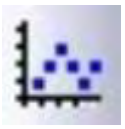
13.20. XY Plot

13.20.1. Overview

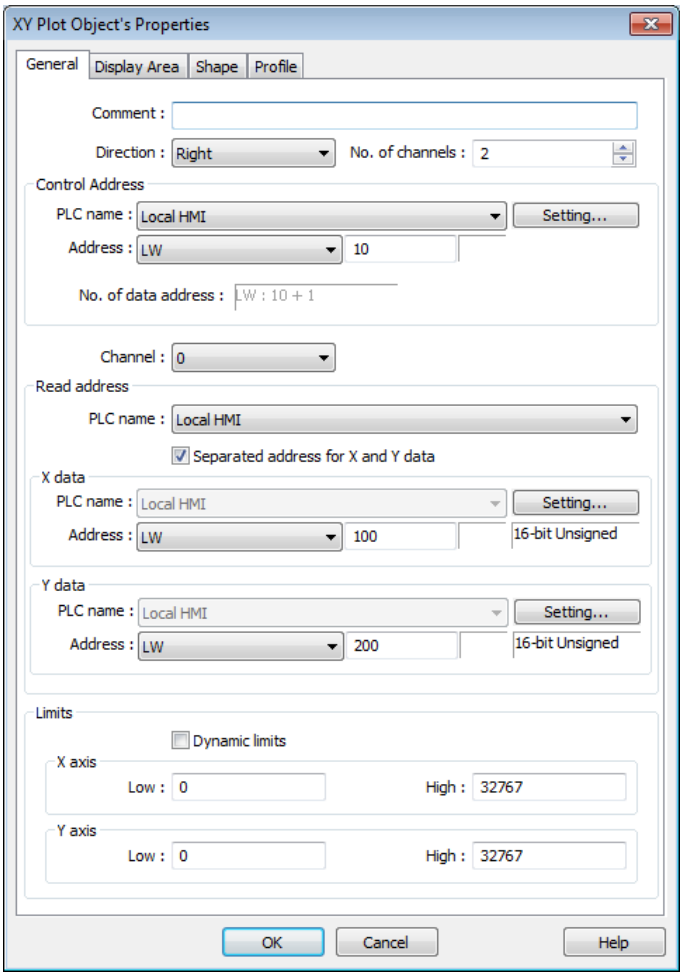
XY Plot object is used to display values for two variables (x,y) for a set of data, where the data comes from word registers. Up to 16 channels can be displayed simultaneously. This object facilitates data observation and analysis. Additionally, negative numbers can be displayed as well.

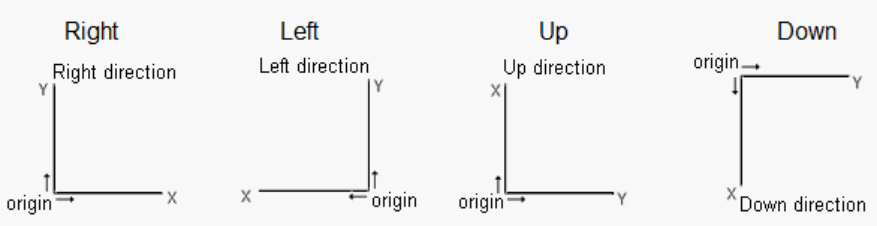
13.20.2. Configuration



Click the XY Plot icon on the toolbar to open a [XY Plot] object property dialog box.

General Tab



<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Direction</td><td>There are four selections, right, left, up or down.
 
</td></tr>
<tr><td>No. of channels</td><td>Set the number of channels for observation.</td></tr>
<tr><td>Control address</td><td>Controls the operation of all channels simultaneously. When the [Control address] is LW-n, assigning values to LW-n will issue commands to XY plot according to the table below. Meanwhile, LW-n+1 l controls the number of data points plotted. After operation, the [Control address] will be reset to 0.
<table>
<tr><th>Control address</th><th>Value</th><th>Result</th></tr>
<tr><td rowspan="3">LW-n</td><td>1</td><td>Plots point on XY curve.
(The plotted points are kept.)</td></tr>
<tr><td>2</td><td>Clears all XY curves.</td></tr>
<tr><td>3</td><td>Clears then plots new XY curve.</td></tr>
<tr><td>LW-n+1</td><td>Any number</td><td>Controls the number of data points plotted.</td></tr>
</table>
No. of data address
Controls the number of data points. Each channel can plot up to 1023 points.</td></tr>
<tr><td>Channel</td><td>Select a channel to configure.</td></tr>
<tr><td>Read Address</td><td>PLC name
Select a PLC which will be the source of [X data] and [Y data] and designate a read address.
The format of the data register blocks used for the display channels depends on whether [Separated address for X and Y data] and/or [Dynamic limits] has been selected. See Example 1.</td></tr>
<tr><td>Dynamic limits</td><td>● When not selected (See Example 2)
The Low and High limits can be set by entering constants. The Low and High limits are used for calculating X and Y range in percentage.
● When selected (See Example 3)
A zoom effect can be created by changing the Low / High Limits.</td></tr>
</table>

Example 1

The format of the data register blocks used for the display channels depends on whether [Separated address for X and Y data] has been selected, and if [Dynamic limits] has been selected. The following explains the situations where 16-bit register is used:

- If [Separated address for X and Y data] is **not** selected, and set [Read address] to LW-n:

	Select [Dynamic limits]		**Not** select [Dynamic limits]	
	X data	**Y data**	**X data**	**Y data**
Low Limit	LW-n	LW-n+2	Constant	Constant
High Limit	LW-n+1	LW-n+3	Constant	Constant
1st data	LW-n+4	LW-n+5	LW-n+0	LW-n+1
2nd data	LW-n+6	LW-n+7	LW-n+2	LW-n+3
3rd data	LW-n+8	LW-n+9	LW-n+4	LW-n+5
4th data	LW-n+10	LW-n+11	LW-n+6	LW-n+7

- If [Separated address for X and Y data] is selected, and set [X data] to LW-m, [Y data] to LW-n:

	Select [Dynamic limits]		**Not** select [Dynamic limits]	
	X data	**Y data**	**X data**	**Y data**
Low Limit	LW-m+0	LW-n+0	Constant	Constant
High Limit	LW-m+1	LW-n+1	Constant	Constant
1st data	LW-m+2	LW-n+2	LW-m+0	LW-n+0
2nd data	LW-m+3	LW-n+3	LW-m+1	LW-n+1
3rd data	LW-m+4	LW-n+4	LW-m+2	LW-n+2
4th data	LW-m+5	LW-n+5	LW-m+3	LW-n+3

Example 2

When [Dynamic limits] is not selected, the Low and High limits can be set. The Low and High limits are used for calculating X and Y range in percentage.

$$\text{Scale}\ (\%) = \frac{\text{Read Address Value} - \text{Low Limit}}{\text{High Limit} - \text{Low Lmit}}$$

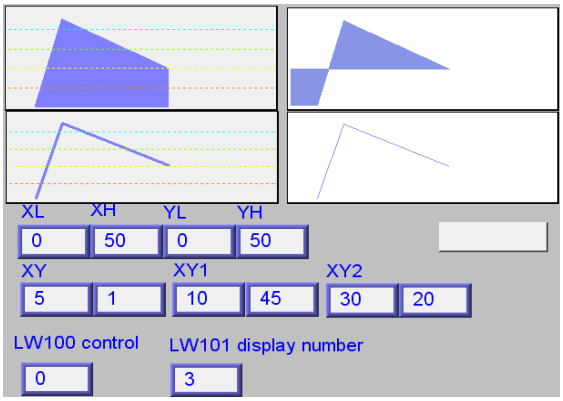
If [Separated address for X and Y data] is **not** selected and the address is LW-n, the corresponding limits are retrieved from the addresses as shown in the following table.

Data format	16-bit	32-bit
X axis low limit	LW-n	LW-n
X axis high limit	LW-n+1	LW-n+2
Y axis low limit	LW-n+2	LW-n+4
Y axis high limit	LW-n+3	LW-n+6

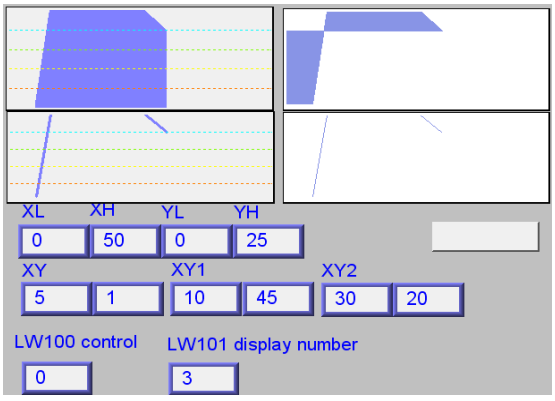
Example 3

If **[Dynamic limits]** is selected, a zoom effect can be created by changing the setting of Low / High Limits.

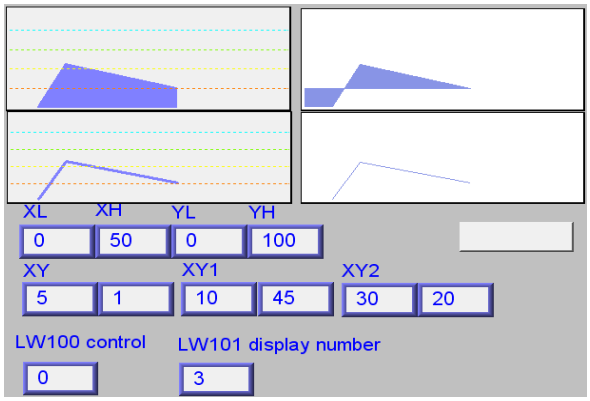
In the following example, XL=X low limit, XH=X high limit, YL=Y low limit, YH=Y high limit, and XY, XY1, XY2 are three XY data. When changing the high limits of X and Y axis, the result is shown below:



Original



Change the high limit of Y axis to 25. (zoom in)



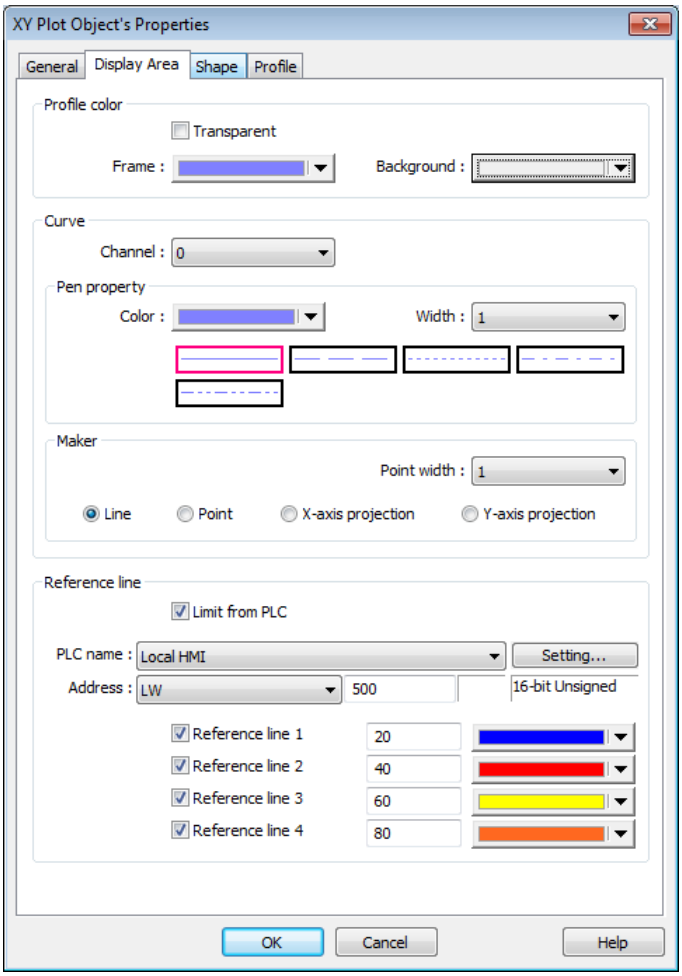
Change the high limit of Y axis to 100 (zoom out)

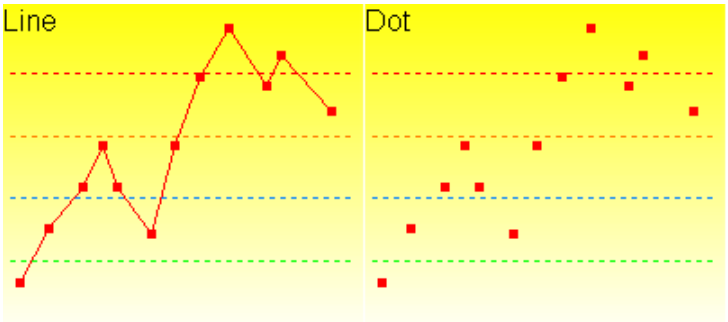
For more information, see “13.17 Trend Display”.

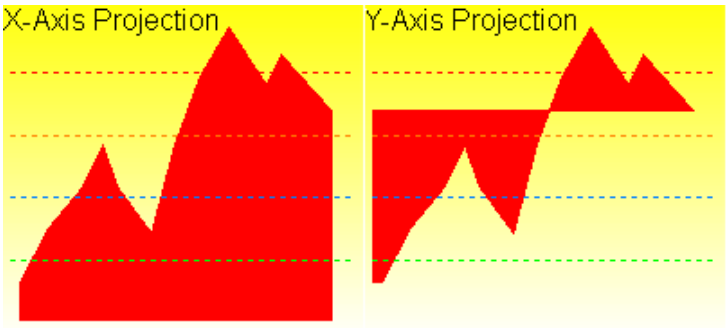
Note

- For cMT Series, on the screen of the visualization device directly pinch two fingers together to zoom out or spread them apart to zoom in.
- X and Y data can be set to different formats. For example: If X data uses 16-bit unsigned, Y data uses 32-bit signed, please note the address setting.
- When using a Tag PLC, such as AB tag PLC, X and Y must be in the same format. When using different formats a warning will be shown.

Display Area Tab



Setting	Description
Profile color	Select the color of the frame and the background, or select [Transparent] check box to hide the frame and background.
Curve	For each channel select the properties of color, width, and line style.
Maker	There are four different types of XY plot. The result is shown below: 



See Example 4.

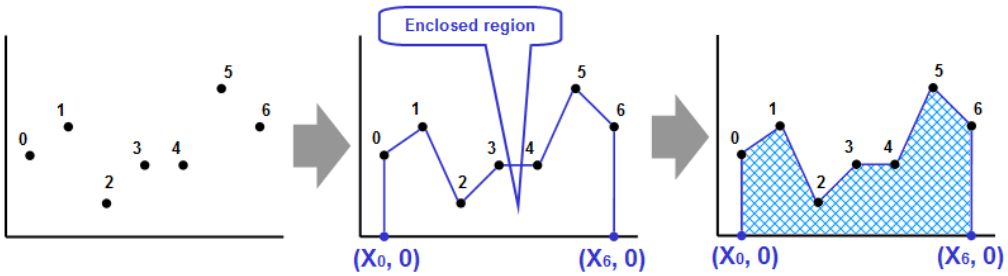
Reference line	Up to 4 horizontal reference lines can be shown on the graph. Fill in high, low limits and Y axis percentage values. Different colors can be selected for each reference line. If [Limit from PLC] is selected, designate a register to be the read address of reference line.

Example 4

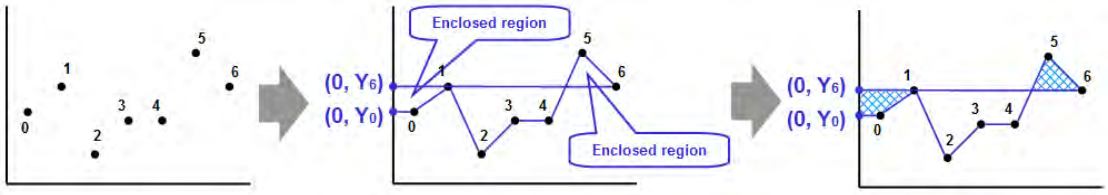
The curve shown in the following figure is drawn with 7 points numbered from P0 to P6.

The steps the system draws the X-axis Projection are:

1. Calculates the two points in X-axis – (X_0, 0) and (X_6, 0).
2. Link all the points in the order of (X_0, 0), P0… P6, (X_6, 0) and returns to (X_0, 0) at last.
3. Fill out all enclosed areas.



Similarly for Y-axis projection:



Note

- XY Plot can be drawn repeatedly up to 32 times:
  1 channel➔32 times
  2 channels➔16 times
  The way to calculate: 32 divided by the number of channels.