



DATA SOURCES

How to Create/Edit Data Sources in TMS

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Introduction

Purpose

This document serves as a template for users to create and develop Data Sources within the TMS application. It provides a foundational understanding of how to add and modify fields, utilize formula fields, apply filters, and adhere to best practices.

Scope

This document functions as an informational guide to the Data Sources module, offering a detailed walkthrough of its features and functionality. However, it does not address how Data Sources interact with other modules, such as Dashboards or Reports.

Data Source Types

Data Sources are essential in TMS for reviewing and reporting data, enabling you to select fields from various records. They can be utilized for reports, dashboards, or independently, though it is important to note that Data Sources do not include formatting information related to how the data will display when printed out.

A Data Source contains information for retrieving a subset of data from the TMS database. This includes the data fields, aggregated data, source tables, relationships, filters, and sort criteria.

TMS offers four types of Data Sources, each with unique advantages for different application areas.

View

The **View** Type Data Source primarily serves as a results viewer in TMS. It defines the columns in query results and provides one row of data per record, using fields only from the specific module without allowing data filtering. Views are the simplest form of Data Source.

Detailed List

The **Detailed List** Type Data Source is the most common one, enabling information retrieval from multiple related modules within a single source. It allows filtering to focus on specific records, providing one row of data per included record. This type is frequently used for reports and dashboards.

Summary List

The **Summary List** Type Data Source is similar to the detailed list but includes summary functions, providing aggregated data instead of individual rows. It allows information retrieval from multiple modules, filtering, and can be used for reports, dashboards, and with the graphing widget to visualize data, such as counting work orders by type codes.

Cross Tab

The **Cross Tab** Type Data Source resembles the summary list but enables two-dimensional data summation, creating a table with selectable rows and columns for simultaneous breakdown by two fields. Commonly used on dashboards, cross tabs can also integrate with the graphing widget.

Creating a New Data Source

To create a new Data Source, follow the steps below.

1: Go to **Data Sources > New**.

2: In the **Segment** dropdown menu, select the segment in which this Data Source should reside.

Note: The segment where the Data Source resides only impacts user access, not the segment's data visibility in the Data Source.

3: Enter a **Name** for the Data Source.

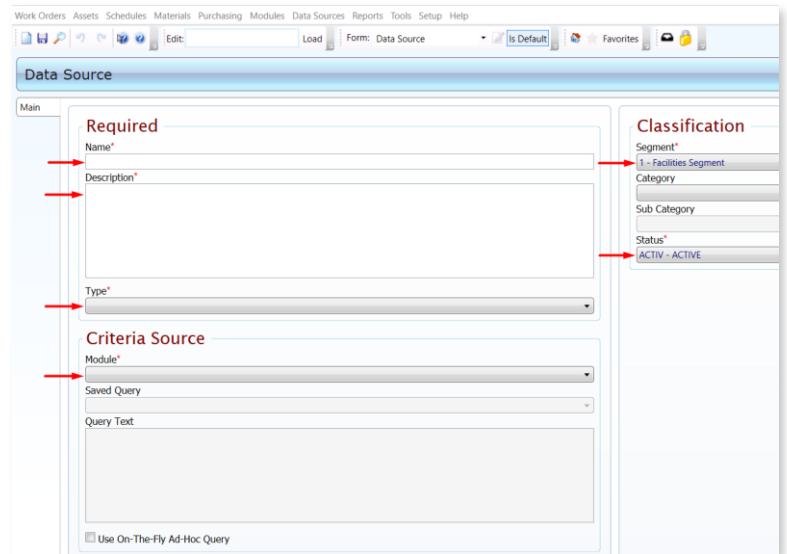
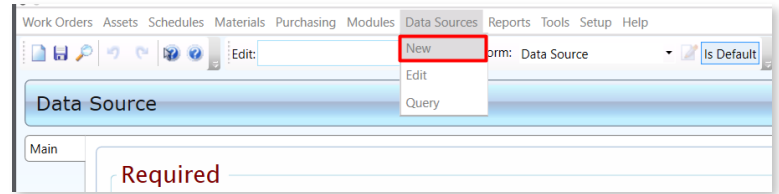
4: Enter a **Description** for the Data Source.

5: In the **Type** dropdown, select the desired type (see descriptions in previous section).

6: Select the **Module** for the Data Source to pull data from.

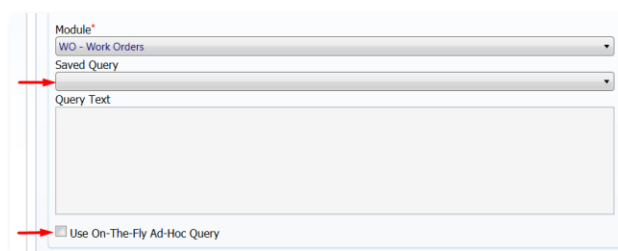
7: In the **Status** dropdown menu, select **Active**.

8: Click **Save**.



For non-view type Data Sources, the **Saved Query** dropdown and **Use On-The-Fly Ad-Hoc Query** checkbox can replace traditional Data Source filters.

- The **Saved Query** dropdown lets you select a query from the module, displaying data for records returned by that query.
- The **Use On-The-Fly Ad-Hoc Query** checkbox enables users to perform a query when generating the Data Source or report, utilizing all records returned by the query.

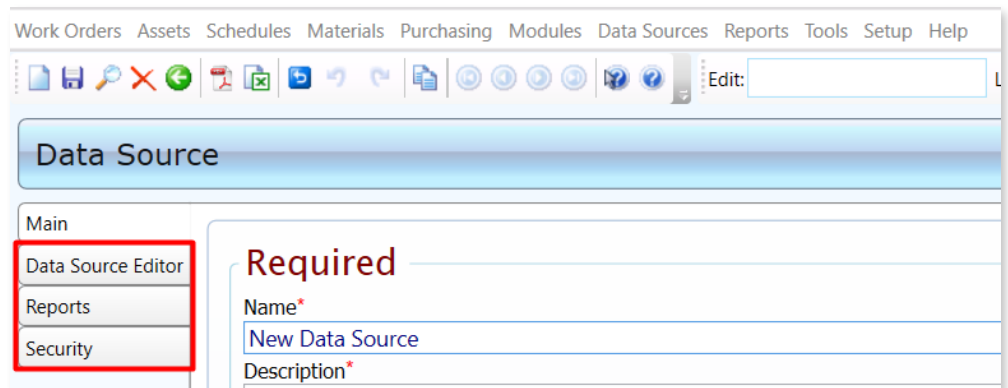


There are also a **Category** and **Sub Category** that can be selected. These are here for categorization and organization to query Data Sources more easily. They have **no** impact on the Data Source itself.

Editing and Building a Data Source

Upon saving a new Data Source, you are taken to the **Data Source Edit** screen. Additional tabs become available when the new Data Source is opened in **Edit** mode. These tabs are:

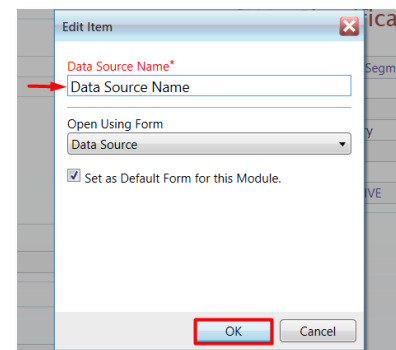
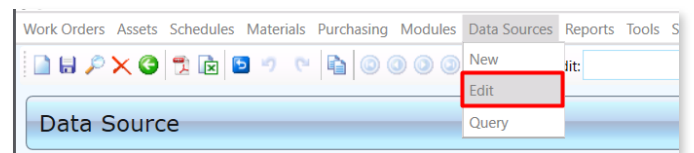
- **Data Source Editor**
- **Reports**
- **Security**



If you are already on a **Data Sources** module screen, you can reach the **Data Source Edit** screen from:

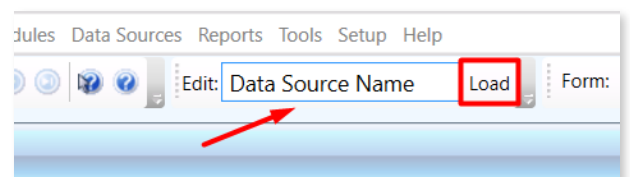
- The menu bar:

1. Go to **Data Sources > Edit**.
2. In the pop-up window, enter the **Data Source Name** of the record you want to edit.
3. Click **OK**. The Data Source opens on the **Data Sources Edit** screen.



- The toolbar:

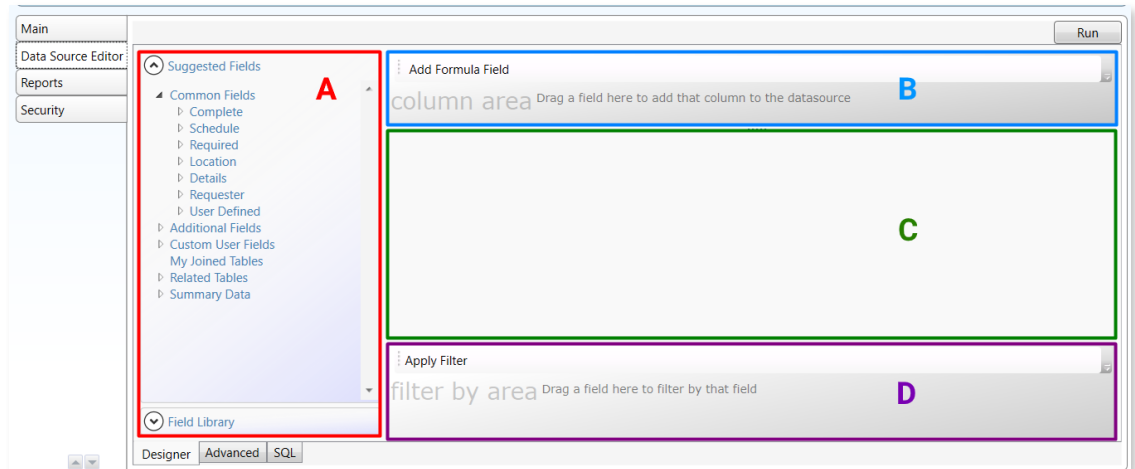
1. In the **Edit** field in the toolbar, enter the **Name** of the Data Source you want to edit.
2. Click **Load**. If found, the Data Source opens on the **Edit** screen.



The Data Source Editor

When you click on the **Data Source Editor** tab, you will see a screen like the image below. It can be broken down into four main areas:

- The Fields Pane (A)
- The Column Area (B)
- The Preview Pane (C)
- The Filter Area (D)



Fields Pane

The **Fields Pane (A)** contains all the fields from the database that can be added to a Data Source.

Column Area

The **Column Area (B)** contains fields you want to display in your Data Source. It also includes an Add Formula Field button for adding formula fields, which will be explained later in this document.

Preview Pane

The **Preview Pane (C)** shows a preview of the data that the Data Source would return.

Filter Area

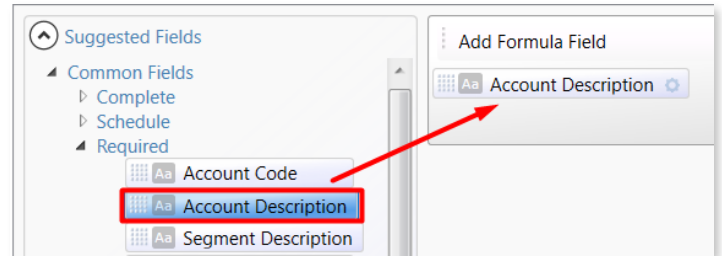
The **Filter Area (D)** contains any fields used to filter the records included in the Data Source.

Note: If you are using a **Saved Query**, have the **Use On-The-Fly Ad-Hoc Query** box checked, or are using the **View** type, the filter area will not show as these options act as the filter for the Data Source.

Specific Edits

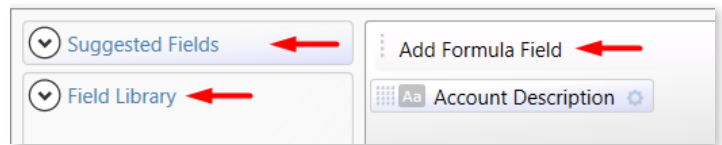
Adding a Field

To add a field to your Data Source, drag from the field pane on the left and drop in the column area.



You can add a field from three different sections:

- **Suggested Fields**
- **Field Library**
- **Formula Field**



Suggested Fields

The Suggested Fields are the simplest to add to a Data Source. Drag the field from the left and add it to the Column Area on the right.

Any field in the Suggested Fields will work without any additional steps or editing.

The suggested fields are broken into six sections: **Common Fields**, **Additional Fields**, **Custom User Fields**, **My Joined Tables**, **Related Tables**, and **Summary Data**.

Common Fields

The **Common Fields** are specific to the main module of your Data Source, i.e., the basic fields that you would see on any record.

For example, the *Work Order Description* field would be under *Common Fields* for the Data Source module. The Common Fields section is broken into different headers that match the standard form for that module.

Additional Fields

The **Additional Fields** are fields related to the main module but may be tied to other modules or may not be commonly thought of as part of that module.

Custom User Fields

The **Custom User Fields** are custom fields tied to that module.

My Joined Tables

The **My Joined Tables** section displays fields from tables already joined into the Data Source, essentially showing fields from other modules linked to it. These fields are organized by their respective tables.

For further details on linked tables, refer to the **Advanced Tab** section of this document.

Related Tables

The **Related Tables** section shows fields from tables that are commonly associated with the main module for the Data Source.

When adding a field from this section, **TMS automatically creates a *join*** for the fields from the relevant table. For example, Time Charge information would be under the related table “Time Charges” in a Work Order module Data Source.

Summary Data

The **Summary Data** section contains fields that calculate a total or summary for related information. For example, Total Hours is a summary field for the Work Order module. It shows the total hours of every time charge on that work order added together.

Field Library

The **Field Library** lists fields organized by database sections.

To add a field, drag it from the field pane on the left to the column area. Fields from the Field Library may not directly relate to the main module of the Data Source; a join might be necessary in the *Advanced Tab* for proper integration.

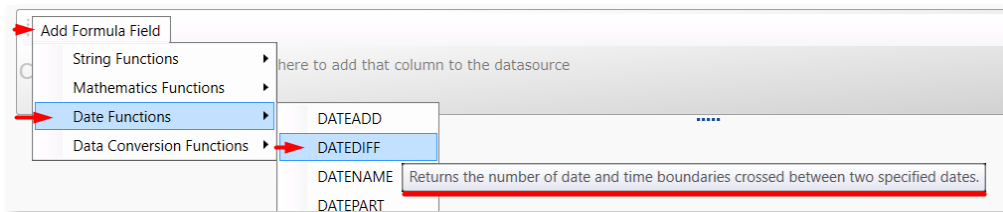
For details on adding joins, refer to the **Advanced Tab** section of this document.

Formula Fields

Formula fields can be added using the **Add Formula Field** button in the column area.

These fields allow you to get specific information from a field, perform calculations between fields, or get other useful information.

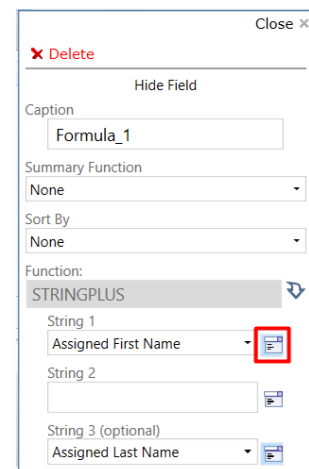
You can hover the mouse over each formula field in the list to see what that formula field does.



Note: Most formula fields have options and/or parameters that need to be set for that formula field to function. After adding the formula field, you can click the *gear* icon on the right side of the field to set the options.

Some options have the dropdown button to switch between a specific value and a dropdown to select another field from the Data Source.

The list of fields available when using the dropdown is the same as the fields currently in the column area.



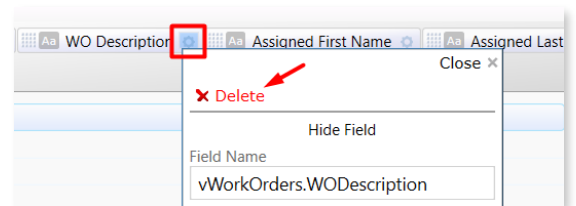
Field Editing

You can get to the **Field Options** for a field by clicking the gear icon to the right of that field in the column area.

The Field Options allow you to rename the field, use summary functions, sort based on that field, and add a mask to the data for that field. Formula Fields, as mentioned above, may have additional options within the field options for the formula being used.

Deleting a Field

To Remove a field, click the *gear* icon to the right of the field and then click the **Delete** button.



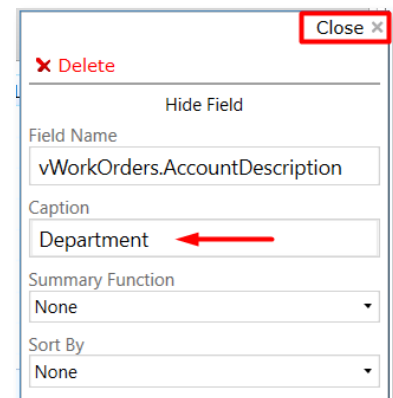
Renaming a Field

To rename a field, you can change the text in the Caption box as seen in the picture.

This can be useful if you intend to use this Data Source on a dashboard and your users are more familiar with a different name than the TMS field name for the field.

In this example, the *AccountDescription* field is being renamed as **Department**.

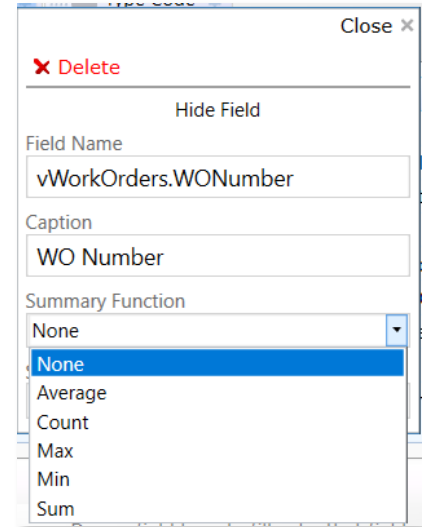
After making the desired changes, click **Close**.



Summary Functions

Summary Functions allow you to summarize a particular column for multiple records within a Data Source. The summary functions available are:

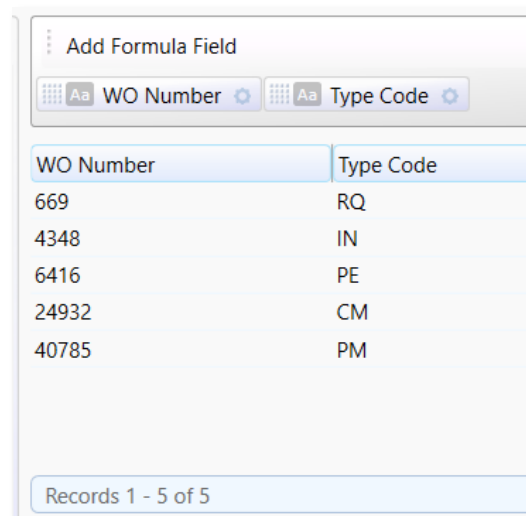
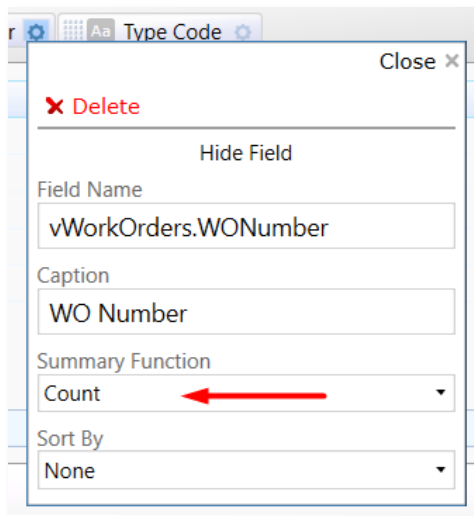
- **Average:** Returns the average of the values in all rows.
- **Count:** Counts the amount of rows.
- **Max:** Returns the highest number.
- **Min:** Returns the lowest number.
- **Sum:** Sums up the value of all rows.



For example, a Data Source with just the Type Code and Work Order Number for the work order module could have a *Count* summary function on the Work Order Number field.

The Data Source would show each Type Code and a count of the number of Work Orders for that Type Code.

Summary Functions only summarize data between records where all other columns match.



The screenshot shows a data source with a table containing 5 records. The columns are 'WO Number' and 'Type Code'. The records are:

WO Number	Type Code
669	RQ
4348	IN
6416	PE
24932	CM
40785	PM

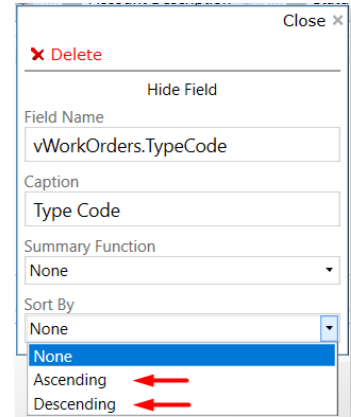
Records 1 - 5 of 5

Sorting

The **Sort By** dropdown allows you to sort the Data Source by a particular column.

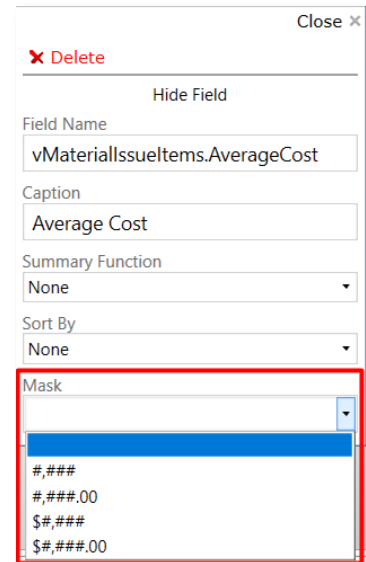
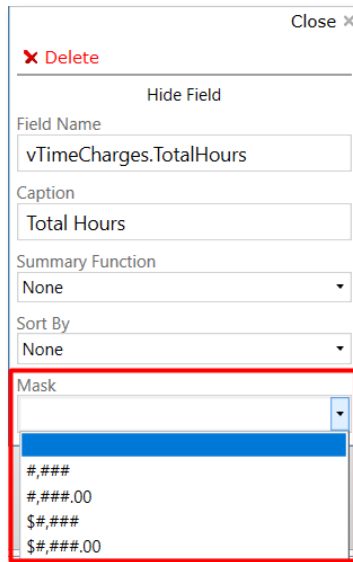
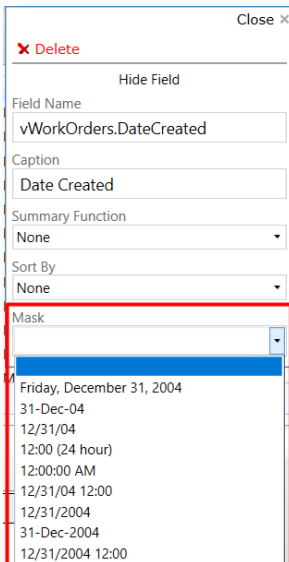
If multiple fields have a *Sort By* selected, it will first sort by the left-most field that has a sort selected and then proceed with the next left-most field that has a sort selected until it has sorted by all the fields that have a sort selected.

Note: If no fields have a sort selected, the Data Source will sort in ascending order from left to right.



Adding a Mask

The **Mask** dropdown allows you to select a specific format for certain types of fields. **Date** and **Numeric** fields have several mask options, though masks are not available for all field types.



Without Masks

Date Created	Total Hours	Average Cost
7/16/2019 7:39 AM	1.00000000	1.00000000
7/16/2019 7:39 AM	1.00000000	19.00000000
7/16/2019 7:39 AM	1.00000000	80.00000000

With Masks

Date Created	Total Hours	Average Cost
07/16/19	1.00	\$1.00
07/16/19	1.00	\$19.00
07/16/19	1.00	\$80.00

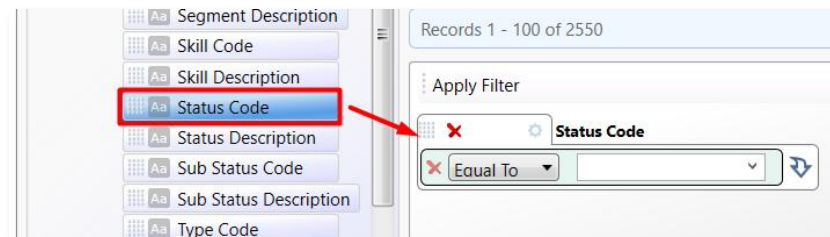
Filters

Filters allow you to narrow down the information that the Data Source will show. For example, if you had a Work Order Data Source and you only wanted to see Active Work Orders, you could add a filter that would look for a Status of “Active.”

Adding a Filter

To add a filter, drag the field you want to filter by from the field pane and drop it in the filter area.

Once the filter is added the Filter Area field, it will look like this.

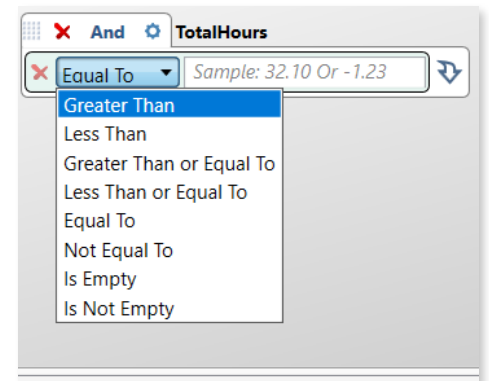
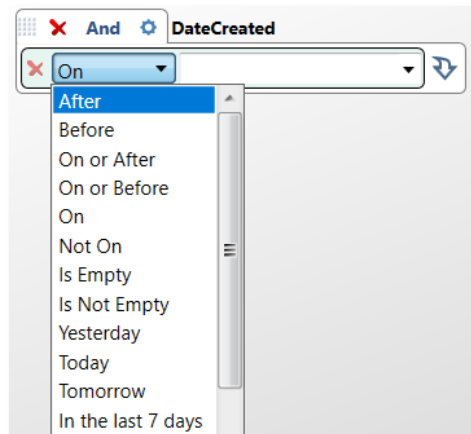
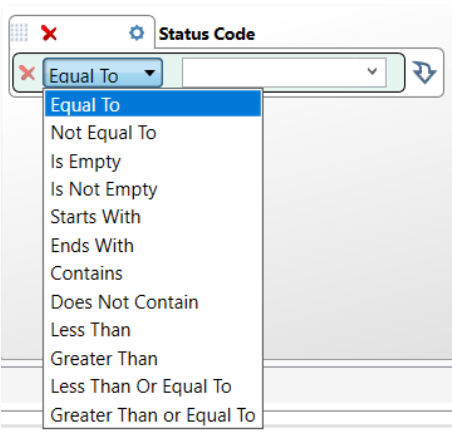


Filter Details

Filters have three major components:

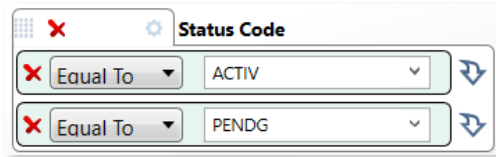
The **Operator dropdown**: has many options. Some are used with the value dropdown (i.e., **Equal To** Active; **Greater Than** 120), while others work independently (i.e., **Is Not Empty**; **Today**).

The Data Source evaluates each record against the specified filter criteria using the operator and value dropdowns. Records that meet these criteria are included in the results.



The **Down Arrow** on the right side of the filter allows you to add additional criteria for the field the filter is for. If the criteria for any row of this filter is met, the record will be included in the Data Source.

For example, if you wanted the Data Source to include **Active** or **Pending** Work Orders, you would use the following filter:

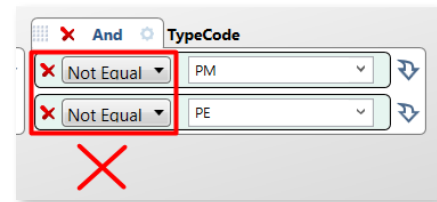


IMPORTANT NOTE: For exclusionary filters (**Not Equal, Not On, Does Not Contain**, etc.), you must add the same field multiple times for the filter to work.

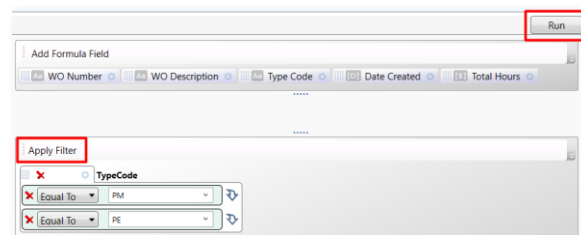
For example, if you wanted to **exclude** Work Orders that have a Type of PM or PE, you would add the Type Code field twice as seen below.



If you instead used the Down Arrow and had both **Not Equal To "PM"** and **Not Equal To "PE"** on the same filter, nothing would be filtered out, as every record would meet one of the two criteria.

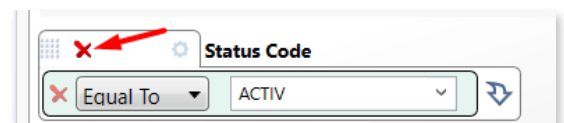


Once you have added a filter, you can click the **Apply Filter** or the **Run** button to update the Preview Pane.



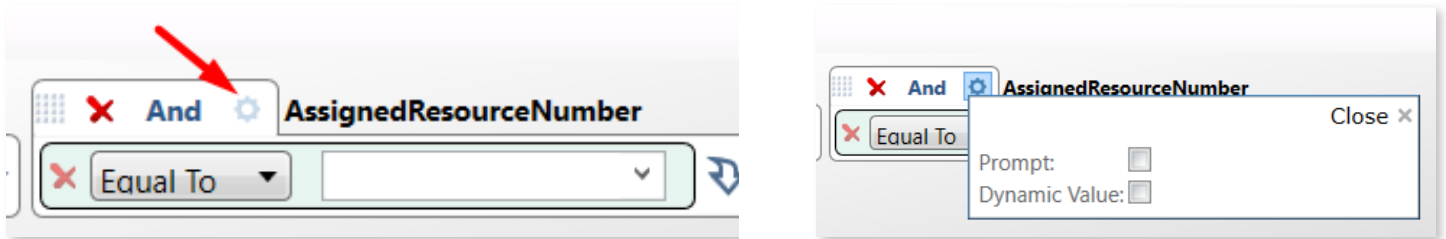
Removing a Filter

To remove a filter, click the **red X** to the left of the filter field name.



Filter Options

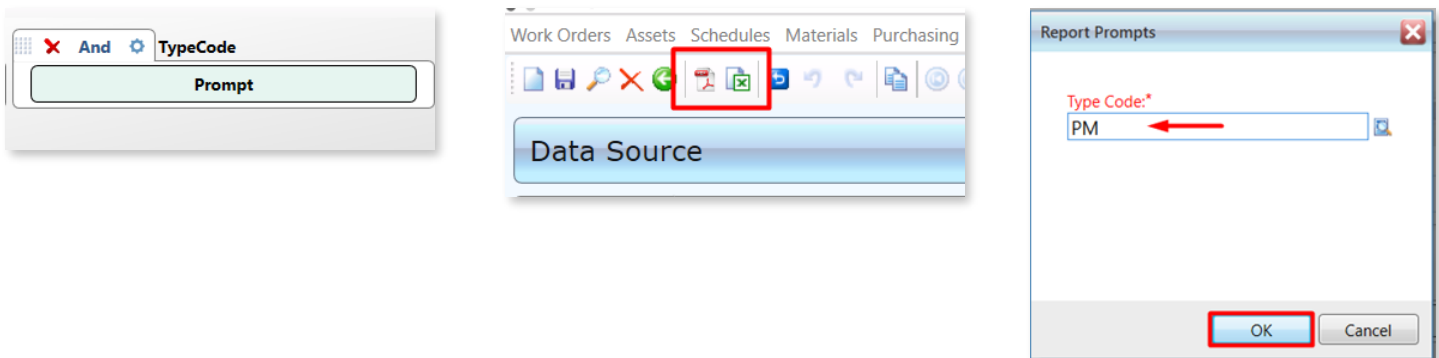
Filter Options allow you to create Data Sources with a prompt for a field value, and with dynamic filters. To access the Filter Options, click the *gear* icon to the left of the filter field name.



Prompt Filter

Prompts allow you to enter filter information at the time the Data Source is generated (or when a report using the Data Source is generated). To make one of your filters a prompt, check the box next to “Prompt.”

For example, if you create a Data Source/Report that shows information about a specific Work Order Type Code, you can make a prompt filter for the Type Code. When the Data Source/Report is run (PDF/Excel), you will be asked to enter the Type you want to run the Data Source/Report for at that time.



Dynamic Filter

Dynamic filters enable a Data Source to filter based on the logged-in user, though they are not available for all fields. Typically, they are used for resource numbers, allowing a single Data Source to display work orders or time charges specific to each user.

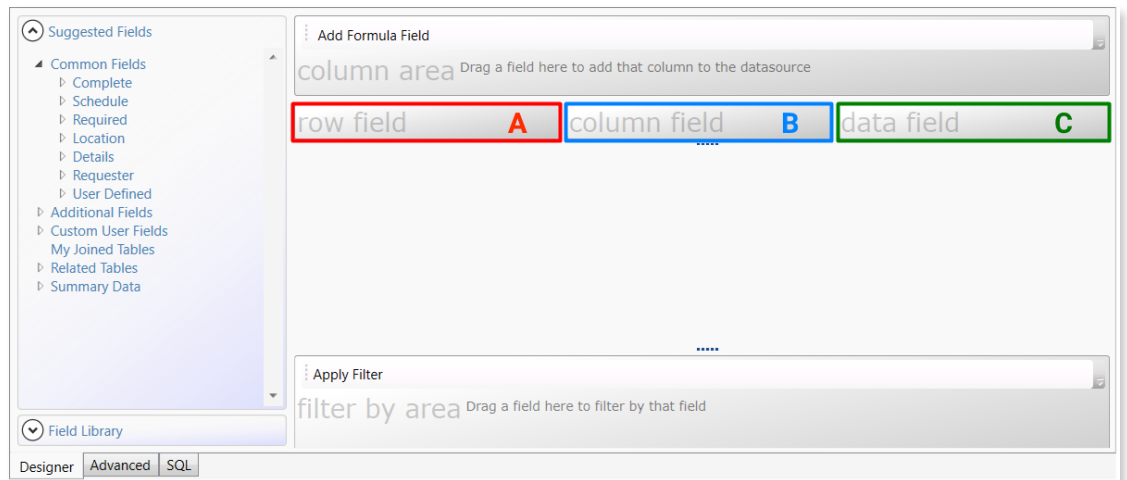
To make one of your filters a dynamic filter, check the box next to “Dynamic Value.”

Note: The dynamic option for Resource Number will **only** work if the logged in user has a Resource tied to their TMS User.

Cross Tab Data Sources

Cross tab Data Sources enable two-dimensional data summation, featuring additional field areas and properties for configuration. The additional field areas are:

- The Row Field (A)
- The Column Field (B)
- The Data Field (C)



The Row Field (A) determines how the data is split out by row; the Column Field (B) determines how the data is split out by column; lastly, the Data Field (C) determines what data is being looked at in the table.

Cross Tab Data Sources essentially make a table.

Notes:

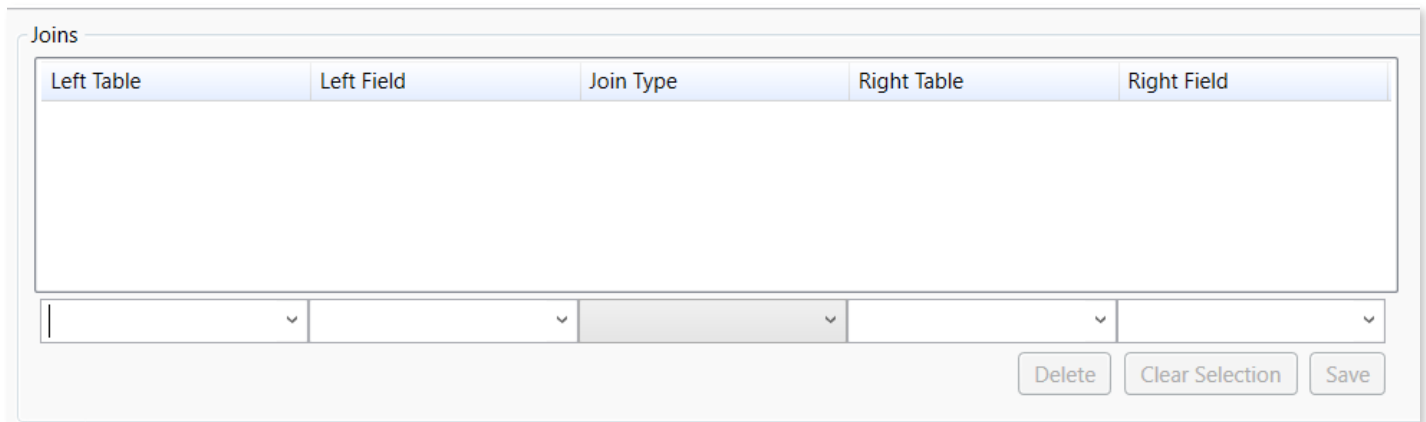
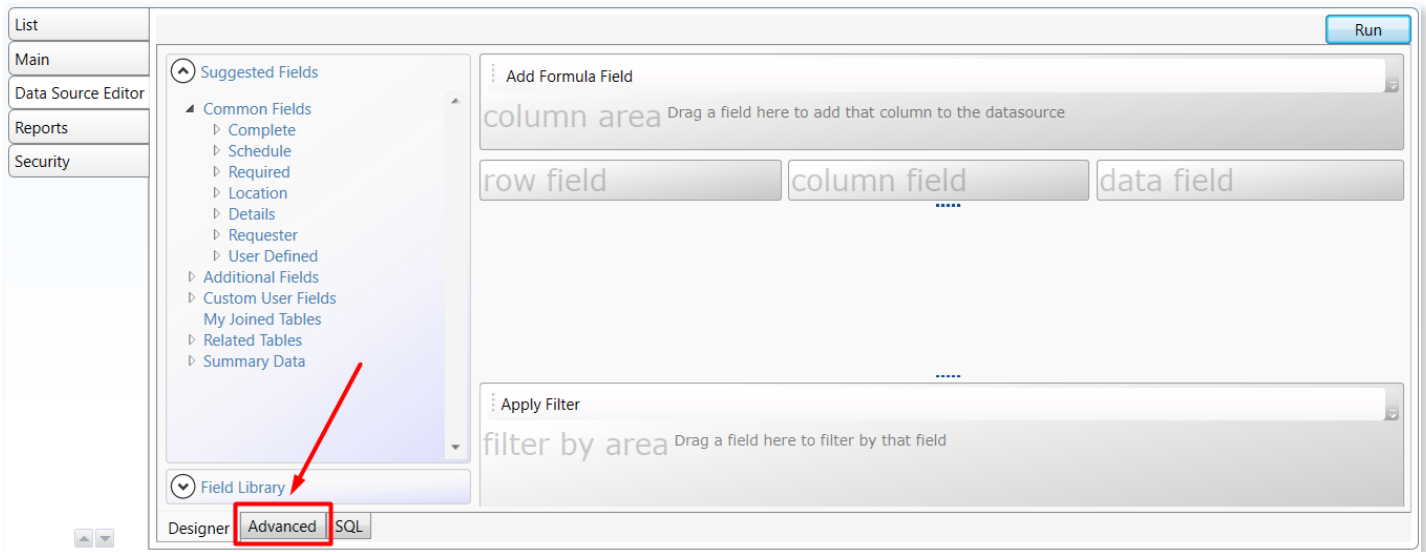
- If no Summary Function is selected for the data field, TMS will use the *Count* option by default.
- The Column Area does not affect the information returned in the Data Source. It can be used to create formula fields that can then be moved into one of the fields (A, B, and C above).
- The system limits rows and columns to a maximum of 300 each.

The Advanced Tab

The Advanced Tab lets you add table joins to your Data Source.

Each module has its own database table for record storage. TMS automatically creates some joins for you when using the Related Fields section, but additional joins may be required for more complex Data Sources.

You can find the advanced tab at the bottom of the Data Source Editor.



Adding a Join

The Advanced Tab shows any joins currently in the Data Source. To add a new join, select a value for each of the five dropdowns and click Save.

The **Left** and **Right Table** fields specify the tables to join, while the **Left** and **Right Field** fields identify the matching fields in each table. The system uses these values to link corresponding records across tables.

If you are uncertain of what selections to use for your joins, see the **Common Joins** section on the next page.

Join Types

There are four types of joins in SQL:

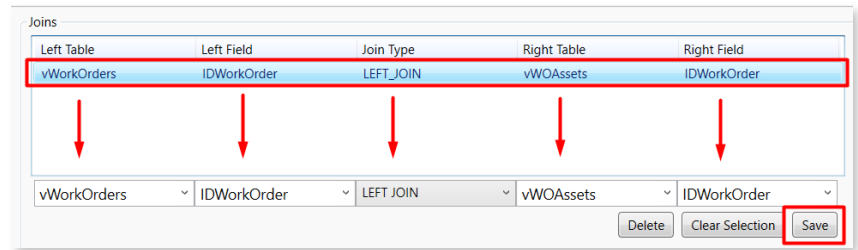
- **Left Join:** Returns all records from the left table and the matched records from the right table. If there is no match, the result is NULL on the side of the right table. This is useful for retrieving all entries from the left table, regardless of whether they have corresponding entries in the right table.
- **Right Join:** A Right Join returns all records from the right table and the matched records from the left table. If there is no match, the result is NULL on the side of the left table. This join is less common but useful when you need all entries from the right table, regardless of corresponding entries in the left table.
- **Inner Join:** An Inner Join returns only the records that have matching values in both tables. This is the most common type of join, used when you need data that exists in both tables and is linked by a common field.
- **Full Join:** A Full Join returns all records when there is a match in either the left or right table records. It combines the results of both Left and Right Joins, showing all records from both tables, with NULLs in places where there is no match.



Editing a Join

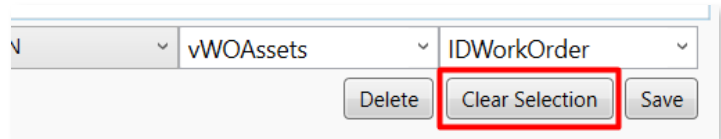
1. Click on the join you wish to edit. The dropdown fields will populate with the values from that join.
2. Change the dropdown values you wish to edit.
3. Click the **Save** button

Note: If you click to edit a join and then decide to add a new join instead, you can click the **Clear Selection** button to clear the dropdown fields.



Left Table	Left Field	Join Type	Right Table	Right Field
vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOAssets	IDWorkOrder

Below the table, five dropdown menus are shown, each with a red arrow pointing to it from the table above. The dropdowns contain: vWorkOrders, IDWorkOrder, LEFT JOIN, vWOAssets, and IDWorkOrder. At the bottom right are buttons for Delete, Clear Selection, and Save. The Save button is highlighted with a red box.

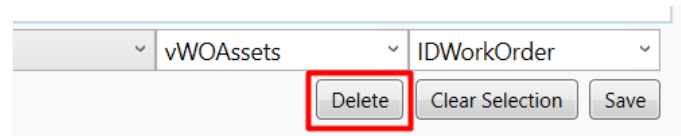


A close-up of the dropdown menus and buttons. The dropdowns show vWOAssets and IDWorkOrder. The buttons are Delete, Clear Selection, and Save. The Clear Selection button is highlighted with a red box.

Removing a Join

1. Click on the join you wish to remove.
2. Click the **Delete** button.

Deleting a join will also remove all fields and filters associated with the table being eliminated.



A close-up of the buttons. The buttons are Delete, Clear Selection, and Save. The Delete button is highlighted with a red box.

Common Joins

Here are some joins that can be useful in specific scenarios. While adding joins may not be necessary for obtaining basic information from a secondary table, they become essential for accessing detailed data.

For instance, if you have a Work Order Data Source and want to include the Assigned Resource's Pager Email, this information is not available in the related Work Order assignment table.

Note: Many of these examples can be combined to create more complex Data Sources. If the last right table in one example matches the first left table in another, they can typically be integrated.

For example, in an Asset Data Source, you could use the "Detailed Work Order Information" example alongside the "Resource Information based on Work Order Assignment."

Work Order Joins

• Resource Information based on Work Order Assignment

vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOAssignments	IDWorkOrder
vWOAssignments	IDResource	LEFT_JOIN	vResources	IDResource

Left Table	Left Field	Join Type	Right Table	Right Field
vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOAssignments	IDWorkOrder
vWOAssignments	IDResource	LEFT_JOIN	vResources	IDResource

• Resource Information based on Time Charges on a Work Order

vWorkOrders	IDWorkOrder	LEFT_JOIN	vTimeCharges	IDWorkOrder
vTimeCharges	IDResource	LEFT_JOIN	vResources	IDResource

Left Table	Left Field	Join Type	Right Table	Right Field
vWorkOrders	IDWorkOrder	LEFT_JOIN	vTimeCharges	IDWorkOrder
vTimeCharges	IDResource	LEFT_JOIN	vResources	IDResource

• Detailed Asset Information

vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOAssets	IDWorkOrder
vWOAssets	IDAsset	LEFT_JOIN	vAssets	IDAsset

Left Table	Left Field	Join Type	Right Table	Right Field
vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOAssets	IDWorkOrder
vWOAssets	IDAsset	LEFT_JOIN	vAssets	IDAsset

• Detailed PM Information

vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOPM	IDWorkOrder
vWOPM	IDPMTTemplate	LEFT_JOIN	vPMTemplates	IDPMTTemplate

Left Table	Left Field	Join Type	Right Table	Right Field
vWorkOrders	IDWorkOrder	LEFT_JOIN	vWOPM	IDWorkOrder
vWOPM	IDPMTTemplate	LEFT_JOIN	vPMTemplates	IDPMTTemplate

PM, PE, and Inspection Joins

PMs, PEs, and Inspections all use the same table (*vPMTemplates*), so the joins are the same for the three modules.

• Detailed Asset Information

vPMTemplates	IDPMTemplate	LEFT_JOIN	vPMAssets	IDPMTemplate
vPMAssets	IDAsset	LEFT_JOIN	vAssets	IDAsset

Left Table	Left Field	Join Type	Right Table	Right Field
vPMTemplates	IDPMTemplate	LEFT_JOIN	vPMAssets	IDPMTemplate
vPMAssets	IDAsset	LEFT_JOIN	vAssets	IDAsset

• Detailed Work Order Information

vPMTemplates	IDPMTemplate	LEFT_JOIN	vWOPM	IDPMTemplate
vWOPM	IDWorkOrder	LEFT_JOIN	vWorkOrders	IDWorkOrder

Left Table	Left Field	Join Type	Right Table	Right Field
vPMTemplates	IDPMTemplate	LEFT_JOIN	vWOPM	IDPMTemplate
vWOPM	IDWorkOrder	LEFT_JOIN	vWorkOrders	IDWorkOrder

• Detailed Resource Information

vPMTemplates	IDPMTemplate	LEFT_JOIN	vPMAssignments	IDPMTemplate
vPMAssignments	IDResource	LEFT_JOIN	vResources	IDResource

Left Table	Left Field	Join Type	Right Table	Right Field
vPMTemplates	IDPMTemplate	LEFT_JOIN	vPMAssignments	IDPMTemplate
vPMAssignments	IDResource	LEFT_JOIN	vResources	IDResource

Asset Joins

• Detailed PM Information

vAssets	IDAsset	LEFT_JOIN	vPMAssets	IDAsset
vPMAssets	IDPMTemplate	LEFT_JOIN	vPMTemplates	IDPMTemplate

Left Table	Left Field	Join Type	Right Table	Right Field
vAssets	IDAsset	LEFT_JOIN	vPMAssets	IDAsset
vPMAssets	IDPMTemplate	LEFT_JOIN	vPMTemplates	IDPMTemplate

• Detailed Work Order Information

vAssets	IDAsset	LEFT_JOIN	vWOAssets	IDAsset
vWOAssets	IDWorkOrder	LEFT_JOIN	vWorkOrders	IDWorkOrder

Left Table	Left Field	Join Type	Right Table	Right Field
vAssets	IDAsset	LEFT_JOIN	vWOAssets	IDAsset
vWOAssets	IDWorkOrder	LEFT_JOIN	vWorkOrders	IDWorkOrder

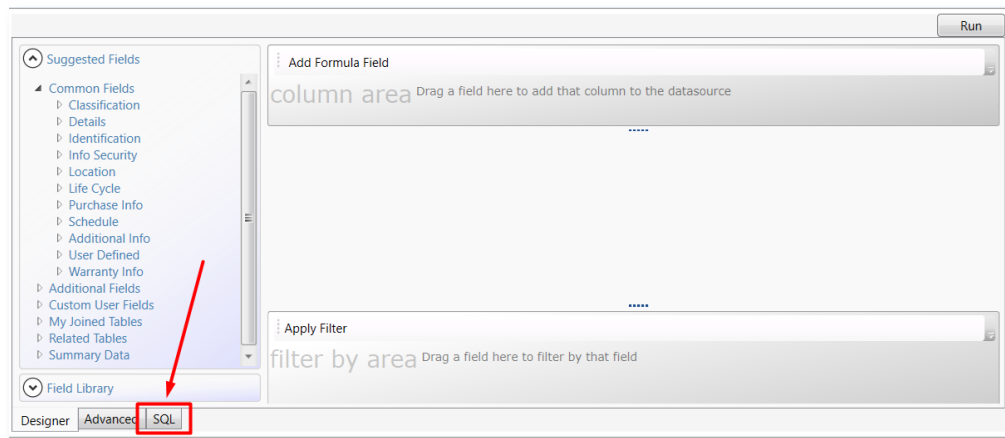
• Detailed Resource Information based on Asset Contacts

vAssets	IDAsset	LEFT_JOIN	vContacts	IDAsset
vContacts	IDResource	LEFT_JOIN	vResources	IDResource

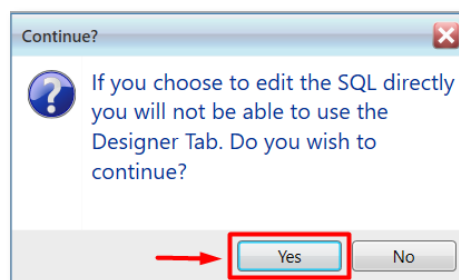
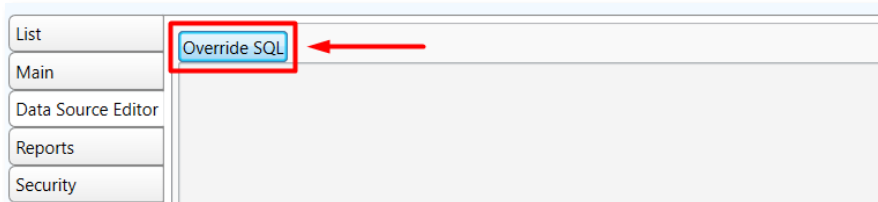
Left Table	Left Field	Join Type	Right Table	Right Field
vAssets	IDAsset	LEFT_JOIN	vContacts	IDAsset
vContacts	IDResource	LEFT_JOIN	vResources	IDResource

The SQL Tab

The SQL tab can be found at the bottom of the Data Source Editor. A SQL override on a Data Source allows you to use your own SQL to get the information you want from the database.



To turn on the SQL override, click the Override SQL button.



Note: If you have already added some fields and filters to the Data Source, the SQL screen will contain the code created so far.

Note: To preview your SQL, you can click back to the **Designer** tab.

IMPORTANT NOTE: Not all modules of TMS fully support Data Sources that use overridden SQL.

Data Sources using overridden SQL can be used on a Dashboard, but you will not be able to double-click on a record to open it **unless** the first column in the Data Source is the ID field from the main table. Some fields with overridden SQL may not be available when using that Data Source for a Report.

Info / Contact Support

DATA SOURCES – How to Create/Edit Data Sources in TMS

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