User manual

AcowaDash

ACOWA INSTRUMENTS

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AcowaDash

082020

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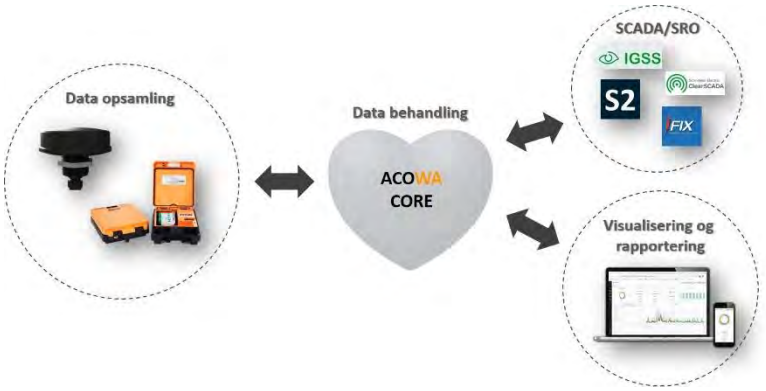
AcowaDash

About AcowaDash

AcowaDash is a unique visualization and analysis tool, based on open source software from Grafana. AcowaDash can be installed on both Linux, macOS and windows-based servers.

AcowaDash supports the data processing program AcowaCore and allows the user to visualize their 4G and SigFox based products from ACOWA, but also offers visualization of the user's existing data from their own SCADA system. The user interface is intuitive and easy to understand and allows users to be divided into different levels, so everyone is confident in using AcowaDash.



AcowaDash is a completely unique tool as it gathers all the information for all pump wells, both capacity calculations and inlet flow, precipitation data, hydrogen sulphide information and stormflow events and visualizes these on a custom design.

AcowaDash provides fast and flexible graphs and tables, with a wide range of options. AcowaDash is supports a wide range of "Panel plugins", which provide many ways to visualize metrics and logs. It is therefore possible to create dynamic custom dashboards. AcowaDash makes it possible to explore your data through ad-hoc queries and dynamic drilldowns. The user can split views and compare different time intervals, queries and data sources side by side. AcowaDash also allows you to mix different data sources in the same graph!

Learn more about the many options at www.grafana.com.

AcowaCore

About AcowaCore

AcowaCore is a data processing program which is used to collect data from both our SigFox based FireFly and our 4G and SigFox based GEKKO data loggers and convert these into a standard ModBus protocol. This data can therefore be returned directly to the user's own SCADA-system without the need for another driver configuration.

As something completely unique, AcowaCore can process event-based logging from our GEKKO data logger and return this data in a format that can be used in all SCADA-systems. At the same time, AcowaCore enables all data about overflow structures, overflow edge profile and conditions to be processed only in

one place - directly in AcowaCore. This allows you to make all changes in one place without having to go to all your devices.

Installation

Software installation

The program is installed on the user's own server or offered as a hosted service. Installation is performed by an ACOWA system integrator and requires access via either VPN, team viewer or similar.

System Requirements

Operating system: Windows10, Windows Server 2014 or later is preferred
Browser: Firefox, Google Chrome, Microsoft Edge and Safari
CPU: Minimum 1 core 2 GHz - preferably multicore 3 GHz or more
RAM: Minimum 4GB - preferably 8GB
Hard disc space: 1GB for application and 3-party applications.
In addition, 1GB per. Monitored device per year log data.
For example, 2 pcs. ACOWA GEKKO data loggers with every 3 years history: 2 (units) * 3 (years log data) = 6GB

3-party programs

In addition to the AcowaDash application itself, a number of 3-party programs are installed:

Python

Python is a programming and scripting language used in both AcowaCore and in connection between AcowaCore and 3-party programs.

Databases

For data storage and setup parameters are installed:
Postgresql (https://www.postgresql.org/)
On IGSS systems we install **Microsoft SQL Server Express** (https://www.microsoft.com/en-us/sql-server)

Dashboard Server

For visualization of data in browser application, we install:
Grafana (https://grafana.com/)**Grafana** (https://grafana.com/)

Service Manager

For installation and management of Windows system services for the AcowaDash Application: NSSM (https://nssm.cc/) 4

System services

Services that will initially be installed:

- **postgresql**
- **grafana-server**
- A range of Acowa services as needed (all with Acowa- in the name) for example:
  - **acowa-dash-core**

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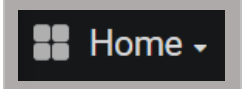
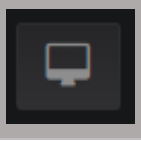
Operation

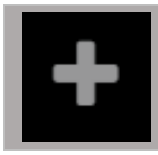
Overview

The Dashboard is divided into 3 different zones. Not all options will be reviewed in the manual, just the functions mostly used.

1. Main functions.

	**HOME** Search, filter and see list of dashboards
	DASHBOARD SETTINGS Settings for the individual dashboards
	**CYCLE VIEW MODE** Show/Hide function buttons

2. Functions menu

	**CREATE** Create new Dashboard, new folder or import.

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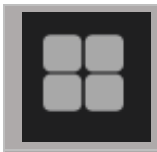
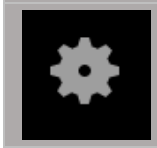
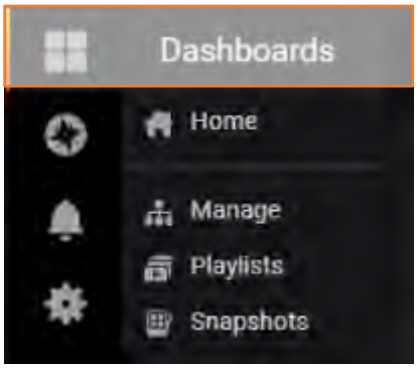
	**DASHBOARDS** Home, manage, playlists and snapshots
	EXPLORE Test playground
	ALERT Rules for alerting and notification options
	**CONFIGURATION** Data sources, users, teams, plugins, preferences and API keys
	USER CONFIGURATIONS Personal preferences and system log off
	HELP Keyboard shortcuts, community and documentation.

Functions menu

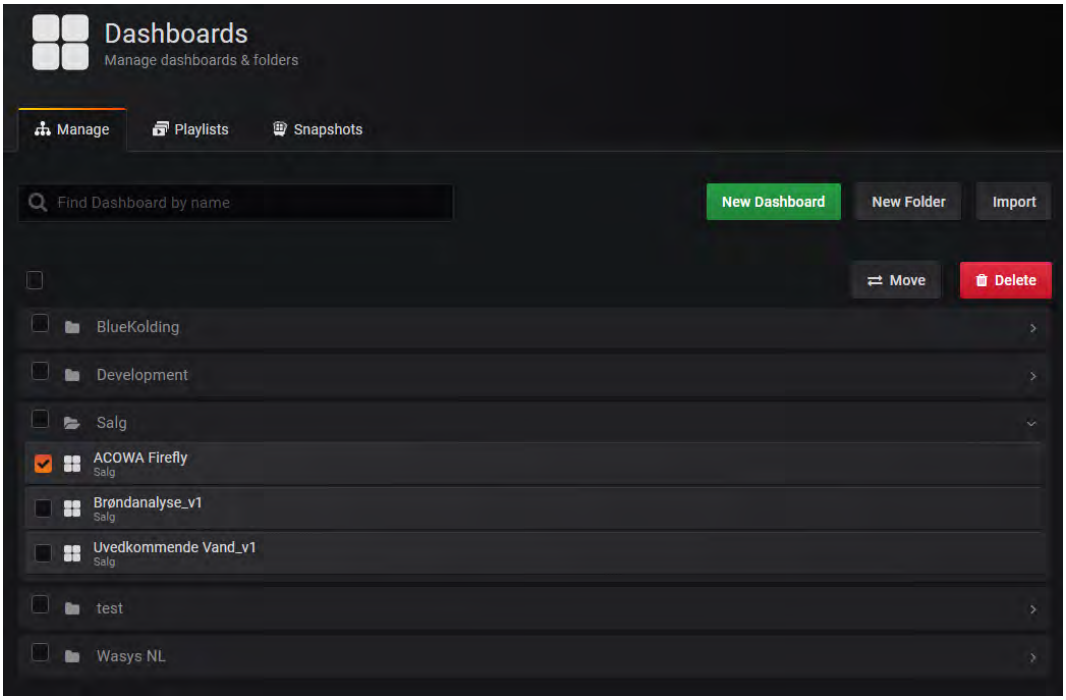
Dashboards



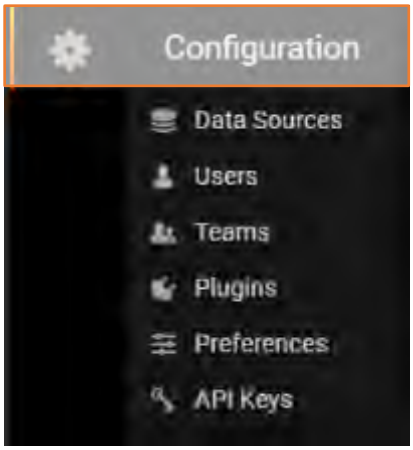
Home.
"Home" will display the selected default dashboard selected under the "Preferences" menu.

If you want to see a list of all your dashboards, select "home" on the main function menu at the top of the screen instead. (See pages 11-12)

Manage.
Under this menu you can manage your dashboards. Here it is possible to create and divide folders, you can move your dashboards around between the folders as well as create new dashboards and delete existing ones.

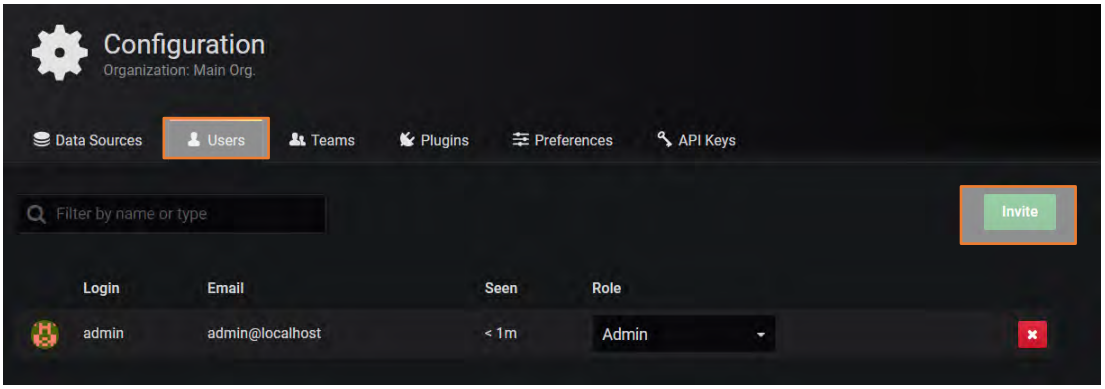


Configuration

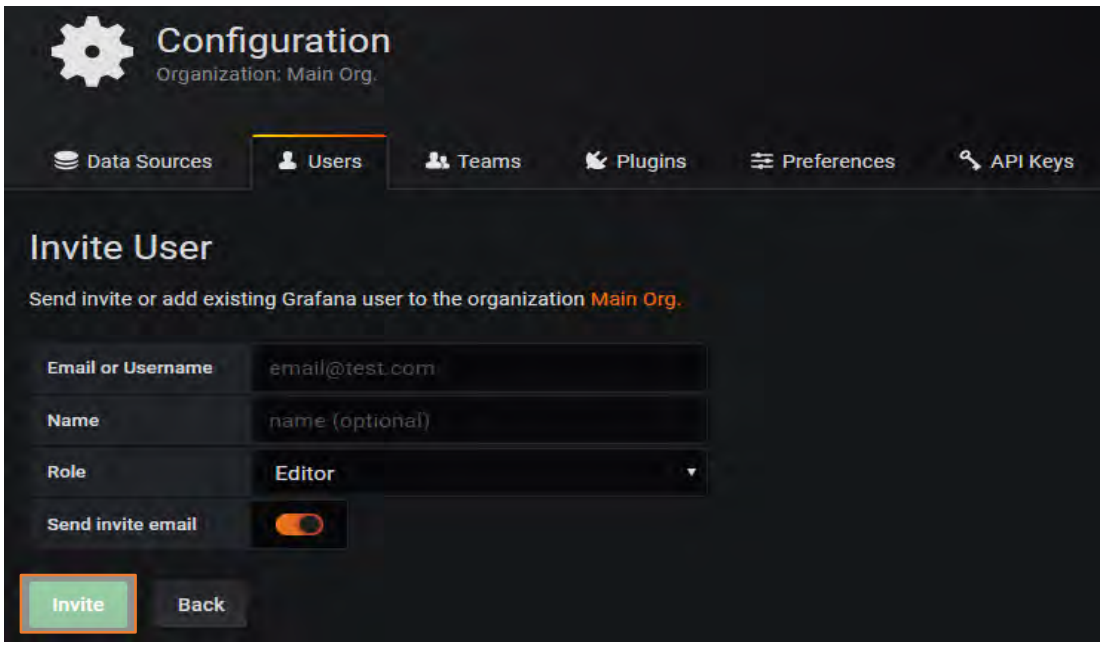


Creating users.

AcowaDash enables the creation of users at different levels and with different user rights. To create a user, you must therefore do the following. Click on the configuration logo on the left side and select the "Users" tab. Then select "Invite".



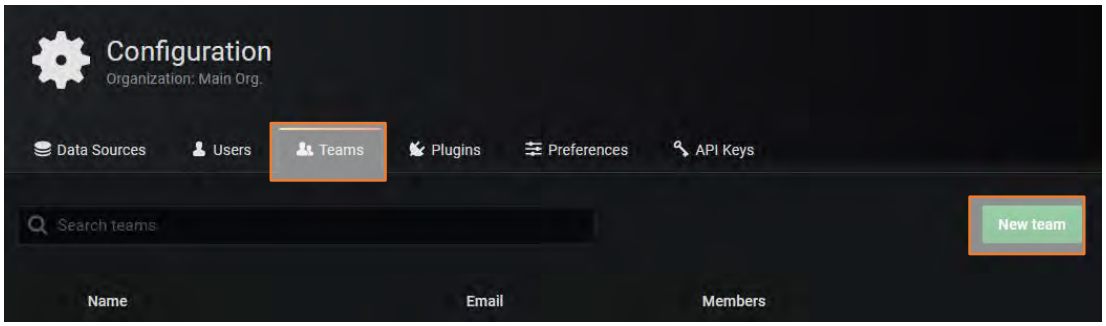
This will open the window below. Here you enter the email address and name of the user and assign the user a role. To finish click "Invite".



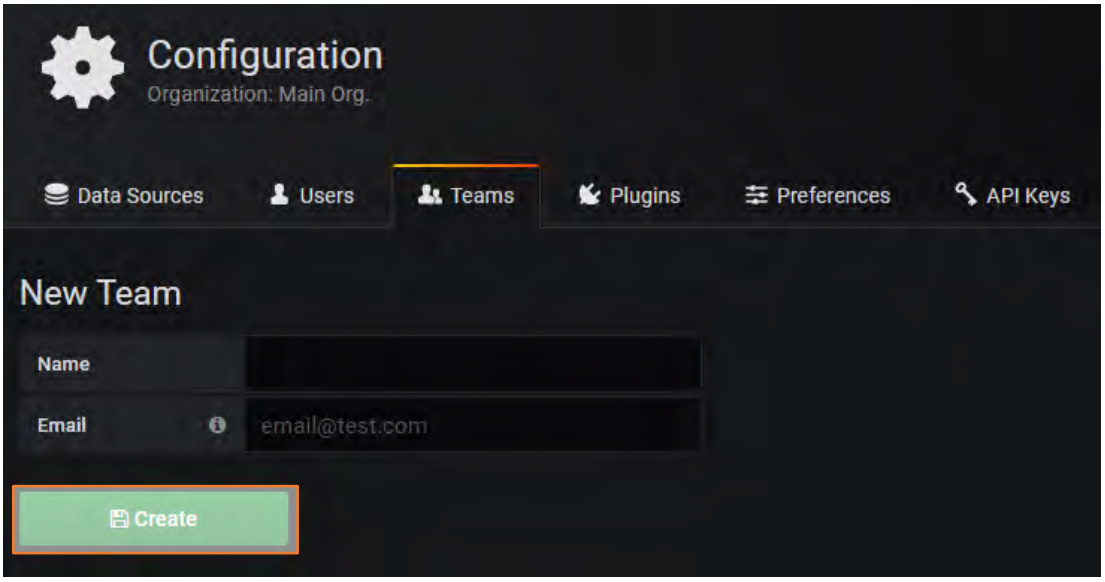
View: The user can only view dashboards.
Edit: The user can add, make changes and delete dashboards.
Admin: The user can add / remove user accesses as well as, add, make changes and delete dashboards.

Creating teams.

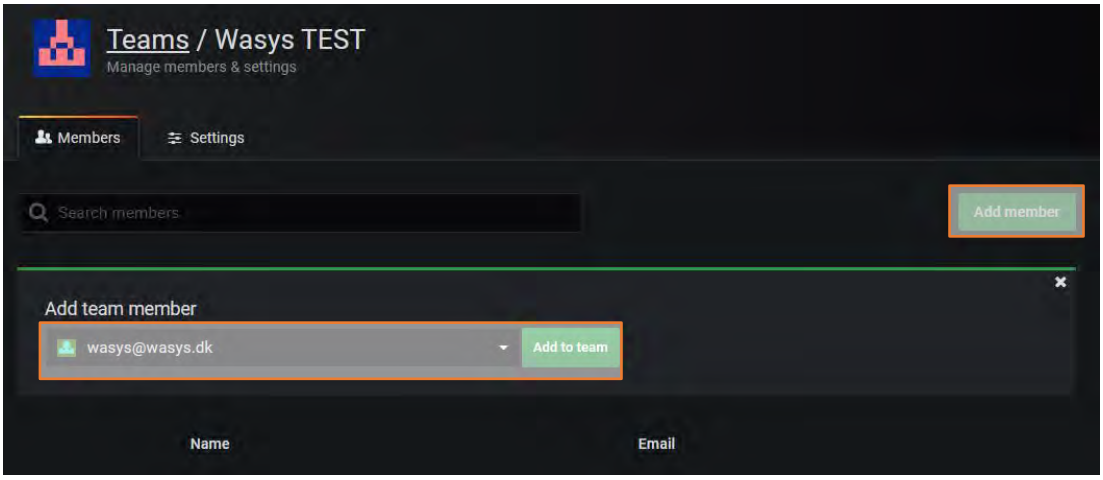
Teams are used if you have a large group of employees, who must have the same role and access options to the individual dash. When you assign access to a specific dashboard (see page 15), you choose whether it is a single user or a team. This allows you to avoid having to assign all employees the same access, as you can simply add them to a team and give the team specific access to the individual dash.



Under the menu "teams", click on "new team" on the right side.



Fill in the name of the team and your own Email address. Then click "create".

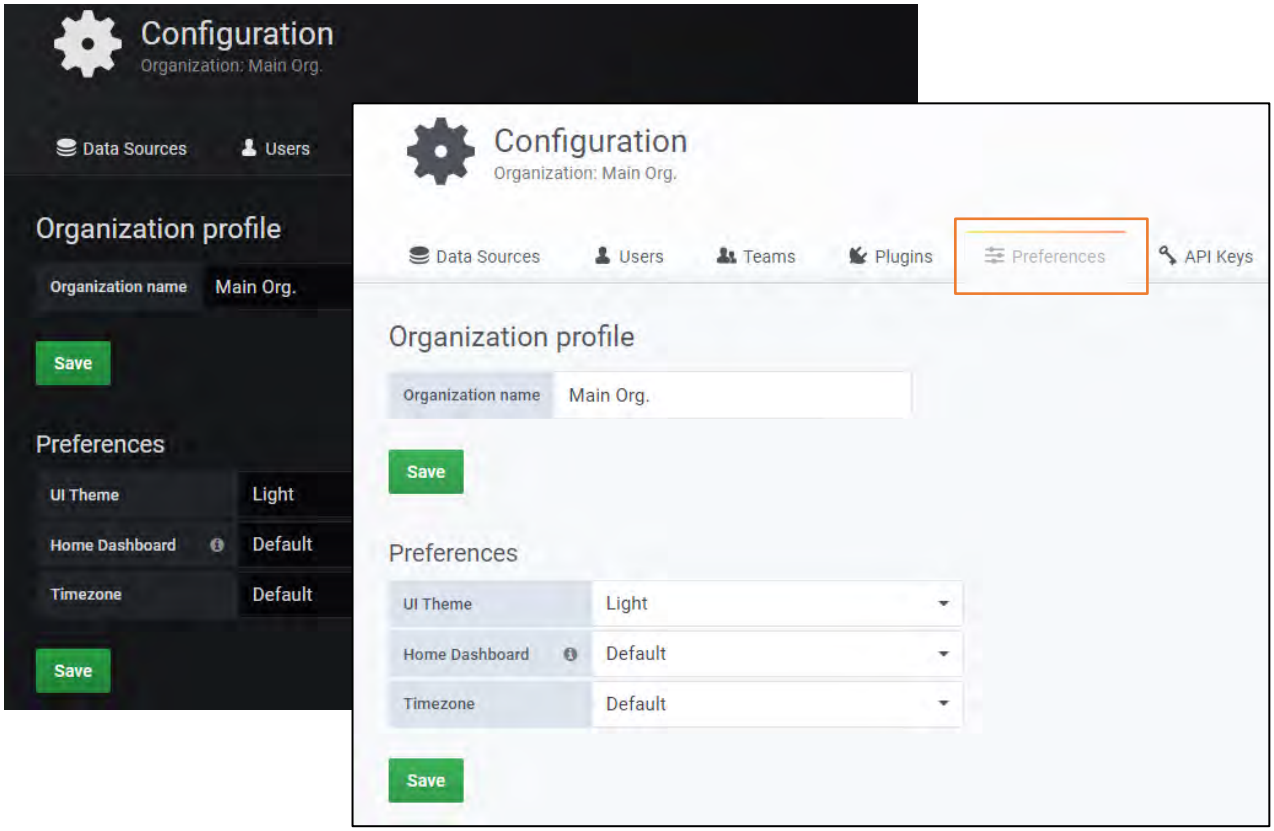


The new team will now appear in the overview list.

Now just edit the team by clicking the name. Then the image above opens. Here, "add member" is selected. In the dropdown menu, the desired user is selected and then confirmed using "Add to team".

Præferences.

Preferences can be assigned the individual user, organization or role.



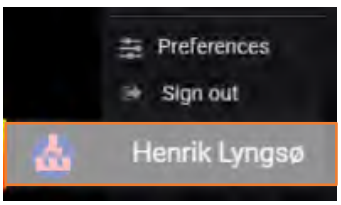
Organization:

Here, the desired name of the organization is selected. Here you also select the preferences, get all default values for new users etc. "UI theme" indicates whether you want a dark or light background. "Home Dashboard" is set to the desired. Default "Home" can be seen on the next page, but this can be changed to what the user desires. "Timezone" can be set to "local browser time" or "UTC".

User præferences:

These parameters are setups for the individual user and may thereby deviate from the organization's standards.

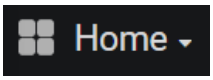
To change personal preferences, click on the logo on the left side of the image

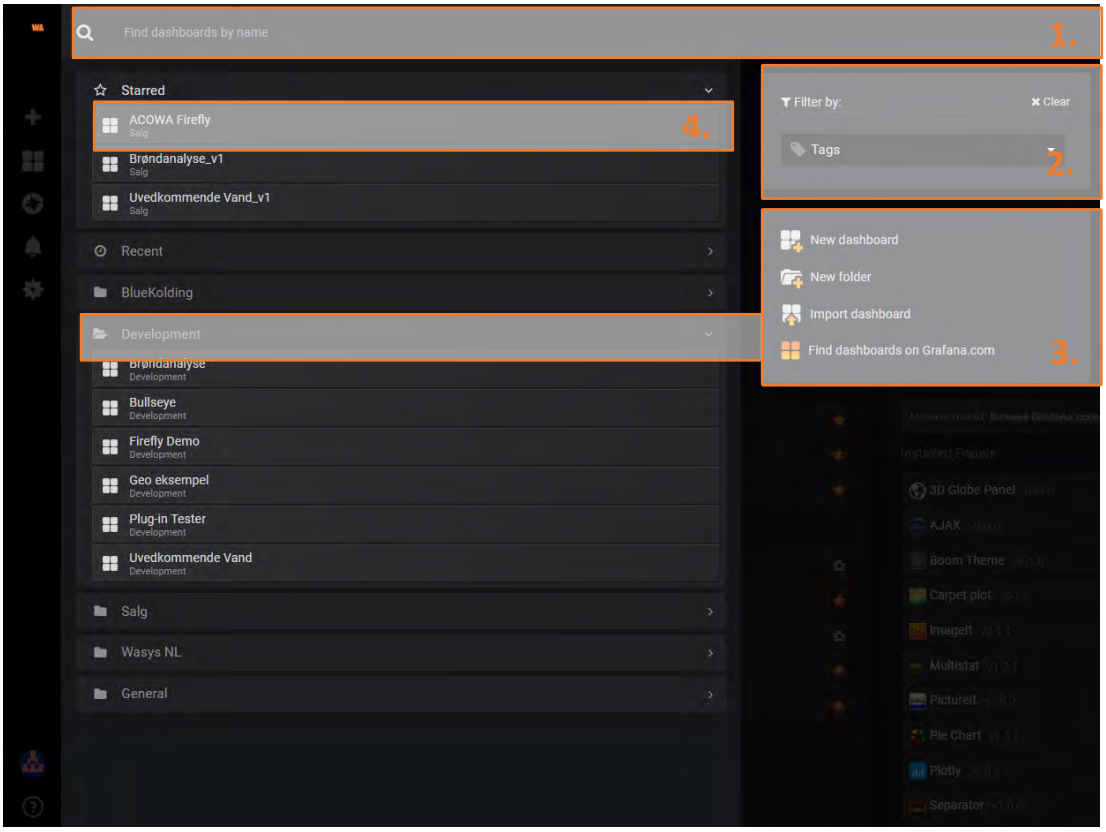


Main menu

Overview Dashboard

To activate the home menu, click on the following symbol:
This results in a similar window.





Under the menu "home" you get the full overview of all your dashboards.

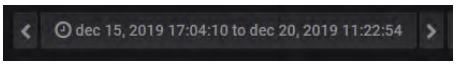
1. Search individual dashboards.
2. Filtration via tags.
3. Creating new dashboards and creating folders. By creating a folder, it is possible to add individual users to different dashboards. (See page 7)
4. Dashboard selection.

The individual dashboards can be set up according to customer requirements and will therefore vary in relation to each other. What we will review in this section, are therefore the general setting options for the individual dashboards.

Selection of desired time period

1. You can manually change a period of time by clicking on the logo in the upper right corner. This will open opens a submenu.

   This may vary depending on the layout choice, but it will generally include a number of set days and provide an option to select a time period. If a different time interval is selected, the curves and data will change according to the selected period.



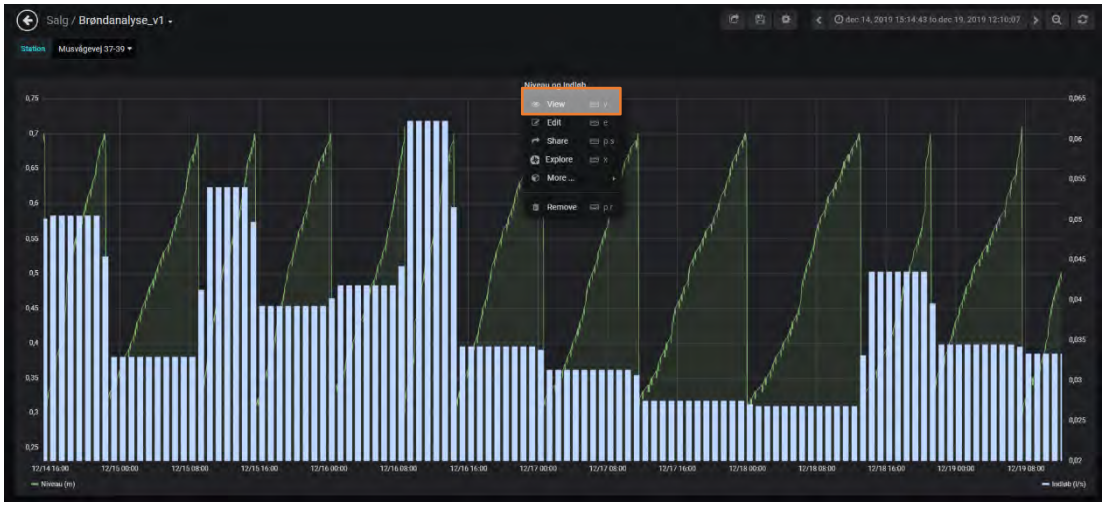
2. Another method would be to zoom directly on a curve image. This is done by holding the mouse over the curves, pressing the left mouse button and marking the period you want to zoom in on. If you want to zoom out, just double-click the left mouse button and the system zooms out automatically. When you use the zoom function, the time interval options change automatically. This means that with the help of the arrows next to the selected period, you can "jump" the same time interval back and forth. This allows you to see any hourly values without having to zoom in and out constantly.

Functions for the individual visualization image

Common to all curves and tables is the top bar opens several options for each image. For each curve or table, it is possible to click on the top bar. Doing so opens a drop-down menu with several options.

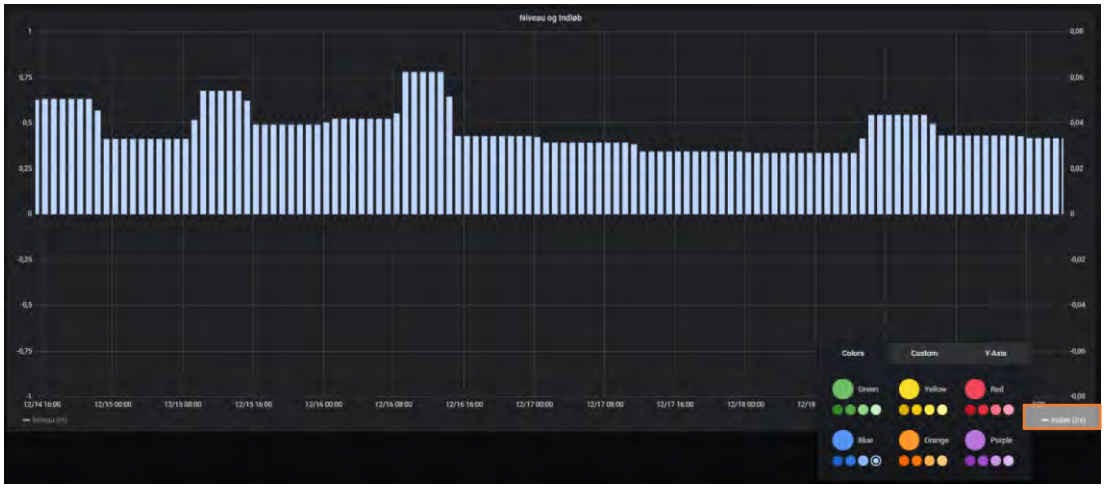
View function

The View function is a function that allows you to focus on a single curve or image. Selecting this zooms the selected curve and you can more easily see curve data.



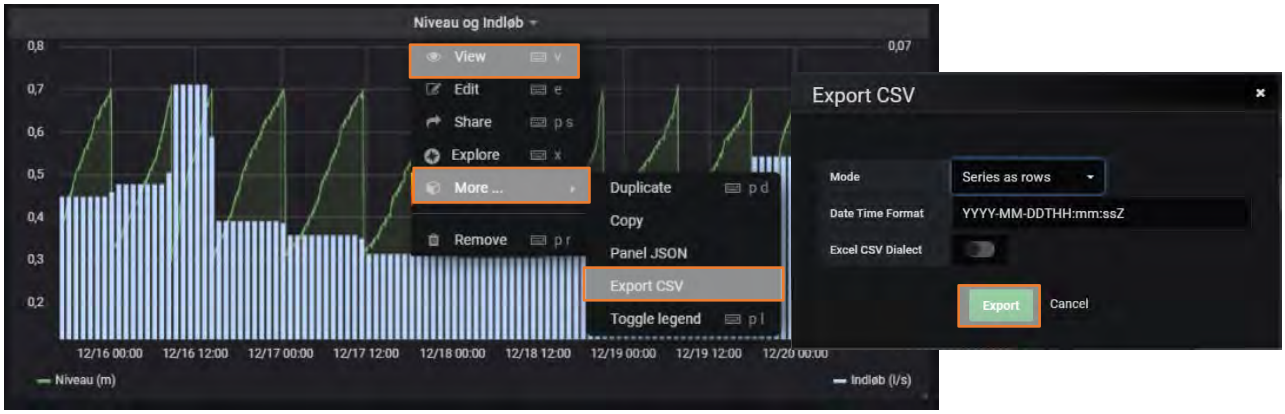
Show / Hide curves or change color and expression

It is possible to show or hide data on a curve. At the bottom of the curve image, the different data will appear. In this exsample, only Level and Inlet are displayed. By pressing the name, e.g. inlet as done in the following cases, only the inlet curve is displayed. It is also possible to change the color of the curves by clicking the color bar next to the name. This results in a pop-up menu where you can select the color and transparency of the individual curve.



Export data to CSV.

If you want to export data to e.g. a CSV file this can be done using an export function under the individual graph or table. To export data to CSV, select "more" and then "Export CSV". Then the window on the right opens. The time period for data is defined by the selected time period. This means that data is only exported for the selected time period described in the previous section. To export data, simply click "export".

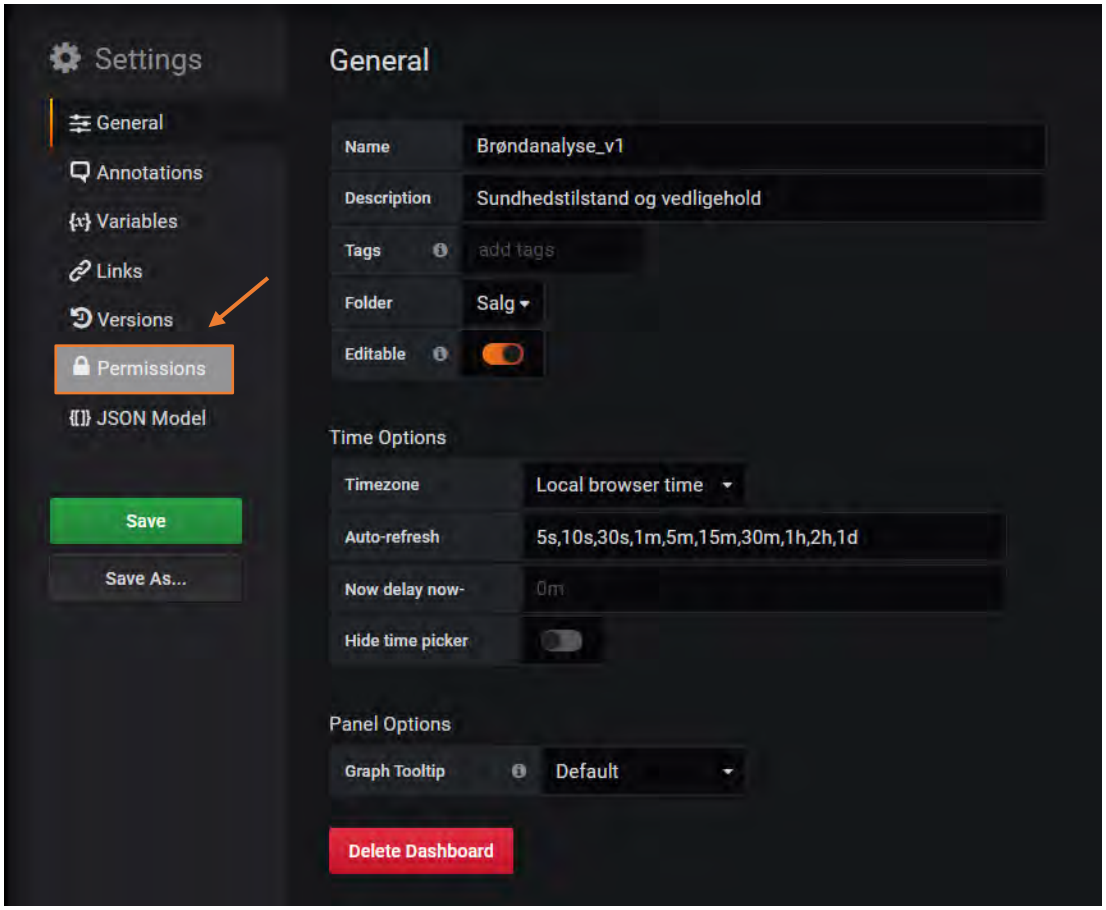


Edit

The function is used in connection with setting up the individual curve or table. (Should only be used by system integrators). Under this menu, the actual data exchange with AcowaCore is set up. Here you also choose which type of visualization you want. It is also under this menu that alarm handling and naming of e.g. the curve takes place.

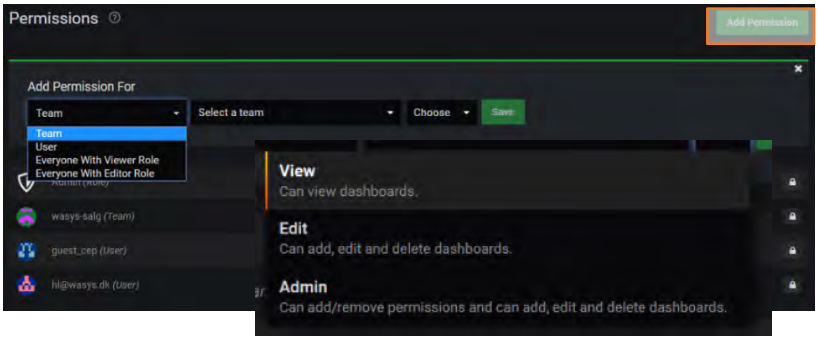
Dashboard settings.

In the top menu line you will find the logo for the settings for the individual dashboard. Clicking this opens a new submenu.



Under this menu you will be able to find the general information about the selected dashboard. Here you can assign the dashboard a tag name which can be used for search, you can assign it a folder and it is also under this menu that you assign the user rights to the individual users or teams. Creation of users and teams can be found under configuration (See page 8).

Select the "permissions" tab on the left side. The image now reopens and there is a list of which users have access to the individual dashboard and which role the individual is assigned. This role can be changed directly on the overview image.



To assign a new user or team the right to the dashboard, select "Add permission". This will open the "add permission For" dropdown menu. The first column selects whether it is a team a single user or someone with a specific role. In column number 2, the team or user in question is selected. In column number 3, the role of the selected is assigned.

View: The user can only view dashboards.
Edit: The user can add, make changes and delete dashboards.
Admin: The user can add / remove user accesses as well as, add, make changes and delete dashboards.

Dashboard Solutions

Stormflow registration and calculations

Final standards for the registration and calculation of stormflow events is individual to the specific country in which it is used. In Denmark there is not yet a specific standard, instead we use a standard called the "Vejle model" where we calculate both true overflow and conditional overflow. All information about stormflow building structures, overflow levels and type of overflow profile is defined locally in AcowaCore, installed locally at the specific user server. This means that the calculation models are dynamic and always compatible with the requirements set by the public authority locally.

True overflow

When the level in the stormflow application rises above the overflow edge and is stable for more than 1 minute, the overflow event occurs and overflows are registered. In the case of true overflow, a calculation of duration and flow rate is started. True overflow flow occurs as soon as the conditions for calculating overflow flow occur (registration of water rise in level above XX mm)

Conditional overflow.
A conditional overflow event is characterized by a start time and an end time. We have set the rules for these as follows.

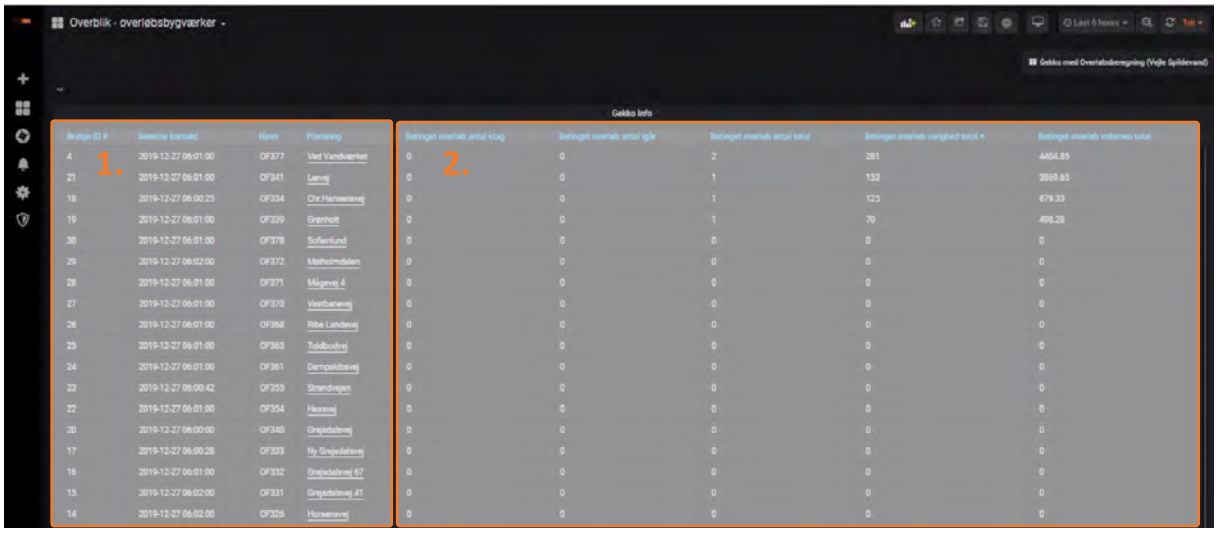
Onset time.

1. The onset time is 5 minutes.
2. A conditional event occurs only when there has been a true overflow for a continuous time that is at least as long as, the onset time period.
3. A conditional event only counts when this condition is met.
4. The duration of overflow and volume in the onset time, is added to the duration of conditional overflow and flow at the moment a conditional event occurs. Duration of overflow is only included if it exceeds the onset time period or if a conditional event is already in progress.
5. Summed flow in the onset time period is added to conditional summed flow at the moment a conditional event occurs. Summed flow is only included if the duration of the overflow exceeds the start time or if a conditional event is already in progress.
6. Within the onset time period, the conditional flow is always equal to 0. While the conditional event is taking place, the conditional flow is identical to the true moment flow.

Completion Time.

1. The completion time period is 5 hours, which is measured from the time of the end of the most recent true overflow. This is only in the event of a true overflow that takes place within the framework of the conditional event.
2. A new conditional overflow will at the earliest take place after there has been no overflow for a time that is at least as long as the completion time period + the onset time period.
3. Duration of conditional flow is counted in the same way as the duration of true flow as long as the completion time period is not completed.
4. Conditionally summed flow is counted in the same way as true summed flow as long as the end time period has not expired.

5. While the conditioned event is taking place, the conditioned flow is identical to the flow of the true flow in the moment.

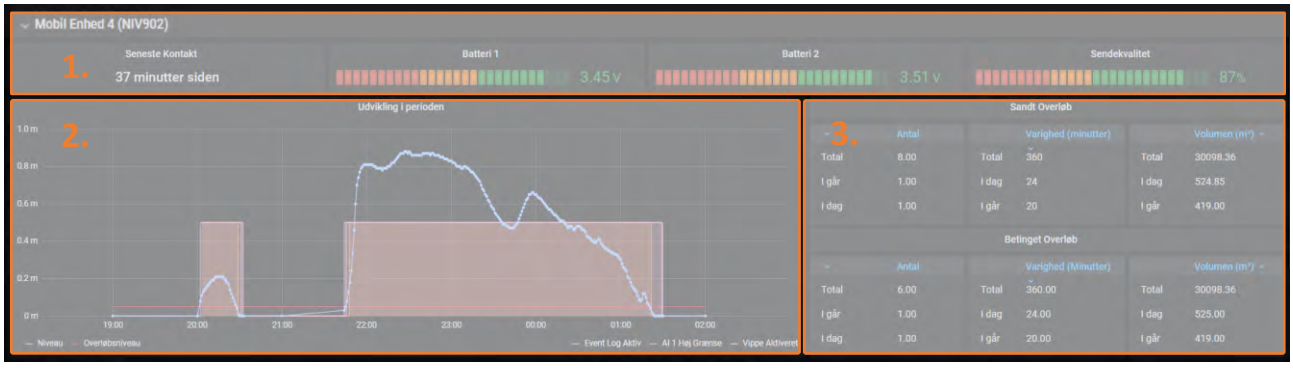


The visualization is done in 2 steps. On the front page, we have an overview with all applications and data from registered stormflow events.

1. On the left side you will find master data on the individual stormflow installations. Unit ID, which in the above example is called bridge id, is the ID number of the SCADA system. This is used when exchanging data between existing SCADA-system and AcowaCore. Last contact represents the time of last contact with the GEKKO data loggers, or most recent data exchange with the SCADA system. Name is individual and so is location. This information is used solely for the identification of the user.

2. On the right side you will find information about overflow events in the individual installation. In the overview image, you will only find the values for conditional overflow. The values include quantity today, quantity yesterday and quantity total. As well as the total values for duration and volume. Duration is given in minutes and volume is given in m³. It is possible to scale all values to the minimum / maximum value by clicking on the name of the box. When this is done, a small arrow will appear next to the name in either the up ^ or down ˅ direction.

If you want a more detailed overview of the individual installation, you can go to the specific installation by clicking on the location name of the structure. This is made clear by an underlining of the location name. When you do so, the image below appears.

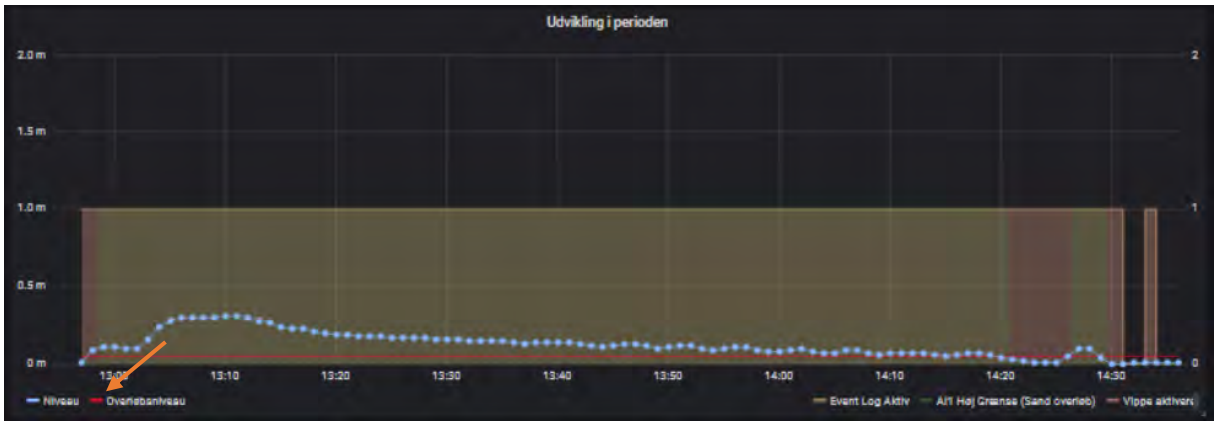


The image is divided into three areas.

1. Top area is the status of the GEKKO data logger. Here you will find the name of the installation, latest contact, battery status and signal strength of your device.

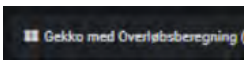
2. At the bottom left is a curve view where you can zoom in and out on a given period (See page 13.)

3. At the bottom right you will find the values for true and conditional overflow. If you want to go back to the overview image, use the function at the top right called Overview - overflow structures.

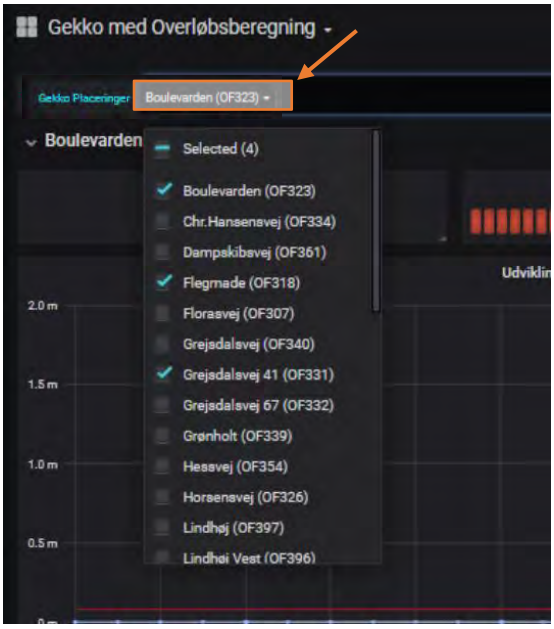


The above image is an example of a recorded overflow event. The red line represents the overflow edge and the blue line represents level. The blue dots are the individual measurements, in this case a registered overflow event is set up with an event logging of 1 min. In the previous picture you will be able to see that the standard logging is 1 hour. To show / hide the individual curves, simply click on the name at the bottom of the image (see page 14.)

If you want to compare or just view more than 1 installation with a detailed view at a time, you can select Gekko with overflow calculation on the upper right corner of the overview picture.



If you want to select an individual or more installations at a time, this is done using the dropdown menu. This is located in the area with Gekko locations in the upper left side. When clicking the arrow next to the installation name on the right right, a list of all the structures appears. Here it is just a matter of ticking the desired locations and closing the window again. This will only display the chosen installations on the overview image.



You can also open and close the image with an extended view, by using the arrow function to the left of the structure name.

Hydrogen sulphide measurement with GEKKO data logger

A CaNaRy hydrogen sulphide meter can be used to measure hydrogen sulphide levels. CaNaRy is a unique hydrogen sulphide meter, which is designed for installation in pumping stations and other sewage related applications.

CaNaRy measures hydrogen sulphide content in gaseous form with a measuring range from 0-300ppm, and converts this to a standard 4-20mA signal. The measuring cell is calibrated from the factory and does not need to be calibrated for the entire life of the cell. The service life is expected to be 2 years minimum.

The visualization of hydrogen sulfide measurement on AcowaDash is as follows.

The image is divided into three areas.

1. Status of latest contact, battery levels and transmission quality.

2. Curve display for log data with the resolution selected in the logging equipment. In addition, a 1-hour average curve for the data can be displayed. The desired period can be changed via +/- zoom on the curve or via period selection in the upper right corner of the image (See page 13.).

3. Overview image for measurements with minimum, maximum and average values. These calculations are made only in AcowaDash and therefore cannot be presented for 3-party programs via AcowaCore.

Level measurement with GEKKO data logger

For level measurement, several different methods can be used. Either via hydrostatic level transmitter (TurTle or GoPle). Via Siemens LR100 radar or via ultrasonic meter.

TurTle is a revolutionary pressure transmitter which is characterized by a robust design and is developed directly for the water supply and wastewater industry. TurTle's unique measuring cell can be separated from the stainless-steel sensor tube. This allows the measuring cell to be replaced without changing the entire electrical installation, or in the event of a damaged cable, the measuring cell can be reused with a new sensor tube. TurTle's measuring range is adjustable via DIP switch on the back of the measuring cell. TurTle can measure in 3 measuring ranges, 0-3mVs, 0-5mVs or 0-10mVs, all with 4-20mA output signal. Furthermore, it is also possible to zero-calibrate the measuring cell via DIP switch.

ACOWA GoPLe is used for level measurements in drinking or wastewater systems and is known for its high reliability and stability in level measurements. ACOWA GoPLe measures via ceramic capacitive measuring principle and, when immersed, converts the growth level into a 4-20mA current loop.

The visualization of level measurement on AcowaDash is as follows.

The image is divided into three areas.

1. Status of latest contact, battery levels and transmission quality.

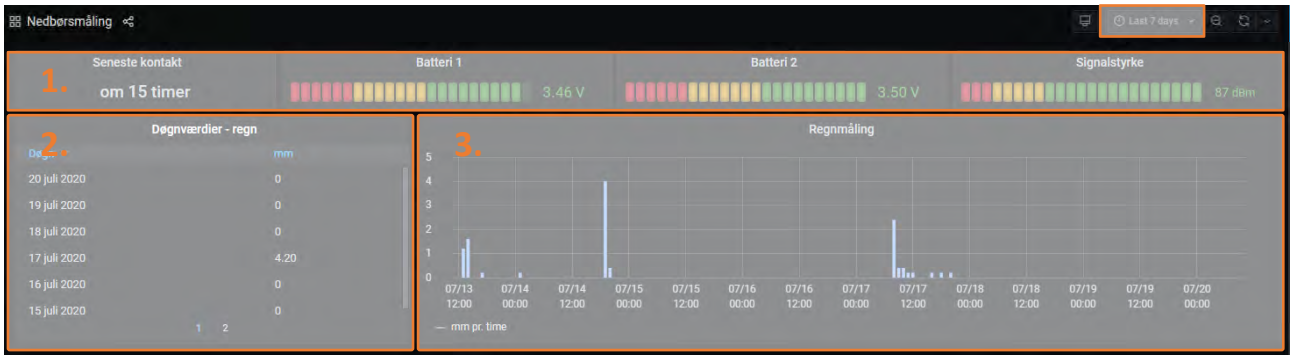
2. Curve display for log data with the resolution selected in the logging equipment. In addition, a 1-hour average curve for the data can be displayed. The desired period can be changed via +/- zoom on the curve or via period selection in the upper right corner of the image (See page 13.).

3. Overview image for measurements with minimum, maximum and average values. These calculations are made only in AcowaDash and therefore cannot be presented for 3-party programs via AcowaCore.

Precipitation measurement with GEKKO data logger

RAIN-O-MATIC PROFESSIONAL measures the precipitation by means of a funnel (orifice 200 cm2), which leads the water down into the self-emptying tipping POM bucket, held in place by a hard ferrite magnet. The magnet always exerts just enough tension to allow the measuring bucket to empty in one quick movement (less than 300 ms) and then return to its normal position, ready to once again collect precipitation. This means the counterweight always remains the same opposite to other conventional two spoons tipping bucket rain gauges.

Rain gauge delivers precipitation measurement in intervals of 0.2 mm as digital NO / NC signal.



The visualization of precipitation measurement on AcowaDash is as follows.

The image is divided into three areas.

1. Status of latest contact, battery levels and transmission quality.

2. The table shows daily values for precipitation in the selected period. The period can be changed either via +/- zoom on the curve image or via period selection in the top right corner. (The display can be made in the same way as with hydrogen sulfide measurement and level measurement).

3. Curve display for log data with the resolution selected in the logging equipment. In addition, a 1-hour average curve for the data can be displayed. The desired period can be changed via +/- zoom on the curve or via period selection in the upper right corner of the image (See page 13.).

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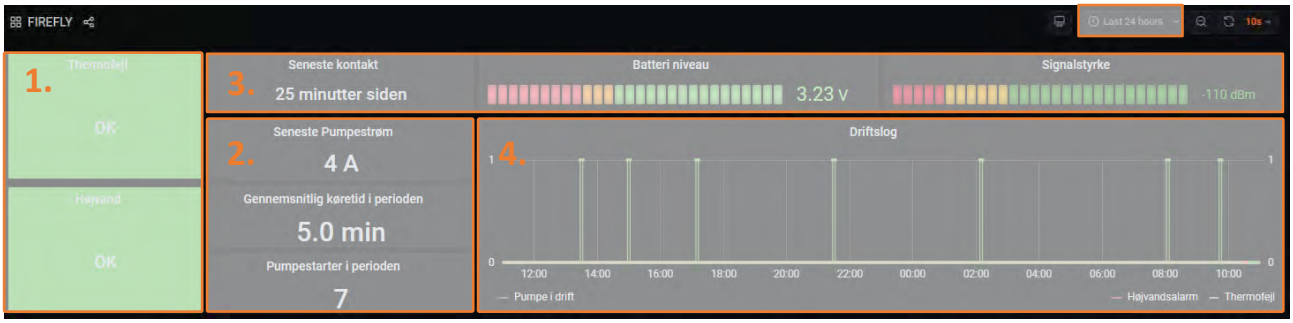
FIREFLY Alarmenhed

FIREFLY is designed for use as a simple alarm unit, according to the term “The local red alarm lamp has become intelligent”. FIREFLY is a battery-powered intelligent alarm device that can replace the existing red alarm lamp, which means, pump and high-water alarms are sent directly to the SCADA-system via the use of Sigfox communication. With the the help af an external power coil, it can also detect the number of starts and operating time for the pump.

FIREFLY comes with 2 digital inputs and 1 analogue input 0-10V DC. This is used for measuring pump current for the detecting of number of starts and operating time in total values, as well as possibility for pump status (On or OFF), in a 5 minutes resolution. This is only with the use of a external power coil.



The visualization of FIREFLY on AcowaDash is as follows.

The image is divided into four areas.

1. Status of the 2 digital inputs

2. Schematic display of operating information on the pumps in the selected period. The period can be changed either via +/- zoom on the curve image or via period selection in the upper right corner (See page 13.).

3. Status of latest contact, battery levels and transmission quality

4. Curve display of the number of starts on the pump, as well as the status of the digital alarm inputs in the selected period. The desired period can be changed via +/- zoom on the curve or via period selection in the upper right corner of the image (See page 13.).

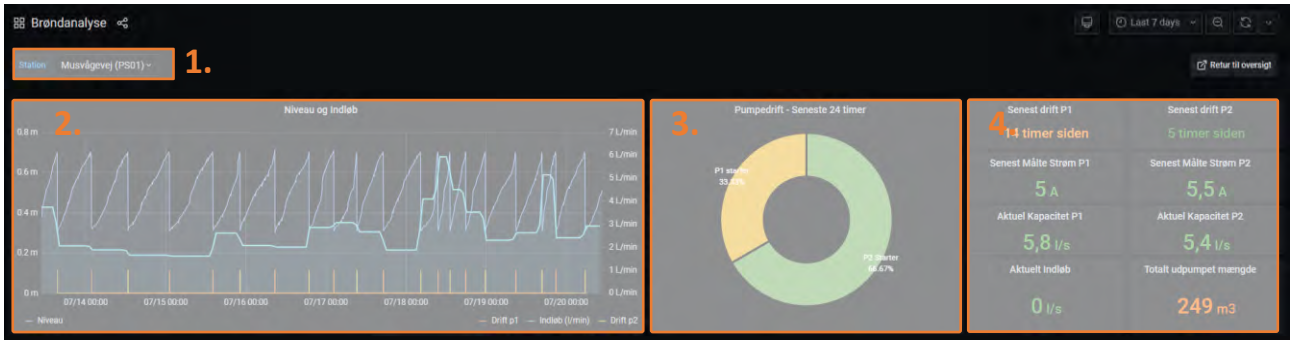
Well Analysis

AcowaCorePro is a data processing program that can use existing historical data from the user's SCADA-system and translate these into valid flow calculations on all pumping stations and stormflow applications.

These valid flow calculations can then provide the user with the following.

- Capacity calculations on all existing pumping stations with historical data.
- Inlet profiles on all existing pumping stations with historical data.
- Bullseye service module which provides a more dedicated pump service scheme.
- Stormflow calculations on all existing pumping stations and stormflow buildings with historical data
- Non-revenue water detection at existing pumping stations with historical data, both direct and indirect diversion.

The function description and visualization of these on AcowaDash is as follows

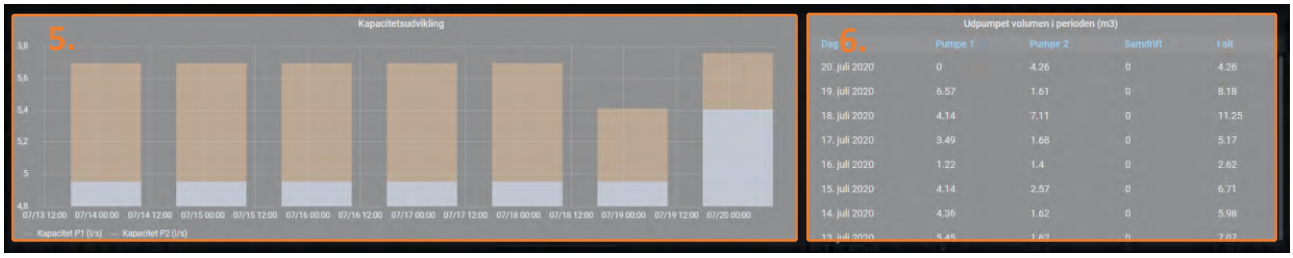


1. With this "dropdown" menu you can change the selection of the showed pumping station.

2. The curve shows the level taken from the SCADA system and the curve for the calculated inlet volume at that station. This curve can, with the use of a rainfall meter, be used in relation to detection of non-revenue water.

3. Distribution of operating time pump 1 and pump 2.

4. Schematic view of the status of the pump station. Power measurement is taken from the SCADA-system, the rest are calculated values by AcowaCorePro. The latest operating time for both pumps, the latest measured current for both pumps, the current capacity of both pumps, the current inlet in the pump well and the total pumped-out quantity at the station are shown here.



5. Comparison curve for monitoring the development of capacity of the pumps. Both individually and against each other.

6. Schematic view on the development of the volume in the pumping station.

Bullseye surveillance.
Bullseye is a function that indicates the performance of the pumps over time. The development over time can tell whether a pumping stationl experiences clogging or pipe breakage or whether the operation of a pump is no longer optimal due to wear or accident

Clogging (Warning and Alarm)
If the indicated operating points move upwards and to the left over time (back pressure increases and flow decreases), there is evidence that the same amount of water can no longer be moved and there is likely to be a clogging.

Pipe Break (Warning and Alarm)
If the movement in the operating points is downwards and to the right (back pressure decreases and flow increases), there is probably a pipe break in the subsequent piping.

Pump service (Warning and alarm)
If the operating point moves downwards and to the left of the system (counter pressure drops and flow drops), the pump is no longer able to move the same amount of water as before and can thus be damaged or worn.

Here, the development of a pump's operation is shown over time. The last days average flow and back pressure (approximated by the value 1/pump flow) for the given pump are plotted in the graph.

Non-revenue water

AcowaCorePro is a data processing program that can use existing historical data from the user's own SCADA-system and translate it into valid flow calculations at all pumping stations and stormflow applications.

These valid flow calculations can then provide the user with the following.

- Inlet profiles of all existing pump stations with historical data.

This data can be used for detecting non-revenue water. More specifically, seepage or the buildup of groundwater that penetrates the gravity lines.

The function description and visualization of these on AcowaDash is as follows

1. These "dropdown" menus allow you to change the selection of pumping station shown below. Here you also enter information about the piping system or the installation area. This information is used to compare the amount of non-revenue water in % further down the page. Here is also the time period in which you wish to monitor your pumping station. Here you enter the period of time, where the possibility for only non-revenue water is the highest. Typically, a period in the during the night hours, is selected.

2. The columns show the inlet volume of non-revenue water per day (during the selected night log period), the calculated accumulated inlet volume of non-revenue water for a 24-hour period, as well as the actual total inlet volume of the same day at that station.

3. Calculation of the total inlet volume versus the inlet volume during the night hours.

4. Schematic view of the selected comparison parameters at the top of the page. Provides a comparison basis for further planning.

Future safe Instrumentation

The mission of ACOWA Instruments is to deliver quality products for intrumentation, based on newest avalable technology and equiped with advanced, thoroughly tested functionality. Choosing an ACOWA products means choosing a future safe product.

High Speed development

If you choose ACOWA Instruments, you choose a future-proof product.

Our skilled developers constantly have a finger on the pulse and make sure that all products labelled ACOWA Instruments, are amongst the best on the market.

Danish design - from top to bottom

ACOWA products are produced and developed in Denmark. This goes for hardware as well as software. On top of this, all developement takes place in close dialogue with our customers.

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