensor="th0" cat="hum" unit="abs">5.9</item>
  <item sensor="th0" cat="dew" unit="c">3.4</item>
  <item sensor="th0" cat="dew" unit="f">38.1</item>
  <item sensor="th0" cat="heatindex" unit="c">11.9</item>
  <item sensor="th0" cat="heatindex" unit="f">53.4</item>
  <item sensor="th0" cat="humidex" unit="c">10.7</item>
  <item sensor="th0" cat="humidex" unit="f">51.3</item>
  <item sensor="th0" cat="cloudheight" unit="m">1063</item>
  <item sensor="th0" cat="cloudheight" unit="ft">3400</item>
  <item sensor="th0" cat="lowbat" unit="">1</item>
  <item sensor="th10" cat="temp" unit="c">22.8</item>
  <item sensor="th10" cat="temp" unit="f">73.0</item>
  <item sensor="th10" cat="hum" unit="rel">43</item>
  <item sensor="th10" cat="hum" unit="abs">8.7</item>
  <item sensor="th10" cat="dew" unit="c">9.6</item>
  <item sensor="th10" cat="dew" unit="f">49.3</item>
  <item sensor="th10" cat="heatindex" unit="c">22.8</item>
  <item sensor="th10" cat="heatindex" unit="f">73.0</item>
  <item sensor="th10" cat="humidex" unit="c">23.9</item>
  <item sensor="th10" cat="humidex" unit="f">75.0</item>
  <item sensor="th10" cat="cloudheight" unit="m">1650</item>
  <item sensor="th10" cat="cloudheight" unit="ft">5280</item>
  <item sensor="wind0" cat="dir" unit="deg">257</item>
  <item sensor="wind0" cat="dir" unit="de">WSW</item>
  <item sensor="wind0" cat="dir" unit="en">WSW</item>
  <item sensor="wind0" cat="gustspeed" unit="ms">0.0</item>
  <item sensor="wind0" cat="gustspeed" unit="kmh">0.0</item>
  <item sensor="wind0" cat="gustspeed" unit="mph">0.0</item>
  <item sensor="wind0" cat="gustspeed" unit="kn">0.0</item>
  <item sensor="wind0" cat="gustspeed" unit="bft">0.0</item>
  <item sensor="wind0" cat="speed" unit="ms">0.0</item>
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  <item sensor="wind0" cat="speed" unit="mph">0.0</item>
  <item sensor="wind0" cat="speed" unit="kn">0.0</item>
```

```
  <item sensor="wind0" cat="speed" unit="bft">0.0</item>
  <item sensor="wind0" cat="chill" unit="c">11.9</item>
  <item sensor="wind0" cat="chill" unit="f">53.4</item>
  <item sensor="th2" cat="temp" unit="c">26.5</item>
  <item sensor="th2" cat="temp" unit="f">79.7</item>
  <item sensor="th2" cat="hum" unit="rel">30</item>
  <item sensor="th2" cat="hum" unit="abs">7.5</item>
  <item sensor="th2" cat="dew" unit="c">7.5</item>
  <item sensor="th2" cat="dew" unit="f">45.5</item>
  <item sensor="th2" cat="heatindex" unit="c">26.5</item>
  <item sensor="th2" cat="heatindex" unit="f">79.7</item>
  <item sensor="th2" cat="humidex" unit="c">26.7</item>
  <item sensor="th2" cat="humidex" unit="f">80.1</item>
  <item sensor="th2" cat="cloudheight" unit="m">2375</item>
  <item sensor="th2" cat="cloudheight" unit="ft">7600</item>
  <item sensor="th2" cat="lowbat" unit="">1</item>
  <item sensor="thb0" cat="temp" unit="c">21.5</item>
  <item sensor="thb0" cat="temp" unit="f">70.7</item>
  <item sensor="thb0" cat="hum" unit="rel">48</item>
  <item sensor="thb0" cat="hum" unit="abs">9.1</item>
  <item sensor="thb0" cat="dew" unit="c">10.0</item>
  <item sensor="thb0" cat="dew" unit="f">50.0</item>
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  <item sensor="thb0" cat="heatindex" unit="f">70.7</item>
  <item sensor="thb0" cat="humidex" unit="c">22.8</item>
  <item sensor="thb0" cat="humidex" unit="f">73.0</item>
  <item sensor="thb0" cat="cloudheight" unit="m">1438</item>
  <item sensor="thb0" cat="cloudheight" unit="ft">4600</item>
  <item sensor="thb0" cat="press" unit="hpa">1021.0</item>
  <item sensor="thb0" cat="press" unit="psi">14.81</item>
  <item sensor="thb0" cat="press" unit="mmhg">765.8</item>
  <item sensor="thb0" cat="press" unit="inhg">30.16</item>
  <item sensor="thb0" cat="sealevel" unit="hpa">1024.2</item>
  <item sensor="thb0" cat="sealevel" unit="psi">14.85</item>
  <item sensor="thb0" cat="sealevel" unit="mmhg">768.1</item>
  <item sensor="thb0" cat="sealevel" unit="inhg">30.26</item>
  <item sensor="thb0" cat="fc" unit="">2</item>
  <item sensor="thb0" cat="fc" unit="wdlive">19</item>
  <item sensor="thb0" cat="lowbat" unit="">1</item>
  <item sensor="solar" cat="irradiance" unit="wqm">503</item>
  <item sensor="rain0" cat="rate" unit="mm">0.0</item>
  <item sensor="rain0" cat="rate" unit="in">0.00</item>
  <item sensor="rain0" cat="total" unit="mm">3325.0</item>
  <item sensor="rain0" cat="total" unit="in">130.91</item>
  <item sensor="th6" cat="temp" unit="c">22.5</item>
  <item sensor="th6" cat="temp" unit="f">72.5</item>
  <item sensor="th6" cat="hum" unit="rel">43</item>
  <item sensor="th6" cat="hum" unit="abs">8.6</item>
  <item sensor="th6" cat="dew" unit="c">9.3</item>
  <item sensor="th6" cat="dew" unit="f">48.7</item>
  <item sensor="th6" cat="heatindex" unit="c">22.5</item>
  <item sensor="th6" cat="heatindex" unit="f">72.5</item>
  <item sensor="th6" cat="humidex" unit="c">23.5</item>
  <item sensor="th6" cat="humidex" unit="f">74.3</item>
  <item sensor="th6" cat="cloudheight" unit="m">1650</item>
  <item sensor="th6" cat="cloudheight" unit="ft">5280</item>
  <item sensor="data0" cat="value" unit="num">0.95</item>
  <item sensor="data0" cat="value" unit="int">1</item>
  <item sensor="data1" cat="value" unit="num">70367.00</item>
  <item sensor="data1" cat="value" unit="int">70367</item>
  <item sensor="data3" cat="value" unit="num">0.77</item>
  <item sensor="data3" cat="value" unit="int">1</item>
  <item sensor="data2" cat="value" unit="num">0.91</item>
  <item sensor="data2" cat="value" unit="int">1</item>
  <item sensor="data4" cat="value" unit="num">0.00</item>
  <item sensor="data4" cat="value" unit="int">0</item>
  <item sensor="data5" cat="value" unit="num">119.00</item>
  <item sensor="data5" cat="value" unit="int">119</item>
  <item sensor="data6" cat="value" unit="num">4.00</item>
  <item sensor="data6" cat="value" unit="int">4</item>
  <item sensor="data7" cat="value" unit="num">1.00</item>
  <item sensor="data7" cat="value" unit="int">1</item>
</data>
<data timeframe="alltime">
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  <item sensor="date0" cat="date" unit="local">20090929053108</item>
  <item sensor="wind0" cat="maxspeeddir" unit="deg">225.0</item>
  <item sensor="wind0" cat="maxspeeddir" unit="de">SW</item>
  <item sensor="wind0" cat="maxspeeddir" unit="en">SW</item>
  <item sensor="wind0" cat="maindir" unit="deg">225.0</item>
  <item sensor="wind0" cat="maindir" unit="de">SW</item>
  <item sensor="wind0" cat="maindir" unit="en">SW</item>
  <item sensor="wind0" cat="gustspeed" unit="ms">1.1</item>
  <item sensor="wind0" cat="gustspeed" unit="kmh">4.0</item>
  <item sensor="wind0" cat="gustspeed" unit="mph">2.5</item>
  <item sensor="wind0" cat="gustspeed" unit="kn">2.1</item>
  <item sensor="wind0" cat="gustspeed" unit="bft">1.2</item>
  <item sensor="wind0" cat="gustspeedmin" unit="time">20060903173306</item>
  <item sensor="wind0" cat="gustspeedmin" unit="ms">0.0</item>
  <item sensor="wind0" cat="gustspeedmin" unit="kmh">0.0</item>
  <item sensor="wind0" cat="gustspeedmin" unit="mph">0.0</item>
  <item sensor="wind0" cat="gustspeedmin" unit="kn">0.0</item>
  <item sensor="wind0" cat="gustspeedmin" unit="bft">0.0</item>
  <item sensor="wind0" cat="gustspeedmax" unit="time">20061231033252</item>
  <item sensor="wind0" cat="gustspeedmax" unit="deg">228</item>
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  <item sensor="wind0" cat="gustspeedmax" unit="kmh">67.7</item>
  <item sensor="wind0" cat="gustspeedmax" unit="mph">42.1</item>
  <item sensor="wind0" cat="gustspeedmax" unit="kn">36.5</item>
  <item sensor="wind0" cat="gustspeedmax" unit="bft">8.0</item>
  <item sensor="wind0" cat="speed" unit="ms">1.0</item>
  <item sensor="wind0" cat="speed" unit="kmh">3.5</item>
  <item sensor="wind0" cat="speed" unit="mph">2.2</item>
  <item sensor="wind0" cat="speed" unit="kn">1.9</item>
  <item sensor="wind0" cat="speed" unit="bft">1.1</item>
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  <item sensor="wind0" cat="speedmin" unit="kmh">0.0</item>
  <item sensor="wind0" cat="speedmin" unit="mph">0.0</item>
  <item sensor="wind0" cat="speedmin" unit="kn">0.0</item>
  <item sensor="wind0" cat="speedmin" unit="bft">0.0</item>
  <item sensor="wind0" cat="speedmax" unit="time">20071227060120</item>
  <item sensor="wind0" cat="speedmax" unit="deg">353</item>
  <item sensor="wind0" cat="speedmax" unit="ms">40.0</item>
  <item sensor="wind0" cat="speedmax" unit="kmh">144.0</item>
  <item sensor="wind0" cat="speedmax" unit="mph">89.5</item>
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    <item sensor="data6" cat="valuemin" unit="time">20090430022200</item>
    <item sensor="data6" cat="valuemax" unit="time">20090906201128</item>
    <item sensor="data6" cat="valuerise" unit="">126094</item>
    <item sensor="data6" cat="valuefall" unit="">126094</item>
    <item sensor="data6" cat="valuesum" unit="num">375509478.00</item>
    <item sensor="data6" cat="valuesum" unit="int">375509478</item>
    <item sensor="data6" cat="valuesumpermin" unit="num">714.44</item>
    <item sensor="data6" cat="valuesumpermin" unit="int">714</item>
    <item sensor="data6" cat="valuedeltasum" unit="num">109133100.00</item>
    <item sensor="data6" cat="valuedeltasum" unit="int">109133100</item>
    <item sensor="data7" cat="value" unit="num">1.00</item>
    <item sensor="data7" cat="value" unit="int">1</item>
    <item sensor="data7" cat="valuemin" unit="num">1.00</item>
    <item sensor="data7" cat="valuemax" unit="num">1.00</item>
    <item sensor="data7" cat="valuemin" unit="int">1</item>
    <item sensor="data7" cat="valuemax" unit="int">1</item>
    <item sensor="data7" cat="valuemin" unit="time">20090505170024</item>
    <item sensor="data7" cat="valuemax" unit="time">20090505170024</item>
    <item sensor="data7" cat="valuerise" unit="">0</item>
    <item sensor="data7" cat="valuefall" unit="">0</item>
    <item sensor="data7" cat="valuesum" unit="num">205151.00</item>
    <item sensor="data7" cat="valuesum" unit="int">205151</item>
    <item sensor="data7" cat="valuesumpermin" unit="num">0.39</item>
    <item sensor="data7" cat="valuesumpermin" unit="int">0</item>
    <item sensor="data7" cat="valuedeltasum" unit="num">0.00</item>
    <item sensor="data7" cat="valuedeltasum" unit="int">0</item>
  </data>
</meteohub>
```

Appendix A: GPL Obligations

NSLU2 Platform

Without Linux for NSLU2 via OpenSlug/SlugOS Meteohub would not be possible on NSLU2. Meteohub is based on this Open Source operating system and realized as a non-derived independent development. Details how Meteohub distribution is constructed and links to sources of Open Source components included into the Meteohub distribution can be found on Meteohub homepage (http://www.meteohub.de/joomla/index.php?option=com_content&task=view&id=36&Itemid=51) .

x86 Platform

On x86 platforms Meteohub is based on Debian Linux "etch-and-a-half". A detailed instruction how Meteohub distribution is constructed from public sources and build scripts that allow to port a Meteohub base distribution to other x86 platforms can be found on Meteohub homepage (http://www.meteohub.de/joomla/index.php?option=com_content&task=view&id=48&Itemid=72).

SheevaPlug Platform

SheevaPlug is supported by a development package provided by Marvell that includes a complete Linux development system. Meteohub is based on 2.6.29 Debian lenny for Kirkwood. Information about additional packages to be installed to have a complete Meteohub system can be found on Meteohub homepage (http://www.meteohub.de/joomla/index.php?option=com_content&task=view&id=53&Itemid=79).

Appendix B: Remarks on Weather Stations

Weather stations supported by Meteohub do have some special features and functional restrictions when used with Meteohub.

WMR 928/968/918N

This station has to connected by a RS232-USB Converter to Meteohub. At the moment two converter chip sets are supported: FTDI and PL2303. A converter that is widely available and compatible to Meteohub is Logiklink USB 2.0 Serial Adapter (Art.Nr. AU0002A). You can get a description an data sheet of this converter here: "www.2direkt.de/i-sell2u/images/datenblatt/AU0002A.pdf "

The serial protocol of this weather station is well understood and widely documented. As a result Meteohub does support all of it's features. The disadvantage of the station not to have a data logger included is compensated by Meteohub. But the stations limitation of being limited to just 3 additional thermo/hygro sensors and lacking support of an uv sensor cannot be fixed by Meteohub.

Since version 1.5 Meteohub reacts very polite when the weather station gets disconnected during operation of Meteohub. Data recording stops, but automatically continues when you reconnect the weather station to Meteohub.

WMR 100

This station gets directly connected by an USB cable. WMR 100 does not have a data logger included, but Meteohub does data logging instead. As the protocol of the WMR 100 is not well published (Oregon does not provide me with information on this) not all aspects of functionality are available for Meteohub at the moment. The most important things are understood and correctly decoded, but some things you can see on the LCD of the WMR 100 still remain unsupported:

- Tendency for temperature and humidity is not supported.
- Ranking of wind speeds by means of a small or big flag on the LCD is not supported.

The other functions are supported. Meteohub supports all available sensors for WMR 100, including additional thermo/hygro sensors as well as an uv sensor. A disconnect of the weather station does stop the data recording. After reconnect data recording will automatically restart.

WMR 200

This station also connects directly via USB cable with Meteohub. WMR 200's data logger is not supported by Meteohub at the moment. Meteohub is doing the data logging itself. As WMR 200 has problems in reporting actual sensor readings, when data logger is completely filled, I strongly recommend to set the data logging interval to the maximum (longest duration). This takes care that the data logger will not reach its capacity for months. However, you should take care to empty the data logger's buffer from time to time manually at the WMR 200 base station (once a month). Meteohub would like to do this for you automatically, but unfortunately Oregon again decided not to provide any information on the protocol. When information about how to clear the buffer via software, Meteohub will make use of this feature.

This functions are known not to be supported by Meteohub:

- All restrictions of WMR 100 do also apply to WMR 200.
- Internal data logger is not supported.

All sensors for WMR 200 are supported, including additional thermo/hygro sensors as well as an uv sensor.

WMRS 200

This station is like a WMR 100 with Sensors from WMR 200 but without any display. WMRS 200 is powered from Meteohub via USB connector. All sensors applicable to WMRS 200 are supported by Meteohub.

RMS 300

This station gets directly connected by an USB cable and is just capable to report data from maximum 3 temp/hygro sensors. The out-door sensor included in the package (THGN-132N) is mapped to channel 0 by Meteohub. RMS 300 does not have a data logger included, but Meteohub does data logging instead. Sensors for wind, rain, uv, pressure are not supported. Additional temp/hygro sensors have to be of type THGR-810. The temp/hygro sensor included in the console is reported on channel 9.

A disconnect of the weather station does stop the data recording. After reconnect data recording will automatically restart.

RFXCOM

Meteohub supports RFXCOM USB receiver 70003/80002 in it's full extend in regard to Oregon sensors. This allows Meteohub to read decent amount of different sensors. During initialization of RFXCOM module Meteohub takes care to configure transmission speed of this module correctly, regardless how it has been configured before.

The new LAN-based 81003 receiver module is also supported by Meteohub. Simply choose the TCP/IP option in the weather station settings of Meteohub and type in the module's IP address and port.

TE-923 (from Hideki)

Meteohub supports the TE-923 weather station from Hideki that is sold under various brands (Mebus, Irox, Honeywell, Nexus). TE-923 had various hardware revisions over time. Meteohub supports hardware versions 3, and 4. The very old version 1, that does not provide live weather data on the USB port, and version 2 is not supported by Meteohub.

Meteohub just makes use of the live data of the TE-923. All logging of data is done by Meteohub, the data logger functionality of the TE-923 is not used by Meteohub.

WH-1080 (from Fine Offset Electronics)

Meteohub supports the WH-1080 weather station from Fine Offset Electronics (www.foshk.com), that is also branded as Watson W-8681, WX-2008, National Geographic 265 NE, Elecsa 6975/ 6976.

Meteohub just makes use of the live data of the WH-1080. All logging of data is done by Meteohub, the data logger functionality of the WH-1080 is not used by Meteohub. Weather forecast icon is not supported by Meteohub.

Vantage Vue, Pro2 and Vantage Pro1 (not Firmware Version A)

Meteohub supports in version 1.9 a subset of the Davis Vantage Pro2 and Pro1 (not Firmware A) functionality. Wind, rain, pressure, uv, solar radiation, indoor temperature, outdoor temperature and 7 extra temp/hum sensors are fully supported. Additional "Soil" and "Leaf" sensors as well as pure temperature sensors are supported.

Meteohub supports RS232, USB and TCP/IP (WeatherLinkIP) variants of the Vantage.

Limitations:

- Data logged in the Vantage is not used by Meteohub. Meteohub logs data for itself and computes min/max values from this.
- RS232 Vantage must have set baud rate to 19.200.

Meteohub polls the Vantage by "LOOP" commands. If nothing has changed the data is not not logged. But if there are more than 30 seconds gone until the last logging, data is logged despite the rule above. This allows to reduce storage demands by not missing any short-term events (like gusts).

Ultimeter 100/800/2100

Starting with version 4.1g Meteohub supports Ultimeter weather stations from Peet Bros. Wind, rain, pressure, indoor and outdoor temperature and humidity are used. Supported Peet Bros data protocols are "data logging", "packet", "complete record".

RainWise MkIII

Starting with version 4.2d Meteohub supports RainWise MkIII weather stations. Wind, rain, pressure and outdoor temperature and humidity are supported. Meteohub handles classical CRC communication type. Sensor thb0 reports pressure and outdoor temp/hum. Sensor th0 also reports outdoor temp/hum.

ELV WS300PC/444/500

Weather stations WS300PC, WS444 or WS500 from ELV are supported since version 4.3 of Meteohub. Data are received from a plug-in, that is available under GPL as source code at download section of "meteohub.de".

La Crosse WS2300

Weather stationWS2300 from La Crosse is supported since version 4.3b of Meteohub. Data are received from a plug-in, that is available under GPL as source code at download section of "meteohub.de".

more WS500 clones: *WS550, WS777, WS888, WS550-Technoline, WS550-LaCrosse-US, WS550-US, WS300PC-US, WS550-LaCrosse-2*

These stations have a different USB vendor and product id, but apart from that they are 100% clones of La Crosse and ELV stations above and are supported by Meteohub (since Version 4.5a).

Plug-In

Starting with Version 4.2b Meteohub supports a generic weather station interface by means of a plug-in mechanism. Plug-in module gets started when data logging starts. The plug-in module reports sensor data on "/dev/stdout" according to the format below. Meteohub includes this data to the logged raw data.

```
Type              Sensor      #     Parameter Description
-------------------------------------------------------------
Wind              wind#       0-9   wind direction (0-360)
                                    gust speed [1/10 m/s]
                                    average speed [1/10 m/s]

Rain              rain#       0-9   rain rate [1/10 mm/h]
                                    rain fall total [1/10 mm]

Thermo            t#          0-39  temperature [1/10 °C]

Thermo/Hygro      th#         0-39  temperature [1/10 °C]
                                    humidity (0-100) [%]

Thermo/Hygro/Baro thb#        0-39  temperature [1/10 °C]
                                    humidity (0-100) [%]
                                    pressure [1/10 hPa] (pressure at station)

UV                uv#         0-9   uv-index [1/10 uvi]

Solar Radiation   sol#        0-9   radiation [W/qm]

Data              data#       0-39  system data [1/100 value]
```

Here is an example that illustrates how output of a plugin should look like:

```
wind0 255 45 32
th1 127 55
data7 200
```

Meaning of the three lines above is:

- wind sensor #0 reports wind with gust speed of 4.5 m/s and average wind speed of 3.2 m/s coming from direction 255°
- temperature/humidity sensor #1 reports 12.7°C and 55% relative humidity
- data feed #7 reports a value of 2.00

Appendix C: Format of Raw Data

Data in the "raw" files is written line by line. Each line start with a UTC time stamp, followed by a sensor id and the sensor's values, separated by blanks.

These sensors are defined:

```
Type    Sensor    Parameter Description
-----------------------------------------
time    date      year  (1970-...)
                  month (1-12)
                  day   (1-31)
                  hour  (0-23)
                  minute (0-59)

wind    wind#     wind direction (0-355)
                  gust speed (0-...) [1/10 m/s]
                  average speed (0-...) [1/10 m/s]
                  windchill [°C]  (or 1/10 °C when number has leading 0)

rain    rain#     rain rate [mm/h] (or 1/10 mm/h when number has leading 0)
                  rain fall yesterday [mm] ** not supported **
                  rain fall total [1/10 mm] (since beginning of recording)

thermo  t#        temperature [1/10 °C]

thermo/ th#       temperature [1/10 °C]
hygro             humidity (0-100) [%]
                  dew point [°C]  (or 1/10 °C when number has leading 0)

thermo/ thb#      temperature [1/10 °C]
hygro/            humidity (0-100) [%]
baro              dew point [°C]  (or 1/10 °C when number has leading 0)
                  pressure (950-1050) [hPa]  (or 1/10 hPa when > 5000)
                  forceast token
                  sealevel pressure (950-1050) [hPa]  (or 1/10 hPa when > 2000)

uv      uv#       uv-index (0-210) [uvi] (or 1/10 uvi when num has leading 0)

solar   sol#      radiation [W/qm]
radiation

Data    data#     system data [1/100 value]
```

Example:

```
20071101145756 rain0 0 0 2764
20071101145757 th1 209 52 11
20071101145801 wind0 212 26 24 11
20071101145807 th3 134 81 10
20071101145829 wind0 195 34 24 10
20071101145830 thb0 218 46 10 1024 3 1024
20071101145831 th2 258 34 9
20071101145836 th1 209 52 11
20071101145843 wind0 262 37 26 9
20071101145843 rain0 0 0 2764
20071101145850 th3 134 81 10
20071101145857 wind0 221 36 26 10
20071101145906 th0 132 82 10
20071101145908 thb0 218 46 10 1024 3 1024
20071101145911 wind0 225 16 26 13
20071101145912 th2 258 34 9
20071101145915 th1 209 52 11
20071101145925 wind0 227 12 26 13
20071101145930 rain0 0 0 2764
20071101145933 th3 134 81 10
20071101145939 wind0 205 12 18 13
20071101145943 th0 132 82 10
20071101145946 thb0 218 46 10 1024 3 1024
20071101145953 wind0 210 24 18 12
20071101145953 th2 258 34 9
20071101145954 th1 209 52 11
20071101150000 date 2007 11 1 16 0
20071101150007 wind0 220 24 18 12
20071101150016 th3 134 81 10
20071101150017 rain0 0 0 2764
20071101150020 th0 132 82 10
20071101150021 wind0 225 34 18 10
20071101150025 thb0 218 46 10 1024 3 1024
20071101150033 th1 209 52 11
20071101150034 th2 258 34 9
20071101150035 wind0 203 24 18 12
20071101150049 wind0 216 18 24 13
20071101150057 th0 132 82 10
20071101150059 th3 134 81 10
20071101150102 thb0 218 46 10 1024 3 1024
20071101150103 wind0 226 24 24 12
20071101150104 rain0 0 0 2764
20071101150112 th1 209 52 11
20071101150115 th2 258 34 9
20071101150117 wind0 212 16 24 13
20071101150131 wind0 219 16 24 13
20071101150134 th0 132 82 10
```

Appendix D: Format of time-compacted Sensor Data

```
type    sensor  #  value descrition
-----------------------------------------
wind    wind#   2  gust average (m/s)
                3  gust min (m/s)
                4  gust max (m/s)
                5  wind average (m/s)
                6  wind min (m/s)
                7  wind max (m/s)
                8  wind chill average (°C)
                9  wind chill min (°C)
                10 wind chill max (°C)
                11 main wind direction (0-15) 0=N, 1=NNO, 2=NO, 3=ONO ... 15=NNW
                12 direction of highest gust speed (0-15)

virtual sdir#   2-17 sixteen values representing maximum gust speed (m/s)
                     from each direction (0-15) 0=N, 1=NNO, ... 15=NNW

virtual tdir#   2-17 sixteen values representing percentage of time for each wind
                     direction (0-15) 0=N, 1=NNO, ... 15=NNW

rain    rain#   2  rain rate average (mm/h)
                3  rain rate min (mm/h)
                4  rain rate max (mm/h)
                5  rain fall during time frame (mm)
                6  rainy days (just makes sense in the month1/day1 time spans)

thb     thb#    2  temperature average (°C)
                3  temperature min (°C)
                4  temperature max (°C)
                5  dew point average (°C)
                6  dew point min (°C)
                7  dew point max (°C)
                8  humidity average (%)
                9  humidity min (%)
                10 humidity max (%)
                11 barometric pressure average (mb)
                12 barometric pressure min (mb)
                13 barometric pressure max (mb)
                14 barometric sea-level pressure average (mb)
                15 barometric sea-level pressure min (mb)
                16 barometric sea-level pressure max (mb)
                17 heat index average (°C)
                18 heat index min (°C)
                19 heat index max (°C)
                20 humidex average (°C)
                21 humidex min (°C)
                22 humidex max (°C)

th     th#      2  temperature average (°C)
                3  temperature min (°C)
                4  temperature max (°C)
                5  dew point average (°C)
```

```
                6  dew point min (°C)
                7  dew point max (°C)
                8  humidity average (%)
                9  humidity min (%)
                10 humidity max (%)
                11 heat index average (°C)
                12 heat index min (°C)
                13 heat index max (°C)
                14 humidex average (°C)
                15 humidex min (°C)
                16 humidex max (°C)
                17 ... additional data at time resolution day1 or month1

t       t#      2  temperature average (°C)
                3  temperature min (°C)
                4  temperature max (°C)
                5  ... additional data at time resolution day1 or month1

uv      uv#     2  uv index (0-2 low, 3-5 medium, 6-7 high,
                           8-10 very high, 11-25 extremly high)

sol     sol#    2  solar radiation (W/qm)

data    data#   2  average
                3  minimum
                4  maximum
                5  sum
                6  sum per minute
                7  sum of increments
                8  rise events (number of rising edges)
                9  fall events (number of falling edges)

                ... where # stands for a number 0-9 (0-39 when thb, th, t, data)
```

Appendix E: Variables for Time & Date

When specifying a file name for FTP upload you can use time and date variables as defined for gnu c function "strftime":

%a The abbreviated weekday name according to the current locale.

%A The full weekday name according to the current locale.

%b The abbreviated month name according to the current locale.

%B The full month name according to the current locale. Using %B together with %d produces grammatically incorrect results for some locales.

%c The preferred calendar time representation for the current locale.

%C The century of the year. This is equivalent to the greatest integer not greater than the year divided by 100.

%d The day of the month as a decimal number (range 01 through 31).

%D The date using the format %m/%d/%y.

%e The day of the month like with %d, but padded with blank (range 1 through 31).

%F The date using the format %Y-%m-%d.

%g The year corresponding to the ISO week number, but without the century (range 00 through 99). This has the same format and value as %y, except that if the ISO week number (see %V) belongs to the previous or next year, that year is used instead.

%G The year corresponding to the ISO week number. This has the same format and value as %Y, except that if the ISO week number (see %V) belongs to the previous or next year, that year is used instead.

%h The abbreviated month name according to the current locale. The action is the same as for %b.

%H The hour as a decimal number, using a 24-hour clock (range 00 through 23).

%I The hour as a decimal number, using a 12-hour clock (range 01 through 12).

%j The day of the year as a decimal number (range 001 through 366).

%k The hour as a decimal number, using a 24-hour clock like %H, but padded with blank (range 0 through 23).

%l The hour as a decimal number, using a 12-hour clock like %I, but padded with blank (range 1 through 12).

%m The month as a decimal number (range 01 through 12).

%M The minute as a decimal number (range 00 through 59).

%n A single `\n' (newline) character.

%p Either `AM' or `PM', according to the given time value; or the corresponding strings for the current locale. Noon is treated as `PM' and midnight as `AM'. In most locales `AM'/`PM' format is not supported, in such cases "%p" yields an empty string.

%P Either `am' or `pm', according to the given time value; or the corresponding strings for the current locale, printed in lowercase characters. Noon is treated as `pm' and midnight as `am'. In most

locales `AM'/`PM' format is not supported, in such cases "%P" yields an empty string.

%r The complete calendar time using the AM/PM format of the current locale.

%R The hour and minute in decimal numbers using the format %H:%M.

%s The number of seconds since the epoch, i.e., since 1970-01-01 00:00:00 UTC. Leap seconds are not counted unless leap second support is available.

%S The seconds as a decimal number (range 00 through 60).

%t A single `\t' (tabulator) character.

%T The time of day using decimal numbers using the format %H:%M:%S.

%u The day of the week as a decimal number (range 1 through 7), Monday being 1.

%U The week number of the current year as a decimal number (range 00 through 53), starting with the first Sunday as the first day of the first week. Days preceding the first Sunday in the year are considered to be in week 00.

%V The ISO 8601:1988 week number as a decimal number (range 01 through 53). ISO weeks start with Monday and end with Sunday. Week 01 of a year is the first week which has the majority of its days in that year; this is equivalent to the week containing the year's first Thursday, and it is also equivalent to the week containing January 4. Week 01 of a year can contain days from the previous year. The week before week 01 of a year is the last week (52 or 53) of the previous year even if it contains days from the new year.

%w The day of the week as a decimal number (range 0 through 6), Sunday being 0.

%W The week number of the current year as a decimal number (range 00 through 53), starting with the first Monday as the first day of the first week. All days preceding the first Monday in the year are considered to be in week 00.

%x The preferred date representation for the current locale.

%X The preferred time of day representation for the current locale.

%y The year without a century as a decimal number (range 00 through 99). This is equivalent to the year modulo 100.

%Y The year as a decimal number, using the Gregorian calendar. Years before the year 1 are numbered 0, -1, and so on.

%z RFC 822/ISO 8601:1988 style numeric time zone (e.g., -0600 or +0100), or nothing if no time zone is determinable. In the POSIX locale, a full RFC 822 timestamp is generated by the format `"%a, %d %b %Y %H:%M:%S %z"' (or the equivalent `"%a, %d %b %Y %T %z"').

%Z The time zone abbreviation (empty if the time zone can't be determined).

%% A literal `%' character.

Appendix F: Directories, Backup and IP Listening

Directories

Meteohub exports its "/data" directory via SMB as a PC network share to the LAN. Windows Desktops/laptops in the LAN can easily connect to this network share. User name is "meteohub", password is "meteohub". The "/data" directory is exported as "public" with the following sub directories enclosed.

- **transfer** has no special meaning an can be used to transfer any data between Meteohub and the outside world.
- **export** provides WSWIN-compatible weather data in a monthly fashion (EXPmm_yy.csv) or all date in one file ("EXP01_00.csv). In addition Meteohub also provides "Weather Display" compatible monthly data in files ("mmyyyylg.txt" for primary sensors and "mmyyyyextralog.csv" for additional sensors).
- **graphs** has all the graph definitions in it. It is recommended to backup these definition from time to time, because you might have invested quite some time to create nice graph definitions. This folder can also contain user-defined HTML templates.
- **log** holds all log files. These can be inspected with Meteohub's web interface. Log files are periodically cut to a maximum of 1000 lines.
    - interfaces.log: Here Meteohub reports its network parameters (ip, etc.) every 15 minutes.
    - alarm.log: Here Meteohub reports about problems like: connect to an Internet weather network failed, FTP upload failed, sensor failed, and low battery condition.
    - messages: This is the kitchen sink for all kinds of system messages that would normally be reported to "syslog".
    - meteohub.log: Errors while reading data from the weather station will be reported here. In RFXCOM mode you will also see unrecognized packets in the log.
    - ntp.log: This is the log for the NTP daemon that does time synchronization via time servers in the Internet.
    - smb.log: This is the log file for SMB, that realizes access to the "/data" directory as a PC network share.
    - thttpd.log: This file logs access to Meteohub's web interface. You can see in the log, if the weather networks in pull mode do actually read the weather data from Meteohub system.
- **weather** contains all weather data. Raw data is in sub directories "YYYYMM" (YYYY=year, MM=month) in the file "raw". Format of "raw" is described in Appendix C. The other files are time-compacted weather data for each sensor and each time resolution. For example, "thb0-min5" holds data of sensor "thb0" (primary indoor thermo/hygro/baro sensor) in time resolution of "5 minutes".
- **uploads** contains graphs and pull weather network data that are generated from Meteohub and are scheduled for upload to a FTP server. These files are uploaded every 5 minutes and then deleted from the folder, if the upload was successful.
- **myweb** contains user specific HTML files. This allows Meteohub to act as a personal

web server. The "index.html" in this directory can be reached by HTTP request "http://..../myweb/index.html" and is pre-configured to show the dashboard an a header line. Sub directory "uploads" holds copies of the files that are going to be uploaded via FTP. The difference to the "uploads" directory mentioned in the paragraph before is, that files don't get deleted after an upload. The idea behind this is, that these files can be used by local HTML files located in the "myweb" directory. The "uploads" sub directory also holds the files needed for local display of the dashboard (dashboard.html, dashboard.swf) and WD live (wdlv5_04.swf, wdlv5_04.exe, swfobect.js, wdlconfig.xml, wdlive.html).

Beside the directories exported via SMB there are a couple of application specific directories that might also be interesting to know. You can access these by logging onto Meteohub via SSH (user "root", password "meteohub").

- "/srv/www/" contains weather data to be picked up from the Internet weather networks..
- "/srv/www/cgi-bin/" contains the application components that are used for administration.
- "/home/meteohub" contains some configuration files, necessary for Meteohub's operation.

Backup

To realize an effective backup the data in the directories "/data" (weather data, graphs) and "/home/meteohub" (configuration files) should be stored. This allows to save all individual settings (exception: time scheduling and network settings, which are stored in Linux system files) that are needed to do a complete restore. These backups can be done in two ways:

Backup via PC-Networkshare
All files in "/data" are accessible from PCs in the LAN. This allows to make a copy of them for backup purposes. Configuration files cannot be backuped this way, because samba does not share these files on the LAN.

Backup via "rsync" (preferred)

"rsync" is a very capable tool for incremental backup of large data volumes. "rsync" detects changes in the data according to the last backup and just transfers these changes to make the backup up to date again. This reduces the amount of data dramatically and allows for a very frequent synchronization of the backup data. Since version 1.6 Meteohub has a "rsync" daemon running ion background. Windows or Linux PCs can connect to Meteohub and can make use of this synchronization feature in order to build a local copy of Meteohub's data and configuration files. Meteohub presents two shares for synchronization via "rsync". "data" contains all the files in the "/data" directory, "config" contains all files from "/home/meteohub".

Windows: "rsync" is available as a package easy to install. It is not just pure "rsync" but also a part of the "cygwin" lib, but this shouldn't be your concern. You can find a version of "rsync" for Windows in Meteohub's download area. After installation of the package you have to "cd" into the "bin" directory. There you can call "rsync" to copy Meteohub's "/data" folder to the "mydata" folder on your local PC (the example assumes that your Meteohub has the name "meteohub" in your LAN):

```
rsync.exe -uav rsync://root@meteohub/data mydata
```

Todo the same with Meteohub's configuration files do this:

```
rsync.exe -uav rsync://root@meteohub/config myconfig
```

You can let your PC to do this automatically by writing a short batch file and by putting this into your time scheduler. This is very straight forward.

To restore data, make use of this "rsync" call (Warning: This time data on the Meteohub will be overwritten):

```
rsync.exe -av mydata rsync://root@meteohub/data
rsync.exe -av myconfig rsync://root@meteohub/config
```

Linux: With Linux "rsync" should be part of the default packages and will not need extra installation in most cases. You can call "rsync" exactly as explained for Windows. Automation should be realized by a crontab entry.

More details about "rsync" can be found here: "http://samba.anu.edu.au/rsync/"

IP Listening

About one minute after starting reboot Meteohub signals its IP by the build in beeper. You can disable this noisy but sometimes helpful feature by placing a file named "noreadip" into the pc network folder "/public/log".

Signaling of the IP starts with a low frequency tone of a long duration. After that each of the four numbers (delimited by a dot) will be signaled one by one. The dot between the numbers will be signaled by a high frequency tone. Each number is signaled by sending beeps digit per digit. Each digit is represented by a middle frequency tone repeated as often as the digit tells us. The zero digit is signaled by ten beeps. After having done this for all digits of all numbers of the IP, the end is signaled by a low frequency, long beep like it started with.

Example: IP 192.168.10.77

Legend: L = low freq. tone, M = middle freq. tone, H = high freq. tone, _ = pause

Signal:	Comment
LLLL___M___M_M_M_M_M_M_M_M_M___M_M___H	192
___M___M_M_M_M_M_M___M_M_M_M_M_M_M_M_M___H	168
___M___M_M_M_M_M_M_M_M_M_M_M___H	10
___M_M_M_M_M_M_M___M_M_M_M_M_M_M___LLLLL	77

When Meteohub does not have a valid IP this will be signaled with three low frequency beeps shortly following each other.

Don't mess this up with the three middle frequency beeps Meteohub sends on NSLU2 platform when having finished boot, which corresponds with the green/yellow blinking Ready/Status LED changing to constant green.

On ALIX.3 boards, that don't have a buzzer, the three LEDs at the back are used for IP signaling. Low frequency beep ("L") is represented by all tree LEDs being switched on. Middle frequency beep ("M") is represented by a short blink of the left most LED and high frequency beep ("H") is represented by a blink of the right most LED. The picture below shows LED situation for standard Meteohub operation, where the right most LED is lit.

On SheevaPlug the blue LED is used for IP signaling. "L" is indicated by blue LED off, "M" is indicated by dimmed blue LED, "H" is indicated by a bright blue LED.

Appendix G: Sensors supported by RFXCOM and Meteohub

Sensor Model	Picture	Measurement
Oregon-THR128 Oregon-THR138 Oregon-THC138		Temperature
Oregon-THN132N Oregon-THWR288A Oregon-THC238/268		Temperature resp.. Water Temperature
Oregon- THGN122N/132N Oregon-THGR122NX Oregon-THGR228N		Temperature, Humidity
Oregon-THGR810 Oregon-THGR328N		Temperature, Humidity
Oregon-WTGR800		Temperature, Humidity
Oregon-THGR918 Oregon-THGN801		Temperature, Humidity
Huger - BTHR918 Oregon-BTHR918N Oregon-BTHR968		Temperature, Humidity, Pressure
Oregon-RGR126 Oregon-RGR682 Oregon-RGR918		Rain Fall
Oregon-PCR800		Rain Fall
Oregon-WTGR800		Wind Speed, Wind Direction
Huger-STR918 Oregon-WGR918		Wind Speed, Wind Direction
Oregon-UVR138 Oregon-UVN800		UV Index

Appendix H: Supported USB Web Cams (experimental for x86 platform)

List of USB web cams which are supported by the gspcav1 driver according to "http://mxhaard.free.fr/spca5xx.html" and are providing JPEG data.

Hersteller	Vendor ID	Product ID	Beschreibung	Bridge
Agfa	0x06bd	0x0404	ePhoto CL20	spca500a
Apex Digital/Sunplus	0x04fc	0x5330	Digitrex 2110	spca533a
GigaTechCompagny/Sunplus	0x04fc	0x5330	TDC 202A	spca533a
Aiptek/Sunplus	0x04fc	0x504a	Mini PenCam-1.3	spca504a
Aiptek/Sunplus	0x04fc	0x504b	Mini Pencam 1.3	spca504b
Aiptek/Sunplus	0x04fc	0x500c	Generic spca504b	spca504b
Aiptek/Sunplus	0x04fc	0x5360	Generic spca536a	spca536a
Aiptek	0x08ca	0x0103	Pocket DV	spca500c
Aiptek	0x08ca	0x0104	Pocket DVII	spca533a
Aiptek	0x08ca	0x0106	Pocket DV3100	spca533a
Aiptek	0x08ca	0x2008	Mini PenCam 2M	spca504b
Aiptek	0x08ca	0x2010	PocketCam 3M	spca504b
Aiptek	0x08ca	0x2012	Slim3200	spca533a
Aiptek	0x08ca	0x2016	PocketCam 2M	spca504b
Aiptek	0x08ca	0x2018	PenCam SD 2M	spca504b
Aiptek	0x08ca	0x2020	Slim 3000F	spca533
Aiptek	0x08ca	0x2022	PocketCam 4M	spca533
Aiptek	0x08ca	0x2024	Pocket DV3500	spca536a
Aiptek	0x08ca	0x2028	PocketCam 4M	spca533
Aiptek	0x08ca	0x2040	Pocket DV4100M	spca536a
Aiptek	0x08ca	0x2042	Pocket DV5100	spca536a
Aiptek	0x08ca	0x2060	Pocket DV5300	spca536a
Benq	0x04a5	0x300a	DC 3410	spca533a
Benq	0x04a5	0x300a	DC 35	spca533a
Benq	0x04a5	0x3003	DC 1300	spca504b
Benq	0x04a5	0x3008	DC 1500	spca533a
Creative	0x041e	0x400a	PC Cam 300	spca500a
Creative	0x041e	0x400b	PC Cam 600	spca504c
Creative	0x041e	0x4012	PC Cam 350	spca504c
Creative	0x041e	0x4013	PC Cam 750	spca504b
Creative	0x041e	0x401d	NX Ultra	spca505b
D-Link	0x084d	0x0003	DSC 350	spca500a
Dolphin	0x08ca	0x2010	PowerCam 2M	spca504b
Dolphin	0x08ca	0x2012	Dolphin Fast usb1016	spca533a
Digital Dream	0x05da	0x1018	Enigma 1.3	spca504b
Digital Dream	0x0733	0x1311	Epsilon 1.3	spca533a
Ezonics	0x04fc	0x0561	EzCam III	spca561a
Genius	0x0458	0x7004	VideoCam Express V2	spca561a
Genius	0x0458	0x7006	Dsc-1.3M Smart	spca504b-P3
Intel	0x8086	0x0630	Pocket Pc Camera	spca500

JVC	0x04f1	0x1001	GC-A50	spca504b
Kodak	0x040a	0x0300	EZ 200	spca500a
Kowa	0x055f	0xc211	Bs-888e	spca536
Logitech	0x046d	0x0890	Traveler	spca500a
Logitech	0x046d	0x0900	Clicksmart 310	spca551a
Logitech	0x046d	0x0901	Clicksmart 510	spca500a
Logitech	0x046d	0x0905	Clicksmart 820	spca533a
Logitech	0x046d	0x0928	QC Express Elch2	spca561a
Labtec	0x046d	0x0929	Webcam Elch2	spca561a
Logitech	0x046d	0x092a	QC for Notebook	spca561a
Labtec	0x046d	0x092b	Labtec Webcam	spca561a
Logitech	0x046d	0x092c	QC chat	spca561a
Logitech	0x046d	0x092e	QC chat	spca561a
Logitech	0x046d	0x092f	QC chat	spca561a
Logitech	0x046d	0x0960	Clicksmart 420	spca504b
Medion	0x08ca	0x2012	MD40820	spca533a
Mercury	0x0733	0x3281	Cyberpix S550v	spca533a
Mustek	0x055f	0xc200	Gsmart 300	spca500
Mustek	0x055f	0xc220	Gsmart mini	spca500
Mustek	0x055f	0xc230	Digicam 330k	spca533
Mustek	0x055f	0xc232	MDC3500	spca533
Mustek	0x055f	0xc420	Gsmart mini2	spca504a
Mustek	0x055f	0xc520	Gsmart mini3	spca504a
Mustek	0x055f	0xc540	Gsmart D30	spca533a
Mustek	0x055f	0xc630	MDC 4000	spca533a
Mustek	0x055f	0xc650	MDC 5500z	spca533a
Mustek	0x055f	0xc530	Gsmart LCD2	spca533a
Mustek	0x055f	0xc520	Gsmart LCD3	spca533a
Mustek	0x055f	0xc440	DV 3000	spca533a
Megapix	0x052b	0x1513	Megapix V4	spca533a
Opti Media	0x06be	0x0800	Optimedia	spca500a
Palmpix	0x04fc	0x7333	DC-85	spca500a
Philips	0x08ca	0x504a	K 007	spca504b
Polaroid	0x0546	0x3273	PDC2030	spca504b
Polaroid	0x0546	0x3155	PDC3070	spca533a
Polaroid	0x0546	0x3191	Ion 80	spca504b
jenoptik	0x0733	0x2211	JDC 21 LCD	spca533
MercuryDigital	0x0733	0x2221	Mercury Digital Pro 3.1 Mp	spca533
MercuryDigital	0x0733	0x1314	Mercury Digital Pro 2.1 Mp	spca533
Concord	0x0733	0x3261	Concord 3045	spca536a
ToptroIndus	0x2899	0x012c	Toptro	spca500a
Terratec	0x04fc	0x504a	TeraCam2 move1.3	spca504b
Trust	0x06d6	0x0031	610 LCD Powerc@m Zoom	spca533a

Philips	0x0471	0x0322	DMVC 1300K	spca504b
Orite	0x0c45	0x607c	I-Cam	sn9c102p
Sangha	0x0c45	0x60c0	Sn-535	sn9c105
PCcam168	0x0c45	0x613c	PcCam168	sn9c120
PCcam +	0x0c45	0x6130	PcCam +	sn9c120
LG	0x0c45	0x60fc	Lic-300	sn9c105
Philips	0x0471	0x0328	SPC700NC	sn9c105
Speed	0x0c45	0x6040	NVC350K	sn9c102p
Philips	0x0471	0x0327	SPC600NC	sn9c105
Sonix	0x0c45	0x613b	Generic	sn9c120
MicroSoft	0x045e	0x00F7	VX1000	sn9c105r
MicroSoft	0x045e	0x00F5	VX3000	sn9c105r
Sonix	0x0c45	0x6138	Sonix	sn9c120
Genius	0x0458	0x7025	Genius eye 311Q	sn9c120
Creative	0x0572	0x0041	Webcam NoteBook	CX11646
Creative	0x041e	0x401f	Webcam NoteBook	Zc0301P
Creative	0x041e	0x4017	Webcam Mobile	Zc0301P
Mustek	0x055f	0xd003	WCam300A	Zc0301P
Mustek	0x055f	0xd004	WCam300A	Zc0301P
Mustek	0x055f	0xc005	WCam300A	Zc0302
Genius	0x0458	0x7007	VideoCamV2	Zc0301P
Genius	0x0458	0x700c	VideoCamV3	Zc0301P
Labtec	0x046d	0x08a2	Webcam Pro	Zc0302
Genius	0x0458	0x700f	VideoCam Web	Zc0301P
Creative	0x041e	0x401e	Creative NX Pro	Zc0301P
Creative	0x041e	0x403a	Creative NX Pro2	Zc0301P
Creative	0x041e	0x4036	Creative Live!	Zc0301P
Wasam	0x0ac8	0x301b	Wasam Wa350R	Zc0301P
LDLC	0x0ac8	0x0302	LDLC	Zc0302
Conceptronic	0x0ac8	0x0302	USB ChatCam	Zc0302
Pro|Series	0x0ac8	0x301b	Msn Messenger Webcam	Zc0301P
Digigr8	0x0ac8	0x301b	Low Light Vision	Zc0301P
SanSun	0x0ac8	0x301b	SanSun508	Zc0301P
LG	0x0ac8	0x301b	Lic 100	Zc0301P
WebCamera	0x0ac8	0x0302	WebCamera	Zc0302
Typhoon	0x10fd	0x8050	Typhoon Webshot II	Zc0301p
Logitech	0x046d	0x08a0	QuickCam IM	zc030x
Logitech	0x046d	0x08ae	QuickCam tor Notebook	zc030x
Typhoon	0x10fd	0x0128	Typhoon Webshot II	Zc0301p
Creative	0x041e	0x401c	Creative NX	Zc0301
Creative	0x041e	0x4034	Creative Instant	Zc0301
Creative	0x041e	0x4035	Creative Instant	Zc0301
Creative	0x041e	0x4051	Creative Live Notebook Pro	Vc301p

Creative	0x041e	0x4053	Creat. Live!Cam VideoIM	Vc301p
Creative	0x041e	0x4029	Creative WebCam Live!	Vc301p
Vimicro	0x0ac8	0x305b	Generic VC0305	Zc0302
Logitech	0x046d	0x08ad	Communicate STX	Zc0302
Logitech	0x046d	0x08d7	Communicate STX	Vc0302
Embedded Webcam	0x0ac8	0x0302	Embedded Webcam	Zc0302
Logitech	0x046d	0x08a9	NoteBook Deluxe	Zc0302
Labtec	0x046d	0x08aa	NoteBooks	Zc0302
Vimicro	0x0ac8	0x303b	Generic	Zc0301p
Genius	0x0ac8	0x301b	Cam Look312p	Zc0301p
Logitech	0x046d	0x08a6	QuickCam IM	zc030x
Chuntex (CTX)	0x0698	0x2003	CTX M730V TFT	zc030x
Microscope Camera	0x0ac8	0x301b	DCM35	zc030x
Philips	0x0471	0x0325	SPC200NC	vc0305
Empress	0x0ac8	0x301b	PC 390	vc0301
A4Tech	0x0ac8	0x301b	PK-35N	vc0301
Philips	0x0471	0x0326	SPC300NC	vc0305
LDLC	0x0ac8	0x301b	Sweety Cam	zc0301p
SAMSUNG	0x0ac8	0x301b	Pleomax SamPwc3800N	zc0301p
Logitech	0x046d	0x08a7	QuickCam Image	zc030x
Logitech	0x046d	0x08ac	QuickCam Cool	zc030x
Logitech	0x046d	0x08d9	QuickCam IM/Connect	zc030x
Logitech	0x046d	0x08da	QuickCam Messenger	zc030x
Logitech	0x046d	0x08d8	QC for Notebook Deluxe	Vc0302
Philips	0x0471	0x032d	SPC210NC	vc0305
Philips	0x0471	0x032e	SPC315NC	vc0305
Pcam	0x093a	0x050f	Pcam	MR97311
Typhoon	0x093a	0x2600	Typhon	Pac7311
Philips	0x093a	0x2601	spc610nc	Pac7311
Pixart ??	0x093a	0x2603	Typhon	Pac7312
Trust	0x093a	0x2608	WB 300P	Pac7311
Gigaware	0x093a	0x260e	VGA PC camera	Pac7311
Trust	0x093a	0x260e	WB 3350P	Pac7311
Sigma	0x093a	0x260e	Cam2350	Pac7311
SnakeCam	0x093a	0x260e	Snake Cam	Pac7311
Aiptek	0x08ca	0x0109	Pocket DV3300	zr36430
Creative	0x041e	0x4024	PC Cam 880	zr36430
Aiptek	0x0d64	0x0108	Fidelity 3200	zr36430
Polaroid	0x0546	0x3187	Ion 320	zr36430
Maxell	0x08ca	0x0109	Maxcam pro DV3	zr36430
Praktica	0x0d64	0x3108	Exakta DC2200	zr36430
Concord	0x0595	0x4343	Eye Q Duo 1300	zr36430
Ricoh	0x0595	0x4343	RDC-6000	zr36430

Concord	0x0bb0	0x500d	EyeQ Go Wireless	zr36430
Praktica	0x0d64	0x0108	DC-Z 1.3 S	zr36430
CRS Electronic	0x0feb	0x2004	303 Digital Camera	zr36430
Genius	0x0d64	0x0108	Digital Camera (?)	zr36430
Concord	0x0595	0x4343	Eye-Q Duo 2000	zr36430
Fujifilm	0x0595	0x4343	EX 10	zr36430
Aiptek	0x08ca	0x2062	Pocket DV5700	zr36430
ChipHead	0x052b	0x1a18	Megapix V12	zr36430
Konica	0x04c8	0x0729	Revio 2	zr36430

Appendix I: Language Files

Without language files Meteohub just supports German and English. By adding language files ending with extension ".lang" to the folder "/public/graphs/" you can make Meteohub to support more languages. Adding language files works as follows:

1. Download a language file template from "www.meteohub.de".
2. The word "TEMPLATE" in the first line of the template file has to be changed to the name of the language (in it's origin language).
3. The succeeding lines in the template list all expressions to be translated, followed by a double colon "::". Translation should be placed directly behind the "::".
4. When the template has been filled with translations it has to be stored in "/public/graphs/" as file "xxxx.lang" (choose a speaking name instead of xxxx).
5. When page "settings" is now called again it will present the new defined language as one of the options. Choose the language and press "save". After that you will see the web interface switching to the selected language. Expressions that have not been translated will be displayed in English.

Language files contain two types of translation entries:

1. Single translation entries provide a direct translation of the expression on the left. Example:
   `Save::Speichern`
2. Array translation entries provide a list expressions on the left of "::" to be translated in exactly the same order on the right of "::". Expressions are separated by "|". Array translation entries start with a double quote followed by a numerical ID and a list of Expressions to be translated separately. On the right of "::" translation of expressions have to occur in exactly the same order as on the left side and also separated by "|". Example::
   `"03|Save|Rename|Delete::Speichern|Umbenennen|L&ouml;schen`

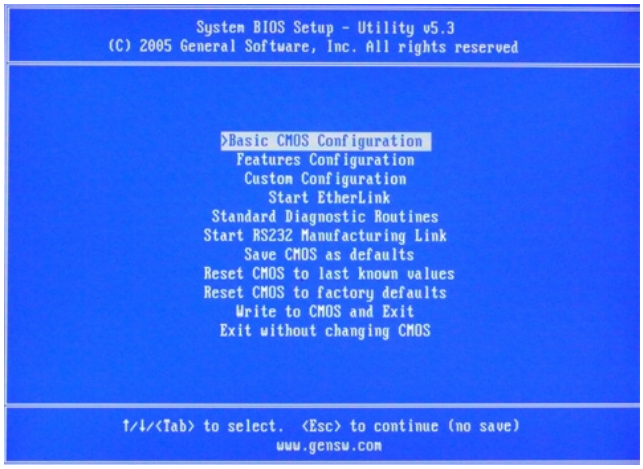
Meteohub allows to update an existing language file to expressions used in new Meteohub versions. Simply select the language you want to update on the "Settings" page and make the language active by pressing "save". Then goto "Maintenance" page and update the language file by pressing "Update". This purges translations no longer used from the language file and adds new expressions to it. Expressions that still have a translation and are still used a left unchanged. Newly added expressions and expressions that have not been given a translation so far are located at the end of the updated language file.

Language files can be edited by any UTF-8 capable text editor. Line ends can be handled in Unix or DOS style (lf vs cr+lf). You will find a link to a simple UTF-8 text editor in the language file section of the downlaod area of "www.meteohub.de".

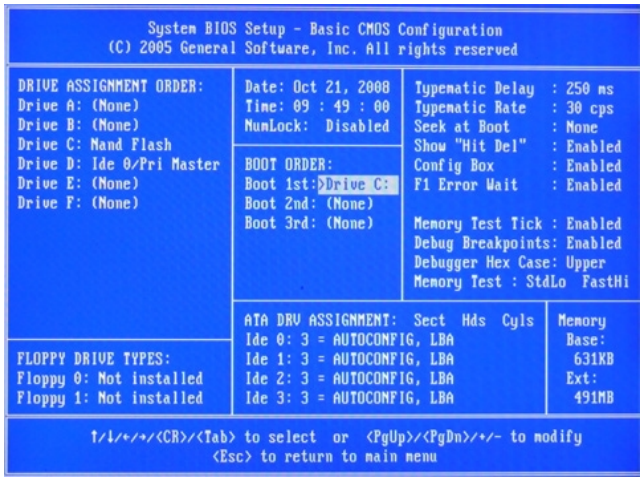
Meteohub uses UTF-8 as default character set when displaying contents on it's web interface. When another character set should be used instead the variable "iso-8859-1" (that is normally bound to UTF-9) has to be redefined in the language file. For example: If your language file needs iso-8859 encoding, you simply have to change the line "iso-8859-1::utf-8" to "iso-8859-1::iso-8859-1" in the corresponding language file. This allows to choose specific character sets for an individual language file.

Appendix J: BIOS-Settings for Fit-PC Slim

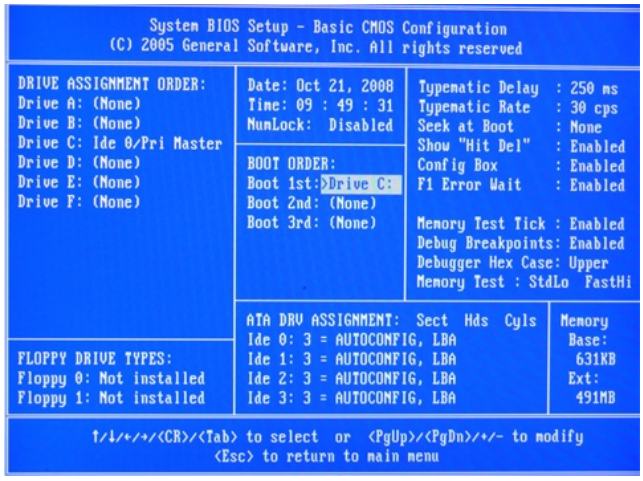
These screen dumps illustrate recommended BIOS settings for Fit-PC Slim

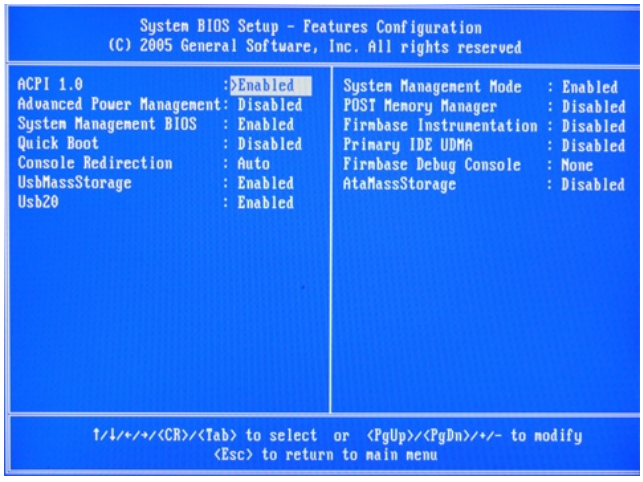


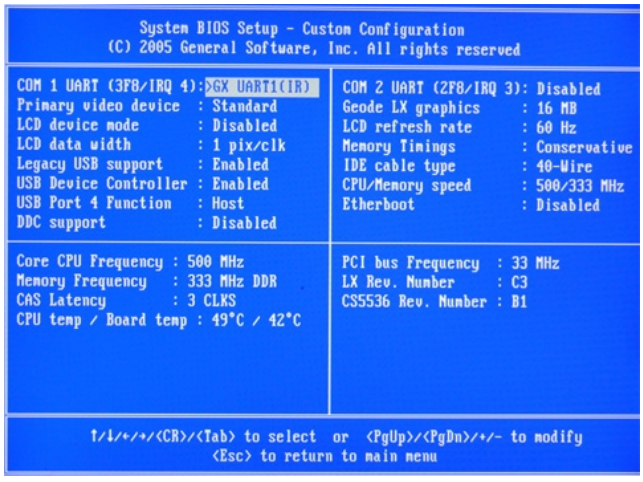
Parameter during Meteohub installation



Parameter during Meteohub Operation

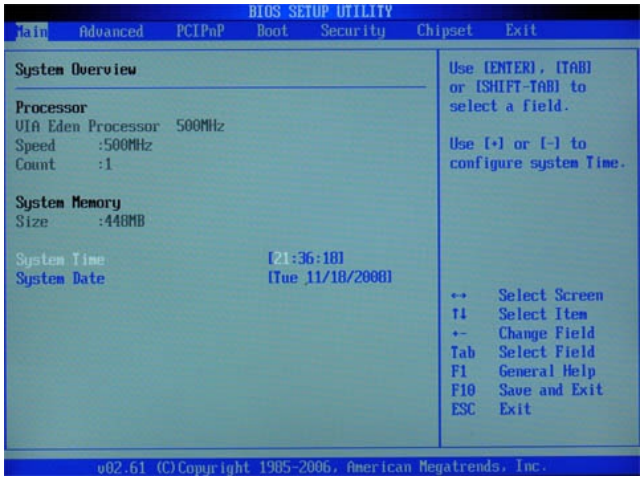


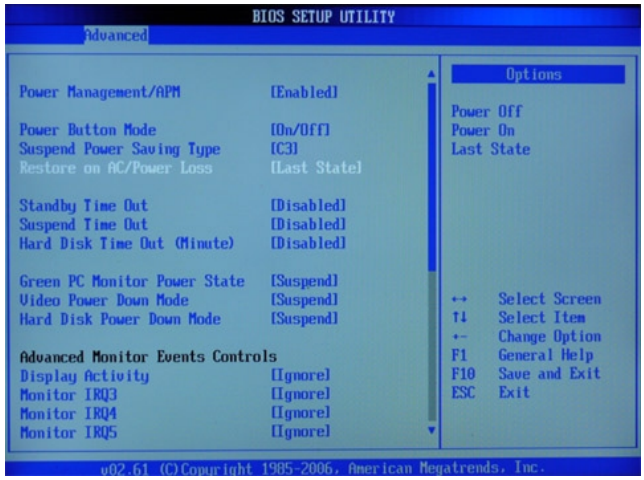


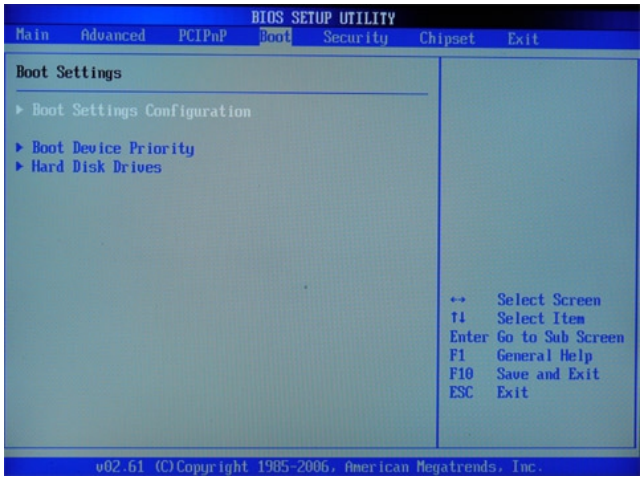


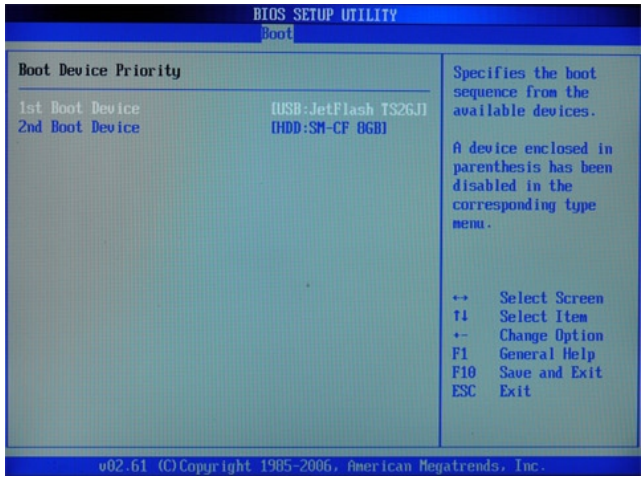
Appendix K: BIOS-Settings for ebox 4300

These screen dumps illustrate recommended BIOS settings for ebox 4300.



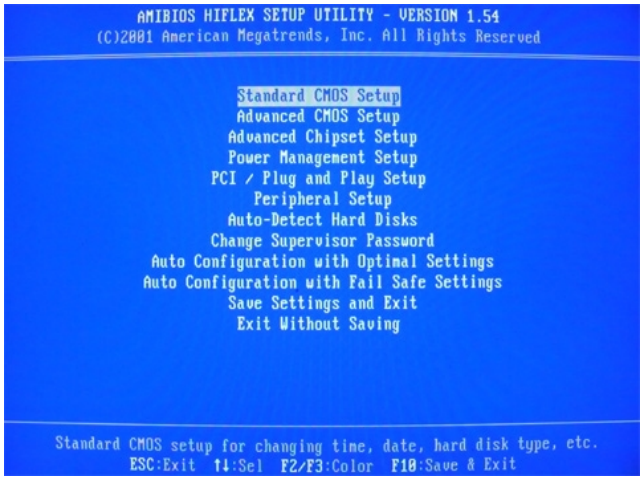




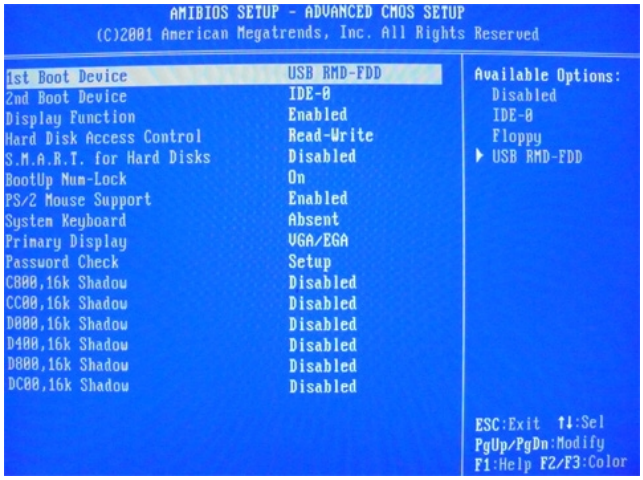


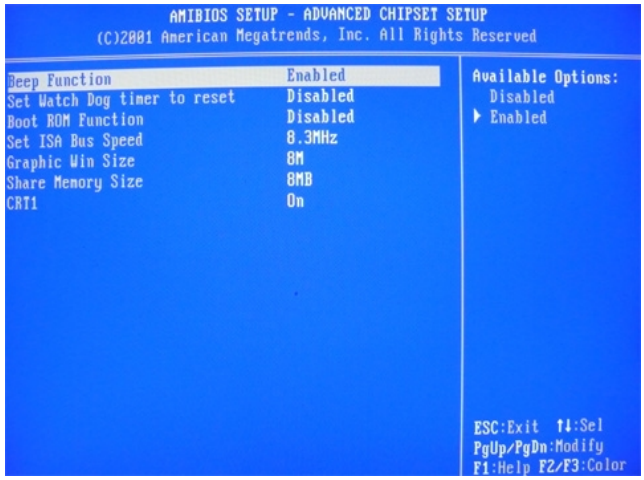
Appendix L: BIOS-Settings for ebox 2300

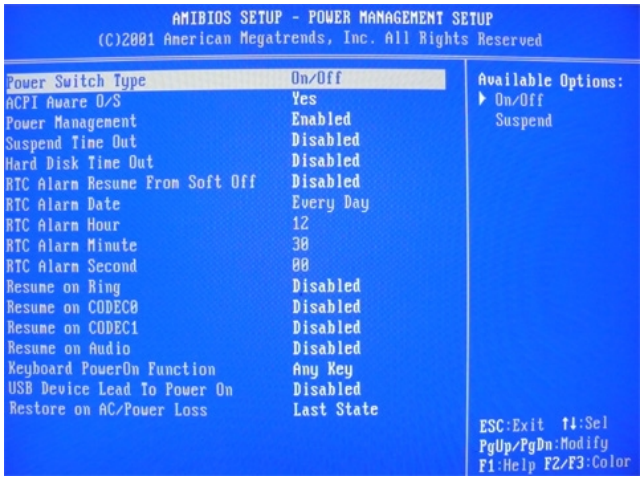
These screen dumps illustrate recommended BIOS settings for ebox 2300.

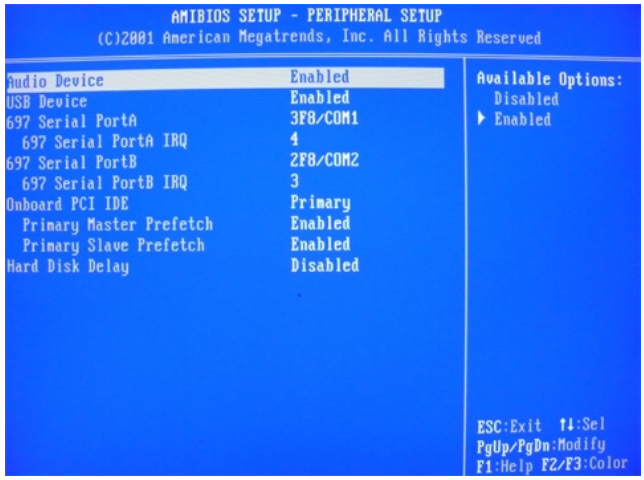


Important: USB stick has to be plugged in during power-on to make "USB RMD-FDD" selectable!



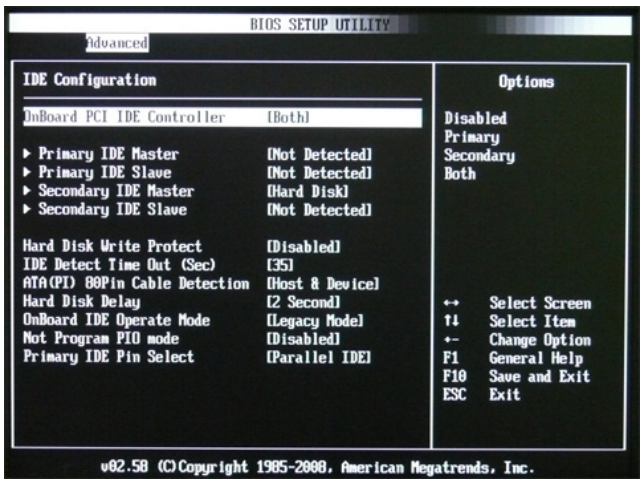


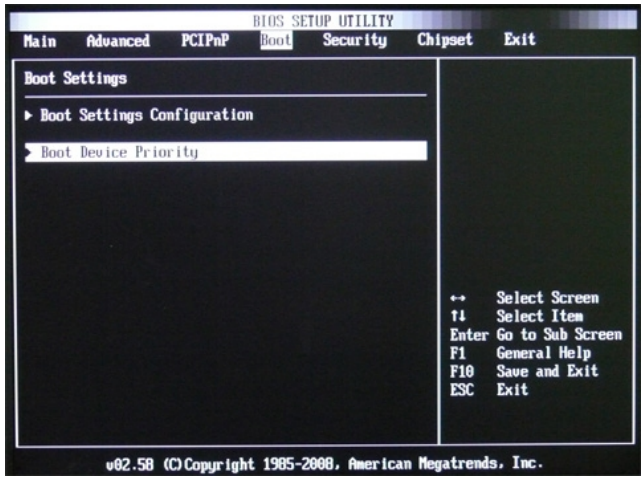




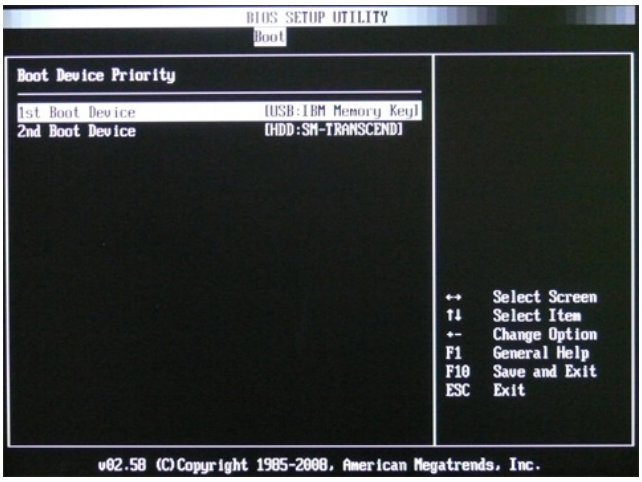
Appendix L2: BIOS-Settings for ebox 3300

These screen dumps illustrate recommended BIOS settings for ebox 3300.

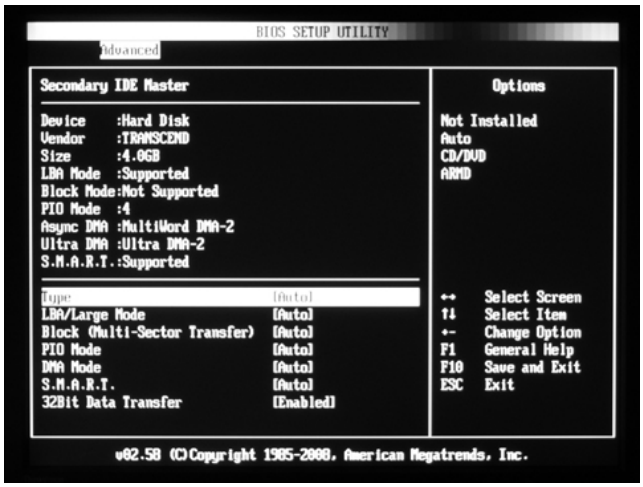




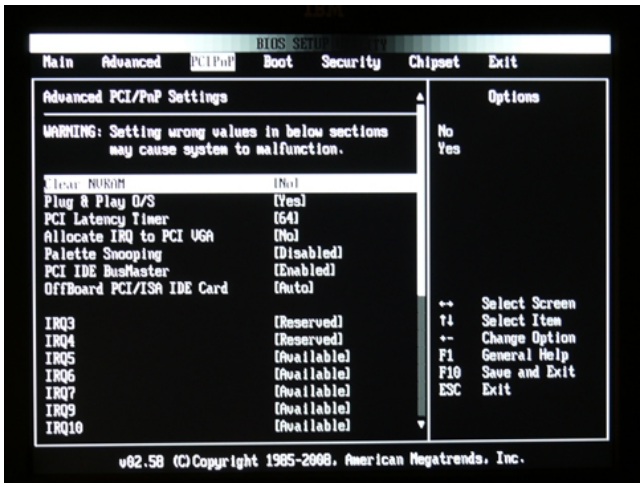
Important: USB stick has to be plugged in during power-on to make "USB RMD-FDD" selectable!



Settings for CF Card as Secondary IDE Master

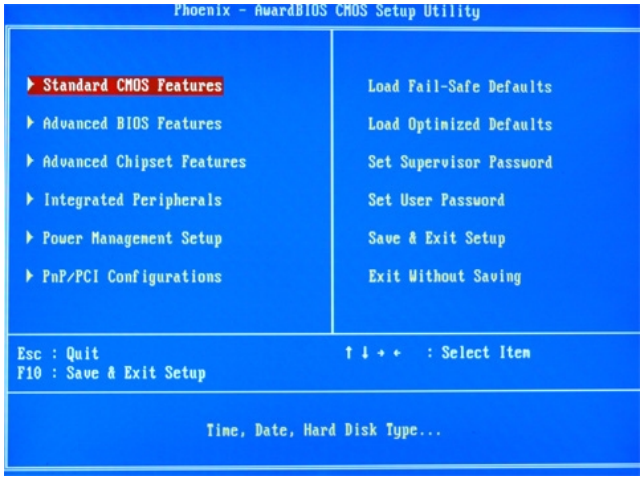


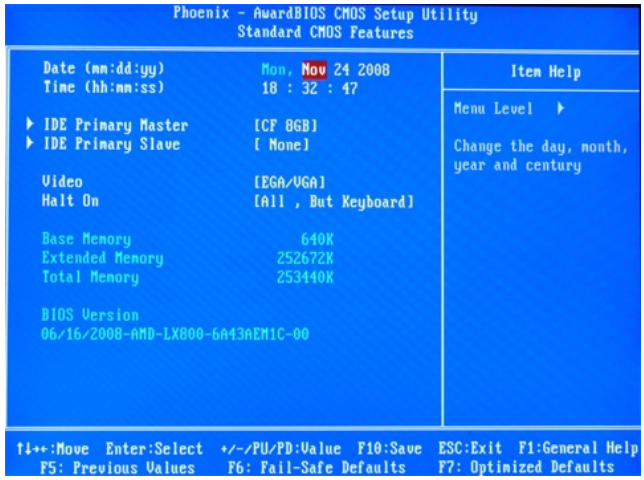
PCIPnP Settings

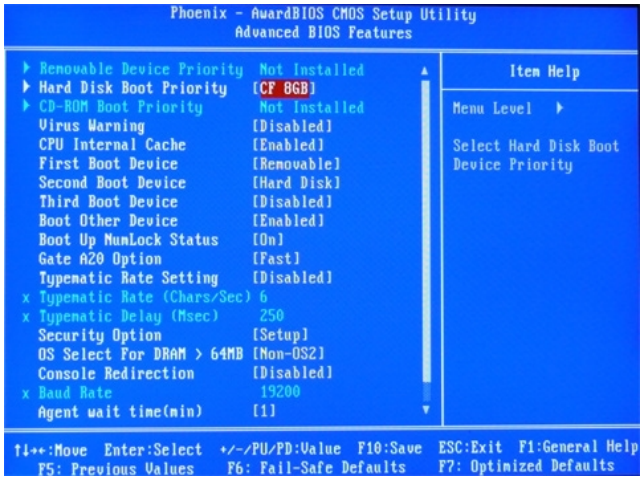


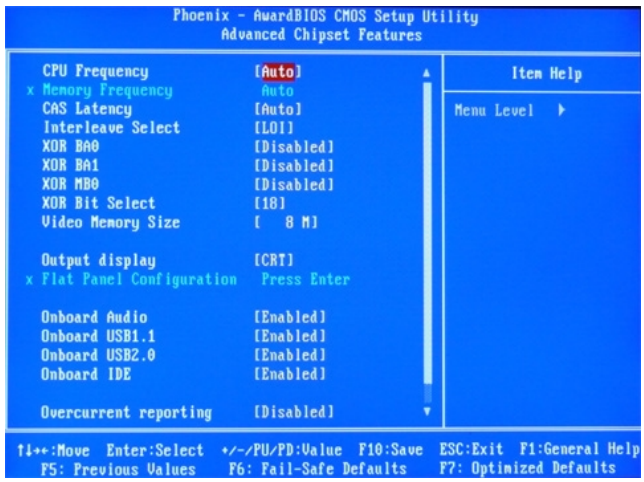
Appendix M: BIOS-Settings für ALIX.1D

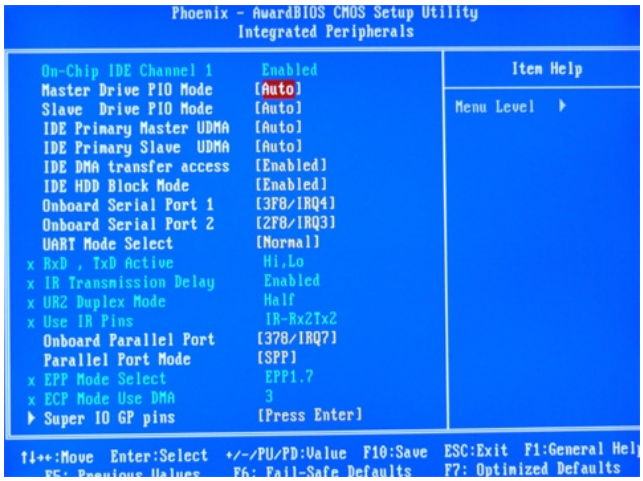
These screen dumps illustrate recommended BIOS settings for ALIX.1D.











Appendix N: Hardware Setup of ALIX.1D

You need the following items to setup Meteohub hardware based on ALIX.1D board:

- PC Engines ALIX.1D system board
- PC Engines indoor metal case (black) for ALIX.1D / ALIX.1C (incl. screws and rubber feet)
- suitable external power supply (rated 12V 1.2 A)
- 4GB CF card
- optional: Compex WLM54G WLAN miniPCI card (802.11 b/g support)
- optional: WLAN antenna with 15 cm connector cable to miniPCI WLAN card

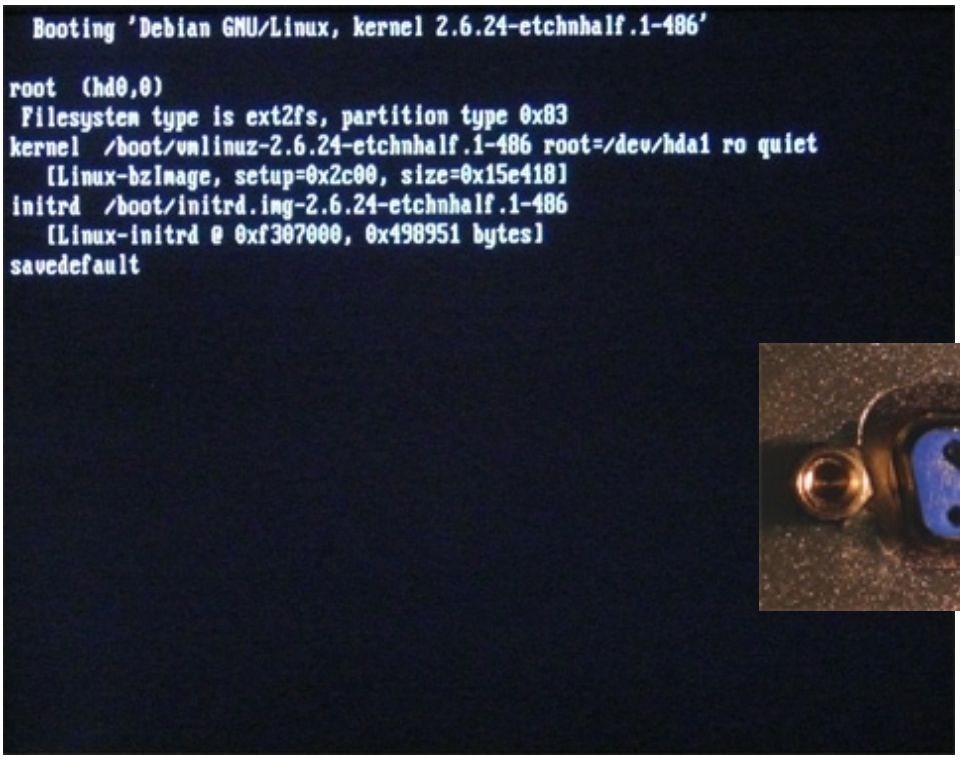
Having these items, installation of hardware components can be done in a few minutes. All you need is a screw driver.

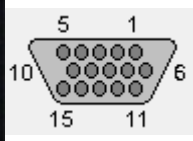
1. Unscrew the 4 screws that are at the back of system board's VGA and RS232

connectors. These have to be removed temporarily to get the upper part of the case mounted in step 6.

2. Mount system board on the lower part of the case and fix it with 4 small silver screws.
3. Put CF card into corresponding on-board slot (see picture).
4. optional: Put minPCI WLAN adapter into corresponding miniPCI slot. MiniPCI cards are mounted in three steps: a) lift non-connecting side a bit b) push connector side into the slot while also pressing down the non-connecting side c) when you hear "click" it is fixed (see picture for final state).
5. optional: Mount WLAN connector into the corresponding hole of the case. Connect the end of the cable with "MAIN" labeled connector on WLAN adapter (see picture). The connector is tiny, make sure it is positioned correctly, then press to make it snap in.
6. Screw the 4 screws from step 1 into VGA and RS232 connector again. The screws will support stability and allow to fix VGA and RS232 cables with dump screws that fit into the heads of the screws used here.
7. Mount upper part of the case, screw this by 4 black screws, put 4 rubber feet below the case.

When booting ALIX.1D without having a monitor connected (or with having an old monitor connected that does not report monitor type on pin 12 correctly) boot procedure will halt at messages "savedefault" (see picture). To avoid this, pins 12 and 5 on VGA connector of ALIX.1D have to be connected. This can easily done by cutting and folding a 18 mm long piece from a paper clip and folding it into u-shape with 5 mm long legs on the ends and a 8 mm long part in-between. Don't forget to remove the bridge before trying to connect a monitor to ALIX.1D. After having done successful boot, the paper clip bridge can be plugged of or an old monitor that does not work for booting can be reconnected, if needed.





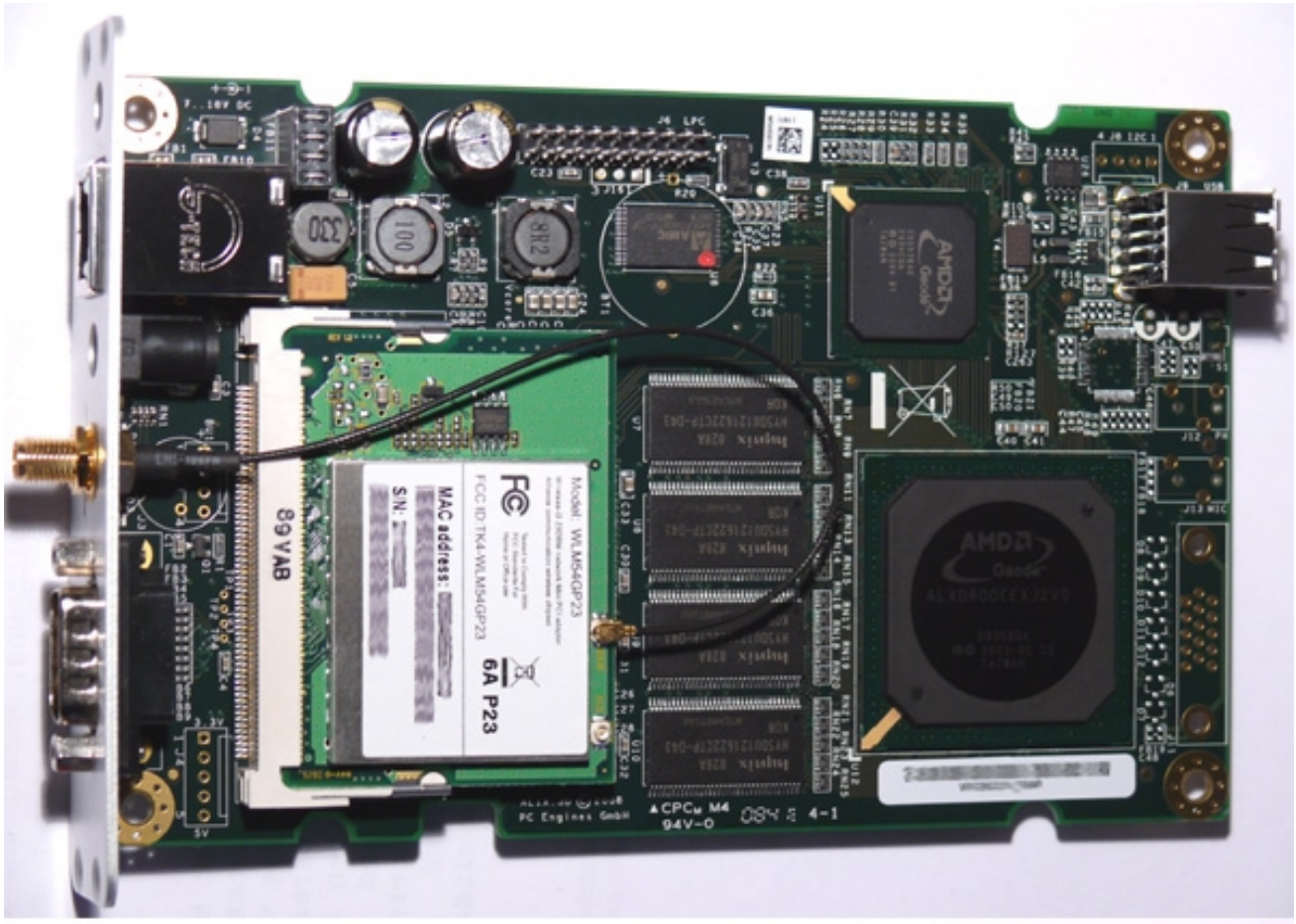
Appendix O: Hardware Setup of ALIX.3D2

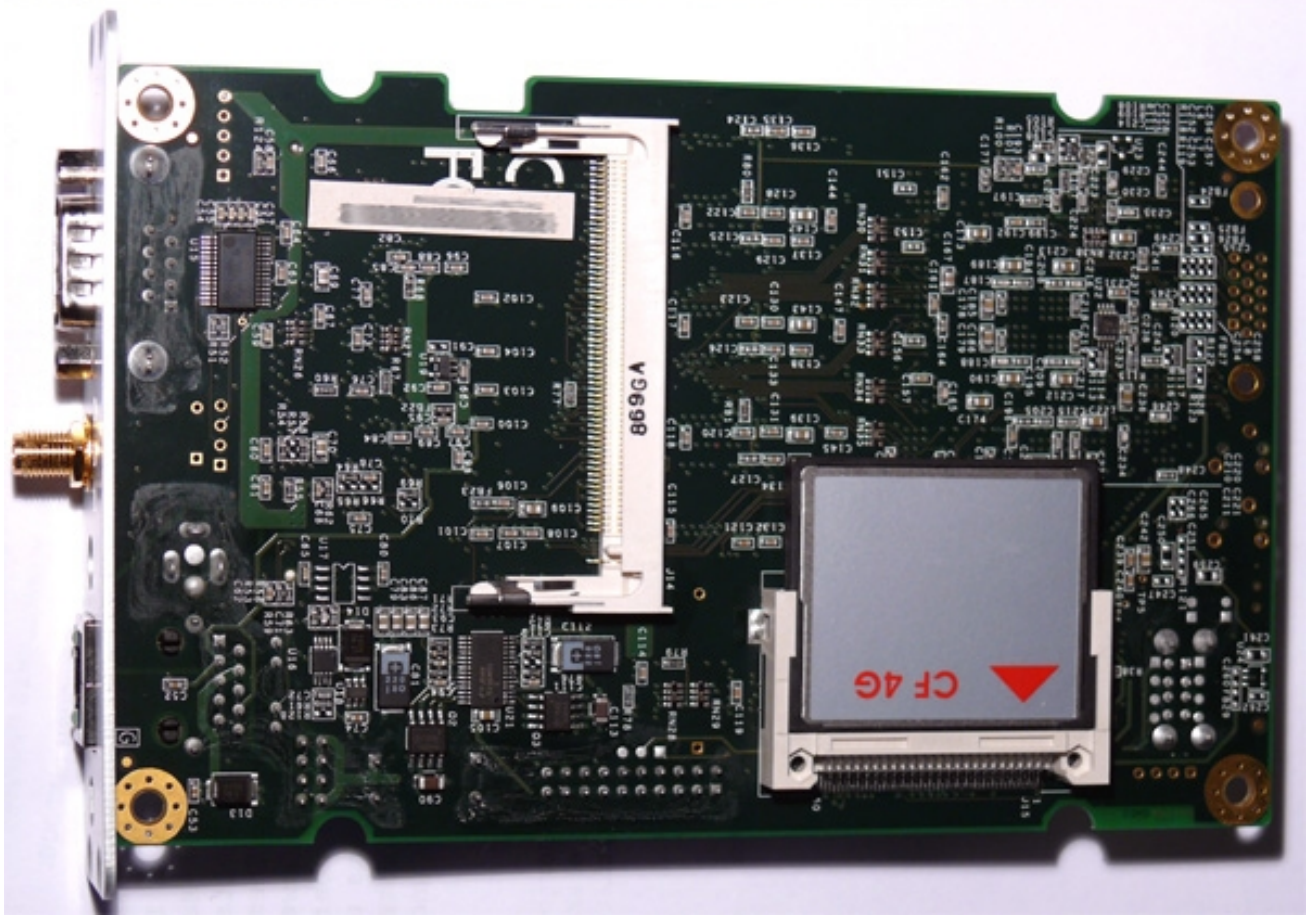
You need the following items to setup Meteohub hardware based on ALIX.3D2 board:

- PC Engines ALIX.3D2 system board
- PC Engines indoor metal case (silver) for ALIX.3 (incl. cover plate for the back, 4 screws, 4 transparent rubber feet, rubber parts to close unused WLAN mounting holes)
- front cover plate with cut-offs for 2 USB ports
- suitable external power supply (rated 18V 0.8 A)
- 4GB CF card
- optional: Compex WLM54G WLAN miniPCI card (802.11 b/g support)
- optional: WLAN antenna with 15 cm connector cable to miniPCI WLAN card

Having these items, installation of hardware components can be done in a few minutes. All you need is a screw driver and a tool to unscrew RS232 connector.

1. Unscrew the 2 screws that are at the back of system board's RS232 connector. put the metal back plate onto the backend of the board and firmly connect backplate and system board with the screws just unscrewed from RS232 connector.
2. Put CF card into corresponding on-board slot. CF cars must already hold Meteohub software.
3. optional: Put minPCI WLAN adapter into corresponding miniPCI slot on the board's upper side. MiniPCI cards are mounted in three steps: a) lift non-connecting side a bit b) push connector side into the slot while also pressing down the non-connecting side c) when you hear "click" it is fixed.
4. optional: Mount WLAN connector into the corresponding hole of the metal back plate. Connect the end of the cable with "MAIN" labeled connector on WLAN adapter (see picture). The connector is tiny, make sure it is positioned correctly, then press to make it snap in.
5. Push system board into the metal case. Make use of the rails inside the case to get the board positioned correctly.
6. mount the back plate to the case by 4 screws. Mount front cover plate with 4 screws. Pay attention that cut-off of font cover plate does match with USP ports on system board.
7. Put transparent rubber feet under the case. Close unused holes on the back plate with appropriate rubber parts.


Model: WLM54GP23
MAC address:
S/N:
6A P23
89 YAB
PC Engines GmbH


CF 4G