



Telemetry Manual

Telemetry is an app for displaying Sparvio data. The data will be sent from an SKH3 logger to the ground via SKC1 or via the drone's data link. The setup also makes use of the database InfluxDB to store the data and the web site Grafana to visualize the data.

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Installation

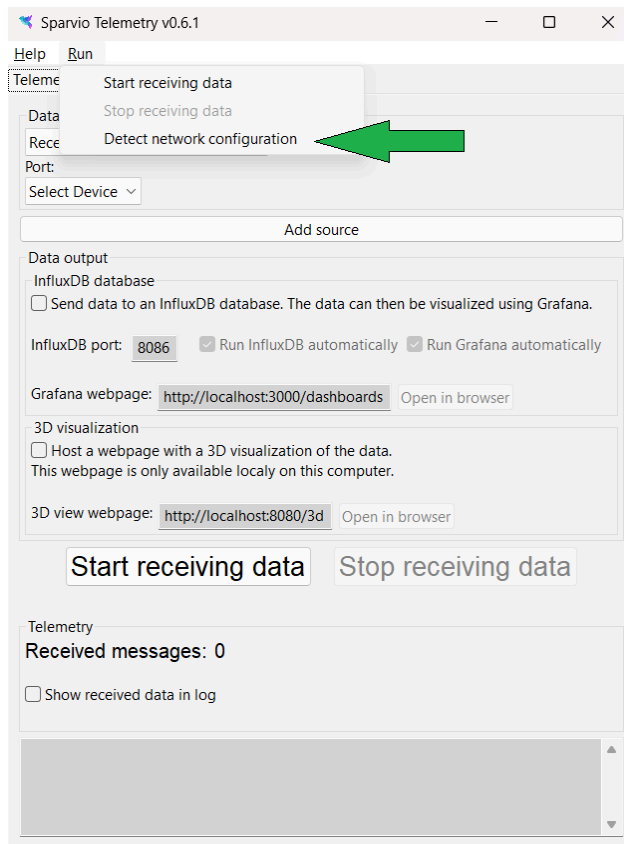
1. Install Grafana:
<https://grafana.com/grafana/download?pg=get&plcmt=selfmanaged-box1-cta1>
Make sure Run Grafana as a Service is enabled
2. Install influxdb:
 - a. Download
https://dl.influxdata.com/influxdb/releases/influxdb-1.7.1_windows_amd64.zip
 - b. Unzip the downloaded folder
 - c. Copy the folder influxdb-1.7.1 to C:\Program Files\influxdb-1.7.1
 - d. Search for **Edit the system environment variables** in the windows search bar and open the Control Panel result
 - e. Press **Environment Variables**
 - f. Select the variable Path under **User variables**
 - g. Press **Edit** under **User variables**
 - h. Press **New** and enter C:\Program Files\influxdb-1.7.1
This folder should contain the executable file influxd.exe
3. Open Grafana at <http://localhost:3000>
 - a. Login with "admin" (without quotes) as both username and password. You can skip changing from the default username and password.
 - b. Under **Data sources**, select **Add new data source** and pick **InfluxDB**
 - i. Under **HTTP**, fill in the URL <http://localhost:8086> (even if it's the default). Make sure this field doesn't have a red border after the change.
 - ii. Under **InfluxDB Details** then **Database** should be "live" (without quotes), user and password are both "admin" (without quotes)
 - iii. Press Save And Test. If an error is shown, this is not a problem
4. Download Sparvio Telemetry app
5. Open Telemetry app



- a. When prompted, use the provided config file config.ini if you have been provided one. Otherwise let the program generate a default config
- b. If you are using RR1 / RR2:
 - i. Plug in RR1 or RR2 to the PC using USB
 - ii. Under Data Source, Use option **Receiver USB (RR1/RR2/RR4)**
 - iii. Change the dropdown labeled port to the COM port for RR2
- c. If you are using Mavlink + HereLink:
 - i. Under Data source, Use option **Mavlink - Initiate UDP link**
 - ii. As Ip, enter the ip-address of the HereLink remote controller
 - iii. Enter 14552 as Port
- d. Under Data output, check the box **Send data to an InfluxDB database**.
- e. Make sure run influxDB automatically and run grafana automatically are checked
- f. Press **Start receiving data**
 - i. If you see the text 'Failed starting influxdb', the Path variable is probably not set correctly.

Using Multiple Receivers

It is possible to use multiple radio receivers communicating with multiple SKH3 at the same time. This requires some extra initial setup. For each SKH3, connect it to your PC via USB. Make sure everything is plugged in. Then, press the menu item Run->Detect network configuration





After doing this, a list containing all Sparvio devices connected to the SKH3 should appear. Press ok and repeat the process for all SKH3 devices.

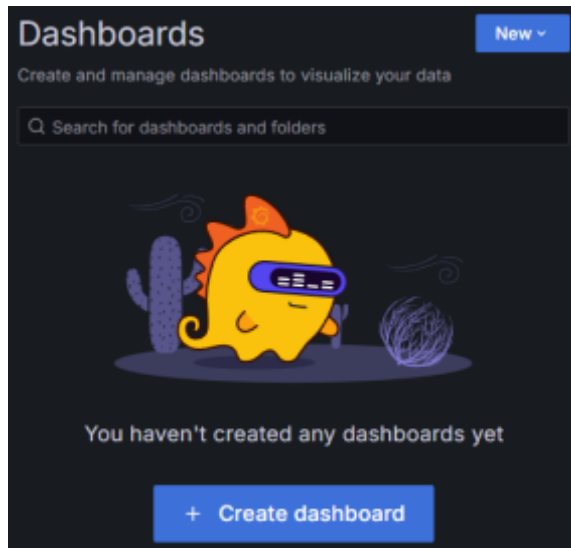
When you are ready to receive data, you can add more input sources by pressing the Add Source button, choose **Receiver USB (RR1/RR2/RR4)** and pick the COM port for your second receiver.

Configure Grafana

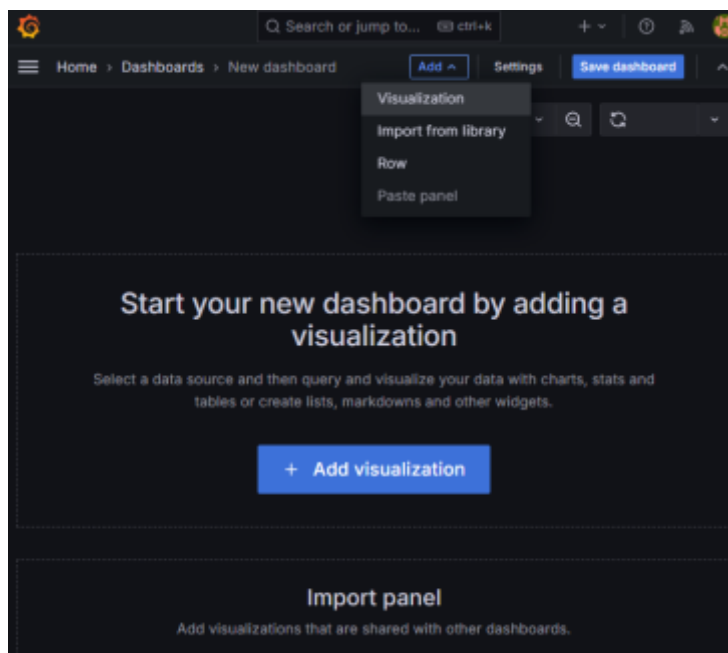
In Grafana there are a number of **dashboards**. On a dashboard there are a number of **panels**, our panels will be displaying graphs. These panels can be moved or resized on the dashboard. The panels get their data from a number of **queries** in the panel. These queries talk to InfluxDB.



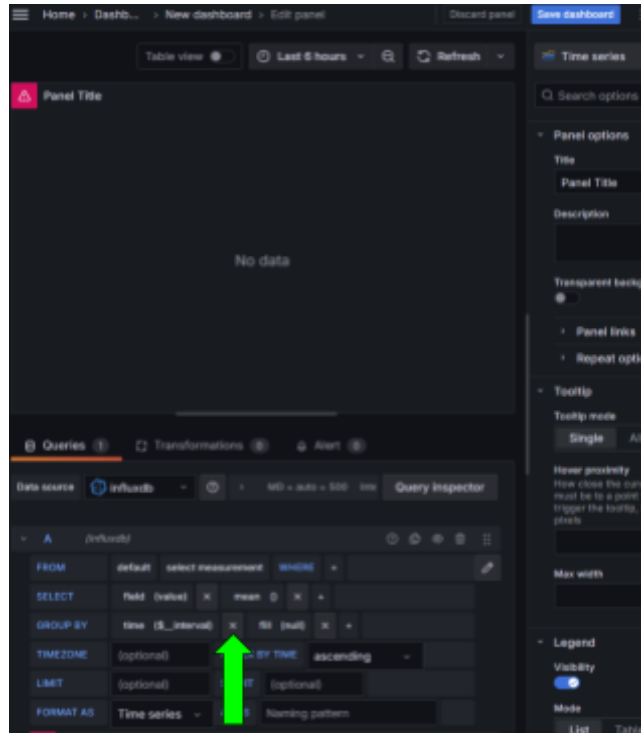
1. Make sure that you are receiving data by checking that the number of **Received messages** are increasing.
2. Select the right **Data Source** and the right **Port** from which you are receiving data from.
3. Then open grafana by pressing the **Open in browser** button in the telemetry app. (The button will become clickable once you have an active source)



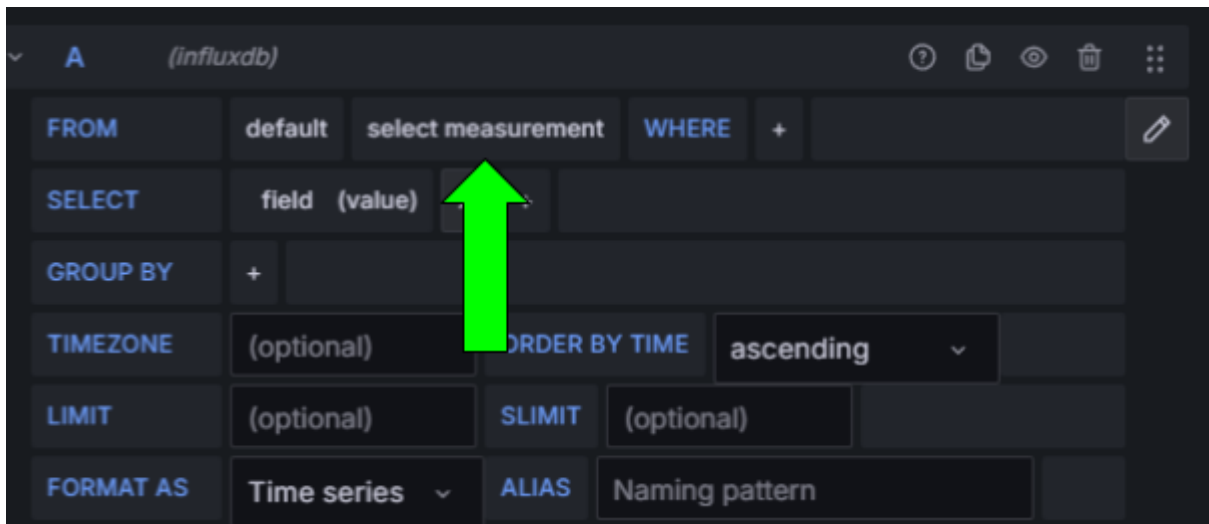
If you are prompted for a login use “admin” for both username and password like before. Click the **Create dashboard** button. You can also click **New** and then **New dashboard**.



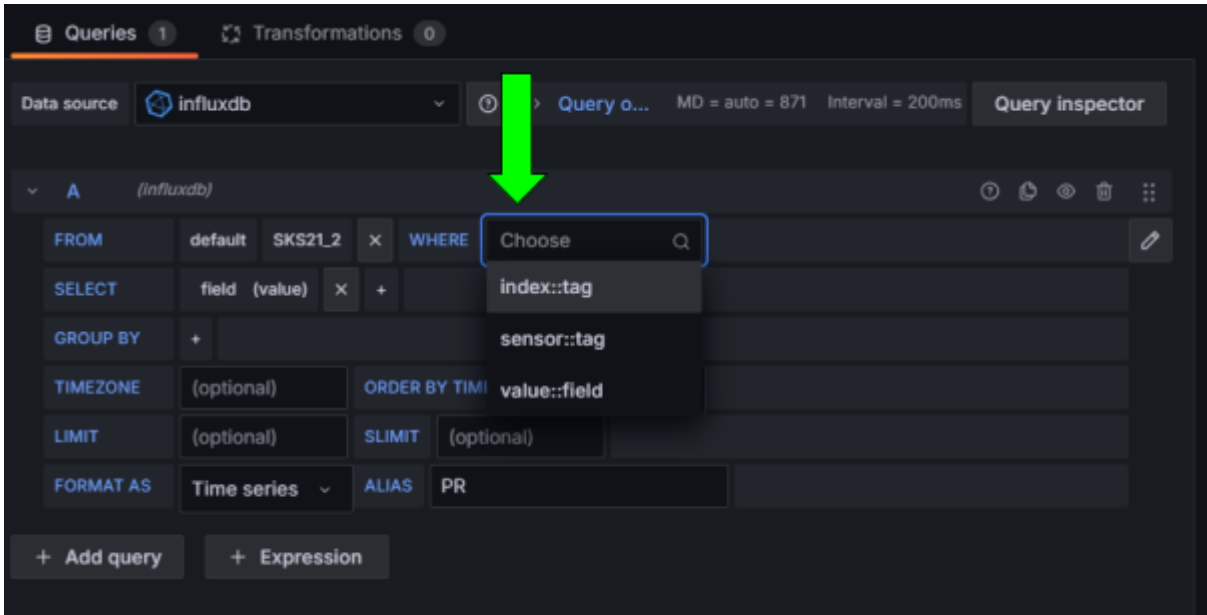
Click **Add visualization** (or **Add** followed by **Visualization** if you don't have that button). Select **influxdb** as the data source by clicking it.



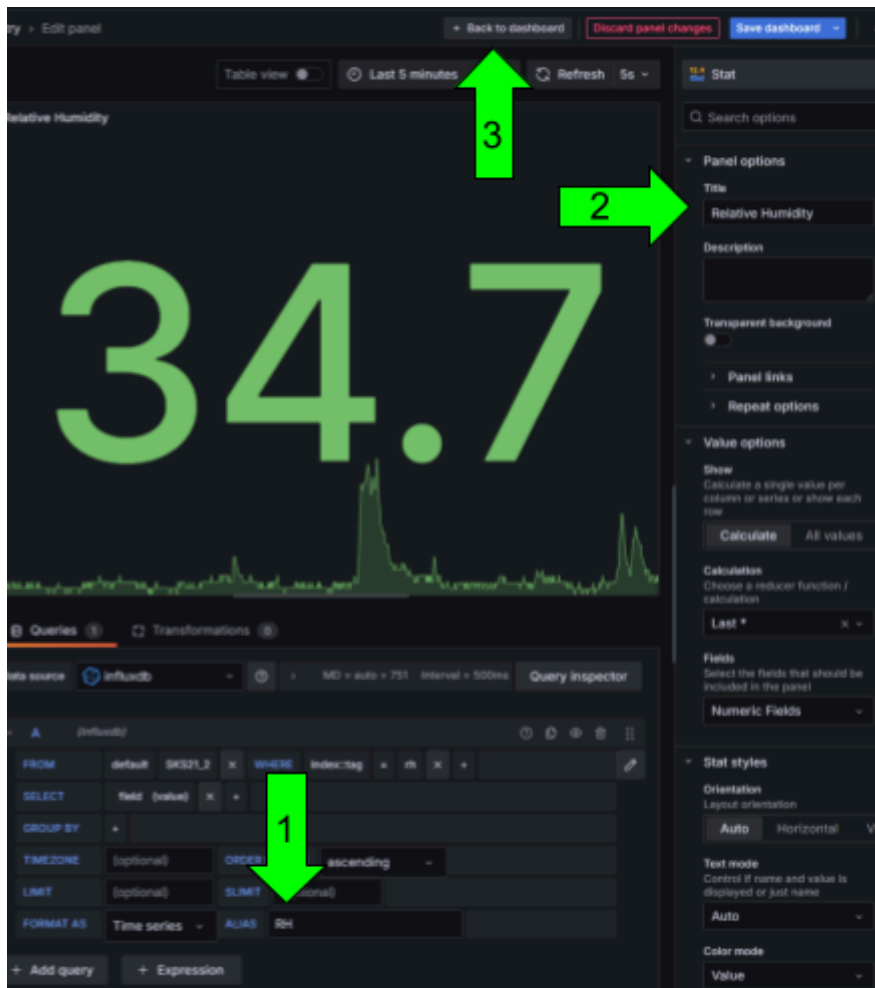
Remove the **GROUP BY** by clicking the cross between **time** and **fill**.



Now click the field that says **select measurement** and you will get a dropdown with all the sensors that are reporting values. Select a sensor that you want to display data from. The sensor labeled rr1 is the data coming from SKH3 itself. If you are connecting via Mavlink, all data will be labeled as skh3.



Click the plus in the where clause. Select **index::tag** and then click **select tag value** and choose what data you want to display.



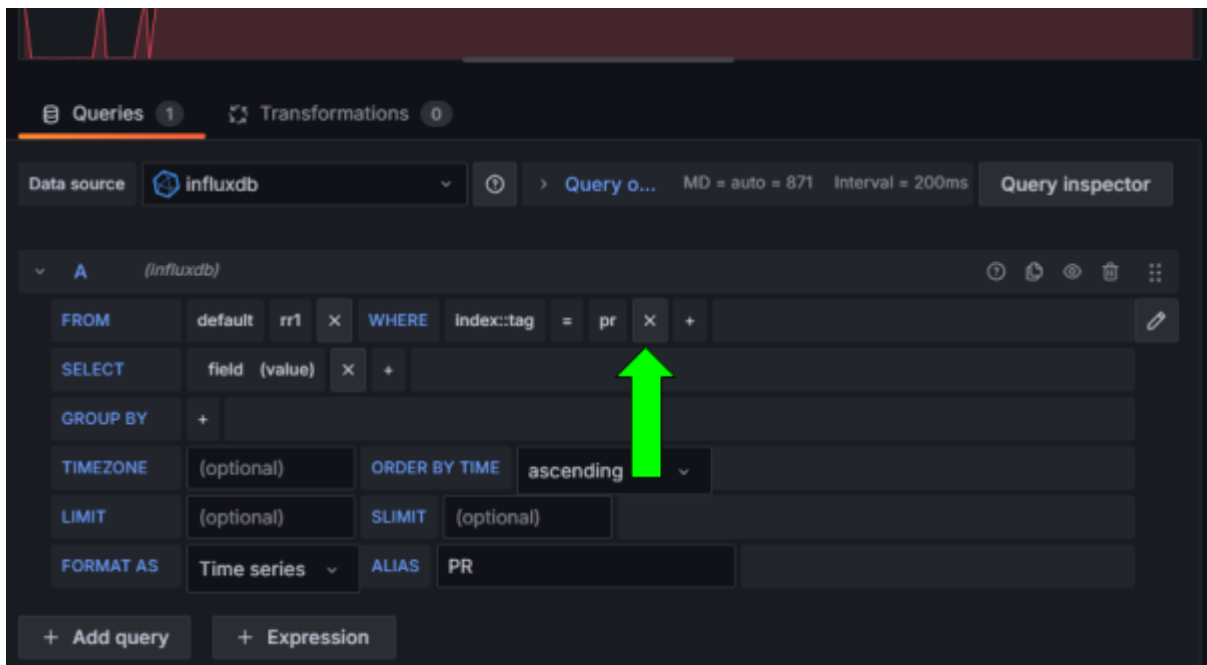
1. Finally change the alias to a descriptive name
2. Give the panel a title in the right side bar



3. Click **Back to dashboard**



To make another panel we will first copy the previous one. Hovering over the panel will show 3 dots in the top right corner, press those and then **More** and then **Duplicate**. Click the 3 dots on the *new* panel and then **Edit**.



Below the large view of the panel there is a query marked A. Remove the **WHERE** clause by pressing the cross to the right of it. Then select a new sensor to receive values from like before. When you are done press **Back to dashboard**.



Keep duplicating and editing to add all the data you want to see. You can drag and resize the panels to organize them as you would like. Make sure to press **Save dashboard** otherwise your changes will disappear after you close the web page.



Update Rate

By default the fastest update rate in grafana is once every 5th second. This can be changed.

1. Place the file custom.ini at C:\Program Files\GrafanaLabs\grafana\conf\custom.ini
2. Restart the grafana service:
 - a. Press Windows + R
 - b. Type services.msc
 - c. Find and select Grafana
 - d. Press **Restart the service**



On your dashboard, click **Settings**.



1. Add a 1s, 1 second, option to the auto refresh options
2. You can also set a title for the dashboard



1. Select your desired update rate, for example **1s**.
2. You can also set the time span, for example **Last 5 minutes**.



Non-time Chart

You can configure a chart that does not have time on the X-axis. For example temperature on the Y axis and altitude on the X axis.

Create a new **Visualization**. (You can as well click on the “+” on top of the screen and then on “new dashboard”).

Change the type from Time Series to **XY Chart**. If you don't have XY Charts as an option you probably have to upgrade to a newer version of Grafana. Note that the similar Trend chart requires ascending X values and because of that we choose the XY Chart.

Create two **Queries** that get the data you want to display.

The screenshot shows the Grafana Query Editor interface with two queries, A and B, configured for InfluxDB. The interface includes a top bar with 'Query 2' and 'Transform data 1' tabs, a 'Data source' dropdown set to 'influxdb', and 'Query options' (MD = auto = 1907, Interval = 10s) and 'Query inspector' buttons.

Query A (influxdb):

- FROM: default pr
- WHERE: sensor::tag = bmp581_0
- SELECT: field(value)
- GROUP BY: +
- TIMEZONE: (optional)
- ORDER BY TIME: ascending
- LIMIT: (optional)
- SLIMIT: (optional)
- FORMAT AS: Time series
- ALIAS: BMP581 #0 pressure

Query B (influxdb):

- FROM: default temp
- WHERE: sensor::tag = bmp581_0
- SELECT: field(value)
- GROUP BY: +
- TIMEZONE: (optional)
- ORDER BY TIME: ascending
- LIMIT: (optional)
- SLIMIT: (optional)
- FORMAT AS: Time series
- ALIAS: BMP581 #0 temperature

At the bottom, there are buttons for '+ Add query' and '+ Expression'.

Go to Transform Data and create a **Join by field** transformation in mode **OUTER (TIME SERIES)** on the field **Time**.



In the options for the XY Chart select your frame and your X and Y field.

Below the XY Chart settings you can also change the visualization to show lines or change the size of the dots.



Geomap

You can configure your measurements to be displayed on an interactive map.

For this guide you will need to have the necessary measurements in Telemetry. So have SKH3 running and make sure it has a GPS fix.

Create a new **Visualization**. (You can also click on the “+” on top of the screen and then on “new dashboard”).

The screenshot shows the InfluxDB Query Editor interface with three queries (A, B, and C) configured for a Geomap visualization. The interface includes a panel title, a time series plot, and a query editor with three queries (A, B, and C) listed below. Each query is configured with a FROM clause (default rr1), a WHERE clause (index:tag = lat, lon, or pr), a SELECT clause (field (value)), and a FORMAT AS clause (Time series). The alias for each query is latitude, longitude, and pressure respectively. The GROUP BY and MEAN options are removed from each query, as indicated by the 'X' marks in the image.

Panel Title

100000
50000
0

11:40:30 11:41:00 11:41:30 11:42:00 11:42:30 11:43:00 11:43:30 11:44:00 11:44:30 11:45:00

— latitude — longitude — pressure

Queries 3 Transformations 2 Alert 0

Data source **InfluxDB** MD = auto = 500 Interval = 500ms Query inspector

A (/influxdb/)

FROM default rr1 WHERE index:tag = lat

SELECT field (value) mean ()

GROUP BY time (\$_interval) fill (null)

TIMEZONE (optional) ORDER BY TIME ascending

LIMIT (optional) SLIMIT (optional)

FORMAT AS Time series ALIAS latitude

B (/influxdb/)

FROM default rr1 WHERE index:tag = lon

SELECT field (value)

GROUP BY +

TIMEZONE (optional) ORDER BY TIME ascending

LIMIT (optional) SLIMIT (optional)

FORMAT AS Time series ALIAS longitude

C (/influxdb/)

FROM default rr1 WHERE index:tag = pr

SELECT field (value)

GROUP BY +

TIMEZONE (optional) ORDER BY TIME ascending

LIMIT (optional) SLIMIT (optional)

FORMAT AS Time series ALIAS pressure

+ Add query + Expression

Next we will configure the coordinates. First add queries for latitude and longitude. Use alias to name the fields. Repeat this for longitude and some initial measurement, for example pressure. Name the coordinates exactly **latitude** and **longitude**, otherwise you will need to configure the **Location Mode**. Also remove the **mean** and **Group by** options, do that by removing the **time** option by pressing the X marked in the image.



The screenshot shows a data table with the following columns: latitude, longitude, pressure · Time, and pressure. The data rows are:

latitude	longitude	pressure · Time	pressure
58.4	15.6	2025-08-07 09:35:30	100710
58.4	15.6	2025-08-07 09:35:45	100710
58.4	15.6	2025-08-07 09:36:00	100711

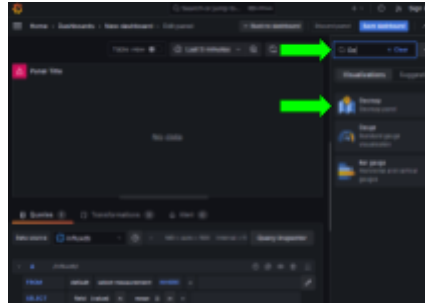
Below the table, the 'Transformations' panel is visible, showing two transformations:

- 1 - Concatenate fields (indicated by arrow 3)
- 2 - Filter fields by name (indicated by arrow 4)

The 'Filter fields by name' transformation is configured with the 'Regular expression pattern' identifier and the following fields selected: latitude · Time, longitude · Time, pressure · Time, and pressure.

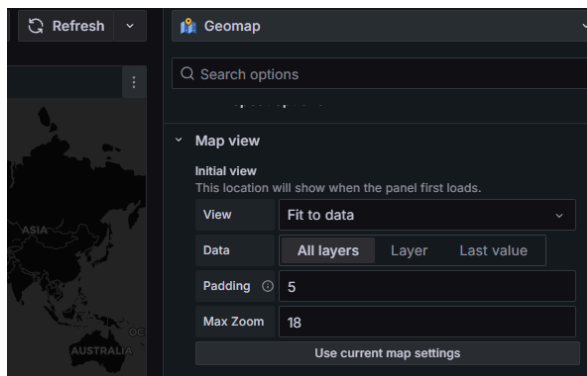
Next we need to put all the fields into the same query.

1. Go to Transformations
2. Switch to table view so that you can see the queries
3. Use **Add another transformation** to add a **Concatenate fields** transformation
4. Optionally add a **Filter fields by name** and click the repeated time fields under the **Identifier** option
5. Switch off table view



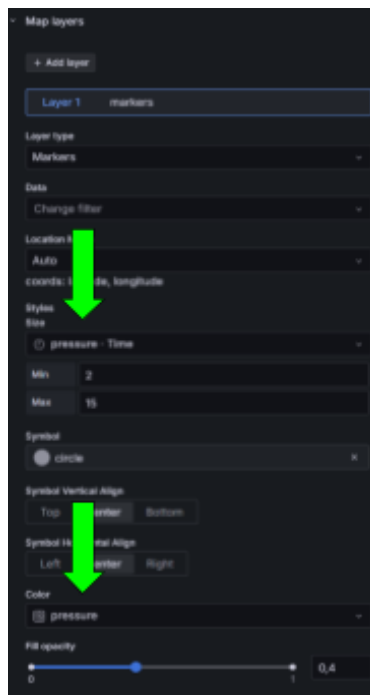
Change the type from **Time series** to **Geomap**.

Now we will go through options from top to bottom and set some reasonable defaults.

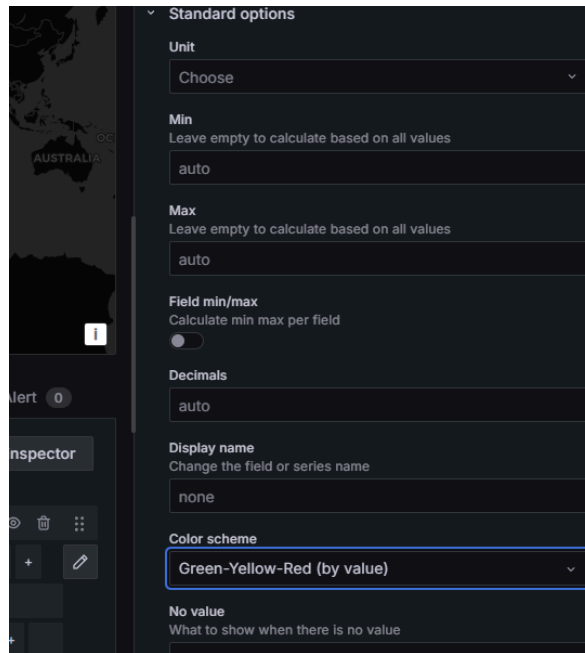


Change **Map view** > **Initial view**

- View: Fit to data



Under **Map layers** you can make the size or the color of the markers depend on different measurements.



Change **Standard options** > **Color scheme** to **Green-Yellow-Red (by value)**. Otherwise the color setting above won't work.

Miscellaneous options:

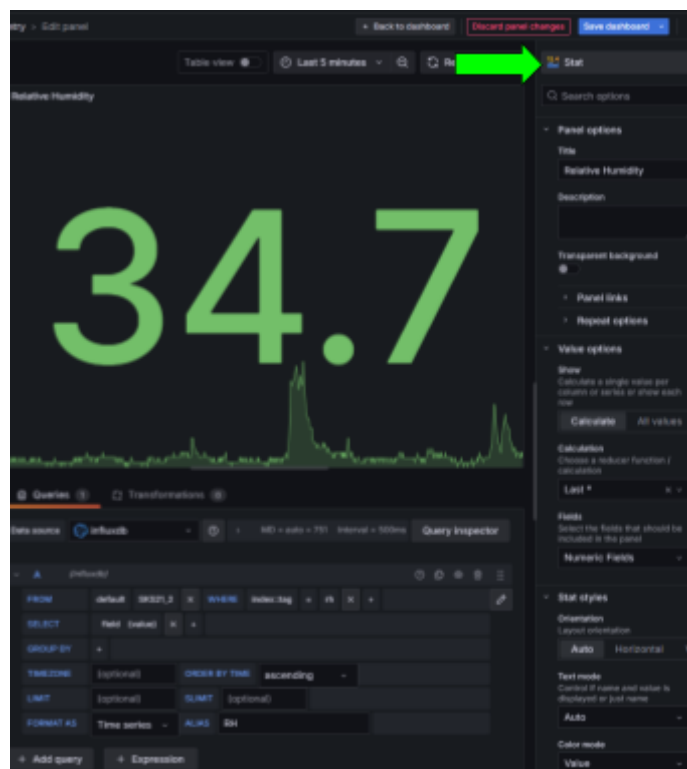
- **Map layers** > **Layer type** can be changed to **Heatmap**
- You can change the **Basemap layer** to **Open Street Map** to get a more detailed map.



Extra Grafana Configuration

These are some extra configuration options that you could use.

- When editing a panel you can add multiple queries to display several lines.
- In the right sidebar when editing a panel you can make various stylistic changes.
 - Under **Standard options** > **Unit** you can select an appropriate unit (this will not perform any conversion if it is not the unit reported by the sensor)
 - Selecting different units for different lines will create different axes but you can also specify explicit axis placement. To display lines with different Y-axes you press **Add field override** > **Fields returned by query** > select a query. Then **Add override property** > **Axis Placement** > **Right**.
 - **Axis** > **Label** is used to label an axis



You can change the visualization from **Times series** to **Stat** if you prefer that



Example dashboard