# Analytical Functions

Info360 contains a library of built-in functions that can be used for plotting, searching, and tracking data. Functions offer a variety of analysis tools for visualizing and monitoring data.

All of the functions can be accessed from the Analytical Functions window. All functions are organized into four tabs on the left: General, Statistics, Moving Average, System, and Sensor.

In the Analytical Functions window, start typing the function name in the Search box to get an immediate list of all the functions containing the typed content. This can greatly speed up finding favorite functions.

Using Analytical Functions Interface

Each function can be run on the current data set by simply selecting the function in the main window, adjusting any customized fields on the right pane, and clicking OK.
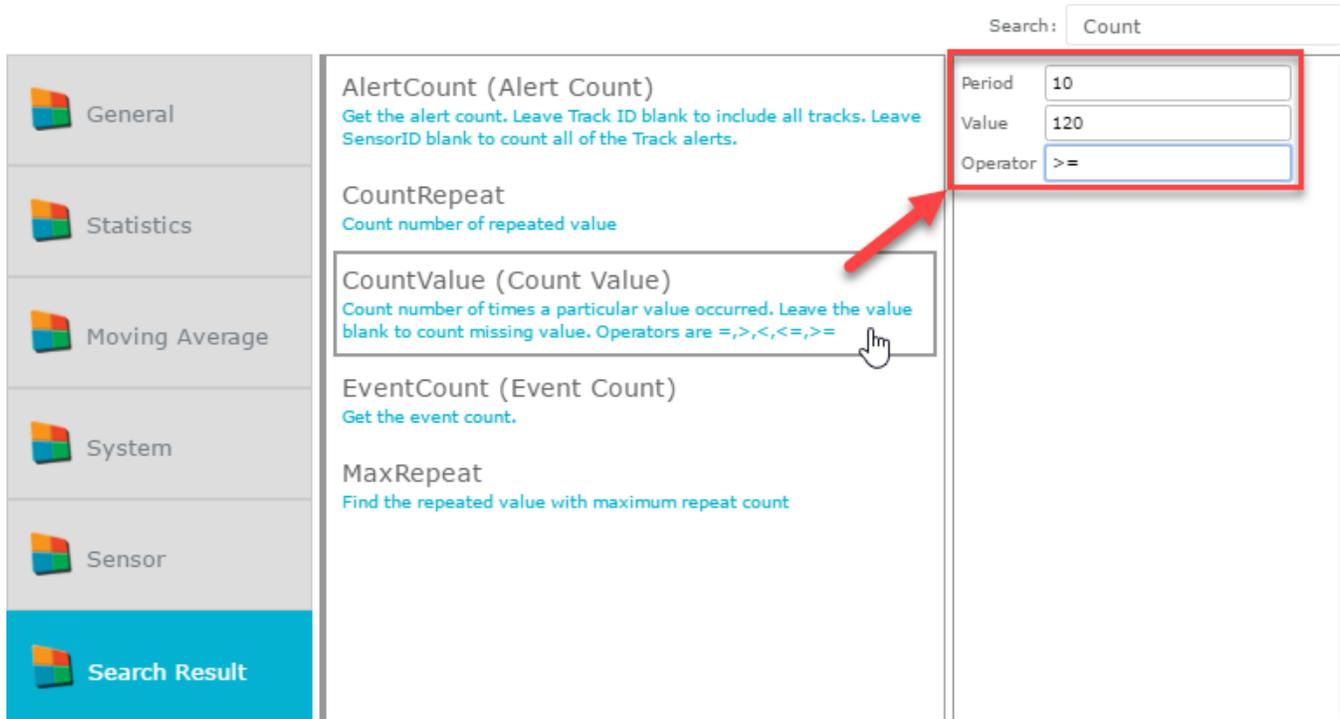
Using Expressions

Alternately, a custom expression can be entered in the bottom pane to utilize any combination of functions from any sensor data.

For information on setting up custom equations and syntax, please refer to Advanced Use of Analytical Functions.

Library

The following list contains all of the Info360 functions. Select any function below for more information and syntax.

General
- Change
- CountRepeat
- CountValue
- Decompose
- Highest
- HighestTime and LowestTime
- Lowest

- Valueof

Advanced Use of Analytical Functions

Input Time Series Data

Each function does analysis on a time series of data.

In many cases this input is optional, and the current sensor will be used as a default.

For example, if there is chart for 'SCADATagA.Flow Rate' then both of these expression will result the same trend:

Close() + Low()

Close('SCADATagA.Flow Rate') + Low('SCADATagA.Flow Rate')

Some functions require the input to be a Sensor ID, while other functions use other functions as input.

Input	Description	Function Examples
Sensor ID	Regardless of the selected time interval used (hourly, daily, etc.), most of these functions require raw sensor data in between sampled time intervals.	Close, Open, High, Low, Average TypicalValue, Sensor, MetaData, Compare Date and Time Functions, etc.
Sensor ID or Function	These functions reference both the time series data and data associated with the sensor. These functions perform better directly on the sensor, however some functions can be passed as input as well.	PercentFull, TotalVolume, and Last
Function	Most functions use other functions as an input. To specify a certain sensor for input data in these functions, use one of the functions that takes Sensor ID as input (e.g. Close(), Sensor(), High(), etc.). The optional time series data input for these functions is typically not mentioned in the Analytical Functions window, but it can always be assigned using the first input in the function. Info360 will check if the first input argument is time series data, if it is then that data will be applied as the input data. If it is not time varying, then it applies the current primary time series data to the function.	Change, MA - Moving Average, StdDev - Standard Deviation, Sum, etc.

For example:

Change(4) - Outputs the difference between the current value and the value reported four periods ago for the current sensor.

Change(Sensor('j50.Pressure'),4) - Outputs the difference between the current value and the value reported four periods ago for sensor "J50.Pressure".

Change('J50.Pressure',4) - Error. This function requires a set of time series data (i.e. the output from another function), not a string.

Combining Functions with Mathematical Operators

Function expressions can be combined with various mathematical operators.

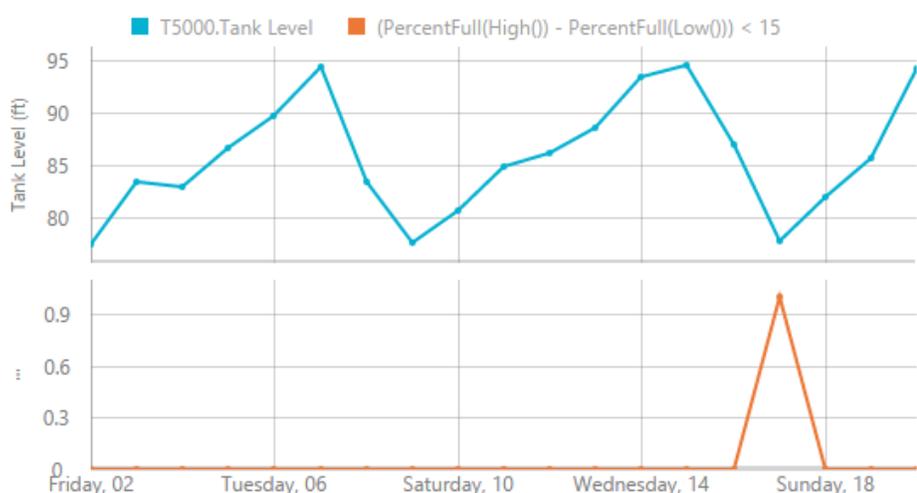Info360 recognizes the following standard math operators: [+ - * /]
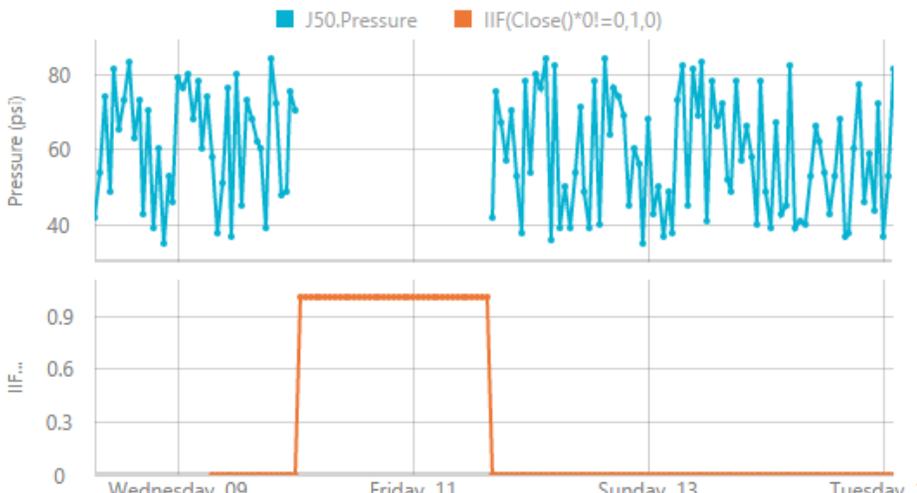
Example: (High() * 2)   +   (Low() / 4)

These operations can also be fed as input to other functions (that recognize functions as input).

Example: ROC(Open() - Open(), 4)

Info360 also recognizes standard logical comparison operators [=, <, <=, >, >=, <>, !=] which result in true/false statements.

The output from comparisons is in the format of 1 for true and 0 for false.

Example	Description
(PercentFull(High()) - PercentFull(Low())) < 15	Outputs a value of 1 on any day that the range in percent full of a tank is less than 15% **T5000.Tank Level** **(PercentFull(High()) - PercentFull(Low())) < 15** Tank Level (ft): 95, 90, 85, 80 0.9, 0.6, 0.3, 0 Friday, 02 Tuesday, 06 Saturday, 10 Wednesday, 14 Sunday, 18
Close()*0 <> 0	Outputs a value of 1 any time the sensor is missing a data point. This expression can be used in IIF statements and Searches. **J50.Pressure** **IIF(Close()*0!=0,1,0)** Pressure (psi): 80, 60, 40 IIF...: 0.9, 0.6, 0.3, 0 Wednesday, 09 Friday, 11 Sunday, 13 Tuesday, 15

Abs(Close() - Open())	Outputs the absolute value of the change between the open and close values. This indicates how much tank levels are fluctuating during each sampled interval.