Server Configuration

A Info360 site simply requires a web map and a connection to a live database. The following topics guide through the set up of Info360.

Data Connection

This step involves connecting Info360 to a SCADA database (Historian). Info360 will only import specified data from the database and store the data in a local SQL Server database where Info360 builds multiple tables for site performance. For that reason, Info360 can connect to multiple historian databases if necessary while keeping data secure.

Multiple common Database Historians are available for connection to Info360 through standard database connections.

- SQL Server
- MySQL
- Oracle
- iHistorian
- Wonderware
- PI

Field	Description
Connection Name	Multiple Connections can be set up for different databases. Use the  icons to create, edit, and delete Connections.
Description	User friendly description of the connection.
Time Offset	Time delay from the system to the server if in different time zones.
Database Type	This drop-down menu specifies the type of database Info360 will connect to. Contact us if your database type is not included.
Database Connection Type	This drop-down menu specifies the connection type for Info360 to use to connect to the database. Options change based on the Database Type specified.
Database Driver Version	[MySQL only] - Specify the driver version used by the MySQL database.
Server Address	Enter the full address of the database server. [Machine Name]\[DB Server Name], [Port # - optional] E.g. WS5002348\SQLDB2, 1436
Login Name & Password	Enter the log in credentials used for the database
Use Connection String	This option allows for a more detailed connection to be set up for a database.
Test Connection	This button will test the connection and report the number of tables and views found.
Database	Once a connection is established, this drop-down menu will populate with any available databases on the server. Select one database per connection.
Save	Save any changes made to the current Connection

> **Warning:**
>
> Server Connection should be set up by IT personnel that know their system. Contact us if issues arise during server connection setup.

Web Map

The Web Map is used to map the locations of sensors and model elements.

Web Maps are typically created by publishing the InfoWater or InfoSWMM model to ArcGIS Online. However, simple shapefiles can also be used for the web map.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Sensor Layer Type</td><td>Composite Layer - use to load a Map Server Service containing multiple GIS layers.

Separate Layers - use to load individual layers via shapefiles or map server service.</td></tr>
<tr><td>Shapefile Source</td><td>If using Shapefiles, click the  icon and browse to a zipped set of shapefiles.</td></tr>
<tr><td>Map Server Source</td><td>If using Map Services, enter the Map Server URL and click on the refresh icon,  , to populate the composite layer service address and sensor ID Field.

Feature Map vs Tiled Map

Map Services can publish feature maps and/or tiled maps.

After loading a URL, Info360 will display whether it successfully loaded Feature and Tiled Maps using text color. Green means it loaded, while red text is not loaded.
<table>
<tr><th>Map</th><th>Description</th><th>Benefit</th></tr>
<tr><td>Feature Maps</td><td>Like shapefiles, feature maps store data for each feature. Note: there is a limit on the number of features that can be displayed at once.</td><td>Properties for each object can be accessed by clicking on the map.</td></tr>
<tr><td>Tiled Maps</td><td>Like a raster, it only displays the location of objects as background.</td><td>Faster for showing all features at once.</td></tr>
</table>
Note:

The Sensor layer must be a Feature Map Layer</td></tr>
<tr><td>Layer Service Address</td><td>If Composite Layer is selected, this Composite Layer Service Address provides a drop-down menu to view the different layers associated with the Service.

If Separate Layers are used, each layer can be manually set using an individual row.</td></tr>
<tr><td>Sensor ID Field</td><td>Drop-down menu to select the field in the map layer to use as the ID recognized in Info360.</td></tr>
<tr><td>Reference Feature/Tiled Map Service</td><td>This section is used for loading additional background layers for mapping purposes.

Click on  to add additional Map Services.

In the Map Table of Contents tab of Command Center, various layers can be turned on and off for different viewing applications.</td></tr>
<tr><td>Add New Sensor Type</td><td>This feature allows for users to customize the Sensor Types which are assigned to each sensor.

This is for specific cases where a user might have two different kinds of flowrate sensors for example. While they both measure flowrate, the user may want to distinguish between the different sensor types. This would be done by adding another Flowrate sensor type with a new custom name.</td></tr>
<tr><td>Test Connection</td><td>Tests connections to provided maps and indicates the number of features found.</td></tr>
</table>

Sensor Data

Once Info360 is connected to the SCADA Database, and it has a map of all the sensors with their ID's and locations, then the live data can be mapped in to the Sensor data tables of Info360.

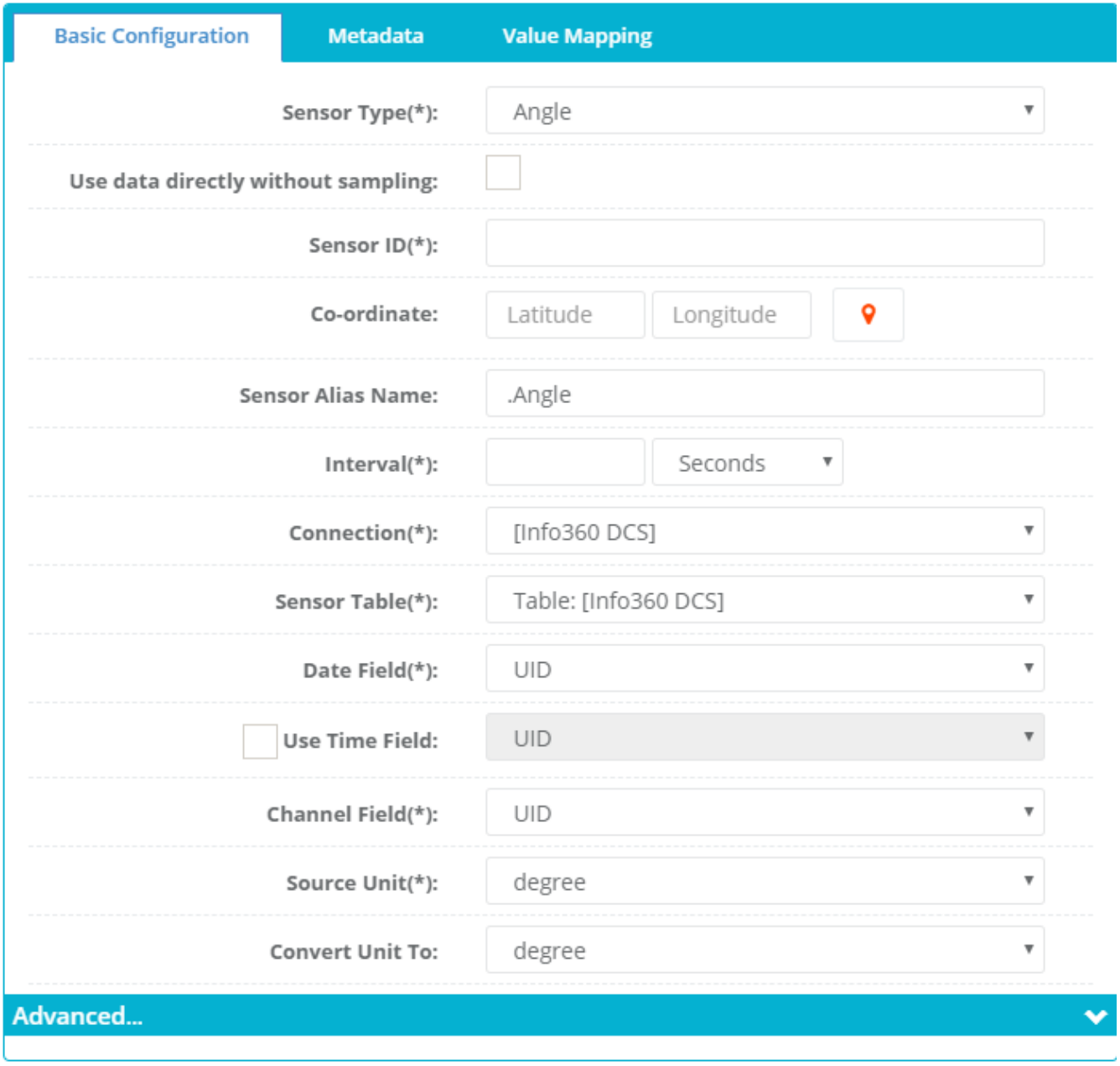
Field	Description
Add New Sensor	Allows you to add and configure new sensors listed below.
All Sensors	Allows you to Validate All Sensors or Update All Sensor's WebMap Information.
Statistics	Displays the statistics of the various sensors configured in your database.
Custom Fields	Allows you to add, edit, and delete custom fields. For more information, refer to How to Manage Custom Fields.

New/Edit Individual Sensor

A separate sensor object is required in Info360 for each feed of measured time series data.

Click Add New Sensor to create a new sensor entry, or click on an existing sensor row in the table to view and edit its properties.

Basic Configuration



Field	Description
Sensor Type	Drop-down menu to select from the available sensor types in Info360. Refer to the Web Map section to Add New Sensor Types.
Use data directly without sampling	Option to toggle on/off data sampling. Sampling cuts the data points into time bins of varying temporal resolution (e.g. every 30 min, hourly, daily, etc.) with key outputs: Open, Close, High, Low, and Average. Turning this off will disable many of Info360's functions and ability to scale the data at different intervals.
Sensor ID	Use the drop-down menu the select an ID that matches one of the ID's imported to the map. The sensor data can be accessed from that map location.
Co-ordinate	Latitude and longitude of the sensor.
Sensor Alias Name	Enter any desired unique name for later reference. Sensors are accessed and searched using Alias name; it can be helpful to include descriptive words. The default is: [Sensor ID].[Sensor Type]

Interval	This specifies the minimum expected interval desired for reporting purposes. If 5 minutes is selected, then when opening charts for the sensor, data intervals down to 5 minutes will be available. During Sampling, Info360 will then take the raw data (at any temporal resolution including irregular), and build the Open, Close, High, Low, and Average tables starting at the 5 minute interval.
Connection	This drop-down menu refers to the Connections set up in the Server Configuration.
Sensor Table	This drop-down menu specifies the table or view to be used within the database referenced by the Connection.
Date Field	Use this drop-down menu to select the field in the Sensor Table that stores the date and time. If the time field is separate, check the box **Use time field** to map the time field as well.
Use Time Field	If the time field is separate from the date, check the box **Use time field** to map the time field in addition to the Date Field specified above.
Channel Field	Drop-down menu to specify the field storing the measured sensor values.
Source Unit	Use the drop-down menu to specify the units of the raw measured data.
Convert Unit To	Use the drop-down menu to specify the desired output units in Info360. If no conversion is desired, set this value equal to the Unit field above.
Elevation	This field is only applicable for pressure sensors. The elevation value is used to convert pressure into Head.

Advanced Field	Description
Sample Date Range	Range of dates you want to get data from.
Tag Field	Drop-down menu to specify the field that stores the Tag Value. Most databases have multiple sensors within the same table and fields, which are separated using a Tag value to specify which sensor relates to the measurement. If this is not the case for the selected database, leave the Tag Field as [Null]
Tag Value	Enter the SCADA tag value that specifies the sensor as a string. E.g. 'INSQLSRV.EM_Pump2.Run'
Where Clause	A where clause in standard SQL format can be used to query out the desired raw data brought into Info360. For example, this could be applied in cases where sensors give a measurement quality reading. A where clause could tell Info360 to only pull data with a quality reading above a minimum threshold. e.g. DateTime > '2015/01/01 00:00:00' AND QualityID = '192'
Max and Min Values	Minimum and Maximum threshold values can be applied to sensor data to avoid spurious data in charts. Optional - set realistic minimum and maximum values for the sensor and define a Threshold action below.
Threshold Value Action	Info360 can either use or ignore specified thresholds. If used, any data that exceeds a set threshold, will be reassigned at the threshold level.
Invert Value	Check this box to multiply values by -1.
Value Factor	A manual factor can be applied to incoming data for conversion purposes. Output = Sensor Data * Factor + Offset
Value Offset	A manual offset can be applied to all data from the selected sensor. This value is a constant that is added to all data points. Output = Sensor Data * Factor + Offset
Tank Curve	[Tank Level only] - Specify the tank geometry for volume calculations using either a Cylindrical setting or a Curve.
Media	Load an image to the sensor which can be shown as a popup when clicking on the sensor from the map.
Sensor Data Type	This drop-down menu is used in rare cases to specify unique data types. More coming soon.
Validate	Click Validate to test the data connection and check the basic data requirements.

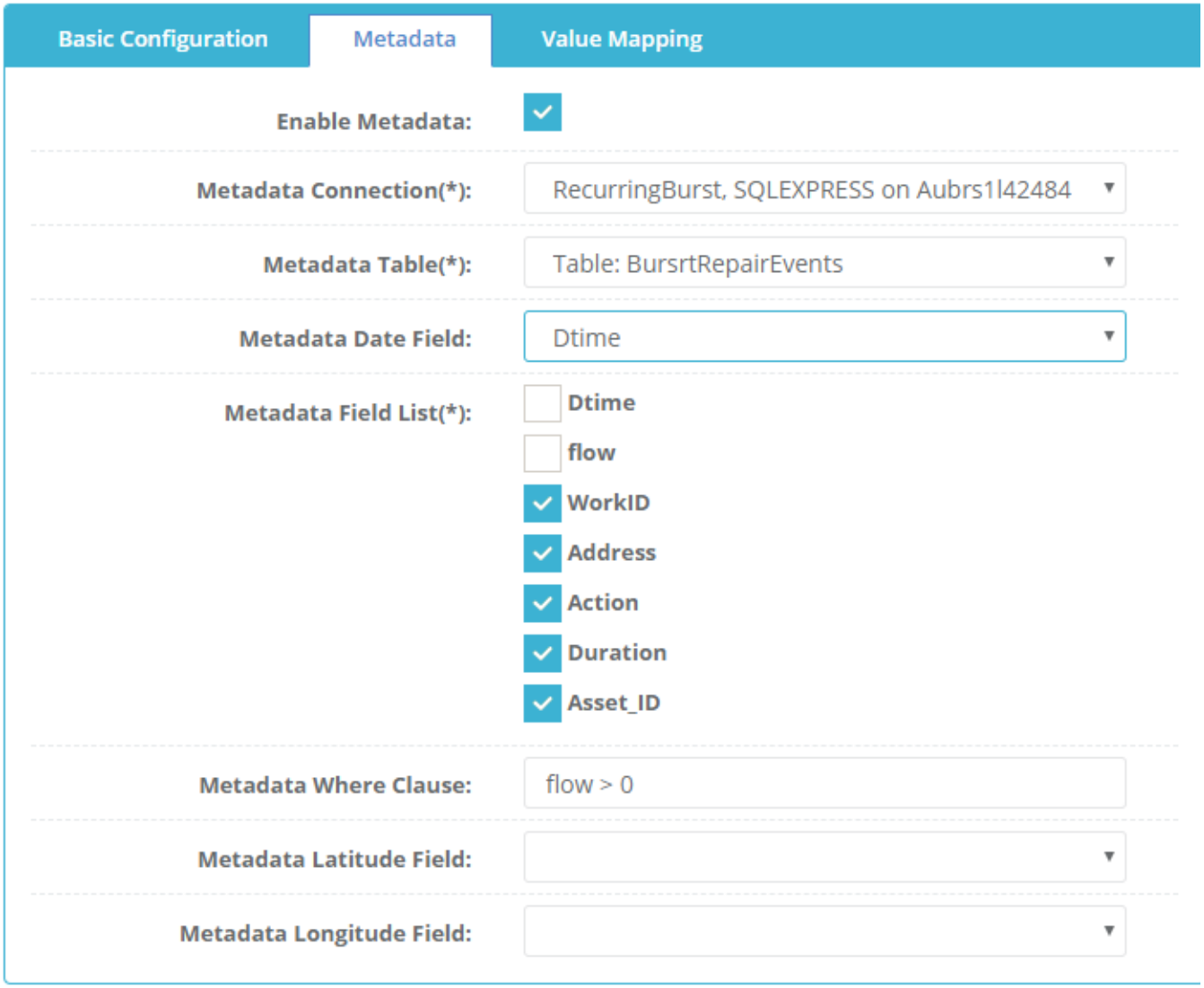
Metadata

Sensors often record more than just the primary value, and often times this extra data can help to explain what is going on at the sensor.

For example, if a flow sensor also includes readings like voltage, batter level, quality of signal, etc., then those time series can be used to investigate unusual flowrate readings from the sensor.

To bring in that data, toggle Enable Metadata, and fill out the necessary database mapping to associate the data to the sensor.

This data can later be called upon using the MetaData function.



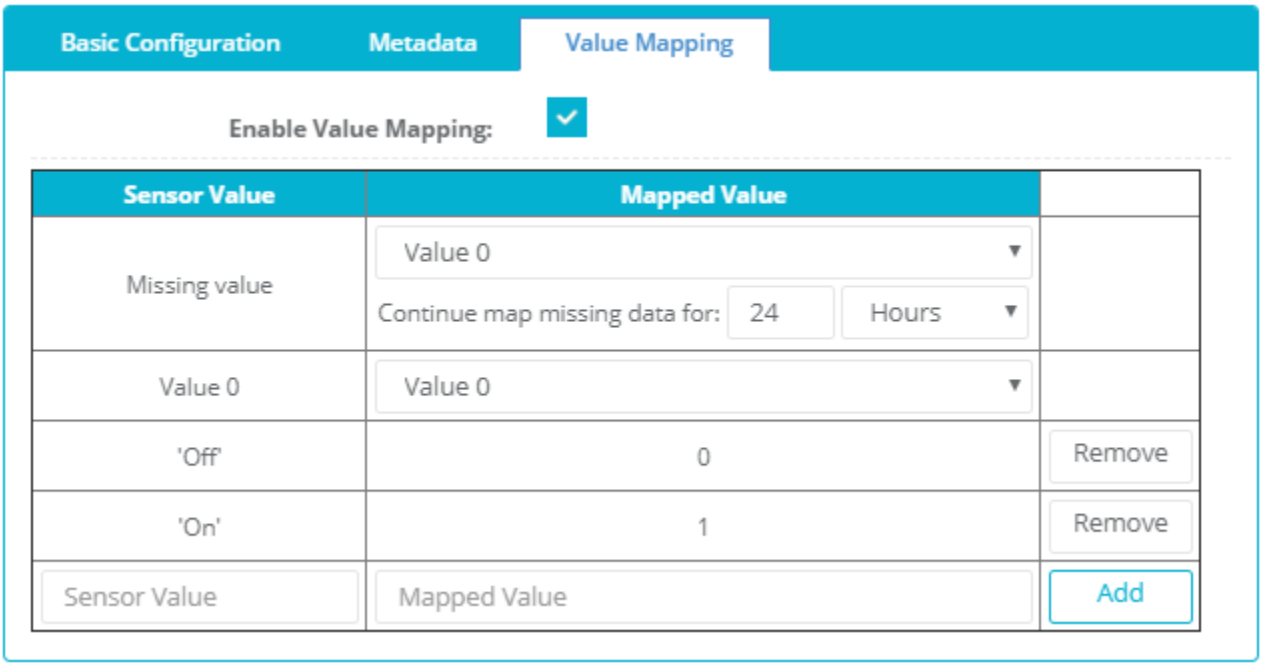
Value Mapping

Value Mapping is a simple Table Lookup capability that can be used when raw sensor data doesn't give exactly the data you want.

For example, if pump status data is recorded as text values of "On" or "Off", it would not be usable in Info360 which requires numerical data (1 or 0). Mapping can easily convert those cases as shown in the example below.

Two other cases available in Value Mapping are deciding what to do with missing values and readings of 0 (which in some cases is considered missing). Value mapping can leave those data points as they are, or assign them to be missing value (null), 0, the last known value, or perform a linear interpolation.

The checkbox to Continue map missing data up to the latest time is a feature designed for BizBlock and Mass Balance. By default, Info360 will fill in missing gaps during sampling after a new valid data point comes in. It doesn't fill in gaps until then, since the value may get replaced otherwise. For BizBlock and Mass Balance, you may want input values estimated up to the current time based on the last known value; if so then toggle on this option. If you leave it off, the BizBlock and Mass Balance will not use the latest gap-filled data.



Billing Data Sensor Setup

BIlling Data sensors are used in Mass Balance to compare with total calculated usage data for determining the Non Revenue Water.

Billing data can be brought in through a database connection in the same format as regular sensor data.

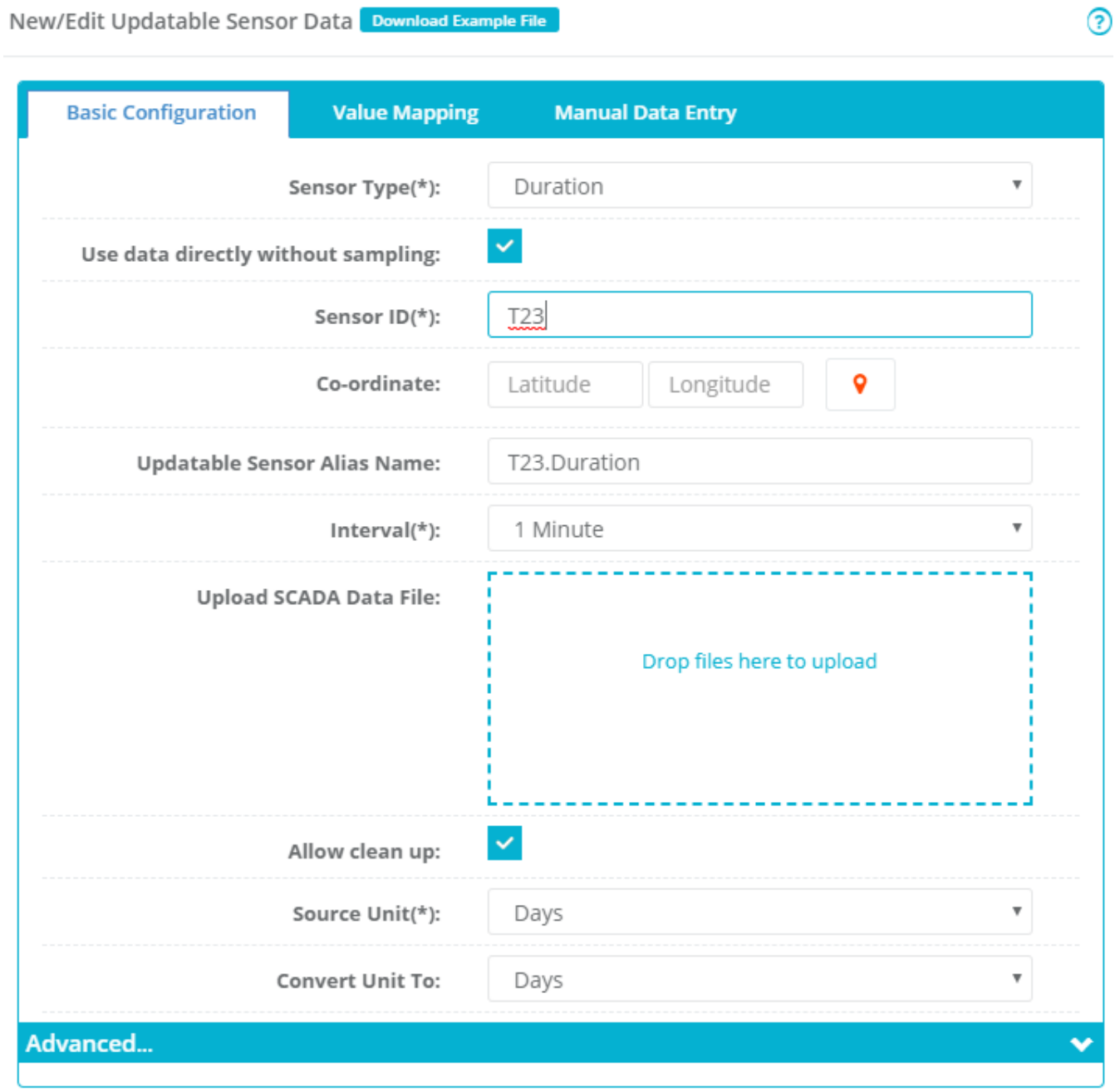
Refer to the Individual Sensor setup information above for details on configuring billing data.

Updatable Sensor Setup

Updatable Sensors use file-based data importing, which updates the data stored for the sensor with each new data push. This approach is well-suited for hydraulic model outputs. Hydraulic models can export model results to a set location accessible to Info360, and then the Data Collector can be set to automatically retrieve the data files and upload to the Updatable Sensor. This data can then be viewed alongside other Sensors as a Reference Chart.

Basic Configuration

The configuration of updatable sensors is shown below:



Field	Description
Sensor Type	Use the drop-down menu to select the Sensor Type. This affects how the sensor data interacts with Info360 functions.
Use data directly without sampling	Option to toggle on/off data sampling. Sampling cuts the data points into time bins of varying temporal resolution (e.g. every 30 min, hourly, daily, etc.) with key outputs: Open, Close, High, Low, and Average. Turning this off will disable many of Info360's functions and ability to scale the data at different intervals.
Sensor ID and Alias Name	The sensor requires a unique Sensor ID without spaces. The Alias Name is what appears in the interface.
Co-ordinate	Latitude and longitude of the sensor.
Interval	Specify the smallest sampling interval desired. Info360 will sample the data at various time intervals down to the lowest limit set in this field. The above example of 600 seconds will result in the data being available in 5 minute intervals, 15 minute intervals, etc. up to daily and monthly intervals.

Upload SCADA Data File	Data can be manually loaded here by drag-and-dropping files in this box. Info360 currently supports CSV, XML, or JSON files. It is required to first set up the file importing using the Data Collector, which can handle automatic period uploads. This method can be used afterwards for manual importing.
Allow clean up	Allows clean up on updatable sensor if scheduler is setup in the sampling tab.
Source Unit	Unit of the physical sensor.
Convert Unit To	Unit you want to convert the data to.

Once the Updatable Sensor is created, set up a Data Collector to automatically retrieve data from a set location. Otherwise data can be updated manually.

> ⚠ **Upload Results from InfoWater or InfoSWMM:**
>
> Once updatable sensors are created in Info360, InfoWater and InfoSWMM models that connect to the Info360 site can see and map model elements to the sensors. Once mapped, model results can be directly uploaded to Info360 updatable sensors for model comparisons and analysis.
>
> See the Hydraulic Model Connection page for more information.

Event Data Sensor Setup

Event Data Sensors are used to import time history data of certain events in time that contain information related to the system. This data can later be plotted along side measured data to show how certain events correlate with data in the system.

Event data is different from MetaData in that is not associated with a specific sensor. For example, one might want to bring in a history of O&M data or customer complaints, and then plot those points against several sensors in the system to review precursor trends in the data that could predict problems before they happen. This would then be implemented as a Track.

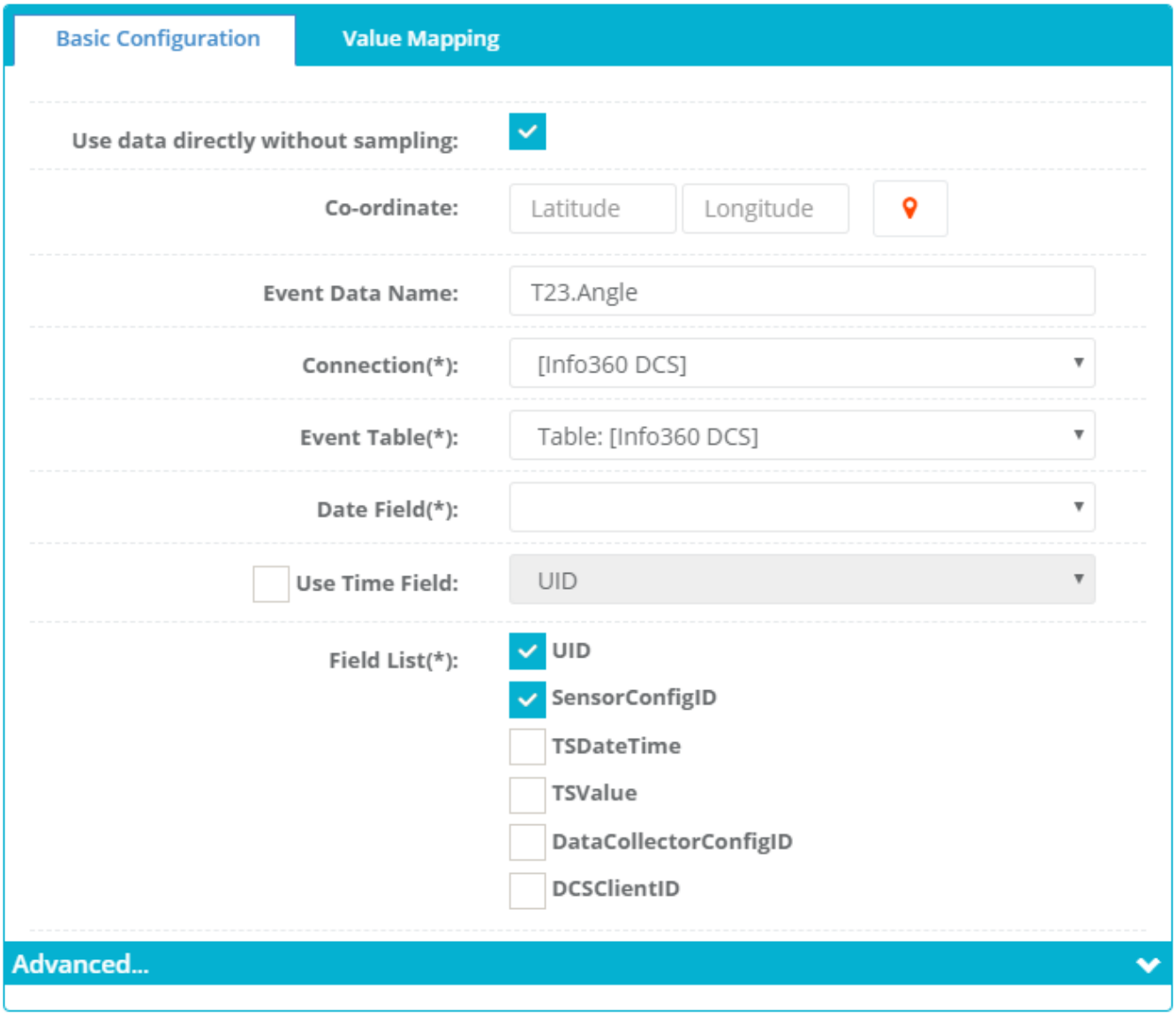
Event Sensor data can be accessed on Charts, or by using one of the following Analytical Functions:

EventCount, EventData, and EventDuration.

Basic Configuration

Event Data is brought in as a table with date/time and any number of optional value fields through a mapped Server Configuration above.

As shown in the sample below, Event Data Sensors simply require a name, a table from the Server Connection, a Date Field, and any optional fields for plotting values.

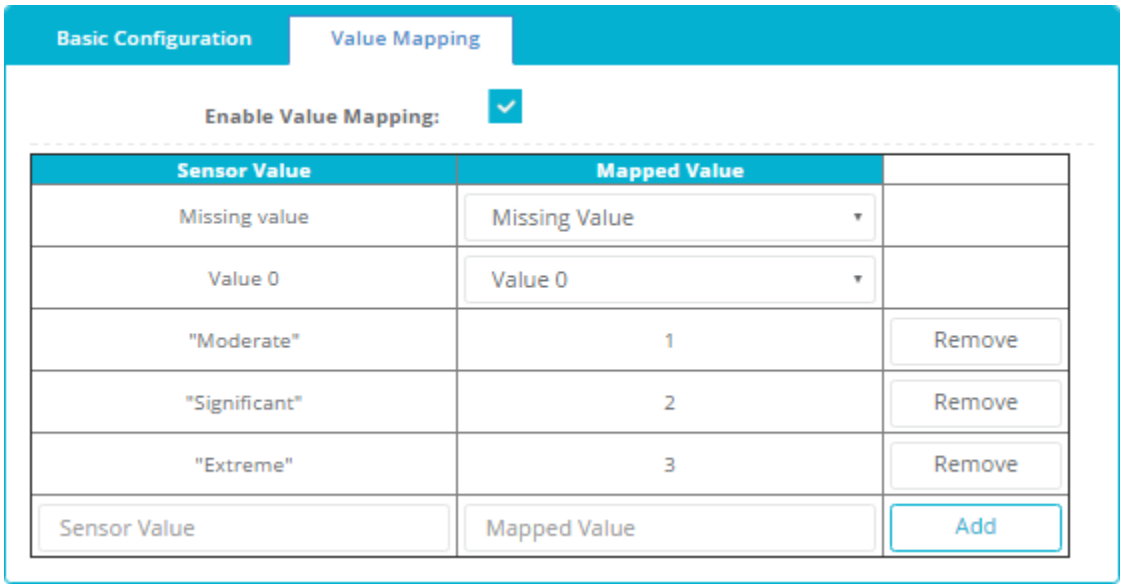


The Advanced configuration section provides an optional tag field or where clause to filter which rows of the event table to import. See the Individual sensor set up content above for more information.

Value Mapping

Value Mapping is a standard table lookup capability. Since Info360 expects Event Data to be in a numerical format for plotting, this is often used to convert important text data with values that can be plotted on a chart.

See example below to map text values in the data to numeric codes.



Virtual Sensor Setup

Virtual Sensors can be set up which retrieve live measured data and apply a function expression to produce output at each time step.

This opens up a wide range of applications in Info360. Wherever there is a certain calculated result from measured data that is desired for reporting or other analysis, consider setting it up with as a virtual sensor. Later this result time series can be directly retrieved the same way other sensors are viewed.

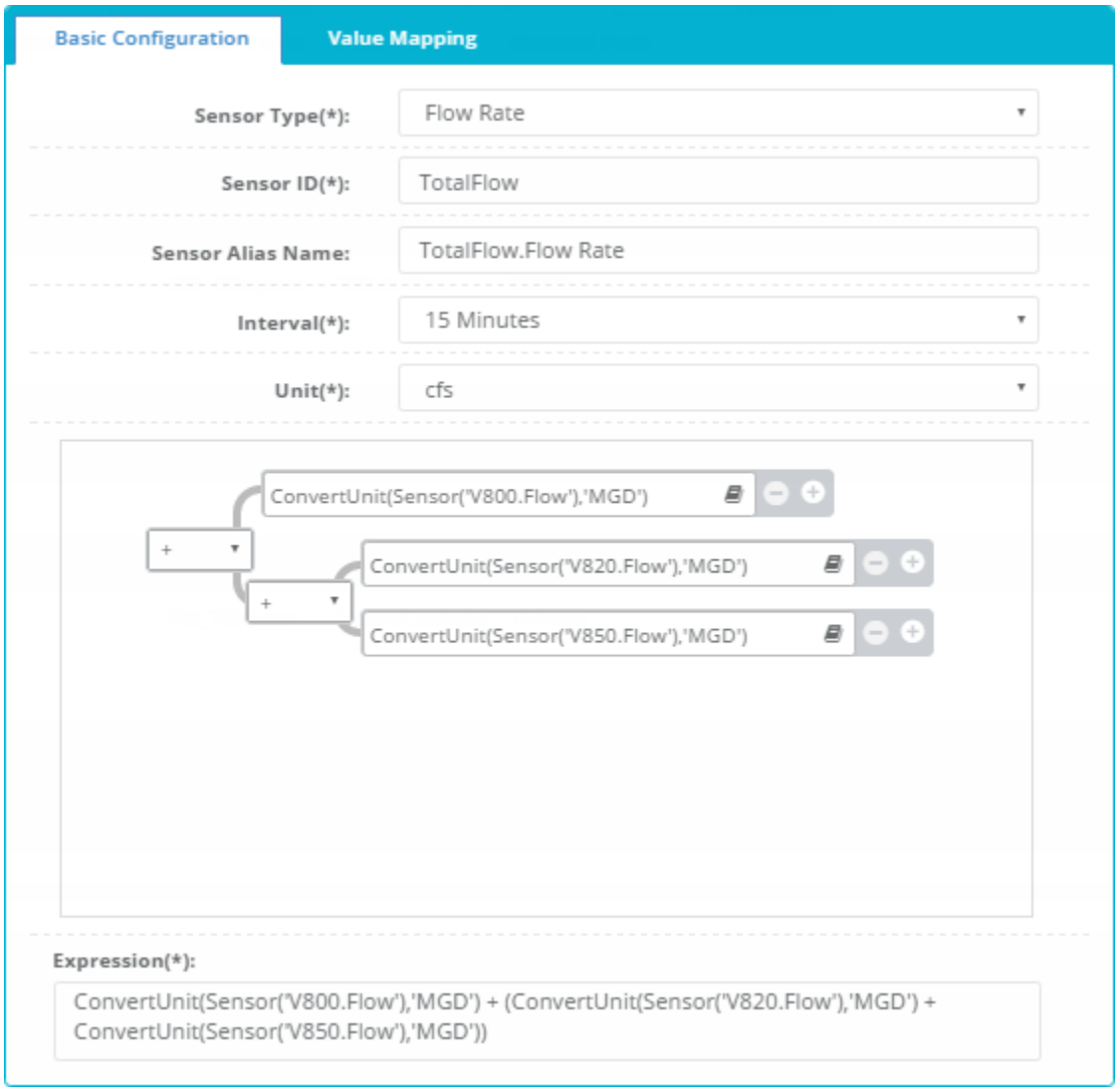
For example, raw pump speed data might come in the form of rotations per minute, however the user would prefer being able to see the nominal speed of the pump. A simple conversion using a function can convert that for the user.

Basic Configuration

The Basic Configuration is for defining the standard sensor properties including Type, ID, Alias, Interval, and Units. Refer to the Sensor fields above for descriptions.

This tab also defines the analytical function expression used for the virtual sensor. Expressions can access a library functions in Info360 including the ability to call data from other sensors.

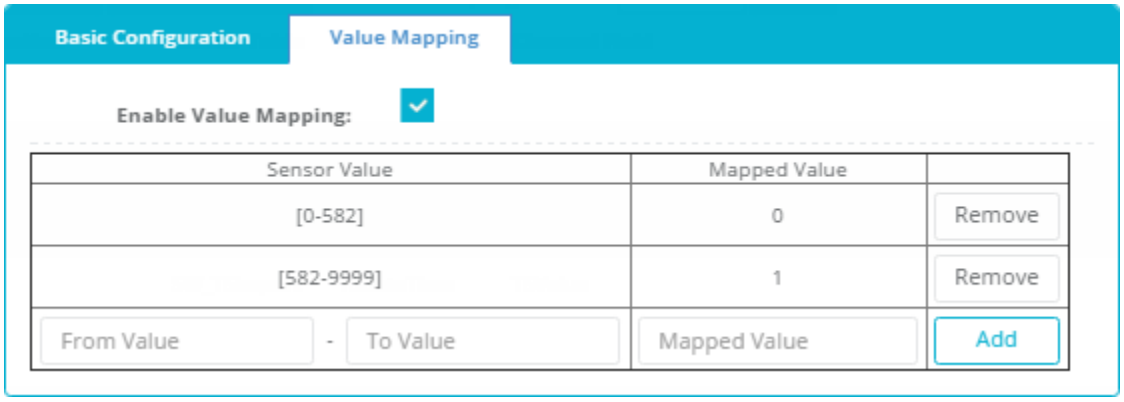
Refer to the Analytical Functions page for setting up expressions.



Value Mapping

Value Mapping is a standard table lookup capability which can be applied to the final output of the function.

For virtual sensors the value mapping is different from normal sensor value mapping in that it applies unique outputs for ranges in function output.



> **Note:**
>
> BizBlockis generally more powerful than Virtual Sensors because it can be customized on the front end and accessed at any time interval.

CSV Mass Import

It can be tedious to add all sensors manually. Typically for new sites, it is best practice to configure all of the sensor data mapping in excel, and then use CSV to bulk import to Info360.

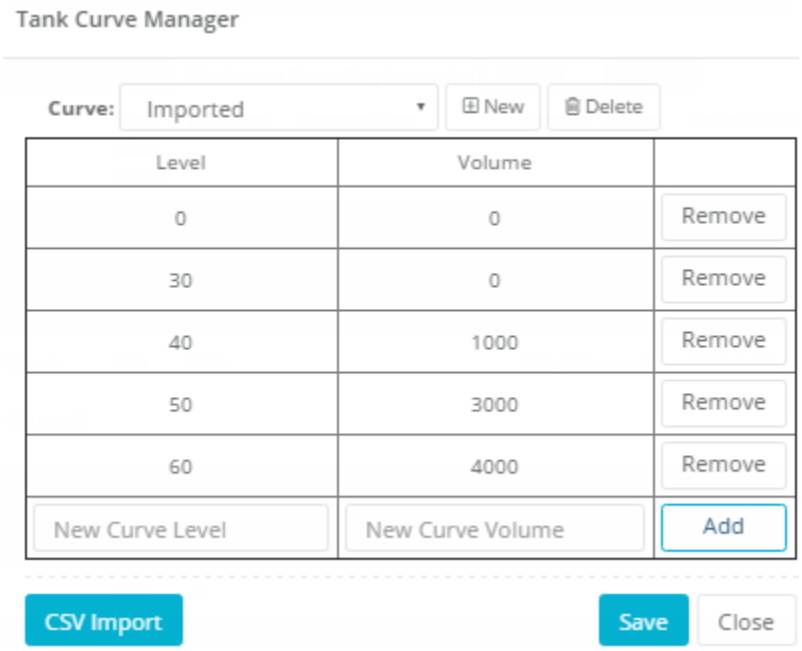
Contact us for assistance setting up the CSV file.

Tank Curve Manager

Tank volumes in Info360 are calculated from Tank Level sensors and Tank geometry. Tank geometry can be defined as cylindrical with a constant set diameter, or using curve data. Curve data is input as a table of tank volumes for each level reading. Info360 applies linear interpolation on the table to determine the volume at any measured level.

The Tank Curve Manager is used to save tank curves which can later be referenced by tank level sensors.

Tank Curves can be entered manually or imported from CSV.



Data Sampling

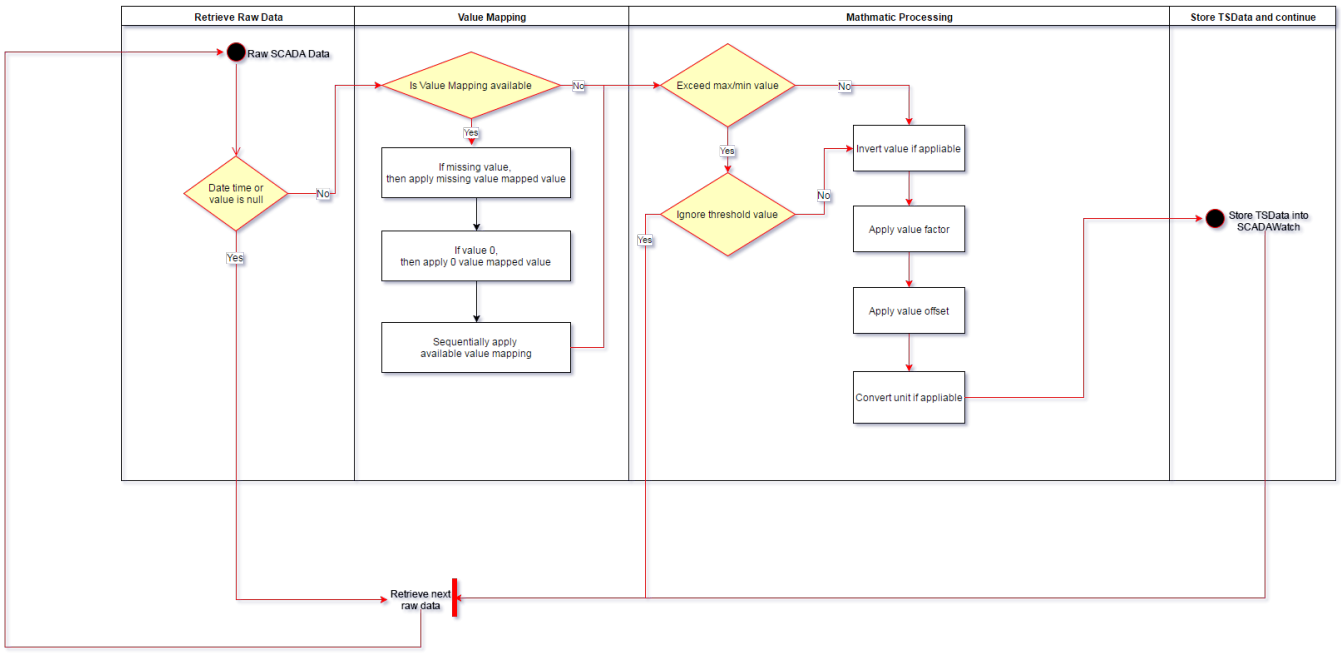
Once the data is mapped for each sensor, it can be loaded into the Info360 database through sampling at the specified interval.

Setting the maximum sampling intervals defines a limit to how far back historical data will be sampled.

It can be a good idea to first test sample a few intervals, and later sample all desired data.

Once set up and sampled, sensors will continue to retrieve new live data from the SCADA database and store all sampled data in the Info360 database.

The logic map below shows the decisions and logic Info360 uses while bringing in data from SCADA.



See the Data Sampling page for more information on how SCADA data is sampled and stored in the Info360 database.