Chapter 166

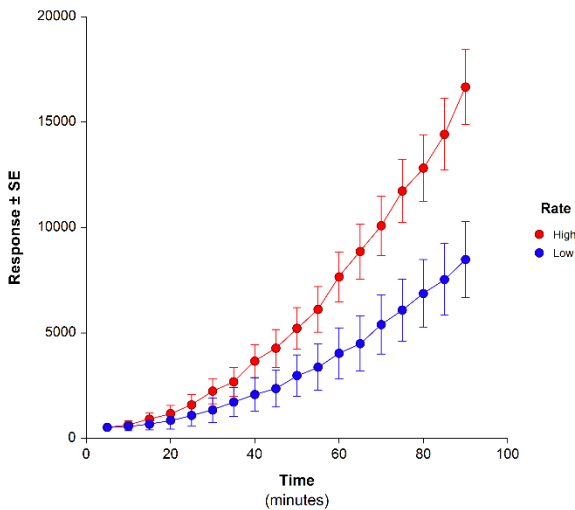# Scatter Plots with Error Bars from Summary Data

Introduction

The Scatter Plots with Error Bars from Summary Data procedure extends the capability of the basic scatter plot by allowing you to plot the variability in Y and/or X corresponding to each point. This procedure allows you to enter the error for both X and Y separately in two ways: 1. as a single magnitude of error, called *delta*, (e.g., standard deviation, standard error, etc.), or 2. by entering the upper and lower error bounds for each point directly, which allows for asymmetric error bars.

This procedure makes use of all of the additional enhancement features available in the basic scatter plot, including trend lines (least squares), confidence limits, polynomials, splines, loess curves, and border plots.

The following graphs are examples of scatter plots with error bars from summary data that you can create with this procedure. This chapter contains information only about options that are specific to the Scatter Plots with Error Bars from Summary Data procedure. For information about the other graphical components and scatter-plot specific options available in this procedure (e.g., regression lines, border plots, etc.), see the chapter on Scatter Plots.
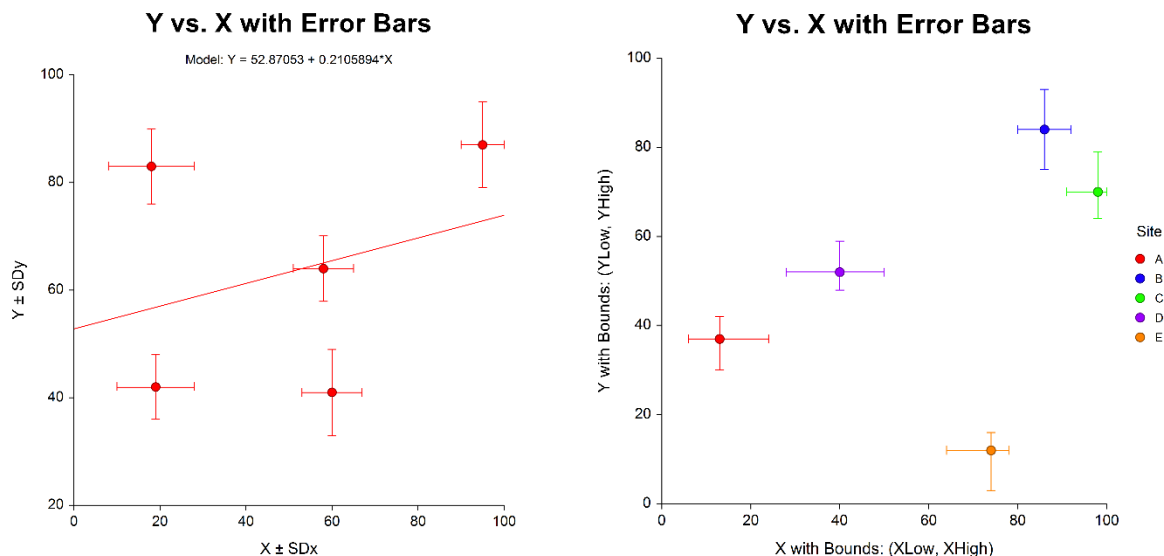

Response vs. Time with Error Bars

Response vs. Time with Error Bars
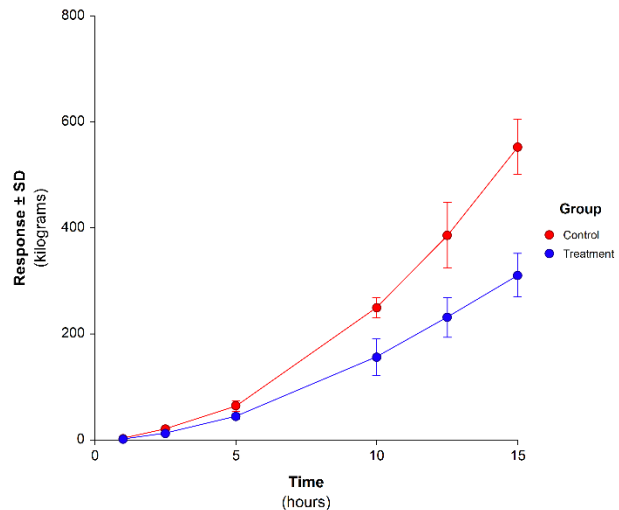
Data Structure

This procedure accepts data in two different input formats. Both data formats involve a single column of paired X and Y values. The difference is due the way that the error is entered. You may enter either a single column containing error values, called *delta*, (e.g., standard deviation, standard error, etc.), which results in symmetric error bars, or you may enter the upper and lower error bounds for each point directly, which allows for asymmetric error bars. You may enter error for the X variable, the Y variable, or both. Rows with missing X or Y values are ignored. Rows with missing error values are plotted, but error bars for the corresponding points are not drawn.

A grouping variable may be used to divide the points into groups (e.g., age group or gender).

Enter Error as ΔY (or ΔX) (Error Bounds = Y ± ΔY (or X ± ΔX))

In this type, X and Y values are contained in two separate columns. Enter a single column containing the error values for the X and/or Y variables (ΔX's and ΔY's). The X error bar bounds for each point are computed as

$$X\ Error\ Upper\ Bound = X + ΔX$$

$$X\ Error\ Lower\ Bound = X - ΔX$$

The Y error bar bounds for each point are computed as

$$Y\ Error\ Upper\ Bound = Y + ΔY$$

$$Y\ Error\ Lower\ Bound = Y - ΔY$$

These bounds result in horizontal error bars that are symmetric about each plotted point.

X and Y with Error Entered as ΔX and ΔY

X	Y	SDx	SDy
18	83	10	7
19	42	9	6
95	87	5	8
60	41	7	8

Enter Upper and Lower Error Bounds Separately

In this type, X and Y values are contained in two separate columns. The upper and lower error bounds for X and/or Y are entered directly, each using two additional input columns. With this input type, it is possible to enter asymmetric error bounds.

X and Y with Upper and Lower Error Bounds

X	Y	XLow	XHigh	YLow	YHigh
13	37	6	24	30	42
86	84	80	92	75	93
98	70	91	100	64	79
40	52	28	50	48	59

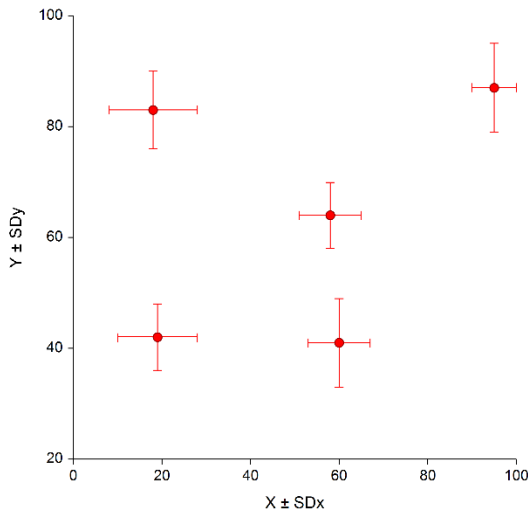# Scatter Plot with Error Bars Window Options

This section describes the specific options available on the Scatter Plot with Error Bars window, which is displayed when the Plot Format button is clicked. For information about the other graphical components and scatter-plot specific options available in this procedure (e.g., symbols, regression lines, data labels, etc.), see the chapter on Scatter Plots. Common plot options, such as axes, labels, legends, and titles are documented in the Graphics Components chapter.
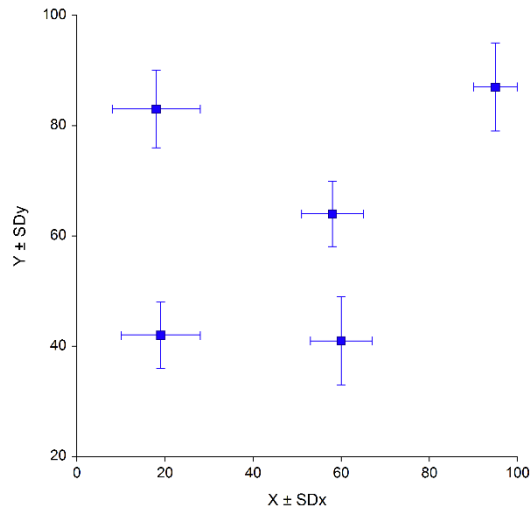
Scatter Plot Tab

Symbols

You can also modify the appearance of all symbols on the plot. By default, the error bars have the same color as the symbols.

Variation (Error Bars)

You can modify the content and appearance of the vertical and horizontal error bars using these options. We will highlight the most commonly-used options.

Y and X Error Bar Lines

Select the error bars to be displayed.
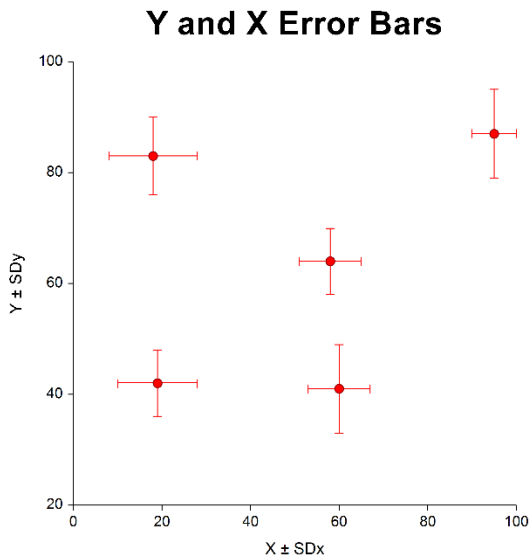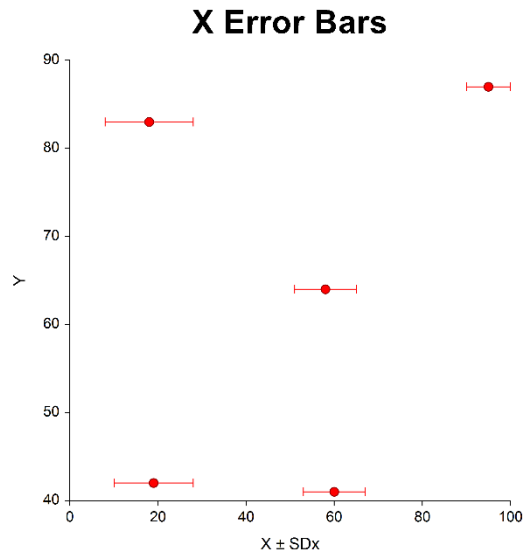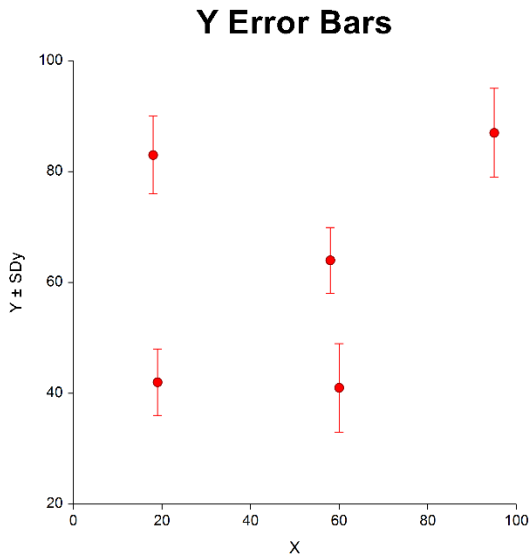
Line Color and Style

Specify the color and style of error bar lines. The lines and symbols are completely customizable.
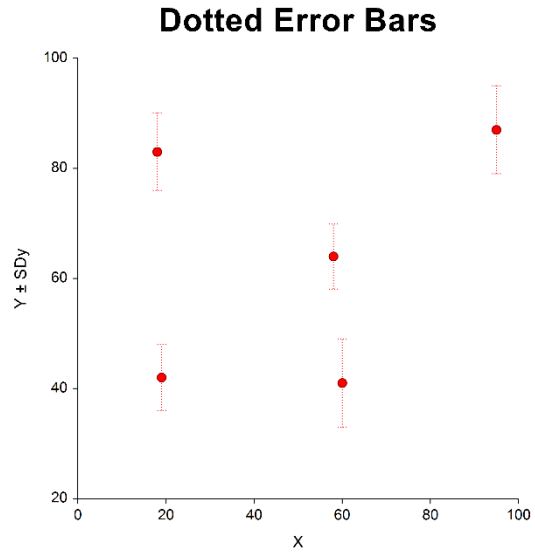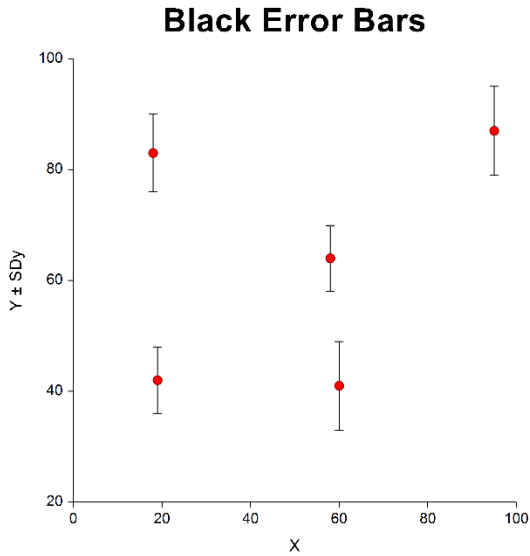
Direction

Specify whether error bars extend up or down (right or left) from the center point.

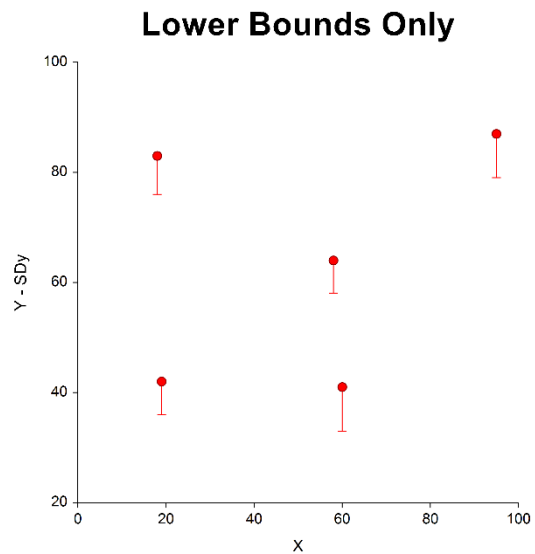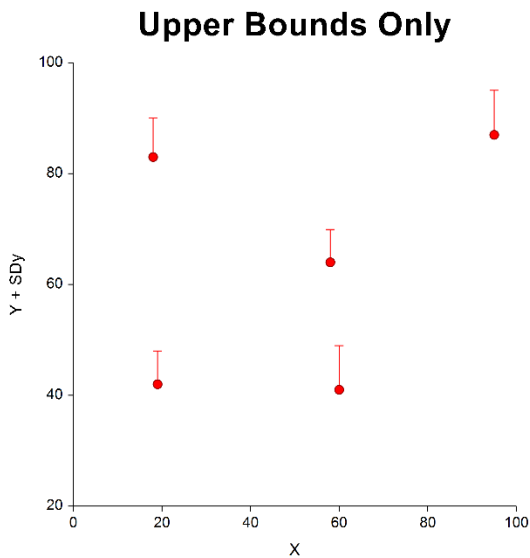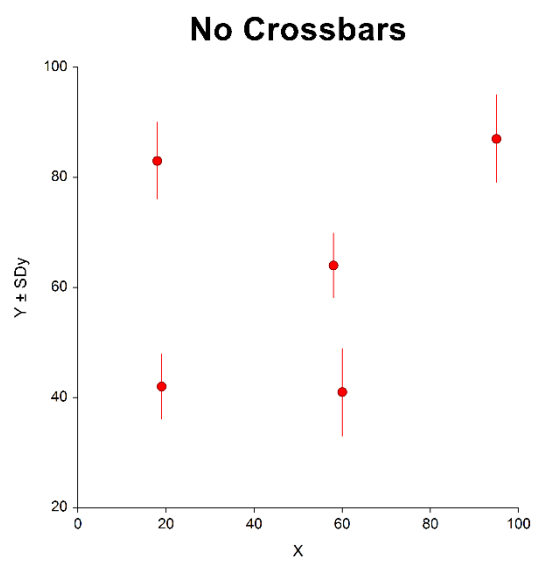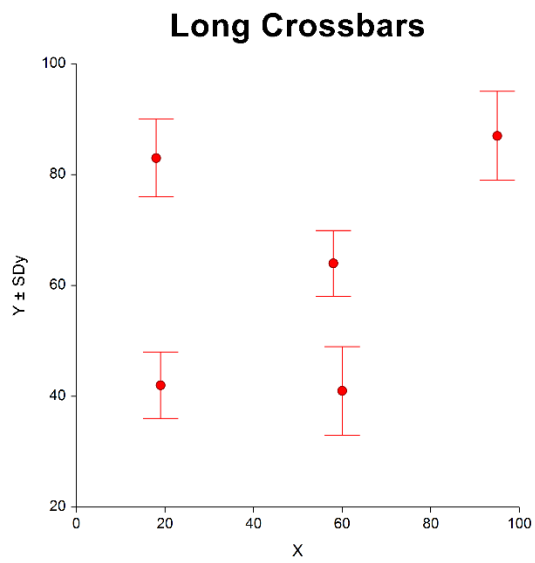## Crossbars

Specify whether or not to include crossbars and their size.

Example 1 – Creating a Scatter Plot with Error Bars from Summary Data by Entering Delta

This example demonstrates how to generate a simple scatter plot with error bars from data that includes standard error measurements for the Y variable. The data used are contained in the ScatPlotErrorSum1 dataset. In this example, Response is the Y variable and Time is the X variable.

Setup

To run this example, complete the following steps:

1   Open the ScatPlotErrorSum1 example dataset

- From the File menu of the NCSS Data window, select **Open Example Data**.
- Select ScatPlotErrorSum1 and click OK.

2   Specify the Scatter Plots with Error Bars from Summary Data procedure options

- Find and open the **Scatter Plots with Error Bars from Summary Data** procedure using the menus or the Procedure Navigator.
- The settings for this example are listed below and are stored in the **Example 1** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

    Variables Tab

    Y (Vertical) Variable..**Response**
    X (Horizontal) Variable.....................................**Time**
    Grouping (Symbol) Variable.............................**Rate**
    Y Error Input Type ....**Enter Y Error as ΔY (Y Error Bounds = Y ± ΔY)**
      Y Error (ΔY) Variable ....**SE**

    Scatter Plot with Error Bars Format (*Click the Button*)

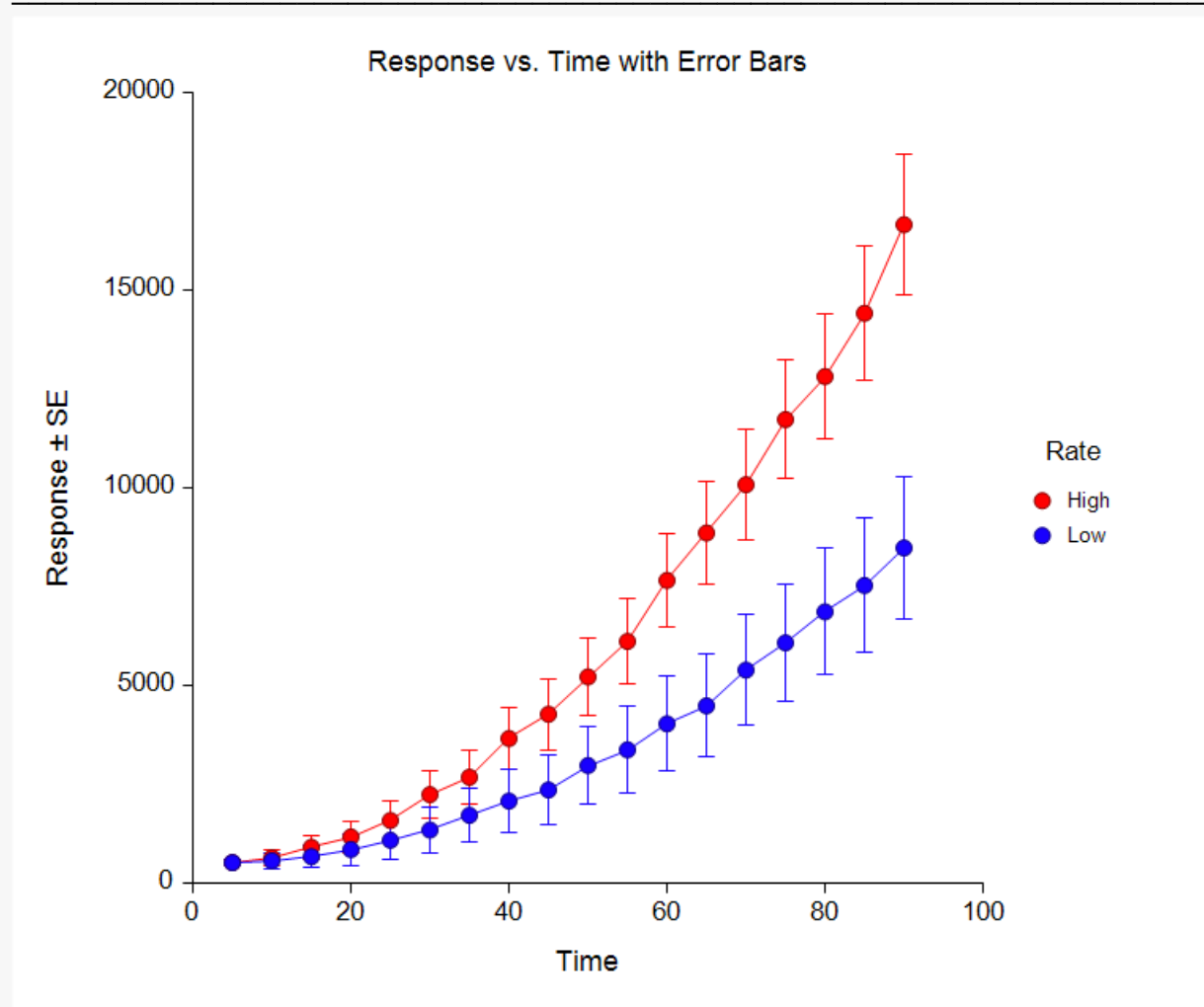   *More Lines Tab*
    Line (Connect Data Points)..............................**Checked**

3   Run the procedure

- Click the **Run** button to perform the calculations and generate the output.

Scatter Plot Output

Scatter Plot Section

Example 2 – Creating a Scatter Plot with Error Bars from Summary Data by Entering Upper and Lower Error Bounds

This example demonstrates how to generate a simple scatter plot with error bars from data that includes upper and lower bounds for both the X and Y variables. The data used are contained in the ScatPlotErrorSum2 dataset.

Setup

To run this example, complete the following steps:

1 Open the ScatPlotErrorSum2 example dataset
- From the File menu of the NCSS Data window, select **Open Example Data**.
- Select ScatPlotErrorSum2 and click OK.

2 Specify the Scatter Plots with Error Bars from Summary Data procedure options
- Find and open the **Scatter Plots with Error Bars from Summary Data** procedure using the menus or the Procedure Navigator.
- The settings for this example are listed below and are stored in the **Example 2** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.


Variables Tab

Y (Vertical) Variable..**Y**
X (Horizontal) Variable......................................**X**
Grouping (Symbol) Variable..............................**Site**
Y Error Input Type ....**Enter Upper and Lower Y Error Bounds Separately**
  Lower Y Error Bound Variable ....**YLow**
  Upper Y Error Bound Variable ....**YHigh**
X Error Input Type ....**Enter Upper and Lower X Error Bounds Separately**
  Lower X Error Bound Variable ....**XLow**
  Upper X Error Bound Variable ....**XHigh**

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3 Run the procedure
- Click the **Run** button to perform the calculations and generate the output.

Scatter Plot Output

Scatter Plot Section
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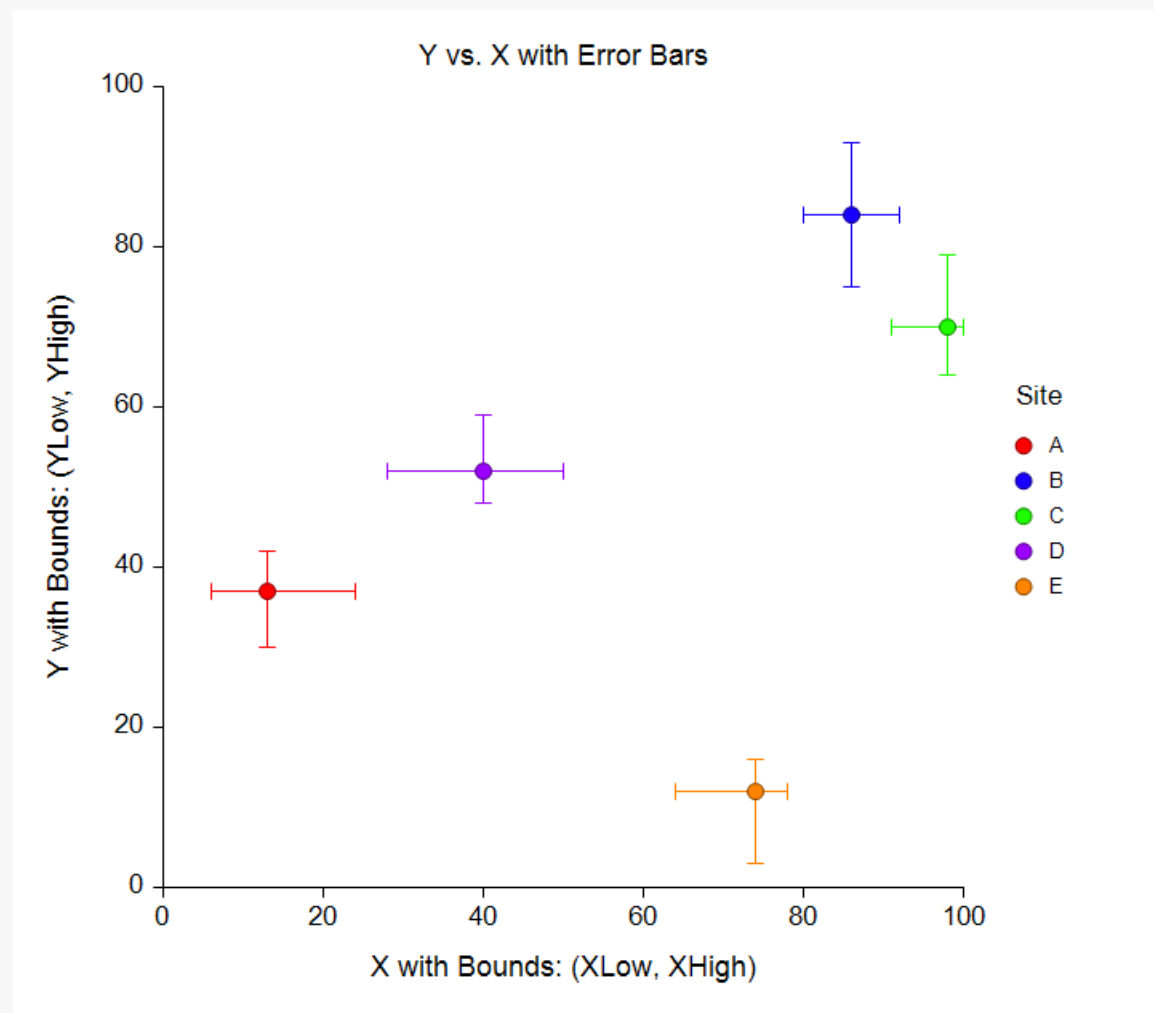
Example 3 – Creating a Scatter Plot from Summary Data with X Error Bars

This example demonstrates how to generate a simple scatter plot with X error bars only. The data used are contained in the ScatPlotErrorSum3 dataset.

Setup

To run this example, complete the following steps:

1   Open the ScatPlotErrorSum3 example dataset

- From the File menu of the NCSS Data window, select **Open Example Data**.
- Select ScatPlotErrorSum3 and click OK.

2   Specify the Scatter Plots with Error Bars from Summary Data procedure options

- Find and open the **Scatter Plots with Error Bars from Summary Data** procedure using the menus or the Procedure Navigator.
- The settings for this example are listed below and are stored in the **Example 3** settings file. To load these settings to the procedure window, click **Open Example Settings File** in the Help Center or File menu.

Variables Tab

Y (Vertical) Variable...**Y**
X (Horizontal) Variable.....................................**X**
Y Error Input Type ....**None**
X Error Input Type ....**Enter X Error as ∆X (X Error Bounds = X ± ∆X)**
  X Error (∆X) Variable ....**SDx**

3   Run the procedure

- Click the **Run** button to perform the calculations and generate the output.

Scatter Plot Output

Scatter Plot Section
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Y vs. X with Error Bars