

# Grafana Chart Normalization - Research

## Overview

Chart normalization in Grafana is a procedure of scaling the data displayed in chart to a specific range or scale. It is useful when the data is displayed in a wide range of values or units of measurement, that can make it difficult for the user to compare the data points or trends. [Time Series Visualizations](#)

Grafana provides a list of **calculations** the user can perform to manipulate values before displaying in the **Transform** tab. [Grafana Calculations](#)

Calculation	Description
All nulls	True when all values are null
All zeros	True when all values are 0
Change count	Number of times the field's value changes
Count	Number of values in a field
Delta	Cumulative change in value, only counts increments
Difference	Difference between first and last value of a field
Difference percent	Percentage change between first and last value of a field
Distinct count	Number of unique values in a field
First (not null)	First, not null value in a field
Max	Maximum value of a field
Mean	Mean value of all values in a field
Variance	Variance of all values in a field
StdDev	Standard deviation of all values in a field
Min	Minimum value of a field
Min (above zero)	Minimum, positive value of a field
Range	Difference between maximum and minimum values of a field
Step	Minimal interval between values of a field
Total	Sum of all values in a field

## Standard Options

In Grafana, the common method for chart normalization is done using the Y-axis scale. By default, Grafana will automatically scale the Y-axis based on the data being displayed. But the user can manually set the Y-axis scale to a specific range by adjusting the “min” and “max” values.

- **Steps for manually adjusting Y-axis scale to a specific range:**
  1. Go to the dashboard where you want to adjust the Y-axis scale.
  2. Click on the panel you want to adjust the Y-axis scale for.
  3. Click on the "Edit" button in the top right corner of the panel.
  4. Click on the "Axes" tab in the panel editor.
  5. In the "Y-Axis" section, you will see options for "Mode", "Min", and "Max".
  6. Set the "Mode" option to "Fixed".
  7. Enter the desired minimum and maximum values for the Y-axis scale in the "Min" and "Max" fields.
  8. Click on the "Save" button to save your changes.

*For example, if Grafana chart displays data in bytes, and the data varies from 1KB to 1GB, the user would want to normalize the data to a more manageable unit scale, such as megabytes. So, the user can set the Y-axis range to start at 0 and end at 1000, and after which enable the “Unit” option to display the data in megabytes, which makes most sense in this case scenario.*

## Standard options definitions

You can apply standard options to most built-in Grafana panels. Some older panels and community panels that have not updated to the new panel and data model will be missing either all or some of these field options.

Most field options will not affect the visualization until you click outside of the field option box you are editing, or press Enter.

### Custom units

You can use the unit dropdown to also specify custom units, custom prefix or suffix and date time formats.

To select a custom unit enter the unit and select the last Custom: xxx option in the dropdown.

- suffix:<suffix> for custom unit that should go after value.
- prefix:<prefix> for custom unit that should go before value.
- time:<format> For custom date time formats type for example time:YYYY-MM-DD. See [formats](#) for the format syntax and options.
- si:<base scale><unit characters> for custom SI units. For example: si: mF. This one is a bit more advanced as you can specify both a unit and the source data scale. So if your source data is represented as milli (thousands of) something prefix the unit with that SI scale character.
- count:<unit> for a custom count unit.
- currency:<unit> for custom a currency unit.

### String units

Grafana can sometimes be too aggressive in parsing strings and displaying them as numbers. To configure Grafana to show the original string value, create a field override and add a unit property with the String unit.

#### - **Min**

Let's you set the minimum value used in percentage threshold calculations. Leave blank for auto calculation based on all series and fields.

#### - **Max**

Let's you set the maximum value used in percentage threshold calculations. Leave blank for auto calculation based on all series and fields.

#### - **Decimals**

Specify the number of decimals Grafana includes in the rendered value. If you leave this field blank, Grafana automatically truncates the number of decimals based on the value. For example, 1.1234 will display as 1.12 and 100.456 will display as 100. To display all decimals, set the unit to String.

#### - **Display name**

Let's you set the display title of all fields. You can use [variables](#) in the field title. When multiple stats, fields, or series are shown, this field controls the title in each stat. You can use expressions like `${__field.name}` to use only the series name or the field name in title. Given a field with a name of Temp, and labels of `{"Loc"="PBI", "Sensor"="3"}`

There is also a case in which the data sets could be in a different unit of measurement – like one chart that is displaying temperature in Fahrenheit and another chart displaying the temperature in Celsius, you can normalize both charts to a common scale like **Kelvin**, so that is easier for the user to compare the data from both charts.

- **Linear Scaling:** Divides the scale into equal parts.
- **Logarithmic Scaling:** Use a logarithmic scale. When you select this option, a list appears for you to choose a binary (base 2) or common (base 10) logarithmic scale.

- **Steps to use the "scale" function to normalize two charts with different measurement units to a common unit:**

1. Open the panel you want to transform in Grafana.
2. Click on the "Transform" tab in the panel editor.
3. Click on the "Add Transformation" button and select "Scale" from the list of transformation functions.
4. In the "Scale" transformation settings, select the target unit that you want to normalize the data to. For example, if one chart uses Fahrenheit and the other chart uses Celsius, you could select Celsius as the target unit.
5. Enter the range of the target unit that you want to normalize the data to. For example, if you want to normalize the data to a range of 0 to 100 degrees Celsius, enter "0" as the minimum and "100" as the maximum.
6. In the "From" field, select the source chart that you want to normalize the data from.
7. Enter the minimum and maximum values of the source chart's range in the "From" fields. For example, if the source chart uses a range of 32 to 212 degrees Fahrenheit, you would enter "32" as the minimum and "212" as the maximum.
8. Click "Apply" to save the transformation and apply it to the chart.