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Note

All measurement data and plots shown in this manual refer to the test installation of Ammonit in Berlin (Ammonit field tests; Dachmast) and dummy data (Power curve measurement; Power curve logger) and are no reference for real assessment projects.

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Chapter 1

Introduction

AmmonitOR (Ammonit Online Report) is a system developed by Ammonit to collect, manage, monitor and archive measurement data from [Ammonit](https://www.ammonit.com) (<https://www.ammonit.com>) data loggers or other 3rd party devices. With AmmonitOR you can easily display your measurement data in plots and schedules. You can create customised status reports and export measurement data.

AmmonitOR follows the MEASNET Site Assessment Guideline, particularly in the field of assessing data integrity and data quality as well as filtering. Refer to 8.1 Assessment of Data Integrity and 8.2.1 Data Quality Assessment and Filtering of the [MEASNET Site Assessment Guideline](http://www.measnet.com/wp-content/uploads/2012/04/Measnet_SiteAssessment_V1-0.pdf) (http://www.measnet.com/wp-content/uploads/2012/04/Measnet_SiteAssessment_V1-0.pdf).

The system is available 24/7 and can also be accessed using mobile devices, e.g., tablet PCs or smartphones.

Users have to be registered to access the monitoring system. AmmonitOR (hosted by Ammonit) is partly free of charge. AmmonitOR can be installed on the customer's Linux™ server (with costs). Contact Ammonit for further details. Benefit from the following AmmonitOR features:

- Global data access around-the-clock (24/7)
- Data quality check using customised filters for sensors, such as ice effects, temperature, humidity, air pressure performance or the measuring system
- Automatic alert emails (based on customised filter conditions), which inform about technical problems, such as faulty measurement data or power supply
- Display of measurement data in diagrams, e.g., histograms, correlation profiles, long term comparison profiles
- Connection log displays online connections of Meteo-40 data loggers, e.g., to monitor connection problems
- Data export in selectable file format, e.g., Microsoft XLS, CSV, HTML
- Generation of PDF reports incl. project details, measurement data and plots for archiving and monitoring purposes
- Long-term data storage of up to three years on a dedicated Ammonit server or on a server of your choice
- Access control: specification of access rights for users, e.g., Admin, User, Guest

Welcome to AmmonitOR



Project list

Manage your project and devices where you have at least read access
11 Projects



Matrix

Displays all your active devices and their current status
12 displayed devices



Premium device management

Manage devices and spend credits to enable full feature set.



Premium credit account management

Manage credit accounts to buy or spend credits to enable full feature set.
1 Credit accounts



Ammonit Live Dashboard

Visualise Meteo-4X Live Data via <https://live.ammonit.com>



Settings

Manage your user access settings. Change password etc.



First steps

Get an short introduction how to use AmmonitOR Premium

Figure 1.1: AmmonitOR Dashboard

Chapter 2

Basic and Premium features

The feature set of AmmonitOR (Ammonit Online Report) is splitted in two groups, **basic** and **premium** features. The basic features includes all monitoring functionalities, alarms and back up the data files. The premium feature set provides analytics tools, reports and data exports. A detailed description is listed below. The premium features have to be unlocked through payment (See more in Chapter 4).

Features	Devices				
	Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Monitoring					
Week's Review	basic	basic	premium	premium	premium
Connection log	basic	basic	basic	basic	basic
Snapshots	basic	N/A	N/A	N/A	N/A
Timeline	basic	basic	basic	basic	basic
Data inspection					
Plots (*)	premium	premium	premium	premium	premium
Statistics	premium	premium	premium	premium	premium
Measurement data	basic	basic	premium	premium	premium
Documentation					
Journal	basic	basic	basic	basic	basic
Logbook	basic	N/A	N/A	N/A	N/A
Photos	premium	premium	premium	premium	premium
Archiving					
Data files	basic	basic	basic	basic	basic
Import data (*)	basic	basic	premium	premium	premium
Export data (*)	premium	premium	premium	premium	premium
Configurations	basic	basic	premium	premium	premium
Settings					
Alarms	basic	basic	basic	basic	basic
Filters	basic	basic	premium	premium	premium
Wind turbines	premium	premium	premium	premium	premium

Table 2.1: Basic and Premium features ((*) partly restricted.)

**Note**

Premium features can be enabled per month and data logger with system internal Credits. The Credits have to be bought over AmmonitOR accounting or Ammoint.

Features	Devices				
Data Exports	Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Original data file	basic	basic	basic	basic	basic
CSV	basic	basic	premium	premium	premium
EXCEL	premium	premium	premium	premium	premium
ODF	basic	basic	premium	premium	premium
HTML	premium	premium	premium	premium	premium
Text	premium	premium	premium	premium	premium
TOA5 (Campbell format)	premium	premium	premium	premium	premium
MGM	basic	basic	premium	premium	premium
EPE	basic	basic	premium	premium	premium

Table 2.2: Basic and Premium list of data exports

Features	Devices				
Data Import	Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Upload	basic	basic	basic	basic	basic
Import to database	basic	basic	premium	premium	premium
Expiration	yes (3 months)	yes (3 months)	N/A	N/A	N/A

Table 2.3: Basic and Premium list of data imports

Features	Devices				
Data Upload	Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
SMTP	N/A	N/A	basic	N/A	N/A
FTP	N/A	basic	N/A	N/A	basic
SCP	basic	N/A	N/A	N/A	N/A
HTTP (manual upload)	basic	basic	basic	basic	basic

Table 2.4: List of data upload methods

Plots Time variation	Devices Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
XY graph	basic	basic	basic	basic	basic
XY dynamic	basic	basic	basic	basic	basic
Band graph	premium	premium	premium	premium	premium
Daily profile	premium	premium	premium	premium	premium
Monthly profile	premium	premium	premium	premium	premium
XY difference	premium	premium	premium	premium	premium
Sunshine hours	premium	premium	premium	premium	premium

Table 2.5: Basic and Premium plots of time variations

Plots Distribution	Devices Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Histogram	premium	premium	premium	premium	premium
Availability	premium	premium	premium	premium	premium
Average polar	premium	premium	premium	premium	premium
Calm analysis	premium	premium	premium	premium	premium
Energy yield	premium	premium	premium	premium	premium
Estimated energy yield	premium	premium	premium	premium	premium
Occurrence polar	premium	premium	premium	premium	premium
Speed direction dots	premium	premium	premium	premium	premium
Speed direction bar	premium	premium	premium	premium	premium
Wind direction	basic	basic	basic	basic	basic
Wind speed	premium	premium	premium	premium	premium

Table 2.6: Basic and Premium plots of distributions

Plots Correlation	Devices Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Correlation plot	premium	premium	premium	premium	premium
Correlation occurrence plot	premium	premium	premium	premium	premium
Long term comparison	premium	premium	premium	premium	premium
Shadow zone	premium	premium	premium	premium	premium
Simple height profile	premium	premium	premium	premium	premium

Table 2.7: Basic and Premium plots of correlation

Plots	Devices				
Turbulence analysis	Meteo-40	Meteo-Laser	METEO-32	AQS 510 (SODAR)	Zephir (LIDAR)
Turbulence intensity	premium	premium	premium	premium	premium
Turbulence intensity polar	premium	premium	premium	premium	premium
Power curve measurement					
Energy yield	premium	premium	premium	premium	premium
Energy yield estimated	premium	premium	premium	premium	premium
Power curve	premium	premium	premium	premium	premium
Wind power density	premium	premium	premium	premium	premium

Table 2.8: Basic and Premium plots of Turbulence analysis and power curve measurement

Chapter 3

Getting started

3.1 Quick guide

Accessing AmmonitOR Go to <https://or.ammonit.com> (<https://or.ammonit.com>) and enter your login details. If you do not have an user access yet, *Sign up* to AmmonitOR. Different user rights are available, see Section 3.2 and Chapter 5.

Creating new projects In order to create a new project, click on *Create new project*, enter a project name and press *Submit* (see also Section 10.1.2).

A project includes all details of the measurement campaign: data logger(s), sensors, measurement data, system information.

Uploading data to the project There are different methods to upload data to a project (see Table 2.4):

- Uploading data files via SCP connection from Meteo-40 data loggers using the *Project key* (see Section 10.1.2.1) displayed in the AmmonitOR project.
- Emailing data files from Zephir300 and AQ510 remote sensors.
Emailing data files from Meteo-32 data loggers.
- Uploading data files via ftp from Zephir data loggers.
- Uploading data files manually from Meteo-40, Meteo-32, Zephir, AQS and Campbell data loggers via the Archiving → Import data menu.

Monitoring the measurement system AmmonitOR provides various overviews for a quick system check:

- Data calendar displaying state of completeness; click on *Completeness* in the *Monitoring* menu.
- Connection log displaying data logger tunnel connections; click on *Connections* in the *Monitoring logger* menu.
- Selection of evaluation plots displaying measurement data over the last 7 days; click on *Week's review* in the *Monitoring* menu.
- PDF reports summarizing system data on a weekly or monthly basis (Premium feature); click on *Reports* in the *Documentation* menu.
- Table of averages displaying hourly average values of a measurand over a month (Premium feature); click on *Statistics* in the *Data inspection* menu.

For a more detailed data check, generate plots for selectable measurands via the *Plots* in the *Data inspection* menu.

Enable premium features Analysis, reports and a variation of data exports are provided:

- Create an Credits account; click on *Premium credits account management* in the *Dashboard* menu and *add account*. Provide your customer ID or request one. And wait until the account is verified by Ammonit.
- Get Credits; click on *Premium credits account management* in the *Dashboard* menu. Click on the Credits account you created and check if your Credit account is already verified by Ammonit. If so, you click on the basket icon and order the Credits. You will get an confirmation and bill. Credits will be enabled after receipt of payment. Or redeem a voucher code.
- Spend Credits; click on *Premium data logger management* in the *Dashboard* menu. Your data loggers and the premium enabled months will be listed here. Select a data logger you want enable premium features.

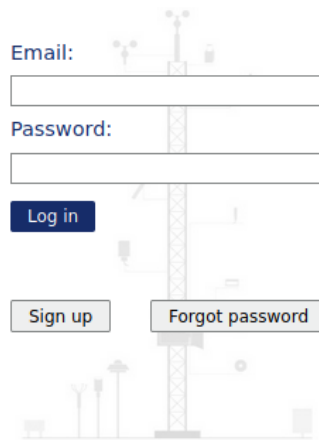
Implementing filters for data plausibility checks AmmonitOR offers various filter options to detect measurement errors or emerging problems. Set filter condition in the Settings → Filters menu.

Exporting data (Premium feature) In order to analyse measurement data in other programs, data can be exported into various formats via the Archiving → Export data menu.

3.2 Log in

In order to work with AmmonitOR, you have to log in your access. Go to <https://or.ammonit.com> (<https://or.ammonit.com>) and enter your email address and password.

Welcome - Please log in

The login form is titled "Welcome - Please log in". It features a background illustration of an oil rig. The form includes two input fields: "Email:" and "Password:". Below the "Password:" field is a blue "Log in" button. At the bottom of the form are two buttons: "Sign up" and "Forgot password".

Email:

Password:

Log in

Sign up

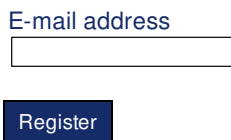
Forgot password

Figure 3.1: Log in to AmmonitOR

If you do not have an user access yet, create your access by clicking on *Sign up*. Enter your email address and click on *Register*.

Register new account

Here you can register a new account. After the registration, you will have to confirm the account registration by following the text from the email you will receive.

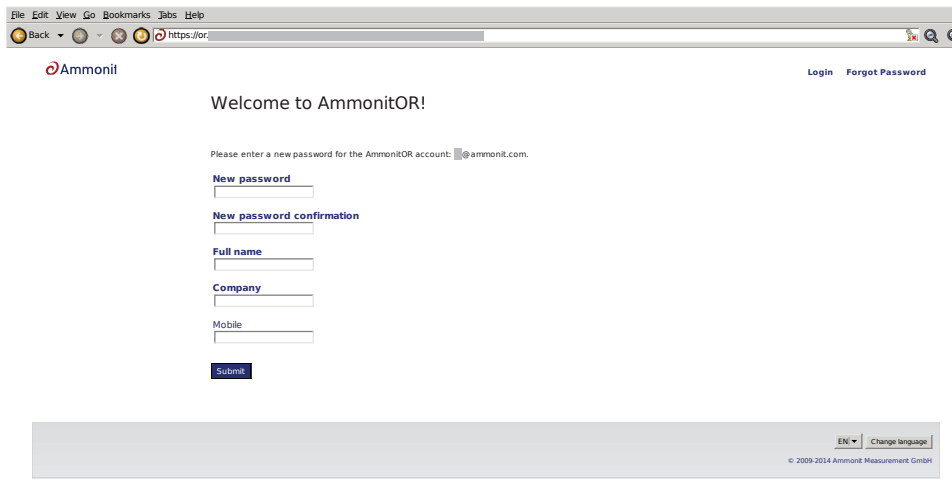
The registration form is titled "Register new account". It features a background illustration of an oil rig. The form includes a single input field labeled "E-mail address". Below the input field is a blue "Register" button.

E-mail address

Register

Figure 3.2: Register for AmmonitOR

Your user access request has to be confirmed. To complete the registration, you will receive an email with an activation link. Open the link and fill in the form.



The screenshot shows a web browser window with the AmmonitOR login page. The browser's address bar shows 'https://or.'. The page has a header with the Ammonit logo and links for 'Login' and 'Forgot Password'. The main content area says 'Welcome to AmmonitOR!' and prompts the user to enter a new password for an AmmonitOR account. The form includes fields for 'New password', 'New password confirmation', 'Full name', 'Company', and 'Mobile', with a 'Submit' button at the bottom. A footer contains a language selector set to 'EN' and a copyright notice for 2009-2014 Ammonit Measurement GmbH.

Figure 3.3: Set up your AmmonitOR user access

If an user access has been successfully created, all AmmonitOR projects can be accessed, for which the registered user has user access rights (see also Section 5.1).

One active user access is sufficient to manage all AmmonitOR projects, for which the user has access rights.



Note

If the password is lost, click on *Forgot password* to create a new password. AmmonitOR sends an email to the registered user with instructions to create a new password for the user access.



Important

To work properly with AmmonitOR, Cookies and JavaScript have to be activated in your browser. Make sure that your browser is up-to-date to avoid problems when displaying any plots.



Note

If you use an AmmonitOR installation on your server, ask your administrator to create a new user access.

3.3 Menu structure and page layout

The AmmonitOR website is structured in content and navigation areas (see Figure 3.4).

Project List

We have upgraded AmmonitOR to version 4.1.4 (2018-02-15)! [Click here to read more](#)

Create new project

Active Projects

Legend: ■ new ■ ok ■ warning ■ error ■ outdated ■ offline ■ maintenance

Name %	Project key %	Devices %	Number of users %	Comment %
■ Ammonit field tests EWNP		1	11	This project contains loggers for field testing beta software releases.
■ Test project JXKH		0	1	

[Click here to view example projects](#)

Figure 3.4: Page layout

System navigation

- Home: Jump to *Dashboard*; click on the Ammonit logo to go to the start page (*Dashboard*).
- User access: Modification of user details and password.
- Project list: Go to your *Project list*.
- Premium account list: Go to your *Premium overview*, where you can manage your premium accounts.
- Manage premium time spans: See your premium time spans and spend credits on your *Premium device list*.
- Help: Open AmmonitOR help in new browser tab or window.
- Logout: Close the session.

Website hierarchy (breadcrumb trail) Indicates the current position in AmmonitOR. Click on a hierarchy to open it.

Site map navigation Shows the system navigation and links to all projects the logged-in user has access rights for.

Language changer Users can switch between an English and French web interface of AmmonitOR.

Chapter 4

Premium account management

To enable the full feature set of AmmonitOR, Premium features has to be bought for datalogger and month of data. The enabled data periods stay as enabled forever. The following steps have to be done:

Creating an Credit account Go to *Dashboard* menu and click on *Premium Credits account management* and add account here.

Invite users to the Credit account (optional) If you like to share the Credit account with other users. Add them as account holders.

Wait for varification by Ammonit Ammonit will verify every Credit account request, that might take time. Ammonit checks if a customer ID already exists or contacts you to get a new one.

Get Credits Click on an Credit account and click on the basket icon. Here Credits can be ordered.

Spend Credits, enable Premium features Go to *Dashboard* menu and click on *Premium data logger management* and chose the data logger to enable the premium features. Click on the "Spend Credits" button and elect the months of full access to all features.

4.1 Credit account

A Credit account enables the user to buy Credits. This Credits can be spend on data loggers to enable the premium feature set. Therefore an Credit account has to created first. In *Dashboard* menu click on *Premium Credits account management* and add account here. Type in your name, billing name, billing country and your Ammonit buisness partner ID if you have already one. If you do not have an Ammonit buisness partner ID Ammonit will fill in this field during the account verification. To have multiple accounts is possible, but only one per Ammonit buisness partner ID. Every Credit account can have multiple account holders.

After creation of an Credit account it needs few days until Ammonit has veriflicated the account. At the *Credit accounts overview* the status of the account can be checked if it is still *pending* or already *verified*. Is the Credit account verified Credits can be bought.

All Credit movements will be logged under the Credits account. Orders are listed under the *Orders* Button. All transactions are listed under the *Transactions* view. Orders and transactions are downloadable as CSV file, easy readyable by any spreadsheet application software like EXCEL or Open Office Calc. At the Credits account view Credits can be bought or spend.



Note

There is just one Credit account allowed per Ammonit buisness partner ID. Contact Ammonit support if the message of "Credits account already exists with the same Ammonit buisness partner ID in the system" is displayed.



Credit accounts overview

Legend: ■ verified ■ pending status

<div><div></div><div>Batbank</div><div>2017-08-11 11:32</div></div>	<div><div>SJPP</div><div>Key</div></div>	<div><div>777888</div><div>ID</div></div>	<div><div>5700</div><div>Credits</div></div>
<div><div></div><div>JokerBank</div><div>no activities</div></div>	<div><div>RLRF</div><div>Key</div></div>	<div><div>555444</div><div>ID</div></div>	<div><div>0</div><div>Credits</div></div>
<div><div></div><div>IvyBank</div><div>no activities</div></div>	<div><div>ZTKV</div><div>Key</div></div>	<div><div>--</div><div>ID</div></div>	<div><div>0</div><div>Credits</div></div>

Add Account

Figure 4.1: Premium credit account list

4.2 Account holder management


An Credit account admin invites other users by clicking on the *Manage* button next to the *Account holders* headline on the Credit account detail page. Enter the email address of the user and decide, whether the new user should have *admin* permissions or should receive notifications, and click *Add*. AmmonitOR adds the new user to the user list. The account holder role can be changed in the combobox in the list of existing users. Press *Update* to apply the new account holder role.





Important

The creator of an Credits account has full permissions and can not be removed from the account.

Premium > Batbank


Batbank [Edit](#)

Invoice recipient	Buisness partner ID	Key	Country code	Status
Bruce Wayne Created by superuser@example.com at 2017-08-10 12:42	777888	SJPP	DE	verified

Last activity:	2017-08-11 11:32		
Orders processing	Orders completed	Transactions	Balance in Credits
8	2	6	5700

Last 10 Transactions

Transaction ID	Datetime	Amount	Logger	Product	Order confirmation ID	Order ID	Created by
AOR-T-SJPP-7	2017-08-11 11:32	-25	D110057	2017-04	-	-	superuser@example.com Details
AOR-T-SJPP-6	2017-08-11 11:30	-25	D110057	2017-03	-	-	superuser@example.com Details
AOR-T-SJPP-5	2017-08-11 11:28	-25	D110057	2017-02	-	-	superuser@example.com Details
AOR-T-SJPP-4	2017-08-11 11:28	-25	D110057	2017-01	-	-	superuser@example.com Details
AOR-T-SJPP-3	2017-08-10 13:37	+800	-	-	88888A	AOR-PO-SJPP-3	superuser@example.com Details
AOR-T-SJPP-1	2017-08-10 13:03	+5000	-	-	-	AOR-PO-SJPP-1	superuser@example.com Details

Account holders [Manage](#)

User	Company	Email	Role	Notifications
Super User		superuser@example.com	Administrator	✓

Figure 4.2: Premium credit account detail

4.3 Get Credits

Several ways exist to get Credits. First method is, that Credits can always be ordered through the Ammonit sales team. Second method is to get Credits through AmmonitOR *Get Credits* interface. The third method uses the same way as the second method, but uses *redeem a voucher* option.

Enter an credit account and click on the *Get Credits* button. In the *Get Credits* view is in addition a green button *Redeem a voucher* to redeem a voucher code.

After placing an order an confirmation email with invoice will be sent. The Credits will be enabled if the payment reached Ammonit.



Note

Minimal amount of Credits have to be bought per order. The order can be places for any number of Credits higher than 12 months of Meteo-40 price.



Important

An order will expire after 3 months.



Purchase credits for account "AmmonitOR Admin Account"

Credits

The credits can be ordered here. Every credit can be spend on buying premium features for particular month for a device.
When bought, it unlocks the premium features for a device and month in every project in AmmonitOR forever. Every device requires a particular number of credits to unlock a month.
The order can be places for any number of credits higher than 300 (12 months of Meteo-40 price).

Once the invoice amount has been credited to our bank account, we activate the ordered credits and you receive the invoice.

Conditions

Indication price per credit (before tax) [EUR] **€1**
Tax **19%**
Minimal amount of credits (12 months) 300

Pricing (in credits per month)

Meteo-32	25
Meteo-40	25
ZephIR LiDAR	35
AQ510 SoDAR	35
Campbell CR devices	50

Amount:

Order now

Redeem a
voucher

Figure 4.3: Get credits

4.4 Spend Credits

Credits can be spend on buying premium features for particular month for a data logger. When bought, it unlocs the premium features for a data logger and month in every project in AmmonitOR forever. Every data logger requires a particular number of Credits to unlock a month.

Credits can be spend in menu of *Credit accounts* or in *Premium data logger management*. A list of available data loggers are displayed. Choose one and select the months for premium feature usage. Please also specifiy credits account, what should be debited. If you want to buy premium for months which do not include data (yet), they are selectable after clicking *Prepay months without data*.

In the blue box are the calculations displayed. Click >Spend Credits> to continue the order process. Confirming the order through the pop up enables the premium feartures for the chosen data logger.



Note

Data logger devices have different prices depending on the device type.



Important

Once enabled premium feature months can't be re-done.

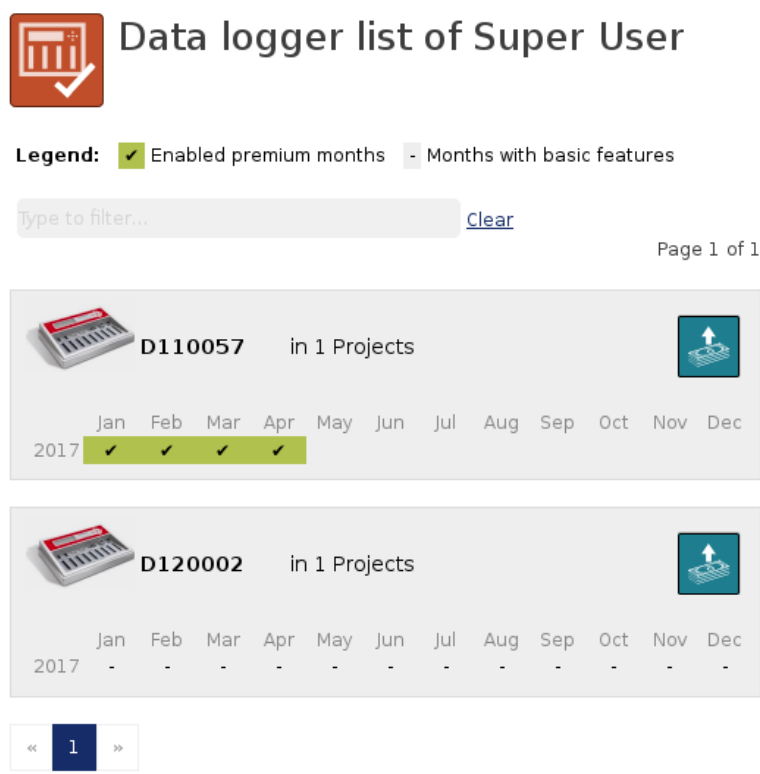


Figure 4.4: Premium device list overview

Spend credits on data logger

*Spend credits for the chosen measurement device to enable full feature set per month.
The features will be available after the confirmation. After confirming the order you will be informed by email.
The amount of credits can vary depending on device type.*

Conditions

Device:
Device type:
Credits per month: **25**

Account to be debited:

Batbank ▼

Prepay months without data

Pick months for device to enable premium features:

2017 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec **all**

Batbank (SJPP)

Balance [Credits]: 5700 get credits

Calculations

Scheduled orders [months]: 0
Sum to spend [Credits]: $25 \times 0 = 0$
Credits left: $5700 - 0 = 5700$

Spend now



Figure 4.5: Spend credits

Chapter 5

User management

5.1 User access

The login details of a registered user are valid for all projects, to which the user has access rights. There are no project-dependent logins.

AmmonitOR offers an integrated user rights management system. Five user roles with different permissions are available: Admin, User, Configurator, Viewer and Guest.

User Role	Permission
Admin	Full permission for accessing, entering and changing entries.
User	Full read and write access, except for user management.
Configurator	Full read and write access as <i>User</i> , but cannot manage users and cannot download data.
Viewer	Full read rights: Viewer can see and download all. Modifications and changes are not allowed.
Guest	Limited read rights: can see plots and summaries, but is not allowed to download data.

Table 5.1: User Roles in AmmonitOR

The number of users within a project is displayed on the project overview page (see also Section 10.1.1). Click on *Edit* to manage user rights (Only available for users with Admin rights): invite new users, change user roles or remove project users.

Only users with Admin rights are allowed to manage user roles.

All project users are sorted by their email address in ascending order.

Project Users

Invite a new user to My First Project

Email

Invite

Existing users

Here are roles each user can have:

	admin	write	read	download
Admin Full permissions.	✓	✓	✓	✓
User Can change configuration and download data, but cannot manage users.		✓	✓	✓
Configurator Can change configuration, but cannot manage users and cannot download data.		✓	✓	
Viewer Can see and download data, but cannot make changes.			✓	✓
Guest Can see plots and summaries, but cannot download data.			✓	

User	Company	Email	Permissions
		admin@ammonit.com	Admin
		user@ammonit.com	User
		viewer@ammonit.com	Viewer

Update

Figure 5.1: User management

**Important**

The logged-in user cannot modify its own rights.

After creating a new project the user automatically becomes the project owner with Admin right.

5.2 Adding users

Users with Admin rights can invite other users by clicking on the *Edit* button next to the *Users* headline on the project overview page. Enter the email address of the user and click *Invite*. AmmonitOR adds the new user with Viewer rights to the user list. The user role can be changed in the combobox in the list of existing users. Press *Update* to apply the new user role.

If the new user does not have an AmmonitOR user access yet, AmmonitOR sends a welcome message to set up the user access. The user has to click on a link in the email (see Figure 5.2) and follow the instructions to set name and password for the user access. The created password is valid for all projects, to which the user will be invited. Additionally, the new user receives an email with the invitation to the specific project (see Figure 5.3). By clicking on the link in the invitation email, the AmmonitOR login page opens in the browser and the user can login with the created login details.

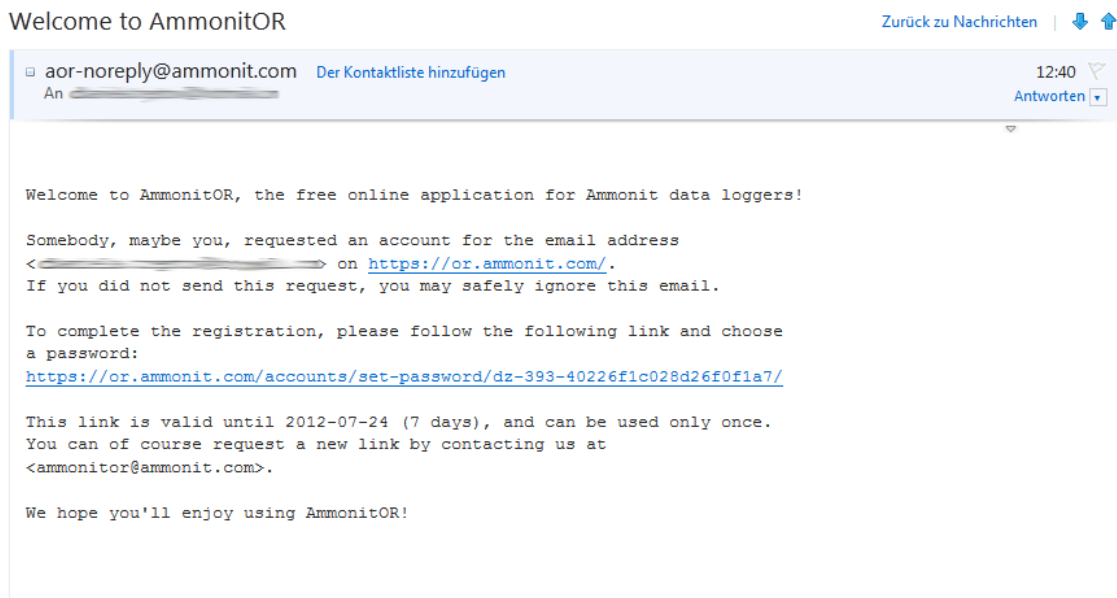


Figure 5.2: Welcome message

If the invited user has already an AmmonitOR user access, the user receives an email with the invitation to the project (see Figure 5.3). The user accesses the project with its email address and password, which he / she uses for other AmmonitOR projects, too.

Your AmmonitOR account now has access to project "My First AmmonitOR Project"

[Zurück zu Nachrichten](#) |  

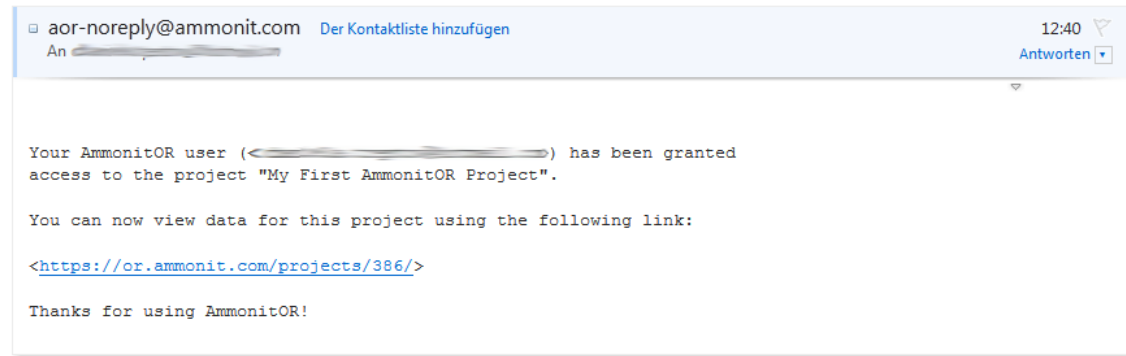


Figure 5.3: Invitation to a project



Note

If users, who already have an AmmonitOR user access, are invited to a new AmmonitOR project, they can log in with their existing password. In order to set a new password, click on *Forgot password*.

5.3 Excluding users from a project

If a user should be excluded or removed from the project, select Remove in the permission combobox. After clicking on *Update* the user is deleted from the project users list.

Chapter 6

Monitoring

The *Monitoring* section provides the control about current status of your projects and data loggers. AmmonitOR shows an overview about your project related devices, measurement data for the last seven days, a completeness overview and a connection overview.

6.1 Devices

A list of all data loggers in your project can be found by clicking on *Devices* in the side menu. AmmonitOR displays logger location map together with a sortable table of all devices in a project, consisting of the most important information regarding a device. The *Latest activity* is shown, which influences the project colour. Each colour is explained in a legend above the table (i.e. green - ok, data arrived on time). If data are late, the comment appears on the bottom of a list element, explaining the encountered issue. Among the displayed data the most recent *Device voltage* value is displayed, *Total number of data files* and more. The device status can be manually overwritten by clicking the Edit status button.

Click on the data logger, to view details of the data logger, e.g., related project and active sensors. For further details see Section 10.2.

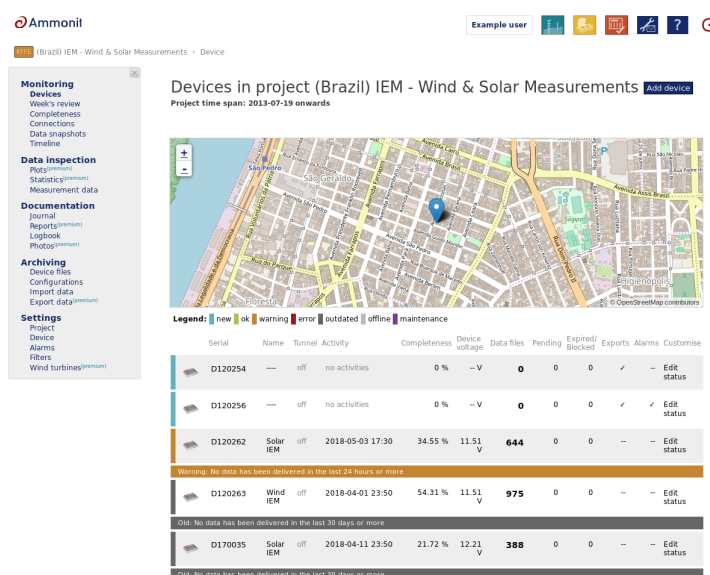


Figure 6.1: List of project related data loggers

The data loggers are sorted by serial number in ascending order.

See also Section 10.2.

6.2 Matrix

The Matrix is a table, what displays active devices the user has read access to. The Matrix is found either in Project under Monitoring → Matrix or on the Dashboard → Matrix.

Every device is displayed with many attributes and values, who are important for monitoring and daily updates on your system. For every displayed device are columns with all evaluations color coded to quickly get an idea what is going on. The color is influenced either by data completeness or filter matches. Setup customised Filters in the settings Section 10.5. Clicking on tiles opens a popup, what shows exactly what filters matched and what status is connected with a filter match. For Example if you configured a sequence filter (see Section 10.5.3) for an Anemometer to detect frozen bearings and set the filter status to *Suspicious*, the tile is colored orange if a match occurs.

The displayed evaluations are also listed in the related project (see Section 10.2.5 or click on *List all evaluations* on the device overview page).



Important

AmmonitOR's Matrix displays the values for the last 7 days. Beginning with the date of the last import!

To customise AmmonitOR's Matrix add or remove devices with the buttons placed next to the caption of the side (see Figure 6.2). Devices have to be actively added to the Matrix.

Ammonit

Figure 6.2: List of devices in AmmonitOR's Matrix view



Important

AmmonitOR Matrix is only updated by data import. Click on the evaluation's tiles to see on the bottom of popup the datetime of the last refresh.

6.3 Week's Review

For a quick system check, AmmonitOR provides an overview about all evaluations and system parameters over the last 7 days. To check the system performance, go to the Monitoring → Week's review menu and select a data logger.

AmmonitOR displays all evaluations, which are listed in the evaluation list (see Section 10.2.5 or click on *List all evaluations* on the data logger overview page).

**Important**

AmmonitOR displays the values for the last 7 days. Beginning with the current date - not the date of the last import!

Click on *Details* to see the xy plot and make further adjustments. See also Section 7.1.2.6.

6.4 Completeness Calendar

AmmonitOR displays for each data logger a *Calendar*, which can be accessed via the Monitoring → Completeness menu. The *Calendar* displays the data completeness for each day, taking into account the number of measurement periods in a day. This means that the completeness will be shown as 100% also if the data will be filled with *None* / *Null* values. The completeness data is also shown only for the imported data.

The *Calendar* is structured in months and days; one row per month.

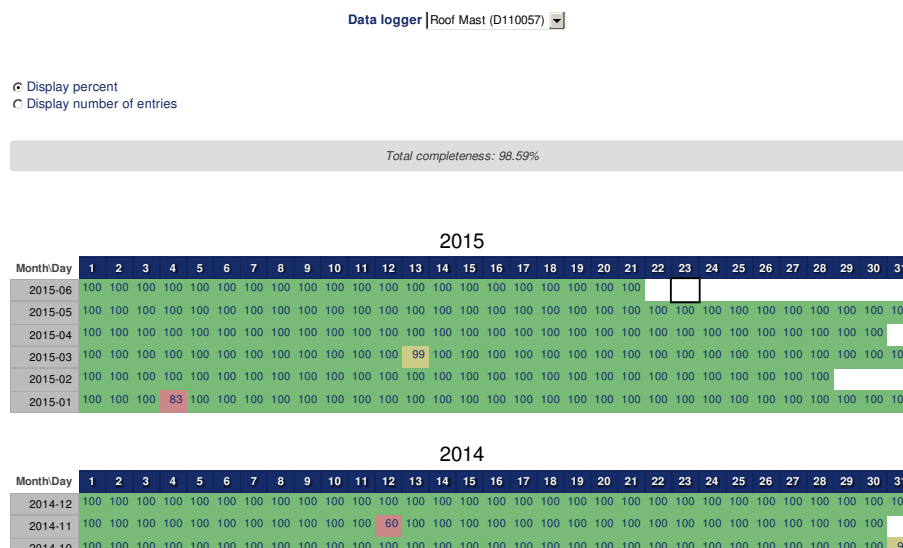


Figure 6.3: Data calendar

Depending on the number of entries for a day, AmmonitOR colours the cell background (see Table 6.1).

Data completeness for the data logger is shown below the *Calendar*. The completeness value refers to the whole period covered by the calendar.

If more than one data logger has been assigned to the project, you can switch between the calendars of the data loggers using the dropdown list above the calendar. There are two table view options: percent or number of entries.

Display percent This table view shows all entries as percentage value from the expected number of entries, e.g., 50 if 72 entries of expected 144 are counted.

Display number of entries This table view displays the exact number of entries for each day.

Colour	Percentage	Number of Entries	Comment
Green	100%	144	Total data completeness for the day.
Yellow	99.9 ... 95%	136 ... 143	A few entries are missing or faulty.
Orange	90 ... 94.9%	129 ... 135	Critical number of entries.
Red	0 ... 89.9%	0 ... 128	Not enough entries for a relevant measurement according to MEASNET.
Violet	>100%	>144	If data has been uploaded twice caused by an error, AmmonitOR has more data available than expected for the day. An alert message is displayed on AmmonitOR. The issue can be solved by archiving data files. To do so, click on the link in the alert message and deactivate the file(s) in the Archiving → Data logger files menu. The selected data file is archived - not deleted! If necessary, the data file can be reimported. For further details see Section 9.1.

Table 6.1: Data Calendar Colours

Click on a day to review the daily measurements. AmmonitOR shows a data table with all data for the selected day. To customize the data table see Section 7.3.

6.5 Connections

On this page the tunnel connections of Meteo-40 data loggers can be monitored. AmmonitOR displays the connections for the last 30 days. For each tunnel connection, AmmonitOR displays a violet-coloured box within the calendar. User can easily see, when the connection started and how long the data logger has been online. All SCP uploads are marked with a orange line in the overview. Place the mouse pointer in the graphic to see further details of the connection.

For reviewing the online connections of a Meteo-40 data logger, the checkbox *Send Logbook data* has to be selected in the Communication → AmmonitOR menu of the Meteo-40 web interface. The checkbox is active by default.

The connections should correspond to the periods and actions configured in the schedule in the Meteo-40 web interface.

AmmonitOR displays the online periods in violet; SCP connections in orange.

The connection times can be displayed as graphic or text.

In order to view connections older than 30 days, click on *earlier connections*. AmmonitOR moves 30 days back and displays this period. Via *later connections* you can move to later periods. If there is no current connection, you can show the latest connection by clicking on *go to latest connection*.

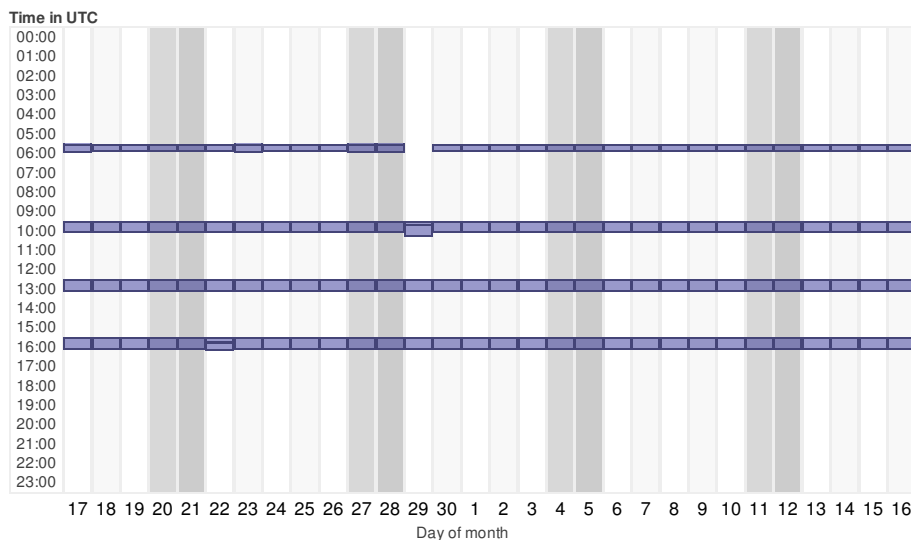
Data logger connections for Roof Mast (D110057)

Project time span: 2011-12-21 onwards

Data logger | Roof Mast (D110057) ▼

Earlier connections | View text | View graphic | Later connections

Showing connections from 2014-09-17 until 2014-10-17 (30 days)



Access this data logger via tunnel

Figure 6.4: Connection overview

If the displayed data logger is scheduled to be online, you can access the data logger via tunnel by clicking on *Access this data logger via tunnel*.

Holding the mouse pointer on the button, the URL of the data logger is displayed.

Note



Tunnel connections of Meteo-40 data loggers can be monitored without uploading measurement data to AmmonitOR. To do so, the connection between data logger and AmmonitOR has to be configured in the Meteo-40 web interface in the Communication → AmmonitOR menu. Select the AmmonitOR server and enter your *Project key* in the relevant fields. Deselect the checkbox *Send CSV files* (active by default). The checkbox *Send Logbook data* (active by default) has to be selected to provide tunnel information to AmmonitOR. Save the configuration.

Thus no measurement data is sent to AmmonitOR - only communication information.

6.6 Data snapshots

The data snapshot page shows the last 24 data snapshots, who are sent by Meteo-40 data logger. Therefore the Meteo-40 data logger has to be configured to send the snapshots to AmmonitOR. A data snapshot is a data set e.g. of 10 minute average values of each channel. The difference to normal data transmission is, that data snapshot is always sent when the data logger connects to the internet. Keep that in mind when you configure the Meteo-40 schedule. It is helpfull to know the actual condition of the measurement system in addition to the normal daily data transmission.

[illegible]

6.7 Timeline

Timeline of (D110057)

Project time span: 2011-12-21 onwards

Data logger Roof Mast (D110057) ▾

Logbook Entries

Legend

- info
- warning
- error

Entries

Entry date	Severity	Message
2015-05-22 14:01:36	info	Date and time set by NTP (+0.036s)

Fri, 22 May 2015 12:00:00 GMT

© 2022 Ammonit Measurement GmbH

6.8 Live Data Aggregator

The Live Data Aggregator profile is required to use the Live Data Aggregator, the client of Meteo-40 Plus Live Data Publisher. It generates the data files on the server from the incoming livedata and requires configuring profiles for each Meteo-40 device for which the files should be generated.

LiveDataAggregator receives the live data sent by the Meteo-40 Plus Live Data Publisher and generates the data files containing the data statistics aggregated to selected interval. LiveDataAggregator profile is related to certain project and describes what should be the statistics and file intervals, what columns should be included and to what recipient these files should be sent.

To configure a new LiveDataAggregator profile a *Add LiveData Profile* button must be pressed. If you wish to edit the pre existing profiles or delete them, click on *Edit* or *Delete* respectively. On the delete, a new page will be opened, where the deletion of the profile must be confirmed.

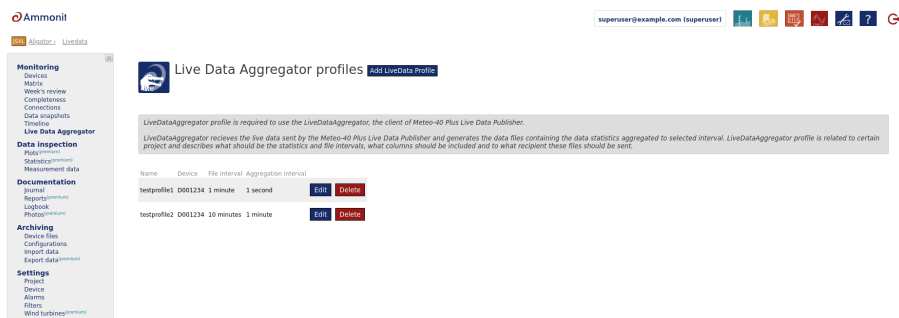


Figure 6.7: LiveDataAggregator profile list

When configuring a new LiveDataAggregator profile, a device for which a profile is going to be created must be specified

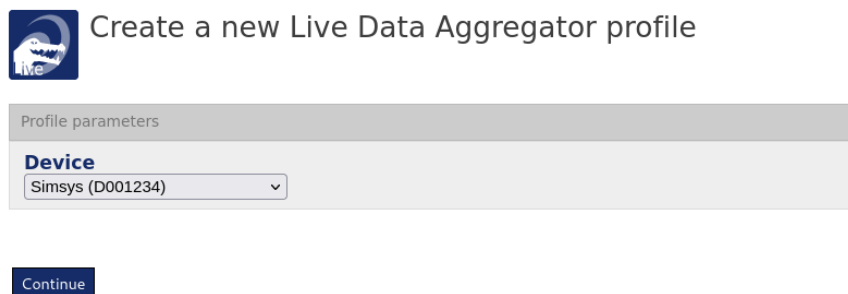


Figure 6.8: LiveDataAggregator logger selection

After that, certain settings must be inputted:

Profile name Name to distinguish between your profiles. Allows inputting only alphanumeric characters are allowed, without the whitespaces.

Data file interval Interval of the output files from LiveDataAggregator.

Data aggregation interval Interval of the output aggregated measurements inside of the file from LiveDataAggregator. Select *1 second* to receive the source data.

Included columns Select which columns should be included in the file from LiveDataAggregator. If you pick *Custom...* a detailed table of every possible column will be shown.

Hostname For now we support only FTP method of delivering the files from LiveDataAggregator. Please put your FTP server hostname or IP address here.

Username FTP server username used for logging in.

Password FTP server password used for logging in.

Directory Optional directory field for path where your files should be stored on your FTP server.

Port FTP server port used for communication.



Create a new Live Data Aggregator profile

Profile parameters

Profile name

testprofile3

Device

Simsys (D001234) ▾

Data file interval

30 minutes ▾

Data aggregation interval

2 minutes ▾

Included columns

All evaluations and channels ▾

FTP server

Hostname:

my.username.com

Username:

exampleusername

Password:

•••

Directory:

/home/Tim/Livedata

Port:

21 ▾

Save profile

Figure 6.9: LiveDataAggregator profile

After you are ready press *Save profile* and you will be re-directed to the profile list. The same procedure applies to editing the pre-existing profile.

Chapter 7

Data Inspection

In this section you are able to view the measurement data, plot it and view hourly averages.

7.1 Plots

Use AmmonitOR to quickly generate plots with measurement data over a defined period. Typical diagrams can be created for wind and solar resource assessment campaigns as well as for power curve measurement projects, e.g., correlation plots, xy plots or energy yield calculations. Information boxes describe, what is displayed in the diagram and how the values are calculated.

AmmonitOR offers various options to customise the plots, e.g., choose the time range, which should be displayed or the sensors, which should be correlated. In this chapter we list all plots, which are currently available in AmmonitOR. Further plots will be added in the future in order to meet your requirements to effectively monitor your projects.

All plots can be exported to PDF format. Thus diagrams can easily be printed and archived.

**Note**

Except of XY graph and wind directions plot are all plots premium features (see feature list Chapter 2).

AmmonitOR lists plots for five different applications. Each plot is marked with its unique icon:

Dynamic analysis



Time variation



Distribution



Comparison



Turbulence analysis



Power curve measurement



Figure 7.1: Overview selectable plots

Dynamic analysis Select plots, which display the behaviour of measurements over a certain time period and allow interactive analysis - marked with red icons

- Dynamic XY plot

Time variation Select plots, which display the behaviour of measurements over a certain time period - marked with light-blue icons

- Band graph
- Daily profile
- Monthly profile
- Overlay graph
- Sunshine hours
- XY plot
- XY difference plot

Distribution Select plots, which show the frequency distribution of measurement values - marked with turquoise icons

- Availability
- Average polar
- Calms analysis
- Energy yield
- Histogram
- Occurrence polar
- Speed direction bar
- Speed direction dots
- Wind direction
- Wind speed

Comparison Select plots, which correlate measurements of sensors of the same type to identify measurement errors - marked with orange icons

- Correlation Occurrence plot
- Correlation plot

- Long term comparison profile
- Shadow zone plot
- Simple height profile

Turbulence analysis Typical plots to display turbulence intensity - marked with yellow icons

- Turbulence intensity
- Turbulence intensity polar

Power curve measurement Typical plots for power curve measurement - special power curve measurement devices necessary, e.g., power meter - marked with dark-blue icons

- Energy yield
- Estimated energy yield
- Power curve
- Wind Power Density

In order to show only relevant plots for solar or wind, select one of the radio buttons on top of the page.

7.1.1 Dynamic analysis

This section lists all plots, which provides interactive analysis of measurement data.

7.1.1.1 Dynamic XY plot

Use the dynamic xy plot to monitor the behaviour of different evaluations over a determined time. One or more sensors can be displayed in the plot.

Go to the Data inspection → Plots menu and select in section Time variation the Dynamic XY plot. Select a data logger from the project and determine the period. Choose the Evaluators, which should be monitored. Select a Statistic and click on Apply to display the diagram.

The plot is splitted into two graphs. The upper graph is used for zoom and detail analysis. The lower graph displays always the chosen timespan overview. It does not move or zoom, but it is possible to select an area to enable detail analysis in upper graph section.

Evaluations with available statistics are displayed next to the right border of plot area. The number of evaluations is limited to five. Pick an evaluation type and statistic and the available evaluations will be displayed. Select one or more of them. To update the graph with new selection click button Apply. If you want to save your setup as preset, give it a name in the text field left of the "Add Preset" button, click Add preset.

Above the plot area is a timepicker field. Chose "date from" date and a period like "Day", "Week" or "Month". E.g. if a date is defined and "Day" is selected, the next 24h will be displayed. With "Week" selected, a timespan of a week will be displayed. Start date is the date you defined.

The upper graph is zoomable by mouse wheel or select an area in lower graph.

In upper graph the lines are highlightable. If you click on one line you want to highlight, the other lines will fade out. To reset the focus click on empty space in the upper plot area. It is also possible to click on the evaluation name above upper plot area. The related line will disappear. Click again and the line will be displayed again.

To get detail information about single measurement points, hover the mouse pointer over the line section. The tooltip shows the selected timestamp and all evaluations with values.



Tip

You can switch between the periods "Day", "Week" and "Month" with already selected evaluations. It is not necessary to use "Apply" button.

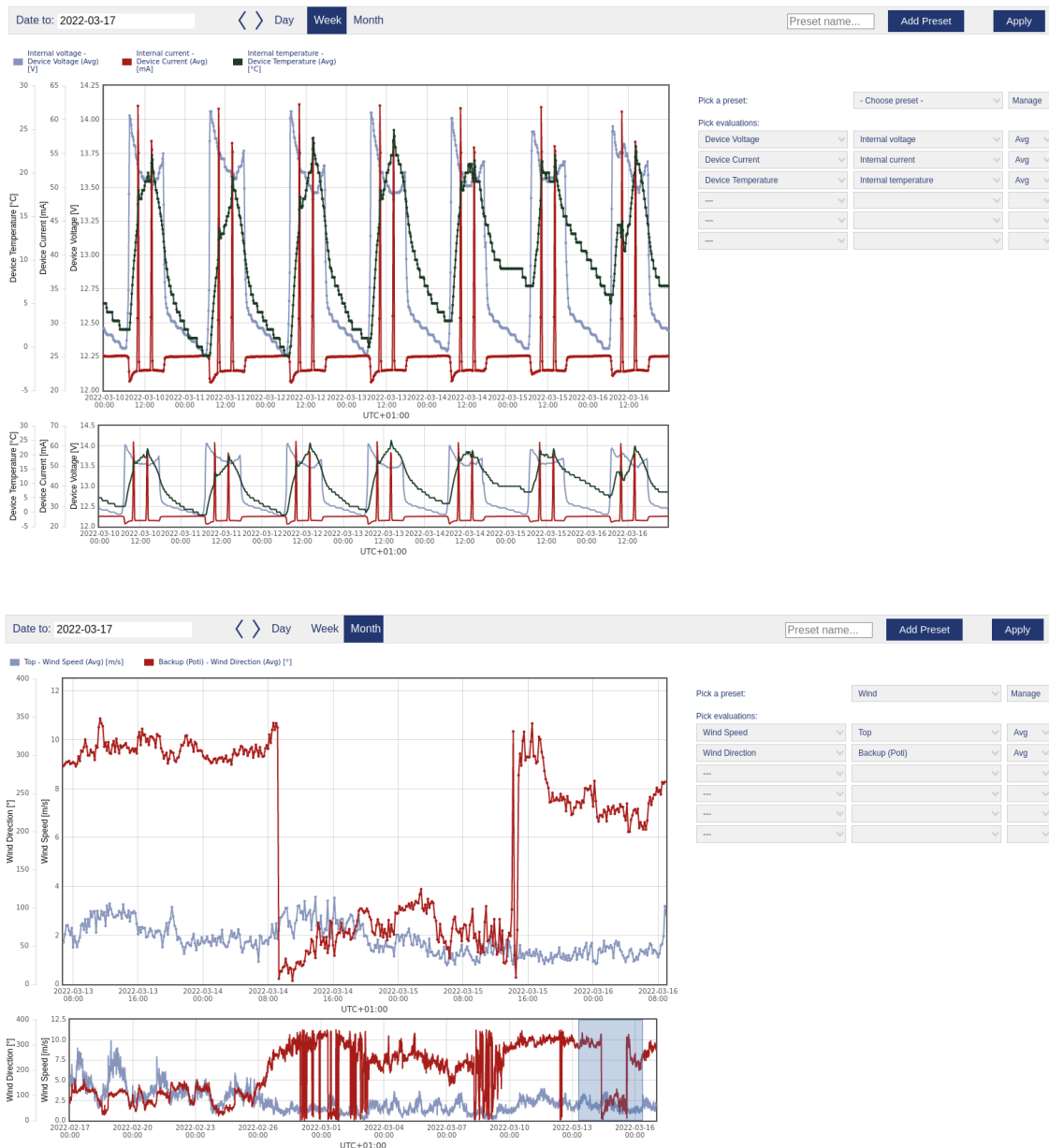


Figure 7.2: Options: Dynamic xy plot

Existing presets can be picked with the dropdown menu next to the Manage button. To manage presets click Manage to see all your created presets listed. One of them can be set as default. Means if you enter the dynamic XY plot page the next time this preset will be shown first. The system will pick a default preset, if not otherwise defined.

It is also possible to rename existing presets, click Edit to do so. In the edit menu the preset can also be deleted. To set the preset as default, click Set default button.

7.1.2 Time variation plots

This section lists all plots, which show the behaviour of measurement values over a certain time period.

7.1.2.1 Band graph

The band graph indicates the daily behaviour of an evaluation for a specified period. Thus the differences between day and night can be analysed. Only one sensor can be displayed in a graph.

AmmonitOR considers all hourly average values of a sensors over a certain period. For every hour of the day the average value is calculated and displayed in the diagram. Each sensor is represented in a graph, e.g., different temperature sensors.

Options

From: 2017-04-25 23:50

To: 2017-04-25 23:50

Evaluation: Top, Wind Speed

Statistic: Average

Colormap: Yellow-Orange-Red

☐ Scale axes to fit data

Plot

[Link for sharing this plot](#)

About this plot...

What
Displays one vertical color curve per day for a specified period.

Why
Evaluate influence of single days and compare with other days simultaneously. If used with yearly time span you can observe seasonal and daily effects in one view.

How
Select evaluation and the statistics to be displayed. Each vertical color bar displays a single day. X-axis displays the date and y-axis displays the time. For every single day are 144 values plotted (period 10 min average). You can choose different colormaps to highlight the values. If values are missing the spot will be white.

Figure 7.3: Options: Band graph of the temperature

Go to the Data inspection → Plots menu and select in section *Time variation* the *Band graph*. Select a data logger from the project and enter the period, which should be displayed in the diagram. Choose an *Evaluation* from the dropdown list and click on *Plot* to display the band graph.

A data table can be displayed by clicking on *Show data table*. In the data table AmmonitOR lists for all sensors the hourly average values. To hide the data table, click on *Hide data table*.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

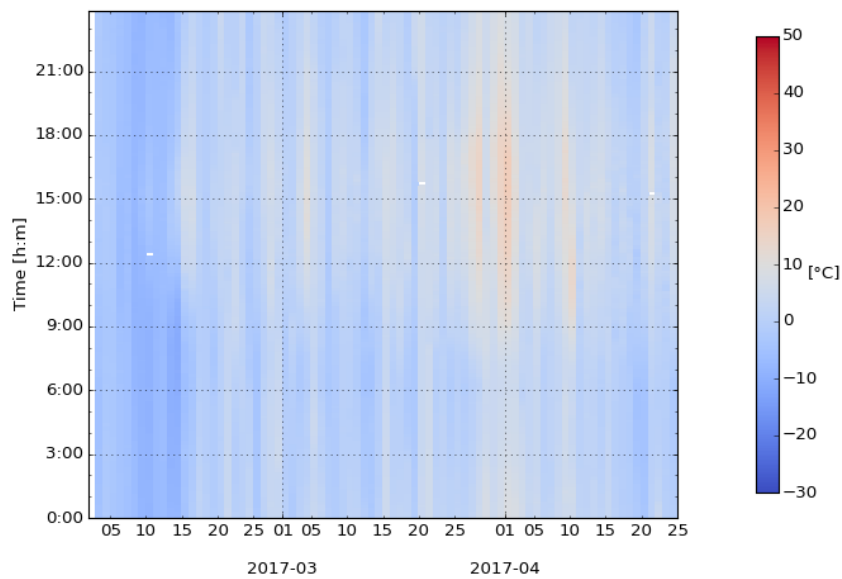


Figure 7.4: Example: Band graph of the temperature

7.1.2.2 Daily profile

The daily profile indicates the daily behaviour of an evaluation for a specified period. Thus the differences between day and night can be analysed. Each sensor is displayed in a graph.

AmmonitOR considers all hourly average values of a sensors over a certain period. For every hour of the day the average value is calculated and displayed in the diagram. Each sensor is represented in a graph, e.g., different temperature sensors.

Options

From

To

Evaluation Type

☒ Scale axes to fit data

Plot

[Link for sharing this plot](#)

About this plot...

What

The daily profile indicates the daily behaviour of an evaluation for a specified period.

Why

Evaluate differences between day and night.

How

Select evaluation type and period. For every hour of the day the average value is calculated over the chosen period and displayed in the diagram. Each evaluation is shown as single characteristic curve. If a more detailed view is needed, select 'Scale axes to fit data'.

Figure 7.5: Options: Daily profile of the temperature

Go to the Data inspection → Plots menu and select in section *Time variation* the *Daily profile*. Select a data logger from the project and enter the period, which should be displayed in the diagram. Choose an *Evaluation type* from the dropdown list and click on *Plot* to display the daily profile. Select *Scale axis to fit data* to get a more detailed view.

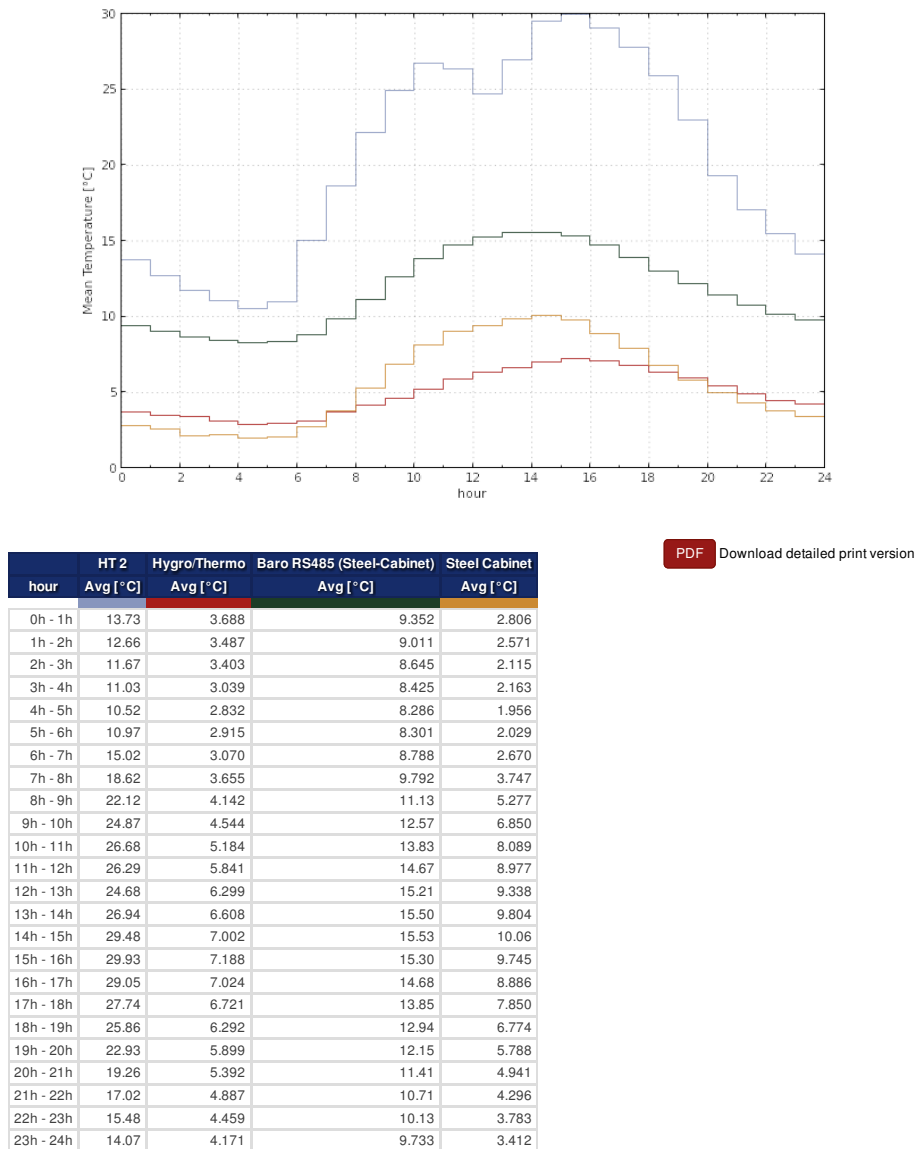


Figure 7.6: Example: Daily profile of the temperature

A data table can be displayed by clicking on *Show data table*. In the data table AmmonitOR lists for all sensors the hourly average values. To hide the data table, click on *Hide data table*.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.2.3 Monthly profile

The monthly profile emphasises on the seasonal impacts on the evaluation by following trends in a curve. Sensor defects can be detected.

Go to the Data inspection → Plots menu and select in section *Time variation* the *Monthly profile* to generate a monthly profile plot. Select a data logger and determine the time period, which should be considered for the plot. Choose an *Evaluator type*, e.g., wind speed or temperature. Select an *Average calculation method*:

- Average for each month
- Average for each hour
- Moving average (based on hourly averages) - a moving average window has to be selected: month, 2 weeks, week

Options

From
2013-01-01 00:00

To
2013-12-31 23:50

Evaluation Type
Temperature

Choose average calculation method
average for each month

Choose moving average window
month

☐ Scale axes to fit data

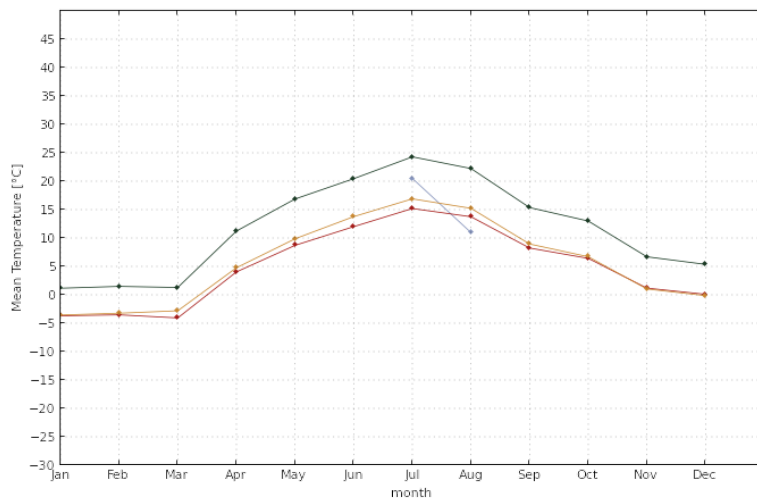
Plot

[Link for sharing this plot](#)

About this plot...
What
The monthly profile shows monthly, hourly or moving averages for one year or less
Why
Evaluate seasonal impacts by following trends in the curve.
How
Select period, evaluation type and method for calculating averages. One curve is displayed for each evaluation from the chosen type. Monthly averages are a simple averaging on the month. Hourly averaging provides more precise results. Moving average displays the trend of the monthly average more detailed. Based on the hourly average, the moving average is calculated on basis of a month, two weeks or one week.

Figure 7.7: Options for Monthly Profile

Monthly average Indicates the seasonal differences of the evaluations, based on average values of each month.


[PDF](#) Download detailed print version

month	HT 2 Avg [°C]	Hygro/Thermo Avg [°C]	Baro RS485 (Steel-Cabinet) Avg [°C]	Steel Cabinet Avg [°C]
2013 Jan		-3.697	1.156	-3.558
2013 Feb		-3.530	1.479	-3.247
2013 Mar		-4.069	1.290	-2.811
2013 Apr		4.028	11.22	4.760
2013 May		8.705	16.87	9.860
2013 Jun		12.00	20.44	13.76
2013 Jul	20.49	15.19	24.29	16.89
2013 Aug	10.96	13.74	22.23	15.23
2013 Sep		8.234	15.35	8.942
2013 Oct		6.413	12.99	6.702
2013 Nov		1.176	6.692	1.028
2013 Dec		0.086	5.357	-0.152

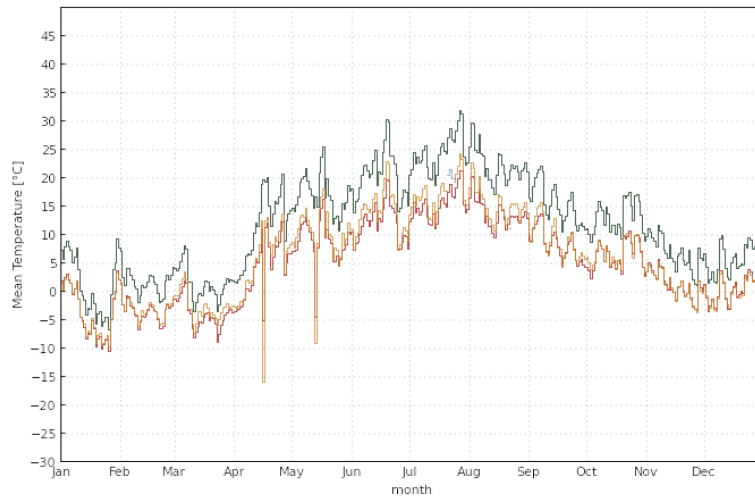
Figure 7.8: Example: Monthly profile of temperature based on monthly averages



Note

If a sensor has had a defect, you can see a deviation in the graph compared to other sensors for the same evaluation as shown in Figure 7.8.

Hourly average Displays the seasonal differences of the evaluations more detailed, based on hourly average values.



date	HT 2 Avg [°C]	Hygro/Thermo Avg [°C]	Baro RS485 (Steel-Cabinet) Avg [°C]	Steel Cabinet Avg [°C]
2013-01-01 00:00:00		1.723	7.194	1.356
2013-01-02 00:00:00		0.487	5.655	0.040
2013-01-03 00:00:00		2.321	7.815	1.911
2013-01-04 00:00:00		3.032	8.715	2.653
2013-01-05 00:00:00		1.990	7.790	1.881
2013-01-06 00:00:00		1.494	7.186	1.364
2013-01-07 00:00:00		-0.674	4.963	-0.398
2013-01-08 00:00:00		0.473	5.929	0.341
2013-01-09 00:00:00		1.847	7.645	1.787
2013-01-10 00:00:00		-1.380	3.791	-1.484

[PDF](#) Download detailed print version

Figure 7.9: Example: Monthly profile of temperature based on hourly averages



Note

If a sensor has had a defect, you can see a deviation in the graph compared to other sensors for the same evaluation as shown in Figure 7.9.

Moving average Displays the trend of the monthly average more detailed. Based on hourly averages, AmmonitOR calculates the moving average on a monthly, 2-weekly or weekly basis for each sensor. Select the basis for the moving average graph from the *Choose moving average window* dropdown list.

$$\alpha'_i = e^{-\frac{1}{2} \cdot w \cdot i^2} \quad \text{with} \quad w = 1 \dots w_n \quad i \in [-m, +m]$$

$$\alpha_i = \frac{1}{\beta} \cdot \alpha'_i \quad \text{with} \quad \beta = \sum_{i=-m}^{+m} \alpha'_i$$

$$\bar{x}_t = \sum_{i=-m}^{+m} x_{t+i} \cdot \alpha_i$$

Equation 7.1: Calculation of moving average (x (t))

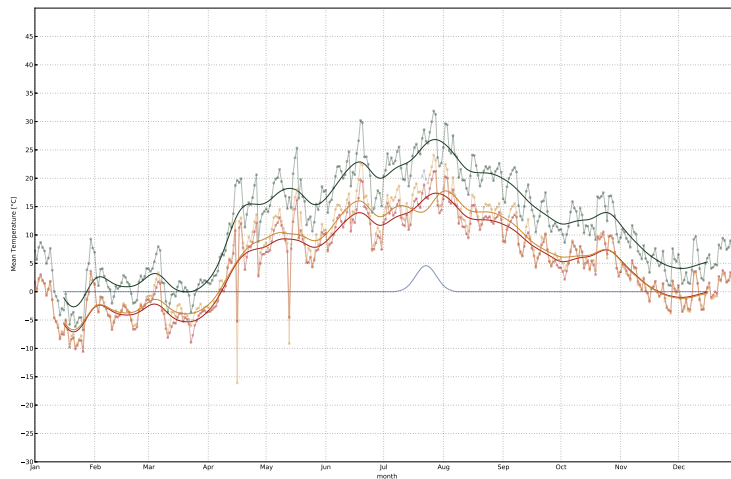


Figure 7.10: Example: Moving average of temperature based on monthly averages



Note

If a sensor has had a defect, you can see a deviation in the graph compared to other sensors for the same evaluation as shown in Figure 7.10.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.2.4 Overlay graph

The periodical overlay graph completes the xy plot (see Section 7.1.2.6). Using this diagram, periodical occurrences can be monitored and the trend of an evaluation can be analysed.

Ammonit displays for each day (x-axis) a coloured graph (see key next to the diagram) - all graphs are shown in one diagram. The trend of the evaluation can be monitored. Unexpected deviations can indicate measurement errors or defective sensors.

Go to the Data inspection → Plots menu and select in section *Time variation* the *Overlay graph*. Select a data logger from the dropdown list and specify the period, which should be displayed. Choose an evaluation and select a statistic, e.g., average.

Options

From

2013-07-16 00:00

To

2013-07-22 23:50

Plot

Evaluation

Global (CMP3), GHI (global horizontal irradiance)

Statistic

Average

[Link for sharing this plot](#)

About this plot...

What

Displays a single curve for each day of the selected period.

Why

Evaluate influence of single days and compare with other days simultaneously.

How

Select evaluation and the statistics to be displayed. Each curve displays a single day. Days are displayed with descending colour intensity. Highest colour intensity refers to newest date.

Figure 7.11: Options for the overlay graph

Click on *Plot* to display the diagram.

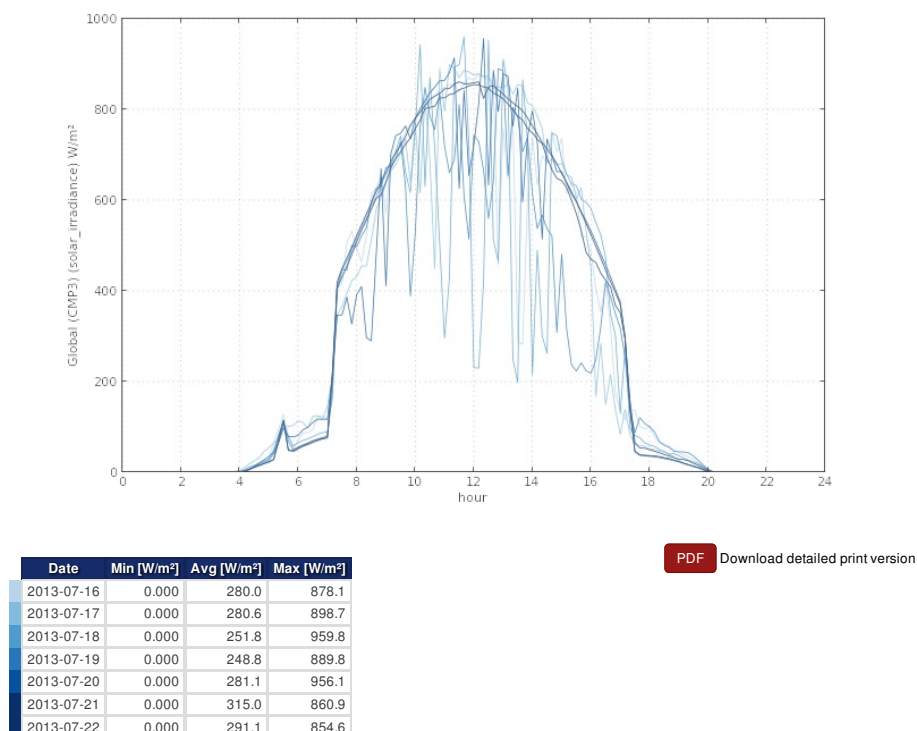


Figure 7.12: Example: Global horizontal irradiance for a specified period in an overlay graph

Below the plot a data table is shown. If the data table has more than 10 rows, the table is hidden. Click on *Show data table* to display the table, on *Hide data table* to hide the table.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.2.5 Sunshine hours

The plot displays the daily sunshine hours in a bar chart. According to WMO the sun is shining at 120 W/m². Sunshine duration sensors measure the sun status. The sun status can also be calculated by Ammonit Meteo-40 data loggers from measurement data gathered by a pyranometer. AmmonitOR does not calculate the sun status from pyranometer measurement data.

Go to the Data inspection → Plots menu and select in section *Time variation* the *Sunshine hour* plot. Select a data logger from the project and determine the period, which should be considered. Choose an *Evaluation* and click on *Plot*.

Options

From

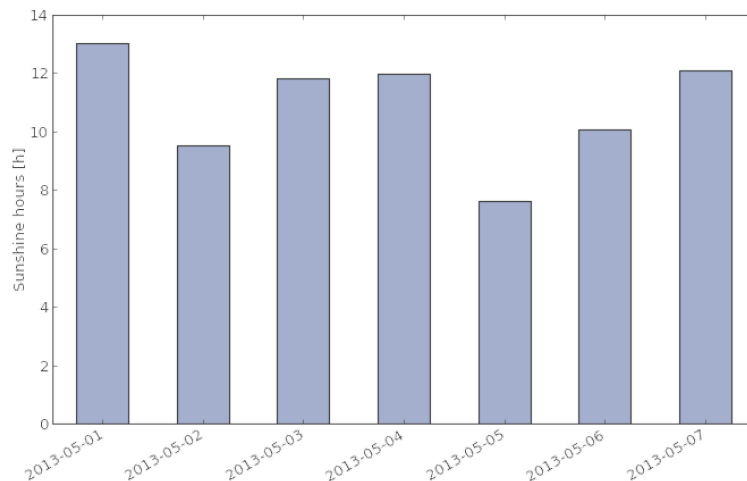
To

Evaluation

[Link for sharing this plot](#)

About this plot...
What
Histogram of sunshine hours.
Why
Compare daily number of sunshine hours.
How
Select a sun status evaluation to display the daily number of sunshine hours over a chosen period.

Figure 7.13: Options for sunshine hours plot



Date	Sunshine hours [h]
2013-05-01	13.02
2013-05-02	9.510
2013-05-03	11.83
2013-05-04	11.98
2013-05-05	7.603
2013-05-06	10.07
2013-05-07	12.10

[PDF](#) [Download detailed print version](#)

Figure 7.14: Example: Sunshine hours for a determined period

AmmonitOR shows the daily number of sunshine hours in a data table. If more than 10 days are listed, click on *Show data table* to display the table, on *Hide data table* to make the table hidden.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.2.6 XY plot

Use the xy plot to monitor the behaviour of different evaluations over a determined time. One or more sensors can be displayed in the plot.

Go to the Data inspection → Plots menu and select in section *Time variation* the *XY plot*. Select a data logger from the project and determine the period. Choose the *Evaluators*, which should be monitored. If more than one sensor should be displayed, hold the CTRL key and use the left-mouse click to select additional sensors. Select a *Statistic* and click on *Plot* to display the diagram.

For comparability all plots of the same evaluation show a common scale. In order to view more details in the plot, the axes can be scaled to fit by activating on the *Scale axes to fit data* checkbox.

Options

From
2014-04-01 00:00

To
2014-04-30 23:50

Evaluators
Top, Wind Speed
Backup, Wind Speed
Backup (Poti), Wind Direction
HT 2, Humidity
Hygro/Thermo, Humidity
Steel Cabinet, Humidity
Internal temperature, Temperature
HT 2, Temperature
Hygro/Thermo, Temperature
Baro RS485 (Steel-Cabinet), Temperature

Statistic
Average

☐ Scale axes to fit data

Plot

[Link for sharing this plot](#)

About this plot...**What**

Time series of any evaluation with selectable statistic.

Why

Flexible display of any evaluation.

How

Select evaluations (hold CTRL to select more than one evaluation) and plot the statistic.

'Average (with minimum / maximum)' displays extreme values, calculated by the data logger. '+/- 1 standard deviation' displays an interval of 1 standard deviation above and below the average. 'Count' displays the number of measurements, which are averaged for the average value. 'Sum' is applicable for status signals, e.g., sun status. It sums up every status count, which has been recorded. 'Median' is the center value of a data series, after sorting all values in ascending order.

Tick 'scale axes', if the y-axis range should be dynamic.

Tick 'Include public weather' to compare measurement data with data from a close public weather station.

Figure 7.15: Options for XY plot

AmmonitOR displays the plot with the evaluation on the y-axis (e.g., temperature and humidity) and time on the x-axis.

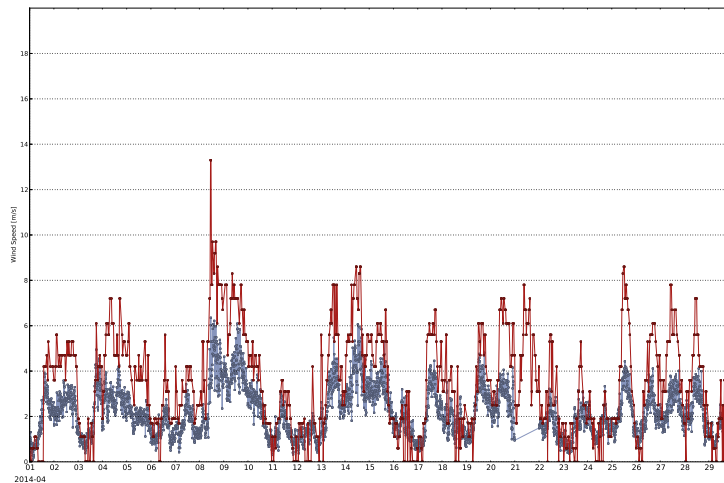


Figure 7.16: Example: Temperature for a determined period in XY plot



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.2.7 XY difference plot

The XY difference plot draws the difference between two evaluations of same evaluation type of a specified period.

Options

From:

2017-04-25 23:50

To:

2017-04-25 23:50

Evaluator Type:

Wind Speed

Top

Backup

PWM

Statistic:

Average

Plot

[Link for sharing this plot](#)

About this plot...**What**

Time series of any evaluation type with selectable statistic to display difference between evaluations.

Why

Flexible display of difference of evaluations. Find out if everything is working correctly.

How

Select evaluations (hold CTRL to select more than one evaluation) and plot the statistic.

'Average (with minimum / maximum)' displays extreme values, calculated by the data logger. '+/- 1 standard deviation' displays an interval of 1 standard deviation above and below the average. 'Count' displays the number of measurements, which are averaged for the average value. 'Sum' is applicable for status signals, e.g., sun status. It sums up every status count, which has been recorded. 'Median' is the center value of a data series, after sorting all values in ascending order.

Figure 7.17: Options: XY difference plot of the temperature

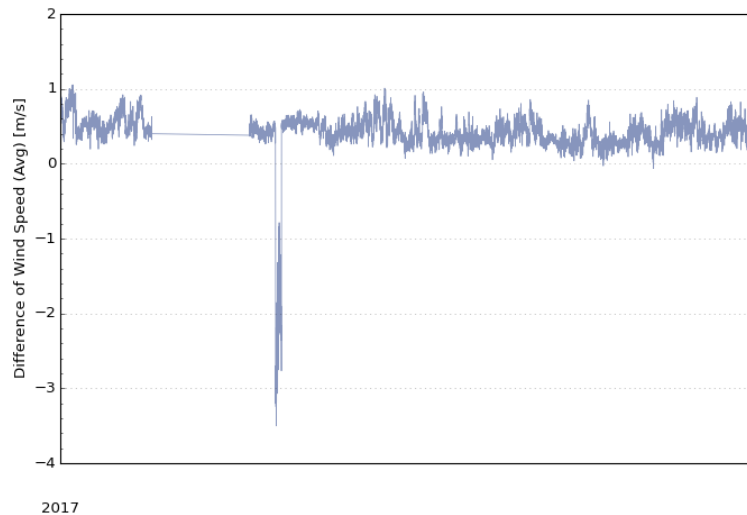
Go to the Data inspection → Plots menu and select in section *Time variation* the *XY difference plot*. Select a data logger from the project and enter the period, which should be displayed in the diagram. Choose at least two *Evaluations* from the dropdown list and click on *Plot* to display the XY difference plot.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.



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Difference of evaluations		Height [m]	Orientation [°]	Difference (Min)	Difference (Avg)	Difference (Max)
Top	Backup	21.00 20.00	None None	-3.501	0.413	1.052

Figure 7.18: Example: Wind speed for a determined period in XY difference plot

7.1.3 Distribution

This section lists all plots, which display a frequency distribution of measurement values.

7.1.3.1 Availability

The availability plot displays in graphical form the values of data availability per evaluation.

The data availability is a percentage value of the imported data with valid values. If the complete data in a data file for a given period is there, the result is 100%. Every missing value, None or NaN results in decrease of data availability. This value is crucial for remote sensors.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Availability* plot. Select a data logger from your project, if more than one data logger is related to the project. Select a *Evaluation type* and choose start and end of the period, which should be displayed. Click on *Plot* to show the evaluation type availability.

Options

From:
2016-09-18 23:50

To:
2016-09-18 23:50

Plot

Evaluator Type:

Wind Speed

[Link for sharing this plot](#)

About this plot..

What
Availability graph for every evaluation type.

Why
In this setting availability means, that data has arrived and is valid. Otherwise you will see less than 100%. Only imported data is taken into account. This plot is especially useful for remote sensors.

How
Display availability for every evaluation type for picked time span.

Figure 7.19: Selectable option for the availability plot

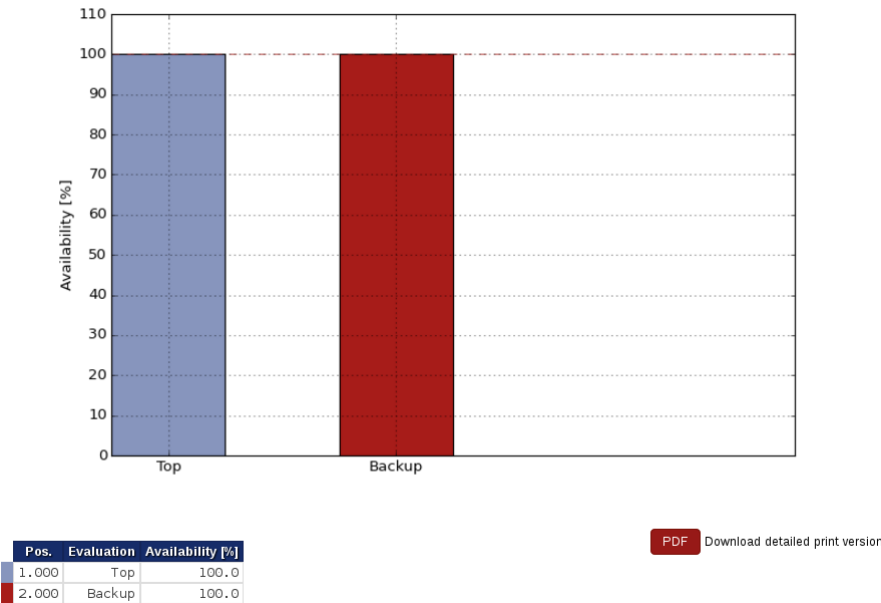


Figure 7.20: Example for the availability plot

Below the plot, a data table is displayed, listing all evaluations for a chosen type, with the value of their availability.



Tip
The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.3.2 Average polar

The average polar displays averaged values of an evaluation per wind direction bin and wind speed bin. The average polar helps analysing the dependency of direction and wind speed for the chosen evaluation.

Choose an evaluation to draw a polar graph for a certain time period. Important is to specify the wind direction sectors as well as the wind speed bins for the averaging. The averages are displayed in form of color map. Different color maps are available to increase the contrast.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Average polar* plot. Select a data logger from your project, if more than one data logger is related to the project. Select a *Evaluation type* and choose start and end of the period, which should be displayed. Click on *Plot* to show the evaluation type average polar.

Options

From: 2017-04-25 23:50

To: 2017-04-25 23:50

Evaluation: Top, Wind Speed

Wind speed evaluation: Top, Wind Speed

Wind direction evaluation: Top (10 Bit), Wind Direction

Sectors: 36 Sectors (10°)

Displayed max windspeed: 12 m/s

Displayed windspeed bin: 0.5 m/s

Colormap: Yellow-Orange-Red

☐ Scale axes to fit data

Plot

[Link for sharing this plot](#)

Figure 7.21: Selectable option for the average polar plot

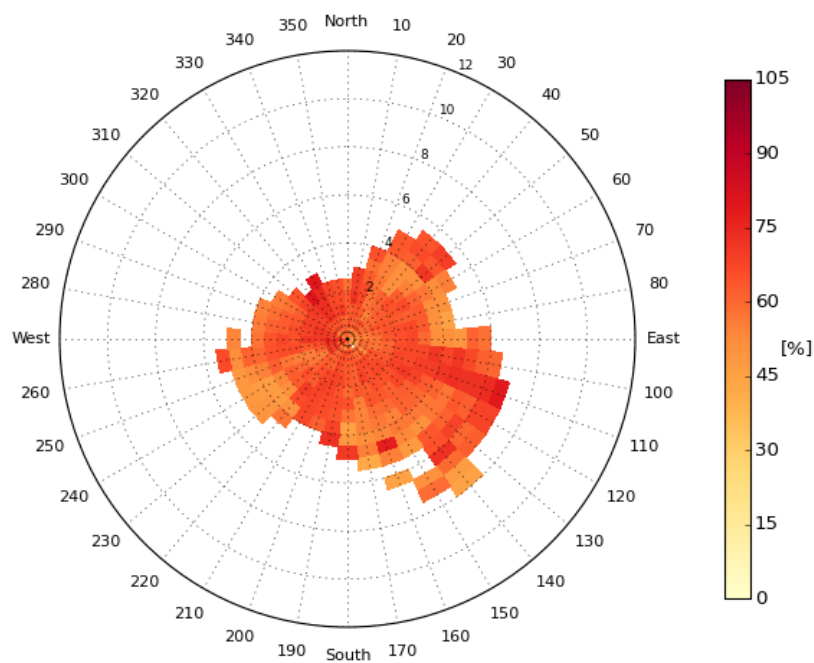


Figure 7.22: Example for the average polar plot



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.3.3 Calms analysis

Use this analysis to inspect calm durations on site for defined wind speed limits.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Calms analysis* plot. Select a data logger, if more than one data logger is related to the project. Set lower and upper calm limit.

The lower calm limit indicates the wind speed, at which your wind turbine does not produce energy (not enough wind). The upper calm limit indicates the critical wind speed, at which your wind turbine might stop producing wind energy due to very high wind speed.

Set start and end of the period, which should be analysed. By default AmmonitOR displays 1 hour bins for the calm duration. If required, choose another bin for calm duration.

Options

From

Choose lower calm limit

Choose upper calm limit

Choose width of bins in min

To

[Link for sharing this plot](#)

About this plot...

What

Calms analysis for each wind speed evaluation.

Why

Analyse calms on site for defined calm limits.

How

Choose the calm limits and the width of bins. All wind speed data, which is less than the lower calm limit and higher than upper calm limit, is included in the figure. Depending on the chosen bin width, each bar shows the share of the defined calm duration (y-axis) to the entire time period. Blue is the share of the lower values and red is the share of the upper values. It is recommended to use higher bin widths for longer time periods to obtain clearness.

Figure 7.23: Selectable options for calms analysis

Click on *Plot* to display the frequency distribution for each wind speed sensor, connected to the selected data logger.

Top speed-N

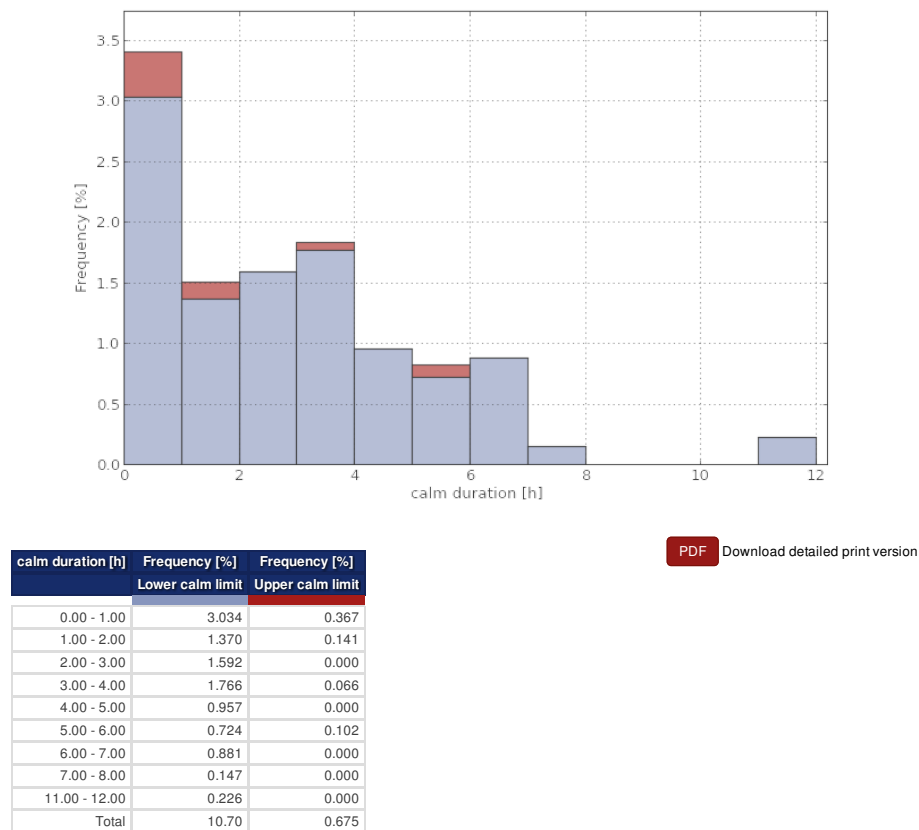


Figure 7.24: Example for calms analysis plot

Frequencies lower calm limit are displayed in blue color; frequencies upper calm limit are displayed in red color.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.3.4 Energy yield

Use this plot to display the energy yield of your wind turbine over a defined period.

The energy yield is calculated as follows:

$$E_i = N_i \cdot P_i$$

Equation 7.2: Calculation of Energy Yield

Where N_i refers to the number of hours in bin i and P_i is the averaged power in bin i .

Go to the Data inspection → Plots menu and select in section *Distribution* the *Energy yield* plot. Select a data logger from your project, if more than one data logger is related to the project. Select a *Wind speed sensor*, the *Power curve* of your turbine and choose start and end of the period, which should be displayed. Click on *Plot* to show the energy yield plot.

If no *Power curve* has been defined, go to the Settings → Wind turbines menu and add a turbine.

Options

From
2011-08-02 00:00

To
2012-02-29 23:50

Wind speed sensor
Top speed-N

Power curve
Nordex (Germany): N100 (Standard)

Plot

[Link for sharing this plot](#)

About this plot...

What

Plot the yielded energy as recommended by the IEC 61400-12-1.

Why

Display the energy, which the wind power plant would have yielded at the specified site (Assuming an availability of 100%).

How

Choose wind speed evaluation and the wind turbine to be compared. Plot theoretically yielded energy.

The energy per bin is calculated as:

$$E_i = N_i \cdot P_i$$

Where N_i is the number of hours in bin i and P_i is the averaged power in bin i according to the related power curve.

Note: If the power value for a bin is not defined in the power curve, the power for this bin is linear interpolated with the adjacent values.

Figure 7.25: Selectable option for the energy yield plot

The energy yield of your turbine is displayed in a bar chart with 0.5 m/s wind speed bins.

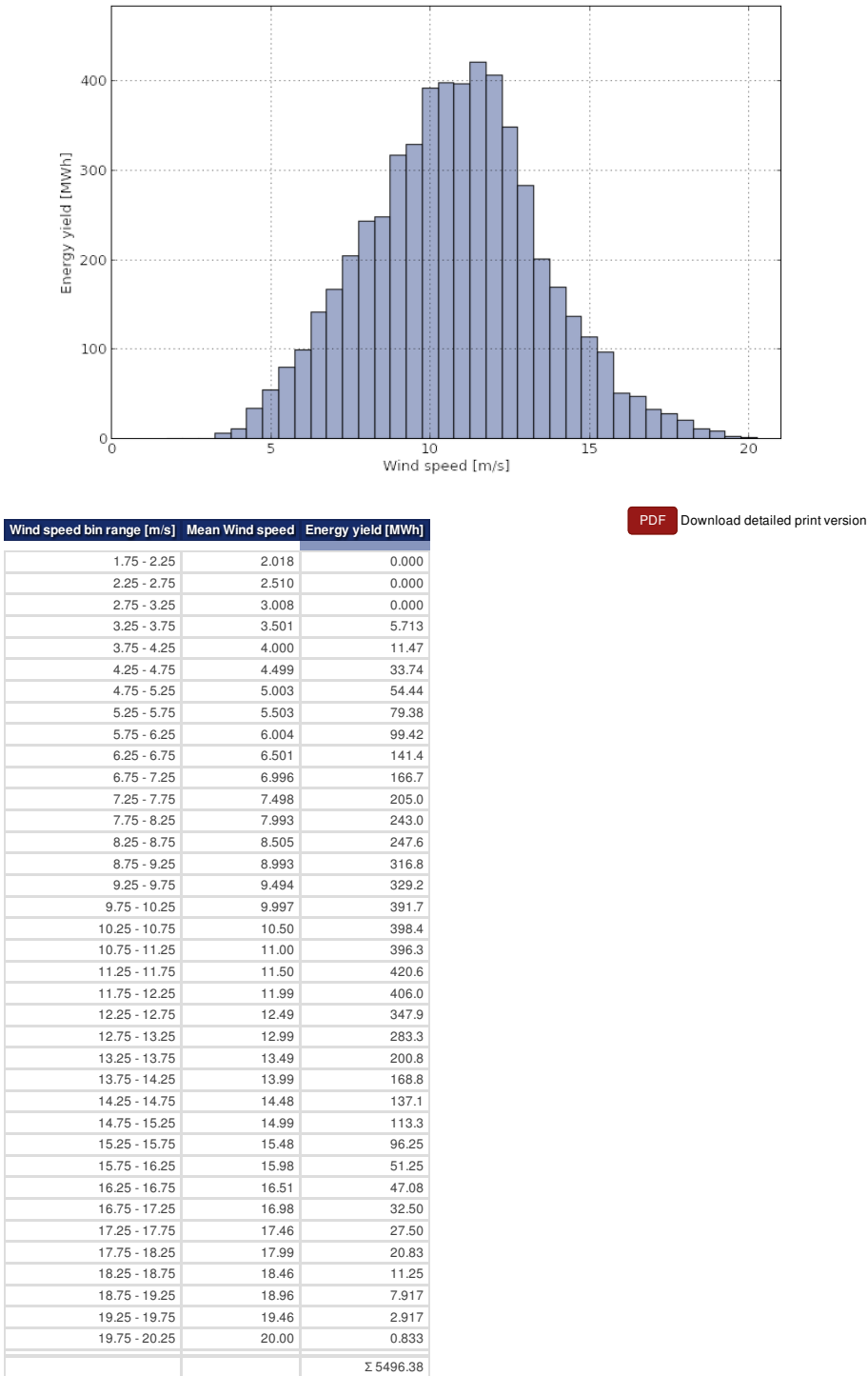


Figure 7.26: Example for the energy yield plot

Below the plot, a data table is displayed, listing all wind speed bins, the energy yield of your turbine as well as the total energy yield for the selected period.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.3.5 Histogram

In the *Histogram* all available evaluations can be displayed to analyse the frequency distribution in selectable bins.

to to the Data inspection → Plots menu and select in section *Distribution* the *Histogram* plot. Select a data logger from the dropdown list and set the time period, which should be displayed. Choose *Evaluation*, *Statistic* and *Bin width*.

Options

From
2013-01-01 00:00

To
2013-12-31 23:50

Evaluation
Top, Wind Speed

Statistic
Average

Choose Bin width
1.0

☐ Scale axes to fit data

Plot

[Link for sharing this plot](#)

About this plot...**What**

Histogram graph for every evaluation.

Why

Evaluate relative frequency of choosen evaluation to analyse density of data.

How

Display frequency density for every evaluation and statistic with different bin width.

Figure 7.27: Options for histogram

Via *Plot* AmmonitOR calculates the chart.

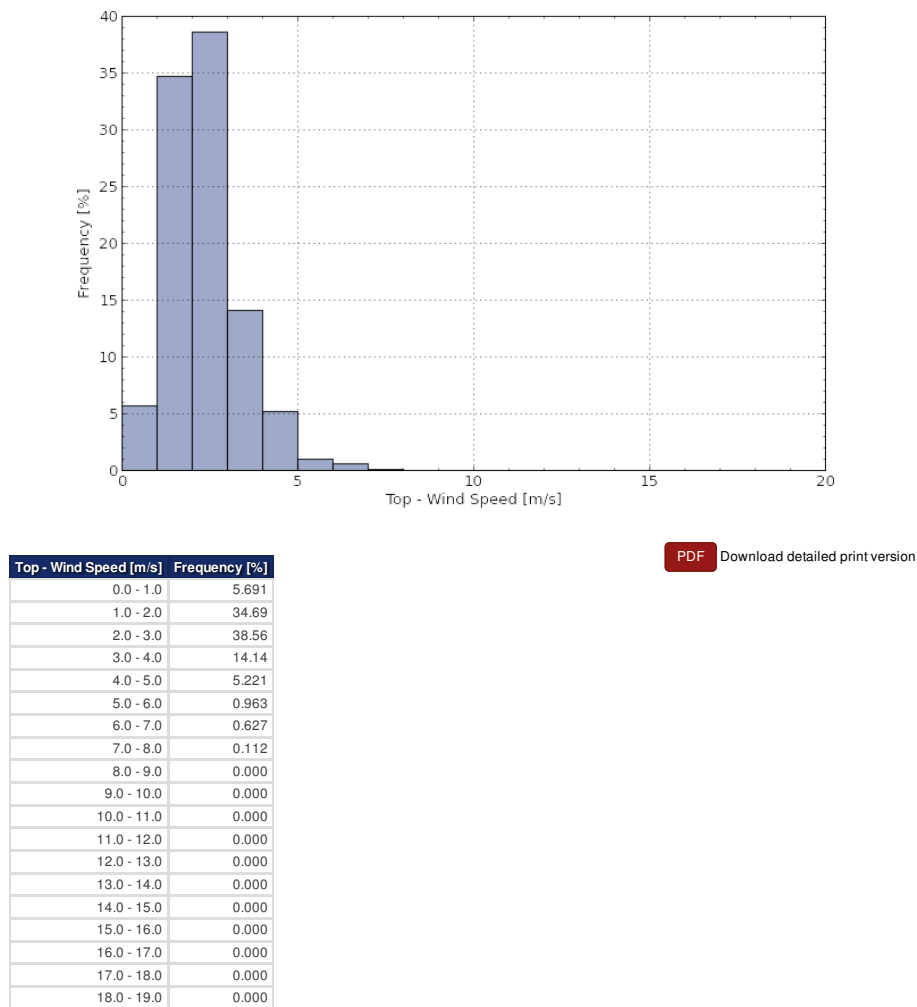


Figure 7.28: Example: Histogram of wind speed for a determined period

Click on *Show data table* to display the table, on *Hide data table* to hide the table.



Tip
The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note
Click on *PDF* to open a PDF file with the plot.

7.1.3.6 Occurrence polar

The occurrence polar displays occurancies of an evaluation per wind direction bin and wind speed bin.

Chose an evaluation to draw a polar graph for a certain time period. Important is to specify the wind direction sectors as well as the wind speed bins for the occurrence calculations. The occurrence are displayaed in form of color map. Different color maps are available to increase the contrast.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Occurrence polar* plot. Select a data logger from your project, if more than one data logger is related to the project. Select a *Evaluation type* and choose start and end of the period, which should be displayed. Click on *Plot* to show the evaluation type occurency polar.

Options

From:
2017-04-25 23:50

To:
2017-04-25 23:50

Evaluation:
Top, Wind Speed

Wind speed evaluation:
Top, Wind Speed

Wind direction evaluation:
Top (10 Bit), Wind Direction

Sectors:
36 Sectors (10°)

Displayed max windspeed:
12 m/s

Displayed windspeed bin:
0.5 m/s

Colormap:
Yellow-Orange-Red

Plot

[Link for sharing this plot](#)

Figure 7.29: Selectable option for the occurrence polar plot

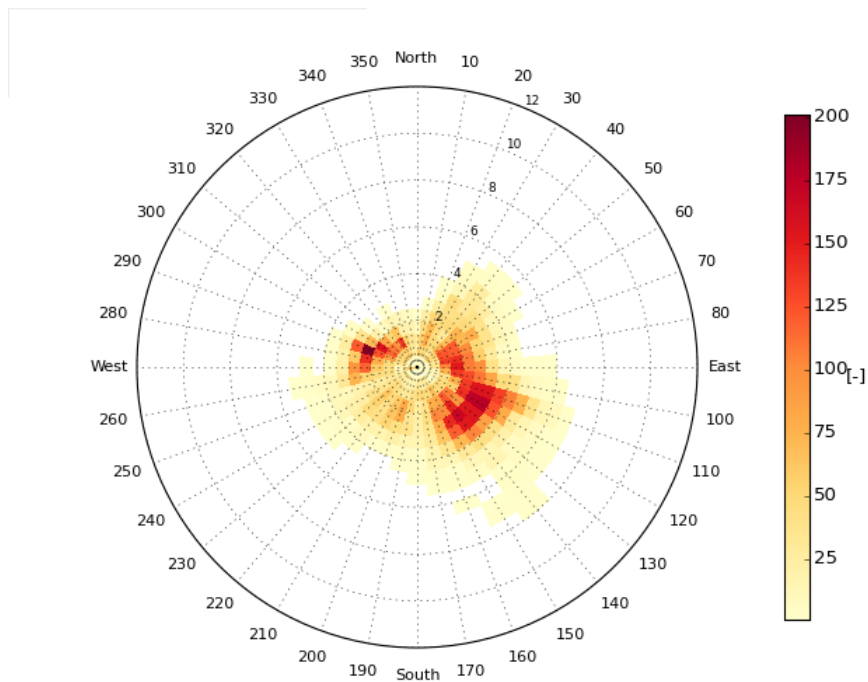


Figure 7.30: Example for the occurrence polar plot



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.3.7 Speed direction bars

The plot with speed direction bars displays the frequency scale of wind speed and wind direction in a wind rose diagram using coloured bars, which indicate different wind speed bins.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Speed direction bar* plot. Select a data logger and define a period, which should be considered. Choose an evaluation pair and determine the number of sectors in the wind rose diagram.

If no *Speed/direction pair* has been defined, an information box is shown. Click on *Add new evaluation pair* and select a wind speed and a wind direction sensor to calculate the evaluation.

Evaluation pairs can also be defined in the Settings → Data logger menu. See Section 10.2.2 for further details.

By default *Normed* is active to display the values in percentage. If the *Normed* checkbox is ticked off, AmmonitOR shows the frequency; how often a wind speed value of a defined scope has been measured in a wind direction sector according to the selected chart options as numbers.

Select *Table with weibull data* to see additional weibull data in the data table. AmmonitOR displays a table referring to the chosen sectors. Wind speed average, weibull's a and weibull's k as well as the frequency of every sector are calculated and displayed. *Table with weibull data* is not selected by default.

Options

From

2013-01-01 00:00

To

2013-12-31 23:50

Plot

Speed/direction pair

Speed/direction @ 21m

Sectors

36 Sectors (10°)

☒ Normed

☐ Table with weibull data

[Link for sharing this plot](#)

About this plot...

What

Polar diagram of wind speed applied for different wind direction sectors.

Why

Evaluate frequency of wind speed per wind direction sector.

How

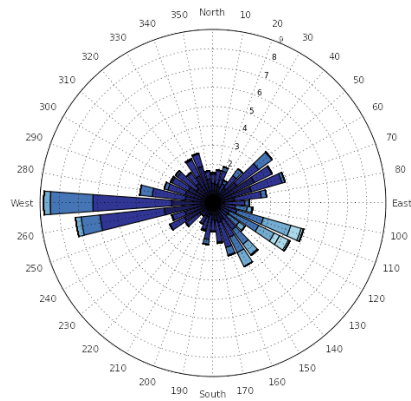
Select speed direction pair or create new evaluation pair. A wind speed frequency bar is shown for each wind direction sector. The length of the bar indicates the frequency of wind speed data in this wind direction. The coloured segments of the bars refer to the wind speed bins according to the data table. Select 'Normed' to display the frequency in %, unselect to see number of data sets. Select 'Table with weibull data' to calculate Weibull parameters in data table. Weibull distribution is calculated as:

$$f(v) = \frac{k}{a} \cdot \left(\frac{v}{a}\right)^{k-1} \cdot e^{-\left(\frac{v}{a}\right)^k}$$

Low k-values indicate high variation in the wind flow; high k-values indicate less variation in the wind flow.

Figure 7.31: Options for speed direction bars diagram

Click on *Plot* to create the diagram.



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Speed [m/s]	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230
0 - 1	0.134	0.157	0.134	0.112	0.179	0.202	0.269	0.224	0.134	0.045	0.045	0.022	0.045	0.090	0.045	0.090	0.112	0.179	0.067	0.157	0.090	0.067	0.067	0.179
1 - 2	0.874	0.807	0.762	0.426	0.762	1.322	2.129	1.860	0.986	0.493	0.224	0.291	0.246	0.403	0.314	0.851	0.941	0.762	0.807	0.448	0.672	0.672	0.381	0.695
2 - 3	0.493	0.739	0.829	0.560	0.807	1.412	1.008	1.658	1.412	1.120	0.896	0.986	0.650	0.448	1.344	1.031	1.344	1.098	0.583	1.300	0.672	0.448	0.381	0.851
3 - 4	0.067	0.022	0.224	0.202	0.448	0.851	0.022	0.157	0.269	0.224	0.627	1.434	1.703	0.739	0.941	0.896	0.403	0.067	0.022	0.246	0.067	0.022	0.000	0.022
4 - 5	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.022	0.246	1.479	0.896	0.381	0.672	0.807	0.045	0.000	0.000	0.022	0.000	0.000	0.000	0.000
5 - 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.560	0.314	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 - 7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.515	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7 - 8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8 - 9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9 - 10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10 - 11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11 - 12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12 - 13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13 - 14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14 - 15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure 7.32: Example: Wind speed and wind direction for a determined period

The plot shows a wind rose with coloured bars, which indicate how often a wind speed has been measured for a wind direction sector. The colours indicate the value in m/s. Refer to the data table below the plot for the wind speed bin related to the colour shown in the wind rose.

Click on *Show data table* to display the table, on *Hide data table* to hide the table.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.3.8 Speed direction dots

The speed direction dots diagram displays the frequency scale of wind speed and wind direction data for a determined period in a wind rose diagram.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Speed direction dots* plot. Select a data logger and define a period, for which should be displayed. Choose an evaluation pair and determine the number of sectors in the wind rose diagram.

If no *Speed/direction pair* has been defined, an information box is shown. Click on *Add new evaluation pair* and select a wind speed and a wind direction sensor to calculate the evaluation.

Evaluation pairs can also be defined in the Settings → Data logger menu. See Section 10.2.2 for further details.

Options

From

2013-01-01 00:00

To

2013-01-31 23:50

Speed/direction pair

Speed/direction @ 21m

Sectors

36 Sectors (10°)

Plot

[Link for sharing this plot](#)

About this plot...

What

Polar diagram of wind speed applied for different wind direction sectors.

Why

Evaluate frequency of wind speed per wind sector.

How

Choose speed direction pair or create one if there's none. A dot is shown for every available average in the chosen time period. Evaluate distribution and frequency of measurements. The lower the wind speed, the closer the dot to the center. Changing the number of sectors allows a finer assignment of the measurements to the sectors.

Figure 7.33: Options for speed direction dots diagram

Click on *Plot* to create the speed direction dots diagram.

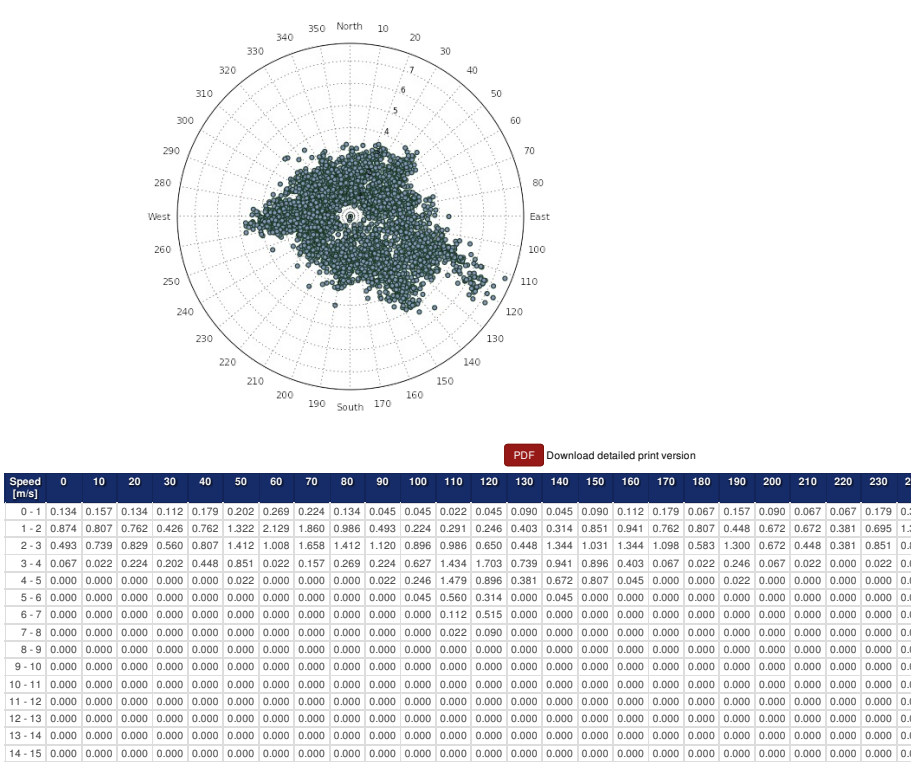


Figure 7.34: Example: Wind speed and wind direction for a determined period

The measurement values are displayed in a wind rose. The higher the wind speed the farther away are the dots from the center of the wind rose diagram. The wind speed is indicated on a scale (0m/s is in the center of the wind rose diagram).

AmmonitOR lists the frequency of measurement values in percentage; how often a wind speed value of a defined scope has been measured in a wind direction sector according to the selected chart options. Click on *Show data table* to display the table, on *Hide data table* to hide the table.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.3.9 Wind direction

The wind direction plot displays the frequency scale of wind directions in a wind rose diagram. AmmonitOR displays for each wind direction sensor a separate wind rose diagram.

Go to the Data inspection → Plots menu and select in section *Distribution* the *Wind direction* plot. Select a data logger from the project and determine the period, which should be monitored. Choose the number of sectors for the wind rose diagram.

By default *Normed* is active and the frequency is displayed in percentage. If you deselect the *Normed* checkbox, the frequency of measurement data is displayed.

Options

From
2013-01-01 00:00

To
2013-01-31 23:50

Sectors
36 Sectors (10 °)

☒ Normed

Plot

[Link for sharing this plot](#)

About this plot...
What
Frequency of wind direction data per sector.
Why
Evaluate the frequency of wind direction data for a selectable number of wind direction sectors.
How
Select the number of sectors in the wind rose diagram. The length of the bar indicates the frequency of measurements in each sector. Unselect 'Normed' to display number of measurements

Figure 7.35: Options for wind rose diagram

Click on *Plot* to generate the wind rose diagram(s).

Backup (Poti), Wind Direction

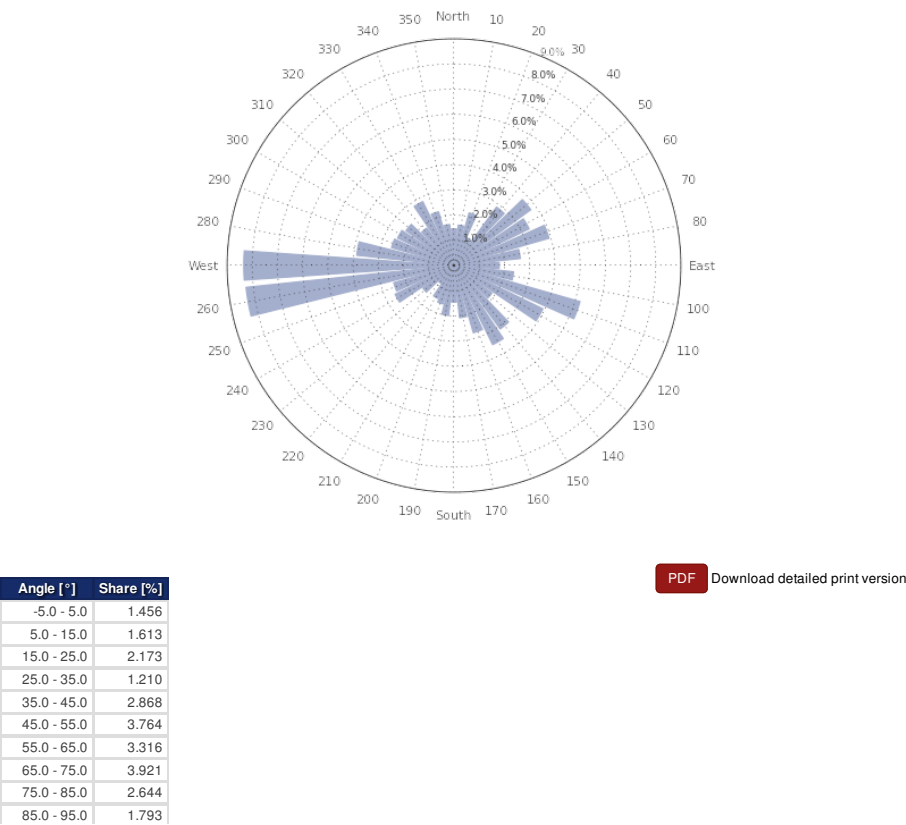


Figure 7.36: Example: Wind rose for a determined period



Tip
The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note
Click on *PDF* to open a PDF file with the plot.

7.1.3.10 Wind speed

AmmonitOR displays the frequency scale of all installed wind speed sensors in histograms. Weibull parameters can be displayed. The distribution of measurement values are calculated in 0.5 m/s bins.

Options

From

2013-01-01 00:00

To

2013-01-31 23:50

Plot

☒ Scale axis to fit data

[Link for sharing this plot](#)

About this plot...

What

Histogram of wind speed including Weibull distribution

Why

Evaluate frequency of wind speed and compare with distribution function.

How

Display histogram of wind speed distribution for every wind speed evaluation. Weibull distribution is calculated as:

$$f(v) = \frac{k}{a} \cdot \left(\frac{v}{a}\right)^{k-1} \cdot \exp\left(-\left(\frac{v}{a}\right)^k\right).$$
 Low k-values indicate high variability in the wind flow, high k-values indicate less variability in the wind flow.

Figure 7.37: Options for wind speed histogram

Go to the Data inspection → Plots menu and select in section *Distribution* the *Wind speed* plot. Select a data logger from the project and determine the period, which should be monitored. Click on *Plot* to display for each wind speed sensor a histogram with Weibull curve and Weibull parameters.

Backup

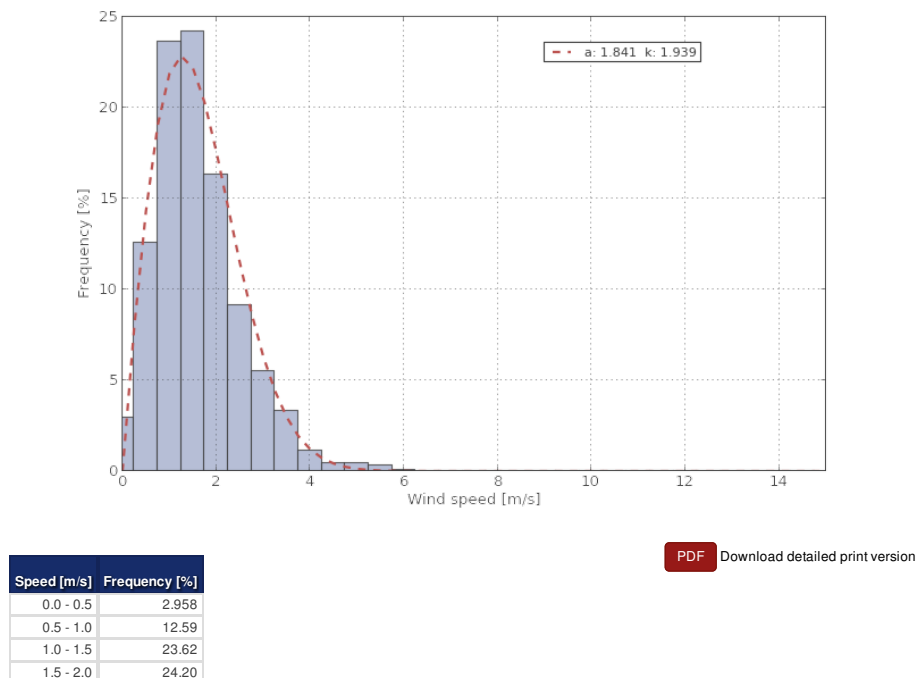


Figure 7.38: Histogram of wind speed

Weibull parameters are calculated using the Modified Maximum Likelihood Estimation algorithm.

$$\frac{\sum_{i=1}^n v_i^k \log v_i P(v_i)}{\sum_{i=1}^n v_i^k P(v_i)} - \frac{1}{k} = \sum_{i=1}^n \log v_i P(v_i)$$

Equation 7.3: Calculation of weibull shape parameter

$$\hat{a} = \left[\sum_{i=1}^n v_i^{\hat{k}} P(v_i) \right]^{1/\hat{k}}$$

Equation 7.4: Calculation of weibull scale parameter

The first equation (shape parameter) is estimated using iterative processes with a precision of ± 0.0001 , the scale parameter is derived from the estimated shape parameter using the second equation.

For each wind speed sensor, AmmonitOR lists the frequency for all 0.5 m/s bins in a data table below the histograms. Click on *Show data table* to display the table, on *Hide data table* to hide the data table.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.4 Comparison

This section lists all plots, which correlate or compare measurement values.

7.1.4.1 Correlation occurrence plot

The correlation occurrence plot is used to compare measurement values (evaluations) of the same sensor type, e.g., anemometers. Thus measurement errors or defective sensors can easily be detected. In addition to the correlation plot the occurrence is displayed. For detailed explanations go to Section 7.1.4.2.

Go to the Data inspection → Plots menu and select in section *Comparison* the *Correlation occurrence plot*. Select a data logger and define the period, which should be considered for the plot. Choose an *Evaluation type* from the dropdown list. AmmonitOR automatically includes all sensors of the evaluation type in the plot. Deselect sensors, which should not be displayed in the correlation profile by using the CTRL key. Click on *Plot* to display the correlation occurrence profile.

Options

From: 2017-04-25 23:50
To: 2017-04-25 23:50

Evaluator Type: Wind Speed
Top
Backup
PWM

Choose Bin width: 0.1

Colormap: Spectral

Plot

[Link for sharing this plot](#)

About this plot...

What

The correlation occurrence plot is used to compare measurement values (evaluations) of the same sensor type.

Why

Measurement errors or defective sensors can be detected.

How

Select two evaluations. The highest evaluation will be automatically placed as reference (x-axis). It is correlated to the primary evaluation (y-axis). The occurrence is displayed at the right hand sided colorbar. To change the gradation of detail pick the bin width. Data table: The calculated linear regression follows $y = m \cdot x + b$. If slope $m < 1$, the values for the reference sensor are higher than the average. If $m > 1$, the values of the compared sensor are higher than the average. The coefficient of determination R^2 indicates the linear correlation. $R^2 = 1$ indicates optimal correlation; $R^2 = 0$ no linear correlation.

Figure 7.39: Selectable options for correlation occurrence plot

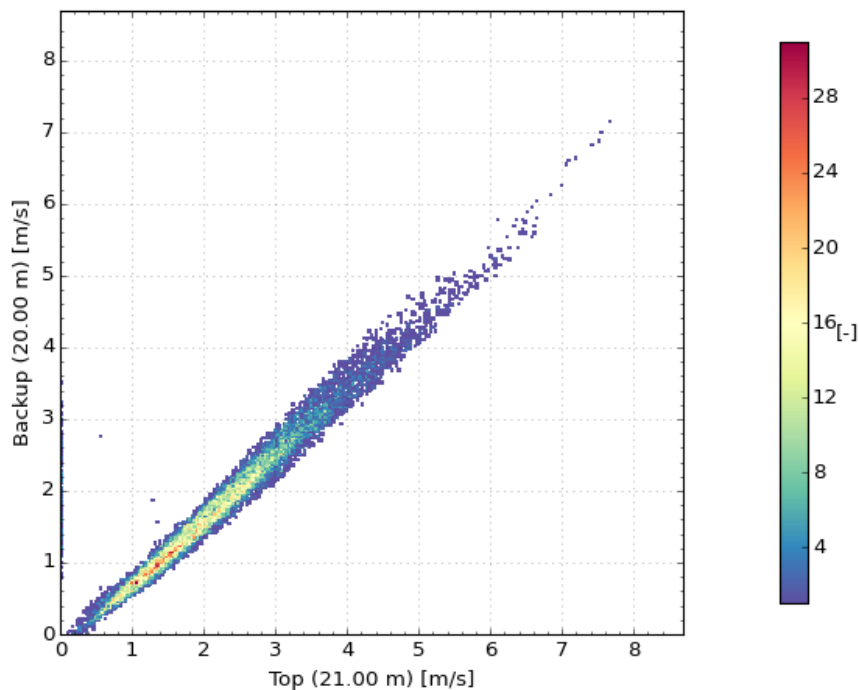


Figure 7.40: Correlation occurrence profile for wind direction



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.



Important

Depending on the installation height of the correlated sensors, the gradient angle of the regression line is different. This is because of atmospheric layers. It affects all height-dependent sensors, e.g., anemometers, temperature sensors and air pressure sensors.

7.1.4.2 Correlation plot

The correlation plot is used to compare measurement values (evaluations) of the same sensor type, e.g., anemometers. Thus measurement errors or defective sensors can easily be detected.

One sensor is used as reference. AmmonitOR automatically selects the sensor with the greatest installation height as reference, it indicated. The reference sensor is shown on x-axis; other sensors on the y-axis. For example: top anemometer on x-axis and backup anemometer on y-axis. All measurement values are displayed in a data cluster - optimally on a diagonal.

AmmonitOR calculates a regression line for each correlation, which is displayed in the plot. Thus the trend of the measurement values can be monitored.

The regression line is calculated as follows:

$$y(x) = \tilde{a} \cdot x + \tilde{b}$$

$$\tilde{a} = \frac{\overline{xy} - \bar{x} \cdot \bar{y}}{\overline{x^2} - (\bar{x})^2}$$

$$\tilde{b} = \bar{y} - \tilde{a} \cdot \bar{x}$$

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

$$R^2 := r_{xy}^2$$

Equation 7.5: Calculation of regression line and coefficient of determination R^2

Go to the Data inspection → Plots menu and select in section *Comparison* the *Correlation plot*. Select a data logger and define the period, which should be considered for the plot. Choose an *Evaluation type* from the dropdown list. AmmonitOR automatically includes all sensors of the evaluation type in the plot. Deselect sensors, which should not be displayed in the correlation profile by using the CTRL key. Click on *Plot* to display the correlation profile.

Options

From

2013-01-01 00:00

To

2013-01-31 23:50

Evaluator Type

Wind Speed

Top

Backup

Plot

[Link for sharing this plot](#)

About this plot...

What

The correlation plot is used to compare measurement values (evaluations) of the same sensor type.

Why

Measurement errors or defective sensors can be detected.

How

The highest sensor is automatically selected as reference sensor (x-axis). It is correlated to the other sensors of the same type (y-axis). The calculated linear regression follows $y = m \cdot x + b$ (compare solid line and data table). If slope $m < 1$, the values for the reference sensor are higher than the average. If $m > 1$, the values of the compared sensor are higher than the average. The coefficient of determination R^2 indicates the linear correlation. $R^2 = 1$ indicates optimal correlation; $R^2 = 0$ no linear correlation.

Figure 7.41: Selectable options for correlation profile

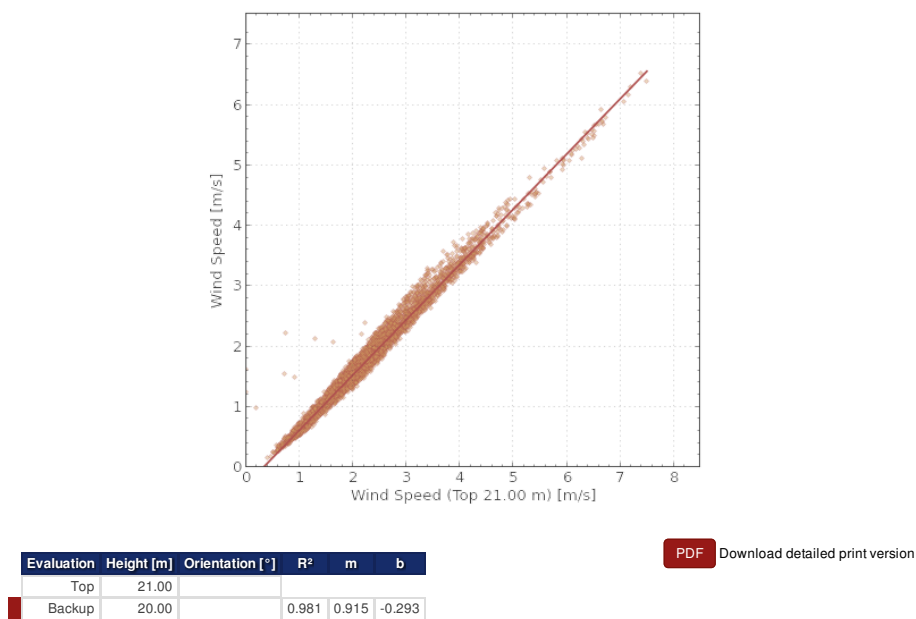


Figure 7.42: Correlation profile for wind direction

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

The explanation next to the diagram (see Figure 7.42) indicates, which regression line corresponds to the correlated sensor. The coefficient of determination R^2 indicates the linear correlation. $R^2 = 1$ means optimal correlation; $R^2 = 0$ indicates no linear correlation.

**Important**

Depending on the installation height of the correlated sensors, the gradient angle of the regression line is different. This is because of atmospheric layers. It affects all height-dependent sensors, e.g., anemometers, temperature sensors and air pressure sensors.

7.1.4.3 Long term comparison profile

The long term comparison profile is used to monitor and detect wear on the top anemometer based on the correlation with the backup anemometer. For a determined period measurement values of the top anemometer are correlated with measurement values of the backup anemometer.

Go to the Data inspection → Plots menu and select in section *Comparison* the *Long term comparison profile*. Select primary and backup wind speed evaluations, which should be correlated. Select a wind direction evaluation.

Wind speed data can be filtered to monitor only a typical wind speed range. Additionally, wind speed data related to a determined wind direction sector can be considered. To do so, select the filter for wind speed and / or wind direction.

Options

From

2013-01-01 00:00

To

2013-06-30 23:50

Primary wind speed evaluation

Top, Wind Speed

Control wind speed evaluation

Backup, Wind Speed

Data are filtered for wind speed range

No filtering

Wind direction evaluation for sector filter

Backup (Potl), Wind Direction

Data are filtered for main wind direction sector

270 ° (±20 °)

Plot

[Link for sharing this plot](#)

About this plot...

What

Measurement values of the primary anemometer are correlated with measurement values of the backup anemometer for a determined period.

Why

Monitor and detect variations on the primary anemometer based on correlation with the backup anemometer.

How

Correlation per day: The coefficient of determination is shown for each day over the selected time period. If a slope is shown in the curve, an error in one of the sensors might be indicated.

Relation of two anemometers: Comparing the anemometers directly by a simple division, allows determining, which anemometer has lower or higher values than the other one.

Turbulence intensity over time: Direct comparison of the turbulence intensity allows determination of icing or wear. Significantly less turbulence intensity in one of the anemometers could be due to a more inert sensor. The inertia could be caused by icing or wear.

Figure 7.43: Options for long term comparison profile

AmmonitOR displays three plots: correlation per day, relation of the chosen anemometers and turbulence intensity over time.

Correlation per day AmmonitOR displays the correlation of the selected wind speed sensors per day. The behaviour of the R^2 can be monitored for the determined period. Optimal correlation would be R^2 close to 1.

correlation per day

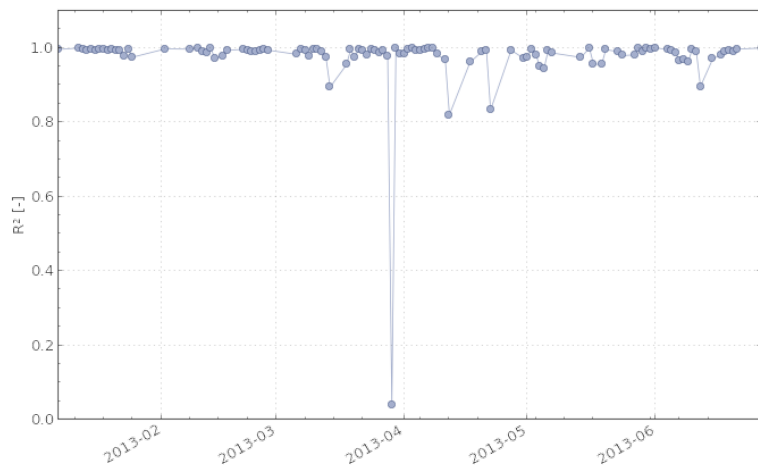
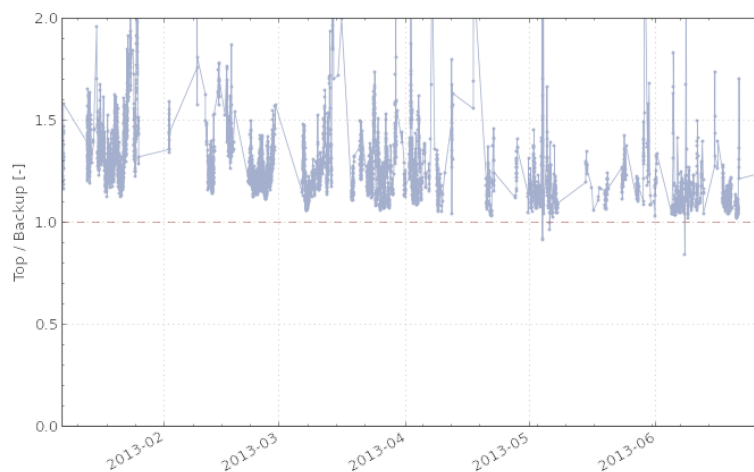

[Show data table](#)
[PDF](#)
[Download detailed print version](#)

Figure 7.44: Correlation of selected anemometers per day

Relation of chosen anemometers The division result of the selected top and backup anemometers is displayed in a curve. If the top anemometer is slower than the backup anemometer, the displayed curve is below the optimal value 1. This plot indicates the defective anemometer.

In a table the total minimum, average and maximum measurement values of the selected anemometers are displayed (based on the calculated averages), as well as the values for the displayed curve.

relation of two anemometers


[PDF](#)
[Download detailed print version](#)

	Type	Height [m]	Orientation [°]	Unit	Min (of Avg)	Avg (of Avg)	Max (of Avg)
Top	Wind Speed	21.00		m/s	0.000	2.293	29.47
Backup	Wind Speed	20.00		m/s	0.000	1.903	7.434
Top / Backup				0.842	1.263	16.74	

Figure 7.45: Relation of selected anemometers

Turbulence intensity over time AmmonitOR displays the turbulence intensity of both anemometers in a plot. If the turbulence intensity of one anemometer is much higher than the other, a defective anemometer can be the reason.

The turbulence intensity is the proportion of standard deviation and average of the 10min statistics over a certain period. The value is given in percentage.

A table shows the minimum, average and maximum value of the turbulence intensity of the selected anemometers.

turbulence intensity over time

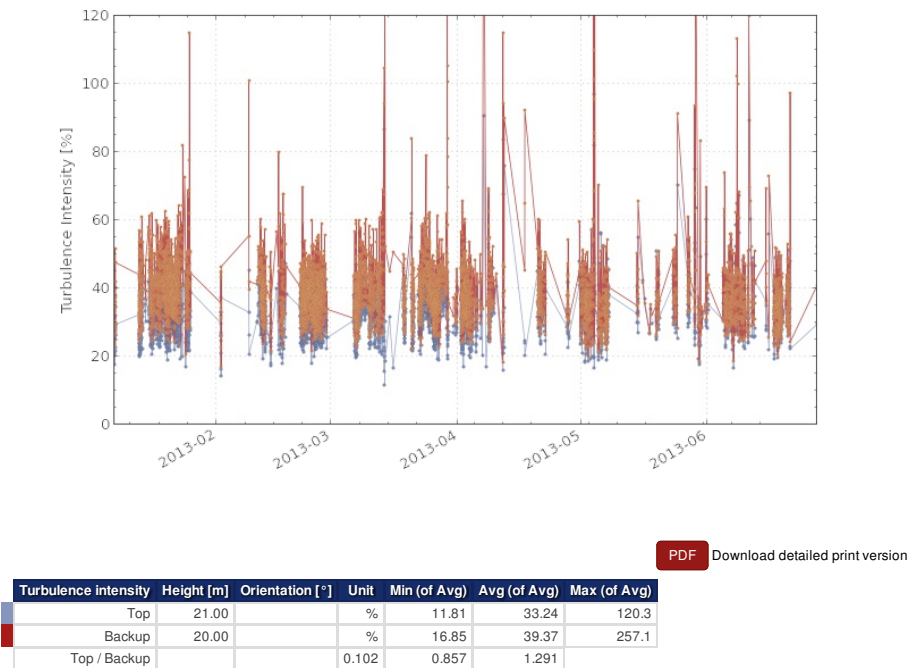


Figure 7.46: Turbulence intensity for selected anemometers



Tip
The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note
Click on *PDF* to open a PDF file with the plot.

7.1.4.4 Shadow zone plot

Generate this plot to display shadow zones caused by the mast or lightning protection. AmmonitOR shows the wind direction by calculating the quotient [q] of two anemometers. The generated chart shows a bulge in the direction of the mast, lightning protection or obstacle.

The shadow zone is calculated as follows:

$$q = \frac{\text{Anemometer1}}{\text{Anemometer2}}$$

Equation 7.6: Calculation of shadow zone

Go to the Data inspection → Plots menu and select in section *Comparison* the *Shadow zone plot*. Select a data logger and determine the period, which should be displayed. Choose wind speed sensors and a wind vane. The numerator should be the top anemometer and the divisor the backup anemometer. However, it is possible to compare other anemometers installed on different heights - according to literature the height difference should not exceed 5m.

Options

From

2013-01-01 00:00

Numerator wind speed evaluation

Top, Wind Speed

Divisor wind speed evaluation

Backup, Wind Speed

To

2013-01-31 23:50

Wind direction evaluation

Backup (Poti), Wind Direction

☐ Cartesian

Plot

[Link for sharing this plot](#)

About this plot...

What

Displays shadow zones caused by the mast or lightning protection.

Why

Monitor position of obstacles in the wind flow. Evaluate origin of data.

How

Select anemometers, which should be compared and a wind vane to consider the wind direction. If an obstacle is between first and second anemometer, a bulge is shown in the data due to the modified wind speed. Values above 1 refer to higher wind speed in numerator evaluation and vice versa. If a bulge is expected, but not shown in the plot, it could indicate data manipulation.

Figure 7.47: Options for shadow zone plot

Click on *Plot* to create the shadow zone diagram.

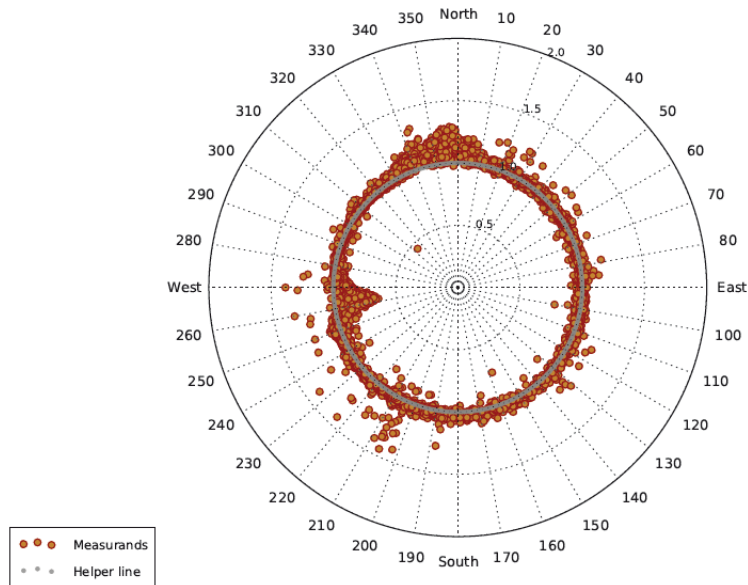


Figure 7.48: Example: Shadow zone plot

In order to show the shadow zone plot in a cartesian chart, select *Cartesian*.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.4.5 Simple height profile

The simple height profile is used to compare evaluations in different installation heights. AmmonitOR displays the average values including standard deviation of an evaluation for a determined period.

Go to the Data inspection → Plots menu and select in section *Comparison* the *Simple height profile*. Select a data logger and determine the period, which should be displayed. Choose an *Evaluation type*, for which all installed sensors are shown in the plot.

Click on *Plot* to display the diagram.

Options

From

Evaluator Type

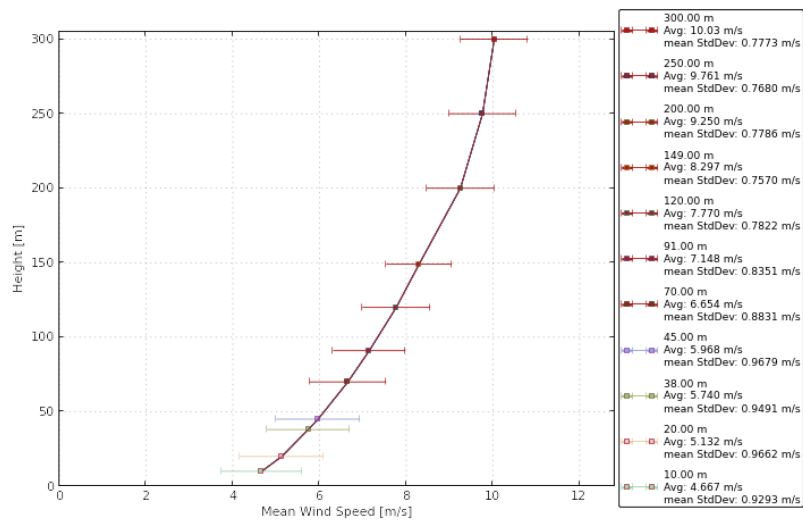
To

[Link for sharing this plot](#)

About this plot...
What
Displays evaluations in different installation heights including standard deviation.
Why
Evaluate same evaluation type in different installation heights.
How
Select evaluation type to display the evaluation over all available heights. Standard deviation indicates the scatter of the evaluation values.

Figure 7.49: Options: Simple height profile

For example: If the simple height profile for wind speed should be displayed, AmmonitOR shows for each installed anemometer a graph.



Evaluation	Height [m]	Avg [m/s]	± mean StdDev [m/s]
Horizontal Wind Speed @ 300m	300.0	10.03	0.777
Horizontal Wind Speed @ 250m	250.0	9.761	0.768
Horizontal Wind Speed @ 200m	200.0	9.250	0.779
Horizontal Wind Speed @ 149m	149.0	8.297	0.757
Horizontal Wind Speed @ 120m	120.0	7.770	0.782
Horizontal Wind Speed @ 91m	91.00	7.148	0.835
Horizontal Wind Speed @ 70m	70.00	6.654	0.883
Horizontal Wind Speed @ 45m	45.00	5.968	0.968
Horizontal Wind Speed @ 38m	38.00	5.740	0.949
Horizontal Wind Speed @ 20m	20.00	5.132	0.966
Horizontal Wind Speed @ 10m	10.00	4.667	0.929

[PDF](#) Download detailed print version

Figure 7.50: Example: Simple height profile for wind speed



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on [Link for sharing this plot](#). A URL is displayed, which can be copied to an email.



Note

Click on [PDF](#) to open a PDF file with the plot.

7.1.5 Turbulence analysis

This section lists typical plots relevant for turbulence analysis.

7.1.5.1 Turbulence intensity

Turbulence intensity is crucial for the wind turbine design, especially to calculate the wind load on the rotor blades and on the tower. It does not necessarily have an impact on the energy yield.

Horizontal and vertical wind speed data is necessary to calculate the turbulence intensity. It is recommended installing a propeller anemometer to measure the vertical wind speed in addition to cup anemometers (horizontal wind speed). Ultrasonic anemometers can also be installed, which measure horizontal and vertical wind speed as well as wind direction.

The average turbulence intensity (I_v) is given in % (percentage). The turbulence intensity is the proportion of standard deviation (σ) and average (v) of the 10min-statistics for a certain period.

$$I_v = \frac{\sigma_v}{\bar{v}} = [\%]$$

Equation 7.7: Calculation of the turbulence intensity (I_v)

$$I_c = \bar{I}_v + \sigma_{\bar{I}_v} = [\%]$$

Equation 7.8: Calculation of the characteristical turbulence intensity (I_c)

$$I_{NTM} = \frac{I_{ref} \cdot (0.75 \cdot v_{hub} + 5,6)}{v_{hub}} = [\%]$$

Class A: $I_{ref} = 0.16$ Class B: $I_{ref} = 0,14$ Class C: $I_{ref} = 0.12$

Equation 7.9: Calculation of the Normal Turbulence Model (NTM) of IEC61400-1

Go to the Data inspection → Plots menu and select in section *Turbulence analysis* the *Turbulence intensity* plot. Select a data logger from the project and determine the period, which should be monitored. Choose a wind speed evaluation. If more than one wind speed evaluation should be displayed, hold the CTRL key and use the left-mouse click to choose further evaluations. Click on *Plot* to display the chart.

By selecting the checkbox *Turbulence intensity profile for IEC's normal turbulence model*, curves of the normal turbulence model are displayed in the diagram, see Figure 7.54.

Options

From

2013-01-01 00:00

To

2013-01-31 23:50

Wind speed evaluation

Top, Wind Speed

Backup, Wind Speed

☒ Turbulence intensity profiles for IEC's normal turbulence model

Plot

[Link for sharing this plot](#)

About this plot...

What

Turbulence intensity (TI) vs. wind speed, sensor height and time.

Why

Evaluate the turbulence in wind flow depending on wind speed and measurement height.

How

Select one or more wind speed evaluations to display the turbulence intensity in different views.

TI indicates the undisturbed wind flow. High values refer to high variations in the wind flow. TI changes with terrain roughness or obstacles.

TI is calculated on the basis of $\frac{\sigma}{\bar{v}}$ (Standard deviation divided by average wind speed)

Turbulence intensity vs. wind speed displays all average values calculated over the selected time period. High turbulence intensity for low wind speed values is typical for the wind flow.

Sensor height vs. turbulence intensity displays the averaged turbulence intensity per height for the selected time period. High TI at low heights is typical due to terrain roughness.

Average turbulence intensity vs. wind speed bins displays the averaged TI per wind speed bin including TI error bars. Select IEC's normal turbulence model for comparison with standard turbulence profile.

Turbulence intensity vs. time displays the distribution of TI over the selected time period.

Figure 7.51: Options for turbulence intensity plots

AmmonitOR generates four plots to monitor turbulence intensity.

turbulence intensity vs. wind speed

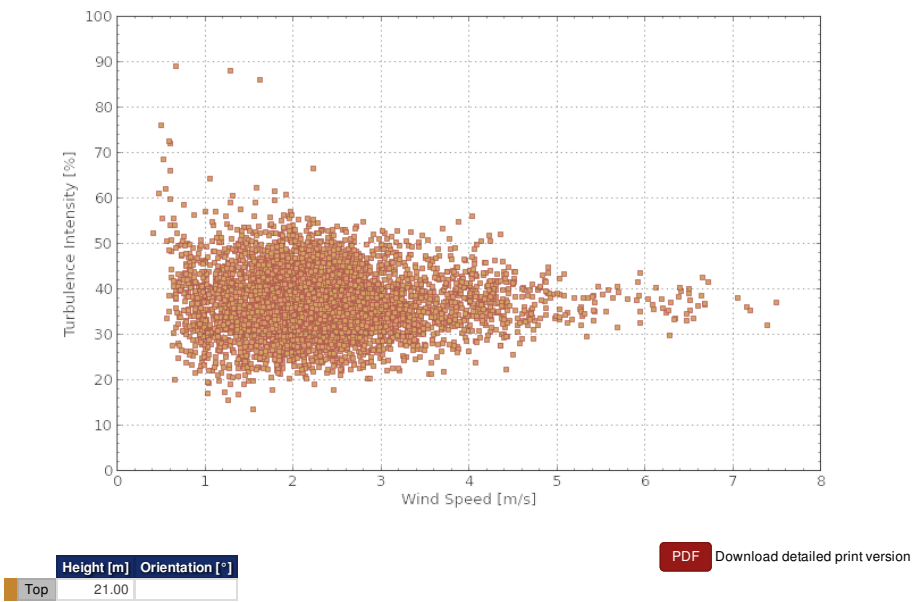


Figure 7.52: Example: Turbulence intensity frequency scale

Figure 7.52 displays the frequency scale of the turbulence intensity on the wind speed.

sensor height vs. turbulence intensity

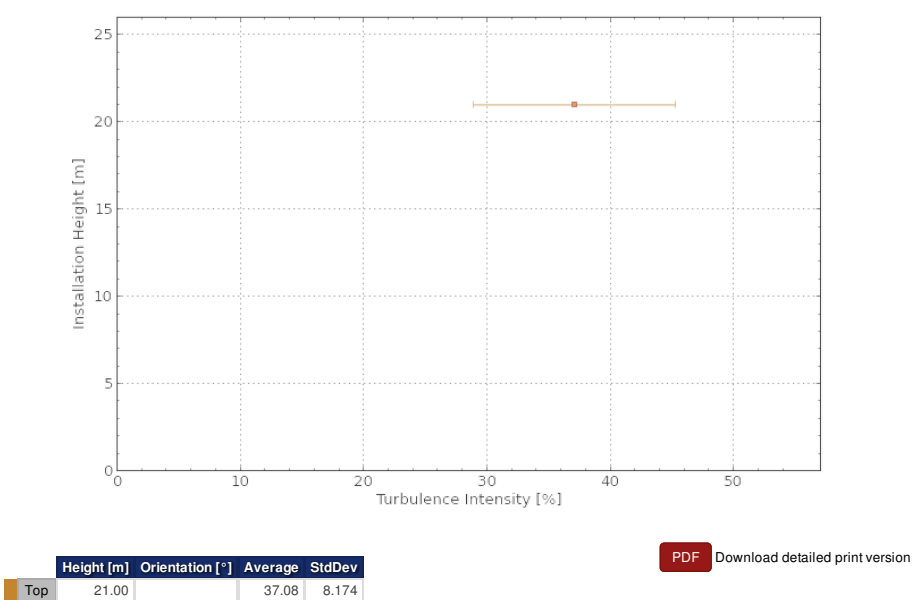


Figure 7.53: Example: Turbulence intensity vs. installation height

Figure 7.53 displays the turbulence intensity of the selected wind speed sensor on the different installation heights.

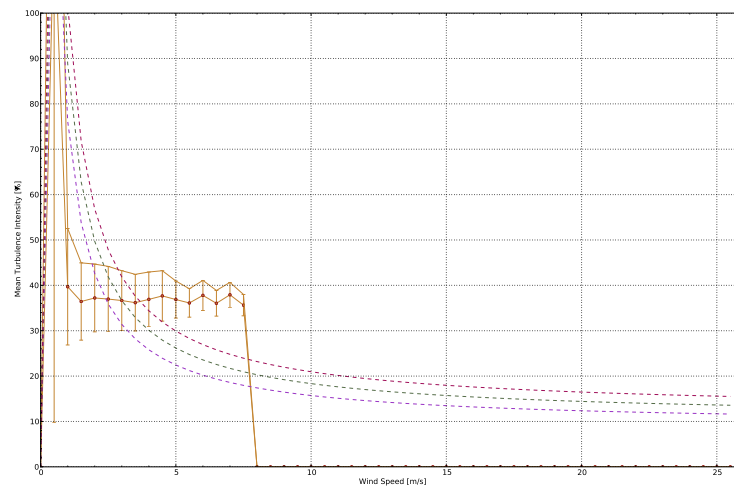


Figure 7.54: Example: Mean and characteristic turbulence intensity

Figure 7.54 displays the mean and characteristic turbulence intensity of the selected sensor.

AmmonitOR lists for each wind speed bin average and standard deviation of the wind speed. Click on *Show data table* to review the data, on *Hide data table* to hide the data table.

turbulence intensity vs. time

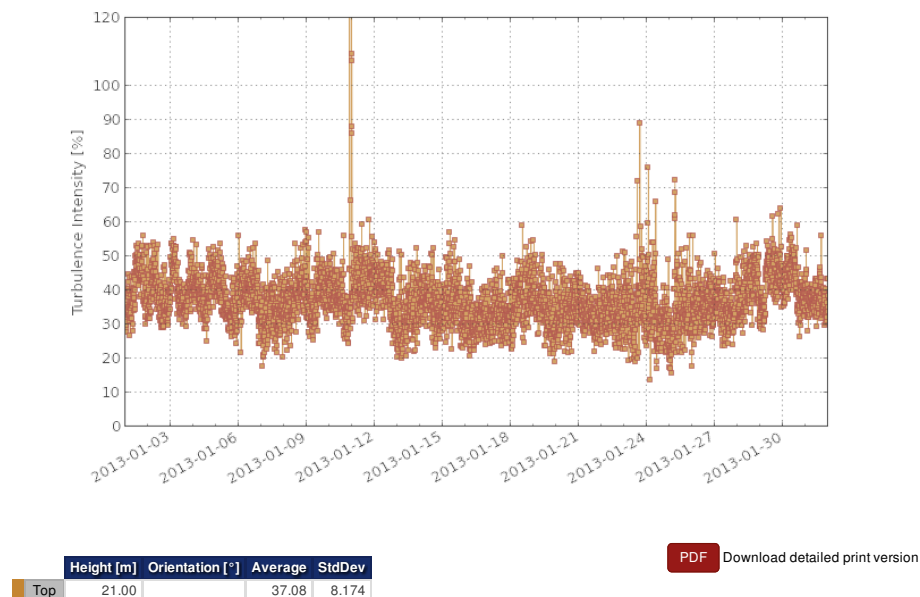


Figure 7.55: Example: Turbulence intensity trend

Figure 7.55 displays the trend of the turbulence intensity for the selected period.

**Tip**

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.

**Note**

Click on *PDF* to open a PDF file with the plot.

7.1.5.2 Turbulence intensity polar

The turbulence intensity polar displays the frequency scale of the turbulence intensity in a wind rose plot.

Go to the Data inspection → Plots menu and select in section *Turbulence analysis* the *Turbulence intensity polar* plot. Select a data logger from the project and determine the period, which should be monitored. Choose a wind speed and a wind direction evaluation from the list. Click on *Plot* to display the wind rose diagram.

Options

From
2013-01-01 00:00

Wind speed sensor
Top, Wind Speed

Wind direction sensor
Backup (Poti), Wind Direction

☒ Normed

To
2013-01-31 23:50

Plot

[Link for sharing this plot](#)

About this plot...

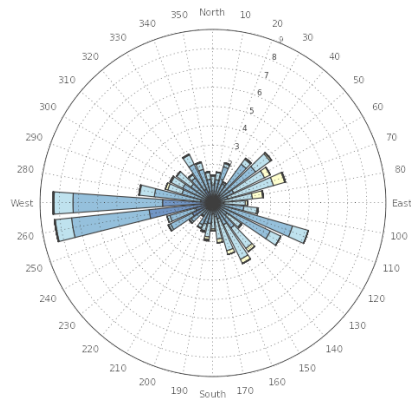
What
Polar bar plot for turbulence intensity (TI).

Why
Evaluate turbulence intensity per wind direction sector.

How
Select wind speed and wind direction evaluation to display frequency of turbulence intensity bins per wind direction sector. Refer to data table for colour of the TI bin. TI indicates the undisturbed wind flow. High values refer to high variations in the wind flow. TI changes with terrain roughness or obstacles.
TI is calculated on the basis of $\frac{\sigma}{\bar{v}}$ (Standard deviation divided by average wind speed).

Figure 7.56: Options for turbulence intensity polar

By default *Normed* is active and the frequency of measurement values is displayed in percentage. If you deselect the *Normed* checkbox, AmmonitOR displays the frequency of the measurement values in numbers.



TI [%]	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230
00 - 10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10 - 20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022
20 - 30	0.134	0.224	0.448	0.359	0.516	0.314	0.090	0.112	0.022	0.000	0.045	0.336	0.157	0.022	0.000	0.000	0.022	0.000	0.022	0.090	0.090	0.381	0.359	0.403
30 - 40	0.807	0.986	1.502	0.740	1.973	2.421	1.098	0.672	0.359	0.538	1.569	3.968	3.161	0.874	1.592	1.255	0.829	0.717	0.538	0.986	1.054	0.874	0.448	0.964
40 - 50	0.448	0.381	0.179	0.090	0.314	0.941	1.793	2.488	1.681	1.143	0.695	0.852	0.605	0.897	1.323	1.995	1.726	1.166	0.785	0.695	0.359	0.179	0.022	0.112
50 - 60	0.045	0.022	0.045	0.022	0.067	0.090	0.314	0.605	0.538	0.112	0.067	0.000	0.000	0.067	0.202	0.224	0.202	0.202	0.112	0.134	0.045	0.000	0.000	0.000
60 - 70	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.045	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.022	0.000	0.022	0.022	0.000
70 - 80	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022
80 - 90	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.022	0.000	0.000	0.000
90 - 100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.022	0.000	0.022	0.000

Figure 7.57: Example: Turbulence intensity polar

The turbulence intensity in the different wind direction sectors is highlighted according to a colour scale. The colours are indicated in the data table below the diagram. AmmonitOR lists for each wind direction sector (10°) the frequency of turbulence intensity in 10% bins.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on [Link for sharing this plot](#). A URL is displayed, which can be copied to an email.



Note

Click on [PDF](#) to open a PDF file with the plot.

7.1.6 Power curve measurement

This section lists a number of plots relevant for power curve measurement applications. In order to display the plots in this section, Speed/power pairs and power measuring units, e.g., power meters, are required.

7.1.6.1 Energy yield

Use this plot to display the calculated energy yield of your wind turbine over a defined period. Additionally, a reference wind turbine can be added to the plot to compare the energy yield of your turbine with the energy yield of the reference turbine.

The energy yield is calculated as follows:

$$E_i = N_i \cdot P_i$$

Equation 7.10: Calculation of Energy Yield

Where N_i refers to the number of hours in bin i and P_i is the averaged power in bin i .

Go to the Data inspection → Plots menu and select in section *Power curve measurement* the *Energy yield* plot. Select a data logger from your project, if more than one data logger are related to the project. Select a *Speed/power pair* and choose start and end of the period, which should be displayed. Optionally, a *Power curve* can be included in the plot - select one from the dropdown list. Click on *Plot* to show the energy yield plot.

If no *Speed/power pair* has been defined, a red-colored information box is displayed. Click on *Add new evaluation pair* and select a wind speed sensor and a power measuring unit (power meter) to calculate the evaluation for the energy yield. It is possible to create more than one *Speed/power pair*.

Evaluation pairs can also be defined in the Settings → Data logger menu. See Section 10.2.2 for further details.

If no *Power curve* has been defined, go to the Settings → Wind turbine menu and add a wind turbine.

Options

From

To

Speed/power pair

Power/Speed
▼

Compare with database power curve

Nordex (Germany): N100 (Standard)
▼

[Link for sharing this plot](#)

About this plot...

What

Plot the yielded energy.

Why

Display the energy, which the wind power plant yielded during its uptime.

How

Choose power evaluation pair and time period. Plot yielded energy.

The energy per bin is calculated as:

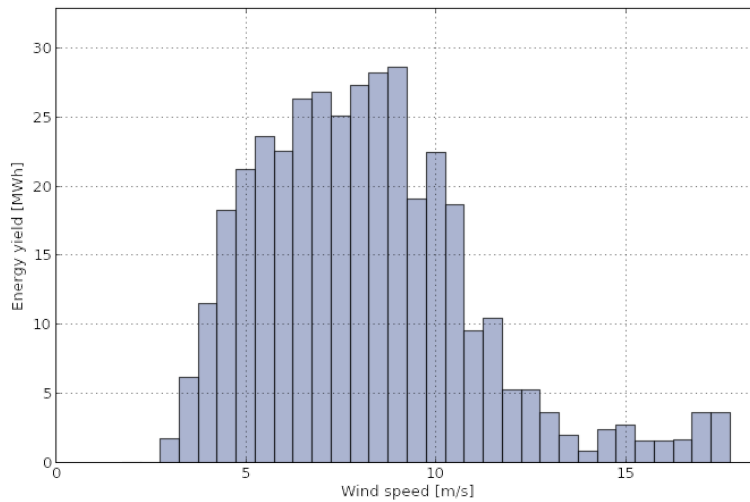
$E_i = N_i \cdot P_i$. Where N_i is the number of hours in bin i and P_i is the averaged power in bin i .

Compare with a power curve from the data base to learn what another wind turbine model would have yielded at this site and during the chosen time period.

Note: If the power value for a bin is not defined in the power curve, the power for this bin is linear interpolated with the adjacent values.

Figure 7.58: Selectable option for the energy yield plot

The energy yield of your turbine is displayed in blue bars. If selected, the energy yield of the reference wind turbine is displayed in red bars.



Wind speed bin range [m/s]	Mean Wind speed	Energy yield [MWh]
1.75 - 2.25	2.014	0.000
2.25 - 2.75	2.524	0.000
2.75 - 3.25	3.017	1.715
3.25 - 3.75	3.492	6.165
3.75 - 4.25	4.002	11.49
4.25 - 4.75	4.404	18.20

[PDF](#) [Download detailed print version](#)

Figure 7.59: Example for the energy yield plot

Below the plot, a data table can be displayed by clicking on *Show data table*. AmmonitOR lists for all wind speed bins the energy yield of your turbine as well as the total energy yield for the selected period. Additionally, AmmonitOR lists the mean wind speed per wind speed bin. If a wind turbine has been selected for comparison reasons, the table list all values of the turbine in a separate column.



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.1.6.2 Estimated energy yield

In order to estimate the energy yield according to IEC 61400-12-1 a number of measurement values have to be collected. Use this plot to predict the annual energy yield based on wind speed and power curve data for a specified time period.

By setting the *Operational range* of the turbine, the extrapolated energy yield per wind speed bin is displayed in the plot. The measurement data is extrapolated to display the maximum achievable energy yield per wind speed bin. According to IEC 61400-12-1 a number of measurement values have to be available to confirm the calculation. Areas with missing measurement values are highlighted in the plot.

Additionally, a reference turbine can be included in the plot to compare its data with your turbine.

According to IEC 61400-12-1 the energy yield forecast is calculated as follows:

$$EP = N_h \sum_{i=0}^N [F(v_i) - F(v_{i-1})] \cdot \left(\frac{P_{i-1} - P_i}{2} \right)$$

Equation 7.11: Calculation of Energy Yield Forecast acc. to IEC 61400-12-1

Where N_h represents the number of hours in the chosen time period, F_v is the Rayleigh probability distribution, v_i is the averaged wind speed per bin i and P_i is the averaged power per bin i .

The Rayleigh distribution is calculated as follows:

$$F(v) = 1 - e^{-\frac{\pi}{4} \left(\frac{v}{v_{avg}} \right)^2}$$

Equation 7.12: Calculation of Rayleigh distribution

Where v_{avg} is the mean wind speed the energy yield is predicted for (4–11 m/s).

Go to the Data inspection → Plots menu and select in section *Power curve measurement* the *Estimated energy yield plot*. Select a data logger from the dropdown list and choose a *Speed/power pair*. Set start and end of the period, which should be displayed. Enter the *Operational range* of your turbine with cut-in and cut out. Use a hyphen (-) to separate the values, e.g., 3-20.

If no *Speed/power pair* has been defined, a red-colored information box is displayed. Click on *Add new evaluation pair* and select a wind speed sensor and a power measuring unit (power meter) to calculate the evaluation for the energy yield. It is possible to create more than one *Speed/power pair*.

Evaluation pairs can also be defined in the Settings → Data logger menu. See Section 10.2.2 for further details.

If a reference turbine should be included in the plot, choose a turbine from the list under *Compare with database power curve*. The selected reference turbine will be displayed with red-colored bars in the plot. If no reference turbine has been defined, go to the Settings → Wind turbines menu and add the required turbine data.

Options

From

2011-08-02 00:00

To

2011-08-31 23:50

Speed/power pair

Power/Speed

Provide operational range of the measured wind turbine in meters per second to display extrapolated energy yield (e.g. 3-20)

3-25

in m/s

Compare with database power curve

Plot

[Link for sharing this plot](#)

About this plot...

What

Plot the predicted energy yield according to IEC 61400-12-1.

Why

Displaying the predicted annual energy yield is an important result of the power curve measurement process.

How

Choose speed/power evaluation pair and time period. Plot the predicted energy of the measured wind turbine according to IEC 61400-12-1. There is one bar for each wind speed bin between $4 - 11 \frac{m}{s}$ ($1 \frac{m}{s}$ steps) showing the predicted energy yield. The energy prediction is calculated according to the IEC 61400-12-1 as

$$EP = N_h \sum_{i=1}^N [F(v_i) - F(v_{i-1})] \cdot \left(\frac{P_{i-1} + P_i}{2} \right)$$
 Where N_h is the number of hours in the chosen time period, F_v is the Rayleigh probability distribution, v_i is the averaged wind speed per bin i and P_i is the averaged power per bin i .

The Rayleigh distribution is calculated as

$$F(v) = 3 - e^{-\frac{\pi}{4} \left(\frac{v}{v_{avg}} \right)^2}$$
 Where v_{avg} is the mean wind speed the energy yield is predicted for ($4 - 11 \frac{m}{s}$)

The extrapolated energy is calculated by assuming that the power below cut in wind speed is zero and the power above the highest measured wind speed bin until cut out wind speed is the power related to the highest measured bin

Compare with a power curve from the data base to learn what another wind turbine model would have yielded at this site and during the chosen time period. **Note:** If the power value for a bin is not defined in the power curve, the power for this bin is linear interpolated with the adjacent values.

Figure 7.60: Selectable option for the estimated energy yield plot

Click on *Plot* to show the estimated energy yield plot.

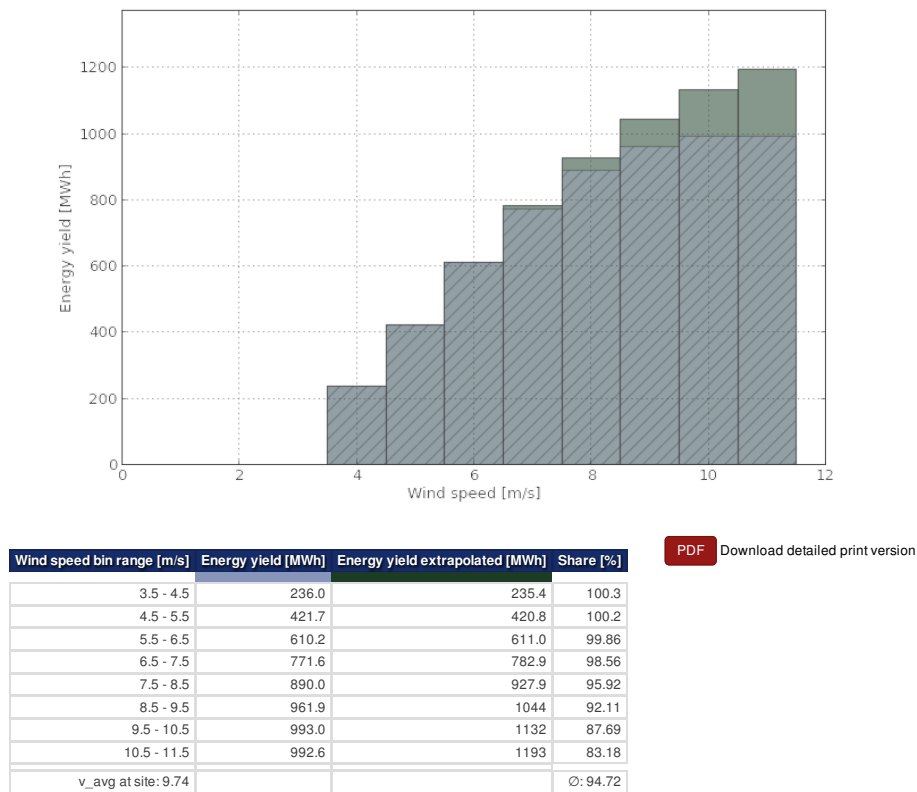


Figure 7.61: Example for the estimated energy yield plot

Below the plot, a data table is displayed. AmmonitOR lists for all wind speed bins the estimated energy yield. If a reference turbine has been selected, AmmonitOR lists also the energy yield of the reference turbine per wind speed bin.

If the *Operational range* of the turbine has been entered, AmmonitOR displays the extrapolated values and its share referring to the number of values available for the energy yield calculation in the table.



Tip
The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note
Click on *PDF* to open a PDF file with the plot.

7.1.6.3 Power curve

Use this plot to display the power curve and optionally the power coefficient of your turbine. AmmonitOR generates a number of wind speed bins in 0.5 m/s steps according to IEC 61400-12-1. For each wind speed bin, the power is calculated and displayed. Additionally, a reference turbine can be added to the graph to compare the values.

The power per wind speed bin is calculated according IEC 61400-12-1:

$$P_i = \frac{1}{N_i} \sum_{j=1} N_i P_{i,j}$$

Equation 7.13: Calculation of the power curve per wind speed bin acc. to IEC 61400-12-1

Where N_i is the number of used 10 minute datasets per bin i . j is the dataset of the chosen time period. $P_{i,j}$ stands for all power data in bin i in the dataset j .

If the *Rotor diameter* of the turbine has been entered, AmmonitOR calculates the power coefficient also according IEC 61400-12-1:

$$c_{P,i} = \frac{1}{\frac{1}{2} \cdot \rho_0 \cdot A \cdot v_i^3}$$

Equation 7.14: Calculation of the power coefficient acc. to IEC 61400-12-1

Where ρ_0 is the air density at 15°C (1.225kg/m³), A is the swept area and v_i is the mean wind speed in bin i that is calculated as:

$$v_i = \frac{1}{N_i} \sum_{j=1} N_i v_{i,j}$$

Equation 7.15: Calculation of the mean wind speed

Go to the Data inspection → Plots menu and select in section *Power curve measurement* the *Power curve* plot. Select a data logger from the list and set start and end of the period, which should be shown in the graph. Select a *Speed/power pair* from the list. Optionally, a reference power curve can be added to the plot.

If no *Speed/power pair* has been defined, a red-colored information box is displayed. Click on *Add new evaluation pair* and select a wind speed sensor and a power measuring unit (power meter) to calculate the evaluation. It is possible to create more than one *Speed/power pair*.

Evaluation pairs can also be defined in the Settings → Data logger menu. See Section 10.2.2 for further details.

If no *Power curve* has been defined, go to the Settings → Wind turbine menu and add a wind turbine.

Optionally the *Rotor diameter* (in m) of the wind turbine can be entered to display the *Power coefficient*.

In order to compare your wind turbine with a reference turbine, choose a turbine from the list. The reference values are displayed in red color in the graph.

Options

From

2011-08-02 00:00

To

2011-08-31 23:50

Speed/power pair

Power/Speed

Compare with database power curve

Nordex (Germany): N100 (Standard)

Rotor diameter

117

To calculate the power coefficient, enter a rotor diameter.

Plot

[Link for sharing this plot](#)

About this plot...**What**

Figure of the measured power curve including comparison with data base turbine

Why

Display the measured power curve and check the correspondending power coefficient curve. Compare the performance of the power curve to turbines from the data base.

How

Choose wind speed and power evaluation and plot power curve. A bunch of wind speed bins is generated, according to the IEC 61400-12-1, in $0,5 \frac{m}{s}$ steps. For each wind speed bin, the correspondending power is calculated and displayed. The power per bin is calculated according to the IEC 61400-12-1 as

$$P_i = \frac{1}{N_i} \sum_{j=1} N_i P_{i,j}$$
Where N_i is the number of used 10 minute datasets per bin i . j is the dataset of the chosen time period. $P_{i,j}$ stands for all power data in bin i in the dataset j .

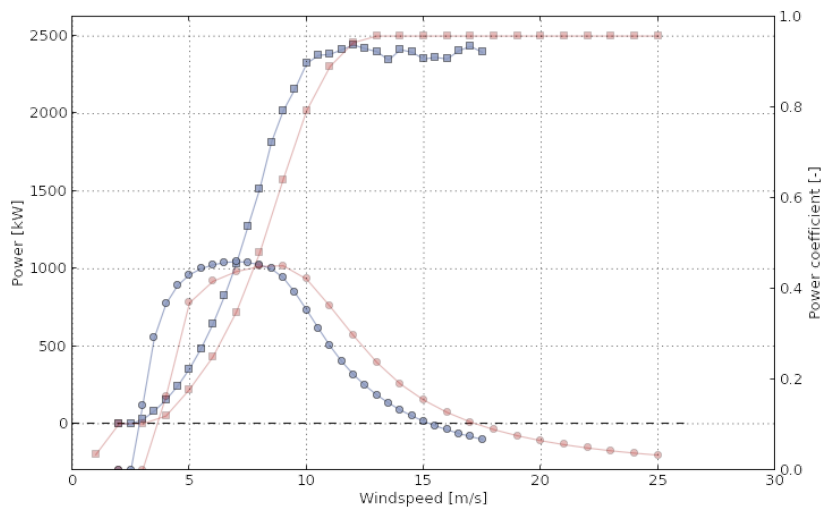
The power coefficient is calculated according to the IEC 61400-12-1 as

$$c_{P,i} = \frac{P_i}{\frac{1}{2} \cdot \rho_0 \cdot A \cdot v_i^3}$$
Where ρ_0 is the air density at $15^\circ C$ ($1.225 \frac{kg}{m^3}$), A is the swept area and v_i is the mean wind speed in bin i that is calculated as
$$v_i = \frac{1}{N_i} \sum_{j=1} N_i v_{i,j}$$

Compare the measured power curve to one from the database to learn the differences between the models.

Figure 7.62: Options for the power curve graph

Click on *Plot* to display the power curve graph.



Wind speed bin [m/s]	Measured power [kW]	cp [-]	Measured power [kW]	cp [-]	Datasets
2.000	0.000	0.000	-200.0	-41.74	219.0
2.500	0.000	0.000	0.000	0.000	264.0
3.000	25.59	0.142	0.000	0.000	402.0
3.500	81.84	0.292	50.00	0.163	452.0
4.000	154.9	0.367	221.0	0.369	445.0
4.500	242.0	0.400	424.0	0.410	440.0

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Figure 7.63: Example of the power curve graph



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on [Link for sharing this plot](#). A URL is displayed, which can be copied to an email.



Note

Click on [PDF](#) to open a PDF file with the plot.

7.1.6.4 Wind power density

Use this plot to display the wind power density at your site. For each wind direction bin, the potential energy of the wind flow is calculated and displayed in a polar plot. Depending on the available evaluations, the calculation method differs as follows:

If there is at least a wind speed evaluation, the wind power density is calculated as:

$$0.5 \cdot \rho \cdot 1m^2 \cdot v^3$$

Equation 7.16: Calculation of the wind power density with wind speed evaluation (the air density is assumed as 1.225 kg / m³)

Where ρ is the air density and v is the wind speed.

If there is a temperature evaluation and a air pressure evaluation available, the wind power density is calculated as follows:

$$0.5 \cdot \frac{B}{R_0 \cdot T} \cdot v^3$$

Equation 7.17: Calculation of the wind power density with wind speed-, temperature- and air pressure evaluation

Where B is the air pressure, R_0 is the gas constant of dry air (287.05 J/kgK) and T is the absolute temperature.

If there is additionally a humidity evaluation available, the wind power density is calculated as follows:

$$0.5 \cdot \frac{1}{T} \left(\frac{B}{R_0} - \varphi \cdot R_W \cdot \left(\frac{1}{R_0} - \frac{1}{R_W} \right) \right) \cdot v^3$$

Equation 7.18: Calculation of the wind power density with wind speed-, temperature-, air pressure- and humidity evaluation acc. to IEC 61400-12-1

Where φ is the humidity, P_{bW} is the vapor pressure ($0.0000205 \cdot e^{0.0613846 \cdot T}$), R_W is the gas constant of water vapor (461.5 J/kgK).

Go to the Data inspection → Plots menu and select in section *Power curve measurement* the *Wind power density* plot. Select a data logger from the list and set start and end of the period, which should be shown in the graph. Select the shown *evaluations* from the lists. If a evaluation is not available, it's not displayed'. If the mean value for the wind power density per bin is desired, *Show average value per bin* has to be selected. The calculation of this mean value can take some time.

Options

From

2011-08-02 00:00

Speed/direction pair

Top speed/direction

Sectors

36 Sectors (10°)

Temperature evaluation

Top Temperature, Temperature

To

2011-08-31 23:50

Air pressure evaluation

Bottom Barometer, Air Pressure

Humidity evaluation

Bottom Hygro/Thermo, Humidity

☐ Show average value per bin (this may take some time)

Plot

[Link for sharing this plot](#)

About this plot...

What

Plot the wind power density for the wind conditions at the site.

Why

Plotting the wind power density gives an overview over the energy in the wind flow.

How

Choose the speed direction pair, the number of desired sectors and the evaluations that are necessary to calculate the wind power density. Depending on the available evaluations, the calculation is done in different ways.

If there's only a wind speed evaluation, the air density is assumed as $\rho = 1.1225 \frac{\text{m}}{\text{s}}$ and the wind power density calculated as:

$WPD = 0.5 \cdot \rho \cdot 1\text{m}^2 \cdot v^3$. Where v is the wind speed.

If there is a temperature and a pressure evaluation available, the wind power density is calculated as:

$WPD = 0.5 \cdot \frac{B}{R_0 \cdot T} \cdot v^3$ Where B is the air pressure R_0 is the gas constant of dry air ($287.05 \frac{\text{J}}{\text{kgK}}$) and T is the absolute temperature.

If there is additionally a humidity evaluation available, the wind power density is calculated IEC 61400-12-1 compliant as:

$WPD = 0.5 \cdot \frac{1}{T} \left(\frac{B}{R_0} - \varphi \cdot P_W \cdot \left(\frac{1}{R_0} - \frac{1}{R_W} \right) \right) \cdot v^3$ Where φ is the relative humidity, P_W is the vapor pressure ($0.0000205 \cdot e^{0.0613846T}$) and R_W is the gas constant of water vapor ($461.5 \frac{\text{J}}{\text{kgK}}$).

Click on Show average value per bin to see the mean value for each bin. Through the combination of the mean value and the bar plot, it's easier to read the power density per bin and assess it's weight.

Figure 7.64: Options for the wind power density graph

Click on *Plot* to display the wind power density graph.

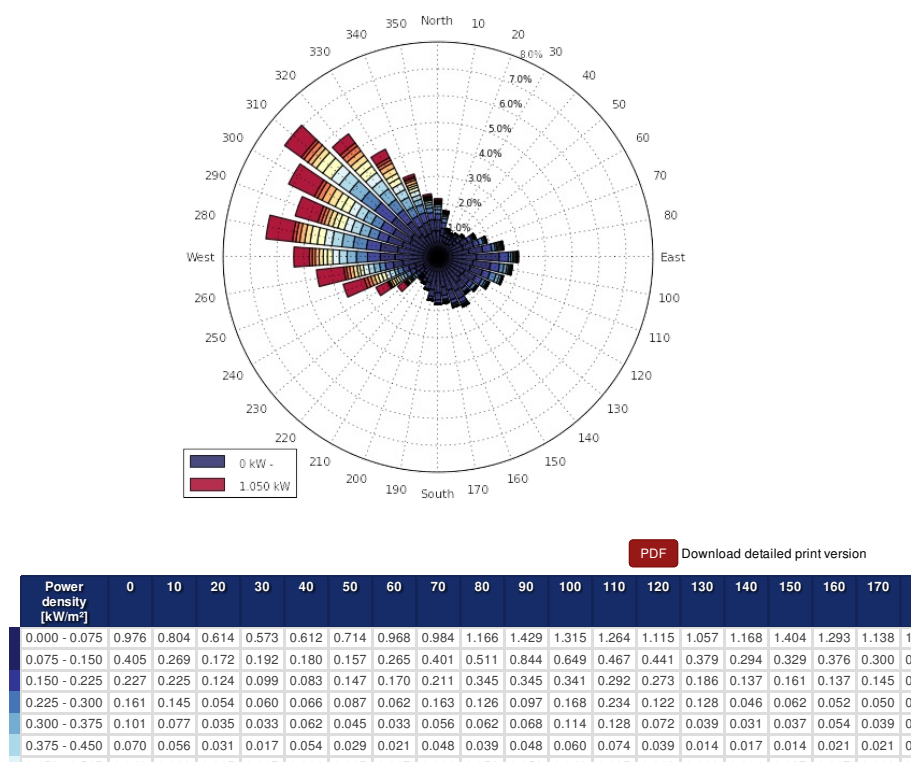


Figure 7.65: Example of the wind power density graph



Tip

The plot can be shared with other project users, e.g., to inform about any circumstances. Click on *Link for sharing this plot*. A URL is displayed, which can be copied to an email.



Note

Click on *PDF* to open a PDF file with the plot.

7.2 Table of Statistics

In the Inspection → Statistics the following options are available: *Wind speed data analysis* and *Averages per month*.



Note

All statistic tables and evaluations are premium features (see feature list Chapter 2).

7.2.1 Wind speed data analysis

Wind speed data analysis is created specifically for wind speed evaluator inspection. It shows the general project completeness, total number of entries, average wind speed, percentage of wind speed values in specific ranges, wind calms occurrence and average turbulence intensity. The period can be specified as a particular month or as a full year.

It requires specification of Year, Month or full year, Evaluation, Lower calm limit, Upper calm limit.

Options
Year
2013 ▾
Choose month or full year
Full year ▾
Evaluation
Backup - Wind Speed ▾
Choose lower calm limit
1.0 m/s ▾
Choose upper calm limit
10.0 m/s ▾

Update

2013		
Completeness	98.6 %	
Total number of entries	2805	
WS average	1.77 m/s	
WS < 4m/s	97.6 %	
WS 4 – 14m/s	2.4 %	
WS > 14m/s	0.0 %	
WS calms < 2h	Lower: 9.8 %	Upper: 0.0 %
WS calms 2h – 6h	Lower: 1.2 %	Upper: 0.0 %
WS calms > 6h	Lower: 7.6 %	Upper: 0.0 %
Turbulence intensity	42.9 %	

Figure 7.66: Wind speed data analysis table

7.2.2 Averages per month

The table of averages displays the data for a selected month, evaluator and statistics. The two different periods are available: one hour averaging period or raw data (10 minutes period).

The first row of the table shows the days of the month; the left column lists the hours and minutes of the day.

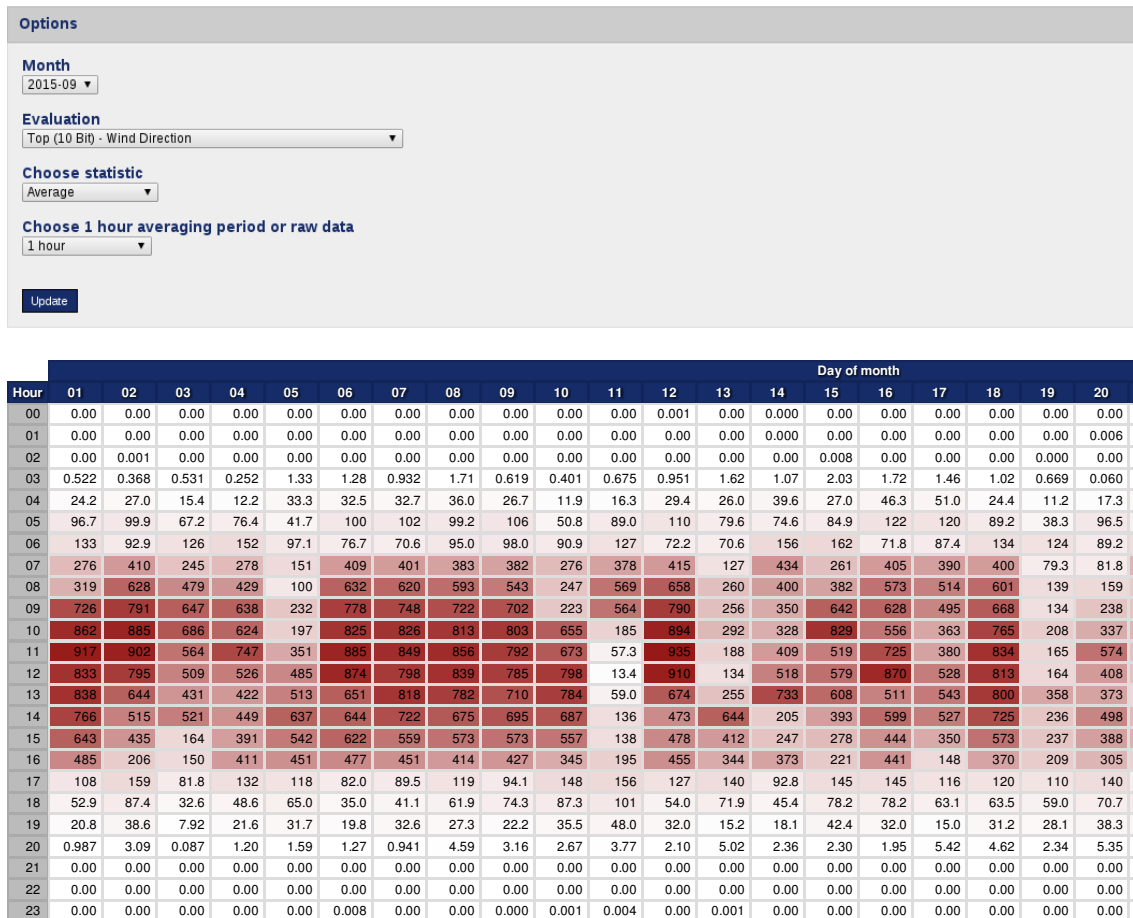


Figure 7.67: Table of averages

To view the hourly average values (or raw data), select a data logger from the dropdown list, if more than one data logger has been assigned to the project. Depending on the selected data logger, AmmonitOR lists all available evaluations. Choose year, month and evaluation, statistics and period to be displayed. The month is displayed in yyyy - mm format. Click on *Update* to generate the table.

By default the checkbox *Visualise values* is selected. Thus the displayed values are coloured. The maximum value of the averages is displayed in dark colour; the lower the values the brighter the colour.

If the checkbox *Visualise values* is unselected, the colour gradation is not displayed; the background of each cell is white.

7.3 All measurement data

Measurement data can be inspected in the Data inspection → Measurement data menu. AmmonitOR displays for each day the recorded and calculated data for all active sensors and channels. *Measurement data* are also shown by clicking on a day in the *Calendar* (see Section 6.4).

By default the last imported data is displayed. If the *Measurement data* are accessed via the *Calendar*, AmmonitOR displays statistics of the selected day.

The layout of the overview is described in the upper right corner of the page. The left column in dark grey colour lists date and time. The upper row in dark blue colour shows selected sensors, channels, evaluations, as well as the unit of the displayed value. The statistics are displayed line by line according to the layout in the upper right corner of the page.

Project data for Ammonit field tests

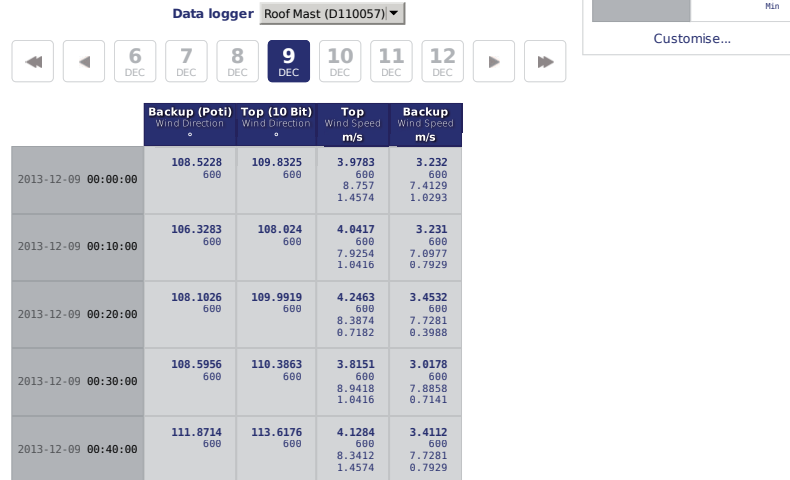


Figure 7.68: Daily statistics

The layout of the *Measurement data* can be changed in a box in the upper right corner of the page. Click on *Customise* to select Evaluations, Channels and Statistics, which should be displayed in the table.

If the *Measurement data* are opened for the first time, the layout of the *Measurement data* has to be defined. If cookies are active in your browser, your configured *Measurement data* layout is saved for the next session.

Display Options

Evaluations

- ☒ Air Pressure
- ☒ Humidity
- ☐ Global Solar Irradiance
- ☐ Status
- ☐ Sun Status
- ☒ Temperature
- ☐ Analog Voltage
- ☒ Wind Direction
- ☒ Wind Speed

Channels

- ☐ Analog Voltage
- ☐ Analog Current
- ☐ Counter
- ☐ Digital
- ☐ RS-485
- ☐ Other

Statistics

- ☒ Avg
- ☒ Count
- ☐ First
- ☒ Max
- ☐ Median
- ☒ Min
- ☐ StdDev
- ☐ Sum

Close

Figure 7.69: Selectable options for daily statistics (depending on data logger type and connected sensors)

Click on the statistical value to displays further details, e.g., configurations like offset and slope.



Figure 7.70: Statistical details

Move to another day by clicking on another day in the timeline. Click on ▶ to go one day forward or on ◀ to go one day backwards. To go one week forward click on ▶▶; backwards on ◀◀.

If no data is available for the selected date, AmmonitOR shows available previous and next data. Click on the link to go to the day.



Note
AmmonitOR always displays the first three values of the next day. So you can better compare and monitor the statistics.

If you want to view statistics of another data logger of the project, use the combobox above the timeline.

Chapter 8

Documentation

In the *Documentation* section AmmonitOR provides a journal over all project activities, the reports over the measurement data, data logger logbook and an photo upload function.

8.1 Journal

The journal is a project wide activity and event collector. Every event like add-a-data-logger or changes will be noted here. Downloads, uploads, subscriptions and removal of data of any kind will be listed with timestamp and the executed user. A generic search field helps to filter the list quickly.

Journal of project Ammonit field tests

Legend ■ update ■ new ■ subscription ■ download ■ deleted

2018 2017

Type to filter... [Clear](#)

Date %	User %	Event %	Device %	Message %	Comments %	Latest comment %
2018-05-15 08:49	jp@ammonit.com	download	D110057	Full config file 'D110057_cfg_5d9d0043.txt' was downloaded	0	Comment
2018-05-15 08:49	jp@ammonit.com	download	D110057	Full config file 'D110057_cfg_fa09abe8.txt' was downloaded	0	Comment
2018-05-15 08:49	jp@ammonit.com	download	D110057	Full config file 'D110057_cfg_09fcfb32.txt' was downloaded	0	Comment
2018-05-09 10:40	dt@ammonit.com	delete		Successfully deleted the report Monthly Solar measurement Report (ID: 1679)	0	Comment
2018-05-09 10:40	dt@ammonit.com	new		Successfully created the report Monthly Solar measurement Report (ID: 1679)	0	Comment
2018-05-02 14:35	ld@ammonit.com	update	D110057	Connection alarm has been updated	0	Comment
2018-05-02 14:35	ld@ammonit.com	update	D110057	Connection alarm has been updated	0	Comment
2018-04-27 13:37	support@ammonit.com	download	D110057	Data file 'D110057_20180426_0000.csv' was downloaded	0	Comment
2018-04-27 13:17	support@ammonit.com	subscription		You have successfully unsubscribed from the report 'Weekly Wind compact Report'.	0	Comment
2018-04-27 13:17	support@ammonit.com	subscription		You have successfully subscribed to the report 'Weekly Wind compact Report'.	0	Comment
2018-04-27 13:15	support@ammonit.com	download		Report Weekly Wind compact Report (ID: 266) compact_376_2018-W16.pdf was downloaded	0	Comment
2018-04-26 14:54	jp@ammonit.com	download	D110057	Data file 'D110057_20180425_0000.csv' was downloaded	0	Comment
2018-04-25 08:23	jp@ammonit.com	new	D110057	Evaluation 'Backup (Poti) (corrected)' of type 'wind_direction' was successfully created	0	Comment

Figure 8.1: Example of Journal for test project

8.2 Reports

AmmonitOR offers the possibility to generate PDF reports. Met mast managers can use AmmonitOR reports for monitoring purposes. Reports include information about the project, data logger(s) and the measurement as well as

features to check data for plausibility and completeness. To enable Report generation premium features have to be enabled (See Chapter 4).

Report types

- Wind Detailed
- Wind Standard
- Wind Compact
- Solar Measurement
- Power Curve Measurement

Available report periods

- Weekly
- Bi-monthly
- Monthly

For power curve measurement, special reports are available. The reports for power curve measurement include calms analysis, energy yield forecasts as well as system information etc.

Users can decide to download the PDF reports via the web interface or subscribe to a report. Thus the report is sent automatically to the registered email address of the user as soon as it has been generated. If data is missing in reports due to communication issues on data logger side, the report generation will wait 2 days. Afterwards the report will be generated. Reports are available for weekly or monthly intervals.

Go to the Documentation → Reports menu to manage your reports.



Important

AmmonitOR reports are designed to monitor measurement and power systems. The reports can only display information, which is available and has been entered in the data logger and/or AmmonitOR, e.g., installation height, slope and offset values etc. AmmonitOR does not interpret or evaluate any data.

8.2.1 Reports for site assessment

AmmonitOR reports are structured data logger-related, i.e., system information and measurement results are displayed data logger by data logger. The following list shows an example:

Project Information

- Project details, e.g., installed data loggers, completeness of data.
- Subscribers, i.e., list of users receiving the report.

Data Logger Dxxxxxx

- Met Mast System Information
 - Sensors
 - Configuration
 - Connection Overview
 - Supply Data
- Measurement Results
 - Time variation overview
 - Wind Speed and wind direction
 - Temperature
 - Global solar irradiation
 - Analog voltage and analog current evaluators
 - Status evaluators

Data Logger Dyyyyyy

- Met Mast System Information
 - Sensors
 - Configuration
 - Communication Overview
 - Supply Data

- Measurement Results
 - Time variation overview
 - Wind Speed and wind direction
 - Temperature
 - Global solar irradiation
 - Analog voltage and analog current evaluators
 - Status evaluators

Appendix Links for downloading data and legal notes

Depending on the report type you have selected, the content is more compact or more detailed.

2.2.1 Time variation overview

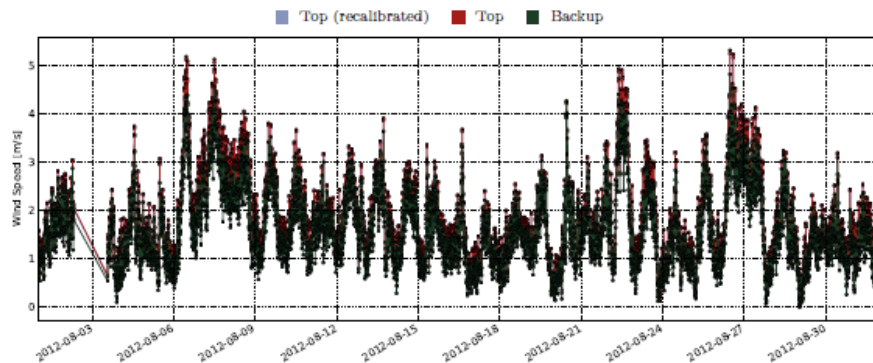


Figure 2: Time variation of wind speed

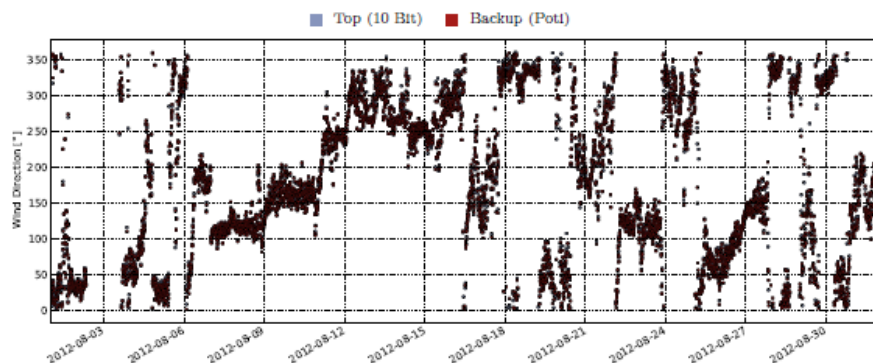


Figure 3: Time variation of wind direction

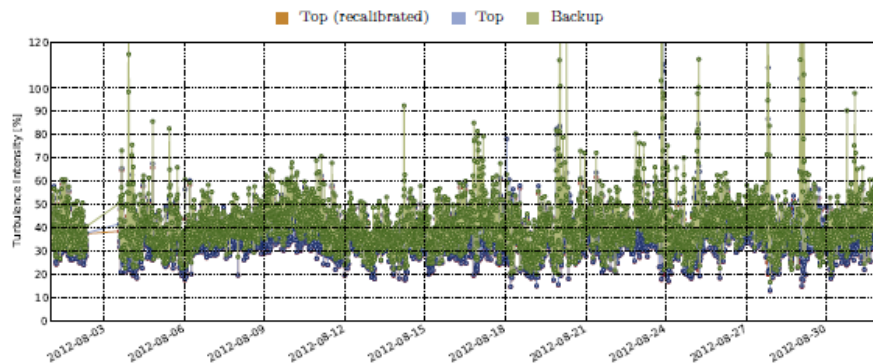


Figure 4: Turbulence intensity as a function of time

Figure 8.2: Extract of a weekly compact report

8.2.2 Reports for power curve measurement

Reports generated by AmmonitOR for power curve measurement are logger-related structured, i.e., the data logger section is repeated according to the number of data loggers related to the project.

Project Overview

- Installed data loggers
- Overview of data transfer and logger access
- Supply data

Data Logger Dxxxxxx

- System information and configuration, i.e., data logger configuration, installed sensors and evaluations
- Measurement results, i.e., a list of all evaluations including average, min and max values and its completeness rates
 - Time variation overview
 - Overlay graph
 - Diurnal profile
 - Wind power density
 - Calms analysis
 - Power curve
 - Site-specific energy yield
 - Energy yield forecast

8.2.3 Report types in AmmonitOR

AmmonitOR offers four report types: *Standard*, *Detailed*, *Compact* and *Power Curve Measurement*.

The *Standard* report includes tables and diagrams of all relevant measurement parameters, sensor configurations as well as a data calendar, which displays the completeness of the measurement for the selected interval (week or month). Additionally, the *Standard* report displays details about the measurement system, e.g., communication and supply information.

The *Detailed* report shows more detailed information, e.g., logbook entries and data logger configuration details.

The *Compact* report includes less details. It is designed for a quick met mast check.

The *Solar Measurement* report includes all necessary information to monitor the all the needed parameters for solar measurement.

The *Power Curve Measurement* report includes all necessary information to monitor the power data of a wind turbine.

Section	Item	Wind Standard	Wind Detailed	Wind Compact	Solar	Power Curve
Generic	Site Information	X	X	X	X	X
	List of Instruments	X	X	X	X	X
	Project Users	X	X			
Data Logger	Configuration	X	X	X	X	X
	Evaluations	X	X		X	X
	Channels	X	X			
	Connection Overview	X	X	X	X	
	Connection Logbook - simple ¹	X				
	Connection Logbook		X		X	
	Internal Voltage	X	X	X	X	X
	Internal Current	X	X		X	X
	Wind Speed - simple ¹	X	X	X	X	
Measurement Data Table	Wind Speed - diurnal ²	X	X		X	
	Wind Direction - simple ¹	X	X	X	X	
	Wind Direction - all ²		X			
	Weibull Curve	X	X	X		
	Flow Inclination		X			

Section	Item	Wind Standard	Wind Detailed	Wind Compact	Solar	Power Curve
	Mean Temperature	X	X	X	X	
	Mean Air Pressure	X	X		X	
	Mean Relative Humidity	X	X		X	
	Mean Solar Irradiance	X	X		X	
	Mean Turbulence		X			
Measurement Data Plots	Wind Speed	X	X	X		X
	Wind Direction	X	X	X		X
	Weibull	X	X	X		
	Flow inclination	X	X	X		
	Temperature	X	X	X	X	X
	Air Pressure	X	X		X	X
	Relative Humidity	X	X		X	X
	Solar Irradiance				X	
	Turbulence Intensity Scatter	X	X			
	Turbulence Intensity Bin ³	X	X			X
	Wind Shadow Zone	X	X	X		
	Active Power Total					X
	Power Meter Overlay Graph					X
Correlation Plot	Wind Speed	X	X			
	Wind Direction	X	X			
	Temperature ⁴		X		X	
	Relative Humidity ⁴		X			
	Solar Irradiance ⁴				X	
Seasonal Plot	Wind Speed ³	X	X			
	Temperature ³		X		X	
	Air Pressure ³		X			
	Relative Humidity ³		X			
	Solar Irradiance ³				X	
Diurnal Plot	Wind Speed	X	X	X		X
	Temperature	X	X		X	
	Solar Irradiance				X	
	Power Output					X
Power Curve Measurement Plots	Wind Power Density					X
	Calms Analysis					X
	Power Curve					X
	Site-specific Energy Yield					X
	Energy Yield Forecast					X

8.2.4 Downloading reports

If reports have already been configured for a project, reports can be downloaded in the Documentation → Reports menu. AmmonitOR lists the configured reports with report type and period.

Click on *Details* to display a list of generated reports. The latest report is listed on top. AmmonitOR shows the period for each report. By clicking on a *PDF* button, the report can be downloaded.

¹Selected details with highest priority are displayed.

²Users can download the 10min average values as CSV file, if necessary.

³Data for at least one month has to be available.

⁴At least two sensors of the same type are necessary to display this plot.

Report: Monthly Wind standard Report [Edit](#) [Regenerate](#) [Delete](#)

Details

Project: First
Available loggers: D110057, D120002
Subscribers: superuser@example.com ([edit](#))
Your subscription: You are subscribing to Monthly Wind standard Report. It will be sent to you by email

[Unsubscribe](#)

Reports

Download	Period	Included data logger(s)	Status
PDF	2017-04	D110057	Not yet available, may take some time to be generated
PDF	2017-03	D110057	Not yet available, may take some time to be generated
PDF	2017-02	D110057	
PDF	2017-01	D110057	

Figure 8.3: Downloading a report

AmmonitOR lists all subscribers of the selected report configuration. By clicking on *Subscribe* your email address is added to the subscriber list.

8.2.5 Generating a new report

Go to the Documentation → Reports menu to create a new report. Click on *Create new subscription* to add a new report.

Select a report type:

- Standard
- Detailed
- Compact
- Power Curve Measurement

... the period, for which the report should be created:

- Weekly
- Monthly

... and the resolution of pdf:

- Standard Definition - normal quality for printing and checking the data, usually not bigger than 20MB.
- High Definition - HD quality for printing the reports on bigger formats, can reach sizes up to 150MB.

Click **Save** to finish the report generation.

New Report Subscription

Type:
Wind Standard

Period:
Monthly

Quality:
Standard Definition

Save

Figure 8.4: Creating a new report

The user, who created the report, is automatically added to the subscriber list of the report.

Click on *Details* in the list of report subscriptions to display the list of generated reports. All reports are generated in the background. It may take some time until the reports are available.

As soon as a report is available, you can download the PDF file by clicking on the *PDF* button.

8.2.6 Subscribing to a report

To receive a report, users have to subscribe to it. Go to the Documentation → Reports menu for the subscription. If reports have already been configured, select a report and click on *Subscribe*. Your email address is automatically added to the subscriber list.

Report: Monthly Wind standard Report Edit Regenerate Delete

Details

Project: First

Available loggers: D110057, D120002

Subscribers: superuser@example.com [edit](#)

Your subscription: You are subscribing to Monthly Wind standard Report. It will be sent to you by email

Unsubscribe

Reports

Download	Period	Included data logger(s)	Status
PDF	2017-04	D110057	Not yet available, may take some time to be generated
PDF	2017-03	D110057	Not yet available, may take some time to be generated
PDF	2017-02	D110057	
PDF	2017-01	D110057	

Figure 8.5: Subscribing to a report

**Note**

Report subscriptions of project users can be managed by Admin users. Open a report configuration in menu Documentation → Reports and click on *Edit* in the subscriber list of the report details overview. AmmonitOR lists all project users. By selecting / deselecting checkboxes, project users can be added / deleted from the subscriber list.

8.2.7 Unsubscribing from a report

If you want to unsubscribe from a report, go to the Documentation → Reports menu and select the report from which you want to unsubscribe. By clicking on the *Unsubscribe* button you unsubscribe from this particular report.

**Note**

Report subscriptions of project users can be managed by users with Write access rights. Open a report configuration in menu Documentation → Reports and click on *Edit* in the subscriber list of the report details overview. AmmonitOR lists all project users. By selecting / deselecting checkboxes project users can be added / deleted from the subscriber list.

8.3 Photos

In the Documentation → Photos menu you can view and upload pictures of data loggers, which have been assigned to the project.

Click on the *Upload new photo* button to add further photos. Additional information about the photo can be added, e.g., camera height, date and time.

The photos should be not larger than 5MB. Upload only GIF, JPG or PNG files.

Upload photo

Required

Image

Choose File

Ammonit_map.jpg

Maximum file size: 5.0 MB

Optional

Camera height

in m

Key picture

E

▼

choose direction of camera

Camera direction

in degrees. North=0, East=90 etc.

Datetime

If the image already contains a date, it does not have to be provided.

Comments

Upload

Figure 8.6: Uploading photos to project



Note

If you upload photos other than the mentioned formats or the file is larger than 5MB, AmmonitOR will reject the file.

The Meteo-40 data logger is able to send monitoring pictures in a certain interval, e.g. 1 hour. This feature is part of premium and needs to be enabled (See Chapter 4). Monitoring pictures are usefull to observe sensors, e.g. to check icing grades.

8.4 Logbook

AmmonitOR displays all logbook entries of Meteo-40 data loggers, provided that firmware version 1.0 Rev. 13645 or higher is installed on the Meteo-40 data logger. The logbook can be accessed via the Documentation → Logbook menu.

The logbook includes all logins to the Meteo-40 web interface and the IP address of the user as well as manually entered Meteo-40 logbook entries.

Chapter 9

Archiving

In the *Archiving* section data files can be managed. You can show, configure, import or export the data.

9.1 Data Logger Files

The imported data files can be accessed in the Archiving → Data logger files menu. All data files for the project are sorted by the file date in descending order. Other sorting options are available by clicking the headers of the columns. AmmonitOR displays file size, first and last entry and the start data of the configuration as well as when and how the data has been uploaded.

The data upload is a basic feature. To import data premium features have to be enabled. For more details towards upload and import mechanics check out Section [9.3](#).

AmmonitOR checks the validity of the file. If an data import fails a click on the detail view of a data file shows the reason why.

All data files can be downloaded compressed in ZIP format by clicking on *Download all files (ZIP)*.

Click on a file name to preview its content. AmmonitOR displays the information about the file itself as well as information about the file in AmmonitOR.

The file content can be downloaded or displayed.

Measurement data file Delete

Project: [project](#)
Data logger: [D110057](#)

Looking at your data file...

Filename: [D110057_20150620_0000.csv](#) (186.5 KB)
Format:
Config: [2015-06-18 00:00](#)
Valid: yes
Expected number of entries: 144
Number of entries: 144
File Period: from 2015-06-20 00:00:00 for 24 hours
Date/Time generated: 2015-06-21 09:03:14
Errors: None
Warnings: None
Infos: None

[Download original data file](#)

[View data from data file](#)

This data file in AmmonitOR

Date/time uploaded to server: 2015-06-23 09:16:39
Imported: yes
Active: yes

[Deactivate and remove data](#)

Figure 9.1: Data files

In order to view the configuration, which was active for the data file, click in the configuration ID in the raw data file list. The configuration can also be accessed by displaying the file content and clicking on the configuration ID in the section with the file characteristics.

In case data for a day has been imported twice, e.g. with different configurations, you can *Deactivate and remove data* of this file. The file is archived not deleted! If necessary, you can reimport the data file.

9.2 Data Logger Configurations

In the Archiving → Configurations menu, AmmonitOR lists all configurations of a data logger. The configurations are listed in ascending order - starting with the initial configuration.

AmmonitOR displays for all configurations start time and number of affected data files, as well as the changes, which have been made. Firmware upgrades are highlighted.

Configurations for Roof Mast (D110057)

Data logger Roof Mast (D110057)			
Earliest entry	Data files	Changes	
2011-12-21 00:00	15	Initial	Detail
2012-01-01 00:00	3	Added evaluator: Thermo_KP (Steel Cabinet);voltage Added evaluator: Hygro_Test (Steel Cabinet);voltage Removed evaluator: Steel Cabinet;humidity Added channels: D4 Added channels: D3 Value for range changed from 1 V to 10 V on A8	Detail
2012-01-06 13:11	6	Added evaluator: Steel Cabinet;humidity Added evaluator: Steel Cabinet;temperature Removed evaluator: Thermo_KP (Steel Cabinet);voltage Removed evaluator: Hygro_Test (Steel Cabinet);voltage Value for range changed from 10 V to 1 V on A8	Detail
2012-01-12 00:00	1	Added evaluator: Thermo_KP (Steel Cabinet);voltage Added evaluator: Hygro_Test (Steel Cabinet);voltage Removed evaluator: Steel Cabinet;humidity Removed evaluator: Steel Cabinet;temperature	Detail
2012-01-13 16:29	12	Firmware upgraded to 1.0+8117-1 Value for range changed from 1 V to 10 V on A8	Detail
2012-01-24 00:00	7	Firmware upgraded to 1.0+8249-1 Removed channels: M1_3 Removed channels: M1_4	Detail
2012-01-31 00:00	10	Firmware upgraded to 1.0+8283-1	Detail

Figure 9.2: Data logger configuration

Click on an entry to display further details of the data logger configuration. First and last data set with the configuration is shown, as well as number of affected data files.

Configuration for Roof Mast (D110057) from 2013-09-23 00:00

Earliest Entry

2013-09-23 00:00:00

Latest Entry

2013-09-23 23:50:00

Number of data files

2

Configuration

Name

Roof Mast

Type

Meteo-40L

Timezone

UTC+01:00

File entry statistic period

10 minutes

File period

24 hours

Calibration CS1

200.07 μ A

Calibration CS2

200.52 μ A

RS485 Master rate

10

Firmware

1.0+13930-1

Communication

CECS power permanent

off

Modem permanent

on

Ethernet permanent

on

Evaluations

Type	Height	Unit	Formula	Source	Statistics						Parameters		
					Avg	Min	Max	Median	StdDev	Sum	Count		
Backup (Pot)	wind_direction	20	°	windvane_pot	A5, A6	✓				✓	✓	slope=360	offset=-75
Backup	wind_speed	20	m/s	linear_cnt	C2	✓	✓	✓		✓	✓	slope=0.07881	offset=0.32 period=1

Figure 9.3: CSV file in AmmonitOR

Configuration General data logger information like name, timezone and firmware version as well as statistic and calibration details.

Communication Indicates the status of the communication options, e.g., CECS power mode switched on for SCADA operation.

Evaluations List of all sensors and evaluations including unit, formula, source/channel, defined statistics and entered parameters (slope, offset, sensitivity).

Channels Structured list of connected channels showing defined statistics, measurement rates and ranges as well as units and used protocols (digital channels).

Data files All CSV files, which have been generated with the configuration. Click on a file to open the content in AmmonitOR; download is also possible.

If data files related to a configuration have to be set inactive for some reasons, click on *Unimport and archive all related data files*. AmmonitOR deactivates the files for all views (plots, calendars etc.). The files are archived, not deleted.

9.3 Import Data

If your measurement data is not automatically transferred to AmmonitOR via email or via SCP file upload, you can upload files manually. To do so, open a project in AmmonitOR and click on *Import data* in the *Archiving* menu.



Note

In the data file section the uploaded data files are always accessible even when they are not imported to the database. The file management of AmmonitOR has two steps, first **upload the data file**, second **import the data file** to the database itself. All datafiles will be uploaded and are always download-able. Even when they are not imported to the database the data files are saved and backed up. To use any kind of inspection feature, plots, data export or generation of reports etc. the data has to be imported to the database. If premium months are bought, the available data files will be imported to the database. Only the Meteo-40 is able to upload and import data as default (basic feature, see also feature list in Chapter 2), but without enabled premium the data in the database expires after 3 months (See feature list in Chapter 2, See premium account management in Chapter 4). If an data file expired after 3 months it gets un-imported from database, but is still available to download.

If more than one data logger has been assigned to the project, select the data logger, whose data should be uploaded. If a Meteo-32 data logger is selected, ROWINFO and ROW files have to be uploaded. The ROWINFO file has to be uploaded in the *Information file* box; ROW files in the *Data files* box. For CSV files generated by Meteo-40 data loggers, only the *Data files* box is available. Click on *Browse* to choose the files, which should be uploaded.

The upload immediately starts.

Press *Import* to perform the import process. This process can take some minutes.



Important

If the serial number of the selected data logger and the uploaded file do not match, AmmonitOR ignores the file and shows a message.



Note

If you upload a file, which has been uploaded before, AmmonitOR ignores this file.

In case your file got rejected you get more informations about the reason, if you go to data files and click on the related file. If something special occurs what is not leading to a rejection, it will be also listed there.



Important

Keep in mind that SODAR AQ510 text files are only allowed to import in the *Classic* format.

9.4 Export Data

Exporting data can be very useful, when data should be analysed separately for a determined time period or data should correspond to a defined file format and structure, e.g., for Turkish or Brazilian authorities. AmmonitOR offers the possibility to export data in different file formats. Some data exports are part of the premium feature set and have to be enabled (See feature list in Chapter 2 and see premium account management in Chapter 4)



Note

In order to analyse data recorded by Meteo-32 data loggers with office software, the ROW files have to be converted. Use the data export function of AmmonitOR to create legible files.

Go to the Archiving → Export data menu to download, email or configure export files. AmmonitOR lists all available exports with file format, period and recipient information.

Edit Modify the configuration of the export

Download/Send Select, which export should be downloaded or send. See Figure 9.4.

Log Click on *Log* to monitor, which export files have been sent via email. AmmonitOR displays a calendar overview and lists per subscribers all exports, which report has been sent successfully. The calendar is displayed in descending order with the current year on top. Missing reports can be send per year to each subscriber by clicking on *Send all missing* in one step. To send single missing export files, click on the export in the calendar and select the subscriber to send the file immediately.

Data logger data export

The screenshot shows the 'Data logger data export' interface with three main sections:

- Select period:** Includes a 'Month' dropdown menu set to '2013-11'. Below it are buttons for 'Download' and 'Send to 0 recipients'.
- Between two exact dates:** Includes two input fields: 'Date/time from' (2013-11-01 00:00) and 'Date/time to' (2013-11-30 23:50). Below them are buttons for 'Download' and 'Send to 0 recipients'.
- All data:** Includes a text description: 'Send data from all past periods. Each period will be sent in a separate email.' Below it is a button for 'Send to 0 recipients'.

Figure 9.4: Selecting the period for the data export

Standard period Depending on the defined period for the export, a year, quarter, month, week or day can be selected, from which the data should be included in the export file. The file can be downloaded or emailed.

Between two exact dates Select start and end date / time for the measurement data in the export file. The file can be downloaded or emailed to the configured recipient.

All periods Select this option to send all data from past periods. Each period is sent in a separate email. Download is not available for this option.

New exports are configured by clicking on *New export*. Go to Section 9.4.1.

In order to delete an export configuration, select the configuration in the export list and click *Edit*. Scroll down and click *Delete*.

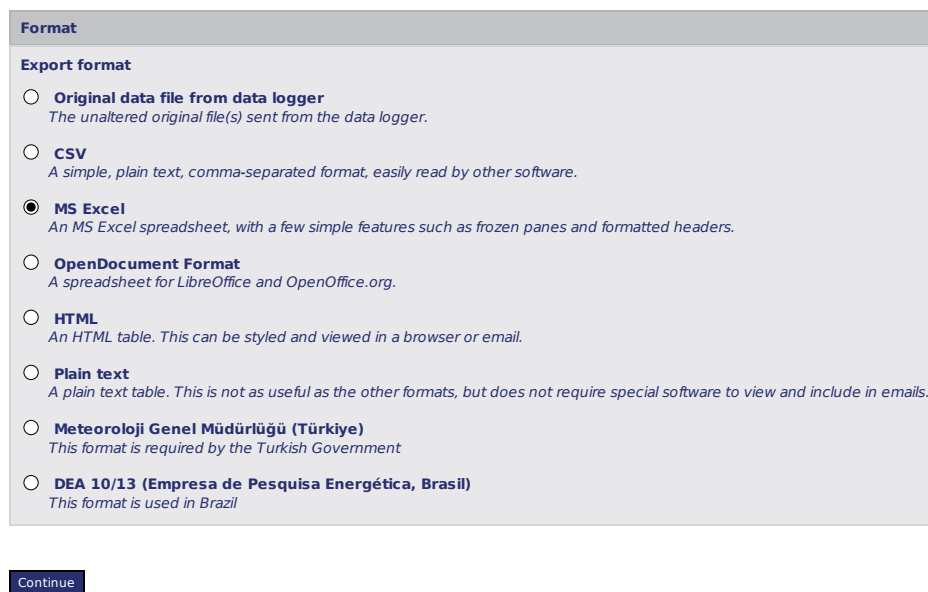
9.4.1 Configuring export files

Click on *New export* in the Archiving → Export data menu to add a new export configuration. The export is configured step by step.

In the first step the export format has to be selected. AmmonitOR offers for example CSV, MS Excel and OpenDocument Format. For the Turkish and Brazilian market special configurations are available. After selecting the format, click on *Continue* go on with the configuration.

If unaltered original files sent from a data logger should be exported, select the first option *Original data file from data logger*.

Data logger data export



Format

Export format

- ☐ **Original data file from data logger**
The unaltered original file(s) sent from the data logger.
- ☐ **CSV**
A simple, plain text, comma-separated format, easily read by other software.
- ☒ **MS Excel**
An MS Excel spreadsheet, with a few simple features such as frozen panes and formatted headers.
- ☐ **OpenDocument Format**
A spreadsheet for LibreOffice and OpenOffice.org.
- ☐ **HTML**
An HTML table. This can be styled and viewed in a browser or email.
- ☐ **Plain text**
A plain text table. This is not as useful as the other formats, but does not require special software to view and include in emails.
- ☐ **Meteoroloji Genel Müdürlüğü (Türkiye)**
This format is required by the Turkish Government
- ☐ **DEA 10/13 (Empresa de Pesquisa Energética, Brasil)**
This format is used in Brazil

Continue

Figure 9.5: Selecting the export file format

In the next step the file content has to be defined. Choose the period, which should be exported, e.g., monthly, weekly. When downloading or sending export files (see Section 9.4), you can select the week, month or exact dates, which are included in the export file.

In the content box you can choose the date/time format used in the file, exclude error-related data, include further information in the file or change the header style.

Sorting of export columns is possible when *Custom...* is selected in *Included columns* by dragging and dropping columns in correct order. The order will be used in the export file. Sorting is possible only in already existing exports. If you wish to order columns in this export please save it and return to this page afterwards.

Format

Export format:
MS Excel

Export period:
monthly

Content

☐ Omit data marked as error

☐ Include source filename in every line

Date/time format:
ISO 8601

Include logger identification in every line:
None

Included columns:
All evaluations and channels

Sorting of export columns is possible when 'Custom...' is selected in 'Included columns' by dragging and dropping columns in correct order.
Sorting is possible only in already existing exports. If you wish to order columns in this export please save it and return to this page afterwards.

Header formatting:
Displayed inline (default)

Figure 9.6: Configuring the content of the export file

In order to digitally sign and encrypt the export file, tick the checkbox in the security box. The displayed password is required to open and decrypt the file. The digital signature of the file has to be verified by downloading the *Public key*. Refer to Section 9.4.2 and Chapter 13 for further details.

Afterwards the email recipients of the export file can be determined. AmmonitOR lists all project users. Additional email addresses can be added in the *Custom email addresses* field. Enter the email addresses line by line or use commas to separate the addresses.

Finally the export email subject needs to be specified. AmmonitOR sends emails giving them default subject containing *Project name, data logger name, export format*. From the dropdown list the other options are available.

Recipients

Email users

☐ test@example.com

☐ test@test.com

Custom email addresses
default@company.com

FTP server

username

password

directory

Export email subject

Email subject
Project name, data logger name, export format

Figure 9.7: Setting export recipients and email subject

Files can be uploaded to an FTP server. Enter the required details into the dedicated fields, i.e. server, username, password and directory.

Files can also be uploaded to server via SCP. Enter the required details into the dedicated fields, i.e. server, username, password and directory. Download a AmmonitOR server public key from data export external recipients view and copy its contents as a new line to your authorized keys file (it is usually under `~/.ssh/authorized_keys`). You will receive your files via SCP from AmmonitOR then!

9.4.2 Signing and encrypting export files for Windows™ users

Encryption is a very complex topic. Using the encryption in AmmonitOR, you can encode data files in a way that third parties cannot read the file, only authorized parties are allowed to open and read the files.

Read this section carefully and follow our description step by step to avoid any misunderstanding. For further details about digital signature and encryption, refer to Chapter 13.

AmmonitOR integrates GnuPG, which is a free software to encrypt data files. GnuPG is based on the international standard OpenPGP. Refer to [Wikipedia](http://en.wikipedia.org/wiki/GNU_Privacy_Guard) (http://en.wikipedia.org/wiki/GNU_Privacy_Guard) or [GnuPG website](http://gnupg.org/) (<http://gnupg.org/>) for further details.

In order to open and read files, which have been encrypted by AmmonitOR, additional software is necessary. We recommend installing GPG4win (GNU Privacy Guard for Windows). Gpg4win enables users to sign and encrypt as well as decrypt email and attachments as well as files in the directory. The software consists of several components:

- GnuPG: encryption tool
- Kleopatra: certificate manager for OpenPGP
- GpgOL: add-in for Microsoft Outlook 2003/2007/2010/2013™ for email encryption
- GpgEx: plug-in for Microsoft Explorer™ for file encryption
- Gpg4win Compendium: documentation for beginners and advanced users

Go to the [GPG4WiN website](http://gpg4win.de/download) (<http://gpg4win.de/download>) and download the current software version. Install the software with the above mentioned components.

If you work with Microsoft Outlook™, the program has to be restarted to implement the GpgOL add-in as separate ribbon.

Before decrypting files, Gpg4win has to be configured. Download the public key from AmmonitOR.

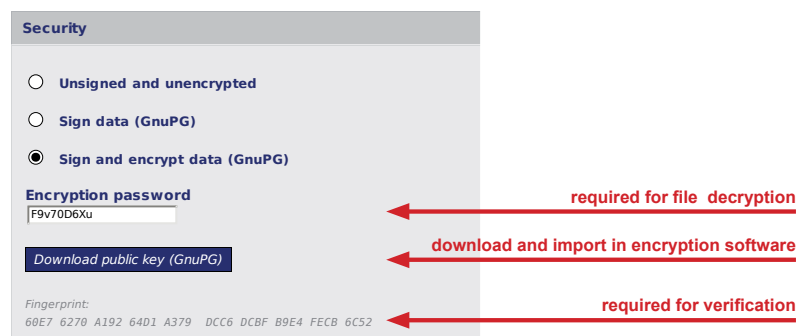


Figure 9.8: Downloading the public key

Import the public key in Gpg4win.

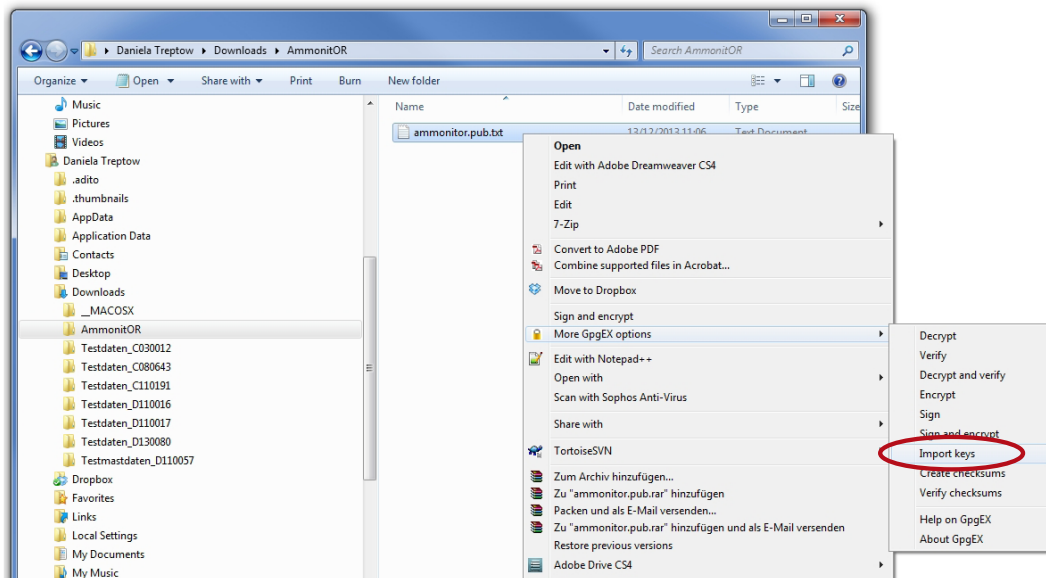


Figure 9.9: Importing the public key

AmmonitOR's public key has to be certified by your own key. Open the Kleopatra software and create a new certificate via the File → New Certificate menu. Select *Create a personal OpenPGP key pair* and enter the required details. Click *Create Key* and enter a high quality passphrase. The key pair should be successfully created.

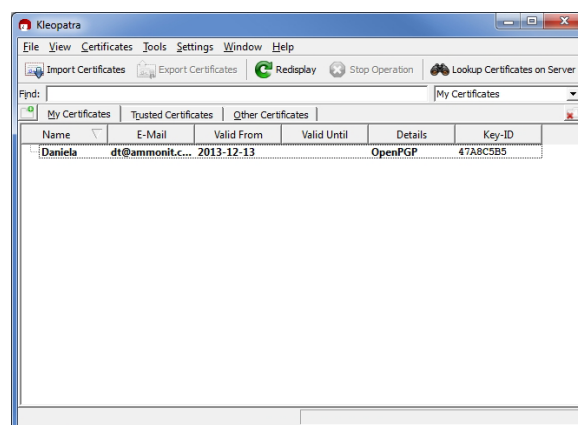


Figure 9.10: Creating the private key

The public key from AmmonitOR has to be certified.

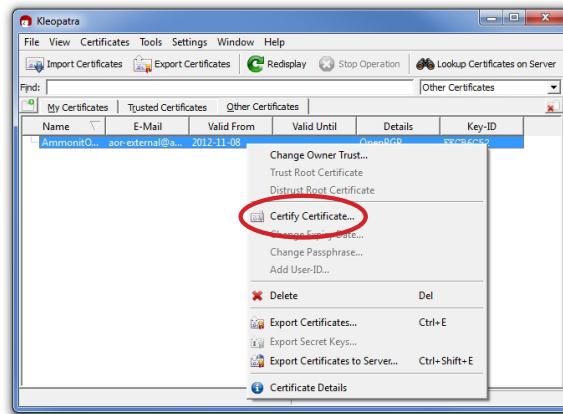


Figure 9.11: Certifying the public key

Check the displayed fingerprint with the one shown in AmmonitOR!

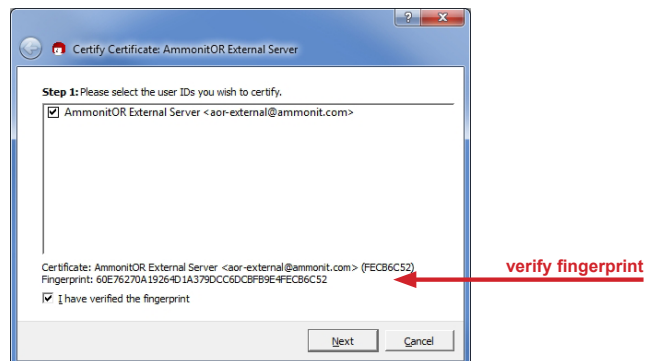


Figure 9.12: Verifying the fingerprint

Finally the passphrase entered for the private key has to be entered, to unlock the private key for the GnuPG certificate. Both certificates are displayed under *Trusted Certificates*.

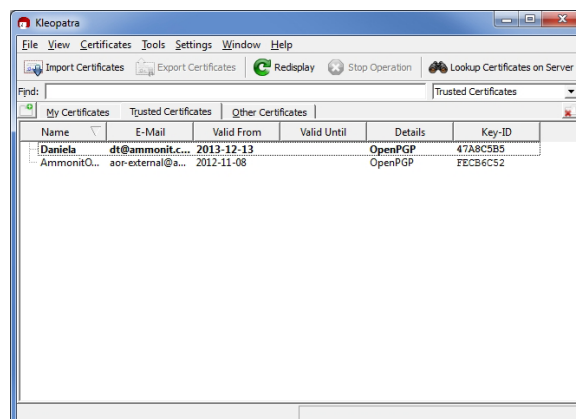


Figure 9.13: Trusted certificates

9.4.2.1 Decrypting data files in the Windows Explorer™

Encrypted files can be decrypted in the Windows Explorer™. Right click on the file and select *Decrypt and verify*.

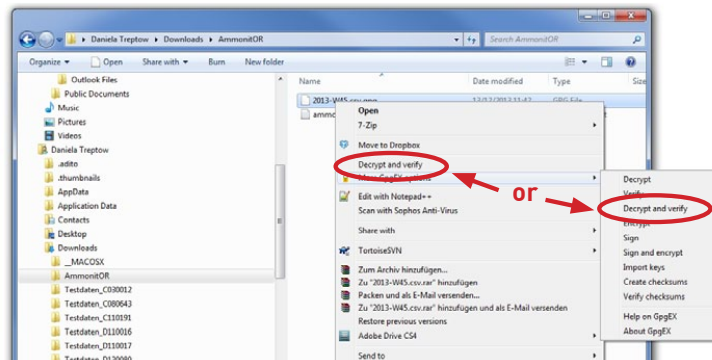


Figure 9.14: Decrypt file in Windows Explorer™

Start the decryption process by clicking *Decrypt and verify*.

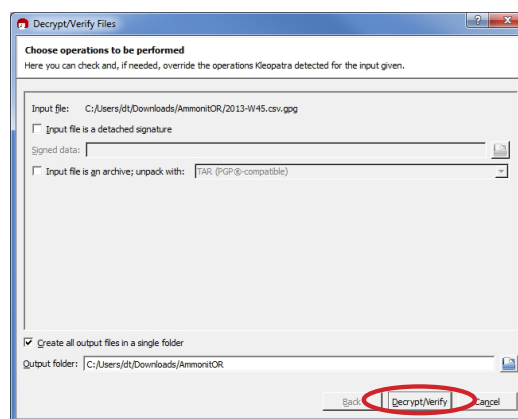


Figure 9.15: Start decryption process

Enter the password for file encryption shown in AmmonitOR (Figure 9.8).

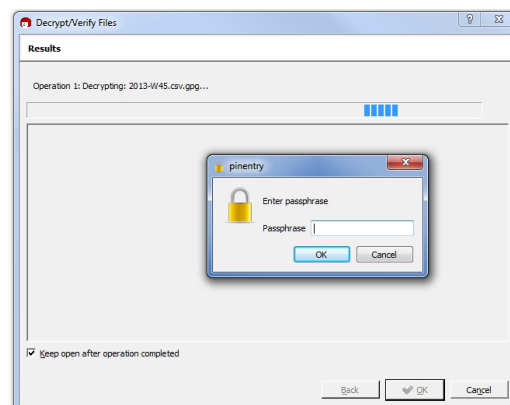


Figure 9.16: Enter file encryption password

After successful decryption the file is displayed in the initial folder or the one selected in the decryption process.

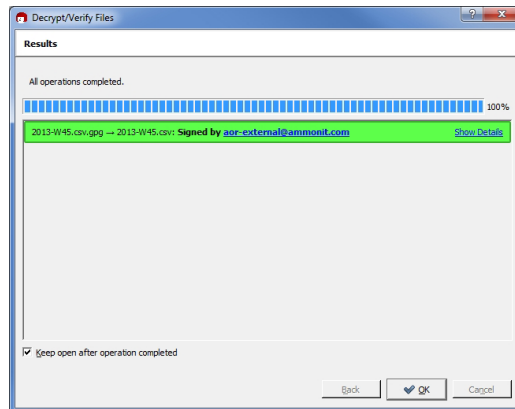


Figure 9.17: Successful decryption

9.4.2.2 Decrypting data files in Microsoft Outlook™

After installing Gpg4win a new ribbon *GpgOL* should be shown in your Outlook™ application. Follow our step by step guide to decrypt encoded data files sent by AmmonitOR.

Open the email item and go to the *Attachments* ribbon. Click on *Save and decrypt*.

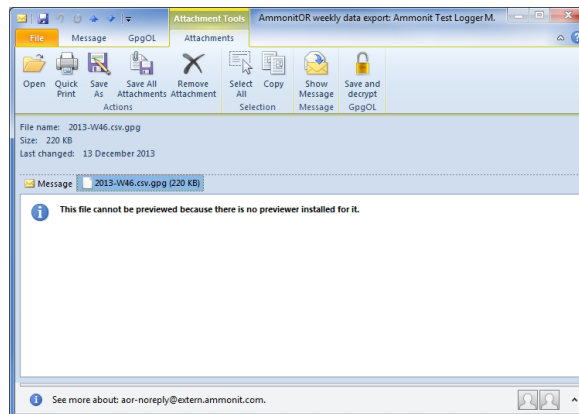


Figure 9.18: Decrypting files sent by email



Note

Only the attached data file is encrypted - not the email message. Decrypting the email message does not work! The attached file has to be selected and decrypted.

Select the folder, in which the files should be saved and start the decryption process. Enter the passphrase for file encryption shown in AmmonitOR.

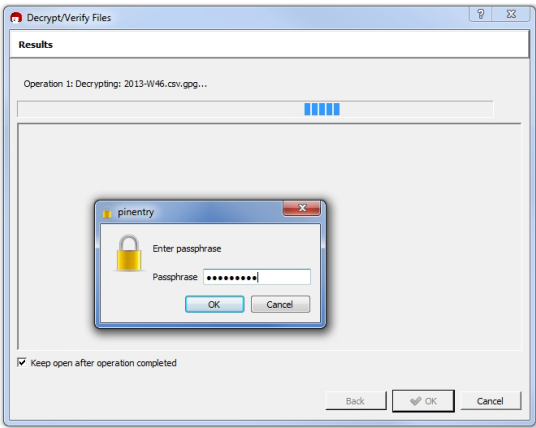


Figure 9.19: Verifying the key pair

Both files encoded and decrypted data files should be successfully saved in the selected folder.

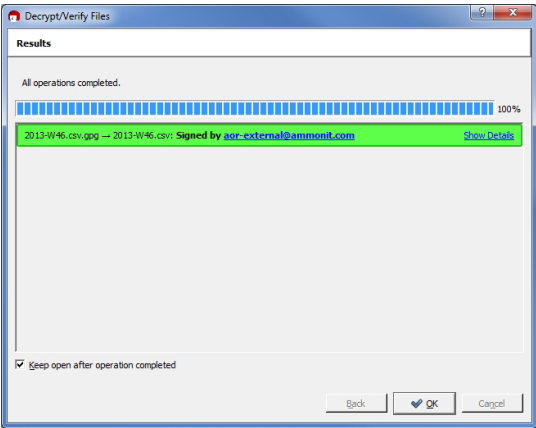


Figure 9.20: Successful decryption of data file

Chapter 10

Settings

In the *Settings* section you can set up the project and the data loggers. Additionally filters can be defined, connection alarms and power curves can be added.

10.1 Project Information

10.1.1 Project details

After going to Settings → Project, AmmonitOR displays the most important project details. Details can be modified by clicking on *Edit* next to the project name. *Edit* is not visible for users with Viewer or Guest access rights.

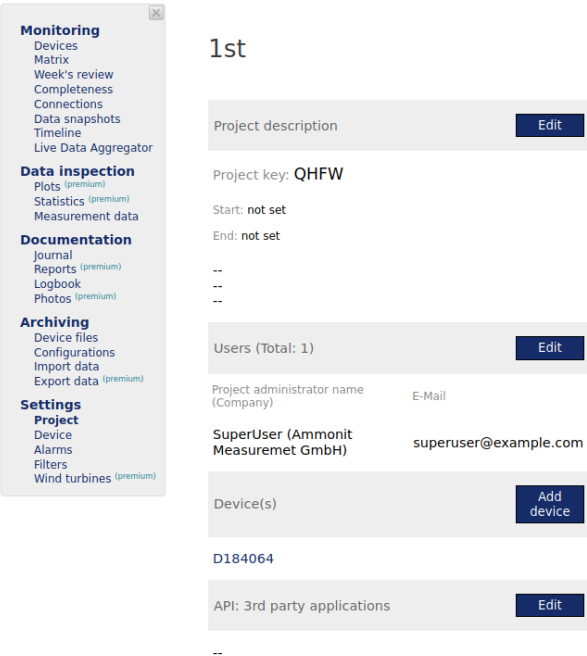


Figure 10.1: Project detail

Project key Unique code assigned to all project-related Meteo data loggers
The *Project key* is also mentioned in the URL of the project.

Comment Text entered in the comment field, when creating a project. The comment can be modified by clicking on the *Edit* button in the Project description block.



Note

The *Edit* button is not visible for users with Viewer or Guest access rights.

Users Number of users registered for this project. Click on *Edit* to display and modify user information; further users can be invited. For everyone visible are users with admin permissions to the project. Contact them if you need further information or permissions to a project.



Note

The *Edit* button is not visible for users with Viewer or Guest permissions.

Device(s) List of all project-related devices with their serial number. Devices can be added, clicking the *Add device* button.

Click on the serial number to see device's details.

API: 3rd party applications List of 3rd party applications, who have access via REST-API. Click the *Edit* button to manage 3rd party access. Also see further descriptions how to use the REST-API correctly with AmmonitOR in Section 15.5.

Projects in AmmonitOR can have two different states: Active or Finished. Click on *Edit* next to the project name to change the state of the project.

10.1.2 Setting up a new project

In order to start your measurement campaign in AmmonitOR, a project has to be created. Click on *New Project* in the navigation menu and enter Project Name and optional Notes and press *Submit*. Project Name and Notes can be modified later.

By setting a *Start date* and an *End date* the project period can be limited. Thus test periods before the actual project start are not analysed for example. Use the DIN format to enter the date, i.e. YYYY-MM-DD (2014-05-31).



Note

The *End date* does not set the *Project state* to finished.

New Project

Project name
My First Project

Notes
Getting started with AmmonitOR

Start date
2014-09-01

End date
2015-08-31

☒ Compare with public weather (data taken from World Weather Online)

Submit

Figure 10.2: Creating a new project

After submitting the project, a new page is displayed and a Project key has been generated (see Section 10.1.2.1).

**Important**

The Project key is used to assign data loggers to a project in AmmonitOR. Additionally, the Project key is used for uploading CSV files from Meteo-40 (see Chapter 11) and information about tunnel availability for the connection log (see Section 6.5). The Project key has to be entered in the Meteo-40 web interface to configure the file upload and/or the online access.

The new project is created and the configuration can start. For changing general project settings click on the *Edit* button next to the project name; for deleting the project, click on *Delete*.

The user, who created the project, automatically becomes the owner of the project and has full access rights (Admin rights). Other users can be invited to the project by clicking on the *Edit* button next to the users headline. For further details see Chapter 5.

10.1.2.1 Project key

The Project key is used to control the communication between AmmonitOR and Meteo-40 data loggers. It is not necessary for Meteo-32 data loggers. Each project has its own unique key. The Project key is also displayed in the URL of the project.

The Project key is very important for all AmmonitOR projects with Meteo-40 data loggers. Enter the Project key in the web interface of your Meteo-40 data logger (Communication → AmmonitOR) to upload files to your AmmonitOR account or to display the tunnel connections. If you use more than one Meteo-40 data logger in the same project, the Project key has to be entered for all assigned Meteo-40 data loggers.

**Note**

If you use an AmmonitOR installation on your server, it has to be configured differently from the AmmonitOR installation on the Ammonit server. Refer to the Meteo-40 manual, which can be downloaded from www.ammonit.com (<https://www.ammonit.com>) or consult the Meteo-40 online help in the web interface.

10.1.3 Uploading data to a project

To view measurement data, at least one data logger has to be assigned to a project. Depending on the data logger type, AmmonitOR offers several methods to add data loggers resp. upload measurement data. Some data loggers have different upload condition due to the premium features (See features list in Chapter 2). For more information about upload and import mechanics in Section 9.3.

- Uploading CSV files via SCP connection for Meteo-40 projects (see Section 10.1.3.1)
- Emailing data files for Meteo-32 projects
- Uploading CSV files via FTP connection for Zephir300 projects (see Section 10.1.3.7)
- Manually import data from Meteo-40, Meteo-32, AQ510 and Zephir300 data loggers (see Section 10.1.3.2, Section 10.1.3.4 and Section 10.1.3.5)

**Note**

Measurement data aggregated by Meteo-40 or Zephir300 data loggers is saved in CSV files. Each CSV file includes statistical data, sensor and data logger details. For further details see Section 11.2.

Measurement data aggregated by Meteo-32 data loggers is saved in ROW files. Each ROW file includes the statistical data for the configured channels as well as the serial number of the data logger. ROW files do not include any information about sensors. Additionally, Meteo-32 generates an ROWINFO file, which contains slope and offset values as well as channel information. The ROWINFO file has to be uploaded to AmmonitOR as well. For further details see Section 12.2.

10.1.3.1 Meteo-40: Automatic data upload via SCP connection

For the automatic data upload, an AmmonitOR project key is required, which has to be entered in the Meteo-40 web interface. Go to the Communication → AmmonitOR menu and enter the project key in the appropriate field. The checkbox *Send CSV files* has to be selected to upload measurement data to AmmonitOR. The checkbox is selected by default.

If you use an AmmonitOR installation on your server, select *Custom server* in the Communication → AmmonitOR menu of your Meteo-40 web interface, enter the project key and your server details.

Test the connection from Meteo-40 to AmmonitOR in the Meteo-40 web interface. A green line in the *Connections* overview indicates the successful upload.

According to the communication schedule, which is configured in the Communication → Schedule menu of the Meteo-40 web interface, CSV files will be uploaded to AmmonitOR. No further interaction is needed. The CSV file includes measurement data as well as details about the data logger and all configured sensors. All details are imported automatically in AmmonitOR.

After the first data upload has been performed, data logger(s), sensor details and statistical data are displayed in AmmonitOR.



Note

Meteo-40 records, which CSV file has been uploaded. In the Data Inspection → Statistics menu all CSV files, which have already been transmitted to AmmonitOR, have a check mark in the column *AmmonitOR*. To start an immediate file upload or to test the connection, press *Run now* in the AmmonitOR row in the Communication → Schedule menu of the Meteo-40 web interface.



Important

At scheduled upload times Meteo-40 transfers all CSV files, which have been generated since the last upload. If it is the first upload, Meteo-40 transfers all CSV files to AmmonitOR - no matter how many CSV files have been generated.



Important

If premium features are not enabled the data stays 3 months in database until it expires. See for more information [Section 9.3](#)

10.1.3.2 Meteo-40: Manual import of CSV files

If you decide not to upload data automatically or data should be displayed immediately, you can import CSV files manually. To do so, a data logger has to be added to your project. Click on *Add data logger* in the project overview (menu: Settings → Project). Enter the required details and finish with *Add data logger*.

New data logger for My First Project

Required

Serial number

Logger type

Optional

Name

Import email address

The from address of the email which will be sent to aor@ammonit.com

Longitude

in ° East

Latitude

in ° North

Altitude

in m

Comment

Add data logger

Figure 10.3: Adding a new Meteo-40 data logger

The newly added data logger is displayed in the project. By clicking either on the data logger image, its name or serial number, data logger details can be modified. In order to view sensor details and measurement data, CSV files have to be uploaded. Go to the Archiving → Import data menu and select data logger as well as CSV files (Data files), which should be uploaded.

**Note**

Measurement data aggregated by Meteo-40 data loggers is saved in CSV files. Each CSV file includes statistical data, sensor details. For further details refer to Section 11.3.

**Important**

If the data logger type entered in AmmonitOR does not match with the data logger type according to the CSV file, AmmonitOR will reject the CSV file.

After importing the files, AmmonitOR displays further details of your project, e.g., data logger details, data calendar, sensors and evaluations.

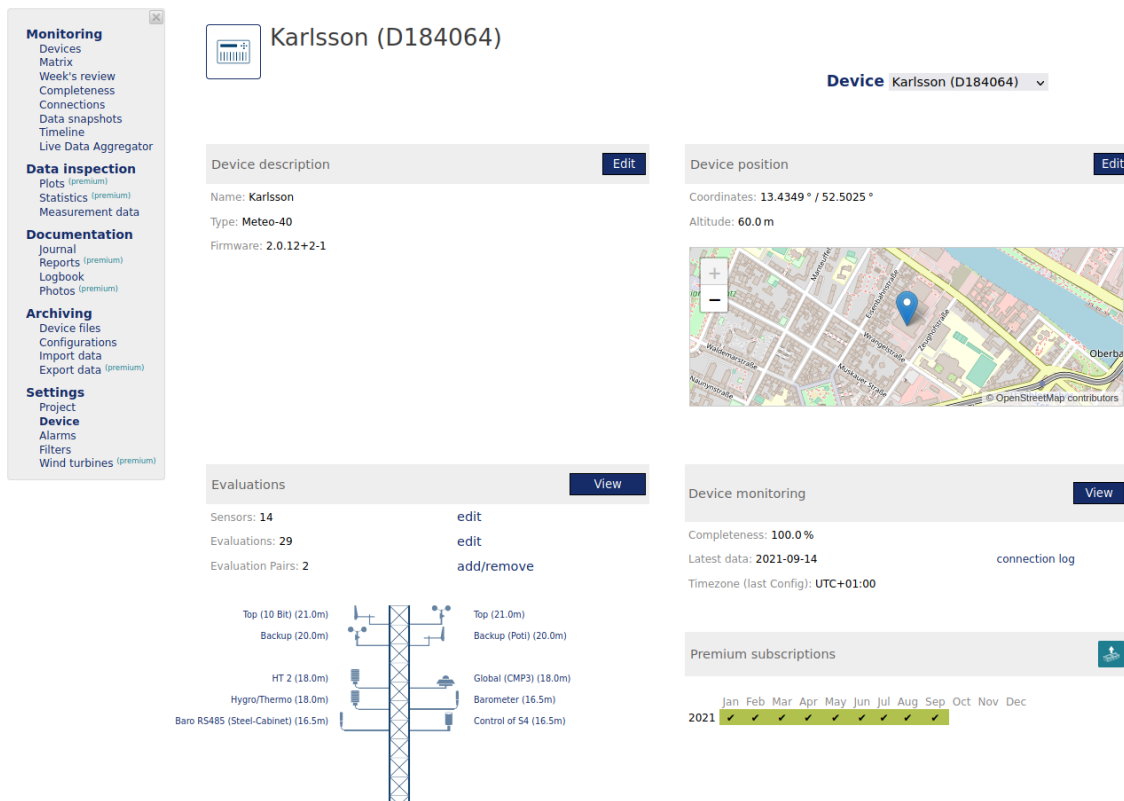


Figure 10.4: Logger details for Meteo-40



Important

If premium features are not enabled the data stays 3 months in database until it expires. See for more information Section 9.3

10.1.3.3 Meteo-32: Emailing measurement data to AmmonitOR

If your Meteo-32 data logger should automatically send emails with measurement data to AmmonitOR, AmmonitOR and your data logger have to be configured. To receive data files, the data logger has to be added to the appropriate project. To do so, click on *Add data logger* in the project overview and enter the required Meteo-32 data logger details. Finish the configuration with *Add data logger* (see also Section 10.1.3.4).

Download and install [Ammonit CALLaLOG software](https://www.ammonit.com/en/customer-support/) (<https://www.ammonit.com/en/customer-support/>) and refer to Chapter 12 to configure your Meteo-32 data logger.



Important

Meteo-32 data import requires enabled premium feature set! (See features list Chapter 2 and premium account management Chapter 4)

10.1.3.4 Meteo-32: Manual data upload

In order to upload data manually, a Meteo-32 data logger has to be added to a project. Click on *Add data logger* in the project overview and enter the required details.

**Important**

Meteo-32 data import requires enabled premium feature set! (See features list Chapter 2 and premium account management Chapter 4)

New data logger for New Project

Figure 10.5: Adding a new Meteo-32 data logger

The added Meteo-32 data logger is displayed in the project overview. In order to display measurement data, files have to be uploaded. To do so, go to the Archiving → Import data menu, select the appropriate data logger and browse on your computer for .rowinfo (information file) and .row (data) files. Upload the .rowinfo file in the *Information file* box; the .row files in the *Data files* box. Click on *Import* to upload the selected files.

Import data logger data

Figure 10.6: Manual upload of Meteo-32 data

**Important**

If the data logger type entered in AmmonitOR does not match with the data logger type according to the ROW file, AmmonitOR will reject the CSV file.

After importing the files AmmonitOR displays further details of your project, e.g., data logger details, data calendar and evaluations.

10.1.3.5 AQ510: Manual data upload

AQ510 data files can be uploaded to AmmonitOR manually through data import tab in AmmonitOR menu. AmmonitOR is compatible with the "Classic" format of an AQ510 data file. The files in this format can be downloaded while having an account in [AQSystems webviewer](http://webview.aqs.se/) (<http://webview.aqs.se/>). The "Classic" format can be then exported in tab export.



Important

AQ510 data import requires enabled premium feature set! (See features list Chapter 2 and premium account management Chapter 4)

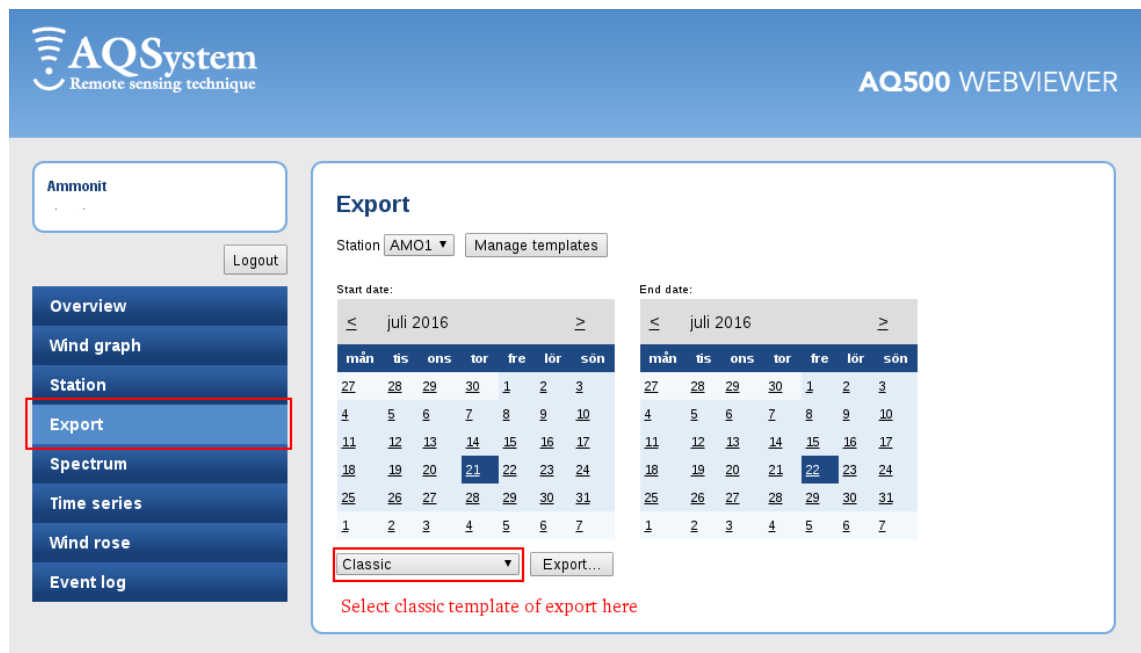


Figure 10.7: AQSystems webviewer "Classic" format export

10.1.3.6 Campbell: Manual data upload

Campbell data files can be uploaded to AmmonitOR manually through data import tab in AmmonitOR menu. AmmonitOR is compatible with the "TOA5" format of Campbell data files with certain setup.

Campbell gives very flexible possibility of setting up how the output file would look like. AmmonitOR requires a certain structure from your Campbell files. If you wish to use AmmonitOR with your Campbell files, you need to adapt the settings of your Campbell to generate files, of a structure, like the one described below.

- First row: Configuration section.
It should contain format "TOA5" as first element,
Followed by device serial as a number, i.e. "17910"
Followed by the Campbell model, i.e. "CR1000",
Followed by one more serial number of the device, i.e. "17910",
Followed by software version i.e. "CR1000.Std.31",
Followed by two empty strings "", ""

Ending with system name i.e. "MyCampbellLogger".

Example of the whole config section (first row): "TOA5","17910","CR1000","17910","CR1000.Std.31","", "", "MyCampbellLogger"

- Second row: "TIMESTAMP", "RECORD", scan_count_Max", followed by series of comma separated evaluation names, sensor heights in meters and evaluation types, enclosed in a word of certain format: "label_height_type".

Example of second row:

"MyEvaluation_12m_Temperature","", "TIMESTAMP", "RECORD", scan_count_Max", "YourEvaluation_100m_Pressure"

for evaluation with label MyEvaluation, at the height of 12 meters and of temperature type and YourEvaluation, at the height of 100 meters and of pressure type.

Please use sign _ between the evaluation elements. Also, please note, that the height needs to be followed by m. 12 meters should be written as 12m. Empty spaces are not supported, so refrain from names with spaces between them.

- Third row: ""TS", "RN", "" followed by series of comma separated units.
Example of third row: "TS", "RN", "", "%", "W/m2".
- Fourth row: "", "", "Max" followed by Series of comma separated statistics.
Example of fourth row: "", "", "Max", "Min", "Min".

The number of columns in rows second to fourth must be equal and represent the columns and their number in the data table that will follow them.

Further rows should contain the data for each timestamp, separated by comma, in columns respective to the evaluation they relate to.

Full list of evaluation types, units and statistics supported by AmmonitOR from Campbell loggers is presented in the tables below. Please adapt your files and match the Campbell names to your file format.



Important

Campbell data import requires enabled premium feature set! (See features list Chapter 2 and premium account management Chapter 4)

Evaluation type in Campbell files	Evaluation type displayed in AmmonitOR
"Pressure"	air_pressure
"Logger_Int_Temp_Avg"	device_temperature
"Battery"	device_voltage
"Batt_Volts_Avg"	device_voltage
"Batt_Volts_Max"	device_voltage
"Batt_Volts_Min"	device_voltage
"Humidity"	humidity
"Tot_Rain"	precipitation
"Day_Rain"	precipitation
"Solar_Total"	solar_GHI
"Temp"	temperature
"Temperature"	temperature
"RECORD"	other
"Nmbr_sats"	other
"Max_clk_change"	other
"WDir"	wind_direction
"WindDir"	wind_direction
"WS"	wind_speed
"VertWS"	wind_speed_vert

Units in Campbell files	Units displayed in AmmonitOR
"RN"	-
"unitless"	-
"Deg"	°
"Degrees"	°
"Degrees Celcius"	°C
"degC"	°C

Units in Campbell files	Units displayed in AmmonitOR
"%"	%
"hPa"	hPa
"metres/second"	m/s
"mm"	mm
"V"	V
"Volts"	V
"W/m2"	W/m ²

Statistics in Campbell files	Statistics displayed in AmmonitOR
"Avg"	Avg
"VectAvg"	Avg
"Min"	Min
"Max"	Max
"Std"	StdDev
"VectStd"	StdDev
"Tot"	Sum
"Smp"	Val
"""	Val

10.1.3.7 Zephir300: Automatic data upload via FTP connection



Note

If you need to upload your Zephir300 10 minute averaged CSV files manually, you can follow the instructions for the Meteo-40 manual data upload (see Section 10.1.3.2).



Important

Zephir data import requires enabled premium feature set! (See features list Chapter 2 and premium account management Chapter 4)

For the automatic data upload, an AmmonitOR project key is required, which has to be entered as FTP username in the Waltz web interface. Connect with your Zephir and go to *Config*. In the tab *Options*, select *Custom FTP server* as shown in the screenshot.



Figure 10.8: Main live menu of Waltz

The fields in *Custom FTP server details* should be filled as below

Server address: Fill in "or.ammonit.com" or, if you have an own AmmonitOR server, your custom server address.

Port: Port is "21" by default. If you have an own server, ask your System Administrator.

Username: The username should be the project key you defined in your AmmonitOR project.

Password: The password is provided by us. Use the [manual for Zephir FTP data import](https://www.ammonit.com) (<https://www.ammonit.com>) to learn how to get one.

Remote path: The remote path has to be "/". Compare the screenshot.

Standard FTP or Secure FTP: For the AmmonitOR FTP service, always use standard FTP.



Important

Make sure that you choose the 10 minute averaged data and CSV format. Otherwise AmmonitOR wont accept the data.

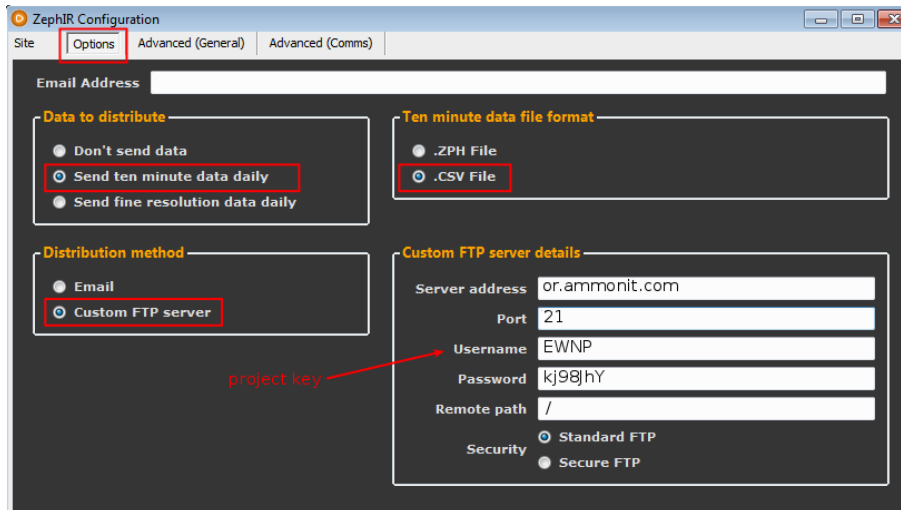


Figure 10.9: How to navigate to FTP server settings in the ZephIR live view.

As soon as you saved the configuration for the zephIR, your 10 minute averaged data files will be sent to AmmonitOR automatically and can be viewed in the respective project.

10.1.4 Deleting projects

In order to delete a project, you have to open it and click on the *Delete* button next to the project name. Before the project will be deleted, AmmonitOR displays a warning message, which has to be confirmed (*Yes, delete all!*).

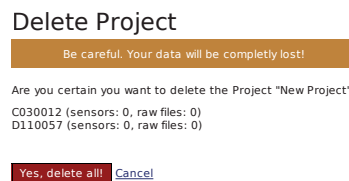


Figure 10.10: Deleting a project



Important

After deleting a project, the data cannot be recovered! In case of doubt, keep the project.

Only users with Admin rights are allowed to delete projects.

10.2 Data Logger Information

10.2.1 List of data loggers

Instead of listing projects, all data loggers implemented in your projects can be listed by clicking on *List all data loggers* in the left navigation of the *Project List* page. AmmonitOR displays for each data logger a box with data logger serial number, name and type. Additionally, 24h averages of temperature and wind speed as well as 24h minimum internal

voltage of the data logger are shown. Put your mouse pointer on the value to display the corresponding sensor for temperature and wind speed. For each data logger, AmmonitOR displays total completeness and when the last data has been imported.

Click on the data logger, to view details of the data logger, e.g., related project and active sensors. For further details see Section 10.2.



Note

If a data logger is used in more than one project, it will be displayed multiply.

For listing data loggers related to a project, select a project and go to the Settings → Data logger menu. AmmonitOR shows only the data loggers related to this particular project. As mentioned above, AmmonitOR indicates additional details for the data logger, i.e., total completeness and minimum internal voltage.

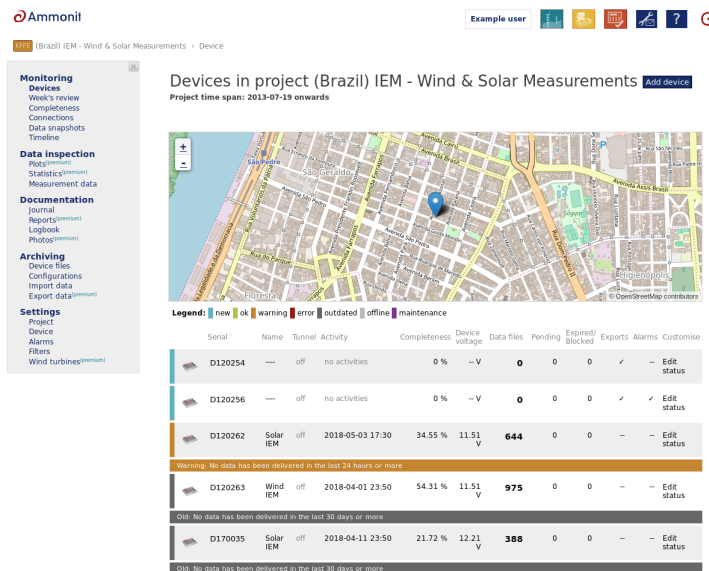


Figure 10.11: List of project related data loggers

The data loggers are sorted by serial number in ascending order.

See also Section 10.2.

10.2.2 Data logger details (Overview)

In order to view details of a data logger, click on it in the data logger list (see Section 10.2.1) or on its serial number resp. on the data logger picture in the project overview (see Section 10.1.1).

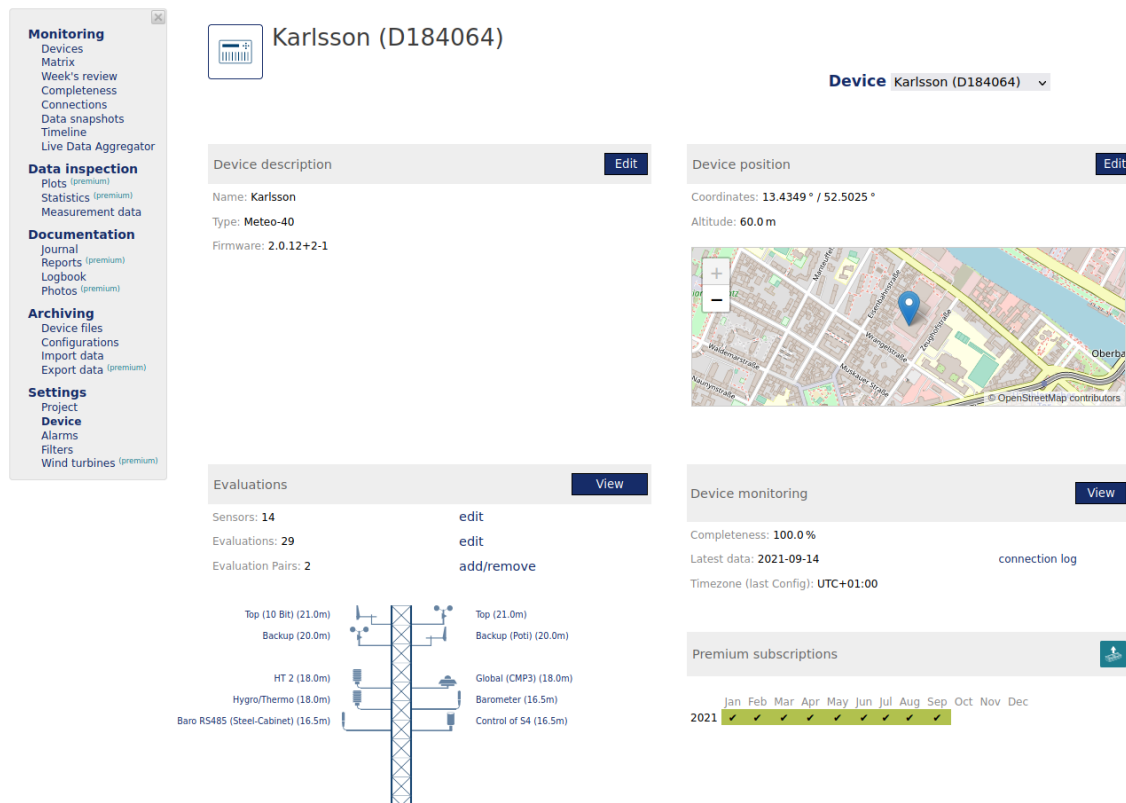


Figure 10.12: Data logger details

Name For Meteo-40 data loggers, AmmonitOR displays the name entered in the Meteo-40 web interface. Click on *Edit* to modify the name in AmmonitOR. The name can also be changed by clicking on the *Edit* button in the data logger box of the project overview.

If there are different names used for the data logger in the Meteo-40 web interface and in AmmonitOR, the name entered in AmmonitOR has priority.

The data files of Meteo-32 data logger do not include a data logger name. So the data logger name can be added or modified only in AmmonitOR.

Type The data logger type is automatically set, when CSV files from Meteo-40 data loggers are uploaded according to the schedule in the Meteo-40 web interface.

If data loggers are added manually, the data logger type has to be selected from a dropdown list. For Meteo-32 data loggers, the type has to be set manually.

The data logger type must correspond to the uploaded data files. If the data files do not correspond with the added data logger type, AmmonitOR will reject the uploaded data files.

Project Name of the project (measurement campaign), to which the data logger is related.

Import email (only displayed for Meteo-32 data loggers) Indicates the email address used by the Meteo-32 data logger to email data files to AmmonitOR.

Completeness AmmonitOR checks how many entries are expected to be in the system and compares the value with the actual number of entries. The completeness is displayed as percentage.

Coordinates Data logger GPS coordinates can be entered in the data logger description. Coordinates entered in the Meteo-40 web interface are not imported in AmmonitOR.

Altitude The altitude of the data logger position can be edit in the data logger description. Altitudes entered in the Meteo-40 web interface are not imported in AmmonitOR.

Latest data Indicates the timestamp of the last imported data set; data format: yyyy-mm-dd hh:mm:ss

Firmware Indicates the firmware version installed on the data logger, which is included in the uploaded CSV (Meteo-40) or ROW (Meteo-32) file.

Comments Individual text, which can be added in the data logger description. Click on *Edit* to modify the comment.

Evaluation pairs Indicates the number of defined evaluation pairs. Click on *add/remove* to modify the settings. Evaluation pairs are important for several calculations, e.g., power curve measurement.

**Note**

Some authorities, e.g., Turkish meteorological institution, demand evaluation pairs in their measurement guidelines. Evaluation pairs refer to related measurands like wind speed and wind direction. The data considered for evaluation pairs should be collected from sensors, which are installed on similar heights; the max. distance is often indicated in the guidelines.

In order to modify name and other data logger details, click on *Edit* in the data logger overview or in the data logger box in the project overview. *Edit* is not visible for users with Viewer or Guest rights.

In order to check the data for completeness, click on *View data calendar*. For more details about the data calendar go to Section 6.4.

By clicking on *View connection log*, AmmonitOR displays the communication behaviour of Meteo-40 data loggers. This feature has to be configured in the Meteo-40 web interface. Refer to Section 6.5 for more details about the connection log.

After data files have been imported, AmmonitOR displays a mast drawing with all sensors connected to the data logger. For Meteo-40 data loggers AmmonitOR displays label and installation height (if available) of the installed sensors. For Meteo-32 data loggers the mast drawing has to be configured - sensor labels and installation height are not included in the data files.

In addition to the mast drawing, AmmonitOR displays a table with sensor label, type, installation height and evaluation. Refer to Section 10.2.4 and Section 10.2.5 for further details about the content of the table.

10.2.3 Deleting data loggers

In order to delete a data logger, you have to go to data logger overview and click on *Delete* next to the data logger name. Before the data logger will be deleted, AmmonitOR displays a warning message, which has to be confirmed (Yes, delete!)

**Important**

After deleting a data logger, the data cannot be recovered! In case of doubt, keep the data logger.

Only users with write access rights are allowed to delete data loggers.

10.2.4 Sensors

AmmonitOR displays a drawing of your measurement system. For Meteo-40 data loggers the drawing is automatically generated on the basis of the uploaded CSV file. The CSV file includes all sensor details configured in the Meteo-40 web interface. Details, which are not configured in the web interface of the data logger, can be added in AmmonitOR.

For Meteo-32 data loggers the drawing has to be adjusted, as some details cannot be configured in the data logger software.

Additionally, AmmonitOR shows a table with configured sensors and evaluations. For further details see Section 10.2.4.1 and Section 10.2.4.2.

If sensor details should be modified, click on *Edit sensors*, which is displayed below the table. Sensor label, type and installation height can be modified and saved in one step. Via *Full details* sensor details including evaluations are displayed and further evaluations can be configured.

Sensors connected to logger D110057

Label	Type	Height	
Top	Anemometer	21.00	Full details
Backup	Anemometer	20.00	Full details
Top (10 Bit)	Wind Vane	21.00	Full details
Backup (Poti)	Wind Vane	20.00	Full details
Hygro/Thermo	Hygro-Thermo	18.00	Full details
Steel Cabinet	Hygro-Thermo	16.50	Full details
Global (CMP3)	Pyranometer	18.00	Full details
Diffuse (CMP6)	Pyranometer	15.00	Full details
PT1000 (CS1)	Other	18.00	Full details
Control of S4	Other	16.50	Full details
Heating Switch (S6) status	Other	16.50	Full details
PV-Voltage	Other	16.50	Full details
Barometer	Barometer	16.50	Full details
Baro RS485 (Steel-Cabinet)	Barometer	16.50	Full details

Save

Figure 10.13: Sensors connected to a data logger

By clicking on *List all evaluations*, AmmonitOR displays a list of all available evaluations, e.g., wind speed, wind direction, humidity etc.

Evaluations

Type	Name	Height	Sensor (type)	Unit	Formula	Source
Wind Speed	Top	21.00m	Top (anemometer)	m/s	linear_cnt	C1
Wind Speed	Backup	20.00m	Backup (anemometer)	m/s	linear_cnt	C2
Wind Direction	Top (10 Bit)	21.00m	Top (10 Bit) (wind_vane)	°	windvane_dig	D1
Wind Direction	Backup (Poti)	20.00m	Backup (Poti) (wind_vane)	°	windvane_pot	A5, A6
Humidity	Hygro/Thermo	18.00m	Hygro/Thermo (hygro_thermo)	%	linear	A2
Humidity	Steel Cabinet	16.50m	Steel Cabinet (hygro_thermo)	%	linear	A8
Temperature	Internal temperature			°C	verbatim	T
Temperature	Hygro/Thermo	18.00m	Hygro/Thermo (hygro_thermo)	°C	linear	A3
Temperature	Baro RS485 (Steel-Cabinet)	16.50m	Baro RS485 (Steel-Cabinet) (barometer)	°C	verbatim	M1_2
Temperature	Steel Cabinet	16.50m	Steel Cabinet (hygro_thermo)	°C	linear	A9
Air Pressure	Barometer	16.50m	Barometer (barometer)	mbar	linear	A4
Air Pressure	Baro RS485 (Steel-Cabinet)	16.50m	Baro RS485 (Steel-Cabinet) (barometer)	mbar	verbatim	M1_1
solar_irradiance	Global (CMP3)	18.00m	Global (CMP3) (pyranometer)	W/m²	linear_pyr	A7
solar_irradiance	Diffuse (CMP6)	15.00m	Diffuse (CMP6) (pyranometer)	W/m²	linear_pyr	A12
Analog Voltage	Internal voltage			V	verbatim	V
Analog Voltage	PT1000 (CS1)	18.00m	PT1000 (CS1) (other)	V	linear	A1
Analog Voltage	Control of S4	16.50m	Control of S4 (other)	V	linear	A11
Analog Voltage	PV-Voltage	16.50m	PV-Voltage (other)	V	linear	A10
Analog Current	Internal current			mA	verbatim	I
Status	Heating Switch (S6) status	16.50m	Heating Switch (S6) status (other)	%	status	D2
Status	Switch 20% ON for D2		Switch 20% ON for D2 (other)	%	status	D4

Figure 10.14: Evaluations recorded by the data logger

For further details about Evaluations go to Section 10.2.5.

10.2.4.1 Sensors with Meteo-40 data loggers

CSV files generated by Meteo-40 include sensor details configured in the Meteo-40 web interface, e.g., label, installation height as well as slope and offset values. According to this configuration, AmmonitOR displays the measurement system (simplified drawing) and shows sensor labels and installation heights.

Click on the sensor in the drawing or in the table to display further details and evaluations. AmmonitOR displays for each sensor evaluation(s) including unit, formula and channel (source).

Click on an evaluation to display an XY plot showing the behaviour of the evaluation over the last 7 days. Additionally, AmmonitOR lists the configuration history and any configuration overrides. See also Section 10.2.5.

10.2.4.2 Sensors with Meteo-32 data loggers

Since sensor details cannot be configured in the CALLaLOG software, which is necessary for working with Meteo-32 data loggers, AmmonitOR cannot display a drawing of the measurement system based on the files sent to AmmonitOR. In addition to the met mast drawing, AmmonitOR lists all sensors and evaluations in a table.

In order to view the measurement system, it has to be configured. Click on the "empty" image (see Figure 10.15) to start the configuration.

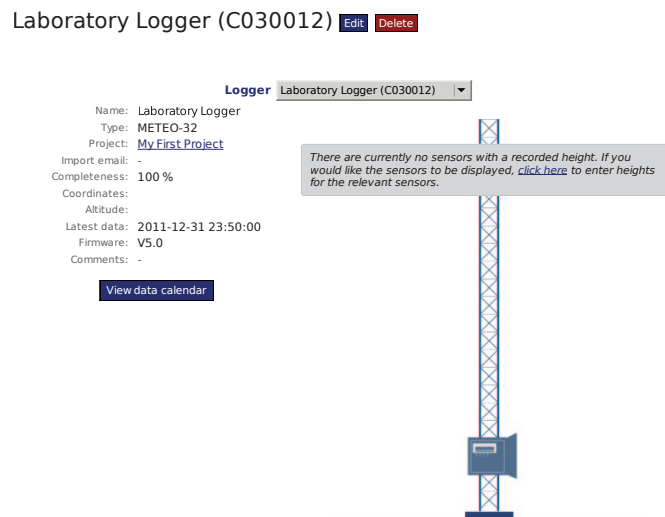


Figure 10.15: Drawing of a measurement system (Meteo-32)

AmmonitOR displays a table, which includes all channels according to the ROW file. Sensor label, type and installation height can be assigned. Press Save to finish the configuration. In order to see further sensor details and evaluations, click on *Full details*.

In order to display details of the evaluation, click on an evaluation listed in the table below the met mast drawing. Click on *List all evaluations* to show all available evaluations of the measurement system.

By clicking on an evaluation a XY plot is displayed, which shows the behaviour of the evaluation over the last 7 days. Additionally, AmmonitOR lists the configuration history and any configuration overrides. See also Section 10.2.5.

Sensors connected to logger C030012

Label	Type	Height	
Top Anemometer	Anemometer	100.00	Full details
d1	Wind Vane		Full details
h1	Hygro-Thermo		Full details
t1	Hygro-Thermo		Full details

[Save](#)

Figure 10.16: Configuring a measurement system (Meteo-32)



Tip

We recommend configuring all sensors in your Meteo-32 measurement project.

10.2.5 Evaluations

On the data logger details page a table is shown, which lists all sensors and visible evaluations. Click on an evaluation to display type, sensor and formula of the calculation as well as unit of the evaluation. If configured, also the installation height of the sensor is indicated.

If evaluator detail page is opened an XY plot is displayed, which shows the measurand behaviour of the last 7 days. In order to view another time period, click on *Edit*. AmmonitOR also calculates the Average of the measured values for the selected period.

While being in data logger details page, if *List all evaluations* is clicked, AmmonitOR displays a table with both visible and hidden (or deactivated) evaluations (see Section 10.2.5.2). Click on the evaluations to display any details. In order to reactivate a hidden or deactivated evaluation, click on *Active* checkbox and *Save* at the bottom of a page.

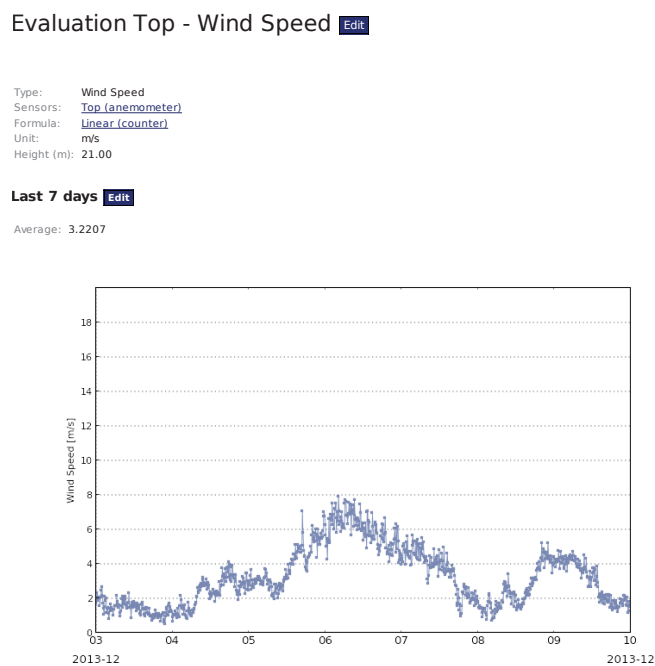


Figure 10.17: Example: Wind speed evaluation with plot

In the *Logger configuration history* all configuration changes are listed and the period, for which the configuration has been valid. In order to view the configuration parameters, click on the *Configuration ID* in the first column. See Section 10.2.5.4 for modifying the configuration.

10.2.5.1 List of supported evaluations and statistics

Type as appears in exports	Type as appears in AmmonitOR UI
Type in export	Type displayed in AmmonitOR
wind_speed	Wind Speed
wind_speed_vert	Vertical Wind Speed
wind_direction	Wind Direction
dir_max_speed	Direction at max. Speed
temperature	Temperature
temperature_differential	Differential Temperature
humidity	Humidity
air_pressure	Air Pressure
precipitation	Precipitation
precipitation_intensity Liquid	Precipitation Intensity Liquid
precipitation_intensity Solid	Precipitation Intensity Solid

Type as appears in exports	Type as appears in AmmonitOR UI
precipitation_intensity Total	Precipitation Intensity Total
precipitation_intensity	Precipitation Intensity
precipitation_status	Precipitation Status
precipitation_sum	Precipitation Sum
synop	SYNOP
solar_GHI	GHI (global horizontal irradiance)
solar_DHI	DHI (diffuse horizontal irradiance)
solar_DNI	DNI (direct normal irradiance)
# solar_DNI_sw	Calculated DNI (direct normal irradiance)
solar_DNIcos_sw	cosine weighted DNI (direct normal irradiance)
sun_status	Sun Status
sun_status_sw	Calculated Sun Status
counter	Counter
voltage	Analog Voltage
status	Status
other	Other Evaluation
any	Any Evaluation
info	Information
voltage u1	Voltage U1
voltage u2	Voltage U2
voltage u3	Voltage U3
current	Analog Current
current I1	Current I1
current I2	Current I2
current I3	Current I3
active_power Total	Active Power Total
active_power P1	Active Power P1
active_power P2	Active Power P2
active_power P3	Active Power P3
active_power	Active Power
power_factor	Power Factor
reactive_power Total	Reactive Power Total
apparent_power	Apparent Power
wind_power_density	Wind Power Density
air_density	Air Density
turbulence_intensity	Turbulence Intensity
device_voltage	Device Voltage
device_current	Device Current
device_temperature	Device Temperature
device_humidity	Device Humidity
device_orientation	Device Orientation
device_longitude	Device Longitude
device_latitude	Device Latitude
device_tilt	Device Tilt
frequency	Frequency
inclination_angle	Angle of Inclination
vibration_frequency	Vibration Frequency
vibration_amplitude	Vibration Amplitude
inflow_angle	Inflow Angle
sound_noise_ratio	Sound Noise Ratio
obukhov_length	Monin-Obukhov length
heat_flux	Heat Flux
stability_parameter	z/L
altitude	Altitude
azimuth	Azimuth
duty_cycle	Duty Cycle
flash_level	Flash Level
bat_passes	Bat Passes
bat_pulses	Bat Pulses
event_code	Event Code
soiling_ratio	Soiling Ratio

Type as appears in exports	Type as appears in AmmonitOR UI
volumetric_water_content	Volumetric Water Content
electrical_conductivity	Electrical Conductivity
reference	Reference
wind_speed_max	Wind Speed Max
variance	Variance (2nd order moment)
skewness	Skewness (3rd order moment)
kurtosis	Kurtosis (4th order moment)
volumetric_flow_rate	Volumetric Flow Rate
energy_flow_rate	Energy Flow Rate

The list of currently supported statistics for evaluations:

- Avg
- Min
- Max
- StdDev
- Sum
- Count
- Val
- Value
- Median

10.2.5.2 Editing evaluations

If an evaluation is not necessary for any reason, the evaluation can be made invisible by clicking the *Active* and *Save* at the bottom of the evaluation list. Hidden or invisible evaluations can be reactivated in the same manner, see Section 10.2.5

Evaluations can be edit by clicking on the *Edit* button displayed in the headline in the evaluation overview page. Label and type of the evaluation can be modified. Here also the evaluation visibility options can be changed.

10.2.5.3 Adding evaluations

In some cases it is required to add further evaluations to a project, e.g., air density. To do so, click on the sensor, which is required to calculate the evaluation.

Click on *Add new evaluation* to configure the evaluation. The new evaluation will be listed in the evaluation list.

10.2.5.4 Modifying the configuration

If measurement data has to be recalculated, e.g., due to sensor replacement, slope and offset values can be modified. To do so, select an evaluation and go to *AmmonitOR configuration overrides*. Click on *New configuration override* to create a new evaluation.

Reason Enter the reason for the configuration override, e.g., replacement of a sensor.

Period Only valid for evaluations, whose sensors are connected to counter channels, i.e. wind speed, precipitation. Indicates the period of time covered by the measurement.

For example: Wind speed is calculated by counting the number of cycles (rotations or tics) per second. 1 has to be entered in the field *Period*.

Sensitivity Only valid for solar irradiation sensors. Enter the sensitivity value given for the new sensor (acc. to calibration protocol).

Offset Enter the offset value, given for the new sensor.

Slope Enter the slope value of the new sensor

Optionally, you can decide with period should be recalculated. You can choose to recalculate the whole measurement, a defined period, all data before a date or all data after a date.

New configuration override

Required

Reason

eg. sensor swap, correction, logger provided only raw files etc

Period

s Period of time covered by a measurement.

Offset

m/s

Slope

m/s/l

Optional

Datetime from

Leave blank to include all data before 'to' date

Datetime to

Leave blank to include future data

Note: All data from this data logger will be reimported when you click save, this may take a number of minutes.

Save

Delete

Figure 10.18: Overriding a sensor configuration (Anemometer)



Important

A modified configuration in AmmonitOR does not affect the data logger configuration or the generation of data files. The configuration is only valid for data in AmmonitOR. Configurations can be modified multiply or deleted. In both cases the data is reimported and newly calculated according to the entered period.

New AmmonitOR configurations are listed under the *Logger configuration history*. Configurations can be modified via the *Edit* button. If further recalculations should be added, click on *New configuration override*.

10.3 Wind Turbine Information

For different power curve analysis, it can be important to compare your turbine data with other turbines. Use this menu to enter wind turbine data as well as power curve information and power coefficient for comparison reasons. Note that the *Rotor diameter* is required for power coefficient curve. Once entered wind turbines, can be used by the editing user in different projects. Other users do not have access to the wind turbine. Wind turbine is part of premium feature set (See features list in Chapter 2).

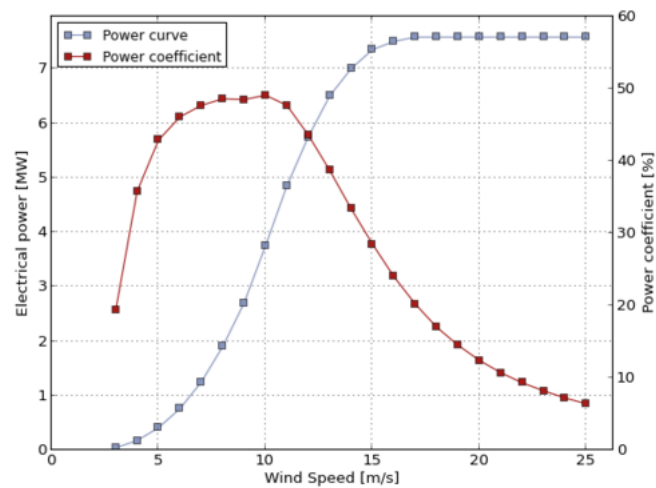
Go to the Settings → Wind turbine information menu to view or edit turbine data. If any data has been entered, AmmonitOR lists the provided turbine information as well as the plot(s) with the turbine power curve.

Vestas: Exemplary wind turbine model ▾ [Add](#)

Manufacturer: Vestas
Model: Exemplary wind turbine model
Updated: 2016-02-15 09:57:44
Rated power: 2 MW
Rated wind speed: 11 m/s
Power regulation: Active pitch regulated
Gear: With gearbox
Cut in wind speed: 2.00 m/s
Cut out wind speed: 25.00 m/s
Hub height: 10 m
Rotor diameter: 126.00 m
Swept area: 12468.98 m²

[Edit or delete turbine](#)

Standard (air density=1.225 kg/m³) [Edit](#)



[Add power curve](#)

Figure 10.19: Wind turbine data in toolbox

In order to modify turbine data, click on *Edit turbine properties*; for modifying power curve and power coefficient data, click on *Edit* next to the air density information. It is possible to enter more than one power curve for a turbine, e.g., if air density varies.

If no turbine data has been provided, click on *Add turbine* to enter the information. By clicking on *Add power curve* the characteristic data for the power curve can be entered. For each wind turbine more than one power curve can be provided.

Delete power curve

Provide power curve information

Variant name

Standard

Air density

1.225

in kg/m³

Source

(not guaranteed course)

Provide information about the source of the power curve

Data points

1	,	0
2	,	0
3	,	0
4	,	2
5	,	97
6	,	255
7	,	459
8	,	726
9	,	1004
10	,	1330

One pair of comma separated power curve points per line.

Save

Cancel

Figure 10.20: Editing a power curve in the toolbox

10.4 Connection alarms

AmmonitOR provides an alarm function in case the data logger does not connect for a defined time period or reconnects after a while of no communication.

Click on *Add new connection alarm* to define a new alarm. Select either *Alert immediately on every new connection* if you want an email as soon as the data logger connects to AmmonitOR or *Alert when a connection has been missing for...* if you want to get an email as soon as the logger did not send data for a specific time period. Choose type of connection to get alerted if only connection of a specific type did not occur. Finally select the recipients of the alarm and save.

Update connection alarm

Mode

- ☐ Alert immediately on every new connection
- ☒ Alert when a connection has been missing for:

24 hours + 30 minutes

How long to wait after the last connection before alerting subscribers.

Connection type

all

Which data logger connections are monitored by this alarm.

Email users

- ☐ Ana Rodriguez Lopez
- ☐ Daniela Treptow
- ☐ Henner Schienitzki
- ☐ Jörg Benesch
- ☐ Karim Fahsis
- ☐ Max Gräber
- ☐ Miriam Degginger
- ☐ Steffen Kühn
- ☐ Vincent Camier
- ☐ Vicente Gutierrez Valles
- ☐ Will Hardy
- ☐ W. Martin Borgert

Save

Figure 10.21: Create a new connection alarm

When alarms have been created, it can be seen in the connection alarm overview.

Connection alarms

Data logger Roof Mast (D110057) ▾

Connection type	Duration	Subscribers		
SCP	24 hours + 30 minutes	2	Edit	Subscribe
tunnel	24 hours + 30 minutes	1	Edit	Subscribe

[Add new connection alarm](#)

Figure 10.22: Alarm overview

10.5 Filters

In order to check measurement data for plausibility, filters can be implemented. In doing so, AmmonitOR alerts when any filter triggers. Filters can be configured for measurement and system data, e.g. temperature and internal voltage. For example: AmmonitOR can send an alert email when the voltage of the battery is lower than a defined value. Or measurement data can be highlighted when the temperature is lower than 4 degrees; icing could be a problem.

AmmonitOR offers different filters and every type has a special function. Filters can be created and managed in menu Settings → Filters. If filters have been created, AmmonitOR displays the filters in an overview - separated by filter type: *Range filters*, *Empty data filters*, *Sequence filters*, *Comparison filters* and *Direction comparison filters*. AmmonitOR lists which filter is active, filter conditions, and what happens when the filter condition applies.

In order to modify, activate or deactivate filters, click on *Details*. To create new filters for a category, click on *Create a new ... filter*.

Range filters

Active	Evaluations	Min. value	Max. value	Message	Alert type	New status	
yes	Top (10 Bit) - wind direction, Backup (Poti) - wind direction	0	360	impossible wind direction	archive and email	Error	Details
yes	Barometer - air pressure, Baro RS485 (Steel-Cabinet) - air pressure	870	1085	impossible air pressure	archive and email	Suspicious	Details
yes	Internal temperature - temperature, Hygro/Thermo - temperature, Baro RS485 (Steel-Cabinet) - temperature, Steel Cabinet - temperature	-40	80	exceptional temperature	archive and email	Suspicious	Details
yes	Hygro/Thermo - humidity, Steel Cabinet - humidity	0	100	Humidity can not be greater than 100%	archive and email	Error	Details
no	Hygro/Thermo - humidity	0	4	humidity testing email	archive and email	Suspicious	Details
yes	Hygro/Thermo - humidity, Steel Cabinet - humidity, Internal temperature - temperature, Hygro/Thermo - temperature, Steel Cabinet - temperature, Barometer - air pressure, Internal voltage - voltage, Internal current - current, Status_8k2 - status, Status_8k2 of S6 - status, Status of S6 - status	600	600	Measurements missing	archive and email	not set	Details
yes	Top - wind speed, Backup - wind speed		30	Test Filter Very High Wind Speed! Unfortunately, your mast flew away...	only archive	Error	Details
yes	Internal voltage - voltage	11.4000		Batterie voltage is low	archive and email	Suspicious	Details

Sequence filters

Active	Evaluations	Threshold	Message	Alert type	New status	
yes	Top - wind speed, Backup - wind speed	36	Anemometer possibly frozen.	archive and email	Suspicious	Details

Comparison filters

Active	Project	Evaluation 1	Comparison type	Evaluation 2	Evaluation 2 factor	Evaluation 2 offset	Message	Alert type	New status	
yes	Ammonit field tests	Top - wind speed	>	Backup - wind speed	6.0000	0.000000	fault	only archive	Suspicious	Details

Direction comparison filters

Active	Evaluation 1	Evaluation 2	Maximum offset	Message	Alert type	New status	
yes	Top (10 Bit) - wind direction	Backup (Poti) - wind direction	90	Wind directions greatly differ	archive and email	Suspicious	Details

Figure 10.23: Overview filters



Tip

AmmonitOR offers a set of default filters for range and sequence filters, which can be used as examples. Click on *Create set of default ... filters* to see and edit the filter conditions.

10.5.1 Range filters

By using the range filters, measurement values, which are out of the normal / expected range, can be detected.

Range filters

Active	Evaluations	Min. value	Max. value	Message	Alert type	New status	
yes	Top (10 Bit) - Wind Direction, Backup (Poti) - Wind Direction, Wind Vane 10 Bit - Wind Direction, Wind Vane Poti - Wind Direction	0	360	impossible wind direction	archive and email	Error	Details
yes	Barometer - Air Pressure, Baro RS485 (Steel-Cabinet) - Air Pressure	870	1085	impossible air pressure	archive and email	Suspicious	Details
yes	Internal temperature - Temperature, Hygro/Thermo - Temperature, Baro RS485 (Steel-Cabinet) - Temperature, Steel Cabinet - Temperature	-40	80	exceptional temperature	archive and email	Suspicious	Details
yes	Hygro/Thermo - Humidity, Steel Cabinet - Humidity	0	100	Humidity can not be greater than 100%	archive and email	Error	Details
no	Hygro/Thermo - Humidity	0	4	humidity testing email	archive and email	Suspicious	Details
yes	Top - Wind Speed, Backup - Wind Speed		30	Test Filter Very High Wind Speed! Unfortunately, your mast flew away...	only archive	Error	Details
yes	Hygro/Thermo - Humidity, Steel Cabinet - Humidity, Internal temperature - Temperature, Hygro/Thermo - Temperature, Steel Cabinet - Temperature, Barometer - Air Pressure, Internal voltage - Analog Voltage, Internal current - Analog Current, Status_8k2 - Status, Status_8k2 of S6 - Status, Status of S6 - Status	580	600	Measurements missing. The counter didn't arrive to 600.	archive and email	Suspicious	Details
yes	Internal voltage - Analog Voltage	11.4000		Batterie voltage is low	archive and email	Suspicious	Details
yes	Hygro/Thermo - Humidity, Steel Cabinet - Humidity	0	95	unlikely humidity	only archive	Suspicious	Details
yes	Internal temperature - Temperature, Hygro/Thermo - Temperature, Baro RS485 (Steel-Cabinet) - Temperature, Steel Cabinet - Temperature	-40	80	impossible temperature	only archive	Error	Details

[Create set of default range filters](#)
[Create a new range filter](#)

Figure 10.24: Range filter

Click on *Create a new range filter* in menu Settings → Filters. Define the range by entering a *Minimum value* and a *Maximum value*. All measurement values fitting into the range are valid. The filter triggers when measurement values are not in the defined range.

After determine the range, at least one sensor has to be selected. AmmonitOR lists all sensors connected to any of the data loggers related to the project. If more than one sensor should be selected, hold the CTRL key and use the left-mouse click to choose the sensors which should be monitored. In the *Statistics* field the statistical value has to be selected, which should be monitored, e.g., average, minimum or maximum. If more than one statistical value should be checked, hold the CTRL key and use the left-mouse click to select further statistics.

Additionally, it has to be decided, what status the data sequence should obtain, if the defined filter triggers:

Suspicious Highlights the affected measurement values in the data overview in yellow colour.

Error Highlights the affected measurement values in the data overview in red colour.

Error-marked values are not considered in plots.

No status Affected data sequence is not highlighted.

**Important**

If the filter status is **Error**, AmmonitOR will not use the measurement values in a plot (see).

Finally *Alert type* and *Message* have to be determined.

Only archive If a filter triggers, AmmonitOR generates a message, which is displayed in the message list of the project.

Archive and email If a filter triggers, AmmonitOR generates a message, which is displayed in the message list of the project and AmmonitOR sends an email to all project users.

The text entered in the *Message* textbox is used for alert email and archived message.

Click on *Add filter* to activate the filter.

Minimum value
 Valid values are above this minimum.

Maximum value
 Valid values are below this maximum.

Evaluators

- Top (Wind Speed) on D110057
- Backup (Wind Speed) on D110057
- Top (10 Bit) (Wind Direction) on D110057
- Backup (Poti) (Wind Direction) on D110057
- Wind Vane 10 Bit (Wind Direction) on D110057
- Wind Vane Poti (Wind Direction) on D110057
- Hygro/Thermo (Humidity) on D110057
- Steel Cabinet (Humidity) on D110057
- Internal temperature (Temperature) on D110057
- Hygro/Thermo (Temperature) on D110057

Statistics

- Average
- Minimum
- Maximum
- Median
- Standard deviation
- Sum
- Count

Status
Error data sequence will be marked with this status

Alert type
only archive

Message
Test Filter
Very High Wind Speed!

☒ Active

Figure 10.25: Example of a range filter for an anemometer



Tip
AmmonitOR offers a set of default filters for range filters, which can be used as examples. Click on *Create set of default range filters* to see and edit the filter conditions.

10.5.2 Empty data filters

By using the empty data filters, measurement values, which are missing are found (i.e. None, NULL, N/A, etc.).

Empty data filters

Active	Loggers	Evaluations	Message	Alert type
yes	D184064, D110057	Top - Wind Speed, Backup - Wind Speed, Anemometer - Wind Speed, Top - Wind Speed, Backup - Wind Speed, Anemometer - Wind Speed	empty value wind speed	no alert, only archive
yes	D184064, D110057	Top (10 Bit) - Wind Direction, Backup (Poti) - Wind Direction, HT 2 - Temperature, Hygro/Thermo - Temperature, Baro RS485 (Steel-Cabinet) - Temperature, Top (10 Bit) - Wind Direction, Backup (Poti) - Wind Direction, HT 2 - Temperature, Hygro/Thermo - Temperature, Baro RS485 (Steel-Cabinet) - Temperature	empty value wind direction	no alert, only archive

Create a new empty data filter

Create set of default empty data filters

Figure 10.26: Range filter

Click on *Create a new empty data filter* in menu Settings → Filters. Select at least one sensor for which you want to filter empty values. AmmonitOR lists all sensors connected to any of the data loggers related to the project. If more than one sensor should be selected, hold the CTRL key and use the left-mouse click to choose the sensors which should be monitored. In the *Statistics* field the statistical value has to be selected, which should be monitored, e.g., average, minimum or maximum. If more than one statistical value should be checked, hold the CTRL key and use the left-mouse click to select further statistics.

Finally *Alert type* and *Message* have to be determined.

Only archive If a filter triggers, AmmonitOR generates a message, which is displayed in the message list of the project.

Archive and email If a filter triggers, AmmonitOR generates a message, which is displayed in the message list of the project and AmmonitOR sends an email to all project users.

The text entered in the *Message* textbox is used for alert email and archived message.

Click on *Add filter* to activate the filter.

Evaluators

- Top (Wind Speed) on D110057
- Backup (Wind Speed) on D110057
- Anemometer (Wind Speed) on D110057
- Top (10 Bit) (Wind Direction) on D110057
- Backup (Pot) (Wind Direction) on D110057
- Direction at Maximum Speed (@21.0m) (Direction at max. Speed) on D110057
- HT 2 (Humidity) on D110057
- Hygro/Thermo (Humidity) on D110057
- HT 2 (Temperature) on D110057
- Hygro/Thermo (Temperature) on D110057
- Baro RS485 (Steel-Cabinet) (Temperature) on D110057

Statistics

- Average
- Minimum
- Maximum
- Median
- Standard deviation
- Sum
- Count

Alert type

no alert, only archive ▼

Message

empty value wind speed

Status

not set ▼

☒ Active

Email users

☐ superuser@example.com

Figure 10.27: Example of an empty data filter for an anemometer



Tip

AmmonitOR offers a set of default filters for empty data filters, which can be used as examples. Click on *Create set of default range filters* to see and edit the filter conditions.

10.5.3 Sequence filters

In order to detect measurement values that do not change over a certain period of time, such as frozen anemometers in icing situations, *Sequence Filters* can be configured. Use these filters to recognize problems with the sensor or missing measurement values.

Sequence filters

Active	Evaluations	Threshold	Message	Alert type	New status	
yes	Top - Wind Speed, Backup - Wind Speed	36	Anemometer possibly frozen.	archive and email	Suspicious	Details

[Create a new sequence filter](#) [Create set of default sequence filters](#)

Figure 10.28: Sequence filter

Click on *Create a new sequence filter* in the Settings → Filters menu to configure a new filter.

Threshold Indicates the minimal number of subsequent identical values, which should be considered suspicious.

Evaluations Select the evaluation, which should be monitored. AmmonitOR displays all evaluations with the serial number of the data logger, to which the evaluation pertains.

If more than one evaluation should be monitored, hold the CTRL key and use the left-mouse click to highlight the evaluations.

Statistics Choose from a list the statistic which should be considered for the filter.

If more than one statistical value should be checked, hold the CTRL key and use the left-mouse click to select the statistics.

Status

- Suspicious: Data sequence is marked in yellow colour in the data overview.
- Error: Data sequence is marked in red colour in the data overview. Errors are considered as measurement errors and are not displayed in plots.

Alert type only archive: AmmonitOR lists date and number of matched entries when the filter applied.

archive and email: As above. Additionally, AmmonitOR send an email to the project members to inform about the filter.

Message Enter a message which is displayed in the filter overview and in the email text, if the alert type is archive and email.

Threshold
36

Evaluations

- Top (Wind Speed) on D110057
- Backup (Wind Speed) on D110057
- Top (10 Bit) (Wind Direction) on D110057
- Backup (Poti) (Wind Direction) on D110057
- Wind Vane 10 Bit (Wind Direction) on D110057
- Wind Vane Poti (Wind Direction) on D110057
- Hygro/Thermo (Humidity) on D110057
- Steel Cabinet (Humidity) on D110057
- Internal temperature (Temperature) on D110057
- Hygro/Thermo (Temperature) on D110057

Statistics

- Average
- Minimum
- Maximum
- Median
- Standard deviation
- Sum
- Count

Status
Suspicious data sequence will be marked with this status

Alert type
archive and email

Message
Anemometer possibly frozen.

☒ Active

Figure 10.29: Example of a sequence filter

**Tip**

AmmonitOR offers a set of default filters for sequence filters, which can be used as examples. Click on *Create set of default sequence filters* to see and edit the filter conditions.

10.5.4 Comparison filters

These filters compare data of two different sensors at the same time.

Comparison filters

Active	Project	Evaluation 1	Comparison type	Evaluation 2	Evaluation 2 factor	Evaluation 2 offset	Message	Alert type	New status	
yes	Ammonit field tests	Top - Wind Speed	>	Backup - Wind Speed	6.0000	0.000000	fault	only archive	Suspicious	Details
yes	Ammonit field tests	Steel Cabinet - Humidity	>	Hygro/Thermo - Temperature	1.0000	0.000000	A	only archive	Suspicious	Details

[Create new comparison filter](#)

Figure 10.30: Comparison filter

Parameters for Comparison Filters

Active defines if the filter is active. only active filters will be used to check anything.

Message a text which will be used if the filter triggers and generates a message.

Alert type Possible values are **no alert** and **email**. **no alert** means, that the generated message will be archived, but there won't be send an email or sms. **email** means, that the generated message will be archived and an email will be send.

Sensor 1 Sensor 1 for the comparison

Comparison type The type how to compare Sensor 1 with Sensor 2

Sensor 2 Sensor 2 for the comparison

Sensor 2 factor A factor for the value of sensor 2

Measurand status **Measurand status** defines the status of the measurands from both sensors after the measurands trigger the filter.

Example 10.1 Simple filter to check difference between two temperatures

The following filter should generate a message and set the measurands status to suspicious if the value of Temperature 1 t_1 is greater than 105% of the value of temperature 2 t_2 . The equation for this filter is:

$$t_1 > t_2 \cdot 1.05$$

Equation 10.1: Linear Equation

Active True

Message Value of temperature 1 >> value of temperature 2

Sensor 1 t_1

Comparison Type >

Sensor 2 t_2

Sensor 2 Factor 1.05

Measurand Status Suspiciou

Example 10.2 Anemometer 1 Windspeed must be lower than Anemometer 2 Windspeed

The following filter should generate a Message and set the measurands status to Suspicious if the value of Anemometer1 (Height: 10 m) is greater than the value of Anemometer 2 (Height: 80 m). The equation for this filter is:

$$s_1 > s_2 \cdot 1.0$$

Equation 10.2: Linear Equation

Active True

Message Value of Anemometer 1 >> value of Anemometer 2

Sensor 1 s_1

Comparison Type >

Sensor 2 s_2

Sensor 2 Factor 1.0

Measurand Status Suspicious

10.5.5 Direction comparison filter

The *Direction Comparison Filter* correlates wind direction data of two wind vanes. Click on *Create new direction comparison filter* in the Settings → Filter menu to add a new filter.

Direction comparison filters

Active	Evaluation 1	Evaluation 2	Maximum offset	Message	Alert type	New status	
yes	Top (10 Bit) - Wind Direction	Backup (Poti) - Wind Direction	90	Wind directions greatly differ	archive and email	Suspicious	Details
Create new direction comparison filter							

Figure 10.31: Direction comparison filter

Evaluation 1 / Evaluation 2 Select the wind vanes which should be compared.

Maximum offset The entered value indicates the maximum deviation between both evaluations. If the difference between both evaluations is greater than the Maximum offset the filter triggers.

Example: If you entered 50 for the offset value and the difference between evaluation 1 and evaluation 2 is 60, the filter triggers. If the difference is 50, the filter does not trigger.

Statistic Select a statistic, which should be monitored.

Status According to the selected status, the data sequence will be marked in the data overview.

- Suspicious: The data sequence is marked yellow in the data overview.
- Error: The data sequence is marked red in the data overview and is not considered in plots.

Alert type only archive: AmmonitOR lists date and number of matched entries when the filter applied.

archive and email: As above. Additionally, AmmonitOR send an email to the project members to inform about the filter.

Message Enter a comment, which will be displayed in the filter overview and in the email sent, if alert type is archive and email.

evaluation 1
 Top (10 Bit) (Wind Direction) on D110057

evaluation 2
 Backup (Poti) (Wind Direction) on D110057

Maximum offset
 90.000000000 Values are valid when bi-directional difference between wind directions is below this value.

Statistic
 Average

Status
 Suspicious data sequence will be marked with this status

Alert type
 archive and email

Message
 Wind directions greatly differ

☒ Active

Figure 10.32: Example of a direction comparison filter

10.5.6 Editing filter details



Important

Only users with Write access rights are allowed to add, modify, copy or delete filters.

Filter conditions can be edited in the Settings → Filters menu by clicking on *Details* of a listed filter. Click on *Edit* on the filter details page to modify filter conditions.

If a filter should be deactivated or deleted, click on the *Details* button of the selected filter in the overview. In the options section you can *Deactivate* or *Delete this particular filter*.

AmmonitOR lists all matched entries data logger by data logger on the filter details page. It is shown on which day the filter condition triggered and how many entries are affected. By clicking on an entry the measurement data for this day is displayed. Suspicious data is marked yellow; errors are marked red (according to the entered filter condition).

10.5.7 Copy filter settings



Important

Only users with `Write` access permissions are allowed to copy filters to a project where they have as well `Write` permissions.

Already created Filters can be copied to another project, where the user has write access. Settings → Filters menu by clicking on *Copy* of a listed filter.

It is possible to copy single filter schemes or the whole section of an specific filter type e.g. Range Filters. It is also possible to copy a filter schema to multiple target projects, who can be `SHIFT` selected.

If a specific filter is copied the parameters, statistics and alert type will be transmitted to the target project. If the evaluation selection of the origin filter has certain evaluation types included, the evaluation type selection will also be applied in the new project.

In case of an Range Filter the parameters like Min and Max values as well as the statistics will be copied to the target project. If in this example only Wind Speed evaluations were selected, the newly created filter in the target project will also contain only Wind Speed evaluations.



Important

Be aware of adjusting subscribers, cause the subscriber list can't be copied. Check also the evaluations automatically selected by the copy-process, if they are the ones you want this filter to be applied.

Chapter 11

Ammonit Data Logger Meteo-40

11.1 Preparing Meteo-40 for AmmonitOR

AmmonitOR version 2.0 and higher is compatible with Meteo-40 data loggers. If you use a previous version on your server, perform an upgrade or contact Ammonit.

To display measurement data and/or communication behaviour of Meteo-40 data loggers in AmmonitOR, the data logger and AmmonitOR have to be configured.

If the data logger should be added to an existing AmmonitOR project, note down the *Project key* of the existing project. If the data logger should be included in a new project, set up a new project in AmmonitOR and note down the *Project key*. The *Project key* has to be entered in the Communication → AmmonitOR menu of the Meteo-40 web interface as shown in Figure 11.1. See also Meteo-40 manual, which can be downloaded from the [Ammonit website](https://www.ammonit.com) (<https://www.ammonit.com>).

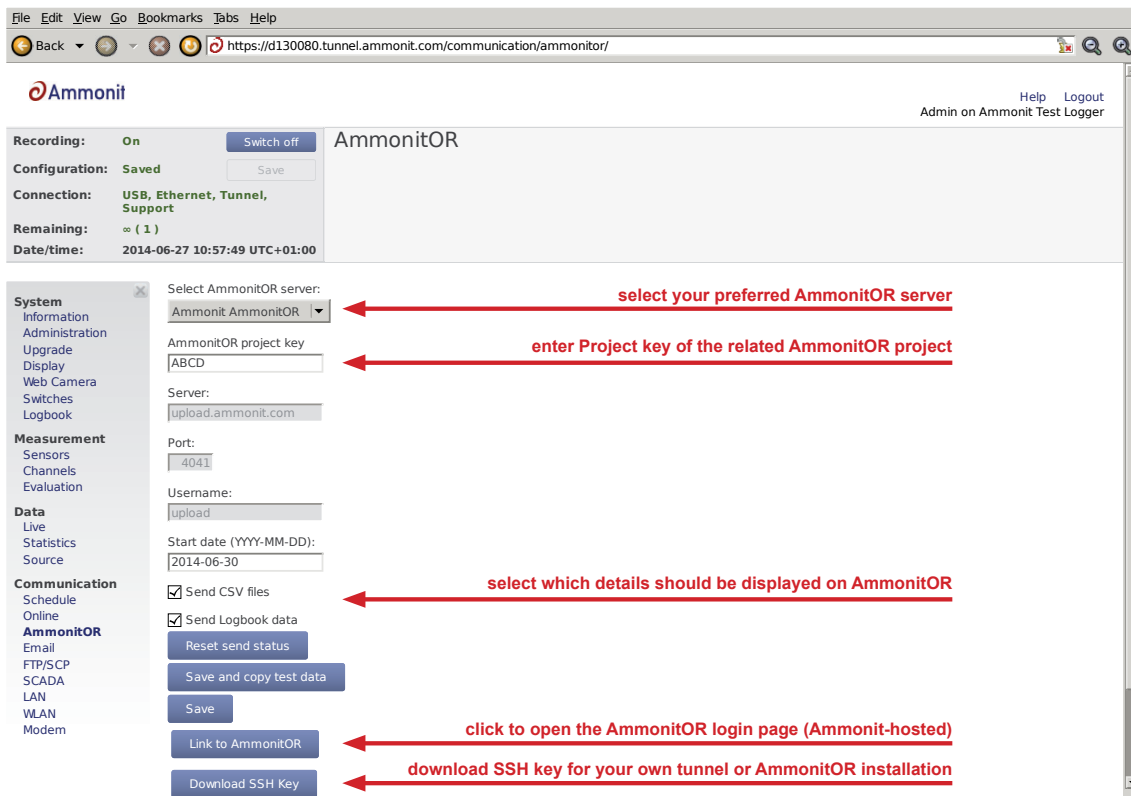


Figure 11.1: Configuring the Meteo-40 web interface

Select your preferred AmmonitOR server: Ammonit-hosted installation or your own AmmonitOR server.

If you use the Ammonit-hosted installation, server details are filled automatically. If you use your own installation, enter the necessary server details. Your local AmmonitOR server has to authenticate each data logger. To do so, see Section 15.3.1.

AmmonitOR project key Enter the *Project* key of your related AmmonitOR project. The *Project* key is displayed in the project overview of your AmmonitOR project. You can connect more than one data logger to an AmmonitOR project. To do so, use the *Project* key for all project-related data loggers.

Decide, which data should be monitored in AmmonitOR:

Both Measurement Data and Communication Behaviour (default) Select both checkboxes *Send CSV files* and *Send Logbook data* to monitor measurement data and communication behaviour of the data logger.

Only Measurement Data Select *Send CSV files* to monitor measurement data, resp. statistic data in AmmonitOR. According to the scheduled upload times, Meteo-40 sends CSV files to AmmonitOR. Deselect *Send Logbook data*.

Only Communication Data Select *Send Logbook data* to monitor the communication behaviour of the data logger. According to the scheduled upload times, Meteo-40 transfers connection details to AmmonitOR - no measurement data is uploaded, when only the checkbox *Send Logbook data* is ticked. *Send CSV files* has to be unticked. The communication behaviour can be monitored in the *Connection Log* (see Section 6.5).

Link to AmmonitOR Click on *Link to AmmonitOR* to enter the AmmonitOR login page or to set up a new AmmonitOR account.

Download SSH Key Applies only, when you use a local AmmonitOR installation (not the Ammonit-hosted installation). Your AmmonitOR server has to authenticate each Meteo-40 data logger. To do so, download the SSH key and see Section 15.3.1.

11.2 CSV Files

Meteo-40 stores measurement data in standard Comma-Separated Value (CSV) format with appended information in ini file format. The CSV file is documented in [RFC 4180](http://tools.ietf.org/html/rfc4180) (<http://tools.ietf.org/html/rfc4180>) and well explained, e.g., in [Wikipedia](http://en.wikipedia.org/wiki/Comma-separated_values) (http://en.wikipedia.org/wiki/Comma-separated_values). Ini files are described e.g. in [Wikipedia](http://en.wikipedia.org/wiki/INI_file) (http://en.wikipedia.org/wiki/INI_file) as well. CSV files can easily be read by many programs and software tools, as is the ini file format.



Note

In almost all cases, the CSV files created by Meteo-40 are compressed using [GNU gzip](http://www.gzip.org/) (<http://www.gzip.org/>) with the typical file extension .gz. gzip compressed files can be uncompressed on all operating systems, see [Wikipedia](http://en.wikipedia.org/wiki/Gzip) (<http://en.wikipedia.org/wiki/Gzip>) for further details.

11.3 Meteo-40 CSV File Format

The measurement data files of the Meteo-40 use the , (comma) as field separator, " (double quote) for embedding commas in textual strings and UTF-8 as character set.

The statistics files generated by Meteo-40 data loggers are structured in two parts, the data in standard CSV format and additional information in so-called ini file format. Both parts are separated by one empty line:

11.3.1 Data part (CSV format)

The CSV part starts with a header line. This line is a comma-separated list of the statistics for each active channel and evaluator. The first item of the list is the data/time entry; followed by the evaluator statistics which have the form

Sensor;Evaluation;Statistic (e.g., Anemometer;wind_speed;Avg or WindVane10bit;wind_direction;Count). Thereafter, the channel statistics are displayed in the form Channel;Statistic (e.g., A2;Avg or C1;StdDev).

The statistics can individually be selected per sensor in the Data → Statistics menu.

Currently, Meteo-40 offers the following statistics: Avg, Min, Max, StdDev, Count, Median, and Sum.

According to the configured statistics interval, Meteo-40 calculates the statistics. Each time period is represented in a line of the CSV file. The values are generally decimal numbers, using a point (.) as decimal mark.

Language settings of the data logger do not have an influence on the CSV file. In the first column of the CSV file the datetime for each statistic is given. Date and time are indicated with milliseconds in accordance to ISO-8601, e.g., 2012-05-31 15:50:00.500.

The date and time values are always the local time of the data logger. The timezone is stated in the second part of the file.

11.3.2 Information part (Ini file format)

The information part contains data logger information as well as sensor details like installation height, slope and offset values, as well as unit and sensor name.

The information part is included in every file. It can be found below the statistical data. The overall format of the configuration is the following:

```
[Section 1] key1=value key2=value [Section 2] key1=value
```

All section names, keys and values are case-sensitive and may contain unicode characters in UTF-8 encoding. While sections and values may contain spaces; keys do not. Each section is unique; each key is unique within its section. Neither the order of sections nor the order of entries within the sections are significant or guaranteed.

- [System]: Serial number and type of the data logger; the name which has been assigned by the user; timezone in the format UTC+xx:xx or UTC-xx:xx; as well as the version of the firmware of the data logger
- [Evaluation] indicates file_interval and stat_interval.
- [Adjustment]: CS1 and CS2 are the calibration values for the current source of Meteo-40. The values are for informational purpose only.
- [Counters]: The measurement_period for counter channels is indicated in seconds, in general 1s. For this time period the number of pulses is counted.
- [Master]: rate of RS485 is given in s, min or h; baudrate for RS485 without unit.
- [Sensor;Evaluator]
 - statistic: List of statistics which are calculated for the sensor, e.g., average, min, max.
 - unit: Unit for the data, e.g., m/s.
 - sensor_label: Name which has been entered by the user in the sensor configuration.
 - sensor_height: Installation height which has been entered by the user in the sensor configuration.
 - sensor_type: Indicates the type of the sensor, e.g., anemometer.
 - sensor_model: The model of the sensor, e.g., Thies First Class Advanced.
 - formula: The type of formula used to convert the electrical values, e.g., linear.
 - formula_params: Parameters which are referenced to in the formula, including related channels and evaluator parameters, e.g., A5 A6 var_offset var_slope. Values of the parameters are displayed in the lines below the formula parameters, e.g., var_offset, var_slope, var_period, var_sensitivity.
- [Channel]
 - statistic: List of statistics which are calculated for the channel/sensor. For each statistic a column is displayed in the upper part of the CSV file.
 - unit: Unit of the calculated data.
 - rate: Configured rate for the channel with unit (not applicable for Master channels).
 - range: Configured range for analog voltage channels (Ax) with unit.
 - protocol: Protocol which is used for digital channels (Dx).

Chapter 12

Ammonit Data Logger Meteo-32

12.1 Preparing Meteo-32 for AmmonitOR

If a Meteo-32 data logger should be part of an AmmonitOR project, the Meteo-32 data logger must have installed firmware version 1.9 or higher. Additionally the data logger has to be configured to send emails to aor@ammonit.com. To do so, start the CALLaLOG software and connect the data logger to your computer.



Note

CALLaLOG can be downloaded from the Ammonit website in the support section: www.ammonit.com (<https://www.ammonit.com>).

Open the GPRS menu and enter the GPRS settings. Figure 12.1 shows an example with settings. The email address (Copy to) is important. Emails have to be sent to aor@ammonit.com. The primary email address (Primary Recipient) can be used for any other address. Enter the same primary email address in the AmmonitOR import email address field in data logger settings for proper data file identification.

Testlogger Vertrieb: GSM Settings -> GPRS data service Configuration

Testlogger Vertrieb

GPRS Access Data

GPRS Provider Data

Access Point Name (APN) = (max. 24 characters)

User-ID = (max. 24 characters)

Password = (max. 24 characters)

SMTP Connection

SMTP-Server = (max. 24 characters)

User-ID = (max. 24 characters)

Password = (max. 24 characters)

E-mail account (Primary Recipient) = (max. 24 characters)

E-mail account (Copy to) = (max. 24 characters) **IMPORTANT for AmmonitOR**

Upload new configuration Close

Figure 12.1: GPRS settings

Fill all mandatory fields (serial number, data logger type, name and import email address) in the Ammonit software CALLaLOG to identify the data logger. On the basis of the data sent by Meteo-32, AmmonitOR archives measurement data.

12.2 ROW and ROWINFO files

ROW and ROWINFO files are sent by the Meteo-32 data logger as email attachments. ROW files include measurement data; ROWINFO files contain channel names, as well as slope and offset values.

Both files have the same base name. Date and time formats are similar to ISO-8601 YYYY_MM_DD_hhmm. ROW files have the extension .row; ROWINFO files have the extension .rowinfo.

12.3 Email Subject

The email subject consists of the data logger serial number and its id, e.g., Ammonit Data Logger C080765 (#21).

12.4 ROWINFO file format

The rowinfo file consists of two lines:

1. The first line is a space separated list of active channels (*three* letter codes). The order is relevant and has to be the order of the activated channels from the .row file.
2. The second line indicates slope and offset values for active channels as space separated list of statements. Every statement consists of *two* letter code of the channel and the postfix `_slope` or `_offset`, an equal sign, and the four digit value. The order is not relevant.

12.4.1 Example

2010_01_21_0000.rowinfo

1st line:

```
s1a s1x s1s s2a s2x s2s s3a s3x s3s d1a d1s d2a d2s h1a t1a b1a r1a s4a  
s4x s4s vxa vxi
```

2nd line:

```
s1_slope=0477 s1_offset=0025 s2_slope=0480 s2_offset=0024 s3_slope=0483  
s3_offset=0024 d1_offset=0178 d2_offset=0176 h1_slope=0100 t1_slope=0100 ↔  
t1_offset=0030  
b1_slope=0060 b1_offset=0800 r1_slope=0000 s4_slope=0483 s4_offset=0025
```

(line breaks here for readability only)

12.5 Explanations

1. If more than one field in the first line refer to the same physical channel, such as s1a and s1x, the slope and offsets are still transmitted only once in the second line.
2. If a channel does not have slope or offset, the respective values are not transmitted.
3. The order in the first line is important, in the second line it is not.

12.6 Row file format

The first line is the header. The other lines are the data, e.g. for 10 minutes values of one day, 144 lines.

The header structure is:

1. starts always with a T
2. date and time in the format MM/DD/YY hh:mm:ss
3. measurement and aggregation frequencies
4. version string
5. serial number of the data logger, e.g., C010203

12.6.1 Example

2010_01_21_0000.row

```
T 01/21/10 00:00:00 1*600 V5.0 C08076543 78 84 2 77 84 2 67 73 3 283 1
    272 2 65 2898 1015 28 47 51 2 119 119 82 84 2 77 80 2 66 75 3 286 1 283 2 62 ↵
    2860 983 28
    43 57 3 130 129 74 83 3 77 79 3 65 70 1 273 3 285 1 64 2830 1001 26 45 48 2 ↵
    123 119 68 79
    2 71 82 2 60 74 3 289 2 275 2 68 2909 982 27 43 48 2 126 126 ...
```

Here the measurement frequency is 1 second, the store frequency is 600 times the measurement frequency, i.e. 10 minutes. For one complete day, there should be one data line per 10 minutes, i.e. 144 data lines.

Chapter 13

Security

In order to monitor your measurement campaigns, measurement data is securely transmitted to AmmonitOR and can be accessed via encrypted HTTPS connection. To protect data from unauthorized access, AmmonitOR encrypts all communications using the industry standard Open SSH protocol (for further details refer to [Wikipedia](http://en.wikipedia.org/wiki/OpenSSH) (<http://en.wikipedia.org/wiki/OpenSSH>)). All browser sessions are encrypted using the SSL (Secure Sockets Layer) protocol. For more information refer to [Wikipedia](http://en.wikipedia.org/wiki/Secure_Socket_Layer) (http://en.wikipedia.org/wiki/Secure_Socket_Layer).

Export data files can be encrypted using [GnuPG](http://gnupg.org/) (<http://gnupg.org/>). GnuPG is a free cryptographic software, which uses public-key cryptography. To encrypt files and messages, GnuPG uses asymmetric keypairs (public and private key), which are individually created by GnuPG users. Refer to [Wikipedia](http://en.wikipedia.org/wiki/GNU_Privacy_Guard) (http://en.wikipedia.org/wiki/GNU_Privacy_Guard) for further details.

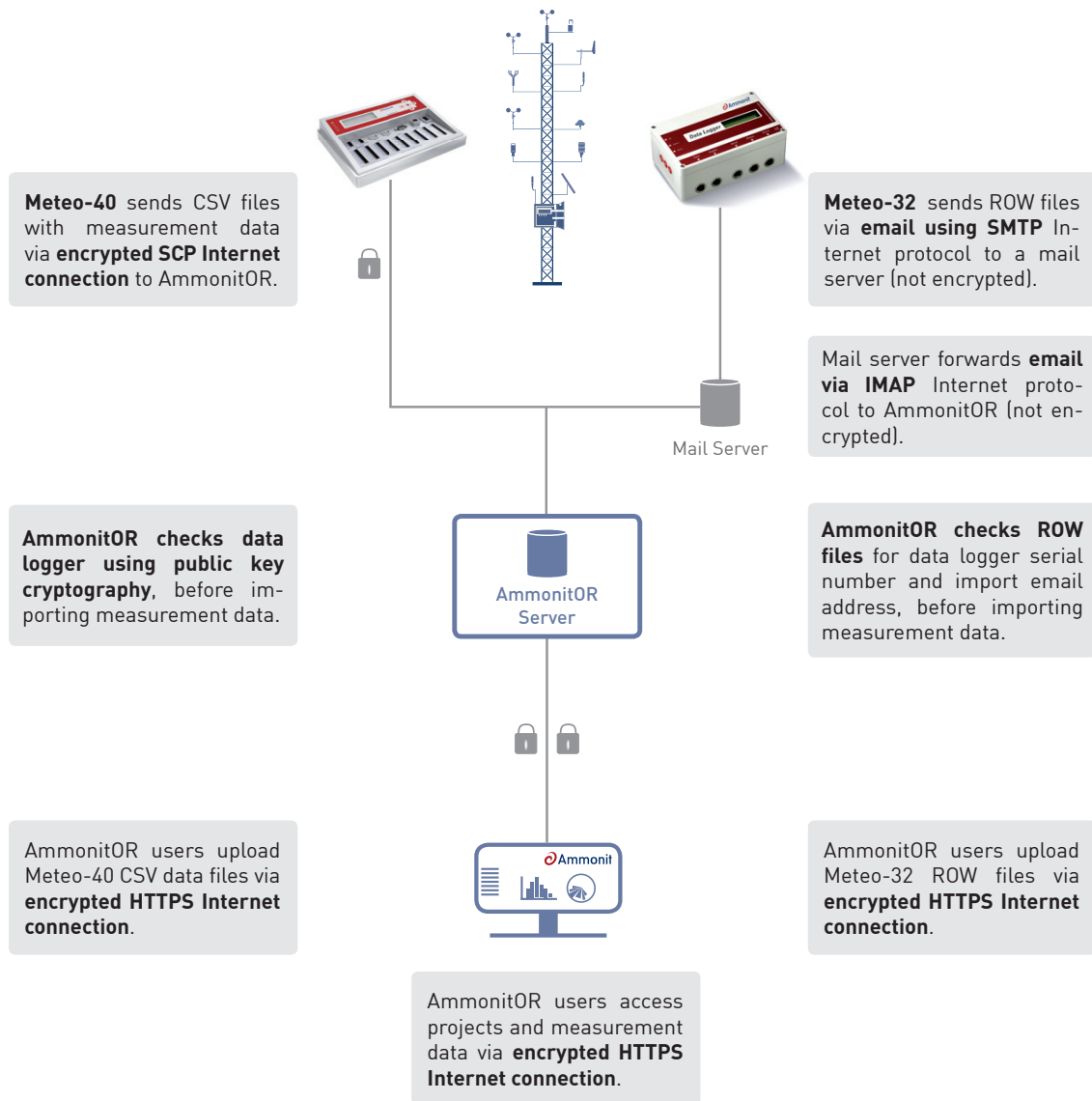


Figure 13.1: Interaction between AmmonitOR and data logger

13.1 Accessing AmmonitOR

Users access AmmonitOR via an encrypted HTTPS internet connection (<https://or.ammonit.com>).

13.2 User management

To view and edit projects in AmmonitOR, users have to be registered. According to the integrated user rights management, AmmonitOR offers several user roles with different permissions. Users can only access projects to which they have been invited to. Refer to Chapter 5 for further details.

User rights are project-related, i.e. that users can have different permission in different projects.

Only users with assigned permissions are allowed to modify project and data logger settings as well as to invite new project users and assign user rights.

13.3 Data transfer between data logger and AmmonitOR

13.3.1 Data transfer between Meteo-40 and AmmonitOR

Meteo-40 uploads CSV files via SCP internet connection to AmmonitOR. The connection is encrypted. Before the data is imported, AmmonitOR checks the data logger using public-key cryptography.

Using the Project key, the measurement data is imported to the corresponding project in AmmonitOR.

13.3.2 Data transfer between Meteo-32 and AmmonitOR

The ROW files of Meteo-32 are send via email using SMTP internet protocol to a mail server. The mail server forwards the email using IMAP internet protocol to AmmonitOR. The connection between data logger and AmmonitOR is not encrypted. Before the measurement data is imported, AmmonitOR checks ROW files for serial number and import email address of the data logger.

13.4 Manual upload of data files to AmmonitOR

If you prefer to upload data files manually to your AmmonitOR account, the files are transferred via a secure HTTPS connection. The connection to or.ammonit.com (<https://or.ammonit.com>) is encrypted using high-grade encryption, AES 256 CBC, with SHA1 for message authentication and DHE_RSA as key exchange mechanism. The certificate is verified by Thawte, Inc. The encryption permits unauthorized people from viewing any transmitted information.

For further details about the certificate refer to the information displayed in your browser.


13.5 Encrypted data export

Data export files can be encrypted using [GnuPG](http://gnupg.org/) (<http://gnupg.org/>). Refer to Section 9.4.2 for further details.

Chapter 14

Frequently Asked Questions

14.1 Account settings

Question	Answer
What do I need to work with AmmonitOR?	<p>You need an account to access the online platform. Enter the URL or.ammonit.com (https://or.ammonit.com) in your browser software and login with your account details.</p> <hr/> <div>  <p>Tip In order to become familiar with AmmonitOR, open one of the example projects.</p> </div> <hr/>
How can I register for AmmonitOR?	Click on <i>Sign up</i> on the login page of AmmonitOR and enter your email address. You will receive an activation link by email. Follow the link and enter your details in the form, e.g., name, company, password to set up your account.
I need access to one of our projects. How do I do this?	Ask a colleague who has read and write permission for this project to send you an invitation to this particular project. If you already have an AmmonitOR account, you can access the project immediately. If you do not have an AmmonitOR account, the invitation includes instructions how an account can be set up.
If I invite a user to my project, does he/she have access to all of my projects?	In AmmonitOR user rights are project-related. Thus users only have access to projects which they have created or to which they have been invited to.
Is it possible to have an own installation of AmmonitOR on our server?	Yes, you can have a separate installation on your server - independent from the Ammonit server. Please contact us for an offer.

14.2 Data import

Question	Answer
How can I import data to my AmmonitOR account?	Depending on the data logger you use, there are different ways to import data to your AmmonitOR account. <ul style="list-style-type: none"> • Automatic data upload via SCP connection with Meteo-40 (refer to Section 10.1.3.1) • Manual import of CSV files from Meteo-40 (refer to Section 10.1.3.2) • Emailing data files from Meteo-32 (Section 10.1.3.3) • Manual import of data files from Meteo-32 (Section 10.1.3.4)
What is an import email address?	The import email address is the address configured in the Meteo-32 data logger to send the emails to. This address and the serial number of the Meteo-32 data logger is used to sort the data into your projects.
From which data loggers can I import data files?	AmmonitOR supports Meteo-40 and Meteo-32 data loggers. If you use a separate AmmonitOR installation, you require version 2.0 or higher to be able to include Meteo-40 data loggers. Meteo-32 data loggers require firmware 1.9 or higher to be compatible with AmmonitOR. The firmware can be downloaded from the Ammonit Website (http://www.ammonit.com).
Can I upload data to AmmonitOR which has previously been downloaded from a Meteo32 data logger?	Yes, you can manually upload ROW files generated by Meteo-32 data loggers via web interface to AmmonitOR. Keep in mind that the import of Meteo-32 data files is a premium feature. If you have no premium features enabled, the data files will be saved on server and imported as soon as premium subscription for the related data logger is enabled.
How can I send data to AmmonitOR which has previously been downloaded from a Meteo-32 data logger?	You can easily upload data files from your Meteo-32 data logger via web interface to AmmonitOR.

14.3 Data evaluation and monitoring

Question	Answer
Do I have to set slope and offset parameters in AmmonitOR?	No, the parameters are configured in the data logger. Use the sensor helper in the Meteo-40 web interface; CallALog software for Meteo-32. The data files sent or uploaded to AmmonitOR include configured slope and offset values for all sensors. For further details about CSV files generated by Meteo-40 data loggers see Section 11.3; details about ROW and ROWINFO files created by Meteo-32 data loggers can be found in Section 12.2.
Can I modify slope and offset parameters in AmmonitOR?	Yes, you can modify the parameters for each sensor for a determined period. Refer to Section 10.2.5.4 for further details.

14.4 Data loggers and projects

Question	Answer
Can I monitor the online periods of my Meteo-40 data logger?	Yes, AmmonitOR is designed to display the data logger connections - only applicable for Meteo-40 data loggers. In order to monitor the online periods of a data logger, it is not necessary to upload measurement data to AmmonitOR. Both features can be configured independently. For further details refer to Section 6.5.
Is it possible to add further data loggers including old data to an existing project?	Yes, you can easily add new Ammonit data loggers. The data files can be uploaded via the Archiving → Import data menu. Refer to Section 9.3 for further details.

14.5 Data export

Question	Answer
I have activated <i>Sign and encrypt data</i> for my data exports. I receive files with .gpg. How can I open these files?	In order to decrypt encoded data files sent by AmmonitOR, you have to install encryption software on your PC. Refer to Section 9.4.2, if you are working with Windows™. Follow the description step by step to avoid any misunderstandings.
I have imported the public-key as described in the manual, but I still cannot open the file, sent by AmmonitOR.	<p>Check the following:</p> <ul style="list-style-type: none">• Did you certify the public key from AmmonitOR with your own private key? Both public and private key should be displayed under <i>Trusted certificates</i> in the GPG4win software (Kleopatra).• If you decrypt the file in Microsoft Outlook™, open the email item, click on the attached file and open the <i>Attachments</i> ribbon. Click on <i>Save and decrypt</i>. Clicking on <i>Decrypt</i> in the <i>GpgOL</i> ribbon does not work, as the email itself is not encrypted, only the data file. Both has to be considered separately.

Chapter 15

Administration

This chapter applies only, if you are the administrator of your own AmmonitOR instance.

15.1 Installation Requirements

If you wish to install AmmonitOR on your server, please contact Ammonit and consider the following aspects.

15.1.1 Hardware Requirements

Consider the following hardware requirements for your AmmonitOR installation. Better hardware means more performance while using AmmonitOR. Recommendations are:

- A server known to work with Debian Linux (e.g. Ubuntu servers also work with Debian)
- Quad core CPU ≥ 2.5 GHz
- Compatible with the amd64 architecture, i.e. Intel or AMD
- ≥ 16 GiB RAM
- ≥ 500 GiB hard disk space

15.1.2 Requirements for the server administrator

For the administration of an AmmonitOR server, you need to be familiar with the following tasks:

- Debian-Linux server administration
- SSH (including key based authentication)
- starting/stopping services using systemd
- Nginx, Gunicorn, PostgreSQL, and RabbitMQ configuration and administration

15.1.3 Server Installation

For remote installation of AmmonitOR by Ammonit, you have to provide:

- Operating system: Linux, esp. Debian 11 („Bullseye“)
You can download Debian at <https://www.debian.org/releases/bullseye/debian-installer/>. The installation guide can be found on <http://www.debian.org/releases/stable/installmanual> (several languages available).
- Server must have a public (remote accessible) IP address. A router in between does not cause any problem; the router has to be configured for port forwarding.

- Server must be accessible over SSH (secure shell). SSH server (package: openssh-server) must be installed on the Linux server.
- We need either a root account or a user account with full sudo permissions. Use strong passwords, e.g., generated by AGP. For even higher security use login over SSH authorized keys.
- If the server is only accessible via VPN, it must support Linux client (e.g. OpenVPN). Any proprietary firewall software can lead to problems and may not be supported by Ammonit.
- Port 443 (or another port of your choice) must be accessible for installation and usage. Optionally also port 80, in addition to port 443.
- Port 2222 (or another port of your choice) must be accessible for continued server maintenance. The port will be used for remote access via SSH. Port 22 is not advised for security reasons or if a custom tunnel server is configured.
- Port 4041 has to be accessible from everywhere. The port is used by Meteo-40 data loggers to upload data to AmmonitOR.
- Ports 22 and 4040 must be accessible from everywhere. These ports are used by Meteo-40 data loggers to setup tunnel connections (only needed, if a custom tunnel server is configured).
- An email account (IMAP) to collect the data files from Ammonit data loggers. AmmonitOR requires the account's password. The account must have enough memory space to archive the emails.
- An email account (SMTP) to send reports, messages, etc. from AmmonitOR.
- Email address of your system administrator.

15.1.4 AmmonitOR Architecture

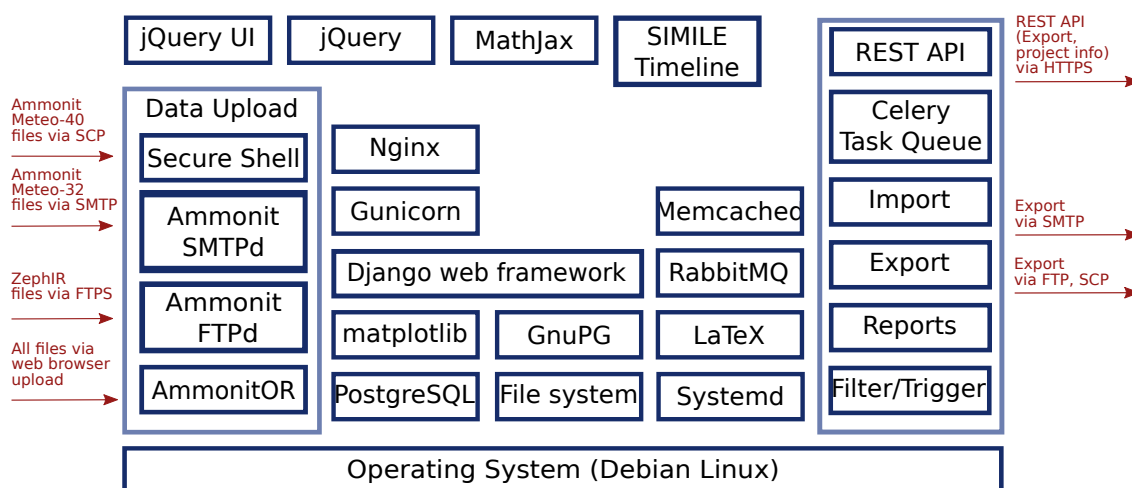


Figure 15.1: AmmonitOR Architecture

15.2 Administration Interface

For maintenance purposes access the administration interface of AmmonitOR. The administration interface is only needed in rare cases. Most configurations can be made in the user interface.



Important

Each change made in the administration menu is final. There are no confirmation prompts! Make only changes, which are absolutely necessary to reduce mistakes.

To access the administration interface, replace the `Project` key in URL with `admin` (see URL in Figure 15.2). Login is only possible with admin rights. The most important elements of the administration interface are:

- User administration -- *Site users*

- Projects administration -- *Projects*
- Data Logger administration -- *Loggers*

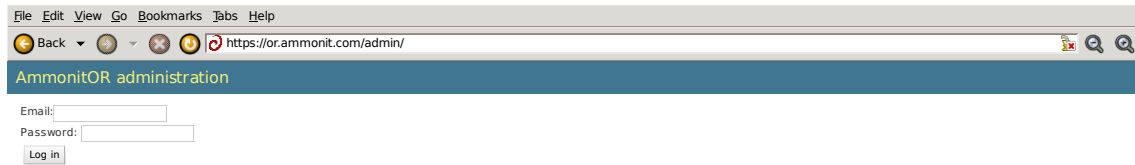


Figure 15.2: Administration Log In page

All administration pages support searching and filtering. The search field is always on the top left. The filtering options are provided on the right side of the list.

In order to edit project settings, the *Action* dropdown menu or the *Add* button can be used. The *Action* dropdown menu is always above the list under the search field. The *Add* button is on the top right. Each list element is editable, e.g., in the project administration. To do so, click on the item, e.g., project name, to display all details and start editing. All displayed fields can be modified. Save the changes by clicking on *Save*.

The history of changes can be displayed by clicking on the button on the top right. To display the project, click on the link button.

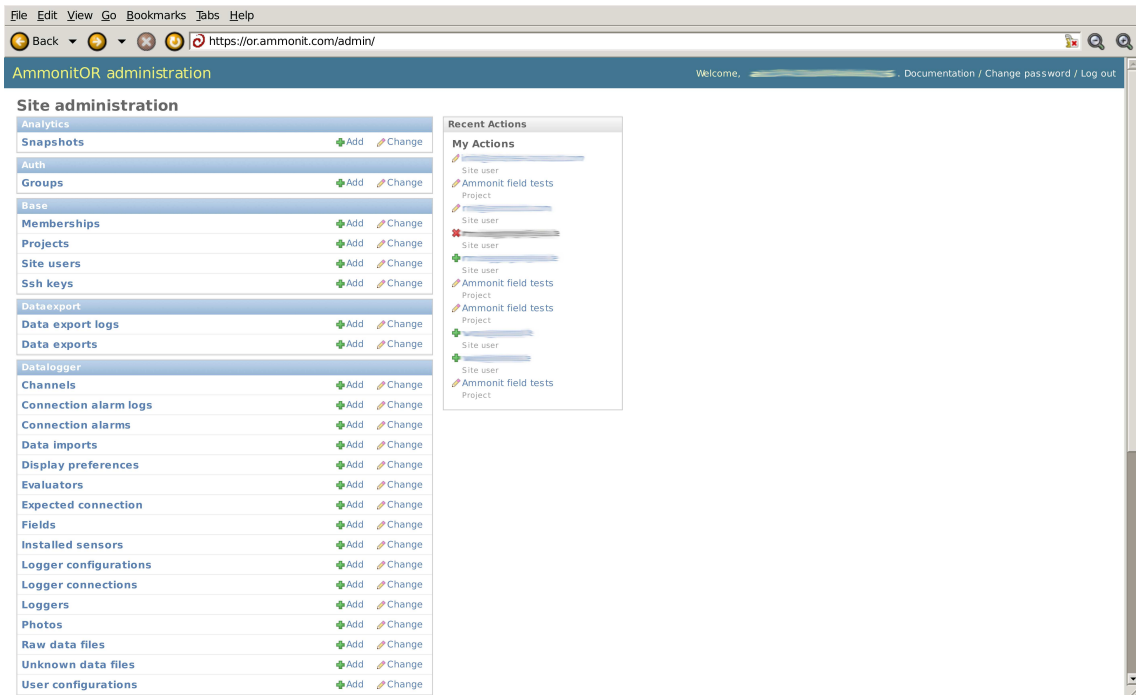


Figure 15.3: Administration home view

15.2.1 User administration

In the user administration *site users* and access rights can be managed. AmmonitOR displays to which projects the user has been invited to and the permissions related to the project. Usernames and passwords can be changed. New users can be added by clicking on *add user* on the top right. Optionally, full name, company and telephone number can be entered.

Users can be selected via the search box on the *site users* page. To perform an action, select an users by activating the checkbox in the first column and choose the action from the dropdown list above the user list. Click on *Go* to perform the selected action.

In the edit mode of a project five attribute fields are available: username, password, personal info, permissions, important dates and project memberships. Additional project memberships per user can be added; three permission types can be selected.

Superuser Administrator of AmmonitOR; system / server and content management (only for experienced users)

Staff status Users working with project data in AmmonitOR (recommended status for site users); not allowed to access the administration interface, only login page.

Alpha tester / beta tester Optional user permissions. Beta tester can work with new beta features of AmmonitOR. Alpha testers are for internal testing purposes used by Ammonit developers. It is not recommended setting this status to project users.



Important

By deselecting the *active* checkbox on the site user edit page, the selected user can be temporarily locked out from AmmonitOR. This feature can be useful in case of spam attacks.

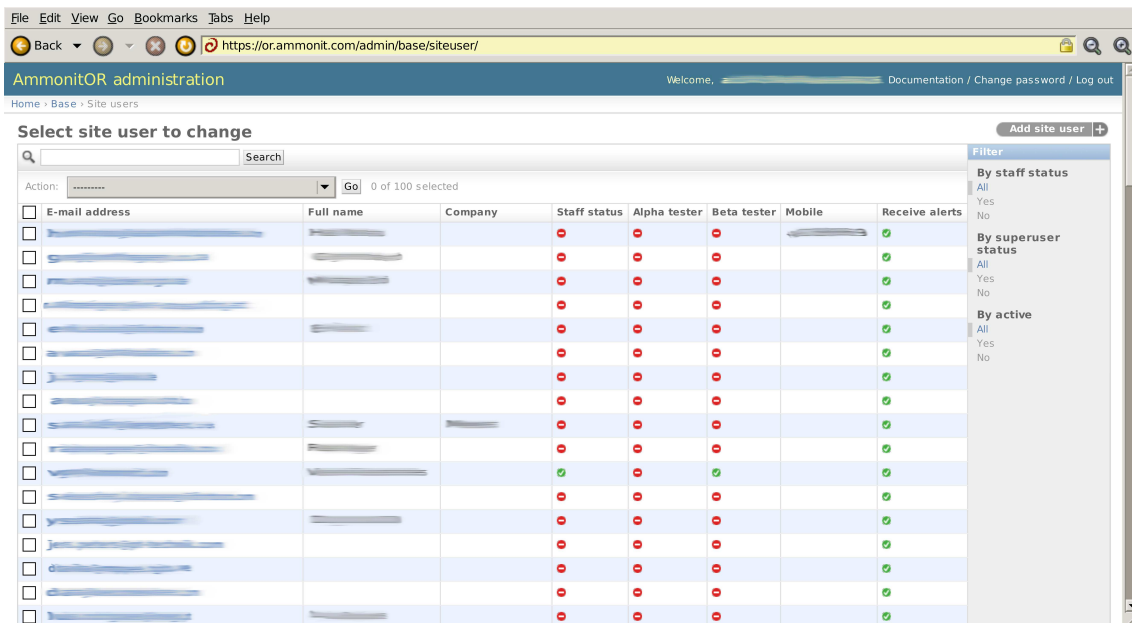


Figure 15.4: Site user administration page

15.2.2 Projects administration

The project administration page provides an overview over all relevant project details: project name, project key, data loggers, project users (members) and available reports.

In order to perform an action, e.g., delete a project or regenerate reports, select one or more projects by activating the checkbox(es) in the first column and choose an action from the dropdown list above. Click on Go to perform the action.

Click on *Add project* on the top right of the page to set up further projects. The project edit page displays all project details including user memberships. Superusers (see Section 15.2.1) can assign read and write permission to site users. Additionally, users can be added to projects. The *Project state* indicates whether a project is active or finished.

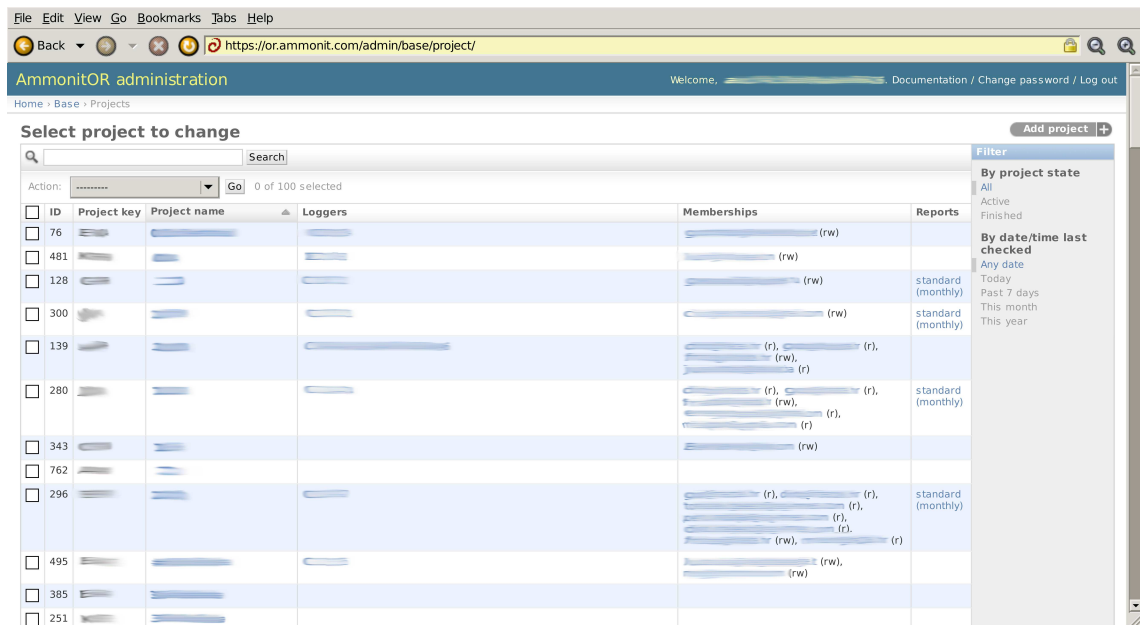


Figure 15.5: Projects administration page

15.2.3 Data logger administration

The data logger administration page lists all available data loggers with serial number, data logger type, name, import email address, firmware version and related projects.

To perform an action, e.g., delete a data logger or reimport missing data files, select one or more data loggers by activating the checkbox(es) in the first column and choose an action from the dropdown list above. Click on Go to perform the action.

Click on a data logger serial number to edit data logger details. On the data logger edit page AmmonitOR displays all settings of the data logger, e.g., related projects, serial number, name, import email address (Meteo-32), data logger type and firmware version.



Important

Ignore database table names and database model names. Do not edit the fields!

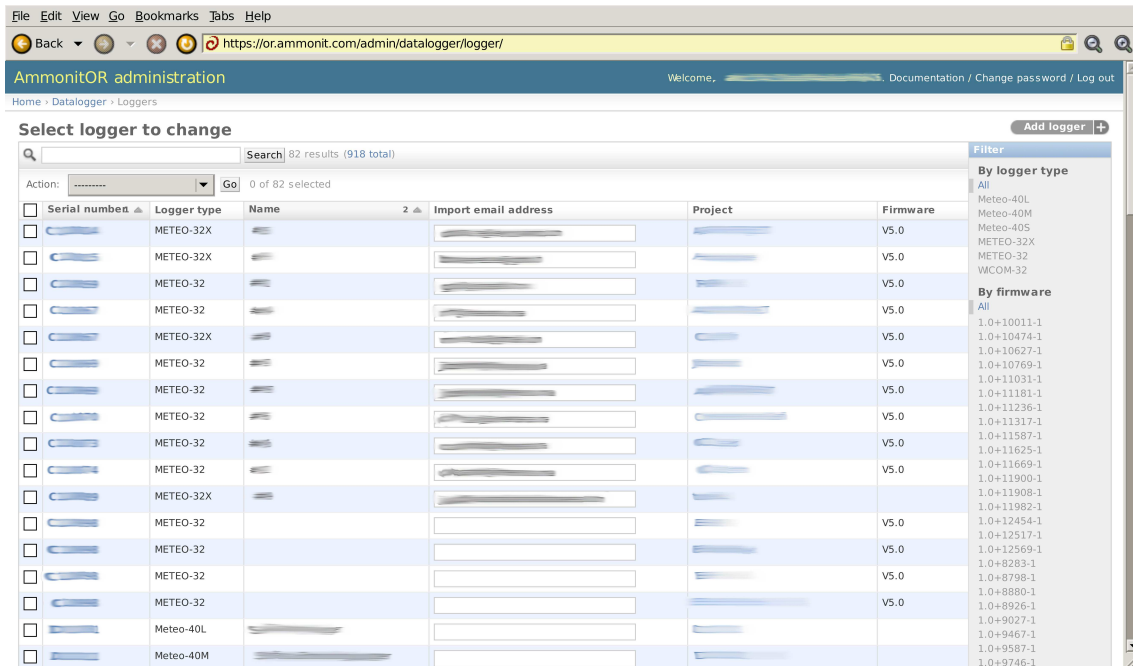


Figure 15.6: Data logger administration page

15.3 Common Tasks

15.3.1 Adding Meteo-40 SSH Keys

To allow Meteo-40 data loggers sending e-mails to AmmonitOR, the SSH key of the data logger has to be added in AmmonitOR. The SSH key can be downloaded in the Communication → AmmonitOR or the Communication → Online menu of the data logger web interface. Add the SSH key in the Base → SSH keys menu of AmmonitOR. Click on *Add ssh key* on the top right of the page.

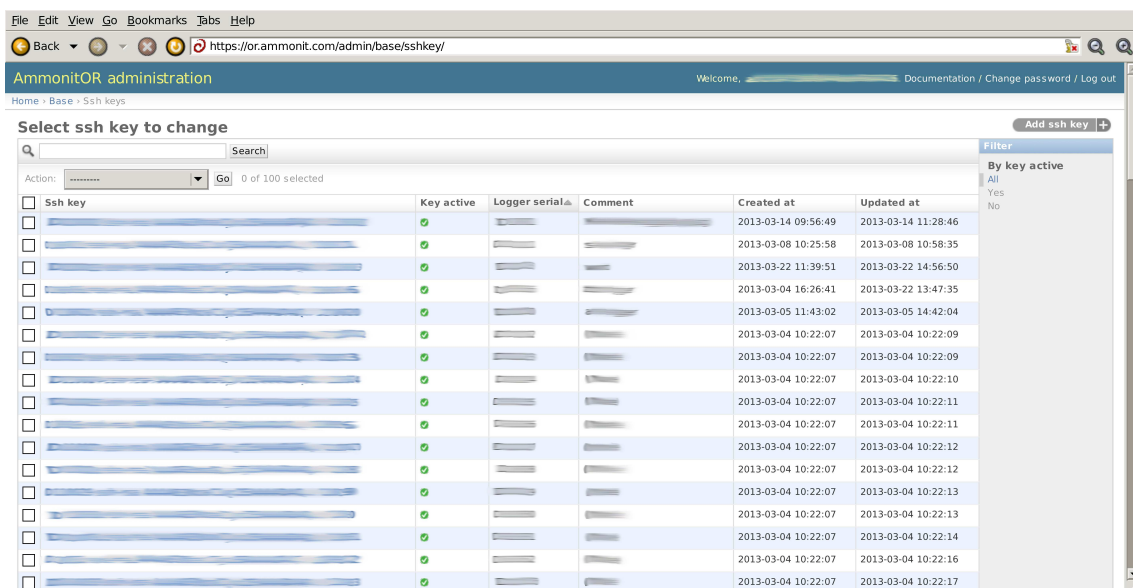


Figure 15.7: SSH key administration page

Copy and past the key into the **Public key** field. Insert the data logger serial number and save the action. This task has to be done once for each data logger.

The screenshot shows the 'Add ssh key' form in the AmmonitOR administration interface. The form has a header bar with 'AmmonitOR administration' and navigation links. Below the header, there's a breadcrumb trail: 'Home > Base > Ssh keys > Add ssh key'. The main form area contains a 'Key active' checkbox, a 'Public key' text area, a 'Logger serial' input field, and a 'Comment' input field. At the bottom right, there are three buttons: 'Save and add another', 'Save and continue editing', and 'Save'.

Figure 15.8: Add SSH key for a data logger

15.3.2 Managing raw data files

The raw data file overview page displays a list of raw data files of all available data loggers. AmmonitOR lists all files imported or not yet imported.

Not yet imported raw data files can be imported by choosing the **Reimport data** option from the dropdown list above. Click on **Go** to perform the action. The reimport may take few seconds.

It is not possible to make any changes on the data file edit page. However, the page displays further details about the file, e.g., import method, which is called *Email Message-ID* or *username*. AmmonitOR displays, which method has been used to import the raw data file, i.e. SCP (Meteo-40), email (Meteo-32) or manual upload. The related configuration file numbers are listed under **Config**. In the **File** field the file name in the database is displayed.

The screenshot shows the 'Raw data file' page in the AmmonitOR administration interface. The page has a header bar with 'AmmonitOR administration' and navigation links. Below the header, there's a breadcrumb trail: 'Home > Datalogger > Raw data files'. The main content area is titled 'Select raw data file to change' and contains a table of raw data files. The table has columns: Action, Raw data file, Logger, Project, Config, File format, Imported, Date/time uploaded, Number of entries, Expected number of entries, and Is active. A filter sidebar on the right allows filtering by 'By is active', 'By imported', 'By file format', and 'By logger type'.

Action	Raw data file	Logger	Project	Config	File format	Imported	Date/time uploaded	Number of entries	Expected number of entries	Is active
<input type="checkbox"/>	D110057_20120807_1418.csv	D110057	My First Project	419762	CSV	✓	2013-04-23 07:23:22	0	144	✓
<input type="checkbox"/>	D110057_20120807_1533.csv	D110057	My First Project	d3eb89	CSV	✓	2013-04-22 14:49:55	0	144	✓
<input type="checkbox"/>	D110057_20120720_1423.csv	D110057	My First Project	7f05f8	CSV	✓	2013-04-22 14:43:04	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	Row file	✓	[blurred]	0	144	✓
<input type="checkbox"/>	[blurred]	[blurred]	[blurred]	[blurred]	CSV	✓	[blurred]	0	144	✓

Figure 15.9: Raw data file page

15.4 Connecting custom data loggers with custom AmmonitOR

The following information is required for setting up a proper connection between custom AmmonitOR installation and Ammonit data loggers:

- Properly working custom AmmonitOR instance (<https://or.yourdomain.com/>)
- Properly working email import for METEO-32 data loggers
- Properly working tunnel access for Meteo-40 data loggers
- Administration rights on AmmonitOR and data logger
- Optional: Properly working custom tunnel server (Tunnel statistics at <https://stats.tunnel.yourdomain.com/>)

Ammonit Meteo-40 data loggers send data via SCP to the AmmonitOR server. Thus AmmonitOR must authenticate the data logger with its SSH key. The connection is established via a tunnel server. AmmonitOR Project key and serial number of the data logger are the references for managing data in the AmmonitOR database. To connect Meteo-40 data loggers with your AmmonitOR installation, some settings have to be made:

- Open the Meteo-40 web interface. Log in as Admin.
- Go to the Communication → Online menu and set the option *Ammonit tunnel*. Save the configuration.
- Go to the Communication → AmmonitOR menu and enter the project key from of related AmmonitOR project. Save the configuration.

If a custom tunnel server is used, further settings have to be made:

- Open the Meteo-40 web interface. Log in as Admin
- Go to the Communication → Online menu and set the option *Custom tunnel*.
- Enter your tunnel login, e.g., `logger@Dnnnnnn.tunnel.yourdomain.com`
- Empty the field *Tunnel port*, if an entry has been made. Save the configuration.
- Click on *Download SSH Key*. A new page opens and displays the SSH key of the data logger. AmmonitOR required this key for authentication. The SSH key has to be added in AmmonitOR under <https://or.yourdomain.com/admin/base/sshkey/>; see below.
- Go to the Communication → AmmonitOR menu and enter the project key from of data logger related AmmonitOR project. Save the configuration.

The next step is to connect AmmonitOR with the data logger:

- Open the AmmonitOR administration page (<https://or.yourdomain.com/admin/>). Log in as Admin.
- If the data loggers has already been added to a project, perform the following actions (Go to the next bullet point to add a data logger to a project):
 - Go to the Base → Ssh keys menu and click on Add ssh key in the upper right corner.
 - Paste the copied SSH key from the data logger in the field *Public key*. Enter the serial number of the data logger in the field *Logger serial*. A comment can be added.
 - Click on Save in the lower right corner.
- If a data logger has to be added to a project, perform the following actions:
 - Go to your AmmonitOR login page (<https://or.yourdomain.com/>); not the administration page. Log in as User, Configurator or Admin (read and write access is required).
 - Add the data logger as described in Section 10.1.1 and Section 10.1.3.
 - Add the data logger SSH key as described in Section 15.3.1.
 -

If a data logger is online available, it is shown in the Connection log (see also Section 6.5) or see additional tunnel tool <https://stats.tunnel.yourdomain.com/>. The Stats-page lists all tunnel statistics.

15.5 API for 3rd party applications

API (application program interface) allows creating a connection between the third party applications and AmmonitOR to exchange data. The third party application can download the raw data files with metadata (additional information) from AmmonitOR projects. The exchange of information is safe and protected with tokens authentication method. The detailed information about its functionality and security is described.

This chapter contains the exemplary requests to demonstrate the functionality of API connection using `curl`- a library for transferring the data. This library is available for a big variety of platforms (including Windows, Linux and OS X). Using this library and given commands the functionality of API can be demonstrated.

15.5.1 General concept

The general concept behind the connection of third party applications is usage of http GET request to connect to particular AmmonitOR addresses (urls) to get data and information. The data is returned as response in JSON format, which can be read by the application. It is similar to requesting the standard url, but done internally between AmmonitOR and application.

- At first the application needs to obtain the token for authentication with a http POST request to AmmonitOR. This request needs to be supplied with:

- A valid AmmonitOR username (as username)
- A project key (as project_key)
- The application name (as app_id) in the data section of request. You can pick any name you want, it is only to graphically distinguish the applications using the API in AmmonitOR later on. Please keep the names of your application/script unique, otherwise you won't know which application you granted the permission to access the data!

```
curl -X POST -d "username=user@example.com&project_key=EWNP&app_id=ExampleApp" https://or.ammonit.com/api/requested_url/
```

Such information allows AmmonitOR to recognize the application details. AmmonitOR will then check if user has a permission to given project (as well as the download permission) and generate a unique token which will be returned as response to the request (in JSON format). Using this token for authentication for further connections with AmmonitOR. You can only receive this token once during your initial request, so please write it down or make your app save it. If you forget it, you will have to define new application and request a new token.

- In the same time AmmonitOR will create an application enquiry in a project. Every new enquiry will display a information message box in the project views. It can also be accessed via project page under 3rd party applications. Any user in a project having both read and download permissions, can then accept the application enquiry or reject it. Only accepted applications can connect to AmmonitOR to get data. The information about the user who accepted/restricted the application along with the time of this operation is recorded.

API permissions of 3rd party applications

Access?	Application	Requested at	Access granted by	Access since	Access restricted by	Restricted since	
yes	WindProfessionalApp	2016-09-07 12:37	superuser@example.com	2016-09-07 12:38			Allow access Restrict access Delete
no	ExampleApp	2016-09-07 12:36			superuser@example.com	2016-09-07 12:36	Allow access Restrict access Delete

Figure 15.10: User interface to interact with the applications management.

- If user who requested the third party application connection loses the project permissions, the token is withdrawn and the application loses the connection. Similarly when the application gets restricted or deleted in the view by any user, the connection is lost.
- After gaining access, the third party application can request the further urls and data, while making the next http GET requests. This time the token received by the first connection needs to be passed in the request authorization header (just like in the example below). AmmonitOR only accepts the requests with a proper token and after confirming all user permissions.

```
curl -X GET https://or.ammonit.com/api/requested_url/ -H 'Authorization: Token 0eb9392d6b5fe83c3'
```

15.5.2 Available responses

AmmonitOR offers a range of responses for third party applications. The user input parameters to the url are:

- *project_key* e.g. EWNP
- *device_serial* e.g. D110057
- *filename.fileformat* with the name just as *original_filename* parameter. E.g. D110057_20160808_0000.csv
- *export_id* being the ID number of the selected export E.g. 4189
- *date_from* and *date_to* for selecting the period for exports and connection boundaries in format YYYY-MM-DDTHH:MM:SS E.g. 2017-01-01T00:00:00

- *date* for selecting the day for which the daily completeness value will be shown, in format YYYY-MM-DDTHH:MM:SS
E.g. 2017-01-01T00:00:00

List of available requests/responses:

- **Connect application with AmmonitOR and obtain authentication token**

```
https://or.ammonit.com/api/auth-token/
{"token": "0eb9392d6b5fe83c35e2a25d7b6c0c1b61f0519f"}
```

- **List of devices in project with their basic metadata**

```
https://or.ammonit.com/api/{project_key}/loggers-list/
[{"project": {"key": "EWNP", "name": "Example project"}, "serial": "D110057", "override_name": "abcdefgh", "series": "meteo-32", "station_number": "1", "override_timezone": "", "override_latitude": 52.5025, "override_longitude": 13.434849, "override_altitude": 40, "is_active": true}, {"project": {"key": "EWNP", "name": "Example project"}, "serial": "C000001", "override_name": "My data logger", "series": "meteo-32", "station_number": "2", "override_timezone": "", "override_latitude": 52.5025, "override_longitude": 13.434849, "override_altitude": 30, "is_active": true}]
```

- **Basic information about particular device in project**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/
{"project": {"key": "EWNP", "name": "1"}, "serial": "D110057", "override_name": "abcdefgh", "series": "meteo-32", "station_number": "1", "override_timezone": "", "override_latitude": 52.5025, "override_longitude": 13.434849, "override_altitude": 40, "is_active": true}
```

- **List of all the devices files in AmmonitOR**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/files/
[{"original_filename": "D110057_20160808_0000.csv", "is_valid": true}, {"original_filename": "D110057_20160809_0000.csv", "is_valid": true}]
```

- **Download of the file content (one file per request only).**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/files/{filename.fileformat}/
{"original_filename": "D110057_20160808_0000.csv", "is_valid": true, "file_content": "Date/time,V1;w V1;wind_speed;StdDev,V1;wind_speed;Count\n 2016-08-08 00:00:00,1,2,3,4,5..."}
```

- **List of all the exports with their basic metadata.**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/export-list/
[{"export_format": "csv", "export_period": "all", "id": 75, "name": "Test Export 1", "recipients": "friend@example.com", "subscribers": [{"company": "Ammonit", "email": "co-worker@example.com", "name": "Co-Worker"}, {"company": "Ammonit", "email": "me@example.com", "name": "Me"}]}, {"export_format": "csv", "export_period": "weekly", "id": 76, "name": "Test Export 2", "recipients": "cusin@example.com", "subscribers": [{"company": "Enterprise", "email": "boss@example.com", "name": "Boss"}, {"company": "Enterprise", "email": "vice-boss@example.com", "name": "Vice Boss"}]}]
```

- **Download of the export content.**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/export/{export_id}/
{"export_content": [{"D110057-2016-W29.csv", "datetime,Top;wind_speed;Avg (m/s),Top;wind_speed;Max (m/s),Top;wind_speed;Min (m/s),Top;wind_speed;StdDev (m/s),Top;wind_speed;Count ()\r\n2016-07-19 00:00:00,1.5349,3.9522,0.441,0.711,600..."}, {"D110057-2016-W30.csv", "datetime,Top;wind_speed;Avg (m/s),Top;wind_speed;Max (m/s),Top;wind_speed;Min (m/s),Top;wind_speed;StdDev (m/s),Top;wind_speed;Count ()\r\n2016-07-26 00:00:00,2.5432,4.5412,0.216,0.876,600..."}]}
```

- **Get information about the device completeness.**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/completeness/
{"total": 75.0, "monthly": {"2017-12": 50.0, "2018-01": 100.0}}
```

- **Get information about the device daily completeness.**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/completeness/day/
{"2017-12-24": 100.0}
```

- **Get details about the connections and their parameters**

```
https://or.ammonit.com/api/{project_key}/{device_serial}/connections/
[{"connection_type": "online", "time_connect": "2021-10-21T14:04:11.325749", "time_disconnect": "2021-10-21T14:04:11.325749", "logger_ipaddr": "127.121.12.5", "logger_time_connect": null, "logger_timezone": "", "server": "tunnel.ammonit.com"}]
```

If your application requires more data, information, views or simply you would want to ask us questions about connecting your application to AmmonitOR, feel free to contact us. We are opened for providing more options in our API.

15.5.3 API example script

```
#!/usr/bin/python3

# Example client for the AmmonitOR REST API
# Copyright 2017 Ammonit Measurement GmbH

import argparse
import json
import sys

import requests

def get_options():
    parser = argparse.ArgumentParser(
        formatter_class=argparse.RawTextHelpFormatter)
    parser.add_argument("-a", "--app",
                        help="Provide the application name",
                        default="Ammonit API example client")
    parser.add_argument("-d", "--device",
                        help="Device serial, e.g. 'D123456'")
    parser.add_argument("-D", "--date",
                        help="Specify date to get completeness "
                        "e.g. 2017-01-01T00:00:00")
    parser.add_argument("-e", "--export",
                        help="Export ID e.g. 123")
    parser.add_argument("-f", "--file",
                        help="Device original filename, "
                        "e.g. 'D123456_20160808.csv'")
    parser.add_argument("-F", "--date_from",
                        help="Specify date from, "
                        "e.g. 2017-01-01T00:00:00")
    parser.add_argument("-p", "--project",
                        help="AmmonitOR project key, e.g. 'ABCD'",
                        required=True)
    parser.add_argument("-s", "--server-url",
                        help="Server URL to use, e.g. https://or.ammonit.com",
                        default="https://or.ammonit.com")
    parser.add_argument("-t", "--token",
                        help="Token to communicate with AmmonitOR, "
                        "coming from requesting the permission view")
    parser.add_argument("-T", "--date_to",
                        help="Specify date to, "
                        "e.g. 2017-12-31T00:00:00")
    parser.add_argument("-u", "--username",
                        help="Valid AmmonitOR user, e.g. bach@example.com",
                        required=True)
    parser.add_argument("-v", "--view",
                        help="\n".join(["Avaliable views:"] + sorted(
                            ["%-12s - %s" % (k, v.__doc__ or "(undocumented)")
                             for k, v in requestables.items()])),
                        required=True)
    return parser.parse_args()

def format_output(output):
    return json.dumps(json.loads(output.decode('utf-8')),
                      indent=4, sort_keys=True)
```

```
def get_token(options, header):
    "make a enquiry for a new app in AmmonitOR"
    url = options.server_url + "/api/auth-token/"
    data = {'username': options.username,
            'project_key': options.project,
            'app_id': options.app}
    r = requests.post(url, data)
    print(format_output(r.content))

def list_devices(options, header):
    "list AmmonitOR devices in project"
    if options.project:
        url = options.server_url + "/api/%s/loggers-list/" % (options.project)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key!")

def get_device_data(options, header):
    "get the device metadata"
    if options.project and options.device:
        url = options.server_url + "/api/%s/%s/" \
            % (options.project, options.device)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key and device serial!")

def list_files(options, header):
    "list data files for a device"
    if options.project and options.device:
        url = options.server_url + "/api/%s/%s/files/" \
            % (options.project, options.device)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key and device serial!")

def get_download(options, header):
    "download data files of given project and device"
    if options.project and options.device and options.file:
        url = options.server_url + "/api/%s/%s/files/%s/" \
            % (options.project, options.device, options.file)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key, device serial, "
              "and name of file to be downloaded!")

def list_exports(options, header):
    if options.project and options.device:
        url = options.server_url + "/api/%s/%s/export-list/" % (
            options.project, options.device)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key and device serial!")
```

```

def get_export_download(options, header):
    if options.project and options.device and options.export \
        and options.date_from:
        url = options.server_url + \
            "/api/%s/%s/export/%s/?date_from=%s&date_to=%s" % (
                options.project, options.device, options.export,
                options.date_from, options.date_to)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key, device serial, export id and"
            " date from!")

def get_completeness_values(options, header):
    if options.project and options.device:
        if options.date_from and options.date_to:
            url = options.server_url + \
                "/api/%s/%s/completeness/?date_from=%s&date_to=%s" % (
                    options.project, options.device,
                    options.date_from, options.date_to)
        else:
            url = options.server_url + \
                "/api/%s/%s/completeness/" % (
                    options.project, options.device)
        r = requests.get(url, headers=header)
        print(format_output(r.content))
    else:
        print("Please provide the project key, device serial and optionally"
            " both date from and date_to!")

def get_completeness_day(options, header):
    if options.project and options.device:
        if options.date:
            url = options.server_url + \
                "/api/%s/%s/completeness/day/?date=%s" % (
                    options.project, options.device, options.date)
            r = requests.get(url, headers=header)
            print(format_output(r.content))
        else:
            print("Please provide the date!")
    else:
        print("Please provide the project key and device serial")

def get_connections(options, header):
    if options.project and options.device:
        if options.date_from and options.date_to:
            url = options.server_url + \
                "/api/%s/%s/connections/?date_from=%s&date_to=%s" % (
                    options.project, options.device,
                    options.date_from, options.date_to)
            r = requests.get(url, headers=header)
            print(format_output(r.content))
        else:
            print("Please provide the date from and to!")
    else:
        print("Please provide the project key and device serial")

```

```
requestables = {
    "device": get_device_data,
    "download": get_download,
    "export_file": get_export_download,
    "exports": list_exports,
    "files": list_files,
    "devices": list_devices,
    "permission": get_token,
    "completeness": get_completeness_values,
    "day_completeness": get_completeness_day,
}

if __name__ == '__main__':
    options = get_options()

    header = None

    if options.view != "permission":
        if options.token:
            header = {'Authorization': 'Token ' + options.token}
        else:
            print("Please provide the token for authentication!")
            sys.exit(1)

    if options.view in requestables.keys():
        requestables[options.view](options, header)
    else:
        print("Unknow view '%s'" % options.view)
        print("Use one of " + ", ".join(sorted(requestables.keys())))
```

Chapter 16

Ammonit Live Dashboard Account

This chapter describes the configuration of AmmonitLiveDashboard account. AmmonitLiveDashboard account is required to use the AmmonitLiveDashboard, the client of Meteo-40 Plus Live Data Publisher. The account receives the live data sent by the Meteo-40 Plus Live Data Publisher. AmmonitLiveDashboard is a client that reads the live data received by the account and displays them in form of graphs and tables in user interface.

AmmonitLiveDashboard is available under: <https://live.ammonit.com/>



Important

The jid and password used for the AmmonitLiveDashboard are provided by AmmonitOR and cannot be influenced.

To create a new AmmonitLiveDashboard account a *Create account* button must be pressed. If you wish to reset the password on the existing account or delete it, click on *Reset password* or *Delete account* respectively.

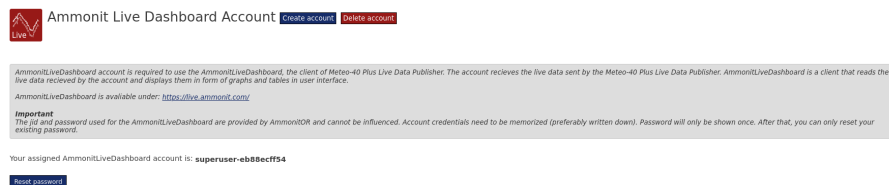


Figure 16.1: AmmonitLiveDashboard main page

On any of these actions, a new page will be opened, where the action must be confirmed.

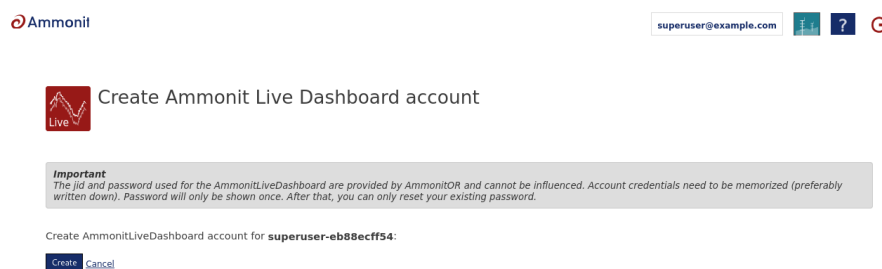


Figure 16.2: AmmonitLiveDashboard prompt

After confirming any change on the AmmonitLiveDashboard account a new page displaying all the credentials will be displayed.



Important

Account credentials need to be memorized (preferably written down). Password will only be shown once. After that, you can only reset your existing password, there is no way of recovering the password.

 Ammonit

superuser@example.com



Credentials changed for Ammonit Live Dashboard Account

Live data account created

Important

The jid and password used for the AmmonitLiveDashboard are provided by AmmonitOR and cannot be influenced. Account credentials need to be memorized (preferably written down). **Password will only be shown once!** After that, you can only reset your existing password.

Your credentials got changed:

JID: **superuser-eb86ecff54**
Password: **Tr7yireL5y**

Figure 16.3: Credentials for AmmonitLiveDashboard account

After creating your account you can start using it with the AmmonitLiveDashboard.

Chapter 17

Release Notes

17.1 Release 5.5.4 (2022-08-10)

- Evaluation cache will be updated on every Data File import, what influences the Matrix view.
- Data snapshot import is now able to import internal evaluations like "Internal Voltage, Internal Current, etc" with updated naming of Meteo40 Firmware 2.1.4.
- Further bugfixes applied on reports, matrix view, config view and data exports.

17.2 Release 5.5.3 (2022-07-14)

- General performance improvements of page loading speed.
- Firmware version of Ammonit data loggers are displayed in device details section.
- Connection Log's visual timezone problems are solved.
- Minor bugfixes dynamic XY, band graph, data import, data export and aligator.

17.3 Release 5.5.2 (2022-06-02)

- DynoXY graph got an visual update.
- Minor bugfixes in connection log, data export, live data, data import and reports.

17.4 Release 5.5.1 (2022-04-20)

- Minor bugfixes in data import, data export, plots, API and UI.

17.5 Release 5.5.0 (2022-04-01)

- Software modernisation upgrade.
- Minor bugfixes in data import, dynamic xy plot and data export.

17.6 Release 5.4.3 (2022-03-09)

- Dynamic XY presets got some bugfixes and an Name-edit function.
- Minor bugfixes mainly for the UI and DataImport.

17.7 Release 5.4.2 (2022-03-02)

- AmmonitOR gets slowly but surely a makeover. With this release we introduce first changes to the look of AmmonitOR.
- Dynamic XY plot has a new preset feature. Creating presets allows you to have different evaluation setups to switch through.
- Data export's re-send function via logs forces the re-sends from now.
- Connection Log displays connections, where no disconnect-trigger has arrived, correctly.
- Minor Bugfixes for Reports, Plots and UI.

17.8 Release 5.4.1 (2022-01-24)

- Filter schemas can be copied to other projects, if the user has write permissions to the target project.
- DynoXY graph shows units in legend and mouse-over.
- Snapshots show the correct timezone.
- Performance improvements for premium months purchase was added.

17.9 Release 5.4.0 (2022-01-18)

- Introduce support for the AmmonitLiveDashboard account management.
- Introduce support for the LiveDataAggregator profile management.
- Several minor Bugfixes in reports, export logs, data files, data import, plots, Meteo-Laser import and UI.

17.10 Release 5.3.8 (2021-11-30)

- AmmonitOR custom installations have now the ability to add ssh key for each data logger via UI.
- Performance improvements on several views, like project detail overview.
- Several minor Bugfixes in API, overlapping data, plots, data import, data exports

17.11 Release 5.3.7 (2021-11-02)

- There are no duplicated data file names in .zip files during direct download any more.
- API download methods are logged into journal now.
- Plots: Polar plot possible displayed sectors are limited to 72 instead of 144 temporarily, due to a third party package bug.
- Bug related to missing logbook files (with their signatures) and full config files is fixed.
- Minor bugfixes to plots, data files and data import.

17.12 Release 5.3.6 (2021-10-26)

- Premium bulk subscriptions are now possible with new interface option.
- Security improvements for the ftp/sftp exports UI.
- API provides a method for fetching the connection log.
- Adding new wind turbine to the database is possible again and works like expected.
- Data Export: The PGP fingerprint is now displayed fully.
- Data files: Delete month of data function works now like expected.
- Minor bugfixes to Data Import, Plots, Data Export, Filters, Data Analysis table.

17.13 Release 5.3.5 (2021-08-23)

- The filtering for empty fields, like "N/A", "None", "NaN" etc is now possible with Empty Data Filter.
- Large data exports will no longer be presented via pickup stream. There is a more efficient way.
- Premium accounts can be soft deleted, but will never purged from database.

17.14 Release 5.3.4 (2021-08-10)

- Empty data filters are introduced to filter empty fields in data. NULL, None, n/a, NAN etc can be detected.
- Data import parsers show more detail on potential erroneous elements of the data file.
- Minor Bugfixes in data import, premium and UI elements

17.15 Release 5.3.3 (2021-07-14)

- General bugfixes to Wind Direction plot, connection alarms.
- Minor bugfixes to ftp import, Zephir parser, MeteoLaser parser.

17.16 Release 5.3.2 (2021-07-01)

- Meteo40A is now fully supported.
- Data files can be deleted by month.
- Wind turbine module had temporarily issue with adding new turbines.
- Minor Bugfixes in reports, dataexport, data import and plots.

17.17 Release 5.3.1 (2021-06-10)

- Bugfixes to data export, data import, plots and views.

17.18 Release 5.3.0 (2021-06-04)

- From now AmmonitOR is based on Python3.
- Data Export: Pick up method was empty after the first subscriber downloaded the data. All subscribers can download the pickup data from now.
- Matrix View: Pop ups are all closed if you click beside the table.
- Data Import: Some restricted files could not be updated due to a bug.
- Connection Alarms missed sometimes the connection datetime.
- Journal displays if Period is missing in Configuration Overrides.
- Minor Bugfixes in Journal, DataExport, Matrix, Reports and UI.

17.19 Release 5.2.7 (2020-11-24)

- Editing of connection alarms bug fixed.

17.20 Release 5.2.6 (2020-11-23)

- Bugfixes in data export, data import, filters, matrix view.
- Minor UI changes in filters.

17.21 Release 5.2.5 (2020-09-24)

- Twentyminutes interval file import are supported.
- Minor bugfixing in UI and data import.

17.22 Release 5.2.4 (2020-09-16)

- Problem with the update of the project status is solved.
- Meteo40 sends diskriminators for certain evaluations. Affected are specifically MODBUS sensors, where one sensor sends many different evaluation outputs. AmmonitOR is now able to display them properly.
- Minor bugfixing in data exports, data imports and UI.

17.23 Release 5.2.3 (2020-09-02)

- Matrix: If there are over 100 devices in the system you have access to, adding devices to matrix was difficult due to the huge loading times. Pagination solved this issue.
- Several fixes to caching mechanics.

17.24 Release 5.2.2 (2020-08-25)

- Matrix view is introduced to dashboard as overview over all active devices in the system the user has access/read permissions to. The devices has to be enabled first and can also be disabled again.
- Several UI fixes for evaluations, data export, premium basket.

17.25 Release 5.2.1 (2020-08-03)

- Matrix view stays still in beta to sort out all major problems first.
- Matrix view has to be enabled over Project settings.
- Matrix view: The evaluation cache is only updated by upload of new data. If files are uploaded more than once an hour, the cache is only updated once per hour.
- Matrix view: Fixed visual bugs and minor functionality bugs.
- Matrix view: Parallel processing highway for caching.

17.26 Release 5.2.0 (2020-07-10)

- Matrix view beta will be released later this release.
- Minor bugfixes in reports, plots and data exports.
- Minor bugfixes in displaying decimal places for slope on offset.

17.27 Release 5.1.0 (2020-05-08)

- Python Decimal datatype (string based) is migrated to float datatype for performance reasons and because it is the standard datatype in meteorology and science.
- Minor bugfixes in DataExport and DataImport.

17.28 Release 5.0.10 (2020-04-24)

- Signature files are now attached to data files and are also displayed in Device Files section.
- Solar report displays Albedo values if set up.
- Dynamic XY deals better with solar evaluations.
- Connection Alarms show the subscriptions now.
- Minor bugfixes in Plots, Reports and Data import parser.

17.29 Release 5.0.9 (2020-03-09)

- The reimport of payed datafiles had issues, what is now resolved.
- Minor issues fixed in Overlapping data files and configuration view.

17.30 Release 5.0.8 (2020-01-13)

- Problems in filter messages are cleaned up and from now they are properly sent.
- Example project page is accessible again.

17.31 Release 5.0.7 (2020-01-07)

- Data exports module sends to every recipient the datai export with gpg-signature.
- Internal structure improvements.
- Minor bugfixes to data exports, reports and UI.

17.32 Release 5.0.6 (2019-11-18)

- Dynamic-XY has an additional slot to display extra evaluation.
- Performance improvements and optimized data importi were applied.
- Minor bugfixes to API, plots, reports and UI.

17.33 Release 5.0.5 (2019-10-17)

- Photos naming is now bulletproof.
- Configuration list shows all data again.
- Minor bugfixes to plots and UI.

17.34 Release 5.0.4 (2019-10-14)

- It is now possible in Correlation Profile to pick explicitly a evaluation for x-axis (Abscisse) and y-axis (Ordinate).
- Timezone is displayed in plots, with a time reference. Timezone is also shown in many other places for orientation.
- Data Export form is fully working again.
- Many tiny UI improvements are applied.
- Minor bugfixes to plots and data overview page.

17.35 Release 5.0.3 (2019-09-17)

- Data files were not downloadable in Data File section.
- Download of data files through web API was blocked for a while. Now everything should work like expected.
- Missing plot images in reports are fixed. Please re-generate manually reports where plot images are missing.
- Completeness calendar performance is improved and duplicate file entries are correctly displayed.
- Minor bugfixes to plots and UI.

17.36 Release 5.0.2 (2019-09-06)

- Minor bugfixes to completeness calendar, reports, data import, plots, API and UI.

17.37 Release 5.0.1 (2019-09-04)

- Completeness calendar is reworked, taking Duplicated Entry into account now.
- More information about import sessions and additional types of files is displayed in Device Files section.
- Minor bugfixes to data exports, plots, evaluations, API and UI.

17.38 Release 5.0.0 (2019-08-30)

- AmmonitOR runs now under Debian 9.0 (Stretch) system instead of Debian 8.0 (Jessie), increasing its security, performance and reliability.
- Templates are now running under jinja2 template engine instead of default django template engine, improving their reliability and performance.
- Some minor bugfixes in all AmmonitOR features.

17.39 Release 4.1.13 (2019-03-26)

- Data Export: Under certain circumstances a problem occurred, that a data export was just sent to the first subscriber. From now on the data export is sent to all subscribers.
- One of the overlapping files were shown as empty, that is resolved.
- Impressum link is working again.
- The data export of original data works again for none-premium data months.
- Some minor bugfixes in API, data export, data import and UI

17.40 Release 4.1.12 (2019-02-14)

- New evaluation sets are supported, like Soiling, Albedo, Variance and many more.
- Fixed some issues with duplicate data entries.
- Project comments are included into reports Standard and Detailed.
- Problematic data files with too long evaluation names can be detected and displayed why they are not imported.
- Some minor bugfixes in data exports, dynamic-xy and general UI.
- All available full configuration files are now shown, instead of incorrectly assigned signature files.
- Export emails are now sent to every single recipient on the list, instead of just first one.

17.41 Release 4.1.11 (2018-12-20)

- Restricted files are displayed in section Archiving > Device Files.
- Tunnel connections are updated every minute in View Monitoring > Devices.
- Many minor bugfixes in data imports.

17.42 Release 4.1.10 (2018-12-12)

- Without premium subscription the data files of Meteo-32, AQS devices, Zephir devices and Campbell data loggers are not imported to AmmonitOR database and the full feature set of AmmonitOR is not usable. They are saved in the section Archive > Device Files > Restricted Files until the premium feature set is enabled, in that case the data files will be fully imported.
- SFTP exports worked insufficient, we solved the issues.
- Premium months are fully imported after transaction, it appeared in the past that was not always the case and needed a manual re-trigger.
- Filter emails are sent again after some issues with the send-trigger.
- Config files are displayed correctly again and not only the signature files.
- Logbook data is displayed even, if data logger has no data files in the system.
- Duplicate and overlapping data entries are better and more convenient to handle now.
- Many minor bugfixes in data exports, data imports and dynamic-graph-xy.

17.43 Release 4.1.9 (2018-09-05)

- We added features to AmmonitConnect.
- Minor bugfixes in data exports and user interface.

17.44 Release 4.1.8 (2018-08-30)

- AmmonitConnect is supported by AmmonitOR now.
- Data export: External recipients (ftp, scp, sftp) can be modified from the level of export edit, they don't require additional url and view.
- Minor bugfixes in data exports, login, premium, logger connections and user interface.

17.45 Release 4.1.7 (2018-07-03)

- Data export supports SFTP transmission.
- Data export: In the past it could happen that files were not sent if the data logger was not Meteo-40 and had no premium subscription. This bug is solved.
- In data file section the files can be easily downloaded by "download all files" button. Works for all file types.
- Minor bugfixes in data exports.

17.46 Release 4.1.6 (2018-05-22)

- Minor bugfixes to data download, timeline, premium, measurement data view and evaluation list view.

17.47 Release 4.1.5 (2018-05-16)

- TOA5 export format has a possibility to change the header format now.
- SCP delivery type of export is added.
- Performance of export page is improved.
- Sorting of columns is possible also in new exports, not only in existing ones.
- Exports mechanics is completely re-newed, resulting in a better performance of a feature.
- All data file types have a calendar view, instead of a long list of files. File summary is additionally being displayed
- Data Snapshots display all values instead of just ones being present in config.
- Many new evaluation types are supported, i.e. electrical conductivity or water content.
- API support empty characters in file names.
- Connection graph works better with a time-zone changes.
- New Meteo-40 column "Date/time last" is being supported.
- Minor bugfixes to plots, reports, completeness, premium and connection alarms.

17.48 Release 4.1.4 (2018-02-15)

- Secondary and tertiary files are no longer mixed up with raw csv files.
- Data reimport warning is being displayed again.
- Picking dates in user interface clearly shows the timespan of the data now.
- General bugfixes to overlapping files, exports, reports, premium functionality and imports.

17.49 Release 4.1.3 (2018-01-31)

- FTP export is repaired.
- Completeness values are now refreshed by manual activation/deactivation of files.
- Connection log handles the timezone differences better.
- General bugfixes to data exports, dynamic XY plot, plots, API and premium functionality.

17.50 Release 4.1.2 (2018-01-11)

- Performance improvements to data exports and data imports.
- Tunnel links are reintroduced to device list of project.
- Dynamic XY plot allows saving the default evaluations for future display.
- Premium calendars are properly displayed for example projects.
- Logger status is automatically refreshed even if data has not arrived.
- Journal entries are now possible to be downloaded as csv file.
- Completeness can be requested via API.
- General bugfixes to evaluations, data exports, dynamic XY plot, API and mast image.

17.51 Release 4.1.1 (2017-12-13)

- Performance improvements.
- General bugfixes to premium functionality, transactions, raw data files, import process.

17.52 Release 4.1.0 (2017-11-24)

- Data Snapshots support system status values now.
- New evaluations: variance, skewness, kurtosis.
- Week's Review, EPE export, transaction and purchase order download, voucher, logger status, secondary and tertiary files improvements and general bugfixes.

17.53 Release 4.0.8 (2017-11-16)

- Rework of device overview layout. Project and device colors do have meaning. The device status is customizable.
- Project detail does not contain any longer redundant information.
- Device detail view design is reworked and contains only device related information.
- More information about import status of data files in Data files section.
- Premium: Pre-payment of premium months in the future is possible now.
- Premium: Pre-paid data months can be cancelled as long they lay in the future.
- Premium: Dynamic XY graph is a free feature.
- Week's Review is customizable.
- Bugfixes in monthly profile and data export format EPE.

17.54 Release 4.0.7 (2017-10-11)

- Dynamic plot can be used with evaluators from ZephIR connected to Meteo-40 logger.
- Premium calendars are now properly displayed on device page.
- User can remove himself from the project using settings section.
- General bugfixes to dynamic plot, reports, purchase process, data exports, filters, connection log.

17.55 Release 4.0.6 (2017-09-26)

- Multiple bugfixes in signature file upload.
- Update purchase order message.
- Bugfixes in XY difference graph.

17.56 Release 4.0.5 (2017-09-22)

- Added more detail information to credit account. The whole purchase process is improved. Every purchase order is a pre-payment request.
- Renamed all "data loggers" to "devices" to provide long time consistence and to support more devices than data loggers.
- Bugfixes in Band graph, Correlation occurrence plot and turbulence intensity.

17.57 Release 4.0.4 (2017-08-30)

- Signature files are sent by Meteo-40 will be saved and are downloadable in detail view of datafiles.
- Performance improvements on Premium data logger list.

17.58 Release 4.0.3 (2017-08-28)

- A first steps guide is added to the dashboard.
- Minor bugfixes for premium logger list, band and average graph.

17.59 Release 4.0.2 (2017-08-23)

- General bugfixes to data exports, credit account, band graph and xy-difference plot.

17.60 Release 4.0.1 (2017-08-22)

- User centered UI design. User is able to see from every view as whom he is logged in and which permission he/she has for the current project the user is working with.
- Introduced premium features. To use premium features you have to buy Credits. Basic features like monitoring and archiving are still for free.
- Premium features are:
 - Accounting to manage Credits and payment informations.
 - Redeem voucher codes.
 - Reports.
 - Meteo32, AQS SODAR, Zephir and Campbell (TOA5 format) data import.
 - Data exports (EXCEL, HTML, Plain Text, TOA5 Campbell).
 - Plots (Basic graphs like xy-graph and wind-direction are for free.).
 - Statistics (Averages per month, wind speed data analysis).
 - Photos.
- Meteo-40 data files have an expiration date. Data gets imported and expires after 3 months (The data files are saved on the server and are always download-able). If you spend Credits for the related time period the data will be reimported and stays forever in the database. Files from other devices are completely blocked for import unless the premium was bought.
- Solar report is new available report format.
- Project overview is now a list view.
- New landing page called dashboard.
- New plots:
 - Correlation plot with occurrences distribution.
 - Average polar: Polar graph of average values filtered by wind direction and wind speed.
 - Occurrence polar: Polar graph of wind speed and occurrence of wind speed per wind direction sector.
 - XY difference: Linear graph where you can display the differences between two evaluations.
 - Band graph: Displays dailys behaviour of an evaluation within a colored spectrum.
- Minor bugfixes in Weeks Review, Reports, Exports, Plots, API and UI.

17.61 Release 3.8.2 (2017-04-20)

- General bugfixes to import, dynamic plot, week's review page and statistics pages.
- Add support for secondary and tertiary statistics files coming from Meteo-40 data loggers.
- CSV, Excel, Raw text, TOA5 and MGM exports have possibility to round decimal places now.

17.62 Release 3.8.1 (2017-03-22)

- General bugfixes to import, gust data, reports and week's review page.
- Journal section has a possibility of adding comments now.

- Filter has a subscribers option, where the email subscribers can be chosen.
- New logbook files will be listed from now on and available for download.
- Dynamic plot fixes including more consistent browsing by date and better support of the select boxes.
- Export files name can be changed while editing export.

17.63 Release 3.7.2 (2017-02-14)

- General bugfixes to reports, data exports, dynamic plot and data files page.
- Vertical wind speed configuration overrides are now possible.
- API provides the export list and it is possible to download export files via API.
- Project admin has a possibility of moving the logger to another project.
- Journal page is added, where user can track all important changes to the loggers within the project.

17.64 Release 3.7.1 (2016-12-21)

- Dynamic XY plot improvements, bugfixes. Added backward and forward buttons to jump between periods.

17.65 Release 3.7.0 (2016-12-13)

- Dynamic XY plot is added to the graphical analysis tool collection.

17.66 Release 3.6.6 (2016-11-17)

- Meteo-40: Gust data files can be correctly imported.

17.67 Release 3.6.5 (2016-11-15)

- Logbook: Interactive search field for logbook content.
- Meteo-40: Gust data files and full config data files are downloadable in data files section.
- Minor bugfixes in data export.
- Improved error messages for data file import.

17.68 Release 3.6.4 (2016-10-27)

- Better detection of overlapping data files. If just one entry is overlapping due to config changes in Meteo-40, both entries will be deleted.
- Data Export: AmmonitOR supports TOA5 Format.
- Config page and plots display Value statistic.
- Access confirmation emails don't provide any broken links.
- API: Upload type of data files will be sent as well.
- Sending test data to an AmmonitOR project will create the data logger if it does not exist already.
- Import of data files is improved.

17.69 Release 3.6.3 (2016-10-12)

- Import of big number of data files no longer causes creation of duplicate sensors.
- Wind direction evaluations are enabled for usage with monthly profile.
- CSV export provides space as a separator.
- Data logger widgets show offline sign while data logger is not connected to tunnel.
- Sorting of table columns of project detail view is now possible.
- General bugfixes to configs, file import, calendar views, Zephyr sensors compatibility.
- Config list view has a separate table for deactivated configs now.

17.70 Release 3.6.2 (2016-09-22)

- Guest users can no longer view statistics pages.
- Data availability plot targeted for remote sensors is introduced.
- General bug fixes to widgets, logbook, exports.
- AmmonitOR zeroes the solar evaluations when negative channel values are present, while overriding the config by user.

17.71 Release 3.6.1 (2016-09-09)

- Rest API is introduced to AmmonitOR. It is possible to access detail project and data logger informations as well as download data logger files through 3rd party application.
- Data availability plot.
- General bug fixes to data export, plots and UI.

17.72 Release 3.6.0 (2016-08-05)

- AmmonitOR runs now under Debian 8.0 (Jessie) system instead of Debian 7.0 (Wheezy).
- Better support of AQS files.
- AQS and Zephyr300 configuration take no longer unnecessary file period into account.
- Power curve measurement plots can be again compared with database wind turbines.
- Exports give possibility of setting a custom order of columns using a drag-and-drop.
- Exports give possibility of formatting the files header.
- EPE export allows choosing wind speed evaluations.
- Export cannot be sent beyond current date.
- Export log provides a valid trigger for sending export.
- Activation and deactivation of evaluations is now more user friendly.
- Measurement data page column order is the same as in CSV data file now.

17.73 Release 3.5.3 (2016-05-10)

- AQS data import's upload form was not allowing to select files and prevented import.
- Measurement data view displays the year information above the table.
- In several places the data logger firmware was not displayed as latest version.
- Some detailed reports were not generated, because of a bug in turbulence intensity plot.
- Data logger widget shows a more informative message, if the needed evaluation is available.

17.74 Release 3.5.2 (2016-04-26)

- Minor bug fixes in reports generation.
- Added AmmonitOR icon to the right upper corner of webpage.

17.75 Release 3.5.1 (2016-04-16)

- SODAR AQ510 is supported by AmmonitOR.
- Zephir import with gaps and 10min averages were refused in the past. AmmonitOR is now able to detect gaps.
- Measurement data page had sometimes issues with displaying the correct end date and time of the day.
- All power evaluations ("active_power") can be grouped as evaluation pair. Before it was only possible for "active_power Total".
- Removed obsolete button "Access data logger via tunnel" for Meteo32 and Remote Sensors in Connections table view.
- Several minor issues in power curve plot, energy yield plot are solved.

17.76 Release 3.4.15 (2016-03-18)

- Performance and stability changes to server.
- Minor problems are solved in energy yield plot and statistic page of average tables.
- Reports are able to display all evaluations again and not only ones, who are listed in config (Temporarily issue since 2016-02).

17.77 Release 3.4.14 (2016-03-04)

- Table of statistics allows different statistic types and average periods.
- Power Curve graph shows additionally the power coefficient curve.
- Several minor bugfixes in reports and plots.
- Project creation page provides some help text.

17.78 Release 3.4.13 (2016-02-29)

- Table of data files is now sortable.
- Histogram plot is able to display negativ ranges as well.
- Fixed a problem with displaying data files in calendar view in right order.
- Reports: Add better handling for large tables with many rows.
- Reports: If data is missing in reports due to communication issues on data logger side, the report generation will wait until 2 days. After the report will be generated.
- Reduced query load for server administration pages.
- Search field on project overview is sensitive for data logger serials and project keys.
- Completeness calendar highlights row and column if mouse hovers over.
- Analysis table for wind speed evaluations is added. It displays average, completeness, calms, entries and turbulence intensity for chosen month or year.
- The email subject of data exports is editable.

17.79 Release 3.4.12 (2015-12-18)

- Week's Review: Fixed a problem with showing the connections of the current day.

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- Connection Log: Added time information to mouse over banner.
 - Fixed a problem in Zephir data import.
 - XY plot: Percipitation and Sum had no unit.
 - Data logger widget: Resolved an issue in the greyout mechanics, when data seems to be old.

17.80 Release 3.4.11 (2015-11-11)

- Added some performance optimisations for logger detail page, configuration list, evaluation list, photos and data export list.
- Added a display option for looking at data files raw content.
- Data file download uses the original filename.
- Fixed data logger delete function.
- Fixed: Connection log was temporarily not available in Google's Chrome.

17.81 Release 3.4.10 (2015-10-23)

- Data files are now organised by month with an index page to jump to a specific month.
- Data files list page has been made faster.
- Data logger name, type and coordinates are taken from the latest configuration file, but it is possible to override them in AmmonitOR. Leave the fields open and AmmonitOR will display the configuration values.
- Configuration list is in reverse order now. The latest entry is first for better readability.
- Fixed a problem with data file zip download.
- Fixed data logger overview it shows either the from CSV imported values or the latest data snapshot if it is newer.

17.82 Release 3.4.9 (2015-10-10)

- Fixed connection log issues when using Mozilla Firefox.
- Increased maximum data file upload size to 4MB (uncompressed)
- Fixed a problem with zipped EPE exports

17.83 Release 3.4.8 (2015-10-08)

- Larger CSV exports are now possible with a pickup-delivery system.
- Timezone support added to connection log, allowing connections to be shown in local time.
- Data tables now have link to relevant data file.
- Data tables now have units and relevant configuration information.
- Warnings are now clearer on data file detail page.
- Older files from Zephir remote sensors can now be processed.
- Added server administration tool to conveniently restore system from backup.
- Speed and performance improvements on a number of pages.

17.84 Release 3.4.7 (2015-08-17)

- Fixed a problem that arose when configuration overrides were created for solar irradiance evaluations.

17.85 Release 3.4.6 (2015-08-13)

- Missing coordinates are now allowed in Meteo-40 data files.
- Data snapshot overview page now handles new/removed evaluations cleanly.
- Improved error message when unrecognised ZPH data files are uploaded (Zephir).

17.86 Release 3.4.5 (2015-08-04)

- Page for creating and updating raw data exports is now working again.

17.87 Release 3.4.4 (2015-07-28)

- Power curve measurement report is now available.

17.88 Release 3.4.3 (2015-07-27)

- Export email of original data file had no attachment.

17.89 Release 3.4.2 (2015-07-23)

- Power curve report is disabled temporarily. In next release the report will be available again.
- Bug fixes in import module.
- Several major and minor bug fixes.

17.90 Release 3.4.1 (2015-07-15)

- Support for Zephir300 devices: Zephir300 CSV data files (10 minute averaged) can be uploaded (ftp or manually) now; Full integration into AmmonitOR.
- New data import experience: Much better feedback about uploaded data files; Improved data upload performance.
- Richer data file overview: More information about data file; Better original data file view; Improved handling of data files (Delete all invalid files with one click).
- New timeline feature: See everything that happens in your AmmonitOR project over time in one view.
- New report period: Bimonthly.
- Week's review: time range is now adjustable (7 days, 14 days, 21 days and 28 days).
- Better experience with evaluation selection in several plots.
- Bug fixes in Wind power density and energy yield plot.
- Bug fix in configuration overwrite. AmmonitOR refused to overwrite values of pyranometer evaluations. As result no values were displayed.
- Several major and minor bug fixes.

17.91 Release 3.3.10 (2015-03-4)

- Confusing presentation of coordinates are resolved.
- Photos have more display options. Coordinates for documentation, gallery for documentation and photo timeline to display monitoring photos send by data logger. The photo timeline will have more display options in future.
- Fixed bugs in plot wind power density and energy yield.

17.92 Release 3.3.9 (2015-02-05)

- Weather station support is disabled, because the external weather api is no longer reliable.
- Boom orientation is added to the sensor description and will be displayed when necessary.
- Connection log now displays exact start and finish times for uploading connections, in case they take longer than a few seconds. This should be useful for monitoring slow uploads (eg via satellite).
- Data file completeness calendar now repeats its header for every year, useful for long term projects.
- Data file completeness calendar now shows latest entries at the top.
- Bug fix: Solar irradiance formula was not found when adding a new evaluation.

17.93 Release 3.3.8 (2014-12-19)

- Changed MGM summary export format to allow missing air density sensors, and removed temperature height.
- Data export calendar was only displaying attempted deliveries, it now displays whether or not an export was successfully sent.
- Data export filename and email subject are improved with more details about format and period.

17.94 Release 3.3.7 (2014-12-15)

- Extension of MGM export formats with summary file format (S) is added.
- Evaluation completeness analysis is now able to correctly handle overlapping configuration periods.
- Minor bug fixes: Daily and monthly profile plots can now handle doubled evaluations.

17.95 Release 3.3.6 (2014-12-03)

- Turkish MGM data export now allows users to choose which height evaluations are used for the D file. The evaluation with the nearest height is chosen.
- Display configuration on data file page if available (METEO-32 data loggers).

17.96 Release 3.3.5 (2014-11-20)

- New regulation for Turkish MGM data export filenames e.g. 120001_20141120_R.txt.
- Improvements in filter for overlapping data files.
- Report changes in standard, detailed, compact. Added information of used wind vane in shadow zone plot. Restored missing plots speed direction bar and speed direction dots. Keep in mind that evaluation pairs a necessary for these plots.
- Minor bug fixes: calm analysis, power curve plot.

17.97 Release 3.3.4 (2014-11-13)

- Periodic data snapshots and monitoring photos can now be uploaded from Meteo-40 dataloggers.
- Project period is more prominent.
- Minor bug fixes: monthly profile, turbulence intensity, wind power density, long term comparison.

17.98 Release 3.3.3 (2014-10-17)

- Status and photo upload via data logger Meteo-40 is available. New menu point for photo upload "data snapshot".
- Report regeneration is improved. Every single report is selectable for regeneration.
- We fixed a problem concerning to display data completeness.
- Logbook calendar has a legend.
- Example projects get new permissions. Read and download permissions are available.
- Minor bug fix: Shadow zone plot, longer term comparison profile, monthly profile, histogram

17.99 Release 3.3.2 (2014-09-22)

- Minor bug fix: SMTP import server.
- Minor bug fix: Shadow zone plot.

17.100 Release 3.3.1 (2014-09-17)

- Minor bug fixes, increasing processing stability.
- Wind turbine example data are available for plots.

17.101 Release 3.3.0 (2014-09-15)

- Sidebar menu is cleaned up and restructured.
- New plot: Wind power density. Plot wind power density in a polar view.
- Log book feature provides a calendar view for entries.
- Project color can be chosen by user.
- Minor performance improvements.
- AmmonitOR is ready for full configuration file upload of Meteo-40.
- New example project for power curve measurement is added with 13 example turbines. The data of example turbines are available for every project.
- Minor bug fixes in plots energy yield estimated, wind speed, long-term-comparison profile.

17.102 Release 3.2.2 (2014-07-29)

- Major performance improvements.
- New plot selection menu to make it easier to find the plot you need.
- New plot: Histogram. Generic histogram of any evaluation.
- New plot: Energy yield. Compare your measurements to your power curves in the toolbox.
- New plot: Estimated energy yield. Compare your measurements to your power curves in the toolbox.
- New plot: Shadow zone can now be shown on cartesian axes.
- Improved photo documentation, including direction markup and cardinal points view.
- Removed error measurement exclusion from filters for performance reasons, will be replaced with new filter framework in the near future.
- Added ability to sign data exports without encryption.
- Raw data files can now be viewed online in table format.
- Projects now have unique colours to help quickly identify which project is active.
- Numerous smaller bug fixes.

17.103 Release 3.2.1 (2014-06-25)

- General stability improvements and help pages are accessible again.

17.104 Release 3.2.0 (2014-06-18)

- New, more readable URL addresses, old bookmarks should redirect appropriately.
- New toolbox for adding turbine power curve information.
- New calendar view for data export logs.
- New power curve measurement report.
- New plot for calms analysis.
- New plot for power curve.
- New plots for energy yield.
- The wind direction and wind speed plots now support up to 144 sectors (2.5°).

17.105 Release 3.1.20 (2014-04-16)

- New information is provided on each plot: what it represents, why it might be useful and how to read it.
- A "connection alarm" can be sent for each connection as it arrives, not just for when it is missing.
- New users can create new accounts themselves online, through a link on the login page ("sign up").

17.106 Release 3.1.19 (2014-03-21)

- The weekly report subscriptions always start on monday for consistency.
- Speed direction bar has new option for showing a table with weibull's a and k for given sectors.
- Monthly profile plot supports flexible start and end dates.
- You can now view wind direction evaluations in a monthly profile plot.
- Daily profile plot has new option to scale axes for better comparison.
- Stability improvements for report generation, wind speed plot and daily profile plot.

17.107 Release 3.1.18 (2013-12-16)

- Added new permission level. The Configurator can change data handling and management, but cannot download data or change project user permissions.
- Minor but necessary improvements for data export (FTP settings), daily-profile, wind-speed graph and reports.

17.108 Release 3.1.17 (2013-11-22)

- Added a button to view details of a related configuration file.
- Minor but necessary improvements for data export, filters, XY-graph, wind-speed graph and long-term-comparison profile.
- In reports the permissions of project users are inherited.

17.109 Release 3.1.16 (2013-11-15)

- Tunnel connections over 24 hours are displayed correctly in connection log.
- Meteo-40 communication configuration is displayed by configuration detail page.
- General improvements for XY-graph

17.110 Release 3.1.15 (2013-11-13)

- General improvements for XY-graph.
- Minor fixes in UI.

17.111 Release 3.1.14 (2013-11-11)

- Project permission system are refactored. The new permissions are: Admin - Full permissions, User - Can change configuration, but cannot manage users, Viewer - Can see and download data, but cannot make changes, Guest - Can see plots and summaries, but cannot download data.
- Logbook entries of data logger Meteo-40 are automatically uploaded and displayed.
- Option for showing public weather information in XY-graph and map, if data logger has coordinates.
- Fixed problem where Forgot-Password email wasn't send, if the user forgot to set a valid password during the first week account validation time.
- General improvements for the plots XY-graph and "Long time comparison"-graph.
- Fixed problem with "earlier connection" button at connection log page.
- Project data logger overview shows only active evaluations.
- Delete button for incident log was added.
- The documentation was updated.

17.112 Release 3.1.13 (2013-09-02)

- Minor but necessary UI fixes for previous release.

17.113 Release 3.1.12 (2013-08-30)

- Export original data files, with the normal export features (eg grouped by month, zipped, encryption, automatic delivery via email and ftp).
- New evaluation pairs. Allows pairs of evaluations (eg Speed/Direction) to be defined. These are then used for various plots, exports and reports.
- New data logger overview, showing most important details for each data logger to quickly identify any possible issues.
- New plots for long term comparison profile: wind speed relationship and turbulence intensity trend.
- French language now available.
- New, cleaner configuration detail page.
- Clicking on a plot in the All Evaluations (7 days) overview allows the plot's parameters to be edited.
- Successful SCP upload tests from Meteo-40 data loggers are recorded and displayed alongside other data logger connections in the connection log.
- Fixed problem where plots were not visible with Internet Explorer 8 (not officially supported).

17.114 Release 3.1.11 (2013-08-07)

- Speed up for All Evaluations (7-days) page.
- Speed up for individual plots.
- Improved layout for data logger configuration detail page.

17.115 Release 3.1.10 (2013-07-29)

- Wind direction evaluations cannot be recalculated from channels, as they require a vector average. A new evaluation can now be created to add an offset to an existing evaluation, calculated by the data logger using vector average.
- Only files with statistic intervals of or greater than 1 minute are accepted.
- Coordinates entered in Meteo-40 data loggers (with latest firmware) are imported.
- Data loggers are listed as a table in the project overview.
- The data logger under the mouse cursor is highlighted in the map in project overview.
- Infrastructure improvements, using new server software for better performance.

17.116 Release 3.1.9 (2013-06-07)

- Simpler configuration for data exports.
- Custom field selection for data export.
- New fields for data exports: data logger serial, project name, data logger name, original data filename.
- Custom date format for data exports.
- New data export format for projects in Brazil: DEA 10/13 (Empresa de Pesquisa Energética, Brasil).

17.117 Release 3.1.8 (2013-05-03)

- New connection alarm feature for all users: Let yourself be notified if no connection has been made from the data logger for a certain time.
- Upgrading weibull parameter estimation to use Modified Maximum Likelihood Estimation, a very accurate method for estimating weibull parameters.
- Added a tool to help find and remove duplicate and overlapping data files.
- Plots can now be downloaded in high resolution PDF format for closer inspection and printing.
- Points in wind direction XY plots are now joined, lines wrap around 360°-0° intelligently.
- A short connection log now appears at the top of the "All evaluations (7 days)" page.
- Identical reports have been removed and now cannot be accidentally created.
- Days with too many data are now shown clearly as blue in the calendar, use the duplicate/overlapping data file tool to resolve these issues.
- Fixed MS Excel report to format values and dates as data, not text.
- Small changes to data export UI.
- Removed "undo" option from project deletion, projects are now deleted instantly and permanently.
- Added incident logs for beta testers, to allow certain data to be manually excluded.

17.118 Release 3.1.7 (2013-04-10)

- Improved formatting in MS Excel export, including frozen panes, clearer header and better column widths.
- Connection log now shows weekdays/weekends in background.
- Added a new plot showing a bar chart for visualization of sunshine duration.
- Available reports can be marked for regeneration by admin users.
- New connection alarm feature for beta testers.

17.119 Release 3.1.6 (2013-03-27)

- AmmonitOR-only evaluations are now also included in data export.

17.120 Release 3.1.5 (2013-03-22)

- Added a new page showing plots for all evaluations over the last week.
- Added a new date/time picker to help choose dates in forms.

17.121 Release 3.1.4 (2013-03-14)

- Reports are now automatically delivered by email when available.
- Disallowed two data loggers with the same serial in a single project.
- A warning is displayed for data exports that might not be possible (eg very large MS Excel files).
- More and clearer information on the data export log page.
- The sun status evaluation detail page now shows its sum.
- XY plot can now show sun status sum.
- Email and SCP connections are now more visible on connection log page.
- All months are now available in the table of averages.

17.122 Release 3.1.3 (2013-03-08)

- FTP passwords no longer need to be reentered for data exports.

17.123 Release 3.1.2 (2013-03-05)

- Fixed connections problems for data imports via SCP with Meteo-40.
- Fixed problem with images in documentation.
- Added a predictable channel ordering for data export.

17.124 Release 3.1.1 (2013-03-01)

- Log files for data exports are now available.
- Data file deletion now possible.
- Release notes are now available in the documentation.

17.125 Release 3.1.0 (2013-01-25)

- Software libraries updated.
- Plot enhancements.
- Report enhancements.

17.126 Release 3.0.3 (2012-12-13)

- Fix minor problems.

17.127 Release 3.0.2 (2012-12-04)

- Fix problem with report generation.
- Fixes for different plots.

17.128 Release 3.0.1 (2012-11-20)

- Fix problem with truncated encrypted files.
- Support sun status on analog inputs for METEO-32.
- Fix problem with unavailable export options..

17.129 Release 3.0.0 (2012-11-08)

- Signing and Encryption support with GnuPG.

17.130 Release 2.1.0 (2012-05)

- Graphic display of tunnel connections from your Meteo-40 data logger.
- Online support form, providing the Ammonit support team with sufficient access and information
- Allow a user to unsubscribe from email alerts
- New plot: "Shadow Zone Plot"
- New plot: "Turbulence Intensity"
- New plot: "Daily Profile"
- New plot: "Monthly Profile"
- New plot: "Turbulence Intensity Polar"
- New plot: "Correlation Plot"
- New plot: "Sunshine Hours Histogram"
- New plot: "Overlay Graph"

17.131 Release 2.0.0 (2012-01)

- The new Ammonit Data Logger Meteo-40 is supported now!
- The data access should be faster.
- Individual data entries cannot be marked anymore, instead use a filter.
- A series of small usability improvements and bug fixes has been applied.

17.132 Release 1.2.0 (2011-03-30)

- New data upload page, to upload old data directly from the browser.
- New METEO-32 value calculator, to help interpret data sent from a METEO-32 data logger.
- Date based pagination for data page.
- Data can now be exported as a ZIP file of daily CSV files for any given time period.
- Extensive review of data integrity.
- Axes in XY charts are scaled identically for all identical units.
- New list of all data loggers in all projects.
- Series of small usability improvements.

17.133 Release 1.1.2 (2011-01-20)

- New data calendar view for each data logger, to recognise missing data.
- CSV Export now uses your custom slopes and offsets.
- Bug fix: Anemometer channels (s1, s2, s3, s4) previously did not take into account the different unit in the offset. This did not change the values, unless a custom offset was set in AmmonitOR. Old data has been automatically converted and new data will be converted when imported. If a custom offset was used, the data will be corrected, we have informed all affected users directly.
- New page for Frequently Asked Questions in manual.
- Series of small usability improvements.

17.134 Release 1.1.1 (2010-12-02)

- Reports are now include high resolution charts.
- Raw data is now shown in data view.
- Data view popup now shows complete data for a given measurand.
- Messages now link to related data entries.
- extended channels (v1, v2, v3, v4, c1, c2) now have their raw values converted, and units provided. Old data has been automatically converted and new data will be converted when imported.
- Past reports are now also listed.
- Several minor improvements for stability.

17.135 Release 1.1.0 (2010-11-30)

- You can subscribe to monthly data reports in PDF format, sent to your email address.
- All plots can now be downloaded and printed in PDF format.
- Photos for each data logger can be uploaded.
- You can export and download your data as a CSV file.
- The data import is now more flexible (eg using data from CALLaLOG).
- Your data logger data is now stored in its own separate datastore for security and speed.
- Our automatic testing has grown to cover all aspects of AmmonitOR.
- A number of small usability changes have been made (see eg the data entry list!).
- A number of small fixes and tweaks.

Chapter 18

Glossary

AGPL

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AmmonitOR

Ammonit Online Report. Software to manage different measurement projects.

CALLaLOG

Software for PCs to configure Ammonit data loggers METEO-32 or download measurement data from Ammonit data loggers METEO-32.

GNU

GNU is a Unix-like computer operating system developed by the GNU Project. See [Wikipedia](http://en.wikipedia.org/wiki/GNU) (<http://en.wikipedia.org/wiki/GNU>).

GnuPG

Also GNU Privacy Guard or GPG is a free cryptography software, which uses public-key cryptography to encrypt and decrypt data.

ROM

Read-Only Memory. A storage medium used in computers. See [Wikipedia](http://en.wikipedia.org/wiki/Read-only_memory) (http://en.wikipedia.org/wiki/Read-only_memory).

Chapter 19

GNU Affero General Public License version 3

Version 3, 19 November 2007

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