

Data Sampling

In order to successfully use Info360, it is important to understand the data sampling process that is used.

Raw SCADA data typically comes in varying time steps which can be inefficient for analysis and display at varying time scales. Info360 does not store this raw data, instead it samples the raw data at varying time intervals and stores it as explained below.

Sample Values

For each sample interval, the following five summary values are stored in the Info360 database.

Type	Description
Open	The first value in each time interval is used to create the data series
High	The highest value in each time window is used
Low	The lowest value in each time window is used
Close	The final value in each time window is used
Average	The average value recorded in each time window is used

Generally, Close is used for viewing real-time data (to see the latest values), High and Low are used in alerts and summary analysis, and Average is used with flow and volume analysis.

Sample Windows

Info360 builds sampled data tables for each sensor down to the specified minimum interval set for each sensor (e.g. 5 minutes - see Interval Setting in [Server Configuration](#)). The example tables below illustrate this process. The Open, High, Low, Close, and Average values are stored at the end of each sample interval, for each time resolution (e.g. hourly, daily, etc.). For example, the data between 0:00 - 0:05 are sampled and summarized at time 0:05.

SCADA	
Time	Value
00:32	76.5
02:56	66.9
04:14	71.2
06:20	78.3
09:58	81.0
13:29	66.1
22:44	74.8
23:44	75.9
25:44	69.6
28:44	57.3
30:01	62.7
32:55	68.4
40:00	57.4
42:25	63.8
48:47	71.0
55:15	74.2

5 Min Sample					
Time	Open	High	Low	Close	Avg
0:05	76.5	76.5	66.9	71.2	71.7
0:10	78.3	81.0	78.3	81.0	79.6
0:15	66.1	66.1	66.1	66.1	66.1
0:20	NULL				
0:25	74.8	75.9	74.8	75.9	75.3
0:30	69.6	69.6	57.3	57.3	63.4
0:35	62.7	68.4	62.7	68.4	65.6
0:40	57.4	57.4	57.4	57.4	57.4
0:45	63.8	63.8	63.8	63.8	63.8
0:50	71.0	71.0	71.0	71.0	71.0
0:55	NULL				
1:00	74.2	74.2	74.2	74.2	74.2

15 Min Sample					
Time	Open	High	Low	Close	Avg
0:15	76.5	81.0	66.1	66.1	73.3
0:30	74.8	75.9	57.3	57.3	69.4
0:45	62.7	68.4	57.4	63.8	63.1
1:00	71.0	74.2	63.8	74.2	72.6

For larger time intervals (e.g. daily), this can be misleading. For example, the Low daily tank level reported at 0:00 on 4/1/2017 correspond with the sample interval between 0:01 3/31/2017 and 0:00 4/1/2017, so each reporting value summarizes the previous day.

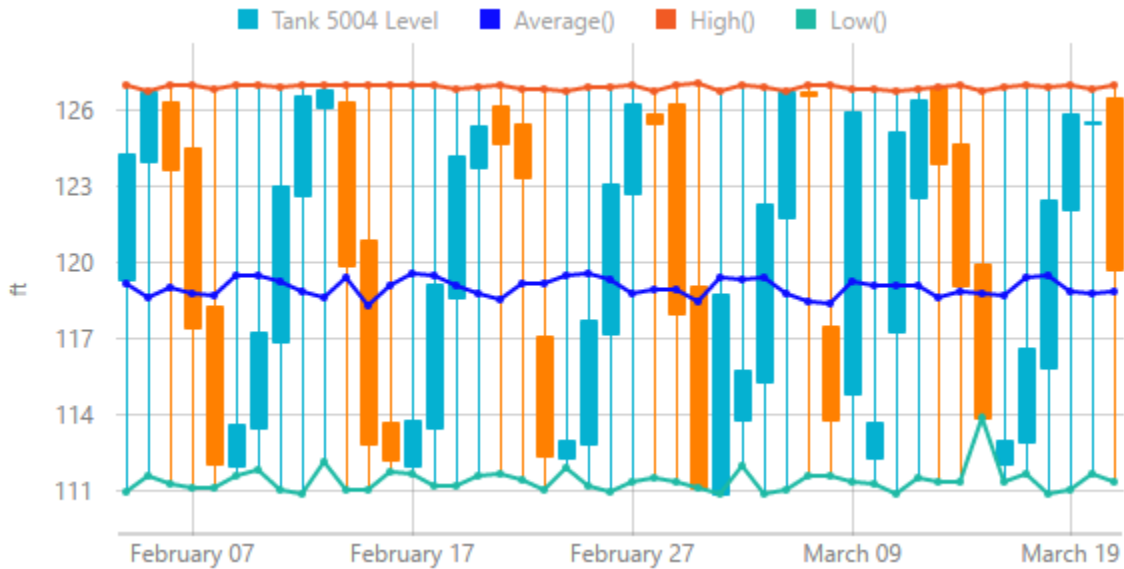


Warning:

Be sure to understand which sample value you are using. Simply opening a Chart from the map will use the default series type (set in the [Settings](#) page) which is initially set as Close. In many cases, the default series type may not be appropriate for the analysis you'd like to do. For example, using hourly Close values to calculate the volume from a pump station will miss variations in data and likely be inaccurate.

Graphical Example

Graphically, a summary of the sample values can be easily seen in Info360 using Candlestick or OHLC Charts in [Historical Chart Configuration](#). These charts use vertical lines at each time step which extend from the Low to the High, with markers at the Open and Close values. The candlestick chart below shows the open and close values using the top and bottom of the thicker portion of the candlestick. When the open is less than the close (e.g. tank is filling), the candlestick is blue, while if the reverse is true (e.g. tank is draining) the candlestick is orange.



Data Quality Control

Often, SCADA data can be prone to noise and gaps in data. Info360 allows for thresholds and value mapping to be configured for each sensor individually. Refer to the [Sensor Configuration](#) page and the [Sampling Logic](#) tree for more information.