FS.Net™

The *Factory Systems Network Interface*

User's Manual

For FS.Net 2.235.X

Version 2.235.37

Contents

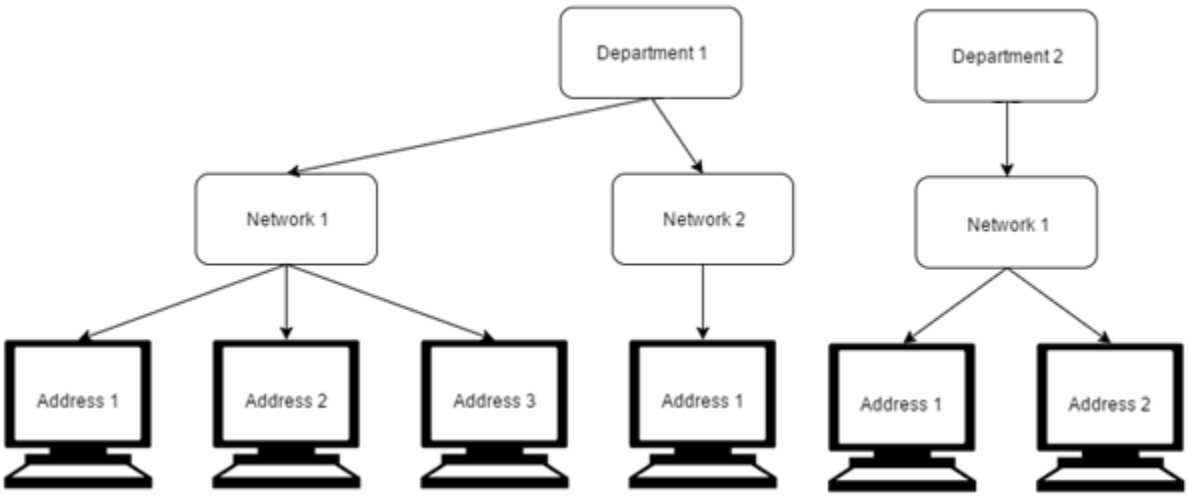
Introduction

Terminology and Data Schema

The Factory Systems Software Suite (***FSWorks***™, ***FS.Net***™, and related products) classifies your data using a hierarchical set of tags. These tags then allow you to sort large amounts of data into meaningful groups at multiple levels.

Plant-level Tags

Our most general categorization comes at the Plant level. At this level, the tag hierarchy looks like the following:



A Plant can have any number of DEPARTMENTS. Each Department can contain up to 99 NETWORKS, which each can contain up to 99 individual ADDRESSES.

A Department, Network, and Address then uniquely identify a WORKSTATION—the data collection point for one or more Machines on the Plant floor.

Workstation-level Tags

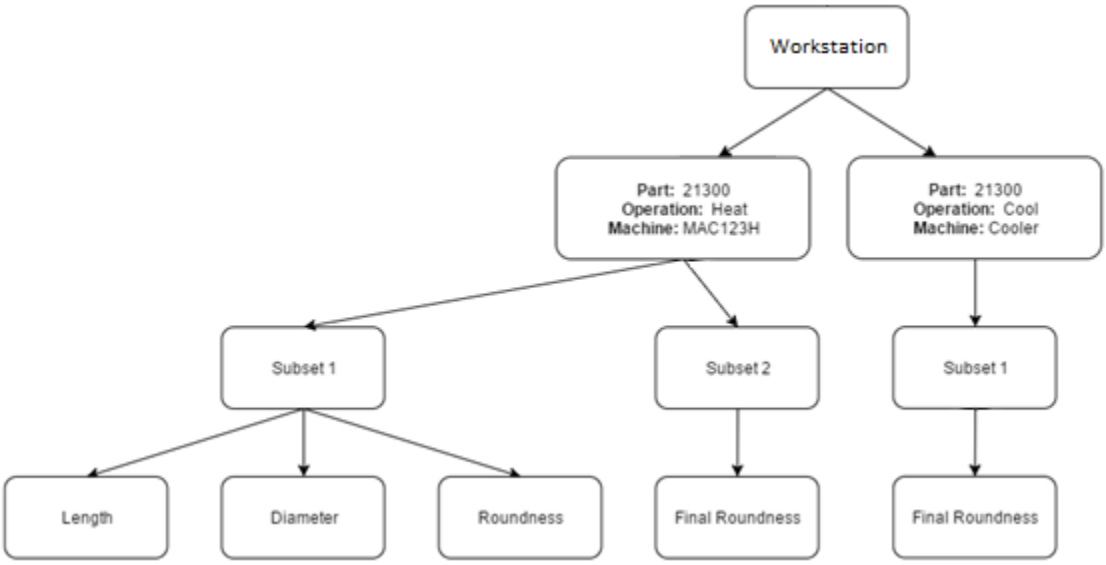
At each Workstation, you must define Specifications (SPECS) for the data that will be collected by that Workstation. Each Spec is identified by a PART, OPERATION, and MACHINE—a combination of tags that we call a POM GROUP (or simply POM).

> NOTE: While the labels "Part", "Operation", and "Machine" are fixed, you are also allowed to defined custom labels called "Categories" which can group data in ways uniquely tailored to your situation.

A POM Group contains one or more SUBSETS, which are used to group FEATURES. A Feature represents the kind of measurement that was taken. Often, data is grouped by

Feature in addition to the standard Part, Operation, and Machine. In those cases, we refer to the group as a POMF.

An example of the Workstation hierarchy can be seen below:



Data Point-level Tags

Individual data points receive the following tags by default:

- Date/Time
- Subgroup #
- Subgroup Index

Additionally, you can add custom tags called EVENTS to your data to create custom classifications.

Retrieving Your Data

When your data is retrieved using ***FS.Net*** or another Factory Systems tool, any combination of tags—at the Plant, Workstation, or Data Point level—can be used to query the data set. This enables you to make Reports, Charts, and other displays that show exactly the data you want without digging through thousands of irrelevant measurements.

System Requirements

Recommended System Requirements for an FS Server

1. Compute Resources
    - vCPUs: 8–16 virtual CPUs.
        - Processor Type: Intel Xeon Scalable (Cascade Lake or newer) or AMD EPYC (Rome or newer).
        - Clock Speed: ≥ 2.5 GHz base with turbo speeds.
        - Ensure the processor supports virtualization extensions (VT-x/AMD-V).
        - Windows Server 2016 or newer
        - SQL server 2016 or newer/Oracle 12c or newer

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2. Memory
    - RAM: 32–64 GB DDR4/DDR5.
        - Minimum 4 GB per core.
        - Allocate memory to match database size and application needs (SQL Server can leverage more memory for caching and query optimization).

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3. Storage
    - Primary Storage (Database):
        - NVMe or SSD storage.
        - Capacity: 1–2 TB.
        - Performance: ≥ 2–3 IOPS per GB sustained.
    - Secondary Storage (Logs/Backups):
        - SSD or Premium HDD.
        - Capacity: 500 GB – 1 TB.
        - Ensure logs are stored on a separate volume from the database to reduce contention.

    File System: NTFS or ReFS with proper alignment for database workloads.

Note: The FS.Net™ application server requires access to the Factory Systems™ database and the application server itself should be accessible on the network to all users who want to view the FS.Net™ website and to all PCs used to collect FS data.

Minimum Client Requirements

- Any modern browser (Edge, Chrome, Firefox, Safari, etc.)

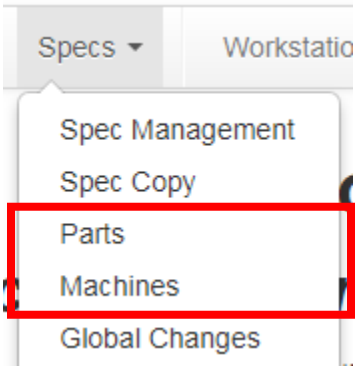
Spec Management

SPECS contain various instructions and limits for the data you collect. Each Spec is identified by a PART, OPERATION, and MACHINE, (referred to as a POM GROUP or simply a POM) and a FEATURE. POM GROUPS contain one or more Features, grouped by SUBSETS. Features, Subsets, and POM Groups all have their own properties referred to as their Spec. Your Features define different measurements represented in your raw data, and Specs are defined per Feature. Because each Feature has its own Spec, we use the terms Spec and POMF (POM + Feature) interchangeably.

When managing ***FSWorks*** Workstations, POMs are transferred between the Workstation and the Server in bundles called SETUPS, which contain all the Spec properties used by the Workstation to process its data.

Parts & Machines

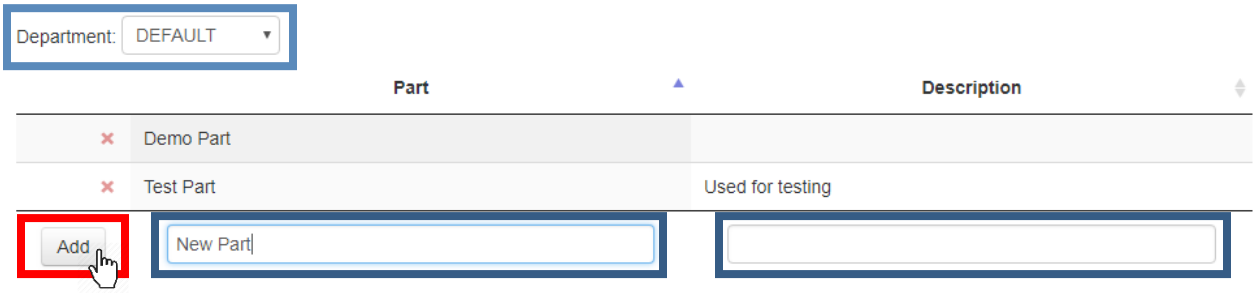
The screens for creating, editing, and deleting Parts and Machines in ***FS.Net*** are essentially identical.



First, select either SPECS > PARTS or SPECS > MACHINES in the app navigation. These links will take you to the PART / MACHINE MANAGEMENT screens.

Creating Parts & Machines

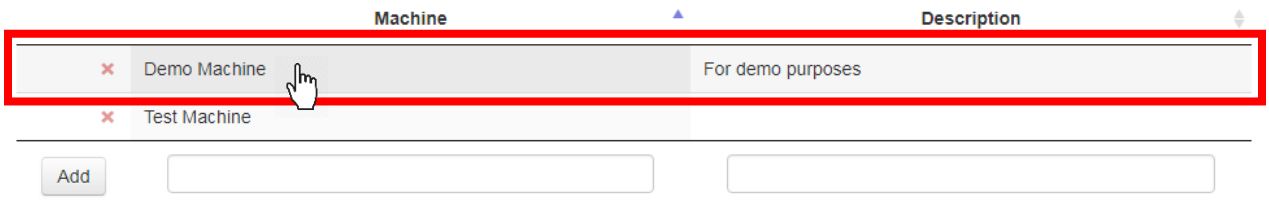
To create a new Part or Machine, select the DEPARTMENT you want to add to, then fill in the Part/Machine NAME and (optional) DESCRIPTION fields, and click ADD:



Once your Part/Machine has been created, it will automatically be selected so you can edit any other properties you need.

Editing Parts & Machines

You can edit a Part or Machine at any time by clicking its entry on the PART or MACHINE MANAGEMENT screen:



This is also where you can delete old Parts or Machines: simply click the delete button beside the name of the Part or Machine you want to delete.

Part Properties

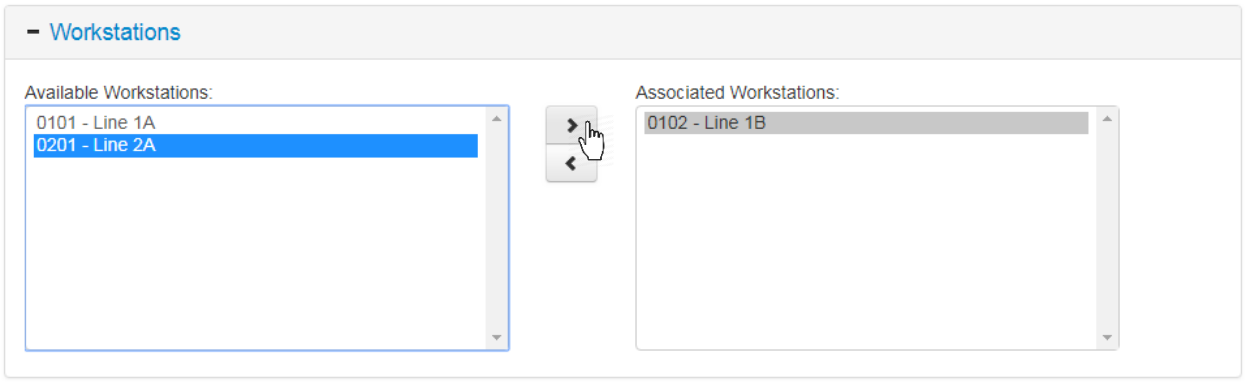
There are no standard properties available for Parts besides NAME and DESCRIPTION., so you will probably not edit them frequently.

> NOTE: The FSTRACK Module adds some additional properties to Parts; see the Modules section for details.

Machine Properties

Machines do have some additional properties you will want to edit. The most important of these are its WORKSTATION ASSOCIATIONS.

Every Machine can be associated with one or more Workstations. When a Machine is associated with a Workstation, that Workstation will have access to any Setups that contain POM Groups with that Machine. Those Setups can then be pushed out from the server and downloaded at the Workstation. If you do not define any Workstation associations, POM Groups with this Machine will not be available at your Workstations.



> NOTE: The FSPRODUCTION Module adds some additional properties to Machines; see the Modules section for details.

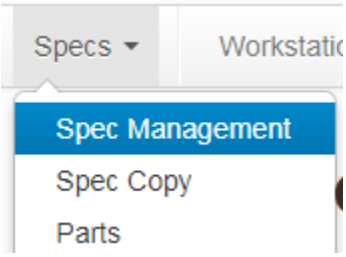
Operations

Operations are simply labels in ***FS.Net*** (and other Factory Systems products). They are never defined independently of Specs, and so can only be created when making new POMs (see below). Operations have no properties.

Specs (POMFs)

Creating POM Groups

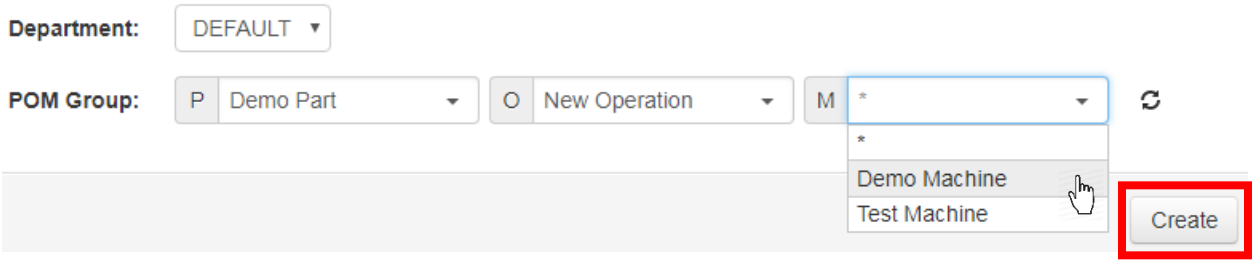
To define a new POM Group, select SPECS > SPEC MANAGEMENT in the app navigation.



Next, click the CREATE GROUP button, which will pull up a form for creating new POM Groups.

On the CREATE NEW POM form, select the DEPARTMENT that you want to add a new POM Group to.

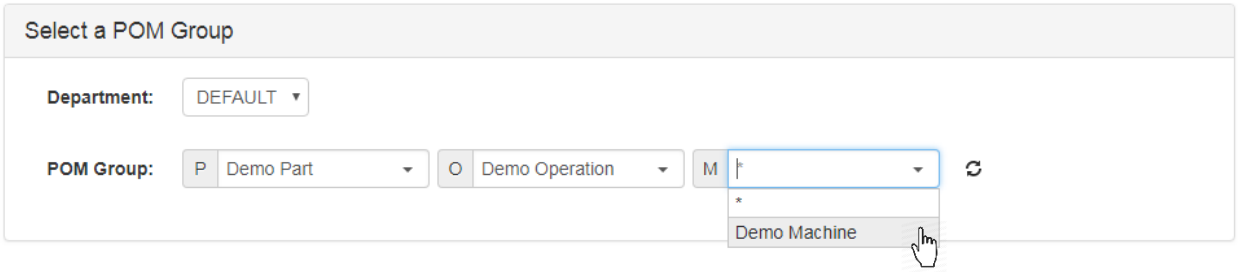
You can now type in the names for a PART, OPERATION, and MACHINE to define your new POM Group. You can select the names of existing Parts/Operations/Machines through an autocomplete dropdown, or type in completely new names if you wish (this is the only way to create new Operations in ***FS.Net***).



Finally, click the CREATE button (see above) to create your new POM Group. It will be automatically selected for you on the Spec Management screen once it has been created.

Editing Specs

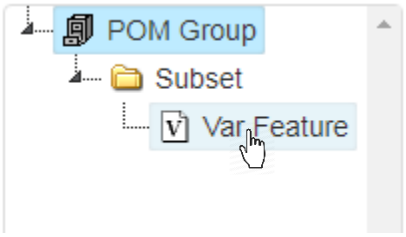
You can edit a Spec at any time by selecting its POM Group from the dropdowns at the top of the SPEC MANAGEMENT screen:



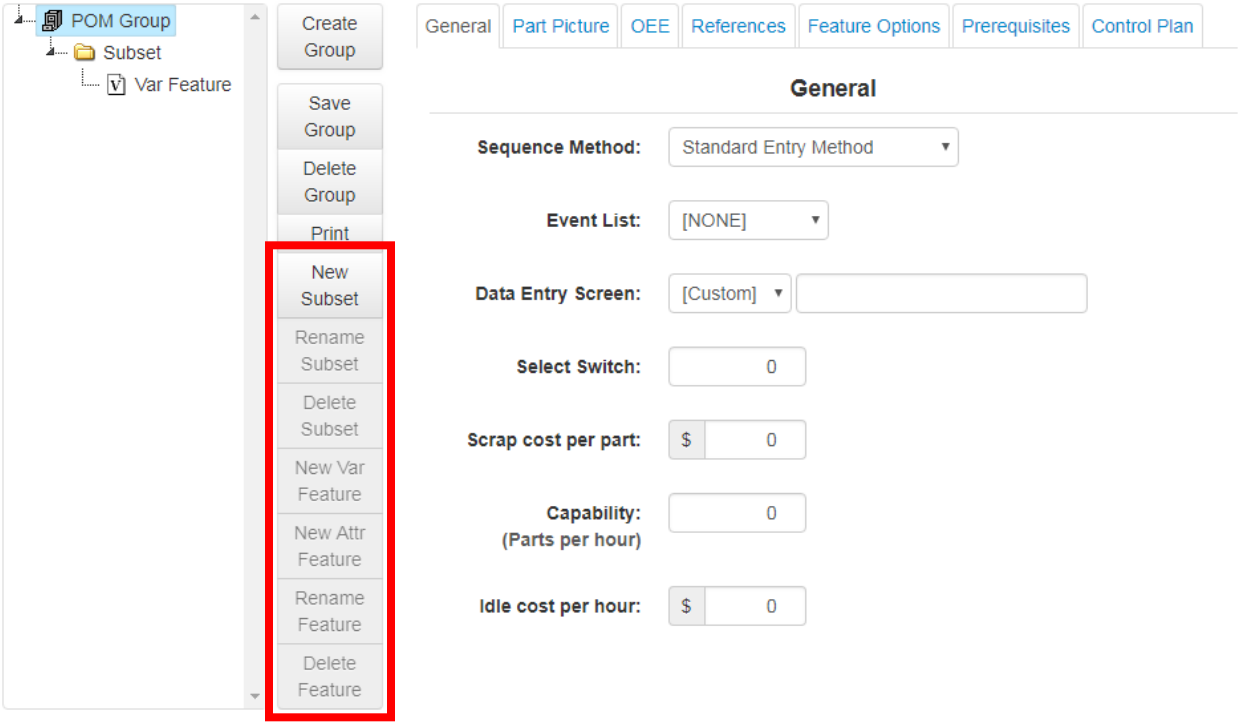
This will populate the Spec Management screen with all the data stored for that POM.

The POM Tree

The POM Tree shows all the Subsets and Features contained in the current POM, and you can edit any of the Spec properties (at the Group, Subset, or Feature level) by clicking on that item.



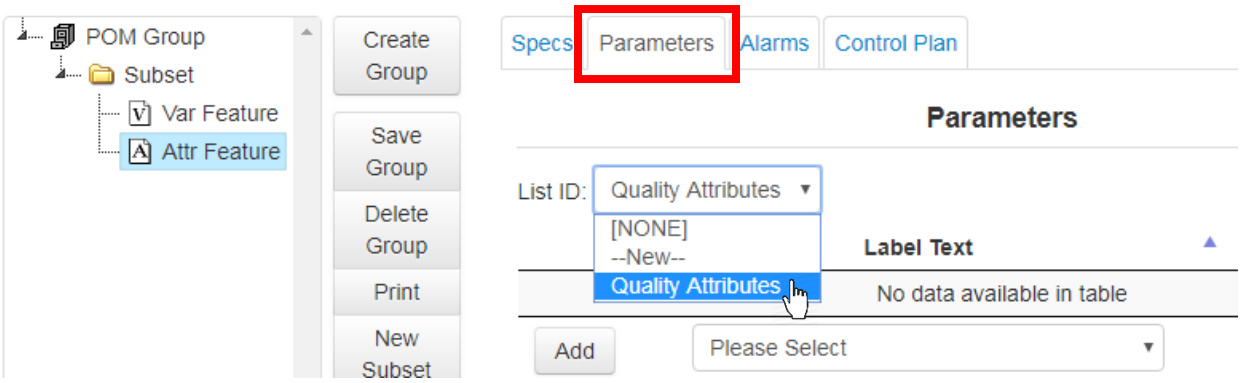
You can create, rename, and delete Subsets and Features using the buttons next to the Tree:



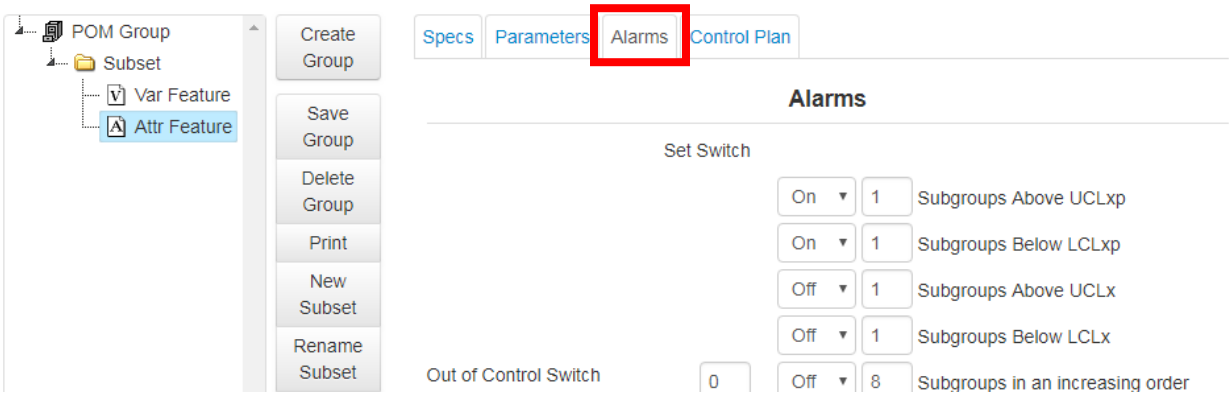
Spec Properties

There are dozens of properties that can be set for each Spec, but two important properties are ATTRIBUTE LISTS and ALARMS.

- ATTRIBUTE LISTS are lists of Labels that are used to tag data, and they are defined on Attribute Features.
  If your Spec contains an Attribute Feature, select that Feature in the POM Tree and click the PARAMETERS tab. Then select which ATTRIBUTE LIST ID and ATTRIBUTE LABELS you want to use for this Feature.

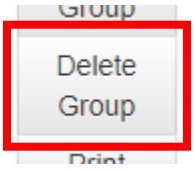


- ALARMS can be triggered at your Workstations based on a Spec.
  To edit Alarms, select any Feature in the POM Tree and click the ALARMS tab. You can indicate which Alarms are Off and On, and what Switch they correspond to. (See the ***FSWorks*** manual for more details.)



Deleting Specs

To delete a Spec, simply select its POM Group on the Spec Management screen and click the DELETE GROUP button.

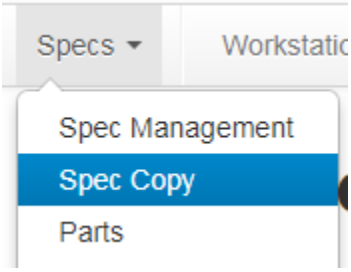


NOTE: Once a POM Group has been deleted, it cannot be recovered. Make sure you really want to delete the Group before you do!

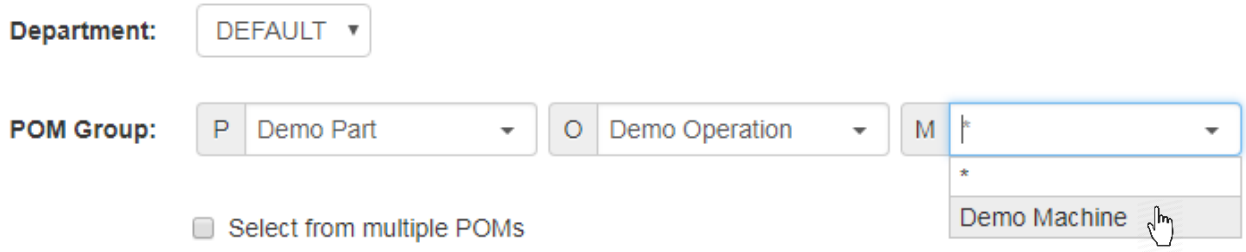
After deleting a Spec/POM, you must recompile any Setups that contained that Spec to update your Workstations (see below).

Copying Specs

FS.Net makes it easy for you to copy the properties of one Spec to another without having to re-type everything yourself. Simply select SPECS > SPEC COPY in the app navigation.

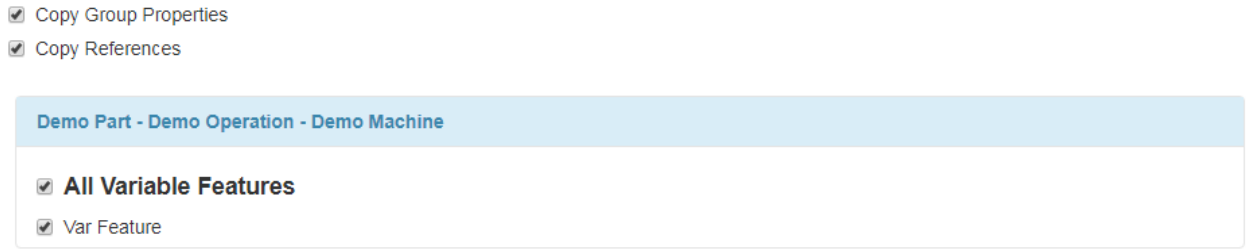


On the Spec Copy screen, select the DEPARTMENT and POM GROUP you want to copy from using the POM selector at the top.

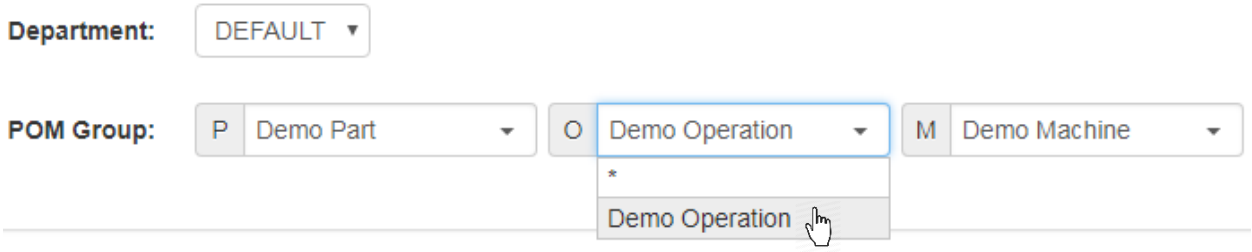


NOTE: If you click SELECT FROM MULTIPLE POMS, you can leave the PART, OPERATION, or MACHINE fields blank (wildcarded), and ***FS.Net*** will copy the properties from every POM Group that matches the non-blank fields.

Once you have selected the POM Group(s) to copy from, a list of their Features will be shown. Select the Features for the Specs you want to copy.

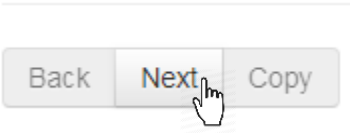


Finally, select the DEPARTMENT and POM GROUP you want to copy to using the POM selector at the bottom. You can even type in new Part, Operation, or Machine names to create an entirely new POM Group at this point.



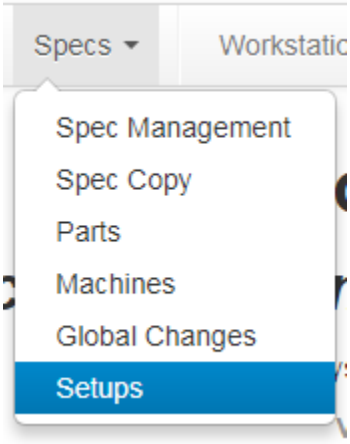
NOTE: You can choose to COPY TO MULTIPLE POMS if you wish (***FS.Net*** will copy the selected properties to every POM Group that matches the fields you fill in). However, you cannot copy *from* multiple POMs and *to* multiple POMs at the same time.

Once you have selected your source and target POMs, click NEXT and you will be taken to a confirmation screen listing the properties to copy. If these are correct, click COPY to finish the process, or click BACK to change your selections.



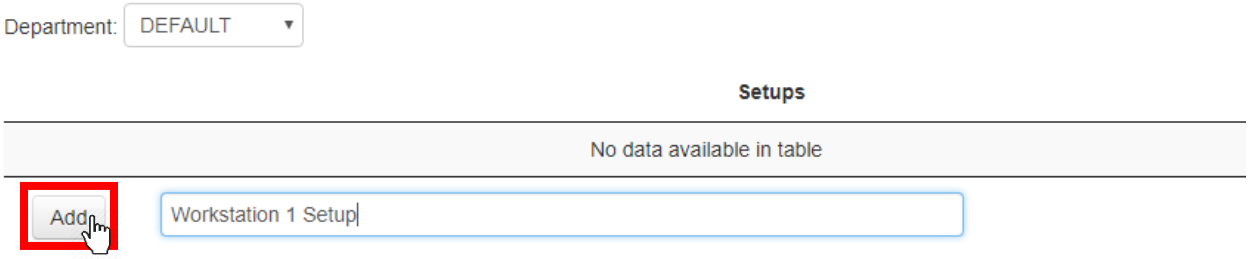
Setups

Once you have defined POM Groups in ***FS.Net***, you will need to create one or more Setups to communicate your Spec properties with your Workstations. You can find all the tools for managing Setups by selecting SPECS > SETUPS in the app navigation.



Creating Setups

To create a new Setup, select the DEPARTMENT you want to add to, enter a (unique) name for the Setup, and click ADD:



Editing Setups

You can edit a Setup at any time by clicking its entry on the main Setups screen:

This is also where you can delete old Setups: simply click the delete button beside the name of the Setup you want to delete.

Setup Commands

There are several Setup Commands that are available that are carried out at the Workstation prior to downloading the Setup.

Delete Commands

DELETE ON PART, DELETE ON MACHINE, DELETE ON OPERATION, DELETE ON FEATURE - These commands will delete Features from the Workstation based on the filters that are set with each command.

DELETE POM, DELETE FEATURE, DELETE MACHINE – These commands will delete a POM Group, ad Feature or a Machine based on the filters that are set with each command.

DELETE ALL GROUP EVENTS – This command will delete the Events that are associated with the group chosen in its filter.

Initialization Commands

Reset Options – This command will return all options at the Workstation to their factory defaults.

Delete All Events - This command will delete all the existing Events on the Workstation

Delete All POM Groups - This command will delete all the existing POM Groups from the Workstation before downloading the ones included in the Setup

Delete All System Events - This command will delete all the existing System Events on the Workstation

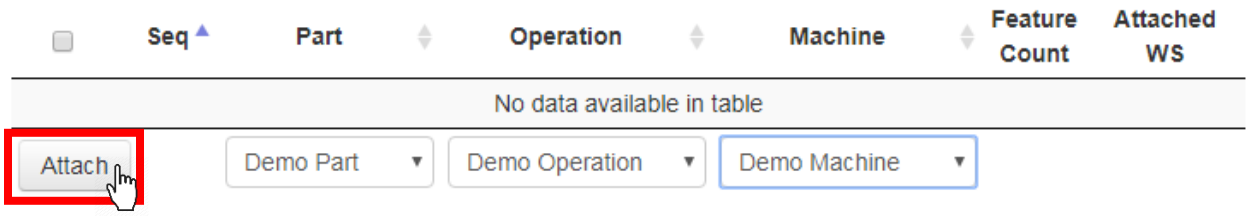
Delete All Attributes - This command will delete all the existing Attribute Events on the Workstation

Delete All Machines - This command will delete all the existing Machines on the Workstation but leave the Groups intact.

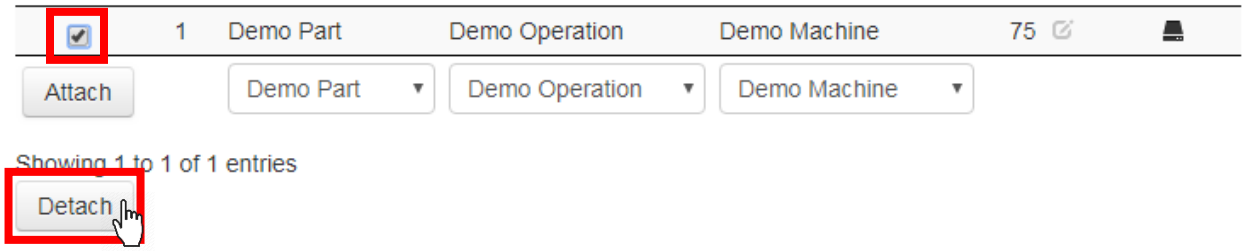
Attaching POM Groups

You should always attach at least one POM to your Setups.

To attach a POM to a Setup, select the PART, OPERATION, and MACHINE for the POM, and then click ATTACH. You must save the Setup after attaching POMs, or your selection will not be finalized.



You can also remove POMs from a Setup by checking its entry in the POM Groups table and clicking DETACH.

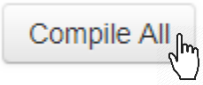


Compiling Setups

After you have edited a Setup you must COMPILE it so that its properties can be downloaded by your Workstations.

You can compile Setups individually by selecting them on the main Setups screen and clicking the COMPILE button.

Alternatively, you can compile all your setups at once by clicking the COMPILE ALL button.



NOTE: If you have many Setups with multiple POMs, it can take a few minutes for ***FS.Net*** to Compile All Setups.

Reports

REPORTS are used to provide summary information, and they display your data similarly to an Excel® spreadsheet.

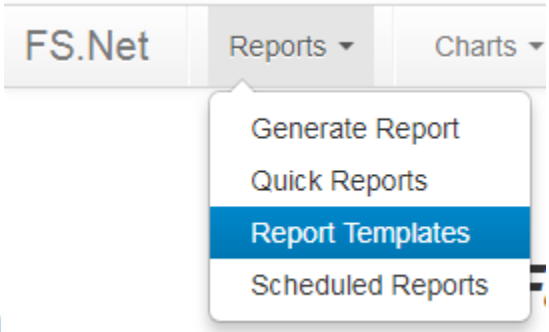
To generate a Report, you must first have a REPORT TEMPLATE. Once you have defined a Template you can then use it to generate a one-time Report or create QUICK REPORTS which can be run multiple times. If you decide to create Quick Reports in your ***FS.Net*** application, you can also use them to set up SCHEDULED REPORTS that deliver finished Reports directly to you on a pre-defined schedule.

Report Templates

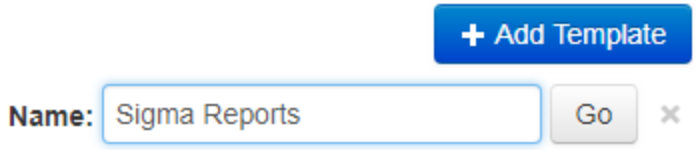
Report Templates determine the content layout and columns for a Report in ***FS.Net***.

Creating Report Templates

To define a new Report Template, select REPORTS > REPORT TEMPLATES in the app navigation.



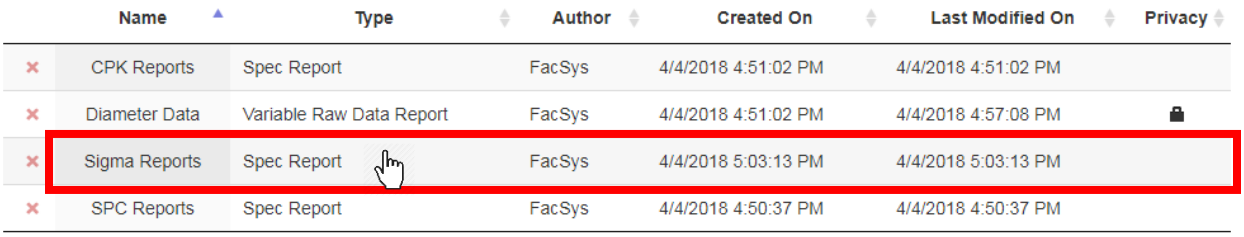
Next, click the ADD TEMPLATE button. Enter a (unique) name for your new Template, then click GO to create a basic Template!



When your Template has been created, you will be redirected to the EDIT REPORT TEMPLATE screen to customize the Template settings.

Editing Report Templates

You can get to the Edit screen for a Template at any time by clicking its entry on the main REPORT TEMPLATES screen:



	Name	Type	Author	Created On	Last Modified On	Privacy
×	CPK Reports	Spec Report	FacSys	4/4/2018 4:51:02 PM	4/4/2018 4:51:02 PM	
×	Diameter Data	Variable Raw Data Report	FacSys	4/4/2018 4:51:02 PM	4/4/2018 4:57:08 PM	🔒
×	Sigma Reports	Spec Report	FacSys	4/4/2018 5:03:13 PM	4/4/2018 5:03:13 PM	
×	SPC Reports	Spec Report	FacSys	4/4/2018 4:50:37 PM	4/4/2018 4:50:37 PM	

This is also where you can delete old Report Templates: simply click the delete button beside the name of the Template you want to delete.

When you edit a Report Template, the most important properties to set are the REPORT TYPE and COLUMNS.

Report Types

The Report Type determines what kind of data can be displayed in your Report. There are four standard Report Types:

- SPEC REPORTS aggregate Variable and Attribute data into rows based on Spec and perform calculations on that aggregated data. For example, a Spec Report would be used to calculate and report a CPK for each individual Spec across a date range.

- VARIABLE RAW DATA REPORTS return Variable data points as individual rows.

- TRACEABILITY REPORTS return Variable and Attribute data points as individual rows that have been cross-referenced with a Label that has been defined with a Traceability option. (See the Labels section for details.)

- EVENT REPORTS return an individual row for each Label Event record for that Report's PRIMARY EVENT type that has been defined with a Traceability option alongside their associated data represented for each Feature in a SPECIFIC FEATURE column or all possible Features using the ALL FEATURES column. (See the Labels section for details.)

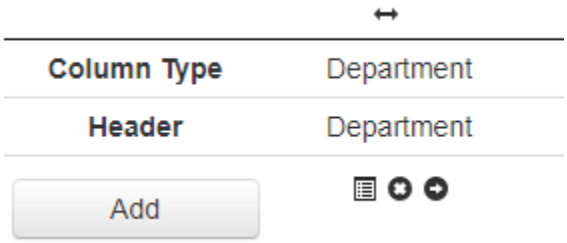
Each Report Type also has its own set of Column types, which you can find listed in full in an Appendix to this manual.

NOTE: Some ***FS.Net*** Modules may add additional Report Types. See the Modules section for details.

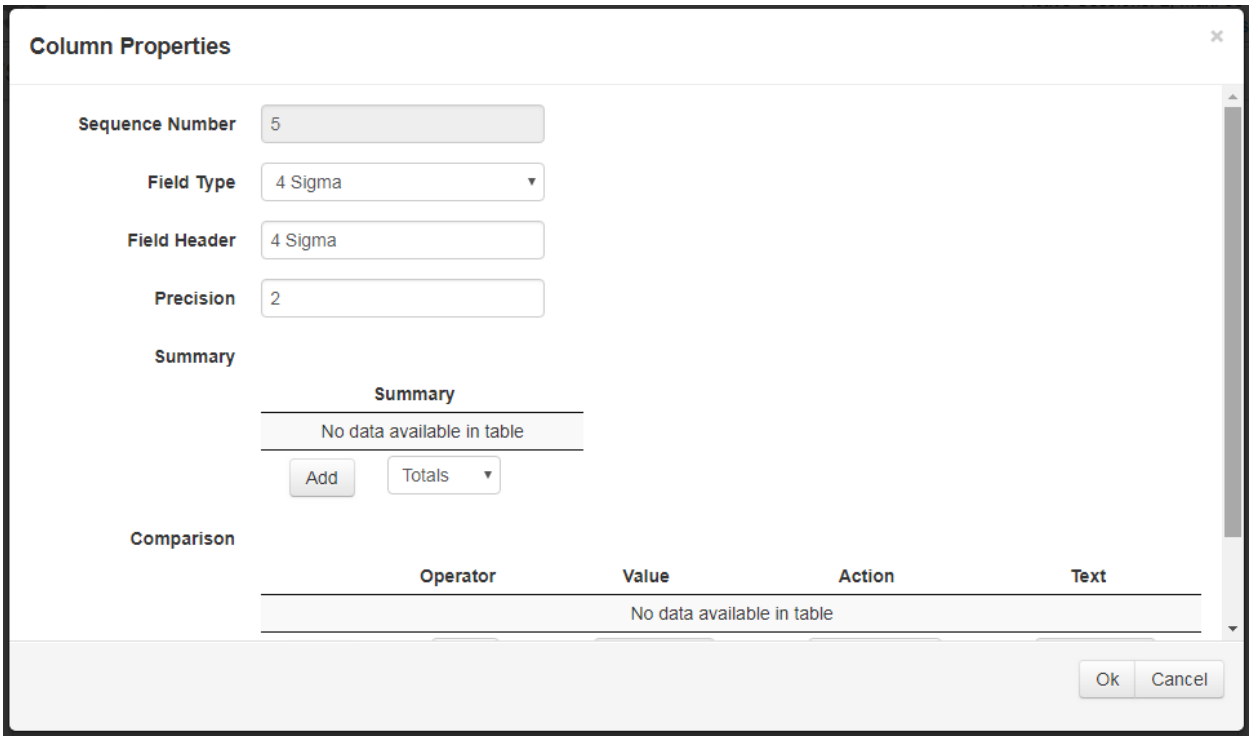
Report Columns

The Columns you define in your Report Template will determine what data is displayed in Reports made from that Template.

By default, every Report Template has DEPARTMENT, PART, OPERATION, MACHINE, and FEATURE Columns included during its creation. These can be altered or deleted. To add other columns, simply click ADD to open the Column Properties form.



In the Column Properties form, you can select the FIELD TYPE for your Column (indicating the kind of data it displays), the HEADER for your Column, and any additional properties that may be available for that Field Type.



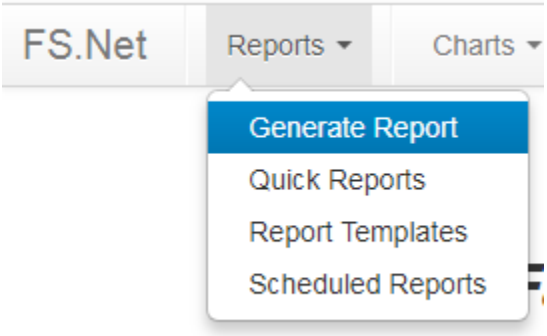
Click OK to add the new Column to your Template.

You can edit, delete, and rearrange the Columns in your Template using the buttons beneath each Column header:

Department	Part	Operation	Machine	Feature
Department	Part	Operation	Machine	Feature

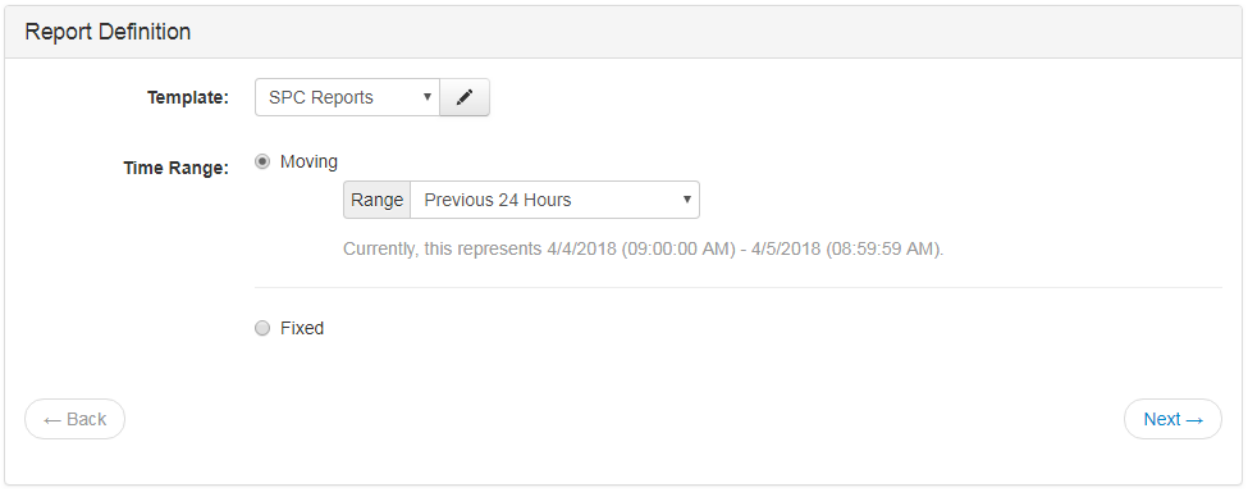
Generating a Report

To generate a single-use Report, select REPORTS > GENERATE REPORT in the app navigation.

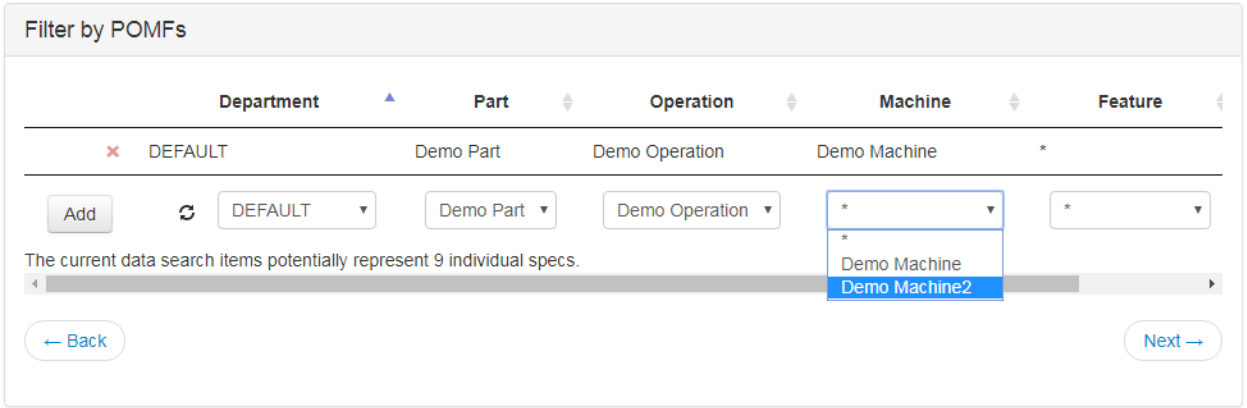


Report generation follows a three-step wizard:

1. Select the Template for this Report, along with the date/time range:

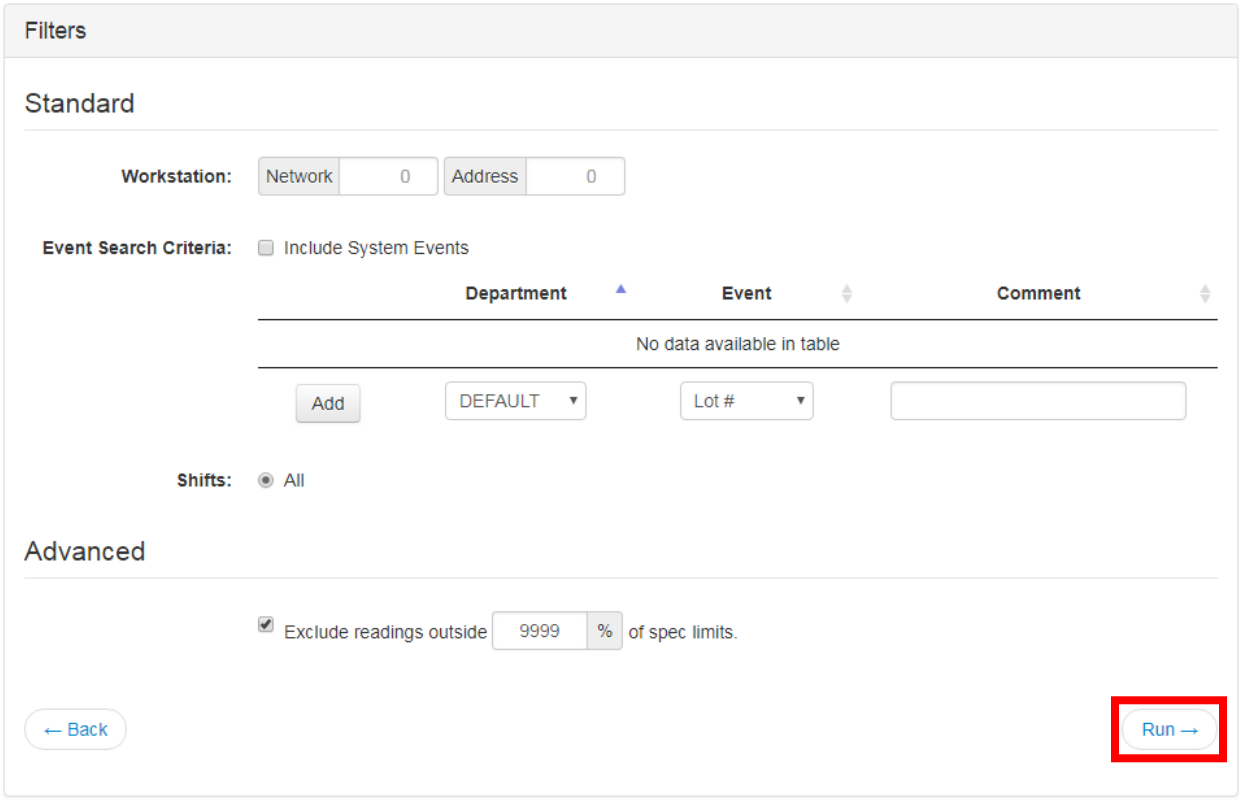


2. Select any POM(F) filters to restrict the data displayed in this Report. Don't forget to hit the ADD button, or your filters will not be applied! In a SPEC REPORT rows will only be generated for Specs where data is present UNLESS the full POM and F are specified in this filtering step and added to the list of filters using the ADD button. If none of the four criteria are left as a wildcard in a POMF filter that row will be included in the Report even if it has 0 readings.



NOTE: While it is possible to generate Reports without any POM(F) filters, this is almost always a bad idea. For a plant that collects large quantities of data, generating Reports without POM(F) filters can take a considerable amount of time and processing power, and typically results in Reports that have so much unrelated data that they are less informative than smaller reports with well-defined filters.

3. Select any other filters that you want to apply (if necessary):



NOTE: The filters that are available to you will depend on the kind of report (Spec, Variable Raw Data, etc.) that you are generating.

Finally, hit the RUN button (see above) to generate your Report!

Sample Report

SPC Reports

2/5/2018 12:00 AM - 2/9/2018 11:59 PM

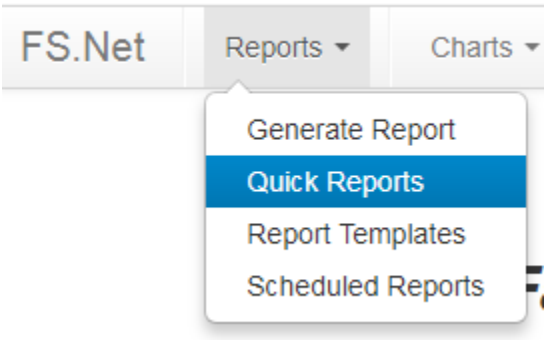
	Part	Operation	Machine	Feature	Reading Count	Max	Min
1	Demo Part	Demo Operation	Demo Machine	Diameter 1	352	8.00	2.00
2	Demo Part	Demo Operation	Demo Machine	Diameter 2	10	6.00	1.00
3	Demo Part	Demo Operation	Demo Machine	Height	7	4.00	4.00
4	Demo Part	Demo Operation	Demo Machine	Length	91	9.00	2.00

Quick Reports

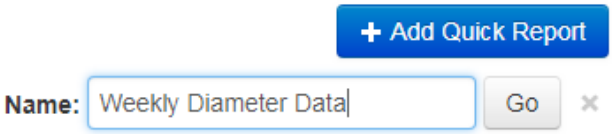
Quick Reports allow you to store all the settings from the Report Generation Wizard so that you can generate multiple Reports using those same settings. For example, you could create a Quick Report to display data from the past 24 hours, and then run that same Quick Report each day to get a snapshot of your data every 24 hours.

Creating Quick Reports

To create a Quick Report, select REPORTS > QUICK REPORTS in the app navigation.



Creating a new Quick Report is just like creating a new Report Template: click on the ADD QUICK REPORT button, enter a (unique) name, and click GO.

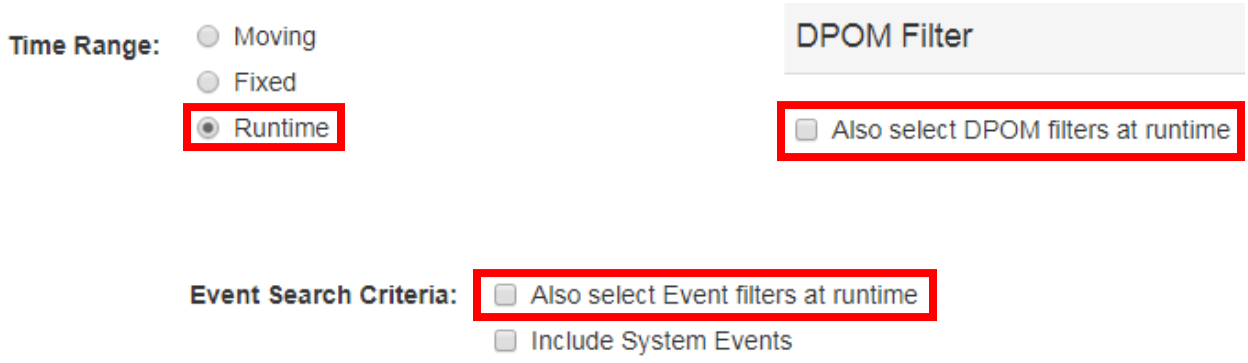


Just like with Templates, you will be redirected to the EDIT QUICK REPORT screen to customize the settings for your new Quick Report.

Editing Quick Reports

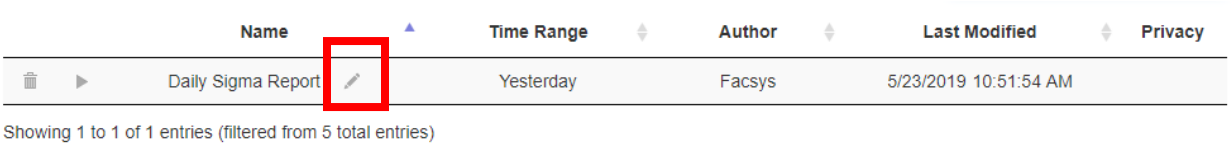
Quick Reports include all the settings from the normal Report Generation Wizard on a single screen (see the "Generating a Report" section for details about these settings).

There are also a few special settings just for Quick Reports. You can set a TITLE for your Quick Report, and you can choose whether it is public or PRIVATE to just you (and your administrator[s]). You can also check a special RUNTIME option for the date/time, POM(F), and Event filters.



Checking RUNTIME for these filters means that ***FS.Net*** will give you a chance to pick new values for those filters each time you run the Quick Report.

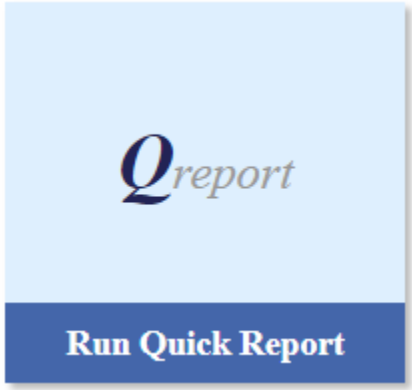
You can manage old Quick Reports on the main QUICK REPORTS screen by clicking the PENCIL icon beside their names to edit them, or by clicking the delete button to delete them.

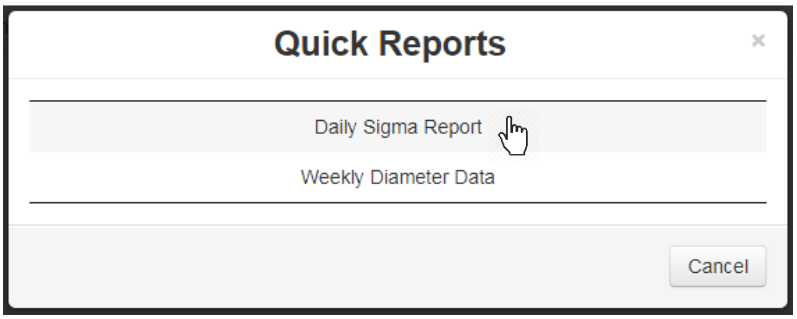


Running Quick Reports

Clicking the **Name** of a Quick Report on the main QUICK REPORTS screen will run the Quick Report, but in ***FS.Net***, there's an even better way to do that!

On the home screen of your ***FS.Net*** application, you'll find a large button (or "widget") that says RUN QUICK REPORT. Clicking this widget will pull up a list of all the Quick Reports available to you, and you can run them directly from the home screen.



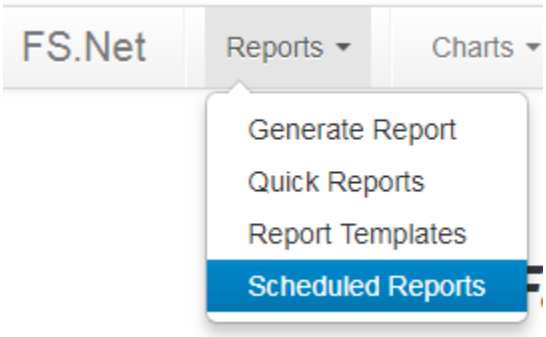


Scheduled Reports

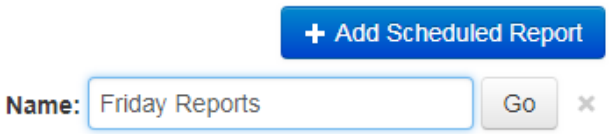
Scheduled Reports take the repeatability of Quick Reports and deliver it straight to you, without having to manually run the Reports every time! Just tell ***FS.Net*** which Quick Reports you want to see, how often, and what your email is, and ***FS.Net*** will take care of the rest.

Creating Scheduled Reports

To set up a new Scheduled Report, select REPORTS > SCHEDULED REPORTS in the app navigation.



On the Scheduled Reports screen, click the ADD SCHEDULED REPORT button, enter a (unique) name, and click GO.



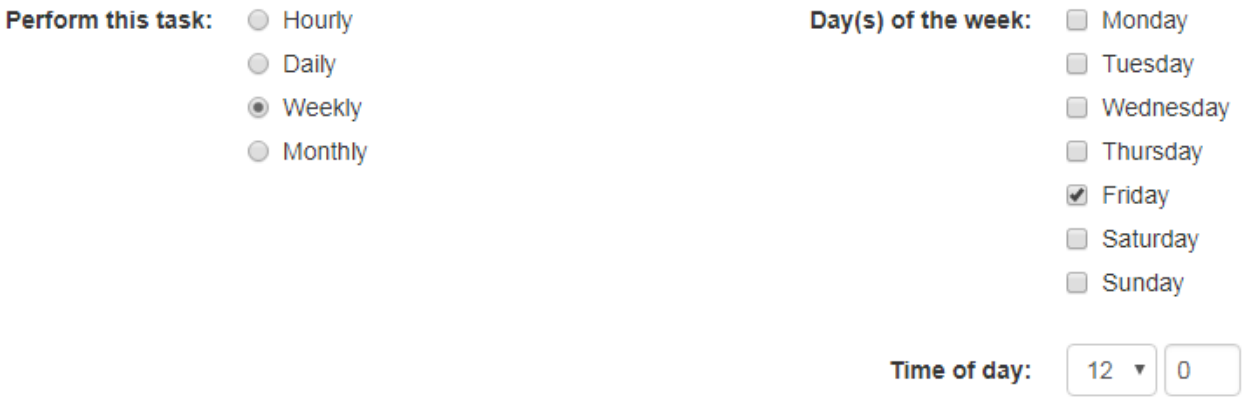
Once your Scheduled Report has been created, you will be redirected to the EDIT SCHEDULED REPORT screen to customize the settings for your new Scheduled Report.

Editing Scheduled Reports

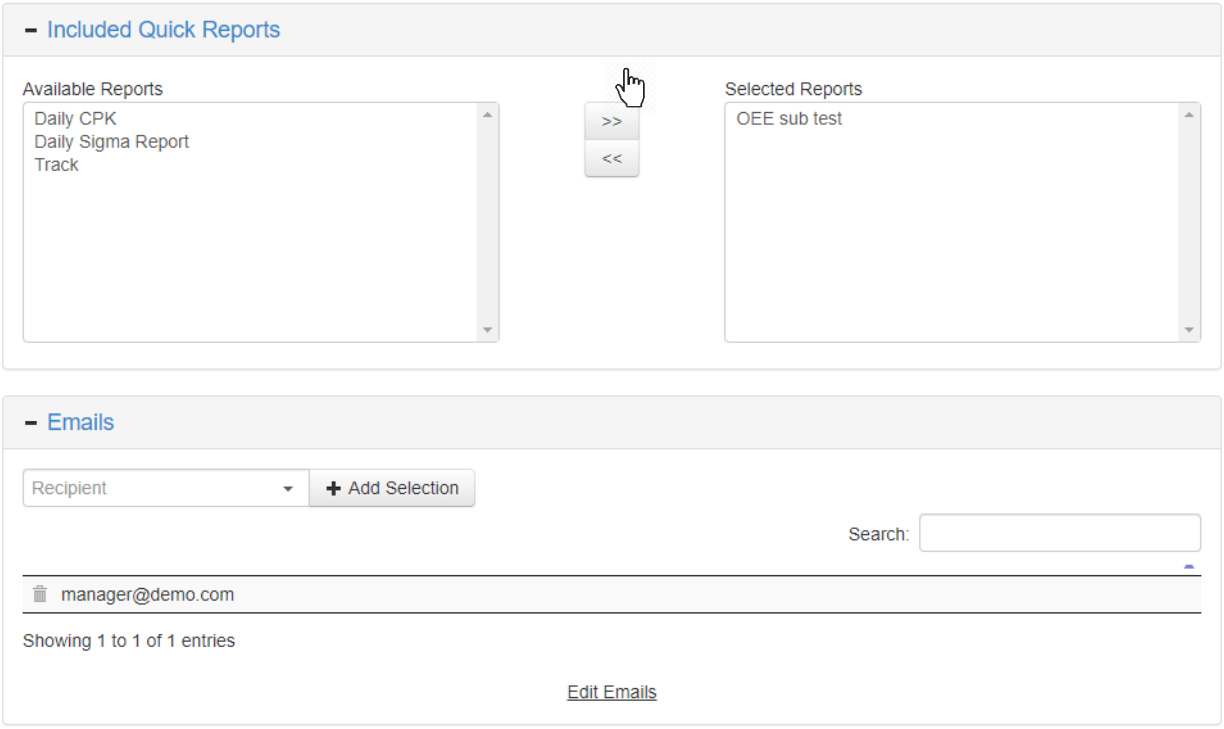
You can edit a Scheduled Report at any time by clicking its entry on the main Scheduled Reports screen:

You can also delete old Scheduled reports here: simply click the delete button beside the name of the Scheduled Report you want to delete.

On the Edit Screen, you can indicate how often you want that Scheduled Report to run:

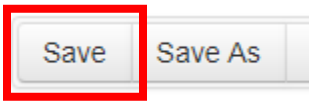


You should also indicate which QUICK REPORTS you want to include in your Scheduled Report, and provide an EMAIL ADDRESS (or multiple addresses) for ***FS.Net*** to send the Scheduled Report to.



NOTE: You cannot save a Scheduled Report without at least one Quick Report selected.

Finally, click SAVE to commit your changes.

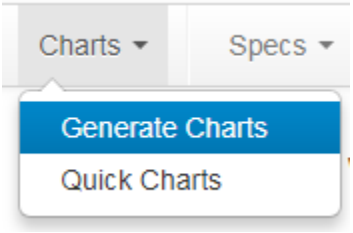


Charts

CHARTS provide a graphical depiction of your data over time, making it much easier to spot trends and areas for improvement in your production cycle. ***FS.Net*** can generate a diverse set of Charts for your data with just a few clicks, and (just like with Reports) you can create QUICK CHARTS that store your settings for repeated use.

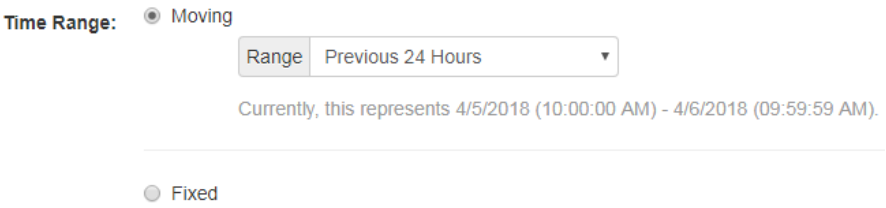
Generating a Chart

Chart generation in ***FS.Net*** follows the same pattern as Report generation.

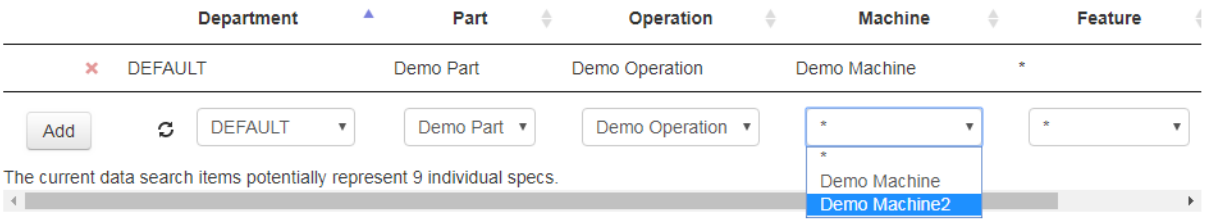


Start by selecting CHARTS > GENERATE CHARTS in the app navigation. Then follow our simple, three-step wizard:

1. Select the date/time range for this set of charts.

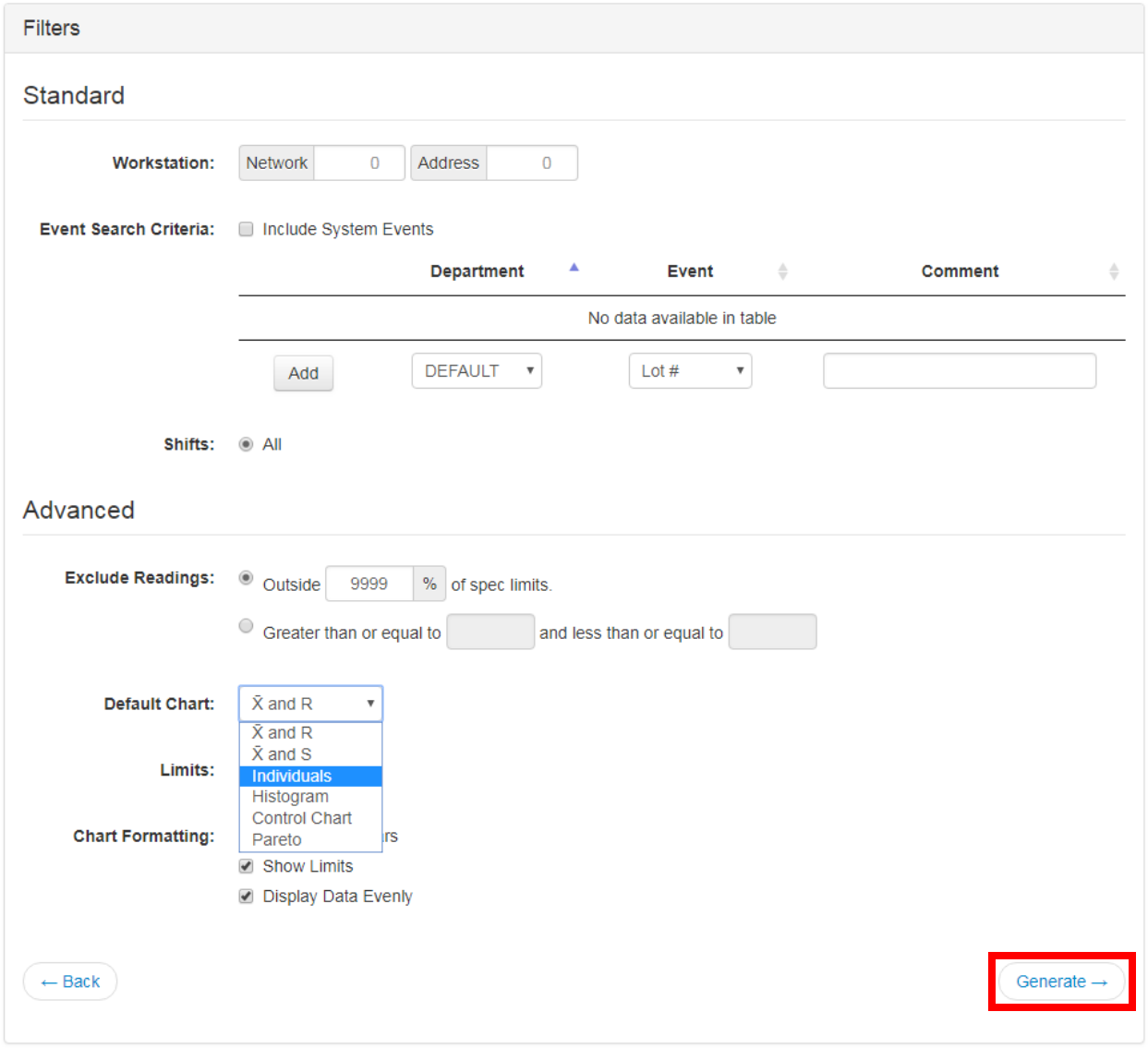


2. Select any POM(F) filters to restrict the data displayed in these Charts. Don't forget to hit the ADD button, or your filters will not be applied!



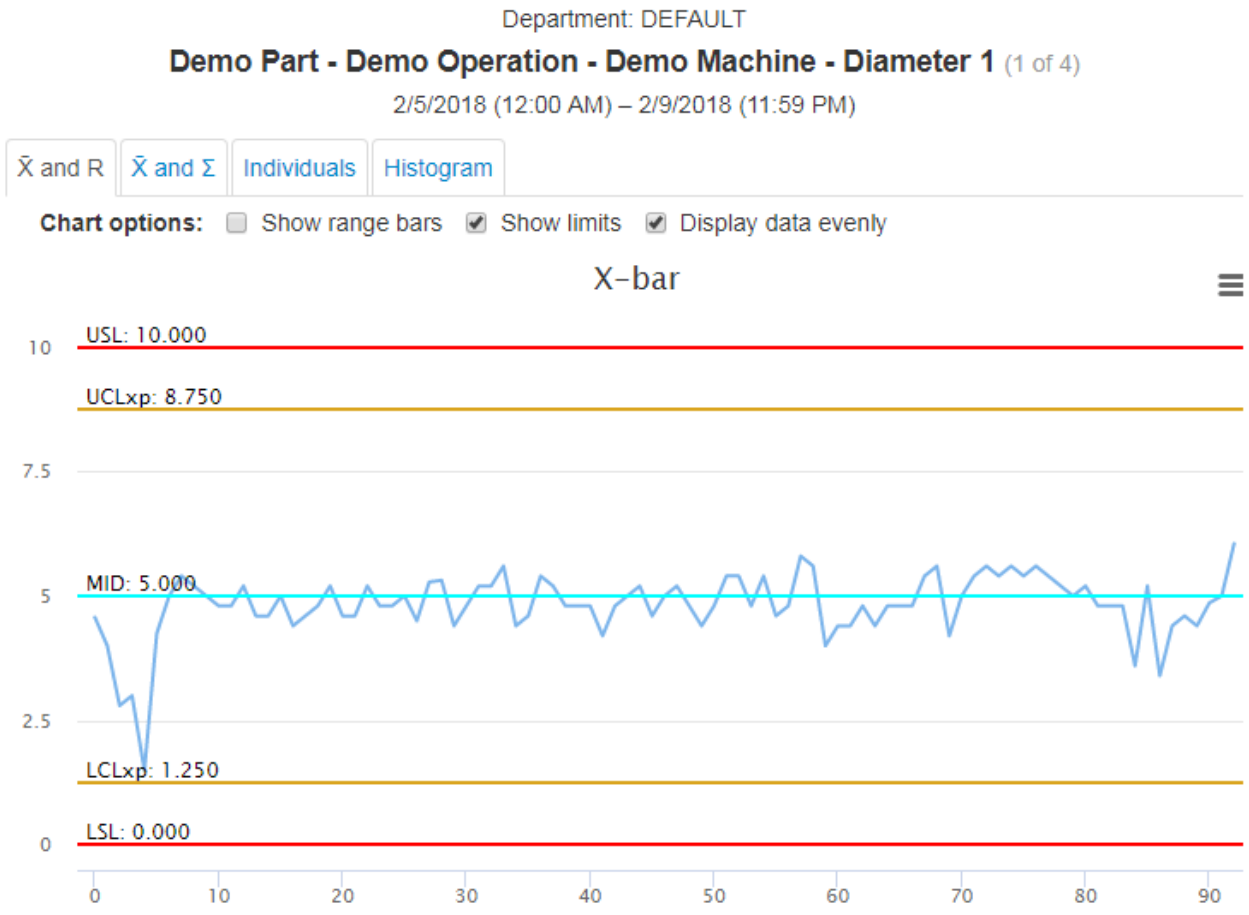
NOTE: It is very important to select good POM(F) filters when generating Charts. Because ***FS.Net*** generates multiple Charts for each Spec you include, including too many Specs can greatly increase the time and processing power required to generate your Charts. In general, we recommend that you do not generate Charts for more than 50 Specs at a time.

3. Select any other filters that you want to apply (if necessary):



Finally, hit the GENERATE button (see above) to create your Charts!

Sample Chart

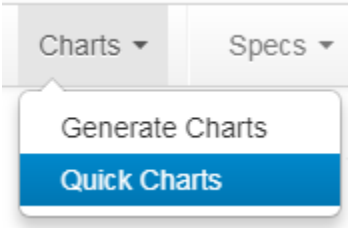


Quick Charts

Quick Charts allow you to store all the settings from the Chart Generation Wizard so that you can generate multiple Charts using those same settings. For example, you could create a Quick Chart to display data from the past 24 hours, and then run that same Quick Chart each day to get a snapshot of your data every 24 hours.

Creating Quick Charts

To create a Quick Chart, select CHARTS > QUICK CHARTS in the app navigation.



Creating a Quick Chart is just like creating a Quick Report: click on the ADD QUICK CHART button, enter a (unique) name, and click GO.

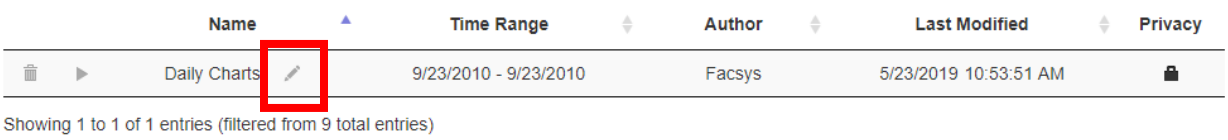
You will then be redirected to the EDIT QUICK CHART screen to customize the settings for your new Quick Chart.

Editing Quick Charts

Quick Charts include all the settings from the normal Chart Generation Wizard on a single screen (see the "Generating a Chart" section for details about these settings).

Just like Quick Reports, there are also a few special settings just for Quick Charts. You can set a TITLE for your Quick Chart, and you can choose whether it is public or PRIVATE to just you (and your administrator[s]). And just like with Quick Reports, you can check a special RUNTIME option for the date/time, POM(F), and Event filters to pick new values for those filters each time you run the Quick Report.

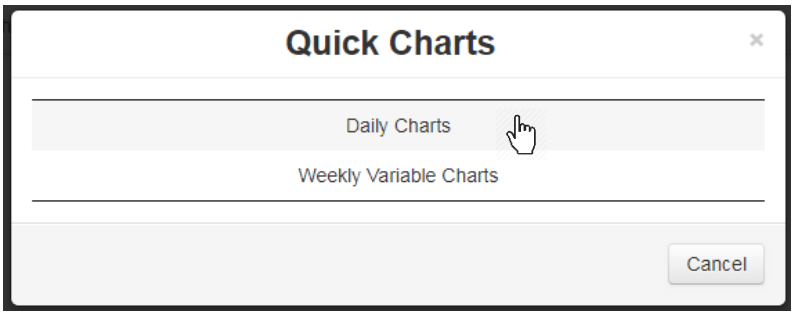
You can manage old Quick Charts on the main QUICK CHARTS screen by clicking the PENCIL icon beside their names to edit them, or by clicking the delete button to delete them.



Running Quick Charts

Just like Quick Reports, there are two ways to run your Quick Charts once you've set them up. You can click the **Name** of a Quick Chart on the QUICK CHARTS screen to run it from there, or you can run any Quick Chart directly from the home screen using the Quick Charts widget.

On the home screen of your ***FS.Net*** application, you'll find a large widget that says RUN QUICK CHART. Clicking this widget will pull up a list of all the Quick Charts available to you, and you can run them with a single click.



Administration

Users & Roles

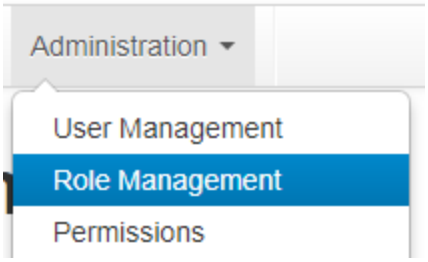
Anyone can use ***FS.Net*** to do basic things like viewing Quick Reports and Quick Charts, but only USERS can log in to create new Reports, manage Specs, and do other administration on the app. By default, your FS.Net installation starts with a single User profile ("FacSys"), but you can add as many User profiles as you want.

Each User has a designated ROLE in FS.Net. Roles indicate what kind of admin powers a User has, and you can set the Permissions for groups of Users in FS.Net based on their Role (see below).

Creating Roles

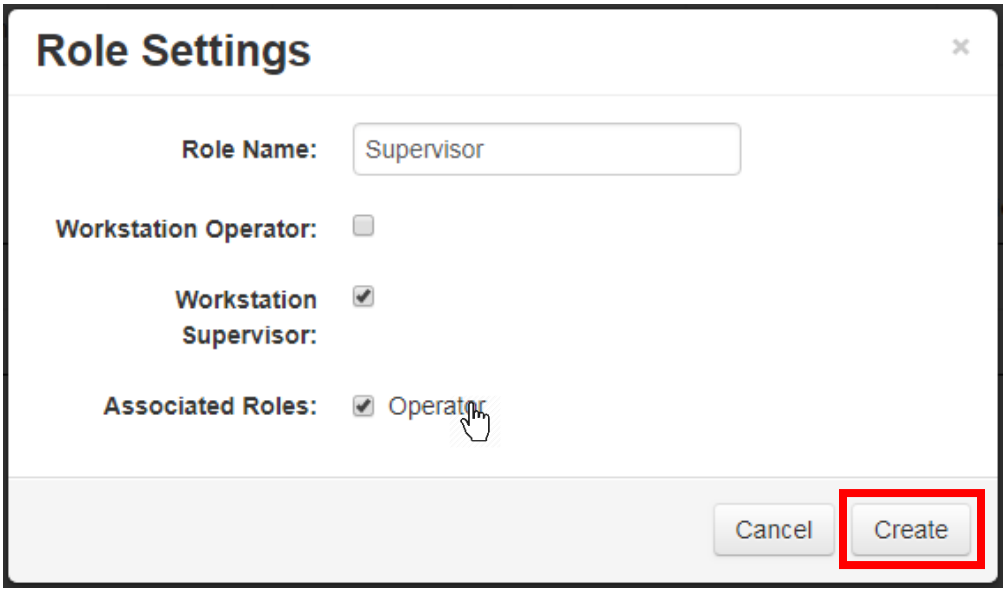
FS.Net starts with only one Role defined: Administrator. This role cannot be edited or deleted, but you can define as many other Roles as you want.

To create a new Role, select ADMINISTRATION > ROLE MANAGEMENT in the app navigation.



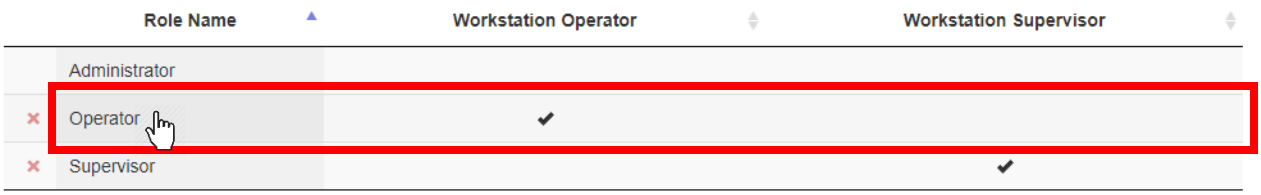
On the Role Management screen, click on the ADD ROLE button to open the Role Settings form.

On the Role Settings form enter a (unique) name for your new Role. You can optionally set this Role to be a WORKSTATION OPERATOR or SUPERVISOR at this point as well, and (once you have multiple Roles defined) you can ASSOCIATE other Roles with your new Role so that your new Role can supervise those other Roles. Finally, click CREATE.



Editing Roles

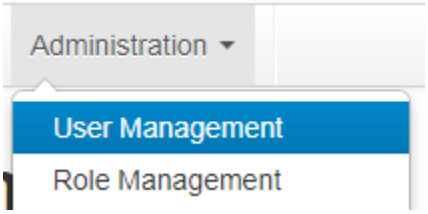
You can edit a Role at any time by clicking its entry on the Role Management screen.



You can also delete old Roles from this screen: simply click the delete button beside the name of the Role you want to delete.

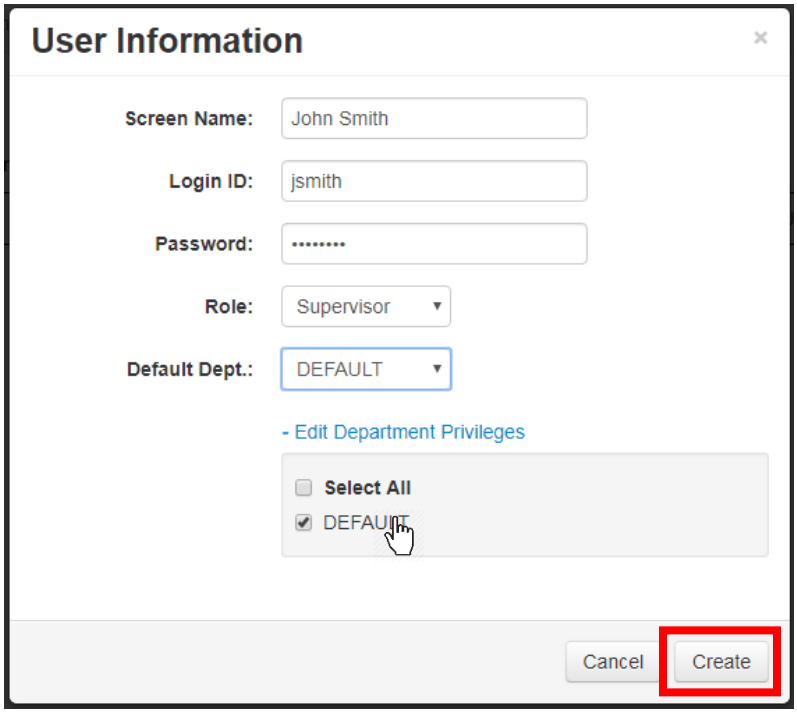
Creating Users

To create a new user, select ADMINISTRATION > USER MANAGEMENT in the app navigation.



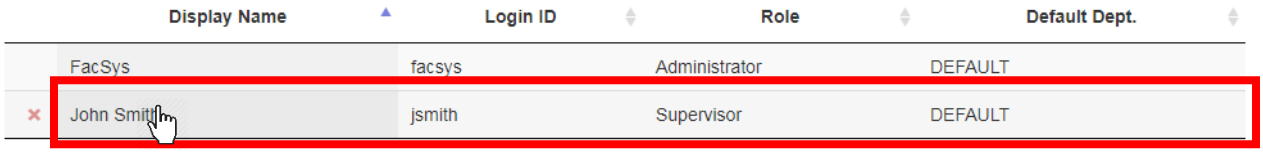
On the User Management screen, click on the ADD USER button to open the User Information form.

On the User Information form, enter a NAME, LOGIN ID, PASSWORD, and ROLE for your new User. You should also add DEPARTMENT PRIVILEGES to the User for at least one Department, so they can access data in ***FS.Net***. Finally, click CREATE.



Editing Users

You can edit a User at any time by clicking its entry on the User Management screen.

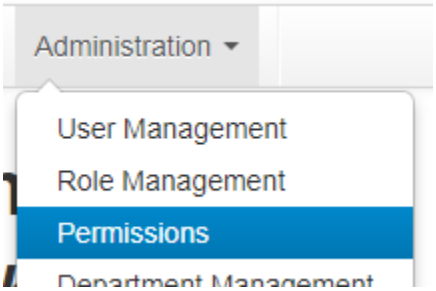


You can also delete old Users from this screen: simply click the delete button beside the name of the User you want to delete.

> NOTE: You cannot delete the default "FacSys" User because ***FS.Net*** uses it as the default Administrator, but you can edit its properties.

Permissions

To manage permissions in ***FS.Net***, select ADMINISTRATION > PERMISSIONS in the app navigation.



On the Permissions screen, you will see a list of every page in ***FS.Net*** and the Role permissions associated with that page.

To give a Role the ability to access a page in ***FS.Net***, simply check the box for that Role and page. To revoke a Role's access to a page in ***FS.Net***, simply uncheck the box. Finally, click SAVE PERMISSIONS.

NOTE: You cannot change the permissions for the Administrator role, or for certain pages that are defined as globally-accessible.

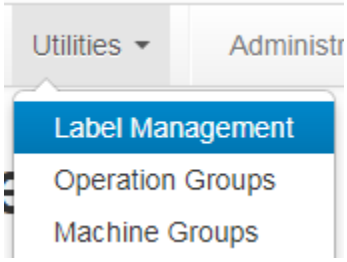
Page Name	Administrator	Operator	Supervisor
Select All		☐	☑
Reports	✔	✔	✔
• Generate Report	✔	☑	☑
• Quick Reports	✔	✔	✔
• Report Templates	✔	☐	☑
• Scheduled Reports	✔	☐	☑
Charts	✔	✔	✔
• Generate Charts	✔	☐	☑
• Quick Charts	✔	✔	✔
Specs	✔	☐	☑
• Spec Management	✔	☐	☑
• Spec Copy	✔	☐	☑
• Parts	✔	☐	☑
• Machines	✔	☐	☑
• Global Changes	✔	☐	☑
• Setups	✔	☐	Save Permissions

Other Features

Label Management

LABELS are custom tags that you can create to categorize your data and come in two types: EVENTS and ATTRIBUTE LABELS. Events can be attached to any data gathered at your Workstations, while Attribute Labels are used for OEE data. By default, all Labels can be grouped in MANAGED LISTS.

Creating Labels & Managed Lists

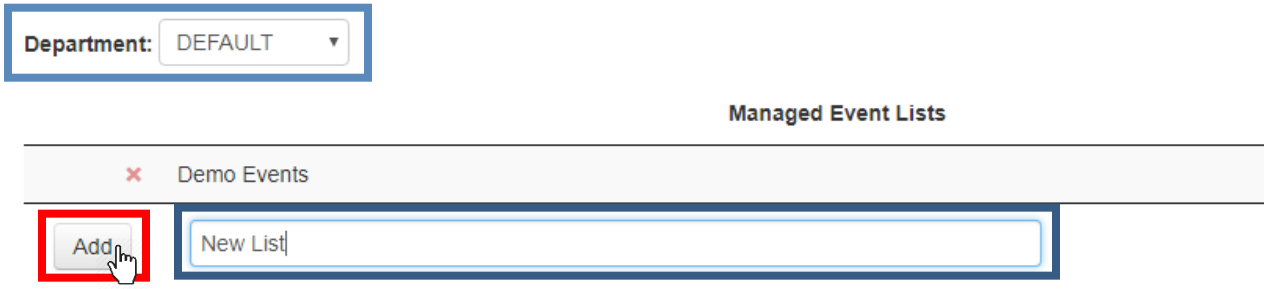


To create new Labels and Managed lists, select UTILITIES > LABEL MANAGEMENT in the app navigation.

On the Label Management screen, choose the kind of Label that you want to manage by clicking the EVENT LABELS or ATTRIBUTE LABELS tab:

New Managed Lists

To create a new Managed List, select the DEPARTMENT you want to create the List for, type in a (unique) name for your List, and click ADD:



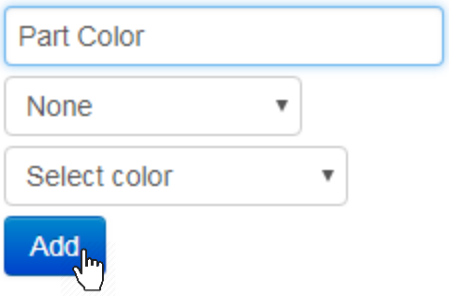
Once your Managed List has been created, it will automatically be selected so you can add Labels to it.

New Labels

To add new Labels to your database, click the EDIT MASTER EVENT LIST (or EDIT MASTER ATTRIBUTE LIST) link on the Label Management screen.

This will open the list of all possible Labels in the currently selected Department.

To create a new Label, type in a (unique) name in the form provided.



For Event Labels, you can optionally select a TRACEABILITY option for your Label (see below). You can also select an optional COLOR for Event Labels.

Finally, click ADD to create your new Label.

Traceability Options

Traceability options define the way that a Label is attached to your data. There are four Traceability options available to you:

- PRECEDES SINGLE: This Event Label will be attached to a single data point entered immediately after it was entered.
- PRECEDES MULTIPLE: This Event Label will be attached to all data points entered after it was entered, until the same Event is entered again.
- FOLLOWS SINGLE: This Event Label will be attached to a single data point entered immediately before it was entered.
- FOLLOWS SUBGROUP: This Event Label will be attached to all data points that make up the Subgroup of data that was entered immediately before the it was entered.

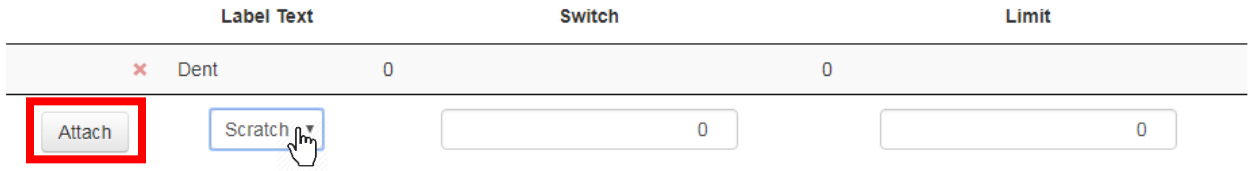
Editing Labels & Managed Lists

You can edit a Label or List at any time by selecting its entry on the Label Management screen.

To delete old Labels or Managed Lists, simply click the delete button beside the name of the Label or List you want to delete.

Adding Labels to Lists

To add a Label to a Managed List, select the Managed List on the Label Management Screen. Then, select the Label you want to add from the LABEL TEXT dropdown, and optionally set a SWITCH and LIMIT for the Label (the default is 0). Finally, click Attach to add the Label to your Managed List.



Modules

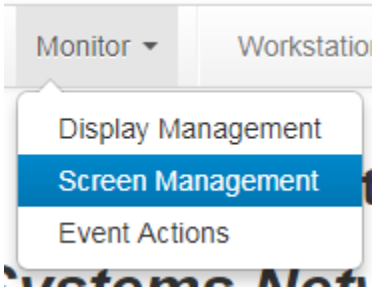
FSMonitor

The Monitor Module gives you the ability to create Displays using real-time data from your plant in ***FS.Net***. Each DISPLAY is a slideshow that contains one or more custom SCREENS that can show your data however you want.

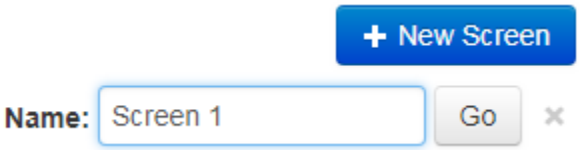
NOTE: If using Internet Explorer, FSMonitor requires version 9 or above.

Creating Monitor Screens

Before you create a Monitor Display, you will need to make at least one Monitor Screen. To create a new Monitor Screen, select MONITOR > SCREEN MANAGEMENT in the app navigation.

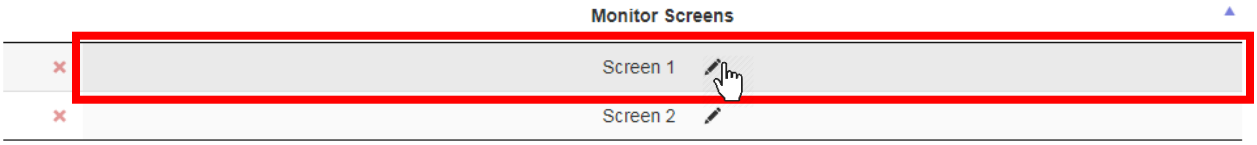


On the Screen Management screen, click the NEW SCREEN button, enter a (unique) name, and click GO.



Editing Monitor Screens

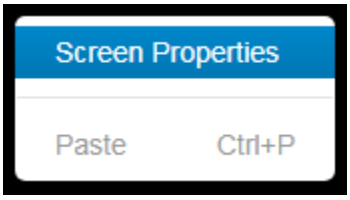
You can edit a Monitor Screen at any time by selecting its entry on the Screen Management screen.



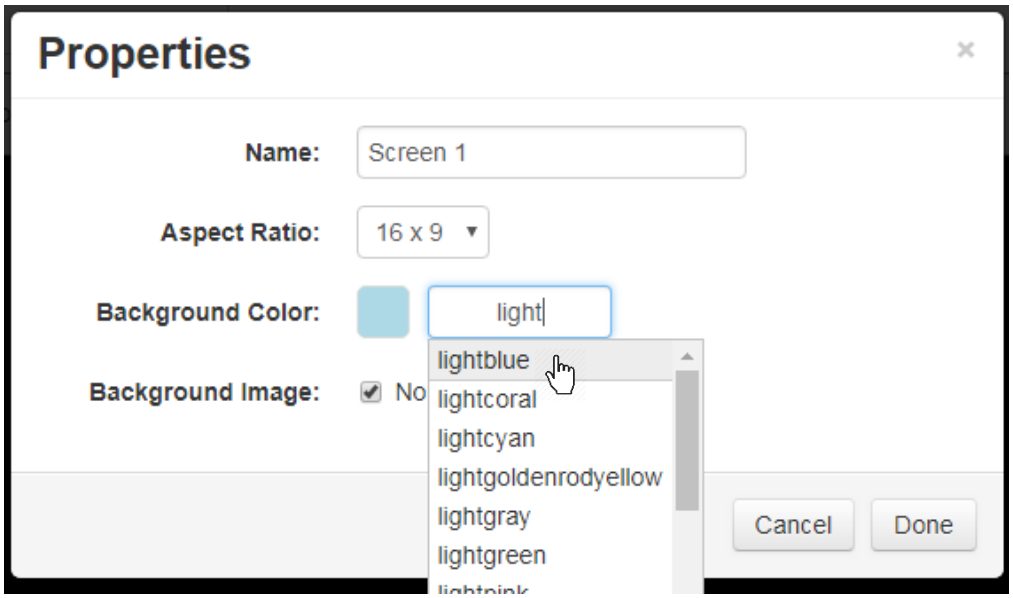
To delete old Monitor Screens, simply click the delete button beside the name of the Screen you want to delete.

The Monitor Editor

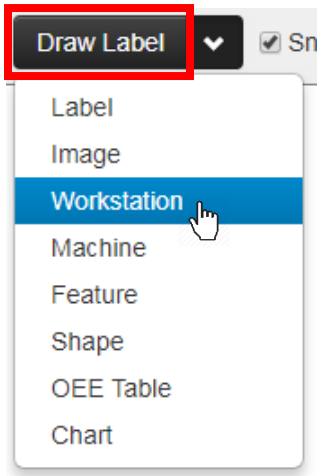
The Monitor Editor is a special page designed to let you draw and manipulate objects on your Monitor Screens. The first thing you will want to edit on a new Monitor Screen are the Screen properties. To edit Screen properties, right-click any empty area inside the Monitor Screen.



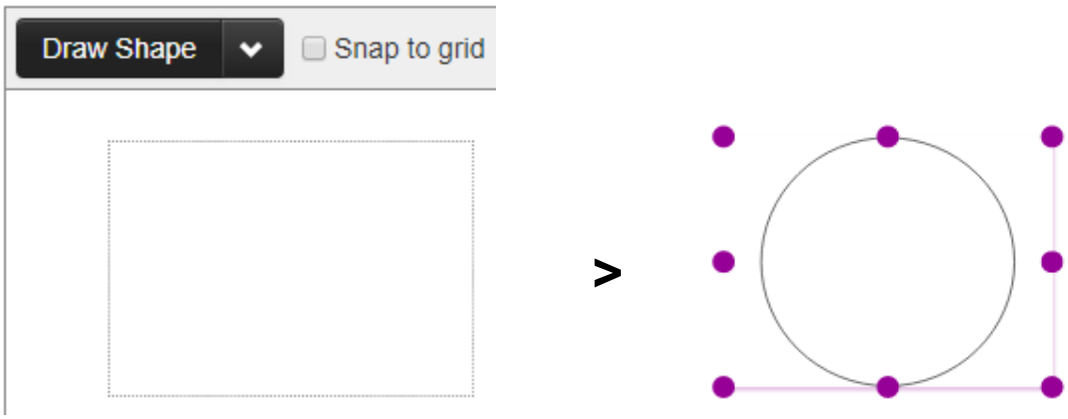
Inside the Screen properties form, you can change the Screen NAME, ASPECT RATIO, and BACKGROUND.



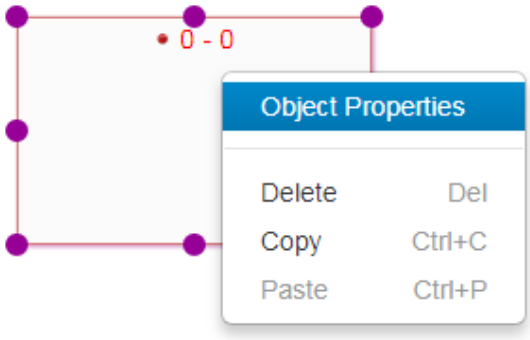
Next, you will want to add Objects to your screen. You can click the dropdown next to the DRAW button to change what kind of Object you want to draw, then click the DRAW button itself to start drawing an Object.



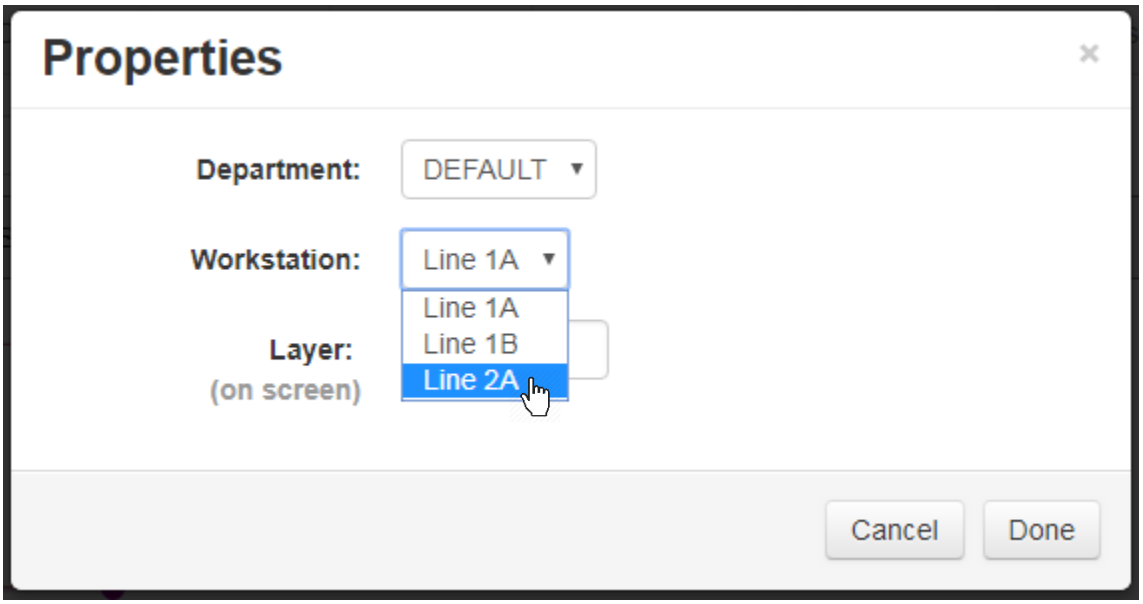
To draw the Object on the Screen, click and hold inside the Screen, then drag to create a boundary-box that is the size you want for your object. Release your click, and the Object will appear!



To move any Object on the Monitor Screen, click and drag. To resize, click the Object to select it, then drag the circular resizers to resize it.

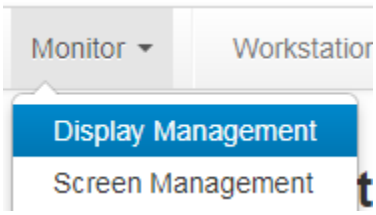


To edit the properties of an Object, right-click it and select OBJECT PROPERTIES. This will open a form that lists all the properties available for that kind of Object:

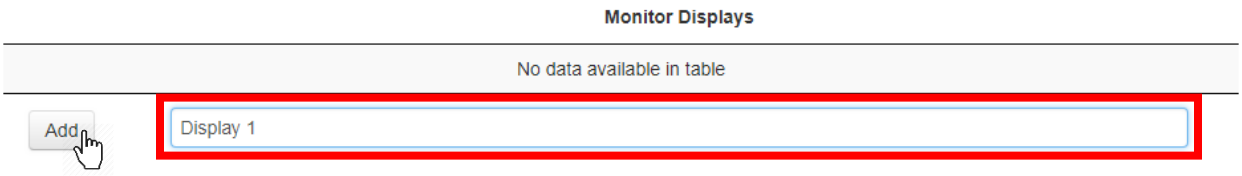


Creating Monitor Displays

Once you have created a Monitor Screen, you need to add it to a Display to see your Screen with real-time data. To create a new Display, select MONITOR > DISPLAY MANAGEMENT in the app navigation.



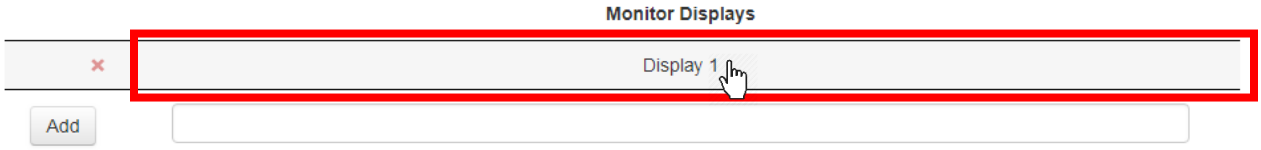
On the Display Management screen, simply type in a (unique) name, and click ADD to create a new Display:



Once your Display has been created, it will automatically be selected for you to edit.

Editing Monitor Displays

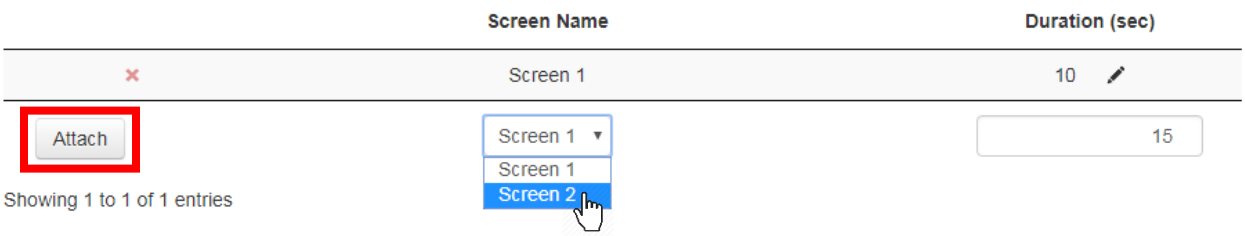
You can edit a Display at any time by selecting its entry on the Display Management screen.



To delete old Displays, simply click the delete button beside the name of the Display you want to delete.

Adding Screens to Displays

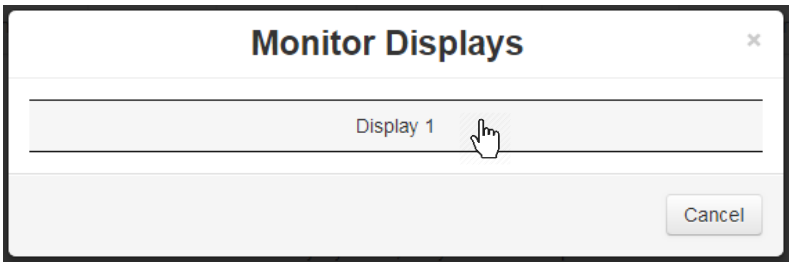
To add a Screen to a Display, select the Screen you want to add from the SCREEN NAME dropdown, and set the DURATION for that Screen to stay in the slideshow (Duration is ignored if there is only one Screen in the Display). Finally, click Attach to add the Screen to your Display.



NOTE: Don't forget to SAVE your Displays after editing!

Viewing Monitor Displays

On the home screen of your ***FS.Net*** application, you'll find a large widget that says VIEW MONITOR. Clicking this widget will pull up a list of all the Monitor Displays available to you, and you can run them with a single click.



NOTE: You can also view a Display from the Display Management page by clicking the VIEW button.

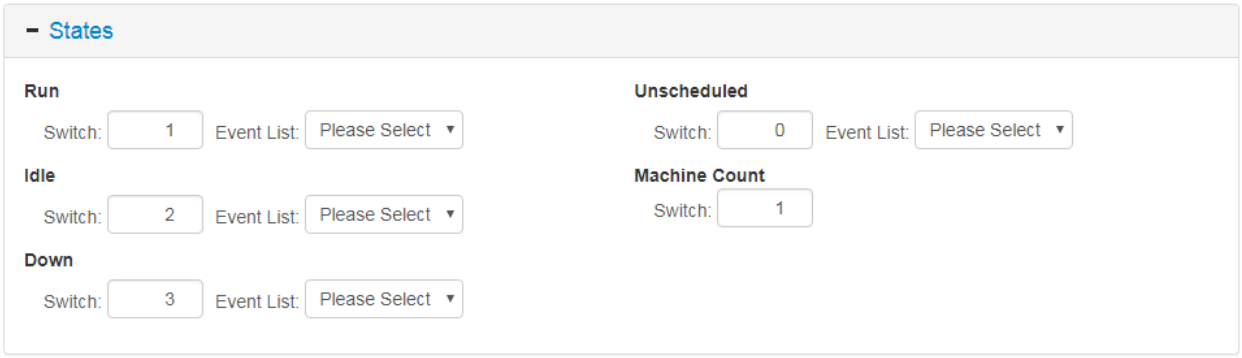
FSProduction (OEE)

The Production Module gives you the ability to set up OEE data collection in ***FS.Net*** and generate custom Reports and Charts to analyze that data once it has been collected.

Machine States

The Production Module adds four STATE properties to every Machine in your Factory Systems database. You can manage these States from the Machine Management screen under SPECS > MACHINES.

For each State property on a Machine, you can designate a SWITCH to be tracked by all Workstations associated with that Machine. Whenever that Switch is activated, the Workstation(s) will log the associated State as OEE data (see the ***FSWorks*** manual for more details).



OEE Reports

The Production Module adds two new Report Types:

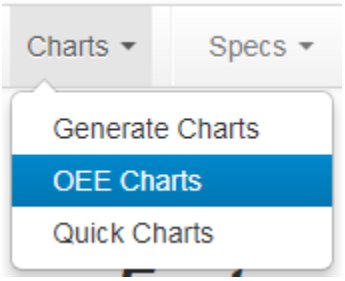
- OEE REPORTS aggregate OEE data into rows based on Spec and perform calculations on that aggregated data. For example, an OEE Report would be used to calculate and report an Overall OEE for each individual Spec across a date range

- OEE RAW DATA REPORTS return OEE data points as individual rows.

You can find what columns are included in these Report Types in the appendix to this manual.

OEE Charts

The Production Module enables you to create new charts that have been tailored for OEE data. To generate an OEE chart, select CHARTS > OEE CHARTS in the app navigation.



You can generate OEE charts for machines based on department or based on arbitrary machine groups that you define in FS.Net.

FSTrack

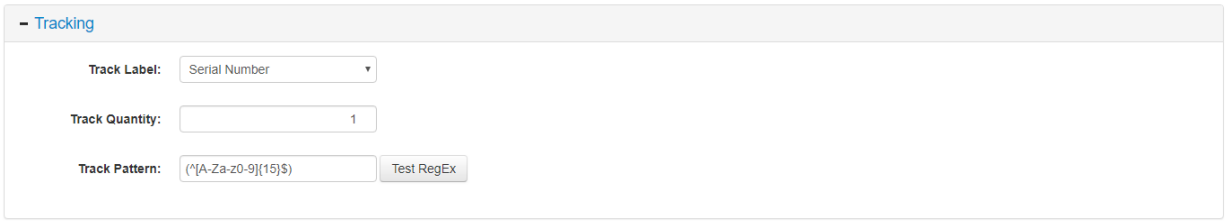
The Track Module gives you the ability to design and utilize Plant Workflows (“Tracks”) in ***FS.Net***.

> NOTE: If using Internet Explorer, FSTrack requires version 9 or above.

Part Tracking

The Track Module adds properties to every Part in your Factory Systems database: TRACK LABEL and TRACK QUANTITY. You can manage these properties from the Part Management screen under SPECS > PARTS or on the Track Layout screen under TRACK > TRACK EDITOR.

The Track Label for a Part tells your Workstations which Event tag to track your part by as it is processed. The Track Quantity indicates how many items you expect to see at each stage before progressing to the next.



The Track Pattern for a part can force the Comments entered for the Track Label to match a pattern.

The Track Pattern will be built using Regular Expressions. A regular expression (regex or for short) is a special text string for describing a search pattern that are built using a widely used standard and will allow for any pattern to be created and used. This includes the ability to enforce comment length and content. For example, to force a Comment to contain only numerical digits and be 15 characters long, the regex “(^[0-9]{15}$)” would be used. To force a Comment to contain only numerical digits AND letters and be 15 characters long, the regex “(^[A-Za-z0-9]{15}$)” would be used.

More can be learned about regular expressions at http://regexr.com.

Tracking Reports

The Track Module adds two new Report Types:

- TRACK RAW DATA REPORTS report Track data into a single row for each Tracking Step completed by a TRACK LABEL and can be filtered additionally by TRACK LABELS. For example, a Track Raw Data Report would be used to see a birth history for a Serial Number.
- TRACK REPORTS report aggregated Track data into a single based on Spec and perform sums on that aggregated data. For example, a Track Report would be

used to see production counts for an Operation over a time range compared to the Ideal production during that time.

You can find what columns are included in these Report Types in the appendix to this manual.

Appendix: Formulas

Cpk

$$Cp = \frac{(USL - LSL)}{6\hat{\sigma}}$$

$$CpU = \frac{(USL - \overline{X})}{3\hat{\sigma}}$$

$$CpL = \frac{(\overline{X} - LSL)}{3\hat{\sigma}}$$

If normally distributed

$$Cpk = Min(CpU, CpL)$$

If unilaterally upper specified distributed

$$Cpk = CpU$$

If unilaterally lower specified distributed

$$Cpk = CpL$$

If Subgroup size > 1, $\hat{\sigma}$ indicates pooled sigma (https://en.wikipedia.org/wiki/Pooled_variance)

Where the populations are indexed *i = 1, …, k*

$$\hat{\sigma} = \sqrt{\frac{\sum_{i=1}^{k}((n_i - 1)\,\sigma_i^2}{\sum_{i=1}^{k}(n_i - 1)}}$$

Else, if Subgroup size = 1, $\hat{\sigma}$ indicates estimated sigma

$$\hat{\sigma} = \frac{\overline{R}}{d_2}$$

Cpk (est)

$$Cp(est) = \frac{(USL - LSL)}{6\hat{\sigma}}$$

$$CpU(est) = \frac{(USL - \overline{X})}{3\hat{\sigma}}$$

$$CpL(est) = \frac{(\overline{X} - LSL)}{3\hat{\sigma}}$$

If normally distributed

$$Cpk(est) = Min(CpU(est), CpL(est))$$

If unilaterally upper specified distributed

$$Cpk(est) = CpU(est)$$

If unilaterally lower specified distributed

$$Cpk(est) = CpL(est)$$

$\hat{\sigma}$ always indicates estimated sigma

$$\hat{\sigma} = \frac{\overline{R}}{d_2}$$

Ppk

$$Pp = \frac{(USL - LSL)}{6\sigma}$$

$$PpU = \frac{(USL - \overline{X})}{3\sigma}$$

$$PpL = \frac{(\overline{X} - LSL)}{3\sigma}$$

If normally distributed

$$Ppk = Min(PpU, PpL)$$

If unilaterally upper specified distributed

$$Ppk = PpU$$

If unilaterally lower specified distributed

$$Ppk = PpL$$

σ always indicates standard sigma. (https://en.wikipedia.org/wiki/Standard_deviation)

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \bar{x})^2}{(N-1)}}$$

Appendix: Report Type Columns

Here is a table of all the possible Report Columns, indicating which Report Types can use each Column.*

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
3 Sigma	✓							
4 Sigma	✓							
6 Sigma	✓							
8 Sigma	✓							
Address	✓	✓	✓	✓	✓		✓	✓
All Features								✓
Availability				✓				
Average Cycle Time				✓				
Bad Parts				✓		✓	✓	
Bell Curve Shift	✓							
Bell Curve Shift-XP	✓							
Category	✓							
Chart	✓							
Comment		✓	✓		✓			
Container						✓		
Container Closed						✓		
Container Opened						✓		
Container Status						✓		
Correction		✓						
Cp	✓							
Cp (est)	✓							

* The OEE, OEE RAW DATA, TRACKING, and TRACK & TRACE Report Types are only available with their associated ***FS.Net*** Modules. See the Modules section for details.

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
Cpk	✓							
Cpk (est)	✓							
Cpl	✓							
Cpl (est)	✓							
Cpm	✓							
Cpu	✓							
Cpu (est)	✓							
Cr	✓							
Cr (est)	✓							
Date		✓	✓		✓	✓		✓
Date-Time		✓	✓		✓	✓		✓
Defect Count	✓		✓					
Department	✓	✓	✓	✓	✓	✓	✓	✓
Difference							✓	
Difference		✓						
Distribution	✓							
Down Time				✓				
Event		✓	✓		✓			
Feature	✓	✓	✓					
First Value	✓							
Good Parts				✓		✓	✓	
Ideal Cycle Time				✓				
Idle Time				✓				
Instance Key						✓		
K	✓							
Kurtosis	✓							
Label Image						✓		

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
Last Value	✓							
LCLrp	✓	✓	✓					
LCLsp	✓	✓	✓					
LCLxp	✓	✓	✓					
Location Index						✓		
Location Level						✓		
LSL	✓	✓	✓					
Machine	✓	✓	✓	✓	✓	✓	✓	✓
Machine Description	✓	✓	✓	✓	✓	✓	✓	✓
Machine Status					✓			
Max	✓							
Max DateTime	✓							
Mean	✓							
Median	✓							
Mid	✓							
Mid-XP	✓							
Min	✓							
Min DateTime	✓							
Network	✓	✓	✓	✓	✓		✓	✓
Nominal	✓	✓				✓		
OEE				✓				
OEE Formula				✓				
OOC High	✓							
OOC High and Low	✓							
OOC Low	✓							
OOT High	✓							
OOT High and Low	✓							

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
OOT Low	✓							
Operating Time				✓				
Operation	✓	✓	✓	✓	✓	✓	✓	✓
Operation Description	✓	✓	✓	✓	✓	✓	✓	✓
Pareto Code	✓		✓					
Pareto Count	✓		✓					
Pareto Label	✓		✓					
Part	✓	✓	✓	✓	✓	✓	✓	✓
Part Description	✓	✓	✓	✓	✓	✓	✓	✓
Part Status					✓	✓		
Parts Inspected	✓		✓					
Performance				✓				
Planned Production Time				✓				
Pp	✓							
Ppk	✓							
Ppl	✓							
Ppu	✓							
Pr	✓							
Primary Event								✓
PZ-l	✓							
PZ-l (est)	✓							
PZ-tot	✓							
PZ-tot (est)	✓							
PZ-u	✓							
PZ-u (est)	✓							
Quality				✓				

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
Range	✓							
RBar	✓							
Reading		✓	✓					
Reading Count	✓							
Report	✓							
Rework State			✓			✓	✓	
Run Efficiency				✓				
Running Time				✓				
SBar	✓							
Shift		✓	✓		✓	✓	✓	✓
Sigma	✓							
Sigma (est)	✓							
Sigma (pool)	✓							
Skewness	✓							
Spec Plan Type	✓							
Specific Event	✓	✓	✓					✓
Specific Feature								✓
Standard Cycle Time				✓			✓	
State End Time				✓	✓			
State Length				✓	✓			
State Start Time				✓	✓			
Subgroup Size	✓	✓	✓					
Target Parts							✓	
Time		✓	✓		✓	✓		✓
Tolerance	✓							
Total Parts				✓		✓	✓	
Traceability Formula			✓					

	Spec	Variable Raw Data	Trace.	OEE	OEE Raw Data	Track Raw Data	Track	Event
UCLrp	✓	✓	✓					
UCLsp	✓	✓	✓					
UCLxp	✓	✓	✓					
Unscheduled Time				✓				
User		✓		✓	✓	✓		
USL	✓	✓	✓					
Var Formula	✓							
Var Raw Data Formula		✓						
Within 1 Sigma	✓							
Within 1 Sigma (%)	✓							
Within 2 Sigma	✓							
Within 2 Sigma (%)	✓							
Within 3 Sigma	✓							
Within 3 Sigma (%)	✓							
WS Name	✓	✓	✓	✓	✓			✓
Xbar-bar	✓							

Contact Information

If you have any questions about features not covered in this manual, or want clarification on any topic, don't hesitate to contact us at support@factorysystems.net, or visit www.factorysystems.net.