

# XLReporter Summary Calculations

## Overview

When retrieving data from historical data sources, many historians provide calculations that are calculated by the historian and returned by **XLReporter**. However, sometimes the set of calculations are limited or there is no filtering that can be applied to the data that contribute to the calculations.

**XLReporter** provides a comprehensive suite of calculations that can be applied to raw or sampled data stored in the historian. In fact, thanks to this functionality, **XLReporter** can treat most relational databases or set of text files as a historian and return this information as if it were recorded by an industry standard historian.

## Data Group Types

- Summary Values from Server
- Summary Values from XLReporter
  - use raw values
- Raw Values
- Raw Text

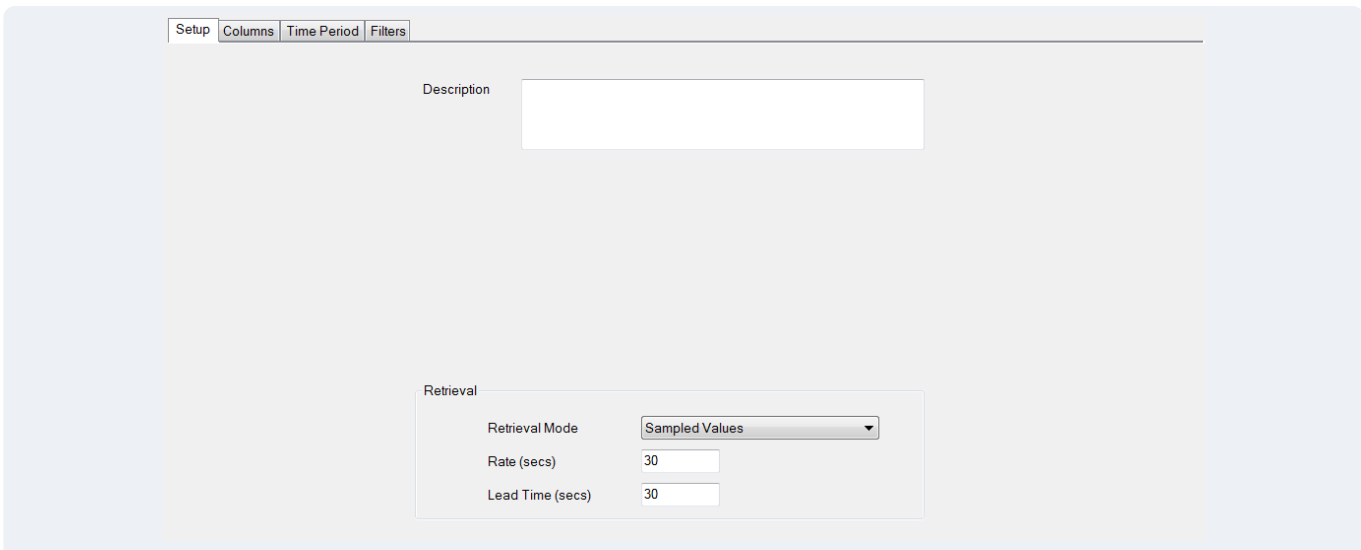
When a new historical data group is configured, the first thing that is prompted for is the type of group to configure.

For **Summary Values from XLReporter**, the **use raw values** option is available. If checked, when calculations are performed, they are raw calculations. For example, if only 5 values are recorded in the historian over the day, the daily average will be the total of those 5 values and then divided by 5.

If this option is unchecked, all calculations are performed time weighted.

## Data Retrieval

Data retrieval defines how the data is retrieved from the historian for **XLReporter** to perform calculations on.



The screenshot shows the configuration interface for a data group. At the top, there are tabs for 'Setup', 'Columns', 'Time Period', and 'Filters'. The 'Setup' tab is active. Below the tabs, there is a 'Description' field with a text input box. Further down, there is a 'Retrieval' section with the following settings:

Retrieval Mode	Value
Retrieval Mode	Sampled Values
Rate (secs)	30
Lead Time (secs)	30

This is defined under the **Setup** tab of the group. There are two **Retrieval Modes** available:

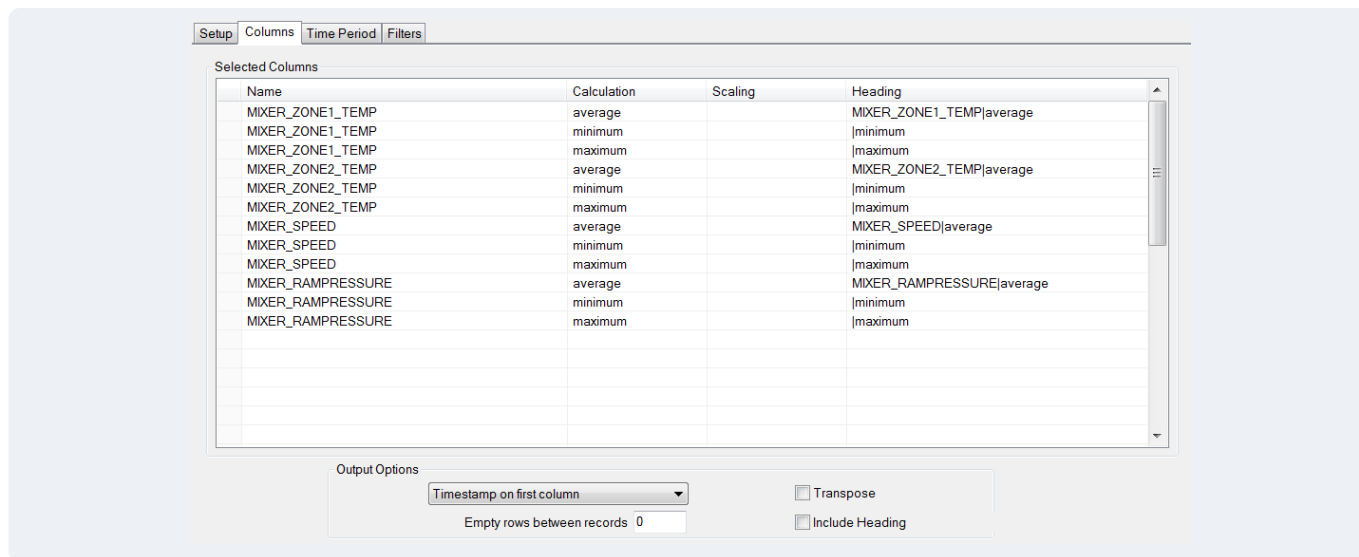
- **Sampled Values**

With this **Retrieval Mode**, interpolated samples are retrieved from the historian to perform calculations on. The **Rate (secs)** determines the interpolated sample rate. The default is 30 second samples. This option may not be available if the historian does not support interpolated sampling.

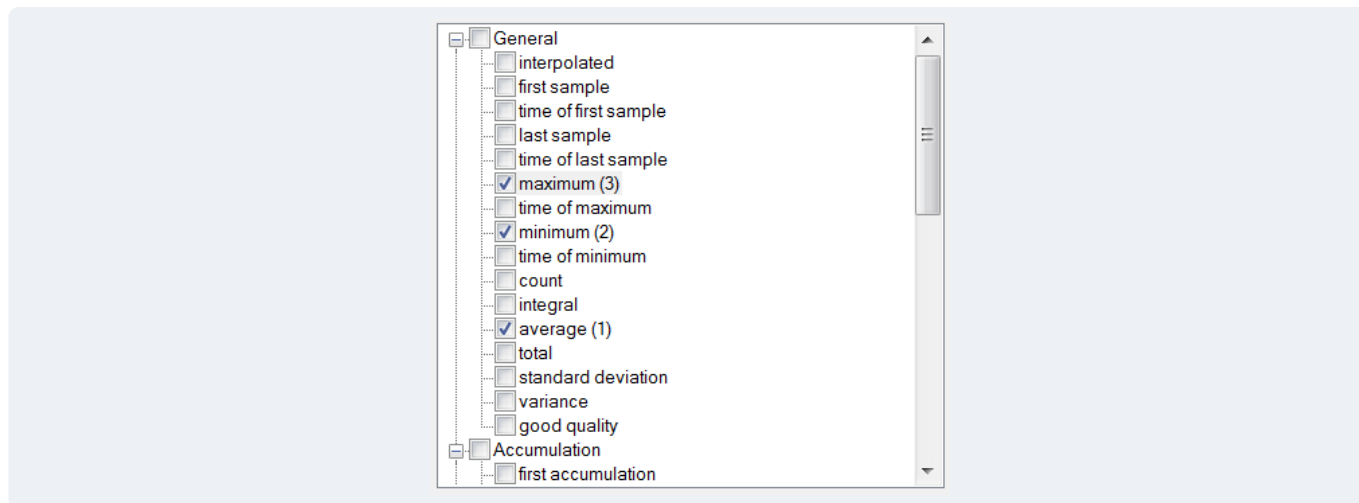
- **Raw Values**

With this **Retrieval Mode** raw samples are retrieved from the historian to perform the calculations on. Keep in mind, if the data is logged to the historian at a high rate, using this mode may cause the report to take longer than usual to generate. This option may not be available if the historian does not support raw value retrieval.

## Calculations



Under the **Columns** tab, up to forty rows can be configured to return data. Each row consists of tag **Name** and a **Calculation**.



After the tag(s) are selected the **Calculation** dialog appears where all the calculations are available. Multiple calculations can be selected here which are returned in the rows of the **Columns** tab.

This list is also accessible once the tags are specified in the **Name** column by clicking the **Calculation** column in the same row.

The calculations are divided into the following categories:

### General

The **General** calculations provide the standard calculations like average, minimum and maximum.

## Accumulation

The **Accumulation** calculations are used to build up a total of samples over a period of time.

The **first accumulation** calculation creates a running total of the first sample of every period. The **last accumulation** calculation does the same thing but with the last sample of every interval.

Consider the following results:

Time	First Sample	First Accumulation
00:00	5	5
01:00	10	15
02:00	15	30
03:00	20	50
04:00	18	68
05:00	15	83
06:00	12	95
07:00	6	101
08:00	4	105

## Difference

The **Difference** calculations are provided to calculate the difference in values over a period of time. These are most useful with totalizers that monitor things like consumption because these calculations can provide how much has been consumed over a period of time regardless of when the totalizer resets.

The **first difference** calculation calculates the difference of the first sample of every period. The **last difference** calculation does the same thing but with the last sample of every interval.

The **first difference accumulation** calculation calculates the difference of the first sample of every period and calculates a running total. The **last difference** calculation does the same thing but with the last sample of every interval.



first difference

Type:

Reset:

Rollover:

Scaling:

When one of the difference calculations is selected, the following options are available:

- **Type**  
The behavior of the samples, either *rising* or *falling*.
- **Reset**  
The value that the samples reset to when the totalizer is reset.
- **Rollover**  
The value that when reached in the samples, the totalizer is reset. If the totalizer never resets, set this to 0.
- **Scaling**  
The scaling factor to apply to the calculated difference value.

Consider the following results with the following settings shown above:

Time	First Sample	First Difference	First Accumulated Difference
00:00	5	5	5
01:00	12	7	12
02:00	20	8	20
03:00	27	7	27
04:00	39	12	39
05:00	52	13	52
06:00	89	37	89
07:00	6	17	106
08:00	17	11	117

## Advanced

The **Mean Kinetic Temperature** calculation (MKT) is a simplified way of expressing the overall effect of temperature fluctuations during storage or transit of perishable goods.

Mean Kinetic Temperature

Actn. kJ/mol:

Temp. Unit:

When this calculation is selected, the following options are available:

- **Actn. kJ/mol**  
The heat activation.
- **Temp. Unit**  
The temperature unit: *Celsius* or *Fahrenheit*.

Note that this calculation is not available if the **use raw values** option is checked when the group is created.

## Sample Analysis

The **Sample Analysis** calculations are provided to determine the **Sample Count** and **Sample Duration** based on up to two specified **Conditions**.

Sample Count

Condition 1:

Condition 2:

Deadband:

The **Deadband** can be configured to only consider samples that have changed by the *absolute value* or *percentage* specified.

For the **Sample Duration, Display** can be configured to show this as *days* (fraction of a day) or as a *percentage* of the interval.

Note that the duration calculations are not available if the **use raw values** option is checked when the group is created.

## Performance

The **Performance** calculations are provided to calculate utilization and performance.

The **State Count** and **State Duration** calculations produce the count or duration (in days or percentage of the interval) based on up to two **Conditions** and a **Deadband** that can restrict the samples based on how much the values have changed based on *absolute value* or *percentage*).

The **ON Count** and **OFF Count** calculations produce the number of times the sample transitions ON (from 0 to non-zero) and OFF (from non-zero to 0).

The **ON Duration** and **OFF Duration** calculations produce the amount of time (days or percentage of the interval) the samples were ON (non-zero) or OFF (0).

The **Availability** calculation produces the duration in days the samples were OFF (0).

Note that the duration and **Availability** calculations are not available if the **use raw values** option is checked when the group is created.

## Energy

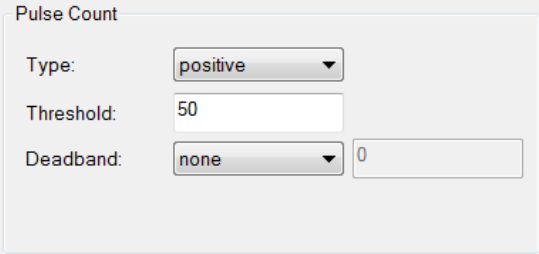
The **Energy** calculations determine the **Produced Energy** or **Produced Emission** by the consumption of various fuels.

For **Produced Energy**, the **Fuel Type** and **Energy Units** are required.

For **Produced Emission**, the **Fuel Type** and **Gas Type** are required.

## Pulse Analysis

The **Pulse Analysis** calculations are provided the peaks and valleys of samples.



Pulse Count

Type:

Threshold:

Deadband:

For the **Pulse Analysis** calculations, the following settings are available:

- **Type**  
Used for the **Pulse Count** calculation, this determines if *positive* pulses (samples that go above the **Threshold** and then below it) or *negative* pulses (samples that go below the **Threshold** and then above it) are counted.
- **Threshold**  
The value by which if the sample is values above are considered a peak and those below considered a valley.
- **Deadband**  
This can be used to filter out momentary changes in the signal.

The **Pulse Maximum** and **Pulse Maximum Time** calculations calculate the maximum value and time of positive pulses only.

The **Pulse Minimum** and **Pulse Minimum Time** calculations calculate the minimum value and time of negative pulses only.

## Filtering

When the data is retrieved from the historian for the calculation(s), the raw values or sampled values can be filtered to remove any anomalies.

This is done under the **Filters** tab of the group. All filters are applied to the raw/sampled data before calculations are performed.