

# **Process Analyzer**

**UA1801-01**

**UA1801-02**

**Process Analyzer Pro**

**E4781-01**

**E4781-02**

**Process Analyzer Client**

**EN**



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## Introduction

Thank you for choosing the Hioki Process Analyzer, the UA1801-01/UA1801-02 Process Analyzer Pro, or the E4781-01/E4781-02 Process Analyzer Client. To obtain maximum performance from the product, please read the Instruction Manuals first and handle and store them with care.

Product name	Name	Description	Reference
—	Process Analyzer	Free of charge	—
UA1801-01	Process Analyzer Pro	Paid, license with expiration date (1 year)	p. 6
UA1801-02	Process Analyzer Pro	Paid, perpetual license	p. 6
E4781-01	Process Analyzer Client	Paid, license with expiration date (1 year) Optional function of the test instrument	p. 6
E4781-02	Process Analyzer Client	Paid, perpetual license Optional function of the test instrument	p. 6

### Software installation

The latest version of the Process Analyzer and the Process Analyzer Pro can be downloaded from Hioki's website. Extract the downloaded zip file and then execute the installer file (setup.exe) in the unzipped folder to install the latest software.

The Process Analyzer Client is an option of the test instrument, so there is no need to install the software separately.

### Target audience (this manual)

This manual has been written for use by individuals who use the product or provide information about how to use the product.


In explaining how to use the product, it assumes electrical knowledge (equivalent of the knowledge possessed by a graduate of an electrical program at a technical high school).

### License agreement

Use of the Process Analyzer and the Process Analyzer Pro indicates acceptance of the terms of the license agreement found at the end of this manual.

The Process Analyzer Client is an option of the test instrument and is subject to the warranty of the test instrument.

## Notations

*	Instructs the reader to see below for additional information.
(p. )	Indicates the page number to reference.
<b>Bold</b>	The items on the screen are printed in bold.
□+□	If "+" is used among multiple keys, the next key(s) must be pressed simultaneously with the first key.
	The function can be used only when you have purchased the paid license for Process Analyzer Pro (UA1801, p. 6).

## Mouse operation

Click	Press and quickly release the left button of the mouse.
Right-click	Press and quickly release the right button of the mouse.
Double-click	Quickly click the left button of the mouse twice.
Drag	While holding down the left button of the mouse, move the mouse and then release the left button to deposit the chosen item in the desired position.
Activate	Click on a window on the screen to activate that window.

# 1 Overview

## 1.1 Product Overview

This system is a software product that reads the result data created by a board test using Hioki's flying probe tester, and performs a statistical analysis and visualization of the read data. When you specify a folder, result files are read automatically and you can easily check changes in resistance value or FAIL ratio using a line or bar chart with a mouse operation.

In addition, if you purchase the paid license for Process Analyzer Pro (UA1801, p. 6), you can use more advanced and useful functions such as singularity detection and measurement value mapping. In addition, if you purchase the Process Analyzer Client (E4781, p. 6), which is an option of the test instrument, you can detect the singularity in real time on the test instrument.

## 1.2 Product Features

### Automatic reading of result files

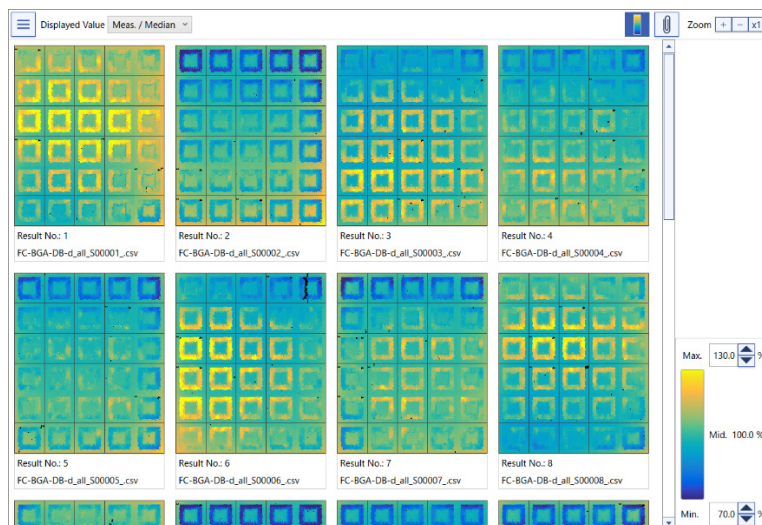
Once the result data of a board test by Hioki's flying probe tester is saved to a specific folder, simply specifying this folder reads all of the result data in the folder automatically.

### Various graph displays without using any spreadsheet software

The read data is visualized in a line or bar chart with a simple mouse operation.

### Measurement value map **Pro**

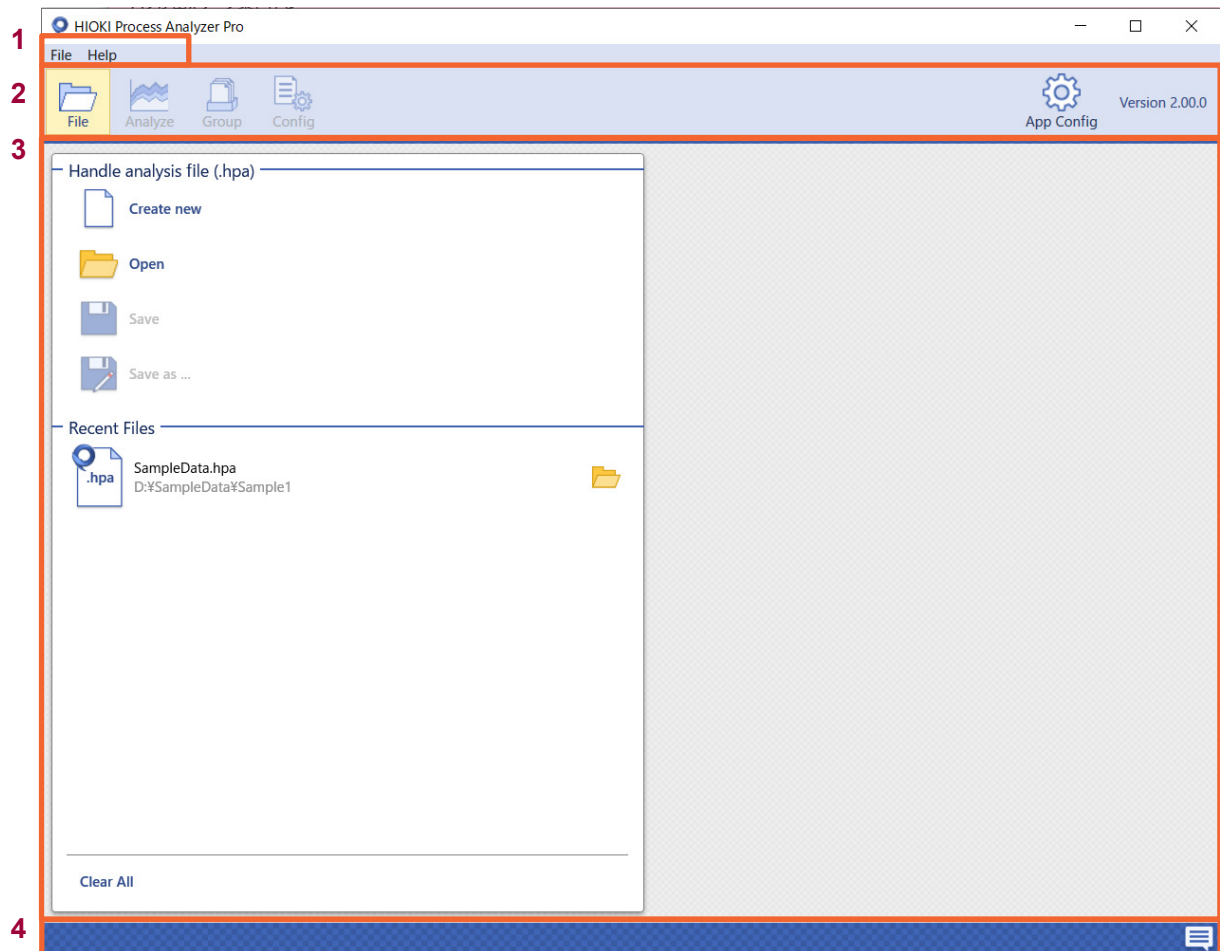
The size of the resistance value of the wiring pattern corresponding to the color gradation is displayed on the measurement value map, allowing you to easily check the trend of the resistance value on the board.



### Singularity detection **Pro**

Hioki's original statistical index called the singularity degree is calculated to find abnormal locations that are outside the correlation. This allows you to detect an abnormality in a micro resistance value that cannot be detected by the test instrument alone.

## 1.3 Window Configuration



No.	Description	Reference
1	Menu bar	p. 5
2	Window select bar	p. 5
3	Main window	p. 5
4	Status bar	p. 6

### 1.3.1 Menu bar

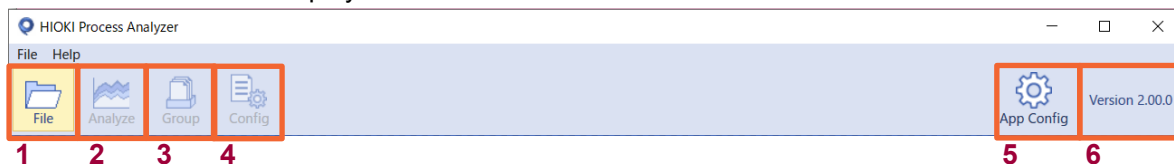
The menu bar displays menu items that can be used with the application.



File	Create new	Creates new analysis data.
	Open	Opens an analysis data file.
	Close	Closes the analysis data.
	Save	Saves the currently opened analysis data to a file. When the analysis data is opened from a file to which it has been saved once, the analysis data is overwritten to the file automatically.
	Save as ...	Saves the currently opened analysis data to a file with another name.
	Recent Files	Displays the list of analysis data files that have been opened recently. Clicking a file name opens the file.
	Exit	Exits the system.
Help	License Activation	Displays the <b>License Activation</b> dialog for Process Analyzer Pro (UA1801) (p. 85).
	About Process Analyzer	Displays the <b>About Process Analyzer</b> dialog (p. 86) that shows the version information, instruction manual, and license information of the system.

### 1.3.2 Window select bar

Select a window to be displayed in the main window.



1 File	Displays the <b>File</b> window (p. 12).
2 Analyze	Display the <b>Analyze</b> window (p. 14).
3 Group	Displays the Results <b>Group</b> window (p. 77).
4 Config	Displays the <b>Config</b> window (p. 80).
5 App Config	Displays the <b>App Config</b> window (p. 83).
6 (Version No.)	Displays the <b>About Process Analyzer</b> dialog (p. 86).

### 1.3.3 Main window

The window selected on the window select bar is displayed.

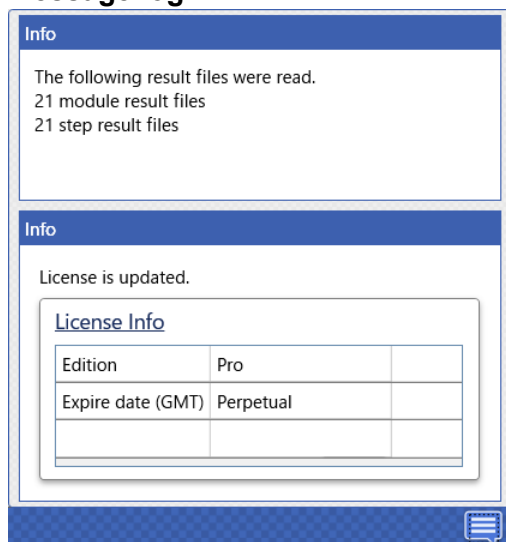
### 1.3.4 Status bar



#### 1 Message log

Shows the messages that have been displayed.

#### Message log



A message is displayed at the lower right part of the window immediately after new analysis data has been created or when the license information has been changed, and then the message disappears after several seconds. The message history can be displayed as a message log.

## 1.4 Process Analyzer Pro (UA1801)

If you purchase the paid license for Process Analyzer Pro (UA1801), you can use the functions shown below.

- Net Visualizer (p. 27)
- Measurement Value Map (p. 33)
- Measurement Value Map Browser (p. 60)
- Singularity Degree List (p. 66)
- Singularity Degree Histogram (p. 67)
- Export CSV (p. 73)

The license activation and check are performed in the License Activation dialog (p. 85).

In addition, the trial license with an expiration date can also be issued. For details, please contact your authorized Hioki distributor or reseller.

## 1.5 Process Analyzer Client (E4781)

Process Analyzer Client is an optional function of the FA1800 series test instrument. Using Process Analyzer Client, the sole test instrument can train the statistics model and detect the singularity. For details, see "7 Process Analyzer Client (p.101)".

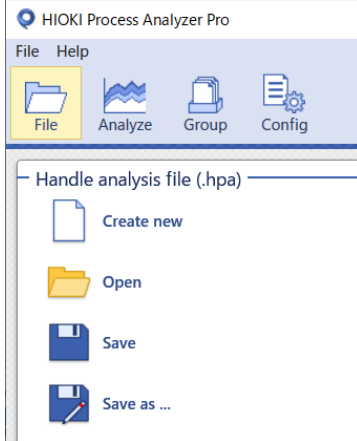
Note that Process Analyzer Client is a different software program from Process Analyzer and Process Analyzer Pro.

## 2 Workflow for Data Analysis

### 2.1 Analyzing New Data

#### Step 1 Executing Create new

Click **Create new** in the **File** window (p. 12).

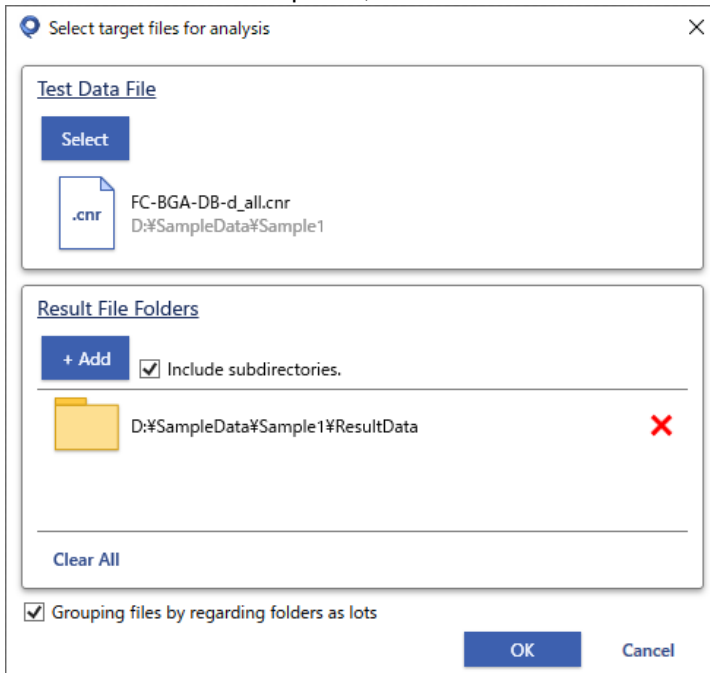


#### Step 2 Selecting the test data and result data folder

When the **Select target files for analysis** dialog appears, click **Select** in the **Test Data File** area, and then select the target test data you want to analyze (p. 87).

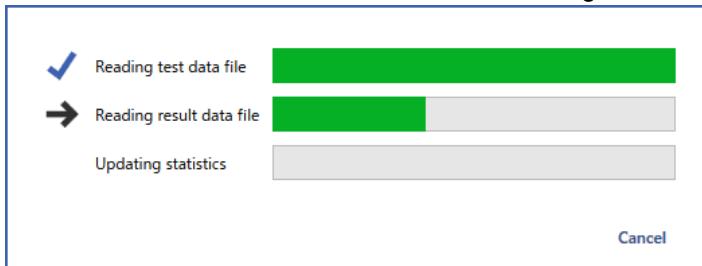
Next, click **+Add** in the **Result File Folders** area, and then select the folder to which the result data is saved (p. 87).

After selections are completed, click **OK**.



### Step 3 Reading the data

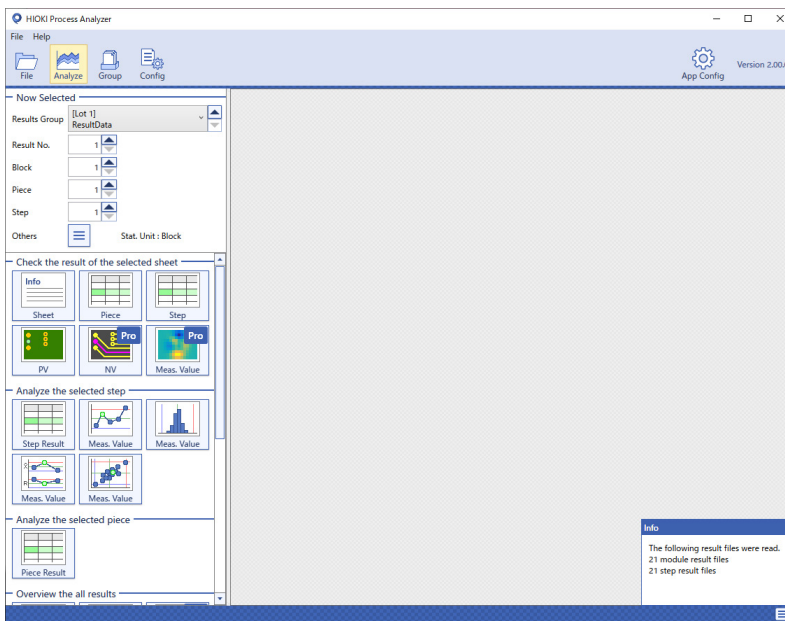
After the data has been selected, the data reading is started.



**[NOTICE]** When the piece panelization is not fixed, the Piece Panelization dialog appears (p. 81).

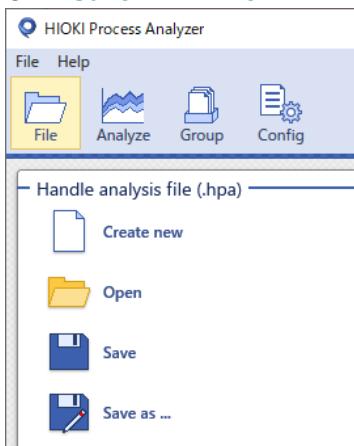
### Step 4 Starting the analysis

After the data has been read, the **Analyze** window appears (p. 14) and the preparation for analysis is then finished.



### Step 5 Saving the analysis data

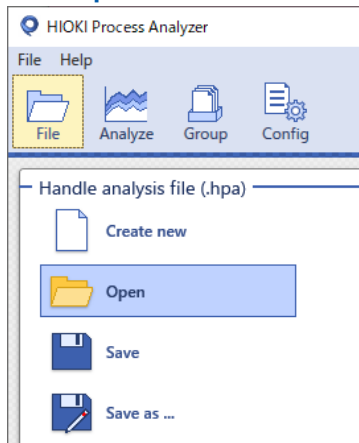
Click **Save** in the **File** window (p. 12) and save the analysis data (p. 87) to a file (\*.hpa).



## 2.2 Opening Saved Analysis Data (\*.hpa)

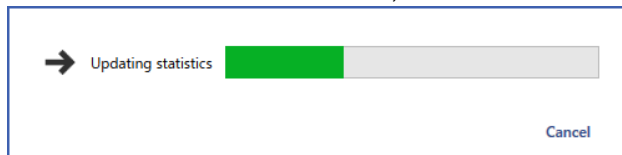
### Step 1 Opening an analysis data file

Click **Open** in the **File** window (p. 12) and select a saved HPA file (p. 87).



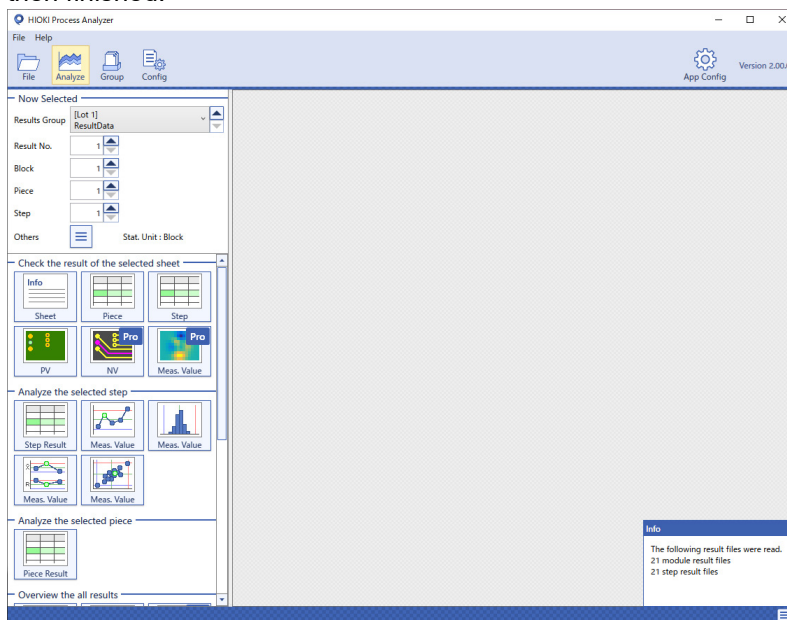
### Step 2 Reading the data

After the data has been selected, the recalculation of the statistics is started.



### Step 3 Starting the analysis

After the data has been read, the **Analyze** window appears (p. 14) and the preparation for analysis is then finished.



## 2.3 Setting the Test Instrument Output

To output the data necessary for the data analysis using Process Analyzer, set the test instrument as follows.

### 2.3.1 FA1283, 1270, FA1116, etc.

#### Setting For AutoTest... → RS / Output file

The screenshot shows the 'Automatic test settings data' dialog box with the 'RS / Output file' tab selected. The 'Output to RS' section has 'Output Step' set to 'No use'. The 'Output to File' section has 'Output Step' set to 'All', 'Divided file' set to 'No divided', and 'Output format' set to 'Standard'. The 'Output Group' is 'No use' and 'Output Module' is 'All'. The 'Units' are set to 'Index'. The 'Simple PASS data output' is set to 'No'. Callouts highlight 'Output Step: All (Required)', 'Output format: Standard (Required)', and 'Output Module: All (Recommended)'.

Meas.2/Alignment	Insulation	Transport, Clamp	Output items
Whole	Retry, Retest	Operation of Standard equipment	Measurement
Ope. of output / Output to printer		RS / Output file	Output data

File data

File name: D:\SampleData\Sample6\FC-BGA-DB-d\_all.cnr

Registration: \* Step Numbers: 42480

Output to RS

Output Step: No use

Output Group: No use

Output Module: No use

Units: Index

RS Setting...

Output to File

Output Step: All

Divided file: No divided

Output format: Standard

Add ModuleNo. for extension

Not output NULL step data

Output Group: No use

Output Module: All

Units: Index

Simple PASS data output: No

Output filename setting...

#### Setting For AutoTest... → Whole

The screenshot shows the 'Automatic test settings data' dialog box with the 'Whole' tab selected. The 'Output judgement' is set to 'Standard'. The 'Point offset value' section has X: -197.633 mm, Y: -148.237 mm, and Z: 0.000 mm. The 'Thickness of Board' is 1.000 mm. The 'Operation of testing' is 'No use'. The 'Fail-steps for operation of testing' is 0. The 'Number of accumulation Fail-Steps which call operator' is 0. The 'Module stop' is 'No'. The 'Number of modules in the module stop' is 1. The 'Display at Auto-testing' is 'All'. The 'Output judgement' is 'Standard'. The 'Action after decided judgement' is '...'. A callout highlights 'Output judgement: Standard (Recommended)'.

Meas.2/Alignment	Insulation	Transport, Clamp	Output items
Whole	Retry, Retest	Operation of Standard equipment	Measurement
Ope. of output / Output to printer		RS / Output file	Output data

File data

File name: D:\SampleData\Sample6\FC-BGA-DB-d\_all.cnr

Registration: \* Step numbers: 42480

Point offset value (-999.999 < > 999.999mm)

X: -197.633 mm Y: -148.237 mm Z: 0.000 mm

Change Offset...

Thickness of Board (0.100 - 2.500mm) 1.000 mm

Operation of testing: No use

Fail-steps for operation of testing (0 - 20000) 0

Number of accumulation Fail-Steps which call operator (0 - 20000) 0

Module stop: No

Number of modules in the module stop (0 - 9999) 1

Display at Auto-testing: All

Unit of test times: All

Output judgement: Standard

Action after decided judgement: ...

## 2.3.2 FA1800 series

### Test program → Test Setting → Output

The screenshot shows the 'Output' settings window. Callouts indicate the following required settings:

- File Type: CSV (Required)**: The 'File Type' dropdown is set to 'CSV'.
- Output Piece File: Yes (Recommended)** and **Output Step File: Yes (Required)**: Both checkboxes are checked.
- Output Condition: Type A (Required)**: The 'Type' dropdown is set to 'A'.
- Output Items (CSV) Step:**
  - StepNo. Super Abs.Step No. (Required)**
  - Measure Value (Required)**
  - Judg. (Required)**
  - Output-judgment (Required)**

The 'Output Items (CSV)' section shows a list of items with checkboxes. The 'Step' tab is selected, and the following items are checked:

Item	Checked
StepNo. Super Abs.Step No.	Yes
Measure Value	Yes
Judg.	Yes
Output-judgment	Yes

The close-up shows the 'Piece' tab selected in the 'Output Items (CSV)' section. The following items are checked:

Item	Checked
Piece	Yes
Judg.	Yes
PieceOJudg.	Yes

Callouts indicate the following recommended settings:

- Output Items (CSV) Piece:**
  - Piece (Recommended)**
  - Judg. (Recommended)**
  - PieceOJudg. (Recommended)**

## 2.4 Precautions

### 2.4.1 Editing the result data with spreadsheet software not recommended

For the reasons shown below, it is not recommended to edit the result data CSV file with spreadsheet software.

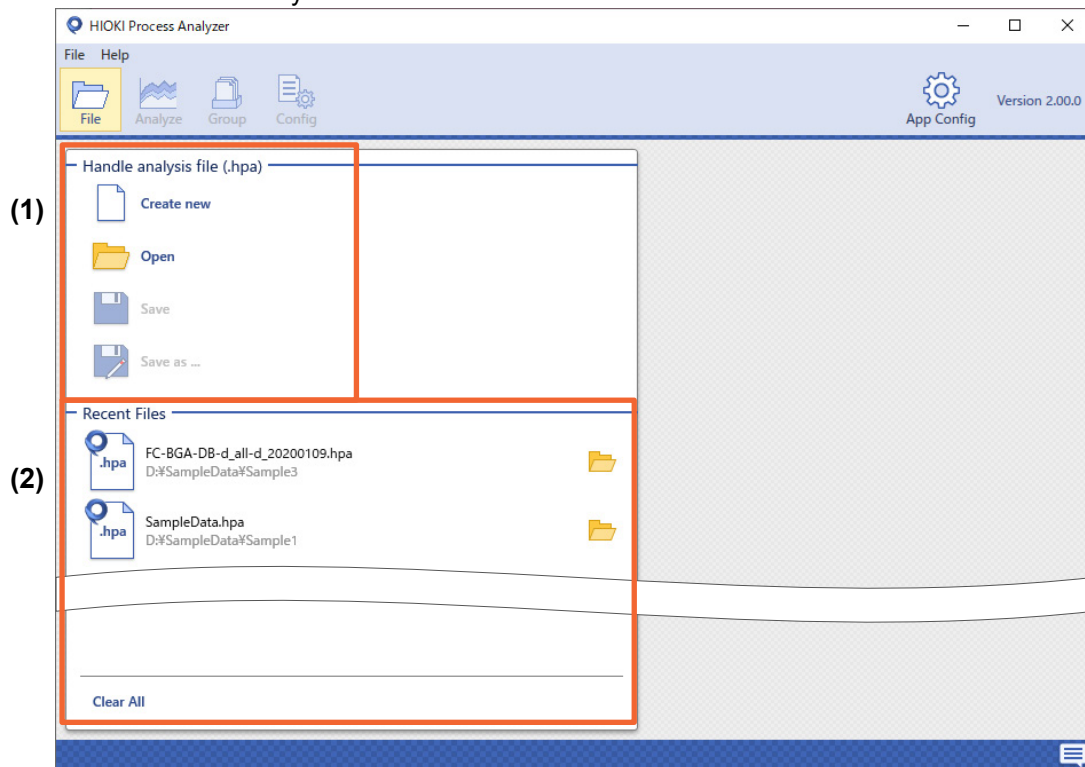
- The number of significant digits of the measured value decreases.
- The test date and time written in the header are rewritten to an unintended format.

When the result data that has been edited with spreadsheet software is read by Process Analyzer, the data may be recognized as different values or the data reading itself may fail.

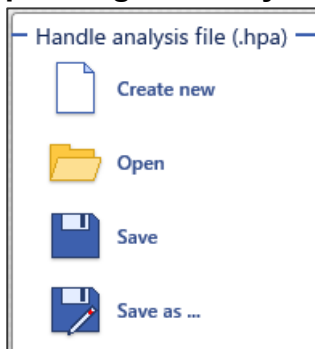
## 3 Window Details

### 3.1 File Window

This window allows you to create or save the statistics data.



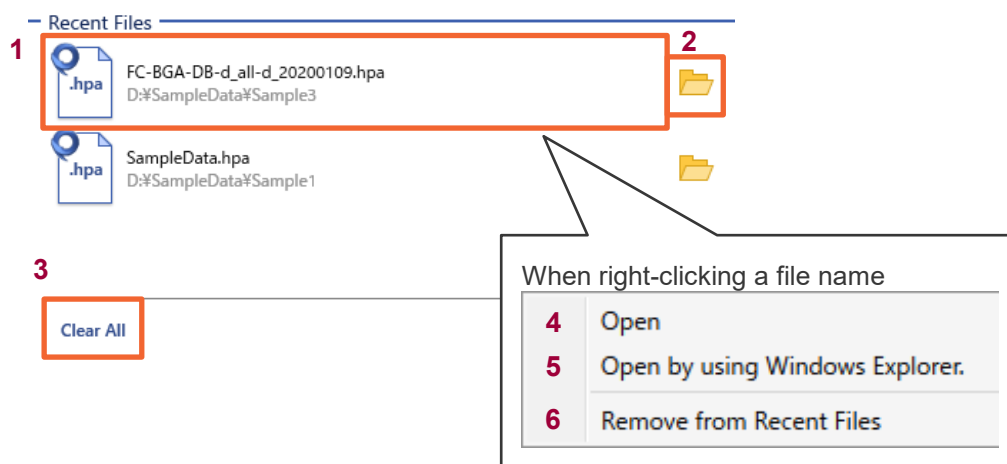
#### (1) Operating the analysis file



<b>Create new</b>	Creates new analysis data.
<b>Open</b>	Opens an analysis data file.
<b>Save</b>	Saves the currently opened analysis data to a file. When the analysis data is opened from a file to which it has been saved once, the analysis data is overwritten to the file automatically.
<b>Save as ...</b>	Saves the currently opened analysis data to a file with another name.

## (2) Recent files

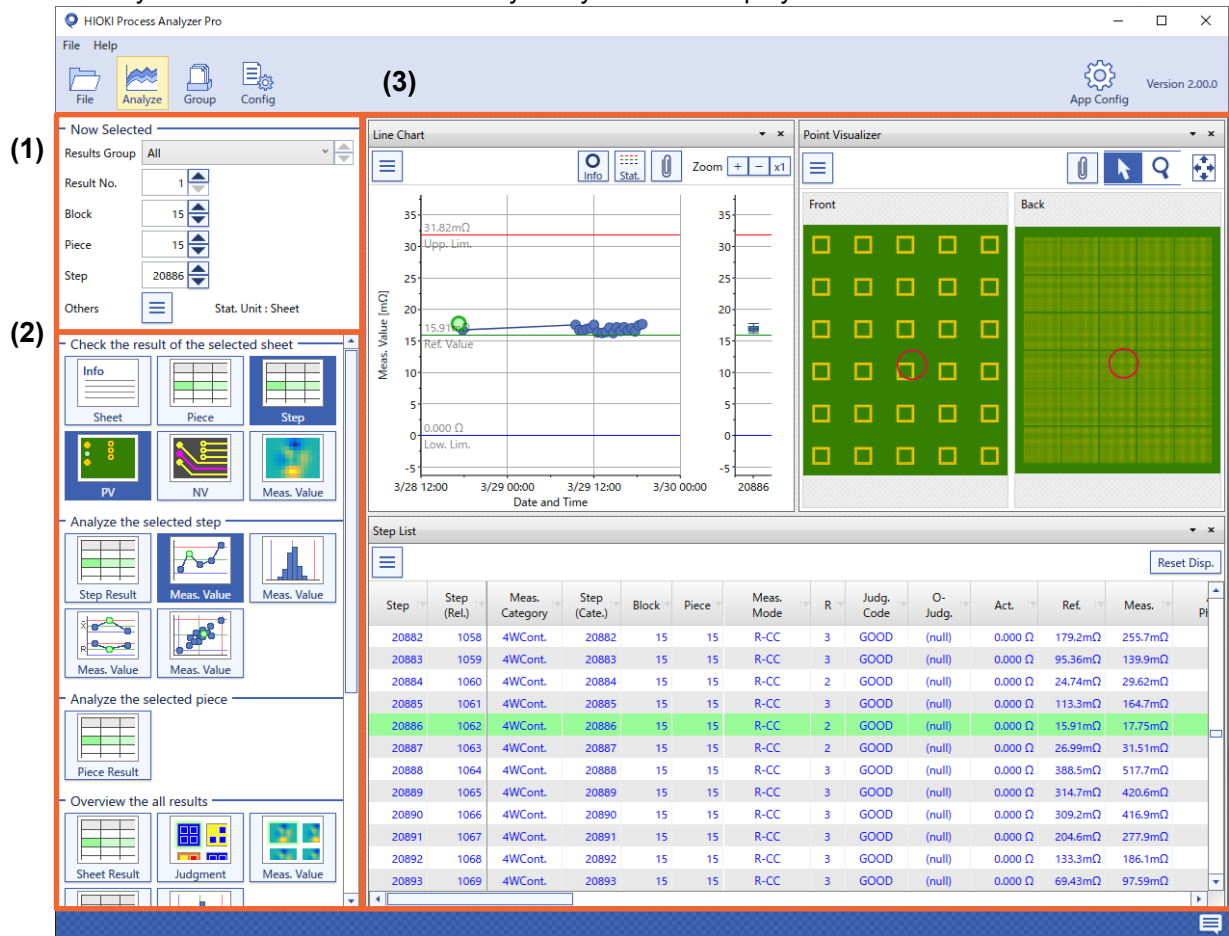
The analysis files that were used recently are displayed in the order of date and time (descending order).



<b>1</b> Analysis file name	Analysis file used recently. Click the analysis file to open it.
<b>2</b> Folder button	Opens the folder in which the analysis file is saved using Windows Explorer.
<b>3</b> <b>Clear All</b> button	Clears all history of the files that have been used recently. Only the history is cleared and the files themselves are not cleared.
<b>4</b> <b>Open</b>	Opens the analysis file.
<b>5</b> <b>Open by using Windows Explorer.</b>	Opens the folder in which the analysis file is saved using Windows Explorer.
<b>6</b> <b>Remove from Recent Files</b>	Only the specified analysis file is cleared from the history of the files that have been used recently. Only the history is cleared and the files themselves are not cleared.

## 3.2 Analyze Window

This is a main window that allows you to analyze the data. Click the tool icon on the left of the window to analyze the data while the necessary analysis tool is displayed.



### (1) Now Selected

The currently selected data number and status are displayed. The selection status is shared by and linked to all analysis tools. When a selection is changed by any analysis tool, the changed selection is used by all analysis tools.

Now Selected

Results Group: All

Result No.: 1

Block: 15

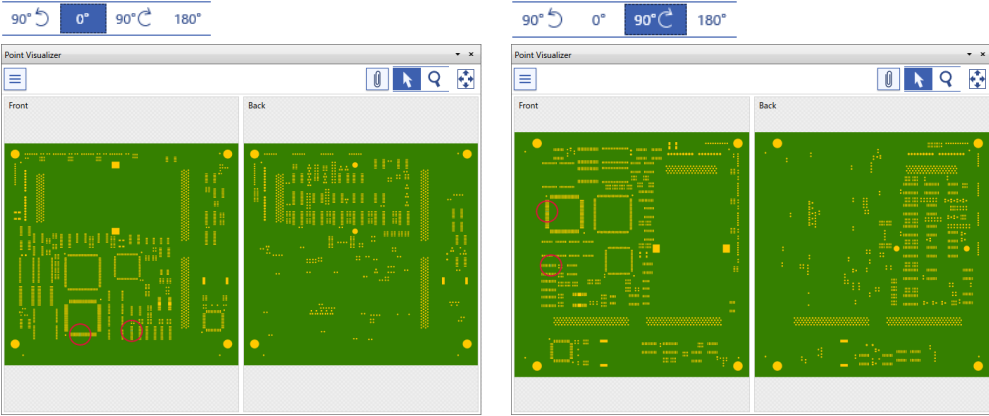
Piece: 15

Step: 20886

Others: Stat. Unit : Sheet

Judg. Type: Judg.

Rotation: 90° 0° 90° 180°

<b>Results Group</b>	Displays the currently selected results group.
<b>Result No.</b>	Displays the currently selected result number.
<b>Block</b>	Displays the currently selected block number.
<b>Piece</b>	Displays the currently selected piece number.
<b>Step</b>	Displays the currently selected step number.
<b>Judg. Type</b>	Displays the currently displayed judgment type.
<b>Rotation</b>	<p>Displays the direction when the board design is displayed. The display direction can be switched using Point Visualizer or Judgment Map.</p> <p>Example of Point Visualizer</p> 
<b>Stat. Unit</b>	Displays the statistics unit that was set in the Config window (p.80).

## When the 2nd selection number is displayed

When an analysis tool that includes a function to compare the values between two steps is used, the 2nd selection number is displayed.

Now Selected

Results Group: All

Result No.: 3

Block: 7 (1st) | 22 (2nd)

Piece: 7 (1st) | 22 (2nd)

Step: 8819 (1st) | 30000 (2nd)

Others: [Menu]


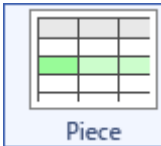






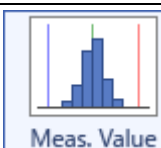
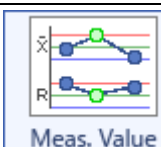
Stat. Unit: Block

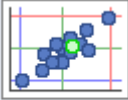
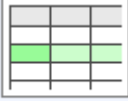
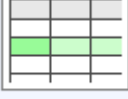

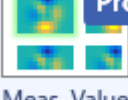
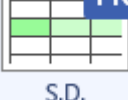
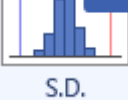
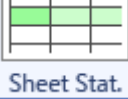
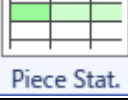
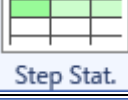


1: 2nd selection number (22, 22, 30000)  
2: Copy button (arrow from 1st to 2nd)  
3: Transpose button (double arrow between 1st and 2nd)

<b>1 2nd selection number</b>	Displays the selection numbers of the 2nd block, piece, and step.
<b>2 Copy button</b>	Copies the 1st selection number to the 2nd selection number.
<b>3 Transpose button</b>	Transposes the 1st selection number and 2nd selection number.

## (2) Analysis tool area

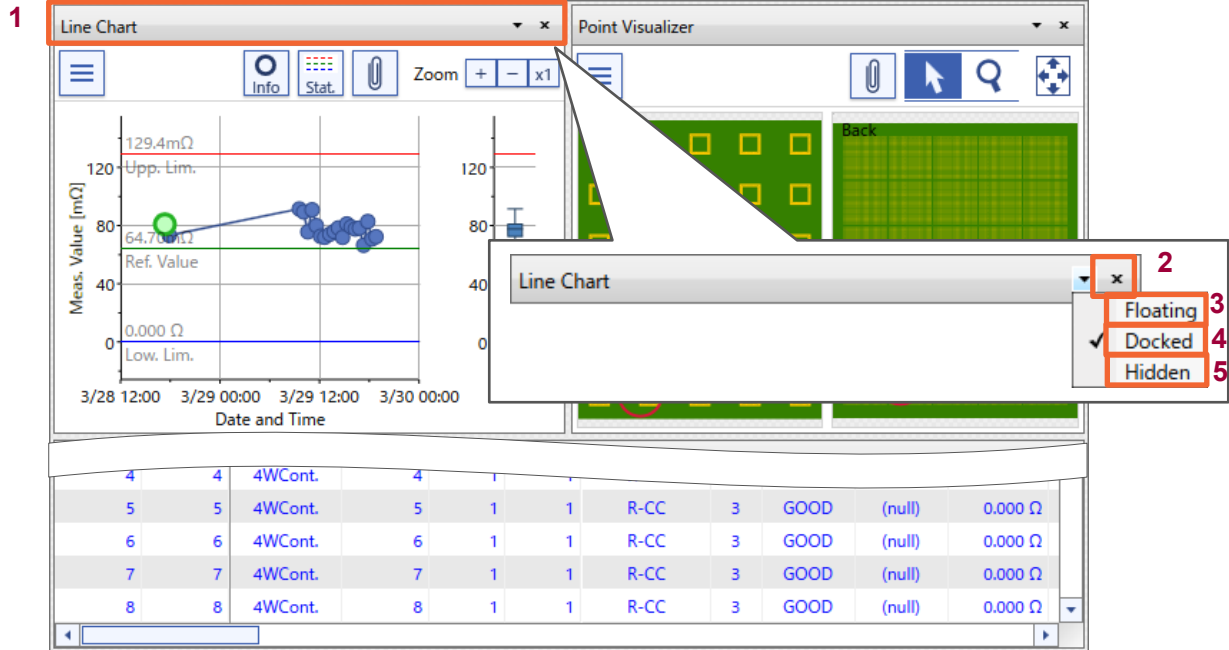
There are multiple analysis tools displayed in the Analyze window. Every time you click the analysis tool button, the analysis tool is shown or hidden.

Tool icon	Name
	Description
	Sheet Information (p. 19)
	Displays the information on the result data and test data corresponding to the selected result number.
	Piece List (p. 21)
	Displays the piece judgment and its statistical information in a tabular form.
	Step List (p. 22)
	Displays the test setting, test result, and statistical information of the step in a tabular form.
	Point Visualizer (p. 24)
	Displays the image of the board surface.
	Net Visualizer (p. 27) <b>(Pro version only)</b>
	Displays the wiring pattern inside the board.
	Measurement Value Map (p. 33) <b>(Pro version only)</b>
	Displays the measurement values and statistics of the step of the board with the selected result number in different colors.
	Step Result List (p. 42)
	Displays the measurement values and statistics of the selected step in all result data in the results group in a tabular form.
	Line Chart (p. 44)
	Displays the chronological changes in measurement values of the selected step in all result data in the results group in a line chart form.
	Histogram (p. 48)
	Displays the variations in measurement values of the selected step in all result data in the results group in a histogram.
	Control Chart (p. 51)
	Displays the variations in measurement values of the selected step that are calculated in units of the results group in a control chart.

 Meas. Value	<p>Scatter Chart (p. 53)</p> <p>Displays the correlation between the measurement values of the selected step and the measurement values of another step of all result data in the results group in a scatter plot.</p>
 Piece Result	<p>Piece Result List (p. 56)</p> <p>Displays the measurement values and statistics of the selected piece of all result data in the results group in a tabular form.</p>
 Sheet Result	<p>Sheet Result List (p. 58)</p> <p>Displays the measurement values and statistics of the selected sheet of all result data in the results group in a tabular form.</p>
 Judgment	<p>Judgment Map (p. 59)</p> <p>Displays the test results of the sheet and piece of all result data in the results group in the judgment color.</p>
 Meas. Value	<p>Measurement Value Map Browser (p. 60) <b>(Pro version only)</b></p> <p>Displays the measurement values and statistics of the step of all result data in the results group in different colors.</p>
 S.D.	<p>Singularity Degree List (p. 66) <b>(Pro version only)</b></p> <p>Displays locations where the absolute value of the singularity degree is large in a tabular form for all steps of all result data in the results group.</p>
 S.D.	<p>Singularity Degree Histogram (p. 67) <b>(Pro version only)</b></p> <p>Displays variations in singularity degree of all steps of all result data in the results group in a histogram.</p>
 Sheet Stat.	<p>Sheet Statistics List (p. 68)</p> <p>Displays the statistics of the sheet of each results group in a tabular form.</p>
 Piece Stat.	<p>Piece Statistics List (p. 69)</p> <p>Focusing on the selected piece, displays the statistics of the piece of each results group in a tabular form.</p>
 Step Stat.	<p>Step Statistics List (p. 70)</p> <p>Focusing on the selected step, displays the statistics of the step of each results group in a tabular form.</p>
 Judgment	<p>Judgment Bar Chart (p. 71)</p> <p>For the selected step, piece, or sheet, the number of judgments of each result is summarized and displayed in a bar chart.</p>
 Export CSV	<p>Export CSV (p. 73) <b>(Pro version only)</b></p> <p>For all result data in the results group, all measurement values are output to one CSV file.</p>

### (3) Tool display area

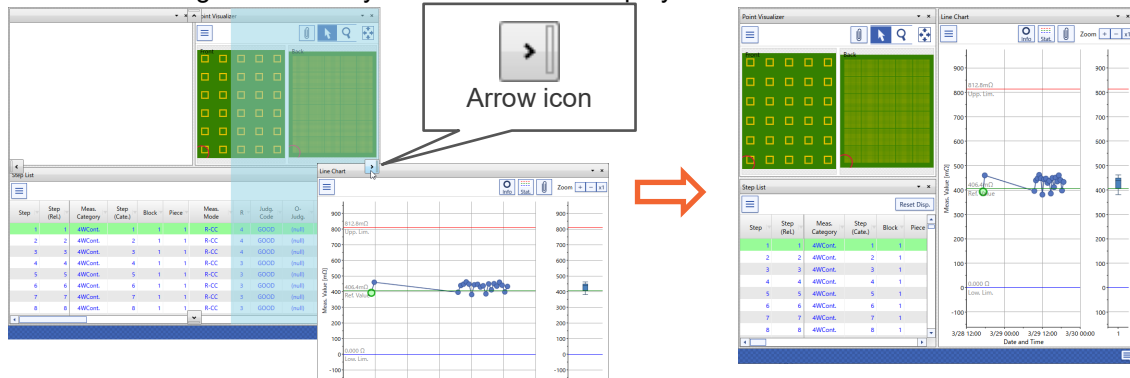
The analysis tools are displayed in the tool display area.



1 Title bar	Displays the name of the analysis tool.
2 Close button	Closes the analysis tool.
3 Floating	Displays the analysis tool separately outside the tool display area.
4 Docked	Displays the analysis tool within the tool display area.
5 Hidden	Closes the analysis tool.

### Changing the display position of the analysis tool

When you drag the title bar of each analysis tool, the arrow icon appears. Dropping the title bar on the arrow icon changes the tool layout within the tool display area.

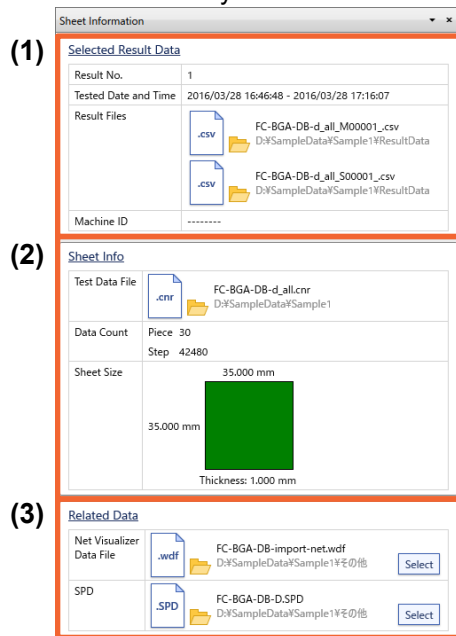


### 3.2.1 Sheet Information





Analysis tool area -> **Check the result of the selected sheet** -> Sheet Information


This window allows you to check the selected result data and test data, and the basic information on the additionally read data related to the display.



#### (1) Selected Result Data




The information on the selected result data is displayed.


Selected Result Data	
Result No.	1
Tested Date and Time	2016/03/28 16:46:48 - 2016/03/28 17:16:07
Result Files	<div><div> FC-BGA-DB-d_all_M00001_.csv D:\SampleData\Sample1\ResultData</div><div> FC-BGA-DB-d_all_S00001_.csv D:\SampleData\Sample1\ResultData</div></div>
Machine ID	-----

<b>Result No.</b>	Currently selected result number.
<b>Tested Date and Time</b>	Test start date and time, and test end date and time of the result data. When such data is written in the result file, the date and time data is displayed. When the data is not written, the date and time that are estimated from the time stamp of the file are displayed.
<b>Result Files</b>	Names of the read result file and the folder to which the result file is saved. When you click the folder icon  , the folder to which the files are saved is opened using Windows Explorer.
<b>Machine ID</b>	ID of the instrument that output this result data (that tested the board).

## (2) Sheet Info


The information on the test data is displayed.

Sheet Info	
Test Data File	<div>  <div> FC-BGA-DB-d_all.cnr   D:\SampleData\Sample1 </div> </div>
Data Count	Piece 30 Step 42480
Sheet Size	<div> <div>35.000 mm</div>  <div>35.000 mm</div> </div> <div>Thickness: 1.000 mm</div>


<b>Test Data File</b>	The name of the test data and the name of the folder to which the test data is saved are displayed. When you click the folder icon  , the folder to which the files are saved is opened using Windows Explorer.
<b>Data Count</b>	Piece count and step count included in the test data.
<b>Sheet Size</b>	Sheet size and thickness specified in the test data. When the correct values are not set for the test data, numerical values different from the actual board dimensions are displayed.

## (3) Related Data Pro

The data necessary to use Net Visualizer (p. 27) is selected and displayed. When there is no related data, this item is not displayed.

Related Data	
Net Visualizer Data File	<div>  <div> FC-BGA-DB-import-net.wdf   D:\SampleData\Sample1\その他 </div> </div> <div>Select</div>
SPD	<div>  <div> FC-BGA-DB-D.SPD   D:\SampleData\Sample1\その他 </div> </div> <div>Select</div>

<b>Net Visualizer Data File</b>	Displays the name of the file that includes the board drawing information used for Net Visualizer (p. 27) and the name of the folder to which this file is saved.
<b>SPD</b>	Displays the name of the SPD file used to display Net Visualizer (p. 27) and the name of the folder to which this file is saved.


When you click the folder icon , the folder to which the files are saved is opened using Windows Explorer. In addition, when you click the **Select** button, this file can be changed to a different file.

## 3.2.2 Piece List




Analysis tool area -> **Check the result of the selected sheet** -> Piece List

This window allows you to check the judgment result of the piece with the selected **Result No.**

In addition, the judgment ratio of each piece during the period specified by **Group**  is also displayed.

For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.6 Piece (p. 93)”.

Piece List										
1	2	3	4	5						
Piece	Piece (Rel.)	Judg.	O-Judg.	Piece: Judg.						
				(null)		PASS		FAIL		Block
1	1	PASS	PASS	0	0.0%	9	42.9%	12	57.1%	1
2	1	PASS	PASS	0	0.0%	15	71.4%	6	28.6%	2
3	1	FAIL	OPEN	0	0.0%	12	57.1%	9	42.9%	3
4	1	PASS	PASS	0	0.0%	14	66.7%	7	33.3%	4
5	1	FAIL	ETCE	0	0.0%	18	85.7%	3	14.3%	5
6	1	FAIL	OPEN	0	0.0%	11	52.4%	10	47.6%	6
7	1	FAIL	ETCE	0	0.0%	12	57.1%	9	42.9%	7
8	1	PASS	PASS	0	0.0%	15	71.4%	6	28.6%	8
9	1	PASS	PASS	0	0.0%	14	66.7%	7	33.3%	9
10	1	PASS	PASS	0	0.0%	13	61.9%	8	38.1%	10
11	1	PASS	PASS	0	0.0%	16	76.2%	5	23.8%	11

<b>1 Piece</b>	Serial piece number in the sheet.
<b>2 Piece (Rel.)</b>	Piece number in the block when multiple pieces are included in one block.
<b>3 Judg. O-Judg.</b>	Judgment of each piece at the test time specified by <b>Result No.</b> <input type="text" value="2"/> .
<b>4 Piece: Judg. Piece: O-Judg.</b>	Displays the test result of each piece number in the entire results group specified by <b>Group</b>  . When <b>Others - Judg. Type</b> is set to <b>Judg.</b> , the count and ratio are displayed for each judgment. When <b>Others - Judg. Type</b> is set to <b>O-Judg.</b> , the count and ratio are displayed for each output judgment.
<b>5 Block</b>	Block number of the block to which each piece belongs.

### Stat. Unit



Stat. Unit

Sheet

Block

The calculation method of the **results in the results group** varies depending on the setting of **Stat. Unit**.


<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.

### 3.2.3 Step List



Analysis tool area -> **Check the result of the selected sheet** -> Step List

This window allows you to check the measurement result of the step of the selected Result No.

In addition, the comparison of all **Step Stat.** results during the period specified by **Group**  is also displayed.

For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.5 Step (p. 91)”.

Step List																				Reset Disp.		
Step	Step (Rel.)	Meas. Category	Step (Cat.)	Block	Piece	Meas. Mode	R	Judg. Code	O-Judg.	Act.	Ref.	Meas.	AC Phase	Meas. /Ref.	Meas. /Mean	Meas. /Median	z-Score	S.D.	Upp. Lim.		Low. Lim.	
																			Abs.	%	Abs.	%
1	1	4WCont.	1	1	1	R-CC	4	GOOD	(null)	0.000 Q	406.4mQ	392.5mQ	----	96.6%	91.1%	89.4%	-1.482	0.129	812.8mQ	+100.0%	0.000 Q	-100.0%
2	2	4WCont.	2	1	1	R-CC	4	GOOD	(null)	0.000 Q	406.6mQ	392.7mQ	----	96.6%	91.1%	89.5%	-1.476	-0.179	813.2mQ	+100.0%	0.000 Q	-100.0%
3	3	4WCont.	3	1	1	R-CC	4	GOOD	(null)	0.000 Q	409.9mQ	397.1mQ	----	96.9%	91.2%	89.6%	-1.471	1.108	819.7mQ	+100.0%	0.000 Q	-100.0%
4	4	4WCont.	4	1	1	R-CC	3	GOOD	(null)	0.000 Q	369.5mQ	357.4mQ	----	96.7%	91.3%	89.7%	-1.445	0.411	739.1mQ	+100.0%	0.000 Q	-100.0%
5	5	4WCont.	5	1	1	R-CC	3	GOOD	(null)	0.000 Q	371.6mQ	359.2mQ	----	96.7%	91.3%	89.7%	-1.445	0.327	743.3mQ	+100.0%	0.000 Q	-100.0%
6	6	4WCont.	6	1	1	R-CC	3	GOOD	(null)	0.000 Q	343.2mQ	333.3mQ	----	97.1%	91.3%	89.8%	-1.437	0.742	686.4mQ	+100.0%	0.000 Q	-100.0%
7	7	4WCont.	7	1	1	R-CC	3	GOOD	(null)	0.000 Q	343.0mQ	333.8mQ	----	97.3%	91.4%	89.7%	-1.434	-0.289	686.1mQ	+100.0%	0.000 Q	-100.0%
8	8	4WCont.	8	1	1	R-CC	3	GOOD	(null)	0.000 Q	314.1mQ	306.2mQ	----	97.5%	91.5%	89.8%	-1.415	0.728	628.3mQ	+100.0%	0.000 Q	-100.0%
9	9	4WCont.	9	1	1	R-CC	3	GOOD	(null)	0.000 Q	316.2mQ	308.0mQ	----	97.4%	91.7%	90.0%	-1.407	-0.743	632.4mQ	+100.0%	0.000 Q	-100.0%
10	10	4WCont.	10	1	1	R-CC	3	GOOD	(null)	0.000 Q	293.2mQ	285.7mQ	----	97.5%	91.7%	90.1%	-1.404	-0.383	586.3mQ	+100.0%	0.000 Q	-100.0%
11	11	4WCont.	11	1	1	R-CC	3	GOOD	(null)	0.000 Q	301.3mQ	293.6mQ	----	97.4%	91.9%	90.2%	-1.381	0.352	602.6mQ	+100.0%	0.000 Q	-100.0%
12	12	4WCont.	12	1	1	R-CC	3	GOOD	(null)	0.000 Q	280.6mQ	273.8mQ	----	97.6%	92.0%	90.4%	-1.377	0.002	561.3mQ	+100.0%	0.000 Q	-100.0%
13	13	4WCont.	13	1	1	R-CC	3	GOOD	(null)	0.000 Q	280.4mQ	283.4mQ	----	97.3%	93.3%	90.3%	-1.341	-1.466	678.1mQ	+100.0%	0.000 Q	-100.0%

Step List

Reset Disp.

Step	Step (Rel.)	Max.	Min.	Mean	$\sigma$	CV (σ/Mean)	Median	MAD (Median)	Cp	Cpk	Step: O-Judg.	J	H	L	Step Name			
											(null)		Point	Net	Point	Net		
1	1	461.9mΩ	381.0mΩ	430.8mΩ	25.80mΩ	6.0%	439.1mΩ	10.17mΩ	5.3	4.9	21	100.0%	<input type="checkbox"/>	1	1	2	1	P1450 S235
2	2	462.1mΩ	381.2mΩ	430.9mΩ	25.85mΩ	6.0%	438.9mΩ	10.40mΩ	5.2	4.9	21	100.0%	<input type="checkbox"/>	1	1	3	1	P1450 S236
3	3	467.3mΩ	385.4mΩ	435.2mΩ	25.90mΩ	5.9%	443.2mΩ	10.75mΩ	5.3	4.9	21	100.0%	<input type="checkbox"/>	4	2	5	2	P1449 S242
4	4	421.4mΩ	345.2mΩ	391.4mΩ	23.53mΩ	6.0%	398.3mΩ	10.74mΩ	5.2	4.9	21	100.0%	<input type="checkbox"/>	6	3	7	3	P1448 S6
5	5	423.5mΩ	347.0mΩ	393.4mΩ	23.66mΩ	6.0%	400.6mΩ	10.68mΩ	5.2	4.9	21	100.0%	<input type="checkbox"/>	6	3	8	3	P1448 S233
6	6	394.7mΩ	321.8mΩ	365.1mΩ	22.11mΩ	6.1%	371.0mΩ	10.66mΩ	5.2	4.8	21	100.0%	<input type="checkbox"/>	9	4	10	4	P1447 S11
7	7	394.5mΩ	322.1mΩ	365.3mΩ	21.99mΩ	6.0%	371.9mΩ	10.38mΩ	5.2	4.9	21	100.0%	<input type="checkbox"/>	11	5	12	5	P1446 S220
8	8	360.2mΩ	295.3mΩ	334.6mΩ	20.03mΩ	6.0%	340.8mΩ	9.765mΩ	5.2	4.9	21	100.0%	<input type="checkbox"/>	13	6	14	6	P1445 S16
9	9	361.4mΩ	296.9mΩ	335.8mΩ	19.80mΩ	5.9%	342.3mΩ	9.601mΩ	5.3	5.0	21	100.0%	<input type="checkbox"/>	15	7	16	7	P1444 S210
10	10	335.8mΩ	274.7mΩ	311.6mΩ	18.41mΩ	5.9%	317.2mΩ	8.887mΩ	5.3	5.0	21	100.0%	<input type="checkbox"/>	17	8	18	8	P1443 S21
11	11	344.0mΩ	281.8mΩ	319.7mΩ	18.85mΩ	5.9%	325.6mΩ	9.630mΩ	5.3	5.0	21	100.0%	<input type="checkbox"/>	19	9	20	9	P1442 S200
12	12	320.6mΩ	262.7mΩ	297.7mΩ	17.31mΩ	5.8%	303.0mΩ	8.167mΩ	5.4	5.1	21	100.0%	<input type="checkbox"/>	21	10	22	10	P1441 S26
13	13	330.0mΩ	270.0mΩ	300.0mΩ	17.58mΩ	5.7%	311.4mΩ	8.801mΩ	5.6	5.3	21	100.0%	<input type="checkbox"/>	23	11	24	11	P1440 S100

1 Step		Serial <b>Step</b> number in <b>Sheet</b> .
2 Step (Rel.)		Serial <b>Step</b> number in <b>Block</b> .
3 Meas. Category		Measurement category to which <b>Step</b> belongs.
4 Step (Cate.)		Serial Step number in the measurement category.
5 Step element		Personal data of each <b>Step</b> .
6 Test result		Measurement result of each <b>Step</b> at the test count selected by <b>Now Selected - Result No.</b> <input type="text" value="2"/>
7 Comparison of the results in the results group in one test time		Data that shows the result of the test that is selected by <b>Now Selected - Result No.</b> <input type="text" value="2"/> as the relative status between the <b>results in the results group</b> specified by <b>Group</b>
8 Summarized result in the results group		Summarizes the <b>result in the results group</b> specified by <b>Group</b> and then displays the result of each <b>Step</b> .
9 AC Phase Unit <div>AC Phase Unit <b>Radian</b> Degree (°) D, Q</div>	Radian	Sets the display unit of the AC phase to radians (Rad).
	Degree	Sets the display unit of the AC phase to degrees (°).
	D, Q	Sets the display unit of the AC phase to D factors (= tan δ) or Q factors.
10 Step: Judg. Step: O-Judg.		<b>Judgment</b> count and ratio in the <b>results group</b> specified by <b>Group</b>  When <b>Others - Judg. Type</b> is set to <b>Judg.</b> , the count and ratio are displayed for each judgment. When <b>Others - Judg. Type</b> is set to <b>O-Judg.</b> , the count and ratio are displayed for each output judgment.

## Stat. Unit



Stat. Unit

Sheet

Block

The meaning of the **results in the results group** varies depending on the setting of **Stat. Unit**.

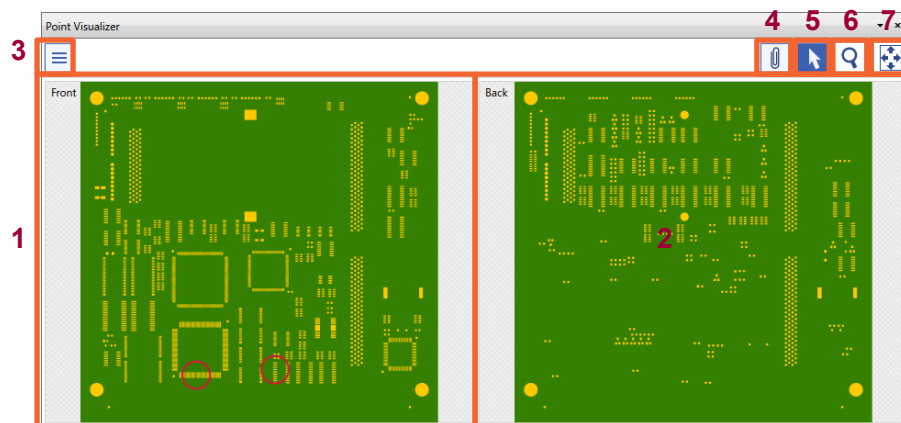
<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.

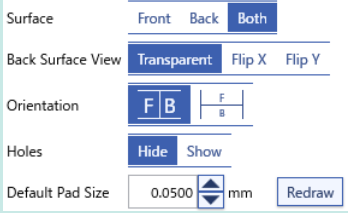


### 3.2.4 Point Visualizer








Analysis tool area -> **Check the result of the selected sheet** -> Point Visualizer

This window displays the board images of the selected test data. Images are drawn when the board is seen from the point information, block information, and others included in the test data. Correct pad shapes may not be displayed when the information on the pad shape and size of the test data is insufficient.



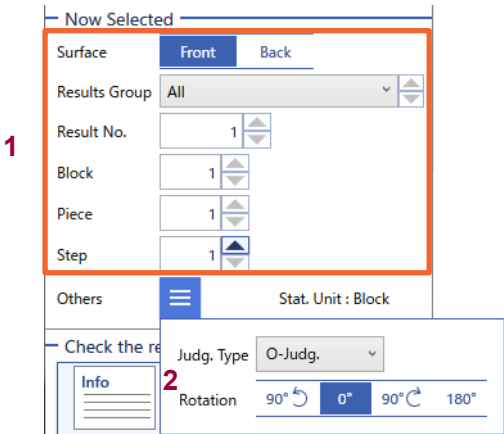
<b>1 Front viewer</b>	Displays the front surface of the board.		
<b>2 Back viewer</b>	Displays the back surface of the board.		
<b>3 Display option</b>	Select the display option.		
	<b>Surface</b>	<b>Front</b>	Displays only the front surface.
		<b>Back</b>	Displays only the back surface.
		<b>Both</b>	Displays both surfaces side by side.
	<b>Back Surface View</b>	<b>Transparent</b>	Displays the transparent view when the back surface is seen from the front surface.
		<b>Flip X</b>	Displays the reverse image of the back surface (the back surface is flipped horizontally around the Y-axis).
		<b>Flip Y</b>	Displays the reverse image of the back surface (the back surface is flipped vertically around the X-axis).
	<b>Orientation</b>		When <b>Both</b> is selected in <b>Surface</b> , both surfaces are displayed horizontally.
			When <b>Both</b> is selected in <b>Surface</b> , both surfaces are displayed vertically.
	<b>Holes</b>	<b>Hide</b>	Even when the pads are holes, the entire surface is displayed in the pad color.
<b>Show</b>		When the pads are holes, the hole color is displayed within the pad color.	

3 Display option		<b>Default Pad Size</b>	Set the display size of the pad when its size is not clarified in the test data.
		<b>Redraw</b> button	Reflects the <b>Default Pad Size</b> setting and redraws the window.
4 Clip tool		Copies the currently displayed map area to the clipboard as an image.	
5 Selection tool		Mouse drag	Moves the display area of the board image within the viewer.
		Ctrl + mouse drag	Zooms in the area selected by dragging the mouse cursor.
6 Magnifier tool		Mouse drag	Zooms in the area selected by dragging the mouse cursor.
		Ctrl + mouse drag	Moves the display area of the board image within the viewer.
7 Entire display tool		Returns the magnification of the display to the standard value and displays the image of the entire board.	

## Other operation

You can zoom in or out the display around the mouse cursor position by turning the mouse wheel forward or backward.

Linking **Now Selected** to Point Visualizer



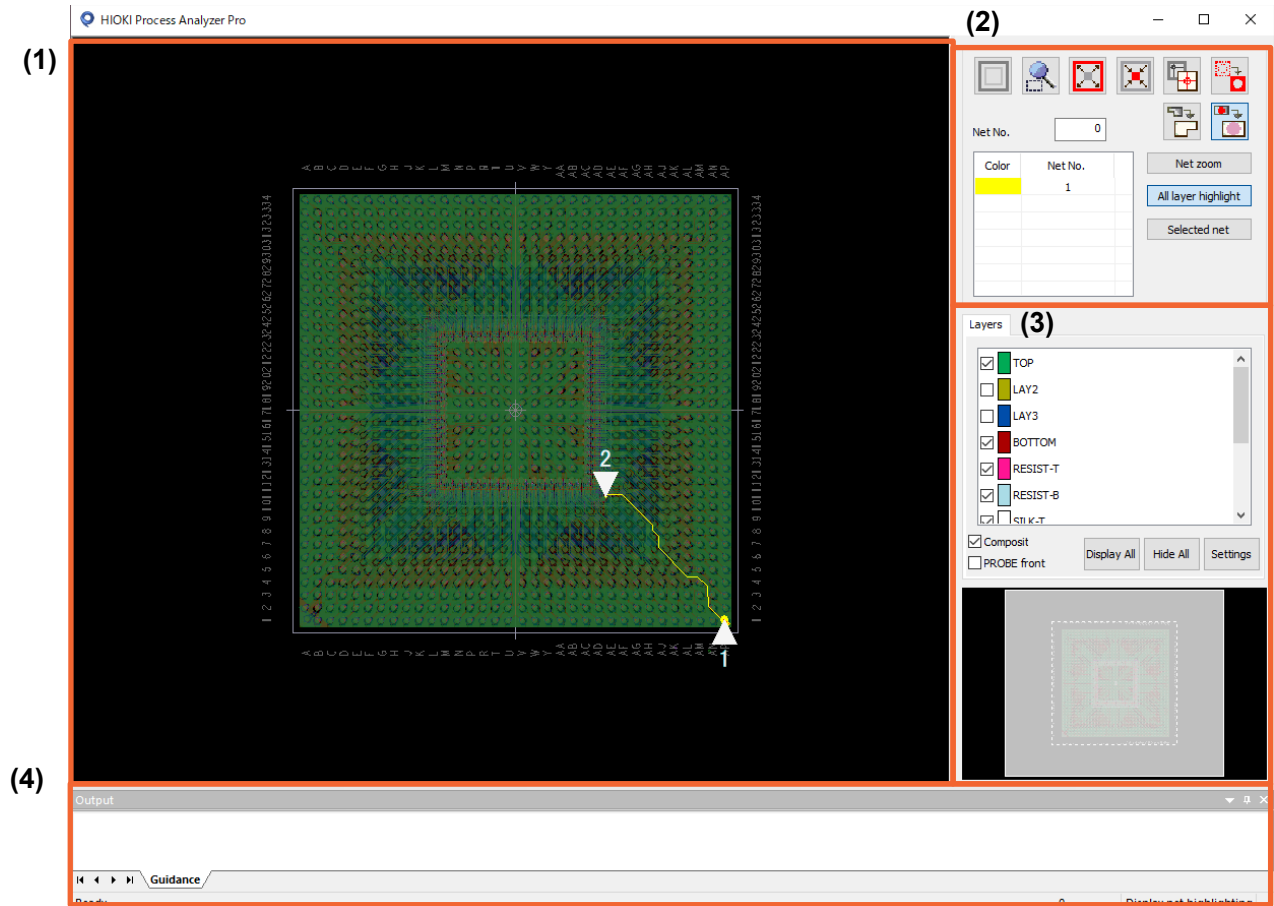
<div>1 <b>Surface</b> <b>Block</b> <b>Piece</b> <b>Step</b></div>	<div>Highlights the point of the selected step.</div> <div></div>
<div>2 <b>Rotation</b></div>	<div>Rotates the viewer display by the selected degrees.</div> <div></div>

### 3.2.5 Net Visualizer (Pro version only)



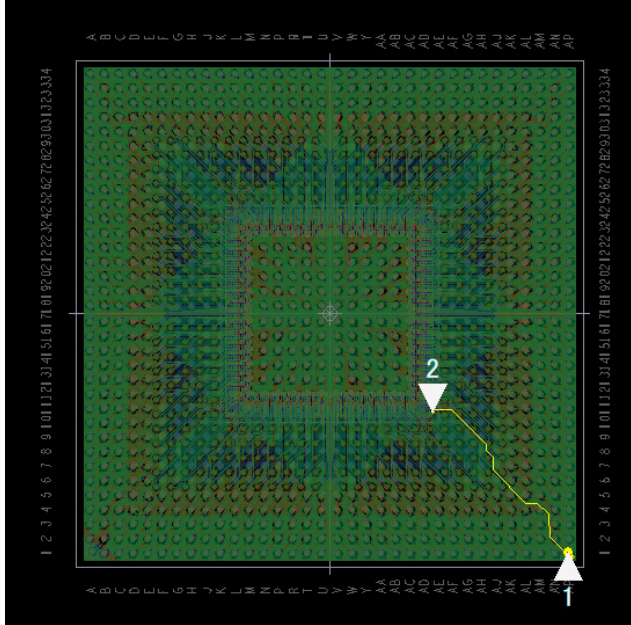
Analysis tool area -> **Check the result of the selected sheet** -> Net Visualizer

The wiring pattern that is seen from the front surface of the entire board is displayed. In particular, the net and point related to the selected step are highlighted. Unlike other analysis tools, Net Visualizer is not displayed in the tool display area. Net Visualizer is always displayed as an independent window.



## (1) Drawing area

The wiring pattern of the board is drawn.



### Sequence when the step is selected

When the selected step number is changed in the Analyze window, the drawing in the drawing area is also updated accordingly. The net (wiring pattern) related to the selected step is highlighted and the point number (relative) to be probed in the step is displayed.

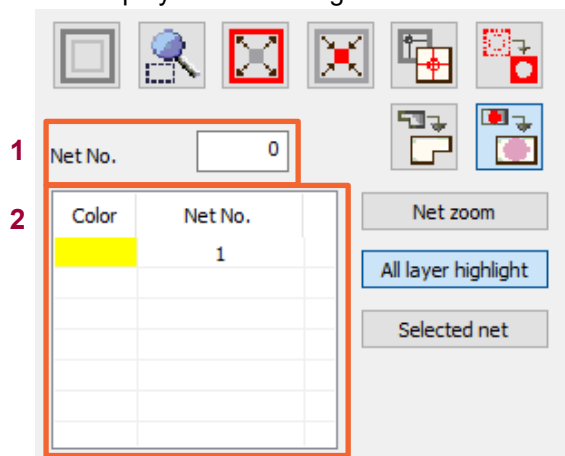
### Shortcut key

The drawing area can be operated with several keys on the keyboard.

4 on the numeric keypad	Moves the drawing area left.
8 on the numeric keypad	Moves the drawing area up.
6 on the numeric keypad	Moves the drawing area right.
2 on the numeric keypad	Moves the drawing area down.
5 on the numeric keypad	Zooms in the drawing area.
0 on the numeric keypad	Zooms out the drawing area.
Esc	Redraws the drawing area.

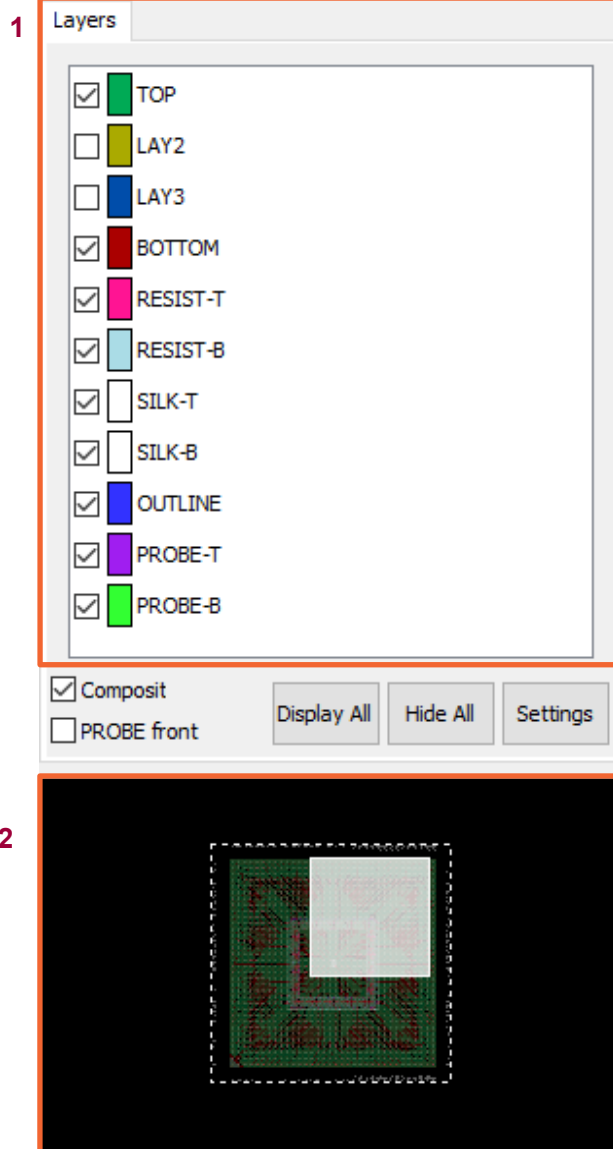
## (2) Tool area

The display in the drawing area can be set.



	Displays the entire board in the drawing area.
	After clicking the button, drag your desired position in the drawing area to zoom in the specified area.
	Zooms in the display in the drawing area.
	Zooms out the display in the drawing area.
	After clicking the button, click your desired position in the drawing area to display the specified position at the center in the drawing area.
	Redisplays the drawing area.
	Switches the back surface view display between on and off.
	Switches the transparent display between on and off.
<b>1 Net No.</b>	Highlights the specified net number.
<b>2 Highlighted net</b>	Displays the highlighted net number and its net drawing color. Double-clicking a color cell can change the drawing color.
<b>Net zoom</b>	Switches the zoom function automatically between on and off so that the highlighted net is exactly stored in the drawing area.
<b>All layer highlight</b>	Highlights also the hidden layers.
<b>Selected net</b>	Displays only the highlighted net.

### (3) Display area



<b>1 Layers</b>	Specify the layer to be drawn in the drawing area.
<b>Composite</b>	Switches the wiring pattern between the paint display and grid-line display.
<b>PROBE front</b>	Always draws the probe layer on the foreground.
<b>Display All</b>	Displays all layers.
<b>Hide All</b>	Hides all layers.
<b>Settings</b>	Sets the detailed information on the layer.
<b>2 Entire display</b>	Displays the range that is displayed on the entire board and in the current drawing area.

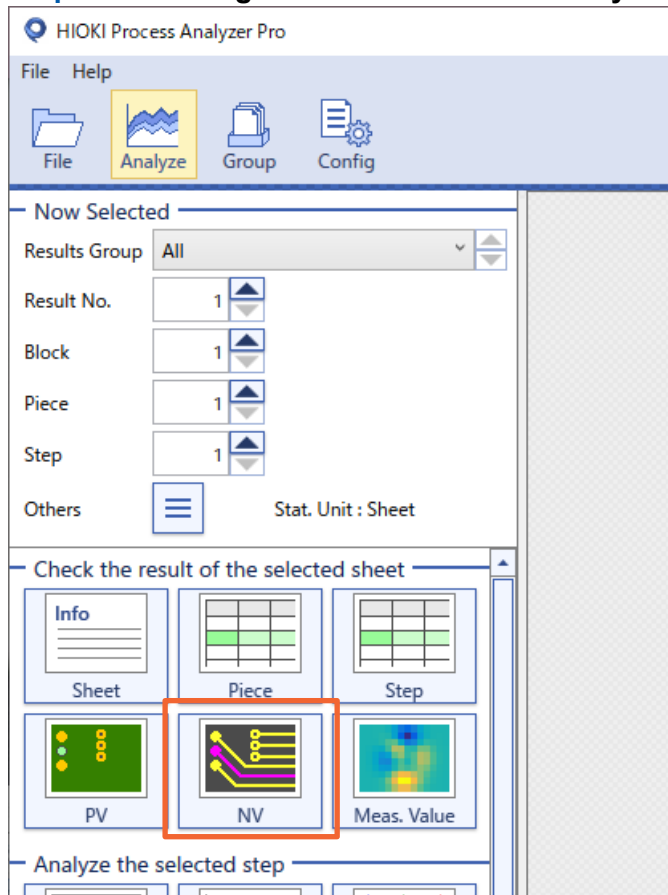
### (4) Guidance

A message from the system is displayed.

## Net Visualizer operating procedure

The following describes the procedure to use Net Visualizer for the first time after new analysis data has been created.

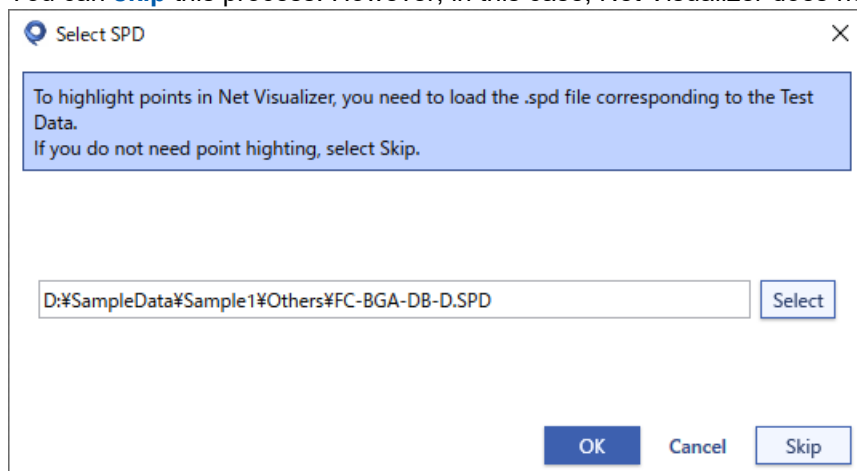
### Step 1 Selecting Net Visualizer in the Analyze window



### Step 2 Selecting the SPD file (when it is displayed)

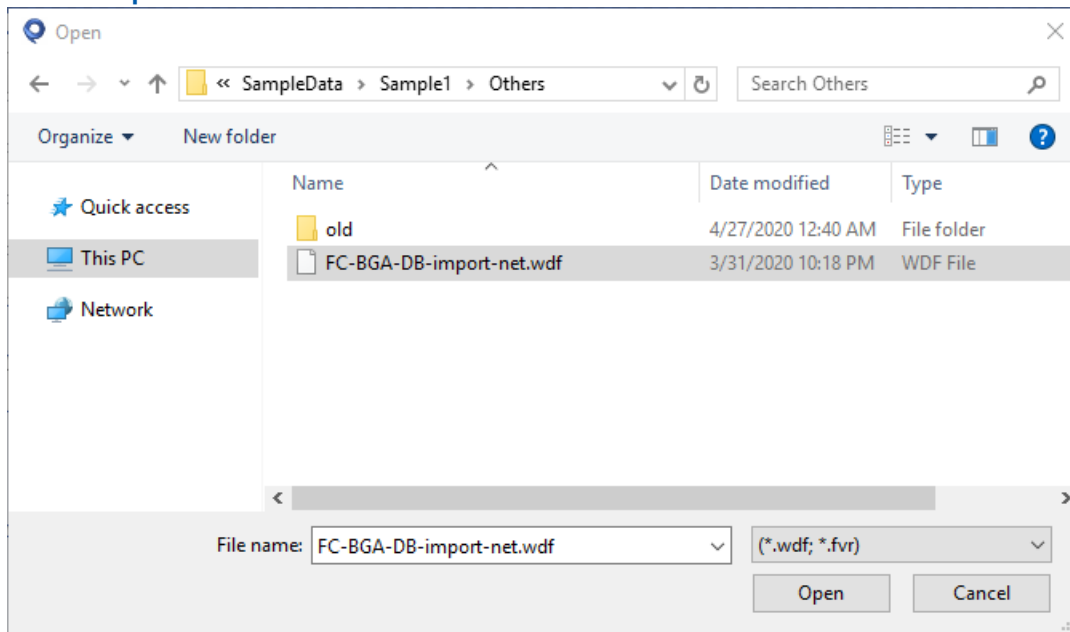
When the highlight display of the point number with Net Visualizer needs the SPD file, the following dialog appears. When there is the SPD file that is used when the test data is created, **select** the SPD file and click **OK**.

You can **skip** this process. However, in this case, Net Visualizer does not highlight the point.

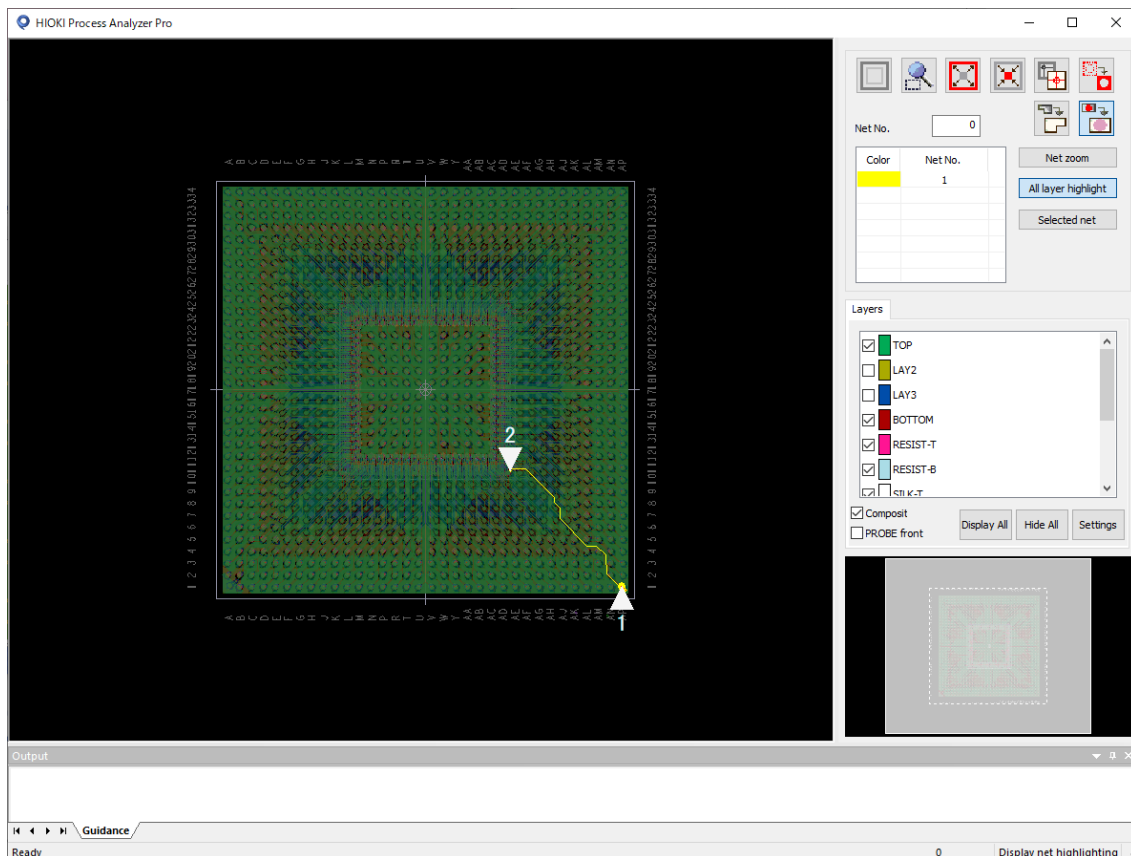


### Step 3 Selecting the WDF file or FVR file

Select the WDF file (p. 87) or FVR file (p. 87) that was used when the SFD file was created, and then click the **Open** button.



When the file selection is complete, Net Visualizer is displayed. When you select the step in the Analyze window, the net (wiring pattern) and point related to this step are highlighted.



### 3.2.6 Measurement Value Map (Pro version only)






Analysis tool area -> **Check the result of the selected sheet** -> Measurement Value Map

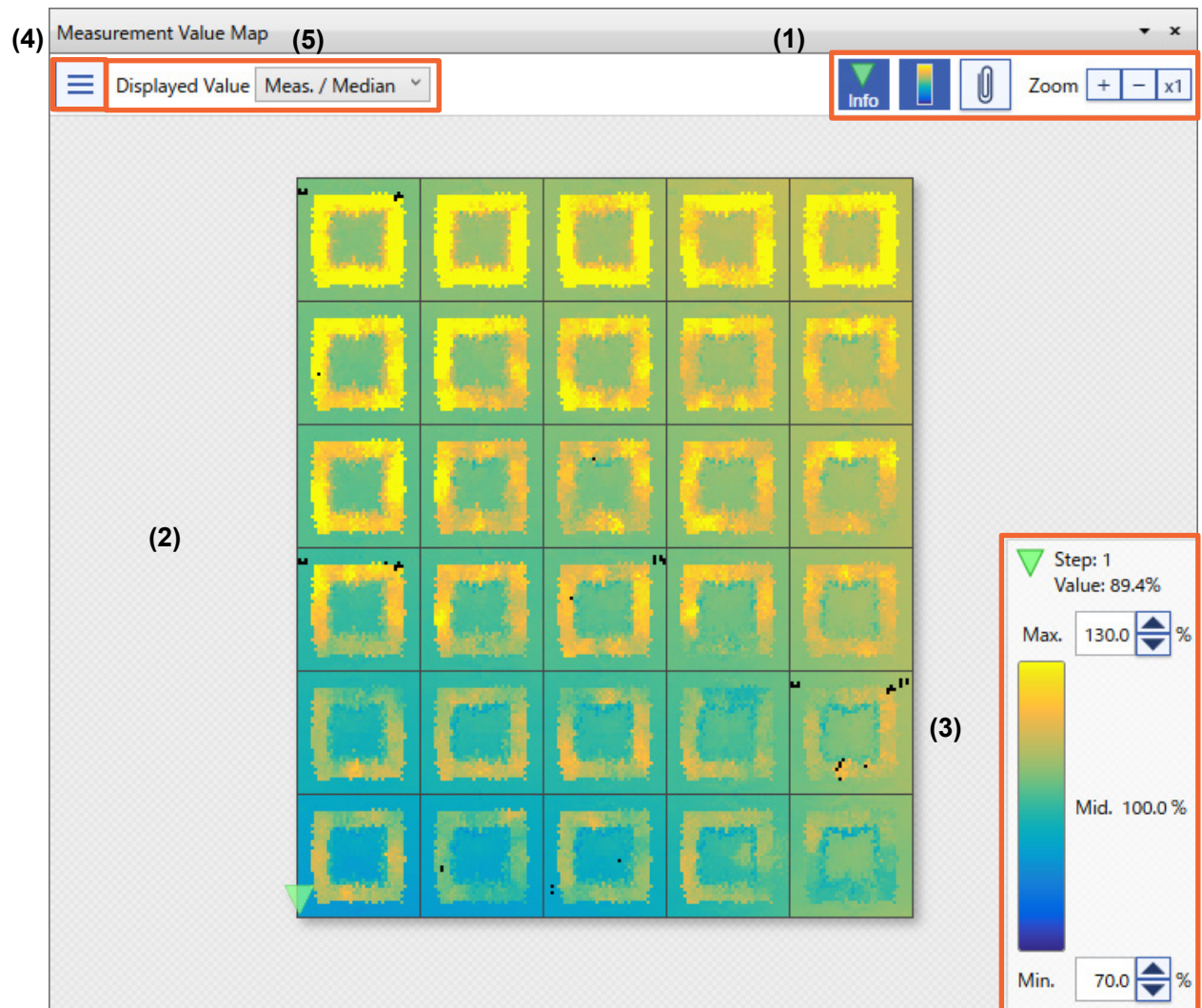
The window in which the image mapping of measurement value on the board is performed in accordance with various statistical methods is displayed.

You can check visually and easily what the currently selected result is in comparison to the result of the other test count and where it is in relation to the full distribution.

#### Data to be displayed

The data to be displayed is classified into four types in accordance with the selection of the display value.

<b>Comparison of the results in the results group in one test time</b>	Displays the result of the test that is selected by <b>Now Selected - Result No.</b> <input type="text" value="2"/> as the relative status between the <b>results in the results group</b> specified by <b>Group</b>  .	<b>Meas. / Median</b> <b>Meas. / Mean</b> <b>Singularity Degree</b> <b>z-Score (Median Based)</b> <b>z-Score (Mean Based)</b>
<b>Summarized result in the results group</b>	Summarizes the <b>result in the results group</b> specified by <b>Group</b>  and then displays the result of each step.	<b>Judg. Count</b> <b>Judg. Count (%)</b> <b>Mean</b> <b>Median</b> <b>Standard Deviation</b> <b>Median Absolute Deviation</b> <b>Coefficient of Variance</b>
<b>Value distribution of all steps in one test time</b>	Displays the result of each step in the test selected by <b>Now Selected - Result No.</b> <input type="text" value="2"/> so that the relative status between each result in the test can be viewed.	<b>Meas. / Ref.</b> <b>Measure Value</b> <b>Judgment</b>
<b>Comparison of mutual steps in results group</b>	Displays how the specified two steps are related in the test range specified by <b>Group</b>  .	<b>Correlation Coefficient</b>



## (1) Display tool

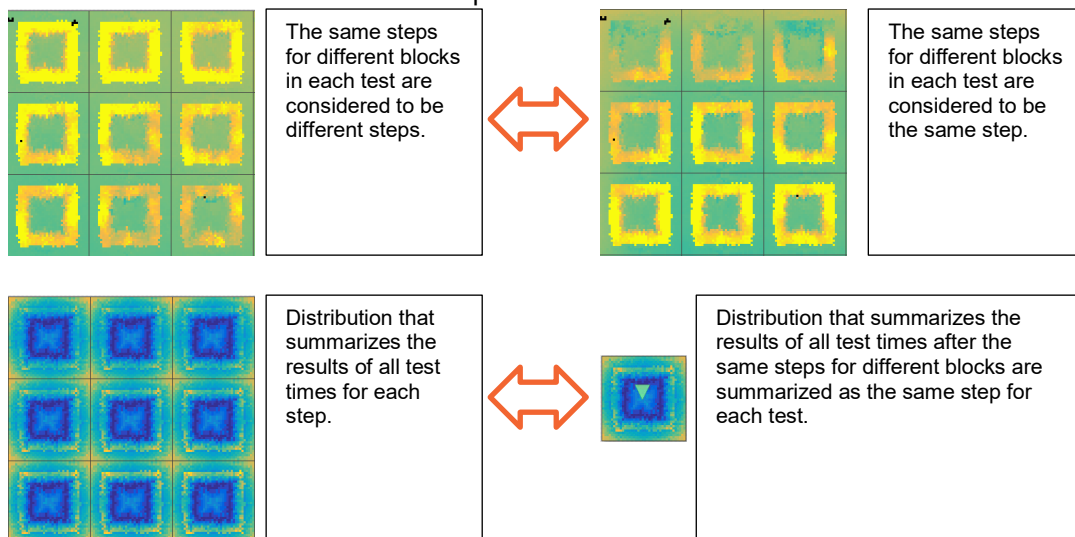


1 Information tool	Displays or hides information of the currently selected step. ▼ Step: 1 Value: 89.4%	
2 Color map range display tool	Displays or hides color map range.	
3 Clip tool	Copies the currently displayed viewer area to the clipboard as an image.	
4 Zoom	+	Zooms in the display every time this button is clicked.
	-	Zooms out the display every time this button is clicked.
	x1	Sets the display size to the standard size.

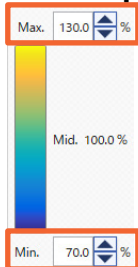
## (2) Measurement value map display area

This area displays the results of the comparison and distribution of the measurement values. For the multi-piece board, the display method is switched to any of the following when the statistics unit is changed by **Sheet** and **Block**.

- The same steps for different blocks are displayed as separate steps.
- These steps are considered as the same step and the calculation result is displayed as the summarized value of the relevant step.



## (3) Color map range



Specify the range of the value allocated to **Color Map** in the **App Config** window (p.83). By adjusting this value, you can view the necessary range in detail and the entire distribution degree. All values that exceed the specified range are displayed in the color allocated to **Max** or **Min**. The unit of the specified range varies depending on the selection of the display value. (% or absolute value, etc.)

#### (4) Display option

The steps to be displayed can be narrowed.

In addition, the display color of the steps (contact error, etc.) for which judgment is not subject to calculation can be selected.

The screenshot shows a settings interface with two main sections. The first section, labeled '1', is titled 'Disp. Step Filter' and contains a 'Recommended' button, a 'Meas. Category' dropdown menu currently showing '4WCont.', and a 'Meas. Mode' dropdown menu currently showing 'R-CC'. The second section, labeled '2', is titled 'Draw N/A value by Judg. Color' and contains two toggle buttons: 'Disabled' and 'Enabled'.

<b>1 Disp. Step Filter</b>	<b>Step</b> types to be displayed can be narrowed.	
	<b>Disabled/Enabled</b>	The narrowing function for the steps to be displayed is <b>Disabled</b> or <b>Enabled</b> .
	<b>Meas. Category</b>	<b>Meas. Category</b> to be displayed can be selected. Multiple categories can be selected. Every time an item in <b>Category</b> is clicked, the selection/deselection option for display is toggled.
	<b>Meas. Mode</b>	<b>Meas. Mode</b> to be displayed can be selected. Multiple categories can be selected. Every time an item in <b>Mode</b> is clicked, the selection/deselection option for display is toggled.
	<b>Recommended</b> button	The items to be displayed are set automatically in accordance with the type and data of the display value.
<b>2 Draw N/A value by Judg. Color</b>	<b>Disabled</b>	All N/A steps are displayed in black.
	<b>Enabled</b>	N/A steps are displayed in the color specified by <b>Numerical Value Color - N/A Value Color</b> (p.83).

## (5) Displayed Value

Select the type of the analysis results to be displayed.

1	Meas. / Median
2	Meas. / Mean
3	Meas. / Ref.
4	Singularity Degree
5	z-Score (Median Based)
6	z-Score (Mean Based)
7	Measure Value
8	Judgment
9	Judg. Count
10	Judg. Count (%)
11	Mean
12	Median
13	Standard Deviation
14	Median Absolute Deviation
15	Coefficient of Variance
16	Correlation Coefficient

### 1 Meas. / Median

The ratio of the measurement value in the test time specified by **Result No.** to the median value in the group specified by **Results Group** is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

The median value is a value of the data located at the median when the target data groups (measurement value at each count) are arranged in the order of size. When the number of target groups is even, the mean value of two values adjacent to the median is used.

### 2 Meas. / Mean

The ratio of the measurement value in the test time specified by **Result No.** to the mean value in the group specified by **Results Group** is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

### 3 Meas. / Ref.

The ratio of the measurement value in the test time specified by **Result No.** to the reference value is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

### 4 Singularity Degree (S.D.)

The singularity degree in the test time specified by **Result No.** is represented by different colors. The step with a higher singularity degree is displayed in a color close to the **Max.** color while the step with a lower singularity degree is displayed in a color close to the **Min.** color.

The singularity degree is a numerical value that indicates the singularity of the measurement value based on Hioki's original algorithm. The smaller the singularity, the closer the singularity degree is to 0. For details about the singularity degree, see "4.5.1 Singularity Degree (Pro version only) (p.92)".

## 5 z-Score (Median Based)

The z-score at the test time specified by **Result No.** is represented by different colors. The reference value is the median value in the specified **Results Group**. The step with a higher z-score is displayed in a color close to the **Max.** color while the step with a lower z-score is displayed in a color close to the **Min.** color.

The **z-Score** is a score that is calculated so that the reference value (median value) is 0 and the standard deviation is 1.

## 6 z-Score (Mean Based)

The z-score at the test time specified by **Result No.** is represented by different colors. The reference value is the mean value in the specified **Results Group**. The step with a higher z-score is displayed in a color close to the **Max.** color while the step with a lower z-score is displayed in a color close to the **Min.** color.

## 7 Measure Value

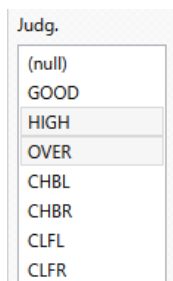
The measurement value at the test time specified by **Result No.** is represented by different colors. The step with a higher measurement value is displayed in a color close to the **Max.** color while the step with a lower measurement value is displayed in a color close to the **Min.** color.

## 8 Judgment

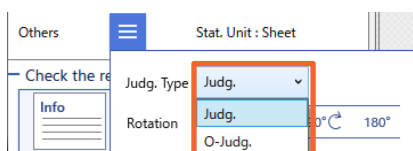
The judgment at the test time specified by **Result No.** is represented by different colors. Each judgment color is set using **App Config**  (p.83).

## 9 Judg. Count

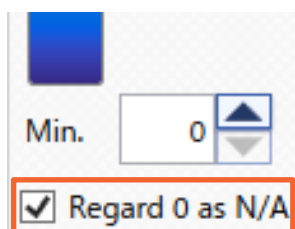
The appearance count of the judgment specified by the specified **Results Group** is represented by different colors. The step with a larger appearance count is displayed in a color close to the **Max.** color while the step with a smaller appearance count is displayed in a color close to the **Min.** color.



When **Judg. Count** is selected in **Displayed Value**, the judgment selection is displayed on the upper side of color map range. Select the judgment you want to check the distribution. Multiple judgments can be selected. (HIGH and OVER are selected in the figure on the left.)



Select **Now Selected - Others - Judg. Type**, and then you can select whether the display target is the step judgment code or output judgment.



When you check **Regard 0 as N/A** that appears on the lower side of the color map range, the steps for which the appearance count of the specified judgment is 0 are displayed in the color allocated by **Numerical Value Color - N/A Value Color** (p. 83). The contrasts of the step for which the appearance count is 0 and the **Step** for which the appearance count is 1 or more can be displayed clearly.

## 10 Judg. Count (%)

The appearance ratio of the judgment specified by the specified **Results Group** is represented by different colors. The step with a higher appearance ratio is displayed in a color close to the **Max.** color while the step with a lower appearance ratio is displayed in a color close to the **Min.** color.

The **Judg. Code** selection, the **Judg. Type** selection, and the **Regard 0 as N/A** display option are the same as those described in **9 Judg. Count**.

## 11 Mean

The mean value in the specified **Results Group** is represented by different colors. The step with a higher mean value is displayed in a color close to the **Max.** color while the step with a lower mean value is displayed in a color close to the **Min.** color.

## 12 Median

The median value in the specified **Results Group** is represented by different colors. The step with a higher median value is displayed in a color close to the **Max.** color while the step with a lower median value is displayed in a color close to the **Min.** color.

**Median** is the value of the data located at the median when the target data groups (measurement value at each count) are arranged in the order of size. When the number of target groups is even, the mean value of two values adjacent to the median is used.

## 13 Standard Deviation

The standard deviation in the specified **Results Group** is represented by different colors. The step with a larger standard deviation is displayed in a color close to the **Max.** color while the step with a lower standard deviation is displayed in a color close to the **Min.** color.

**Standard Deviation** is a square root value of the dispersion. This means that the larger the standard deviation, the more data that takes a value far from the mean value. The probability that a value appears in the range of mean value  $\pm$  standard deviation in the normal distribution is 68.7%.

## 14 Median Absolute Deviation

**Median Absolute Deviation** in the specified **Results Group** is represented by different colors. The step with a larger **Median Absolute Deviation** is displayed in a color close to the **Max.** color while the step with a smaller **Median Absolute Deviation** is displayed in a color close to the **Min.** color.

**Median Absolute Deviation** is a median value of the difference groups where the difference of each data from the median value is enumerated.

This numerical value is less affected by the singular value at the end of the distribution when compared to **Standard Deviation**.

## 15 Coefficient of Variance

**Coefficient of Variance** in the specified **Results Group** is represented by different colors. The step with a larger **Coefficient of Variance** is displayed in a color close to the **Max.** color while the step with a smaller **Coefficient of Variance** is displayed in a color close to the **Min.** color.

**Coefficient of Variance** is a value derived when the standard deviation of each data is divided by the mean value of each data.

This value shows a relative deviation on which the mean value of each measurement data is reflected when compared to **Standard Deviation**.

## 16 Correlation Coefficient



The correlation coefficient to the specified step in the specified **Results Group** is represented by different colors. The step with a larger correlation coefficient is displayed in a color close to the **Max.** color while the step with a smaller correlation coefficient is displayed in a color close to the **Min.** color. When **Correlation Coefficient** is selected in **Displayed Value**, the 2nd selection value (**2nd**) is displayed in **Now Selected**. The correlation coefficient of each step is calculated based on the step specified by the 2nd selection value.

- Now Selected

Results Group All

Result No. 1

	1st	2nd
Block	26	26
Piece	26	26
Step	36453	36453

<b>1 Copy button</b>		Copies the currently selected <b>Step</b> specified in <b>1st</b> to the reference value <b>Step</b> number of the correlation coefficient specified in <b>2nd</b> .
<b>2 Transpose button</b>		Transposes the currently selected <b>Step</b> specified in <b>1st</b> and the reference <b>Step</b> data of the correlation coefficient specified in <b>2nd</b> .

The reference step of the correlation can also be changed using **Base Step (= 2nd)** displayed at the top of the measurement value map tool.

Measurement Value Map

Displayed Value Correlation Coefficient

Base Step (=2nd) 36453

**Correlation Coefficient** shows a correlation degree between the increase and decrease trend of each test time of the reference **Step** and the increase and decrease trend of each test time of each **Step**. Higher **Correlation Coefficient** means that the same increase and decrease trend appears in each test to the reference **Step**.

## Stat. Unit



The calculation method of the **results in the results group** varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.

## Other operation

You can zoom in or out the display area of the measurement value map around the mouse cursor position by turning the mouse wheel forward or backward.

You can move the measurement value map within the display area by dragging the mouse cursor.

You can switch the selected **Step** by clicking another step with the left mouse button.

— Now Selected —

Results Group All

Result No. 1

Block 6

Piece 6

Step 7819

— Now Selected —

Results Group All

Result No. 1

Block 20

Piece 20

Step 27478

---



Group

The detailed result can be compared for each Result No. that focuses on one step. For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.5 Step (p. 91)”.

## 1. Introduction

The test results of the step selected by **Now Selected - Step** and the statistical calculation result are displayed for each test.

**Now Selected**

Results Group All




Result No. 4

Block 2

Piece 2

Step 2354

Step Result List																	Machine ID
1	2	3	4		5			6				7					
Result No.	Step	Step (Rel.)	Judg. Code	O-Judg.	Ref.	Upp. Lim.	Low. Lim.	Meas.	Meas./Ref.	Meas./Mean	Meas./Median	z-Score	S.D.	Mean	σ	Median	MAD (Median)
1	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	281.8mQ	149.0%	111.2%	114.8%	1.256	1.176	253.5mQ	22.60mQ	245.5mQ	10.14mQ
2	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	236.3mQ	125.0%	93.2%	96.3%	-0.759	(N/A)	253.5mQ	22.60mQ	245.5mQ	10.14mQ
3	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	307.2mQ	162.4%	121.2%	125.1%	2.376	0.834	253.5mQ	22.60mQ	245.5mQ	10.14mQ
4	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	254.9mQ	134.8%	100.6%	103.8%	0.066	-2.046	253.5mQ	22.60mQ	245.5mQ	10.14mQ
5	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	245.5mQ	129.8%	96.9%	100.0%	-0.351	-2.240	253.5mQ	22.60mQ	245.5mQ	10.14mQ
6	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	294.3mQ	155.6%	116.1%	119.9%	1.806	-0.455	253.5mQ	22.60mQ	245.5mQ	10.14mQ
7	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	230.5mQ	121.9%	90.9%	93.9%	-1.017	(N/A)	253.5mQ	22.60mQ	245.5mQ	10.14mQ
8	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	255.6mQ	135.2%	100.9%	104.1%	0.097	0.410	253.5mQ	22.60mQ	245.5mQ	10.14mQ
9	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	232.1mQ	122.8%	91.6%	94.5%	-0.944	(N/A)	253.5mQ	22.60mQ	245.5mQ	10.14mQ
10	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	223.0mQ	118.0%	88.0%	90.9%	-1.345	-0.561	253.5mQ	22.60mQ	245.5mQ	10.14mQ
11	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	243.9mQ	129.0%	96.2%	99.3%	-0.423	(N/A)	253.5mQ	22.60mQ	245.5mQ	10.14mQ
12	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	227.9mQ	120.5%	89.9%	92.8%	-1.131	(N/A)	253.5mQ	22.60mQ	245.5mQ	10.14mQ
13	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	243.3mQ	128.7%	96.0%	99.1%	-0.450	0.047	253.5mQ	22.60mQ	245.5mQ	10.14mQ
14	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	254.5mQ	134.6%	100.4%	103.7%	0.047	0.033	253.5mQ	22.60mQ	245.5mQ	10.14mQ
15	2354	938	GOOD	(null)	189.1mQ	378.2mQ	0.000 Q	241.3mQ	127.6%	95.3%	98.3%	-0.544	-0.723	253.5mQ	22.60mQ	245.5mQ	10.14mQ

1 <b>Result No.</b>	Result No. during the period specified by <b>Group</b>  .
2 <b>Step</b>	Serial step number in the sheet.
3 <b>Step (Rel.)</b>	Serial step number in the block.
4 <b>Test results</b>	Measurement results of this step in each test time.
5 <b>Step element</b>	Personal data of this step.
6 <b>Comparison of the results in the results group in one test time</b>	Data that shows the result of each test time in this step as the relative status between the <b>results in the results group</b> specified by <b>Group</b>  .
7 <b>Summarized result in the results group</b>	Summarizes the data in <b>the results group</b> specified by <b>Group</b>  and then displays the result of this step.

## Stat. Unit



Stat. Unit

Sheet

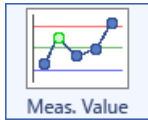
Block

The meaning of the **results in the results group** varies depending on the setting of **Stat. Unit**.


The data in the display line varies depending on the setting of **Stat. Unit**.

Stat. Unit: Sheet	Data in the display line	Displays information on one <b>Step</b> selected in <b>Now Selected</b> for each test time.
	Calculation method of the results in the results group	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
	Example	10 <b>Steps</b> → 1 <b>Piece</b> : 10 <b>Pieces</b> → 1 <b>Sheet</b> : 10 test times Displays how Step 1 of <b>Result No.</b> 1 is related to the calculation result of only Step 1 of 10 tests.
Stat. Unit: Block	Data in the display line	Displays all lines of the <b>Step</b> in <b>Piece</b> other than the currently selected <b>Step</b> for each test time.
	Calculation method of the results in the results group	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.
	Example	10 <b>Steps</b> → 1 <b>Piece</b> : 10 <b>Pieces</b> → 1 <b>Sheet</b> : 10 test times Displays how Step 1, Step 11, and Step 21–Step 91 of <b>Result No.</b> 1 are related to the calculation result of Step 1, Step 11, and Step 21–Step 91 of 10 tests.

### 3.2.8 Line Chart



Analysis tool area -> **Analyze the selected step** -> Line Chart

For one selected step, the measurement values for each test time during the period specified by **Group**  are displayed chronologically in a graph.

You can check how the step you have selected has changed for each Result No.

#### Step designation

— Now Selected —

Results Group

Result No.

Block

Piece

Step

A chart in which the measurement values of the step selected by **Now Selected - Step** are plotted in each test time is displayed.

#### Stat. Unit

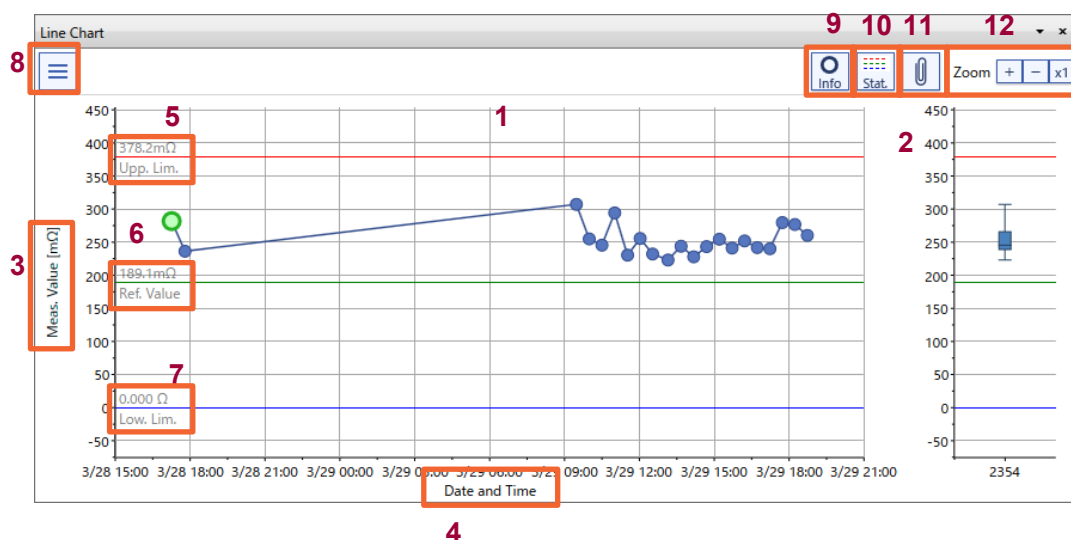



Stat. Unit

☐ Sheet ☐ Block

The calculation method of the **results in the results group** varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same pieces of different blocks are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same pieces of different blocks are calculated collectively. When there are 10 same Pieces on one Sheet and the number of test times in the specified results group is 10, 100 results are obtained.



<b>1 Meas. Value</b> transition graph	Displays a line chart in which the measurement values are plotted chronologically. The range of the test time to be plotted is set by clicking  .
<b>2 Meas. Value</b> distribution graph	Displays the distribution of the measurement values in the set range in a box-and-whisker plot chart.
<b>3 Y-axis Meas. Value</b>	Displays the size of the measurement value. The display range can be changed using <b>8 Display option</b> .
<b>4 X-axis Time series</b>	Displays chronologically. The allocation in the display range can be changed using <b>8 Display option</b> .
<b>5 Upp. Lim.</b>	Upper limit value line of the selected step.
<b>6 Ref. Value</b>	Reference value line of the selected step.
<b>7 Low. Lim.</b>	Lower limit value line of the selected step.

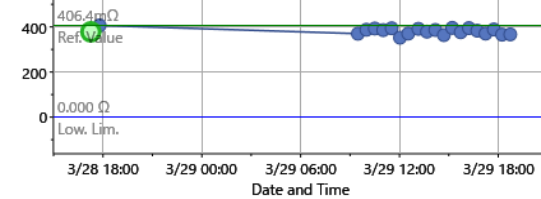
## 8 Display option

X Axis	Date and Time	Date only	Date Order
	<div>Auto</div> <div>Adjust for Ref.</div> <div>Min. - Max.</div> <div>0 - Max.</div>		
Y Axis Range			

Allows you to set the ranges and allocations of the X-axis and Y-axis.

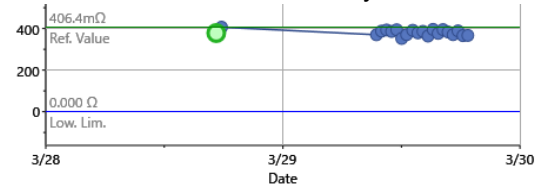
### X Axis: Date and Time

Allocates the date and time evenly from the first test end time to the last test end time.



### X Axis: Date only

Allocates the date from the first test end date to the last test end date evenly.



### X Axis: Date Order

Allocates all tests evenly regardless of the time.

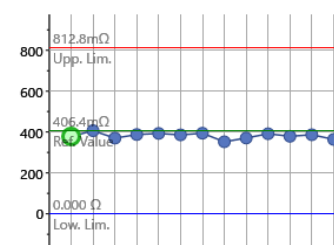


### Y Axis Range: Auto

Sets the range of the Y-axis automatically.

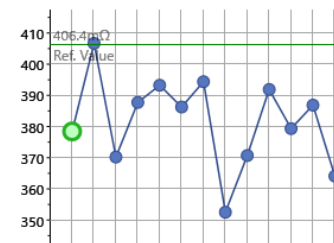
### Y Axis Range: Adjust for Ref.

Displays the range between the reference value, the upper limit value, and the lower limit value.



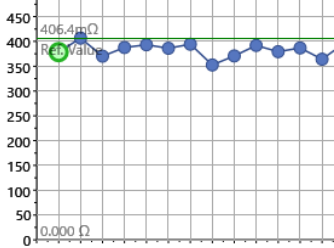

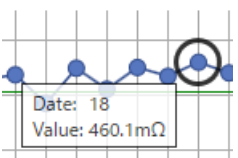

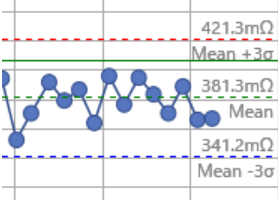




### Y Axis Range: Min. - Max.

Displays the range between the maximum and minimum values.



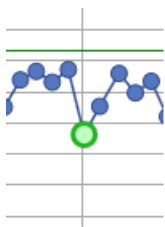
### Y Axis Range: 0 - Max.

Displays the range between 0 and the maximum value.

		
<b>9</b> Information button 		<p>When this button is turned ON, the test date and time, and the value at the plot point are displayed if the cursor is aligned with the plot point. The contents of the test date and time to be displayed depend on the X-axis setting you have set using <b>8 Display option</b>.</p>
<b>10</b> Statistics button 		<p>When this button is turned ON, a line that shows the mean value of the <b>results in the results group</b> <math>\pm 3\sigma</math> and the values are displayed above or below the reference value line.</p>
<b>11</b> Clip button 	Copies the currently displayed graph area to the clipboard as an image.	
<b>12</b> Zoom tool		Zooms out the graph range on the X-axis (the necessary range is enlarged). The same operation can be performed by turning the mouse wheel forward.
		Zooms in the graph range on the X-axis (the range is reduced so that the entire graph is seen). The same operation can be performed by turning the mouse wheel backward.
		Initializes the zoom display.

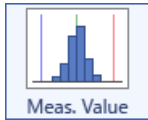
## Other operation

The display range of the X-axis can be moved by dragging the mouse cursor during zoomed in display. Similarly, the display range of the X-axis can be specified by dragging the mouse cursor while holding down the Ctrl button. Releasing the button zooms in the specified range.




**Now Selected - Result No.** can be specified by clicking the plot point. The selected test time is represented by the green plot point. This number is linked to all analysis tools that are displayed at the same time.

### 3.2.9 Histogram



Analysis tool area -> **Analyze the selected step** -> Histogram

For one selected step, the measurement value range and appearance frequency histogram for each test time during the period specified by **Group**  are displayed.

You can check the measurement value distribution of one step you have focused on during the specified period.

#### Step designation

— Now Selected —

Results Group

Result No.

Block

Piece

Step

A chart in which the measurement values of the step selected by **Now Selected - Step** are plotted in each test time is displayed.

#### Stat. Unit

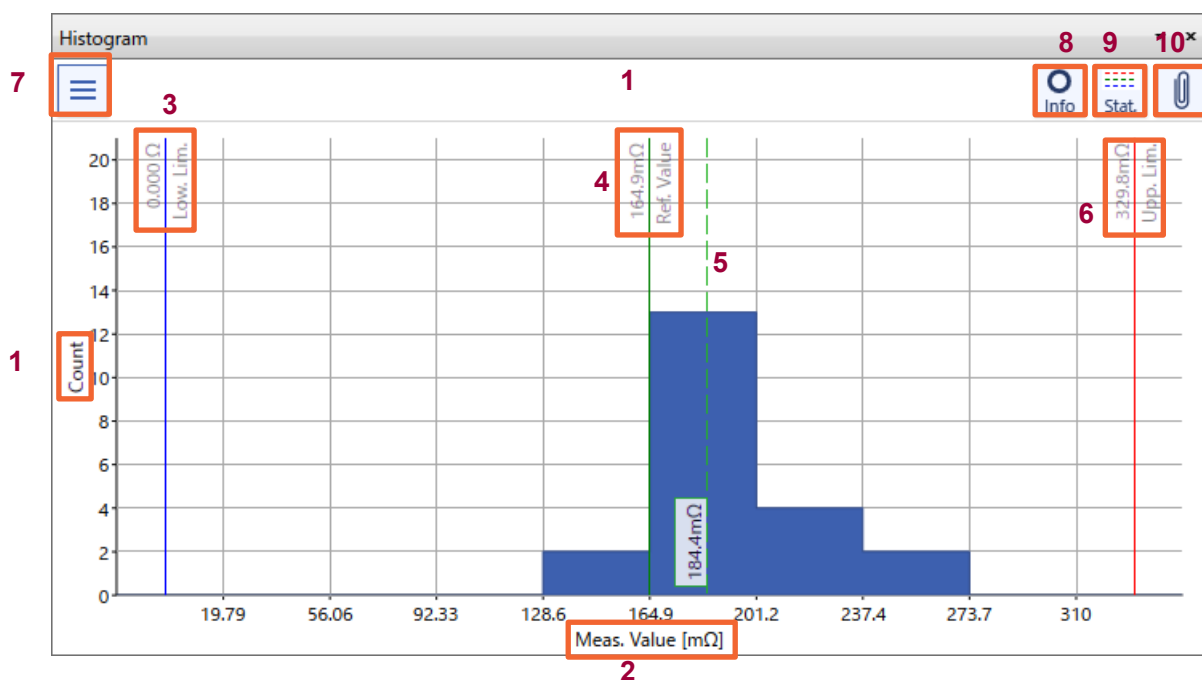


Stat. Unit

☒ Sheet ☐ Block

The calculation method of the **results in the results group** varies depending on the setting of **Stat. Unit**.

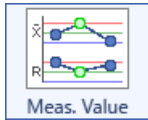
<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same pieces of different blocks are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same pieces of different blocks are calculated collectively. When there are 10 same Pieces on one Sheet and the number of test times in the specified results group is 10, 100 results are obtained.



<b>1 Y-axis Count</b>	Displays the appearance count of the measurement value in each range. The display range can be changed using <b>8 Display option</b> .	
<b>2 X-axis Meas. Value</b>	Displays the measurement value range. The number of divisions and the display range can be changed using <b>8 Display option</b> .	
<b>3 Low. Lim.</b>	Lower limit value line of the selected step.	
<b>4 Ref. Value</b>	Reference value line of the selected step.	
<b>5 Selected step position</b>	Measurement value line at the test time selected by <b>Now Selected - Result No.</b>	
<b>6 Upp. Lim.</b>	Upper limit value line of the selected step.	
<b>7 Display option</b> 	<b>X Axis Range: Auto</b>	Sets the range of the X-axis automatically.
	<b>X Axis Range: Adjust for Ref.</b>	Displays the range between the values of <b>Ref. Value</b> , <b>Upp. Lim.</b> , and <b>Low. Lim.</b> . 
	<b>X Axis Range: Min. - Max.</b>	Displays the range between the minimum and maximum values of the appeared <b>Meas. Value</b> . 

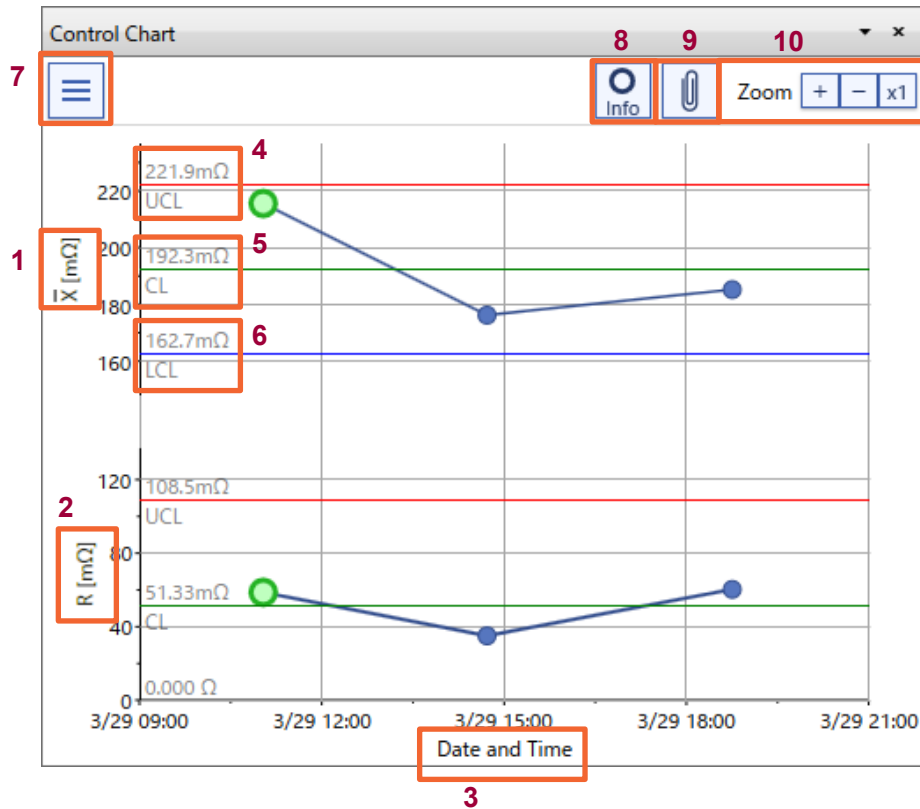
<p><b>7 Display option</b></p>	<p><b>X Axis Range:</b> 0 - Max.</p>	<p>Displays the range between 0 and the maximum value of the appeared <b>Meas. Value</b>.</p>
	<p><b>X Division</b></p>	<p>Set how many vertical axes are used to divide the specified range of the X-axis. When <b>Auto</b> is set, the range is divided by the recommended number of divisions.</p>
	<p><b>Y Axis Max.: Total</b></p>	<p>A range from 0 to the total test times is set to the Y-axis range.</p>
	<p><b>Y Axis Max.: Max.</b></p>	<p>A range from 0 to the maximum count in the divided measurement value range is set to the Y-axis range.</p>
<p><b>8 Information button</b></p>		<p>When this button is turned ON and the cursor is aligned with the upper left point of the bar chart, the details of the range value and the appearance count are displayed.</p>
<p><b>9 Statistics button</b></p>		<p>When this button is turned ON, a line that shows the mean value of the <b>results in the results group</b> <math>\pm 3\sigma</math> and the values are displayed on the left or right of the reference value line.</p>
<p><b>10 Clip button</b></p>	<p>Copies the currently displayed graph area to the clipboard as an image.</p>	

### 3.2.10 Control Chart



Analysis tool area -> [Analyze the selected step](#) -> Control Chart

For the selected step, samples are extracted from each results group to display the  $\bar{x}$ -R control chart.



1 Y-axis ( $\bar{x}$ )	Displays the mean value of the sample measurement values.
2 Y-axis (R)	Displays the “maximum value - minimum value” of the sample measurement values.
3 X-axis Default: <a href="#">Date and Time</a>	Displays the test date and time of the last tested result of the samples in the results group. The actual display value is switched using the display option.
4 UCL (Upper Control Limit)	Displays the upper control limit calculated from the samples.
5 CL (Center Line)	Displays the mean value of $\bar{x}$ or R calculated from the samples.
6 LCL (Lower Control Limit)	Displays the lower control limit calculated from the samples.

<div>7 Display option</div> <div><div><div></div></div><div>Sample count<div>5</div></div><div>X axis<div>Date and Time</div><div>Date only</div><div>Date Order</div></div></div>	<div>Sample count</div> <div>Specify the number of samples to be selected from each results group (2 to 5).</div>
	<div>X Axis</div> <div>Select the type of the X-axis.</div>
	<div>Date and Time</div> <div>Displays the test date and time.</div>
	<div>Date only</div> <div>Displays the test date and time, but does not display the time on the auxiliary axis.</div>
	<div>Date Order</div> <div>Displays the numbers allocated to each results group from 1 in the order of test date and time.</div>
<div>8 Information button</div> <div><div></div><div>Info</div></div>	<div>Displays or hides the detailed information.</div> <div>When the mouse cursor is moved onto the control chart in the display status, the information at the mouse cursor position is displayed.</div> <div><div><div><div>.9mΩ</div><div></div><div>Results Group: [Period 1]</div><div>2016/03/28 16:31</div><div>~ 2016/03/29 06:26</div><div>Value: 201.0mΩ</div></div></div></div> <div><div>Results Group:</div><div>Details of the results group</div></div> <div><div>Value:</div><div>Value calculated from the samples</div></div>
<div>9 Clip button</div> <div><div></div></div>	<div>Copies the entire control chart to the clipboard.</div>
<div>10 Zoom tool</div>	<div><div><div>+</div></div><div>Zooms in the display in the X-axis direction.</div></div> <div><div><div>-</div></div><div>Zooms out the display in the X-axis direction.</div></div> <div><div><div>x1</div></div><div>Returns the magnification in the X-axis direction to the default value.</div></div>

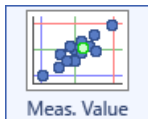
## Control chart

This control chart is one of seven QC tools. The control chart is used to distinguish data variations due to an accidental cause in the process from those due to an abnormal cause. In the  $\bar{x}$  - R control chart, a specific number of samples is generally selected from each lot, the mean value ( $\bar{x}$ ) and range (R) are calculated. These values are multiplied by the predetermined coefficients to calculate the upper control limit and lower control limit. The calculated values are displayed graphically. If there is no process error, each point is plotted between the upper control limit and lower control limit around the center line according to the variations due to an accidental cause in a well-balanced manner. However, if a process error occurs, the points are plotted outside the control limit or are continuously plotted above or below the center line according to the variations due to an abnormal cause.

## Stat. Unit

When the setting of the statistics unit (p. 90) is changed in the Config window (p. 80), the calculation method of the statistics is changed. However, even when "Block" is selected in **Stat. Unit**, the control chart always uses the same calculation method as "Sheet" in **Stat. Unit**.

### 3.2.11 Scatter Chart



Analysis tool area -> **Analyze the selected step** -> Scatter Chart

#### Step designation

Now Selected

Results Group: All

Result No.: 1

Block: 1st (1) 2nd (26)

Piece: 1 (1) 2nd (26)

Step: 337 (337) 36453 (36453)

Others: [Menu Icon]

Stat. Unit: Sheet

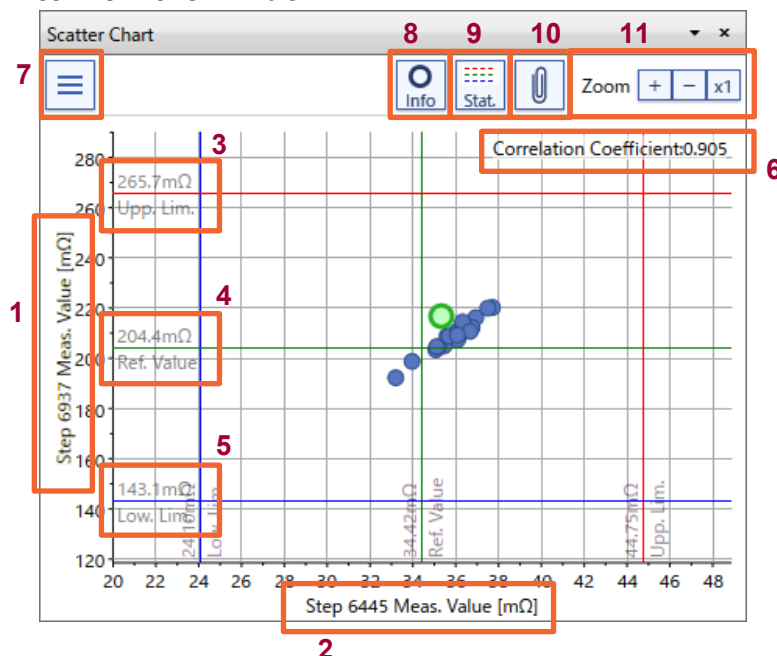
A chart in which the **Meas. Value** of **Step** selected by **Now Selected** - **Step** is plotted in each test time is displayed. The 1st select value (**1st**) is displayed on the Y-axis while the 2nd select value (**2nd**) is displayed on the X-axis.

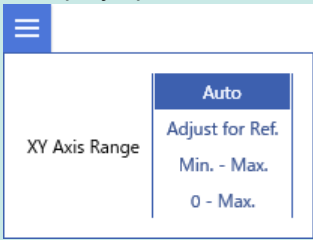
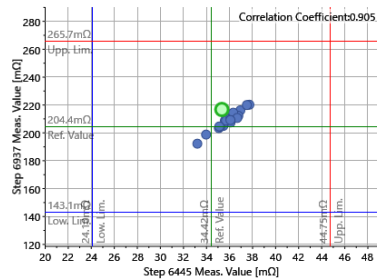
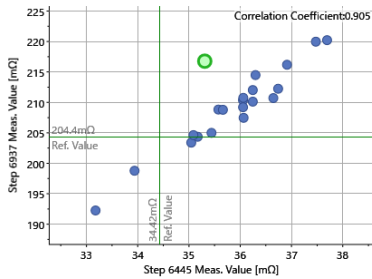
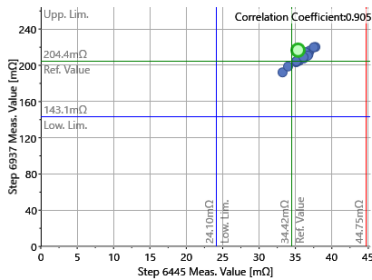
#### Stat. Unit


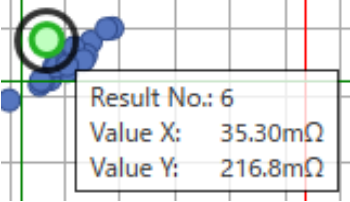

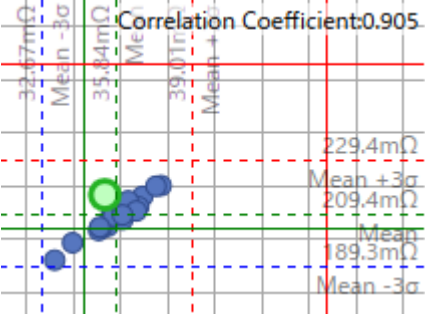

The display target varies depending on **Config** - **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	The same <b>Pieces</b> of different <b>Blocks</b> are considered as a different type. When the number of test times in the specified results group is 10, 10 points are displayed.
<b>Stat. Unit: Block</b>	The same <b>Pieces</b> of different <b>Blocks</b> are considered as the same type. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 points are displayed.

#### How to view the window



<b>1</b> Y-axis	Displays the measurement values of the selected 1st step ( <b>1st</b> ).	
<b>2</b> X-axis	Displays the measurement values of the selected 2nd step ( <b>2nd</b> ).	
<b>3</b> Upp. Lim.	Displays the upper limit value specified for the step. This value is not displayed in the measurement mode where there is no upper limit value.	
<b>4</b> Ref. Value	Displays the reference value specified for the step.	
<b>5</b> Low. Lim.	Displays the lower limit value specified for the step. This value is not displayed in the measurement mode where there is no lower limit value.	
<b>6</b> Correlation Coefficient	Displays the correlation coefficient between the selected 1st step ( <b>1st</b> ) and 2nd step ( <b>2nd</b> ) of the displayed data. The correlation coefficient is -1 to 1. The closer the value to 1, the stronger the positive correlation becomes. The closer the value to 0, the weaker the correlation becomes.	
<b>7</b> Display option 	<b>XY Axis Range:</b> <b>Auto</b>	Sets the range of the X-axis and Y-axis automatically.
	<b>XY Axis Range:</b> <b>Adjust for Ref.</b>	The display range is set so that the reference value, upper limit value, and lower limit value fit to the window. 
	<b>XY Axis Range:</b> <b>Min. - Max.</b>	The display range is set so that the maximum value and minimum value of the appeared measurement value fit to the window. 
	<b>XY Axis Range:</b> <b>0 - Max.</b>	The display range is set so that the maximum value and 0 of the appeared measurement value fit to the window. 

<b>8</b> Information button 	<p>Displays or hides the detailed information.</p> <p>When the mouse cursor is moved onto the control chart in the display status, the information at the mouse cursor position is displayed.</p> 						
<b>9</b> Statistics button 	<p>For the displayed data, the mean value and the mean value <math>\pm 3\sigma</math> (<math>\sigma</math> is the standard deviation) of each of the X-axis and Y-axis are displayed by broken lines.</p> 						
<b>10</b> Clip button 	<p>Copies the entire scatter plot to the clipboard.</p>						
<b>11</b> Zoom tool	<table border="1"> <tr> <td>+</td><td>Zooms in the display in the X-axis and Y-axis directions.</td></tr> <tr> <td>-</td><td>Zooms out the display in the X-axis and Y-axis directions.</td></tr> <tr> <td>x1</td><td>Returns the magnifications in the X-axis and Y-axis directions to the default values.</td></tr> </table>	+	Zooms in the display in the X-axis and Y-axis directions.	-	Zooms out the display in the X-axis and Y-axis directions.	x1	Returns the magnifications in the X-axis and Y-axis directions to the default values.
+	Zooms in the display in the X-axis and Y-axis directions.						
-	Zooms out the display in the X-axis and Y-axis directions.						
x1	Returns the magnifications in the X-axis and Y-axis directions to the default values.						


### Mouse operation

Click a point.	Selects the specified data (Result No.).
Mouse wheel	Zooms in or out the display in the X-axis and Y-axis directions.
Drag	Moves the display. (Zoomed in display only)
Ctrl + drag	Zooms in the specified range.

### 3.2.12 Piece Result List



Analysis tool area -> **Analyze the selected piece** -> Piece Result List

For one selected step, the test results for each test time during the period specified by **Group**  are displayed. The results can be compared in detail for each Result No. that focuses on one piece. For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.6 Piece (p. 93)”.

#### Piece designation

— Now Selected —

Results Group

Result No.


Block

Piece

Step

The test results of the piece selected by **Now Selected - Piece** are displayed for each test time.

Piece Result List					
1	2	3	4		
Result No.	Piece	Piece (Rel.)	Judg.	O-Judg.	Machine ID
1	22	1	PASS	PASS	
2	22	1	PASS	PASS	
3	22	1	FAIL	ETCE	
4	22	1	FAIL	OPEN	
5	22	1	FAIL	ETCE	
6	22	1	PASS	PASS	
7	22	1	FAIL	ETCE	
8	22	1	PASS	PASS	
9	22	1	PASS	PASS	
10	22	1	PASS	PASS	
11	22	1	PASS	PASS	

1 Result No.	Result No. of the results groups specified by <b>Group</b>  .
2 Piece	Serial piece number in the sheet.
3 Piece (Rel.)	Serial piece number in the block.
4 Test results	Test results of this piece for each test time.

## Stat. Unit




The data in the display line varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Data in the display line</b>	Displays the information on one <b>Piece</b> selected in <b>Now Selected</b> for each test time.
<b>Stat. Unit: Block</b>	<b>Data in the display line</b>	Displays all lines of the same <b>Pieces</b> as the <b>Piece</b> selected in <b>Now Selected</b> for each test time.

### 3.2.13 Sheet Result List



Analysis tool area -> **Overview the all results** -> Sheet Result List

For one selected Result No. = test time, the test results during the period specified by **Group**  are displayed.

You can check the detailed information, such as results in the piece judgment for each test time.  
For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.7 Sheet (p. 94)”.


Sheet Result List												Reset Disp.
Result No.	1 Tested Date and Time		2		Machine ID	3 Piece: Judg.						
	Start	End	Judg.	O-Judg.		(null)		PASS		FAIL		
1	2016/03/28 16:46	2016/03/28 17:16	FAIL	(null)		0	0.0%	22	73.3%	8	26.7%	
2	2016/03/28 17:18	2016/03/28 17:48	FAIL	(null)		0	0.0%	18	60.0%	12	40.0%	
3	2016/03/29 08:59	2016/03/29 09:29	FAIL	(null)		0	0.0%	19	63.3%	11	36.7%	
4	2016/03/29 09:30	2016/03/29 10:00	FAIL	(null)		0	0.0%	21	70.0%	9	30.0%	
5	2016/03/29 10:01	2016/03/29 10:30	FAIL	(null)		0	0.0%	21	70.0%	9	30.0%	
6	2016/03/29 10:31	2016/03/29 11:01	FAIL	(null)		0	0.0%	16	53.3%	14	46.7%	
7	2016/03/29 11:02	2016/03/29 11:32	FAIL	(null)		0	0.0%	17	56.7%	13	43.3%	
8	2016/03/29 11:33	2016/03/29 12:02	FAIL	(null)		0	0.0%	16	53.3%	14	46.7%	
9	2016/03/29 12:03	2016/03/29 12:32	FAIL	(null)		0	0.0%	19	63.3%	11	36.7%	
10	2016/03/29 12:40	2016/03/29 13:00	FAIL	(null)		0	0.0%	17	56.7%	13	43.3%	

<b>1 Tested Date and Time</b>	Displays the test start time and end time of the test time specified by <b>Result No.</b>
<b>2 Test results</b>	Displays the judgment of the entire <b>Sheet</b> at the test time specified by <b>Result No.</b>
<b>3 Piece: Judg.</b>	Displays the detailed results of each <b>Piece</b> at the test time specified by <b>Result No.</b> Depending on the selection of <b>Now Selected - Others - Judg. Type</b> , the detailed data and ratio of <b>Judg.</b> or those of <b>O-Judg.</b> are displayed.

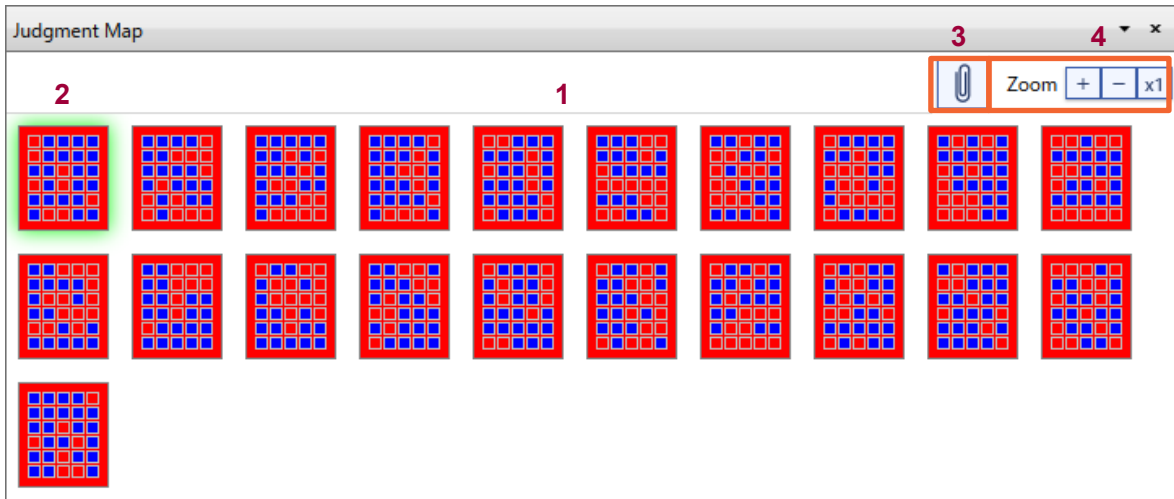
### 3.2.14 Judgment Map








Analysis tool area -> **Overview the all results** -> Judgment Map

The test results of each **Piece** in each test time during the period specified by **Group**  are displayed in a map.

You can easily check FAIL positions in the results group, how the FAIL parts are distributed in the results group, or whether there is **Piece** with a particularly large number of FAILs.




1 Map display area	Detailed piece results for each Result No. = test time are displayed in a map. When <b>Now Selected - Others - Judg. Type</b> is <b>Judg.</b> , the color on the map is the judgment color. When it is <b>O-Judg.</b> , the output judgment color is displayed. The judgment color and output judgment color can be set in the <b>App Config</b> window  (p. 83).	
2 Selected Result No. map	The green frame is displayed on the map of the currently selected Result No.	
3 Clip button 	Copies the currently displayed map area to the clipboard as an image.	
4 <b>Zoom</b> tool		Zooms in the map display area.
		Zooms out the map display area.
		Initializes the zoom display.

### 3.2.15 Measurement Value Map Browser (Pro version only)




Analysis tool area -> **Overview the all results** -> Measurement Value Map Browser

Windows in which the measurement values on the board are image-mapped using various statistical methods are displayed for each test time during the test range specified by **Group** .

You can visually and easily check what the trends of all test results are during the target period or whether there is any test that shows singular trends.

#### Data to be displayed

The data to be displayed is classified into two types in accordance with the selection of the display value.

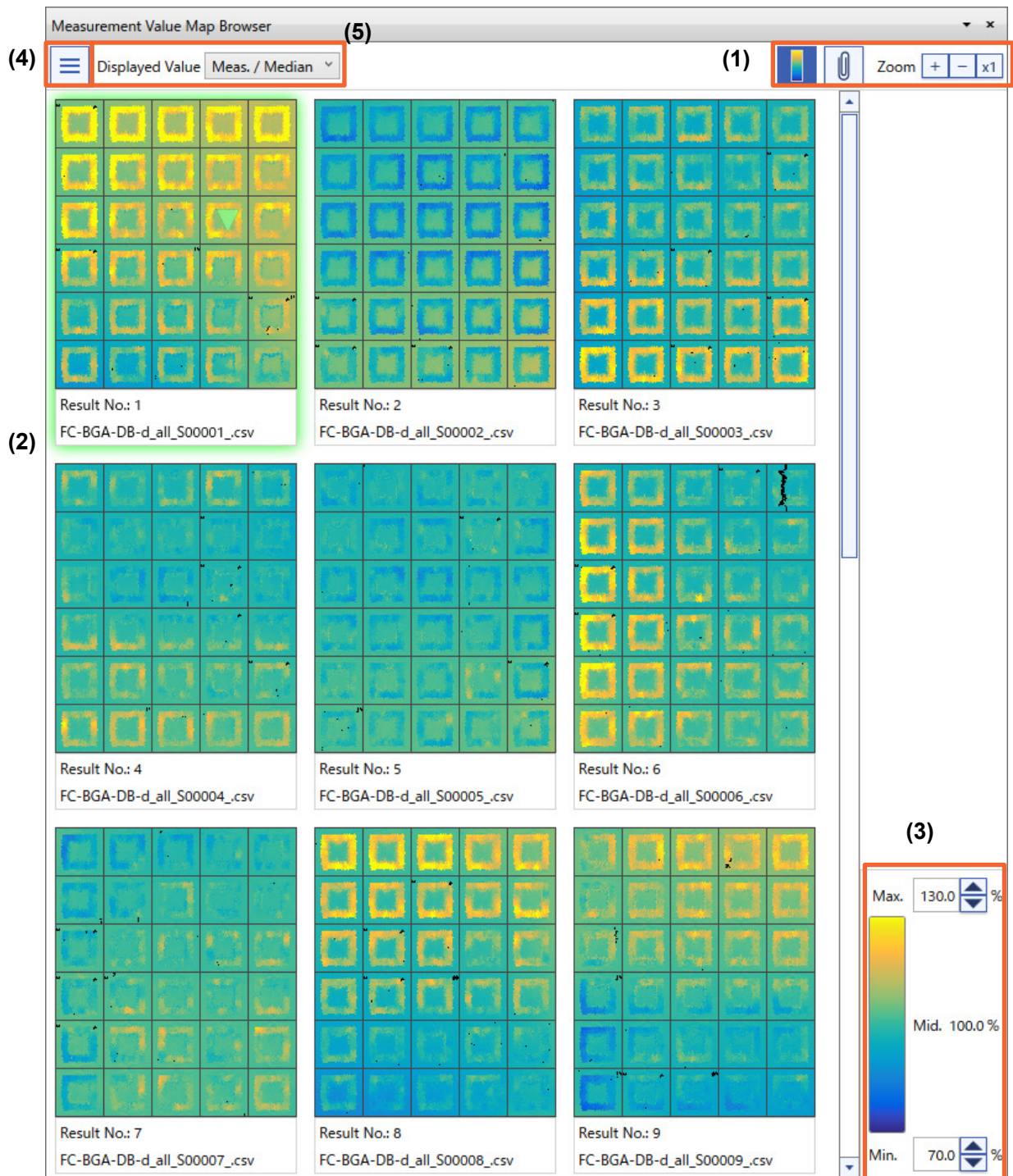
<b>Comparison of the results in the results group in one test time</b>	Data that shows the result of each test time as the relative status between the <b>results in the results group</b> specified by <b>Group</b>  .	<b>Meas. / Median</b> <b>Meas. / Mean</b> <b>Singularity Degree</b> <b>z-Score (Median Based)</b> <b>z-Score (Mean Based)</b>
<b>Value distribution of all steps in one test time</b>	Displays the results of all <b>Steps</b> in each test time so that the relative status between each step result can be viewed.	<b>Meas. / Ref.</b> <b>Measure Value</b> <b>Judgment</b>

#### Stat. Unit



The calculation method of the **results in the results group** varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the results group is 10, 100 results are obtained.



## (1) Display tool



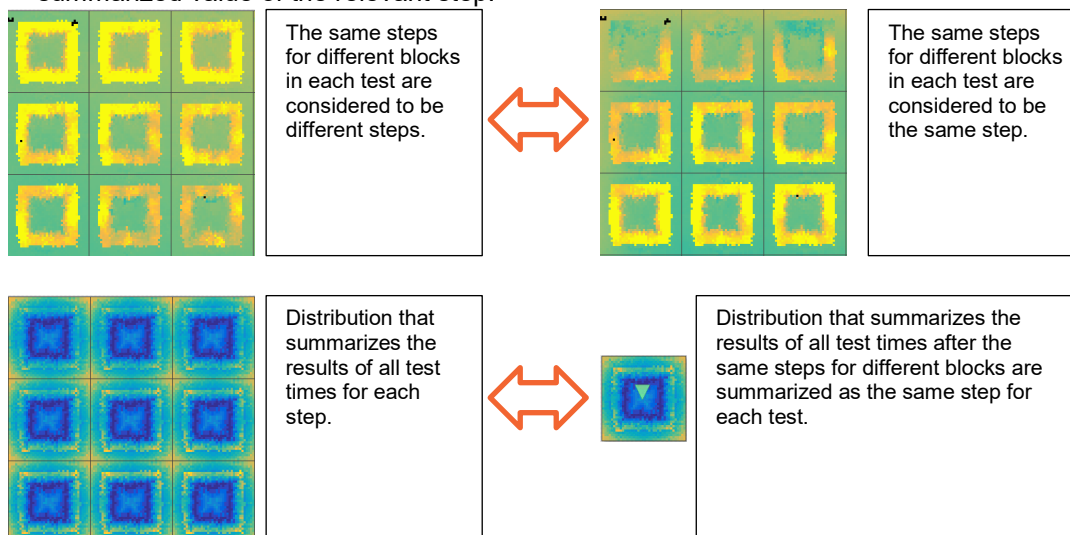
1 Color map range display tool	Displays or hides color map range.	
2 Clip tool	Copies the currently displayed viewer area to the clipboard as an image.	
3 Zoom tool	+	Zooms in the display every time this button is clicked.
	-	Zooms out the display every time this button is clicked.
	x1	Sets the display size to the standard size.

## (2) Measurement value map display area

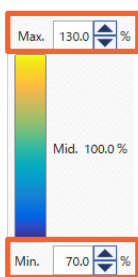
This area displays the results of the comparison and distribution of the measurement values.

For the multi-piece board, the display method is switched to any of the following when the statistics unit is changed by **Sheet** and **Block**.

- The same steps for different blocks are displayed as separate steps.
- These steps are considered as the same step and the calculation result is displayed as the summarized value of the relevant step.



## (3) Color map range



Specify the range of the value allocated to **Color Map** in the **App Config** window (p.83). By adjusting this value, you can view the necessary range in detail and the entire distribution degree. All values that exceed the specified range are displayed in the color allocated to **Max** or **Min**. The unit of the specified range varies depending on the selection of the display value. (% or absolute value, etc.)

#### (4) Display option

The **Steps** to be displayed can be narrowed.

In addition, the display color of the **Steps** (contact error, etc.) for which **Judgment** is not subject to calculation can be selected.

The screenshot shows a settings panel with three numbered sections:

- 1 Disp. Step Filter:** Includes a 'Recommended' button, 'Meas. Category' (4WCont.), 'Meas. Mode' (R-CC), and a 'Disabled/Enabled' toggle.
- 2 Draw N/A value by Judg. Color:** Includes a 'Disabled/Enabled' toggle.
- 3 Display Order:** Includes radio buttons for 'Result No.' and 'File Name'.

<b>1 Disp. Step Filter</b>	<b>Step</b> types to be displayed can be narrowed.	
	<b>Disabled/Enabled</b>	The narrowing function for the steps to be displayed is <b>Disabled</b> or <b>Enabled</b> .
	<b>Meas. Category</b>	<b>Meas. Category</b> to be displayed can be selected. Multiple categories can be selected. Every time an item in <b>Meas. Category</b> is clicked, the selection/deselection option for display is toggled.
	<b>Meas. Mode</b>	<b>Meas. Mode</b> to be displayed can be selected. Multiple categories can be selected. Every time an item in <b>Mode</b> is clicked, the selection/deselection option for display is toggled.
	<b>Recommended button</b>	The items to be displayed are set automatically in accordance with the type and data of the display value.
<b>2 Draw N/A value by Judg. Color</b>	<b>Disabled</b>	All N/A steps are displayed in black.
	<b>Enabled</b>	N/A steps are displayed in the color specified by <b>Numerical Value Color - N/A Value Color</b> (p.83).
<b>3 Display Order</b>	<b>Result No.</b>	Displays the result numbers from the upper left position of the browser in the ascending order.
	<b>File Name</b>	Displays the file names from the upper left position of the browser in the ascending order.

## (5) Displayed Value

Select the type of the analysis results to be displayed.

1	Meas. / Median
2	Meas. / Mean
3	Meas. / Ref.
4	Singularity Degree
5	z-Score (Median Based)
6	z-Score (Mean Based)
7	Measure Value
8	Judgment

### 1 Meas. / Median

The ratio of the measurement value in the test time specified by **Result No.** to the median value in the group specified by **Results Group** is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

The median value is a value of the data located at the median when the target data groups (measurement value at each count) are arranged in the order of size. When the number of target groups is even, the mean value of two values adjacent to the median is used.

### 2 Meas. / Mean

The ratio of the measurement value in the test time specified by **Result No.** to the mean value in the group specified by **Results Group** is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

### 3 Meas. / Ref.

The ratio of the measurement value in the test time specified by **Result No.** to the reference value is represented by different colors. When the measurement value at the test count is higher than the median value, a color close to the **Max.** color is displayed. When the measurement value is lower than the median value, a color close to the **Min.** color is displayed.

### 4 Singularity Degree (S.D.)

The singularity degree in the test time specified by **Result No.** is represented by different colors. The **Step** with a higher singularity degree is displayed in a color close to the **Max.** color while the **Step** with a lower singularity degree is displayed in a color close to the **Min.** color.

The singularity degree is a numerical value that indicates the singularity of the measurement value based on Hioki's original algorithm. The smaller the singularity, the closer the singularity degree is to 0. For details about the singularity degree, see "4.5.1 Singularity Degree (Pro version only) (p.92)".

### 5 z-Score (Median Based)

The z-score at the test time specified by **Result No.** is represented by different colors. The reference value is the median value in the specified **Results Group**. The **Step** with a higher z-score is displayed in a color close to the **Max.** color while the **Step** with a lower z-score is displayed in a color close to the **Min.** color.

The **z-Score** is a score that is calculated so that the reference value (median value) is 0 and the standard deviation is 1.

## 6 z-Score (Mean Based)

The z-score at the test time specified by **Result No.** is represented by different colors. The reference value is the mean value in the specified **Results Group**. The step with a higher z-score is displayed in a color close to the **Max.** color while the step with a lower z-score is displayed in a color close to the **Min.** color.

## 7 Measure Value

The measurement value at the test time specified by **Result No.** is represented by different colors. The step with a higher measurement value is displayed in a color close to the **Max.** color while the step with a lower measurement value is displayed in a color close to the **Min.** color.

## 8 Judgment

The judgment at the test time specified by **Result No.** is represented by different colors. Each judgment color is set using **App Config**  (p.83).

## Other operation

You can move up and down in the browser by turning the mouse wheel forward or backward.

The display of each test result inside the browser is zoomed in or out by turning the mouse wheel forward or backward while holding down the Ctrl key.

You can switch the selected Result No. or step by clicking another step with the left mouse button.

### 3.2.16 Singularity Degree List (Pro version only)



Analysis tool area -> **Overview the all results** -> Singularity Degree List

For the steps whose singularity degree (p. 92) has been calculated for all steps, high-level steps with a larger absolute value of the singularity degree are displayed in a tabular form in descending order. (N/A) steps whose singularity degree has not been calculated are not displayed.

1 <b>Display Range (Abs. Value)</b>	Displays top XX% of the large absolute values of the singularity degrees.
2 <b>Filtering within the same net</b>	If there are multiple steps in the same net, displays only the top XX steps with the large absolute values of the singularity degrees.
3 <b>CSV</b> output button	Saves the current display contents to a CSV file.

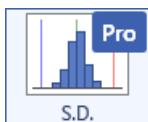
#### List function

For details about the list function, see “3.2.23 List common functions (p. 74)”.

#### Display contents of each row

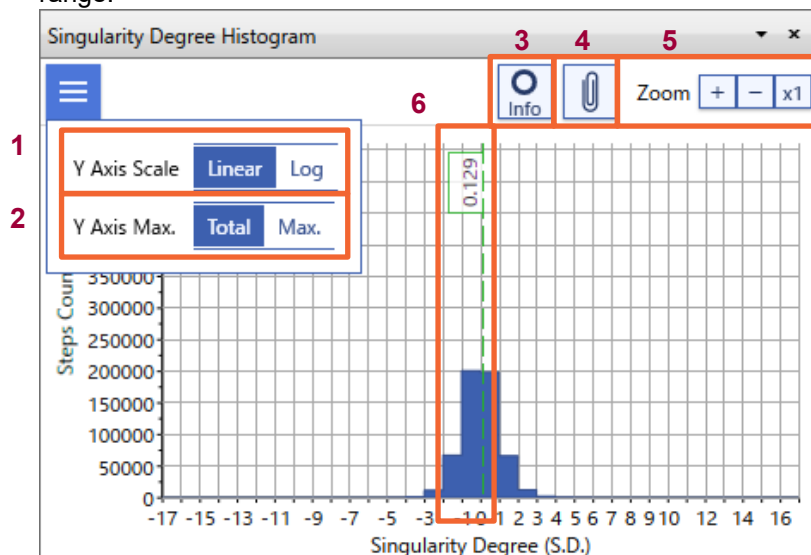
For details about the display contents of each row, see “4.5 Step (p. 91)”.


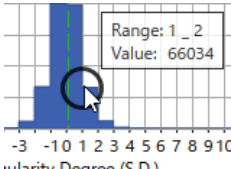




### 3.2.17 Singularity Degree Histogram (Pro version only)



Analysis tool area -> [Overview the all results](#) -> Singularity Degree Histogram

For the steps whose singularity degree (p. 92) has been calculated for all steps included in the results group, the distribution of the singularity degree is displayed in a histogram. The X-axis displays the singularity degree and the Y-axis displays the number of steps that enters each singularity degree range.

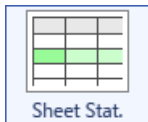


1 Y Axis Scale	Linear	Displays the Y-axis using the linear scale.
	Log	Sets the Y-axis scale to Log.
2 Y Axis Max.	Total	Sets the maximum value of the Y-axis to the total number of steps.
	Max.	Sets the maximum value of the Y-axis to the maximum value of the histogram.
3 Information button 	Displays or hides the detailed information. When the mouse cursor is moved onto the histogram in the display status, the information on the range of the singularity degree at the mouse cursor position is displayed. <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 10px;"> <b>Range:</b> Range of singularity degree  <b>Value:</b> Number of steps included in this range           </div> </div>	
4 Clip button 	Copies the entire histogram to the clipboard.	
5 Zoom tool		Zooms in the display in the X-axis direction.
		Zooms out the display in the X-axis direction.
		Returns the magnification in the X-axis direction to the default value.
6 Selected step	Singularity degree of the selected step.	


#### Mouse operation

Mouse wheel	Zooms in or out the display in the X-axis direction.
Drag	Moves the display in the X-axis direction. (Zoomed in display only)


### 3.2.18 Sheet Statistics List



Analysis tool area -> **Compare results groups** -> Sheet Statistics List

Detailed sheet **Judgment** for each test time during the period specified by **Group**  is displayed. Even when **All**, **Lot**, or **Period** is selected in **Group**, you can easily check the total judgment appearance frequency. When multiple **Periods** are registered in **Group**, you can easily compare the detailed board **Judgment** results for each period.  
For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.7 Sheet (p. 94)”.


Sheet Statistics List							
1	2	3					
Results Group	TotalSheet Count	Sheet: Judg.					
		(null)		PASS		FAIL	
[Period 1]	9	0	0.0%	0	0.0%	9	100.0%
[Period 2]	12	0	0.0%	0	0.0%	12	100.0%

<b>1 Results Group</b>	Period number specified by <b>Group</b>  . When All is specified in <b>Group</b> , ALL is displayed. When Lot is specified, the lot number is displayed.
<b>2 TotalSheet Count</b>	Total number of tested <b>Sheets</b> (boards) in the results group.
<b>3 Sheet: Judg.</b>	Depending on the selection of <b>Now Selected - Others - Judg. Type</b> , the detailed data and ratio of <b>Judg.</b> or those of <b>O-Judg.</b> are displayed.

### 3.2.19 Piece Statistics List





Analysis tool area -> **Compare results groups** -> Piece Statistics List

The detailed **Judgment** in the **Piece** that is selected by **Now Selected - Piece** for each test time during the period specified by **Group**  are displayed. Even when **All**, **Lot**, or **Period** is selected in **Group**, you can easily check the total judgment appearance frequency. When multiple **Periods** are registered in **Group**, you can easily compare the detailed data of the relevant **Piece Judgment** for each period.

For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.6 Piece (p. 93)”.

Piece Statistics List

1	2	3	4						Reset Disp.
Results Group	Piece	Piece (Rel.)	Piece: Judg.						
			(null)		PASS		FAIL		
[Period 1]	1	1	0	0.0%	4	44.4%	5	55.6%	
[Period 2]	1	1	0	0.0%	5	41.7%	7	58.3%	

<b>1 Results Group</b>	Period number specified by <b>Group</b>  . When All is specified in <b>Group</b> , ALL is displayed. When Lot is specified, the lot number is displayed.
<b>2 Piece</b>	Serial <b>Piece</b> number in the sheet.
<b>3 Piece (Rel.)</b>	<b>Piece</b> number in the <b>Block</b> when multiple <b>Pieces</b> are included in one <b>Block</b> .
<b>4 Piece: Judg. Piece: O-Judg.</b>	Summarizes the data in <b>the results group</b> specified by <b>Group</b>  and then displays the test result of the selected <b>Piece</b> . When <b>Others - Judg. Type</b> is set to <b>Judg.</b> , the count and ratio are displayed for each judgment. When <b>Others - Judg. Type</b> is set to <b>O-Judg.</b> , the count and ratio are displayed for each output judgment.

### Stat. Unit



Stat. Unit

Sheet Block


The meaning of the **results in the results group** varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.

### 3.2.20 Step Statistics List






Analysis tool area -> **Compare results groups** -> Step Statistics List

The detailed judgment data and various statistics of the step selected by **Now Selected - Step** for each test time during the period specified by **Group**  are displayed. Even when **All**, **Lot**, or **Period** is selected in **Group**, you can easily check the total judgment appearance frequency. When multiple **Periods** are registered in **Group**, you can easily compare the detailed judgment data in the relevant step for each period.

For details about how to use the sort and filter functions of the list itself, see “3.2.23 List common functions (p. 74)”. For details about each data item, see “4.5 Step (p. 91)”.

Step Statistics List																				Reset Disp
1	2	3	4	5											6					
Results Group	Step	Step (Rel.)	Ref.	Upp. Lim.	Low. Lim.	Max.	Min.	Mean	$\sigma$	CV ( $\sigma$ /Mean)	Median	MAD (Median)	Cp	Cpk	(null)	Step: Judg. Code				
[Period 1]	1		406.4mΩ	528.3mΩ	284.5mΩ	461.9mΩ	381.0mΩ	429.9mΩ	31.17mΩ	7.2%	443.6mΩ	16.21mΩ	1.3	1.1	0	0.0%	GOOD	9	100.0%	HIGH
[Period 2]	1	1	406.4mΩ	528.3mΩ	284.5mΩ	460.1mΩ	385.5mΩ	431.4mΩ	22.43mΩ	5.2%	436.1mΩ	11.90mΩ	1.8	1.4	0	0.0%	12	100.0%	0	0.0%

<b>1 Results Group</b>	Period number specified by <b>Group</b>  . When All is specified in <b>Group</b> , ALL is displayed. When Lot is specified, the lot number is displayed.
<b>2 Step</b>	Serial <b>Step</b> number in the <b>Sheet</b> .
<b>3 Step (Rel.)</b>	Serial <b>Step</b> number in the <b>Block</b> .
<b>4 Step element</b>	Personal data of the <b>Step</b> .
<b>5 Summarized result in the results group</b>	Summarizes the <b>result data in the results group</b> specified by <b>Group</b>  and then displays the result of the relevant <b>Step</b> .
<b>6 Step: Judg. Step: O-Judg.</b>	Displays the test result of the relevant <b>Step</b> that is selected from all results groups specified by <b>Group</b>  . When <b>Others - Judg. Type</b> is set to <b>Judgment</b> , the count and ratio are displayed for each judgment. When <b>Others - Judg. Type</b> is set to <b>O-Judg.</b> , the count and ratio are displayed for each output judgment.

### Stat. Unit



Stat. Unit

Sheet Block

The meaning of the **results in the results group** varies depending on the setting of **Stat. Unit**.

<b>Stat. Unit: Sheet</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated separately. When the number of test times in the specified results group is 10, 10 results are obtained.
<b>Stat. Unit: Block</b>	<b>Calculation method of the results in the results group</b>	The same <b>Pieces</b> of different <b>Blocks</b> are calculated collectively. When there are 10 same <b>Pieces</b> on one <b>Sheet</b> and the number of test times in the specified results group is 10, 100 results are obtained.

### 3.2.21 Judgment Bar Chart



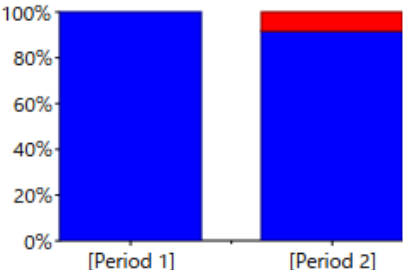
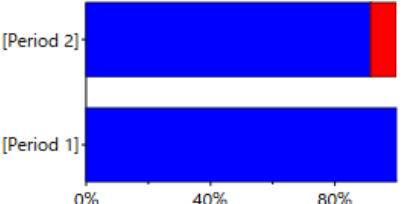
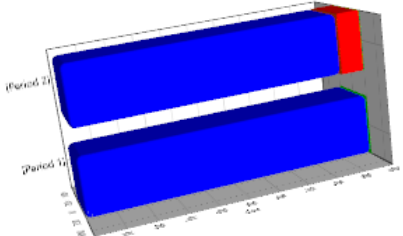

Analysis tool area -> **Compare results groups** -> Judgment Bar Chart

The appearance count of each **Judgment** for each test time during the period specified by **Group** is displayed in a bar chart.

Even when **All**, **Lot**, or **Period** is selected in **Group**, you can easily check the total judgment appearance frequency. When multiple results groups are registered, you can easily compare the detailed judgment data for each results group.



<p><b>1</b> Graph display area</p>	<p>The judgment appearance count of the data selected in <b>3 Counting objects</b> during the period specified by <b>Group</b> is displayed in a bar chart.</p> <p>When <b>Now Selected - Others - Judg. Type</b> is <b>Judg.</b>, the chart color is the judgment color. When it is <b>O-Judg.</b>, the output judgment color is displayed.</p> <p>The judgment color and output judgment color can be set in the <b>App Config</b> window (p. 83).</p>	
<p><b>2</b> Display option</p> <div> <p>Value: <b>Abs.</b> <b>%</b></p> <p>Counting empty data: <b>Disabled</b> <b>Enabled</b></p> <p>Direction: <b>Vertical</b> <b>Horizontal</b></p> <p>Depth: <b>2D</b> <b>3D</b></p> </div>	<p>Set the chart display form.</p> <p><b>Value: Abs.</b></p>	<p>The Y-axis displays from 0 to the maximum value of the chart.</p>

<div>2 Display option</div> <div><div><div></div><div>Value</div><div>Abs.</div><div>%</div></div><div><div>Counting empty data</div><div>Disabled</div><div>Enabled</div></div><div><div>Direction</div><div>Vertical</div><div>Horizontal</div></div><div><div>Depth</div><div>2D</div><div>3D</div></div></div>		<div>Value: %</div> <div>The Y-axis displays from 0 to 100%.</div> <div></div>	
		Counting empty data: Disabled	Empty data is not counted as a chart element.
		Counting empty data: Enabled	Even empty data is counted as one element on the chart.
		Direction: Vertical	The bar chart is displayed vertically.
		Direction: Horizontal	The bar chart is displayed horizontally.
			
		Depth: 2D	The 2D bar chart is displayed.
		Depth: 3D	The 3D bar chart is displayed. Drag the perspective 3D chart to rotate it.
			
<div>3 Counting objects</div> <div><div>Sheet</div><div>Piece</div><div>Step</div></div>		<div>Changes the counting object. Select the object data number in <b>Now Selected</b>.</div> <div><div><div><div>Count</div><div>100%</div><div>90%</div><div>80%</div><div>70%</div><div>60%</div><div>50%</div><div>40%</div><div>30%</div><div>20%</div><div>10%</div><div>0%</div></div><div><div>[Period 1]</div><div>[Period 2]</div></div></div><div><div><div>Selected element : Piece 19</div><div><div>Count</div><div>100%</div><div>80%</div><div>60%</div><div>40%</div><div>20%</div><div>0%</div></div><div><div>[Period 1]</div><div>[Period 2]</div></div></div><div><div><div>Selected element : Step 26482</div><div><div>Count</div><div>100%</div><div>80%</div><div>60%</div><div>40%</div><div>20%</div><div>0%</div></div><div><div>[Period 1]</div><div>[Period 2]</div></div></div></div></div></div>	
<div>4 Clip button</div> <div></div>		<div>Copies the currently displayed map area to the clipboard as an image.</div>	
<div>5 Zoom tool</div>		<div>+</div>	<div>Zooms in the chart area horizontally.</div>
		<div>-</div>	<div>Zooms out the chart area horizontally.</div>
		<div>x1</div>	<div>Initializes the zoom display.</div>

### 3.2.22 Export CSV (Pro version only)



Analysis tool area -> **Others** -> Export CSV

For all result data in the results group, all measurement values are output to one CSV file.

Export CSV

Export Header: Disabled Enabled

Export Column Header: Disabled Enabled

Export Row Header: Disabled Enabled

Number of significant digits: 4

Sample

#Data

3.925e-001,4.598e-001,3.960e-001,4.391e-001,4.475e-001,4.619e-001,4.481e-001,3.927e-001,4.602e-001,3.952e-001,4.389e-001,4.477e-001,4.621e-001,4.483e-001,3.971e-001,4.652e-001,4.010e-001,4.432e-001,4.518e-001,4.673e-001,4.538e-001,3.574e-001,4.180e-001,3.605e-001,3.983e-001,4.061e-001,4.214e-001,4.091e-001,3.592e-001,4.201e-001,3.623e-001,4.006e-001,4.082e-001,4.235e-001,4.113e-001,3.333e-001,3.899e-001,3.368e-001,3.710e-001,3.792e-001,3.947e-001,3.817e-001,3.338e-001,3.902e-001,3.375e-001,3.719e-001,3.790e-001,3.945e-001,3.823e-001,3.062e-001,3.579e-001,3.085e-001,3.408e-001,3.476e-001,3.602e-001,3.500e-001,2.3080e-001,3.593e-001,3.099e-001,3.423e-001,3.486e-001,3.614e-001,3.507e-001,2.2857e-001,3.330e-001,2.876e-001,3.175e-001,3.236e-001,3.358e-001,3.254e-001,2.

Export

Export Header	Change whether to output the information such as the test data name or included data count as a header.
Export Column Header	Change whether to output the column header.
Export Row Header	Change whether to output the row header.
Number of significant digits	Change the number of significant digits
Sample	Displays an image of the CSV file to be output.
Export	Specify the save destination and save the CSV file.

### Difference of output by statistics unit

The output data varies depending on the setting of **Stat. Unit** (p. 90) as follows.

Stat. Unit	Column	Row
Sheet	Result No.	Absolute step number
Block	Result No._Block No.	Relative step number

### 3.2.23 List common functions

The lists displayed by the analysis tool includes the common functions: filter and sort.

Step	Step (Rel.)	Judg. Code	O-Judg.	Act.	Ref.	Meas.	AC Phase	Meas. /Ref.	Meas. /Mean	Me. /Me
30296	560							185.5%	125.4%	1
30188	452							185.4%	123.4%	1
30297	561							185.0%	125.3%	1
21962	722							184.0%	118.6%	1
30348	612							183.8%	124.0%	1
23325	669							183.6%	122.1%	1
13072	328							183.2%	126.5%	1
13073	329							182.8%	126.5%	1
30129	393							182.8%	124.1%	1
22016	776							182.5%	118.8%	1
13060	316							182.5%	126.2%	1
30241	505							182.4%	123.1%	1
30132	396							181.8%	122.2%	1
13061	317	GOOD	(null)	0.000 $\Omega$	146.7m $\Omega$	266.6m $\Omega$	----	181.7%	124.0%	1
22067	827	GOOD	(null)	0.000 $\Omega$	157.3m $\Omega$	285.3m $\Omega$	----	181.3%	118.0%	1
13055	311	GOOD	(null)	0.000 $\Omega$	178.8m $\Omega$	324.0m $\Omega$	----	181.2%	125.7%	1

### Basic operation

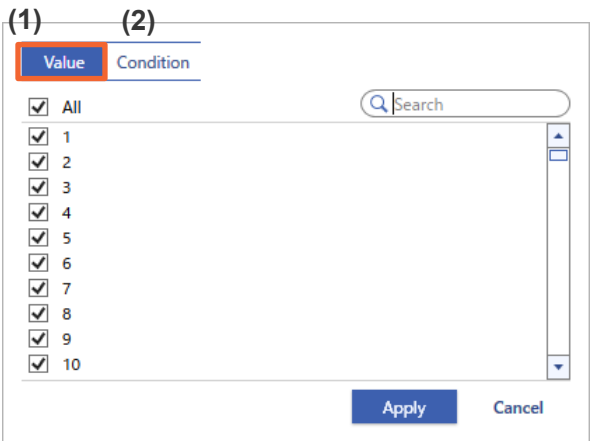
The character color varies depending on the judgment and JUMP settings.

Blue	Pass judgment (PASS)
Red	Fail judgment (FAIL)
Green	JUMP
Black	Other than those shown above

### Filter



When you click ▼, the filter setting appears.



(1) Value filter

You can select the value to be displayed.

Value

Condition

1

☒ All

2

☒ 1

☒ 2

☒ 3

☒ 4

☒ 5

☒ 6

☒ 7

☒ 8

☒ 9

☒ 10

1 All	Check this check box to select all items. Uncheck the check box to deselect all items.
2 Search	Only values including characters you have entered are extracted.

(2) Condition filter

You can specify the extraction condition using the comparison operators.

Value

Condition

1

☐ All

2

☒  ≤ Value ≤

3

☐ Value ≤  or  ≤ Value

4

☐ Value =

1 All	Displays all values.
2 <input type="text"/> ≤ Value ≤ <input type="text"/>	Displays the values within the specified range.
3 Value ≤ <input type="text"/> or <input type="text"/> ≤ Value	Displays the values outside the specified range.
4 Value = <input type="text"/>	Displays the values that match the condition.

Filter status

Step

☒

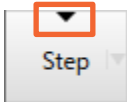
✓ is displayed during filtering.

Sort



Click the column header to sort the data.

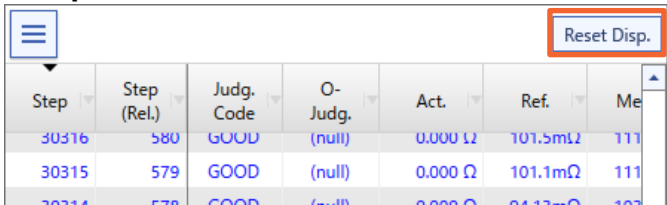
Sort status



▼ or ▲ is displayed above the header during sorting.

▼ Descending order	Sorts the values from the highest to the lowest.
▲ Ascending order	Sorts the values from the lowest to the highest.

Reset Disp.



Click **Reset Disp.** to cancel all filter and sort functions of the list.

## 3.3 Results Group Window

This window allows you to specify the parameters related to the results group (p. 90).

**Results Group**

File Help

File Analyze **Group** Config

App Config Version 2.00.0

**(1)** All Lot **Period** Undo

Periods Setting

**(2)** + Add + Add all test days Sort by starting date and time

Valid	Start	End		
<input checked="" type="checkbox"/>	2016/03/28 15:59	2016/03/28 18:39	Reset	Delete
<input checked="" type="checkbox"/>	2016/03/29 08:08	2016/03/29 12:40	Reset	Delete
<input checked="" type="checkbox"/>	2016/03/29 12:38	2016/03/29 18:59	Reset	Delete

Clear All

**(3)** Zoom + - x1

Result data

Period 1

Period 2

Period 3

3/28 15:00 3/28 18:00 3/28 21:00 3/29 00:00 3/29 03:00 3/29 06:00 3/29 09:00 3/29 12:00 3/29 15:00 3/29 18:00 3/29 21:00

### (1) Results group selection

<b>Results Group</b>	<b>All</b>	Considers all results groups as one results group.
	<b>Lot</b>	Considers the folder to which the result files are saved as the unit of the lot and divides the results groups in units of lots.
	<b>Period</b>	Set an arbitrary period to divide the results groups by period.
<b>Undo</b>		Cancels all operations in the Results Group window.

## (2) Period list area (displayed only when **Period** is selected.)

The results group is set for each period. When the period is specified, the statistics are recalculated by period when the Analyze window (p. 14) is opened.

1

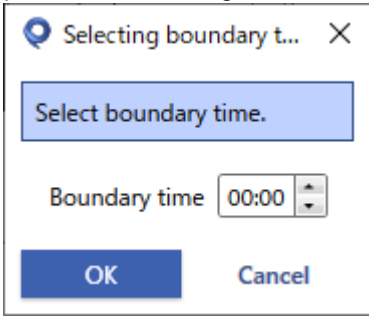
+ Add

+ Add all test days

Sort by starting date and time

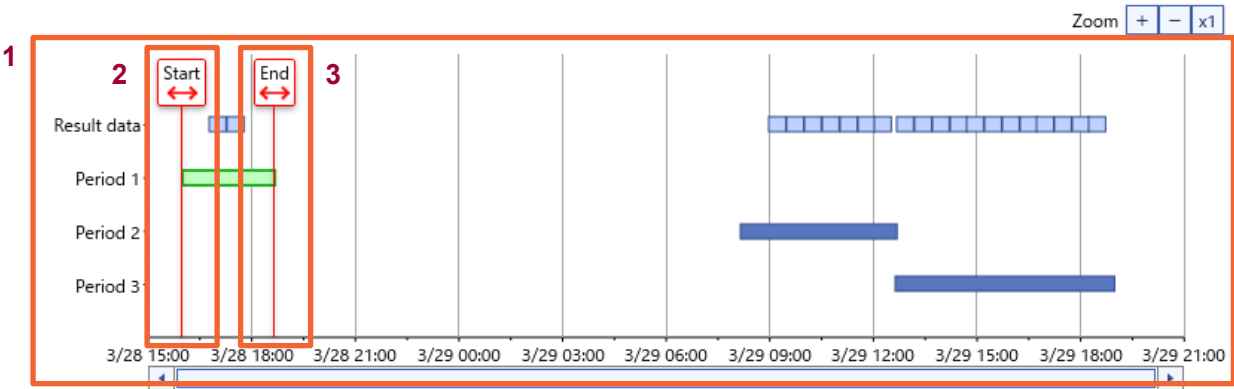
	Valid	Start		End			
	<input checked="" type="checkbox"/>	2016/03/28 15:59	-	2016/03/28 18:39	<input type="button" value="Reset"/>	<input type="button" value="Delete"/>	
	<input checked="" type="checkbox"/>	2016/03/29 08:08	-	2016/03/29 12:40	<input type="button" value="Reset"/>	<input type="button" value="Delete"/>	
	<input checked="" type="checkbox"/>	2016/03/29 12:38	-	2016/03/29 18:59	<input type="button" value="Reset"/>	<input type="button" value="Delete"/>	

Clear All

+ Add	Adds a new period to the end.	
+ Add all test days	Creates the period day by day based on the boundary time. However, the period not including the result data is not added.	
		
Sort by starting date and time	Sorts the periods by the start date and time of the period.	
1 Period list	Valid	Displays whether the specified date and time are valid as a period. The period is invalid when the end date and time are earlier than the start date and time. ✓ Valid ✗ Invalid
	Start	Displays the start date and time of the period.
	End	Displays the end date and time of the period.
	Reset	Sets the start date and time and the end date and time of the period to a range including the test date and time of all result data which has been read.
	Delete	Deletes the specified period.
Clear All	Clears all periods.	

**(3) Period Gantt chart area (displayed only when **Period** is selected.)**

The results group is set for each period. The display of the period Gantt chart synchronizes with that of the period list.



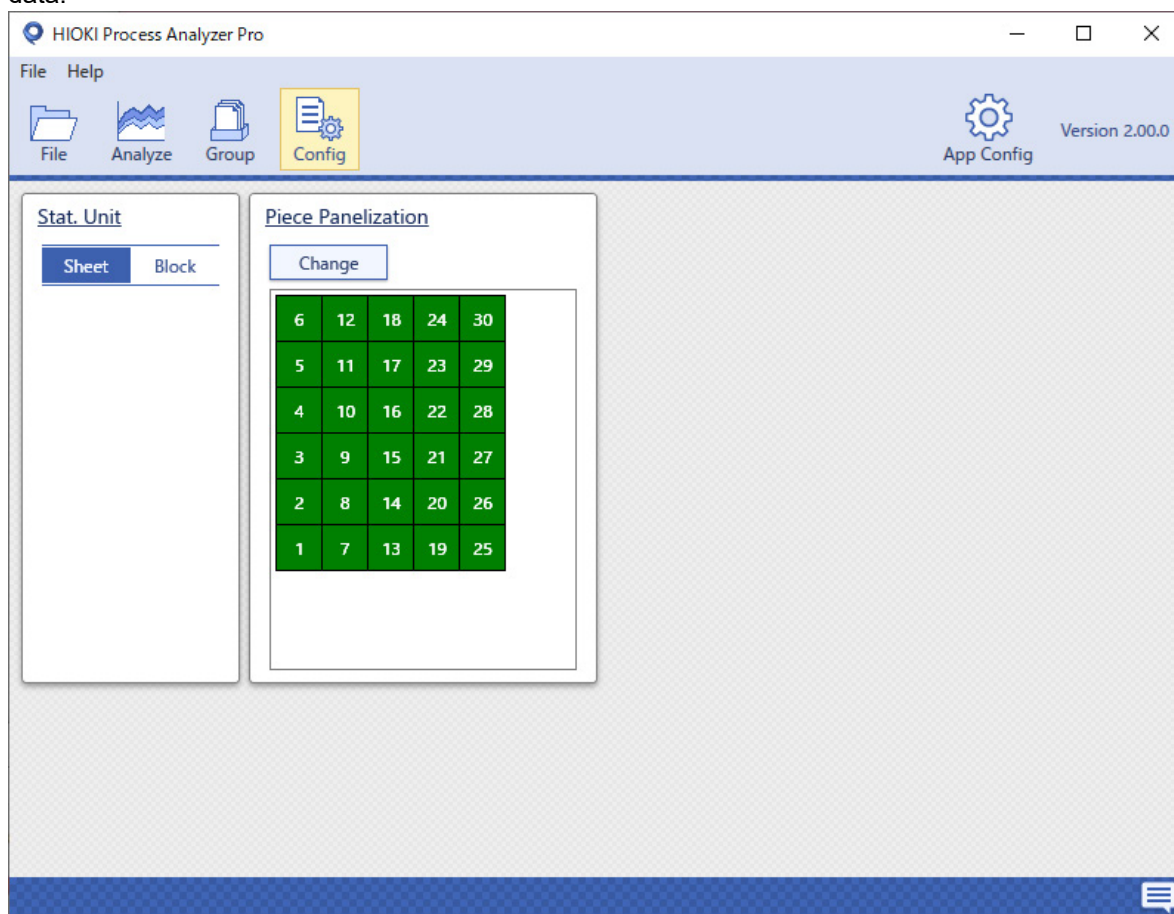
<b>Zoom</b> tool		Zooms in the display in the X-axis direction.
		Zooms out the display in the X-axis direction.
		Returns the magnification in the X-axis direction to the default value.
<b>1</b> Period Gantt chart	Displays the periods in a Gantt chart.	

**Mouse operation**

Mouse wheel	Zooms in or out the display in the X-axis direction.
Drag	Moves the display in the X-axis direction. (Zoomed in display only)
Ctrl + drag	Zooms in the specified area in the X-axis direction.
Click period.	Selects the specified period.
<b>2</b> Drag the <b>Start</b> bar.	Changes the start date and time of the selected period.
<b>3</b> Drag the <b>End</b> bar.	Changes the end date and time of the selected period.

## 3.4 Config Window

This window is related to the analysis data settings. The settings are saved for each unit of analysis data.



Stat. Unit*	Sheet	Sets the statistics unit (p. 90) to Sheet.
	Block	Sets the statistics unit (p. 90) to Block.
Piece Panelization	Determines the piece display position in the following window. Click the <b>Change</b> button to display the Piece Panelization dialog (p. 81).	

\* When the settings have been changed, the statistics are recalculated in accordance with the statistics unit specified when the Analyze window was opened.

### 3.4.1 Piece Panelization dialog

The pieces are panelized to display the results in a grid in some windows. Specify the arrangement order of grid shape pieces.

**1** Panelize

**2**

	Data Count	Set Count
Total blocks count	2	2
Total pieces count	28	32

**3** Block Panelization

X: 2

Y: 1

**4** Piece Panelization in Block

X: 4

Y: 4

**5** Preview

13	14			27	28		
9	10	11	12	23	24	25	26
5	6	7	8	19	20	21	22
1	2	3	4	15	16	17	18

**6** OK **7** Cancel

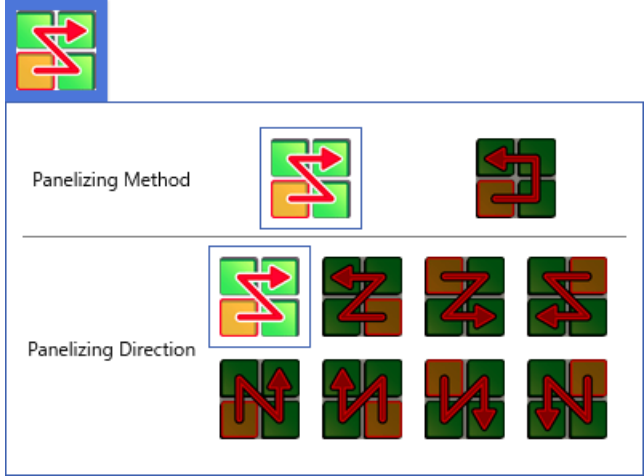
<b>1 Panelize</b>	<b>Auto</b>	Panelizes the pieces automatically.
	<b>Manual</b>	Panelizes the pieces by the set panelizing method.
<b>2 Element count display<sup>*1</sup></b>	<b>Total blocks count<sup>*2</sup></b>	Displays the total block count.
	<b>Total pieces count</b>	Displays the total piece count.
	<b>Data Count</b>	Displays the total block count and total piece count of the test data.
	<b>Set Count</b>	Displays the total block count and total piece count when the pieces are panelized as set in this dialog.
<b>3 Block Panelization<sup>*1</sup></b>	<b>X</b>	Block panelization count in the X-axis direction.
	<b>Y</b>	Block panelization count in the Y-axis direction.
		Specify the panelizing method and panelizing direction of the block.
<b>4 Piece Panelization in Block<sup>*1*2</sup></b>	<b>X</b>	Piece panelization count in the X-axis direction in one block.
	<b>Y</b>	Piece panelization count in the Y-direction in one block.
		Specify the panelizing method and panelizing direction in one block.
<b>5 Preview</b>	Displays the piece panelization order.	



<b>6 OK</b> button	Changes the piece panelization and closes the dialog.
<b>7 Cancel</b> button	Closes this dialog without changing the piece panelization.

\*1 **Panelize**: Displayed only when **Manual** is selected.

\*2 Displayed only with the different-type/multiple-piece layout (p. 88) data.

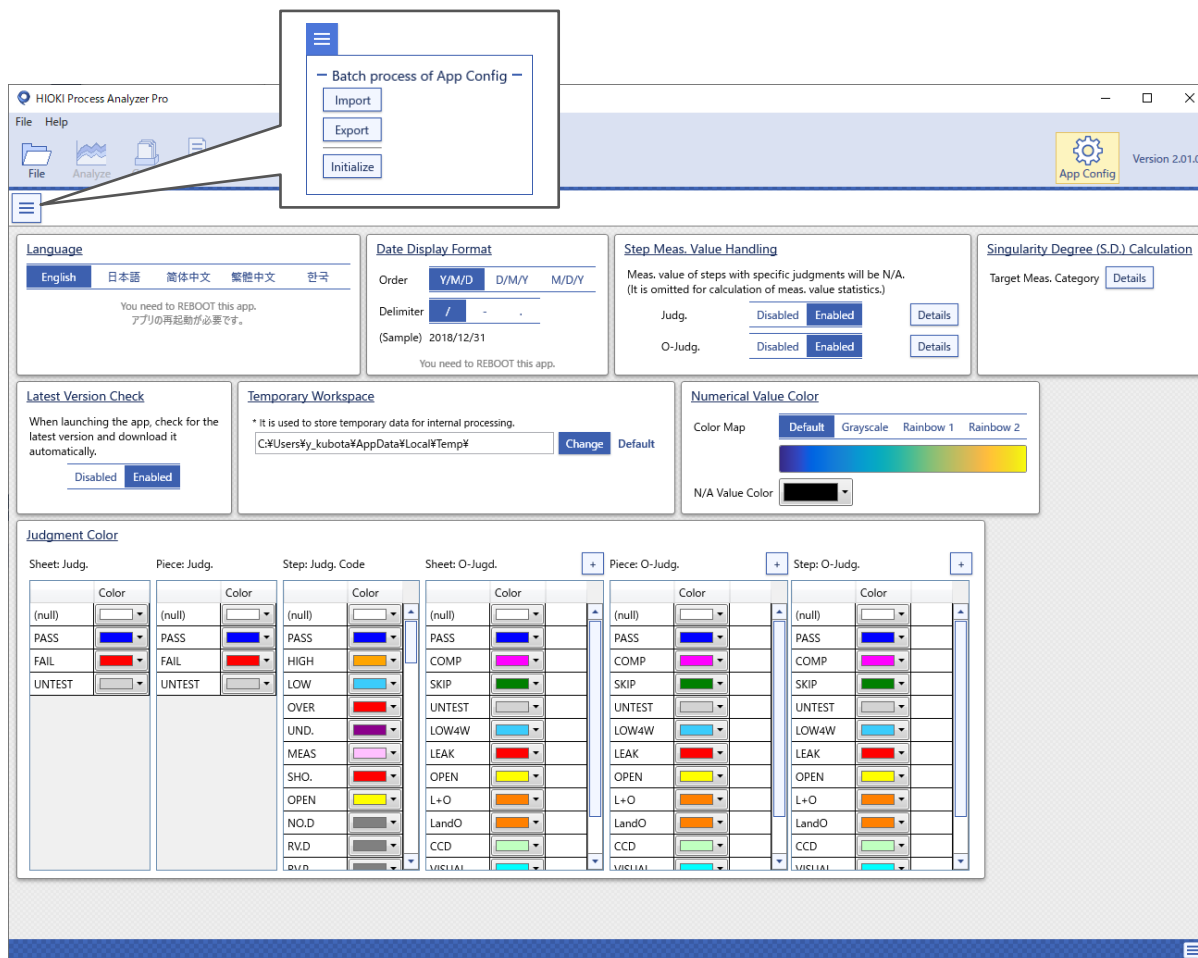
### Piece panelizing method and panelizing direction



<b>Panelizing Method</b>		After a column has been numbered in a fixed direction, all pieces are numbered while the next column is numbered in the same direction.
		After a column has been numbered in a fixed direction, all pieces are numbered while the next column is numbered in the reverse direction.
<b>Panelizing Direction</b>	Performs the numbering from the orange square of the icon (any of the upper left, lower right, upper left, and upper right squares) in the horizontal or vertical direction.	





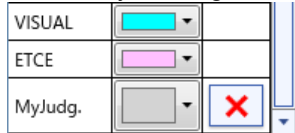
## 3.5 App Config Window

This window is a configuration window of this system. The configuration is common to the entire system, and then it is saved regardless of the analysis data.



<b>Batch process of App Config</b>	<b>Import</b>	Saves the App Config to a file.
	<b>Export</b>	Loads the App Config file that has been exported.
	<b>Initialize</b>	Initializes the App Config completely.
<b>Language*</b>	Allows you to set the display language.	
<b>Date Display Format*</b>	<b>Order</b>	Allows you to specify the order of year, month, and day when the date is displayed in the window.
	<b>Delimiter</b>	Allows you to specify the delimiter character when the date is displayed in the window.
	<b>(Sample)</b>	Displays the sample of the date to be displayed in the window.
<b>Step Meas. Value Handling</b>	Sets the measurement value of the step with the specified judgment or output judgment to N/A (missing value). N/A is ignored when statistics are calculated. Changing whether to set what judgment or output judgment to N/A is performed in the Select Judgments dialog that is displayed by clicking the <b>Details</b> button.	
	<b>Judg.</b>	Enables or disables the process to set the step with the specified judgment to N/A.
	<b>O-Judg.</b>	Enables or disables the process to set the measurement value of the step with the specified output judgment.

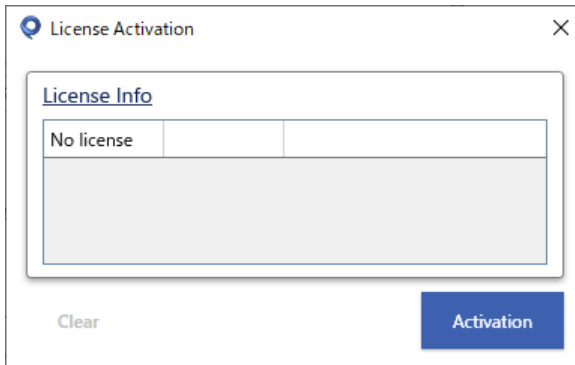
\* To reflect the changed setting, the system needs to be restarted.

<b>Singularity Degree (S.D.) Calculation</b>	Specify the measurement category to calculate the singularity degree (p. 92). Changing the singularity degree is performed in the Selecting Meas. Category dialog that is displayed by clicking the <b>Details</b> button.	
<b>Latest Version Check</b>	Set whether to check this system application is the latest version by connecting the system to the Internet. Even when this check is enabled, the version is not checked if this system is not connected to the Internet.	
<b>Temporary Workspace</b>	<b>Change</b>	Changes the temporary workspace.
	<b>Default</b>	Returns the temporary workspace to the default value.
<b>Numerical Value Color</b>	Set the display color corresponding to the numerical value color on the measurement value map (p. 33).	
	<b>Color Map</b>	Select the color corresponding to the numerical value. <div>  Default         </div> <div>  Grayscale         </div> <div>  Rainbow 1         </div> <div>  Rainbow 2         </div>
	<b>N/A Value Color</b>	Set the N/A (missing value) color.
<b>Judgment Color</b>	Set the color to be used when a judgment is displayed by a color, such as on a judgment map (p. 59).	
	<b>Sheet: Judg.</b>	Specify the judgment color of the sheet.
	<b>Piece: Judg.</b>	Specify the judgment color of the piece.
	<b>Step: Judg. Code</b>	Specify the judgment code color of the step.
	<b>Sheet: O-Judg.</b>	Specify the output judgment color of the sheet.
	<b>Piece: O-Judg.</b>	Specify the output judgment color of the piece.
	<b>Step: O-Judg.</b>	Specify the output judgment color of the step.
	Add and Delete O-Judgment	The definition of the output judgment color is added in the Add O-Judgment dialog that is displayed by clicking the <b>+</b> button. In addition, the output judgment you have added can be deleted by clicking the <b>x</b> button in the list. <div>  </div>

## 3.6 License Activation Dialog

This dialog allows you to perform the license activation of Process Analyzer Pro.

### Status before license activation

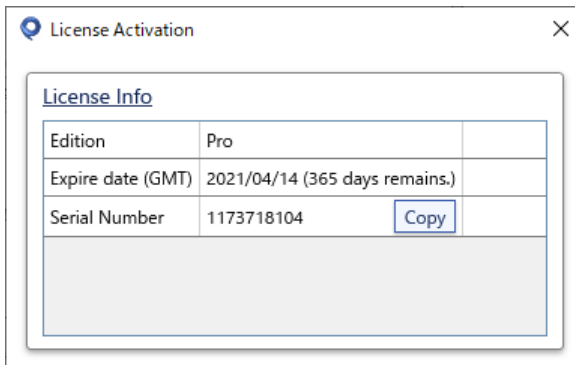


License Info		
No license		

Clear      Activation

<b>Clear</b>	Cancels the activated license.
<b>Activation</b>	Loads the trial license with expiration date and activates it. The license activation continues even when the application is restarted. <u>To activate the license with the USB hard key, insert the key into the USB port and close the dialog.</u>

### After license activation

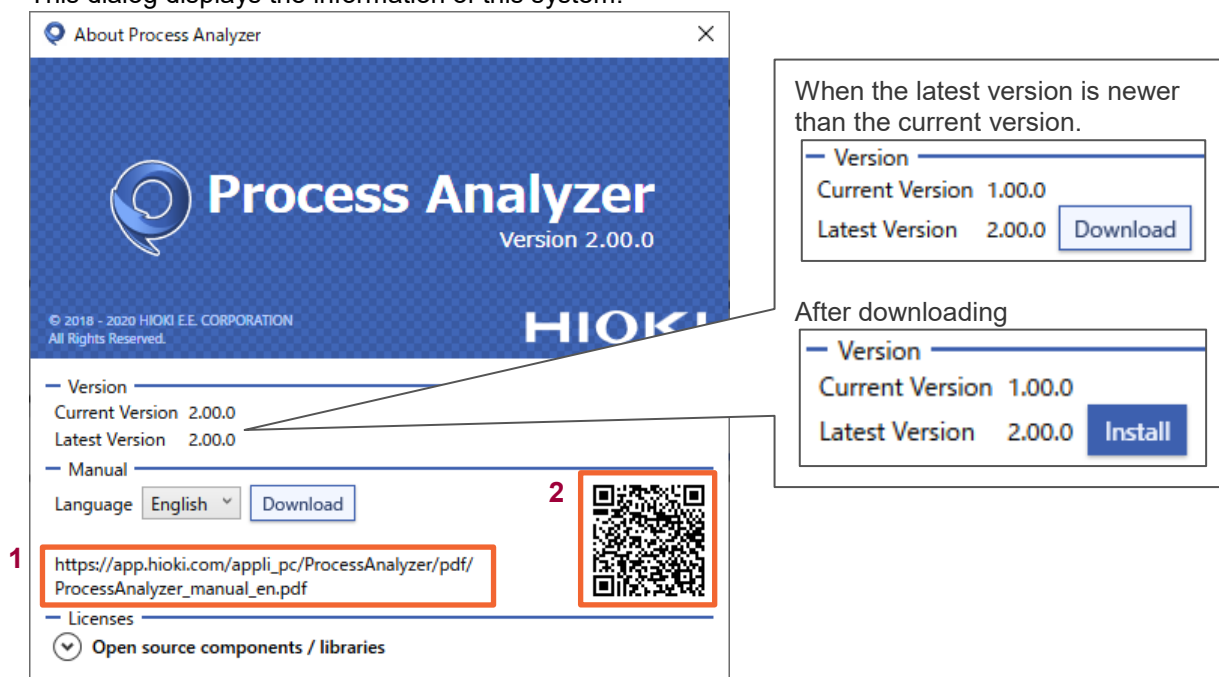


License Info		
Edition	Pro	
Expire date (GMT)	2021/04/14 (365 days remains.)	
Serial Number	1173718104	Copy

<b>Edition</b>	Displays the license activated edition.
<b>Expire date (GMT)</b>	Displays the expiration date of the license.
<b>Serial Number</b>	Displays the serial number of the license. Click the <b>Copy</b> button to copy the serial number to the clipboard.

## 3.7 “About Process Analyzer” Dialog

This dialog displays the information of this system.



<b>Version</b>	<b>Current Version</b>	Displays the current version number of this system.
	<b>Latest Version</b>	Displays the latest version number of this system that is disclosed by Hioki. The latest version is not displayed when this system is not connected to the Internet.
	<b>Download</b>	Displayed when the latest version is newer than the current version. Click the button to download the installer for the latest version. (The installation is not performed automatically.)
	<b>Install</b>	Displayed after the installer for the latest version has been downloaded. Click the button to exit the system and start the installer.
<b>Manual</b>	<b>Language</b>	Displays the language of the instruction manual to be referred to.
	<b>Download</b>	Downloads the instruction manual file.
	<b>1 URL</b>	Displays the URL of the instruction manual.
	<b>2 QR code</b>	Displays the QR code of the instruction manual. Use this QR code when referring to the instruction manual from a smartphone or the like.
<b>Licenses</b>	Displays the license information on the open source software used by this system.	

## 4 Data Details

### 4.1 Major Files and Extensions

The following describes major files and files types used by this system.

Type	Extension	Description
Analysis data	.hpa	Analysis data of Process Analyzer
Test data	.cnr	Test data of FA1283 and 1281, etc.
	.egl	Test data of 1270 and 1271, etc.
	.shk	Test data of FA1116 and 1116, etc. (except for in-circuit testers)
	.prk	Test data of FA1811, etc.
	.wkr	Test data of FA1817, etc.
	.grb	Test data of FA1816, etc.
	.gsh	Test data of FA1813, etc.
Result data	.csv	Test result data. There are two types of file formats. One corresponds to .cnr, .egl, and .shk, and the other corresponds to .prk, .wkr, .grb, and .gsh.
Board data	.wdf	Data created by UA1781. This data includes the information on the wiring pattern and test point.
	.fvr	Data created by UA1782. This data includes the information on the wiring pattern and test point.
Others	.sfd	Data used to create the test data.
	.spd	Data used to create the test data.

### 4.2 Data Configuration

The test data of this system mainly consists of the following data.

Sheet	Entire data for one board.
Block	The block is the unit in which step-and-repeat* is performed and includes at least one piece. Even in different blocks, the piece configuration and step configuration in the block are always the same.
Piece	The piece is the unit of the piece data and includes at least one step. The piece has the judgment. When a PASS judgment is given to all steps included in the piece, a PASS judgment is also given to the piece.
Step	Minimum unit of the test.

\* A design method to panelize multiple same wiring pattern units (blocks) on one sheet.

## 4.2.1 Block, and same-type/multiple-piece layout and different-type/multiple-piece layout

When one sheet consists of multiple pieces, its data configuration is divided into the block and same-type/multiple-piece layout and different-type/multiple-piece layout.

### Same-type/multiple-piece layout

When all pieces are composed of the same step configuration, this data configuration is called the same-type/multiple-piece layout. In the same-type/multiple-piece layout, one block always includes only one piece.

### Different-type/multiple-piece layout

When pieces with different step configurations are mixed, this data configuration is called the different-type/multiple-piece layout. In the different-type/multiple-piece layout, one block includes two or more pieces.

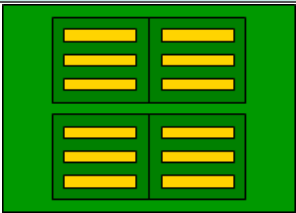
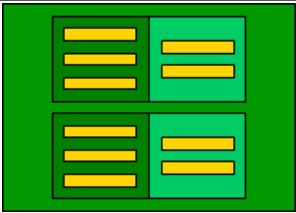
### Block

Regardless of the same-type/multiple-piece layout and different-type/multiple-piece layout, when the entire data is configured by repeating in units of the same piece configurations and the same step configurations, this repeat unit is called the block.

### Relative number

The serial number in the block is called the relative piece number or relative step number.

### Example of data configuration

	Board image	Data configuration (The numerical value notation is "absolute number (relative number)").
Same-type/multiple-piece layout		<pre> graph LR     Sheet --&gt; B1[Block 1]     Sheet --&gt; B2[Block 2]     Sheet --&gt; B3[Block 3]     Sheet --&gt; B4[Block 4]     B1 --&gt; P1[Piece 1(1)]     P1 --&gt; S1[Step 1(1)]     P1 --&gt; S2[Step 2(2)]     P1 --&gt; S3[Step 3(3)]     B2 --&gt; P2[Piece 2(1)]     P2 --&gt; S4[Step 4(1)]     P2 --&gt; S5[Step 5(2)]     P2 --&gt; S6[Step 6(3)]     B3 --&gt; P3[Piece 3(1)]     P3 --&gt; S7[Step 7(1)]     P3 --&gt; S8[Step 8(2)]     P3 --&gt; S9[Step 9(3)]     B4 --&gt; P4[Piece 4(1)]     P4 --&gt; S10[Step 10(1)]     P4 --&gt; S11[Step 11(2)]     P4 --&gt; S12[Step 12(3)]           </pre>
Different-type/multiple-piece layout		<pre> graph LR     Sheet --&gt; B1[Block 1]     Sheet --&gt; B2[Block 2]     B1 --&gt; P1[Piece 1(1)]     P1 --&gt; S1[Step 1(1)]     P1 --&gt; S2[Step 2(2)]     P1 --&gt; S3[Step 3(3)]     B1 --&gt; P2[Piece 2(2)]     P2 --&gt; S4[Step 4(4)]     P2 --&gt; S5[Step 5(5)]     B2 --&gt; P3[Piece 3(1)]     P3 --&gt; S6[Step 6(1)]     P3 --&gt; S7[Step 7(2)]     P3 --&gt; S8[Step 8(3)]     B2 --&gt; P4[Piece 4(2)]     P4 --&gt; S9[Step 9(4)]     P4 --&gt; S10[Step 10(5)]           </pre>

#### **4.2.2 Data consistency of the test data (.cnr, .egl, .shk) between this system and some equipment**

---

Unlike this system, the data configuration of some equipment has no step-and-repeat concept. Therefore, there are no block (unit of step-and-repeat operation) and piece. On the other hand, there is a group or module as a unit to divide the data freely.

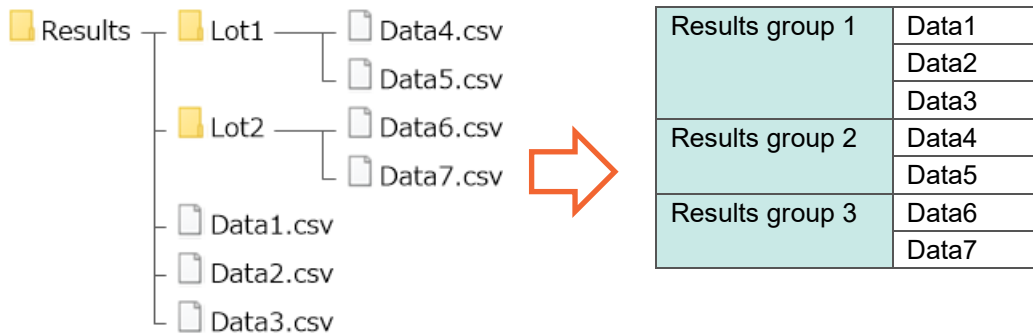
This system checks that the step-and-repeat conditions are satisfied in units of modules or groups when the test data is read, and converts the data configuration into that described in “4.2 Data Configuration (p. 87)” as much as possible.

## 4.3 Results Group

Multiple result data that has been read is divided into several results groups, and then the statistics of each results group can be calculated. The results groups can be set in units of lots (unit of the folder to which the result files are saved) or arbitrary periods. The setting is performed in the window described in “3.3 Results Group Window (p.77)”.

### Designation in units of lots

The results group of each folder to which the result file is saved is set.



## 4.4 Stat. Unit (Statistics Unit)

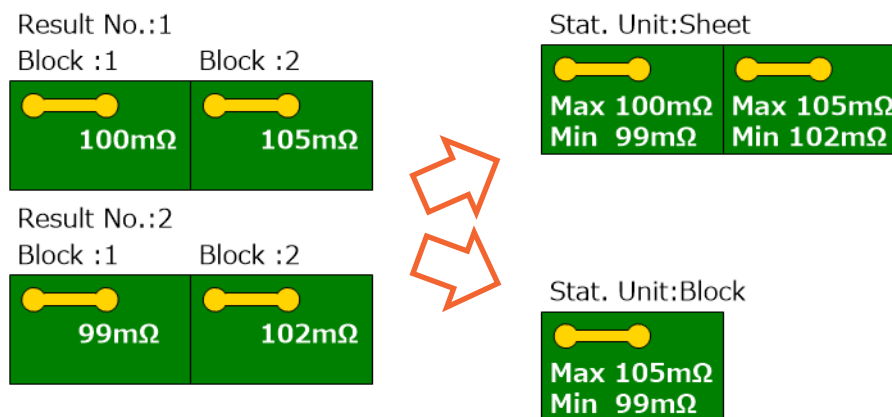
When the board consists of multiple blocks (p. 88), the statistics are calculated in two ways described below.

- The sheet is considered as one unit.
- The block is considered as one unit.

In this system, this is called the statistical unit.

When the statistics unit is Sheet, the blocks in the sheet are considered as different blocks and various statistics of each different block are calculated. On the other hand, when the statistics unit is Block, the blocks in the sheet are considered as the same blocks and various statistics of all blocks are calculated.

The statistics unit is changed in the window described in “3.4 Config Window (p. 80)”.



## 4.5 Step

The minimum unit of the board test is displayed.

### List display

#### Test Data File

<b>Step</b>	Absolute step number. Serial step number of the entire inspection data.	
<b>Step (Rel.)</b>	Relative step number. Serial step number in the block (p. 88). When the statistics unit (p. 90) is Block, the statistics of all steps with the same relative step number are calculated.	
<b>Meas. Category</b>	Meas. Category The measurement category is not set in the test data, .cnr, .egl, and .shk. When the data is read, the measurement category is allocated automatically by judging the measurement mode or each measurement condition.	
<b>Step (Cate.)</b>	Step number in the absolute category. Serial step number of each measurement category.	
<b>Block</b>	Block number of the block to which the step belongs.	
<b>Piece</b>	Piece number of the piece to which the step belongs.	
<b>Meas. Mode</b>	Measurement mode.	
<b>R</b>	Measurement range.	
<b>Act.</b>	Actual value.	
<b>Ref.</b>	Reference value.	
<b>Upp. Lim.</b>	<b>Abs.</b>	Absolute value of the upper limit value.
	<b>%</b>	Ratio of the upper limit value to the reference value.
<b>Low. Lim.</b>	<b>Abs.</b>	Absolute value of the lower limit value.
	<b>%</b>	Ratio of the lower limit value to the reference value.
<b>J</b>	Jump flag. When this flag is set, this step is not tested.	
<b>H, L</b>	<b>Point</b>	Test point number.
	<b>Net</b>	Net number to which the test point belongs.
<b>Step Name</b>	Name given to the step.	

#### Result data

<b>Result No.</b>	Result number. The result number is a unique number created by this system that is allocated to the data that has been read from 1 in the order of test date and time.
<b>Judg. Code</b>	Judgment code. (null) shows that there is no judgment code.
<b>O-Judg.</b>	Output judgment. (null) shows that there is no output judgment.
<b>Meas.</b>	Measurement value. (N/A) shows that there is no measurement value (missing value).
<b>AC Phase</b>	Phase when the AC measurement is performed.
<b>Meas. / Ref.</b>	Value created from the measurement value divided by the reference value.
<b>Meas. / Mean</b>	Value created from the measurement value is divided by the mean value.
<b>Meas. / Median</b>	Value created from the measurement value is divided by the median value.
<b>z-Score</b>	z-Score. z-Score = (measurement value - mean value) / standard deviation
<b>S.D.</b>	Singularity degree (p. 92).
<b>Machine ID</b>	ID of the instrument that has tested this step.
<b>Results Group</b>	Results group to which this step belongs.

### Statistics data\*

<b>Max.</b>	Maximum value of the measurement value.
<b>Min.</b>	Minimum value of the measurement value.
<b>Mean</b>	Mean value of the measurement value.
<b><math>\sigma</math></b>	Standard deviation of the measurement value.
<b>CV (<math>\sigma</math>/Mean)</b>	Coefficient of variance of the measurement value. Coefficient of variance = standard deviation / mean value
<b>Median</b>	Median value of the measurement value.
<b>MAD (Median)</b>	Median absolute deviation of the measurement value.
<b>Cp</b>	Process capability index of the measurement value.
<b>Cpk</b>	Process capability index that considers the deviation of the mean value of the measurement values.
<b>Step: Judg. Code</b>	Number of judgment codes of the step and its ratio.
<b>Step: O-Judg.</b>	Number of output judgments of the step and its ratio.

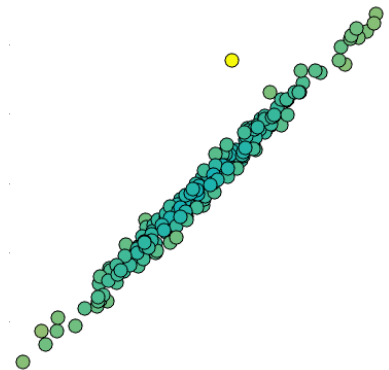
\* The statistics data of each step in the results group is calculated. When the statistics unit is Block, the statistics of all steps with the same relative step number are calculated.

#### 4.5.1 Singularity Degree (Pro version only)

“Singularity degree” in this system is a numerical value that shows the singularity of each step calculated by Hioki’s original algorithm. The correlation between the steps in the entire inspection result subject to statistical analysis is considered. When the measurement value is outside the range of the correlation and particularly high, the singularity degree is large. Conversely, when it is low, the singularity degree is small. The smaller the singularity, the closer the singularity degree is to 0.

Generally, when there are local errors such as through-hole cracks or “mouse bite” holes, the absolute value of the singularity degree tends to be large.

In addition, regardless of the setting of the statistics unit (p. 90), the singularity degree is always calculated using the Block unit for the statistics.



## 4.6 Piece

Unit of one piece. One piece includes one or more steps. The judgment of the piece is decided by the judgment of the step. One sheet includes one or more pieces.

### List display

#### Test data system

<b>Piece</b>	Absolute piece number.
<b>Piece (Rel.)</b>	Relative piece number.

#### Result data system

<b>Result No.</b>	Result number. The result number is a unique number created by this system that is allocated to the data that has been read from 1 in the order of test date and time.
<b>Judg.</b>	Judgment. (null) shows that there is no judgment.
<b>O-Judg.</b>	Output judgment. (null) shows that there is no output judgment.
<b>Machine ID</b>	ID of the instrument that has tested this piece.
<b>Results Group</b>	Results group to which this piece belongs.

#### Statistics data system\*

<b>Piece: Judg.</b>	Number of piece judgments and its ratio.
<b>Piece: O-Judg.</b>	Number of piece output judgments and its ratio.

\* The statistics data of each piece in the results group is calculated. When the statistics unit is Block, the statistics of all pieces with the same relative piece number are calculated.

## 4.7 Sheet

Unit of one board to be tested. One sheet includes one or more pieces. The judgment of the sheet is decided by the judgment of the piece.

### List display

#### Result data system

<b>Result No.</b>	Result number. The result number is a unique number created by this system that is allocated to the data that has been read from 1 in the order of test date and time.	
<b>Tested Date and Time</b>	<b>Start</b>	Test start date and time.
	<b>End</b>	Test end date and time.
<b>Judg.</b>	Judgment. (null) shows that there is no judgment.	
<b>O-Judg.</b>	Output judgment. (null) shows that there is no output judgment.	
<b>Machine ID</b>	ID of the instrument that has tested this sheet.	
<b>Results Group</b>	Results group to which this piece belongs.	
<b>Piece: Judg.</b>	Number of judgments of pieces <b><u>included in the sheet</u></b> and its ratio.	
<b>Piece: O-Judg.</b>	Number of output judgments of the pieces <b><u>included in the sheet</u></b> and its ratio.	

#### Statistics data system\*

<b>TotalSheet Count</b>	Total number of sheets included in the results group.
<b>Sheet: Judg.</b>	Number of sheet judgments and its ratio.
<b>Sheet: O-Judg.</b>	Number of sheet output judgments and its ratio.

\* The statistics data is calculated in the results group.

## 5 Common Usage

### 5.1 Checking Variations in Wiring Resistance

#### Analysis tools to be used

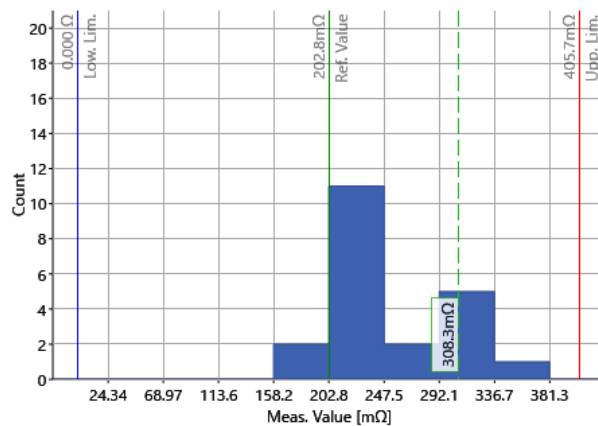
- Histogram (p. 48)
- Line Chart (p. 44)

#### 1. Select the step.

Select the 4-wire continuity step to check variations in wiring resistance.

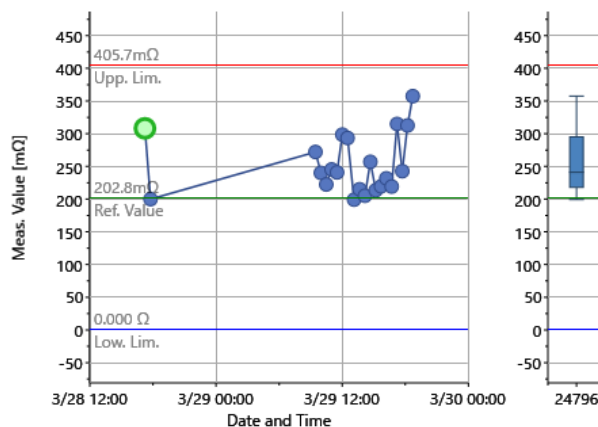
#### 2. Display a histogram.

Check for variations using a histogram. Since the 4-wire continuity step displays the reference value, upper limit value, and lower limit value, you can understand how the wiring resistance value of the specified step varies between the upper and lower limit values.



#### 3. Display a line chart.

Furthermore, a line chart is convenient to check chronological variations.



## 5.2 Comparing the Failure Rate of the Piece of Each Lot

### Analysis tools to be used

- Piece Statistics List (p. 69)
- Judgment Bar Chart (p. 71)

Compare the failure rate of the step in the same manner as described in the step statistics list.

### 1. Specify the results group.

Select **Lot** or **Period** in the Results Group window (p. 77). When selecting **Period**, set the start date and time and the end date time in Periods Setting.

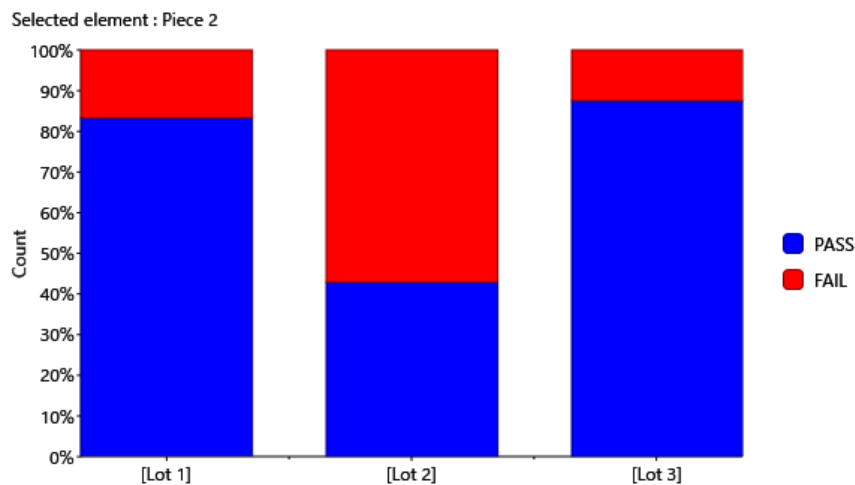
### 2. Compare the failure rate in Piece Statistics List.

In Piece Statistics List, the statistics of the results groups can be compared in a tabular form. When Piece Statistics List is opened after the results group has been specified, the ratio of each judgment is displayed.

Results Group	Piece	Piece (Rel.)	Piece: Judg.					
			(null)		PASS		FAIL	
[Lot 1]	18	1	0	0.0%	6	100.0%	0	0.0%
[Lot 2]	18	1	0	0.0%	4	57.1%	3	42.9%
[Lot 3]	18	1	0	0.0%	5	62.5%	3	37.5%

### 3. Compare the failure rate in Judgment Bar Chart.

To visually check the ratio of the judgment, use Judgment Bar Chart. When you select **Piece** in **Counting objects**, a bar chart that summarizes the piece judgments of each lot is displayed. In particular, when **Value** is set to **%**, the ratio of the judgment can be displayed in an accumulation bar chart form.



## 5.3 Looking for a Location with Low Process Capability Index (Cp or Cpk)

### What is a process capability index?

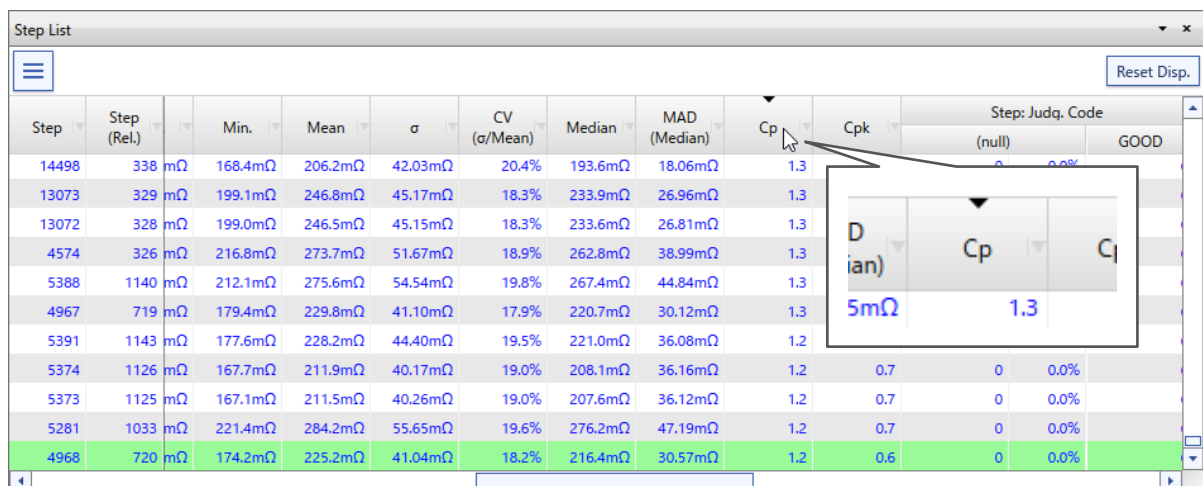
This process capability is a capability related to process quality. The process capability index is a scale that shows how wide the variation degree of the production fits to the actual value. Generally, when this value is 1.33 or more, it is judged that the process capability is sufficient. When it is less than 1.00, it is judged that the process capability is insufficient.

### Analysis tools to be used

- Step List (p. 22)
- Step Statistics List (p. 70)
- Line Chart (p. 44)

### 1. Sort Step List by Cp (or Cpk).

Open Step List and click the column header of Cp (or Cpk) to sort the data in the ascending or descending order of Cp (or Cpk). After that, select a location with particularly low process capacity in all data.



The screenshot shows the 'Step List' window. A callout box highlights the 'Cp' column header, which has a dropdown arrow. Below the header, the value '1.3' is displayed. The table lists various steps with their respective process capability indices.

Step	Step (Rel.)	Min.	Mean	$\sigma$	CV ( $\sigma$ /Mean)	Median	MAD (Median)	Cp	Cpk	Step: Judg. Code
14498	338	mΩ	168.4mΩ	206.2mΩ	42.03mΩ	20.4%	193.6mΩ	18.06mΩ	1.3	(null)
13073	329	mΩ	199.1mΩ	246.8mΩ	45.17mΩ	18.3%	233.9mΩ	26.96mΩ	1.3	GOOD
13072	328	mΩ	199.0mΩ	246.5mΩ	45.15mΩ	18.3%	233.6mΩ	26.81mΩ	1.3	
4574	326	mΩ	216.8mΩ	273.7mΩ	51.67mΩ	18.9%	262.8mΩ	38.99mΩ	1.3	
5388	1140	mΩ	212.1mΩ	275.6mΩ	54.54mΩ	19.8%	267.4mΩ	44.84mΩ	1.3	
4967	719	mΩ	179.4mΩ	229.8mΩ	41.10mΩ	17.9%	220.7mΩ	30.12mΩ	1.3	
5391	1143	mΩ	177.6mΩ	228.2mΩ	44.40mΩ	19.5%	221.0mΩ	36.08mΩ	1.2	
5374	1126	mΩ	167.7mΩ	211.9mΩ	40.17mΩ	19.0%	208.1mΩ	36.16mΩ	1.2	0.7 0 0.0%
5373	1125	mΩ	167.1mΩ	211.5mΩ	40.26mΩ	19.0%	207.6mΩ	36.12mΩ	1.2	0.7 0 0.0%
5281	1033	mΩ	221.4mΩ	284.2mΩ	55.65mΩ	19.6%	276.2mΩ	47.19mΩ	1.2	0.7 0 0.0%
4968	720	mΩ	174.2mΩ	225.2mΩ	41.04mΩ	18.2%	216.4mΩ	30.57mΩ	1.2	0.6 0 0.0%

### 2. Check Step Statistics List using Cp (or Cpk).

In Step Statistics List, you can compare Cp (or Cpk) of the selected step of each results group. Accordingly, you can judge whether the lot specific symptom leads to the low process capacity.

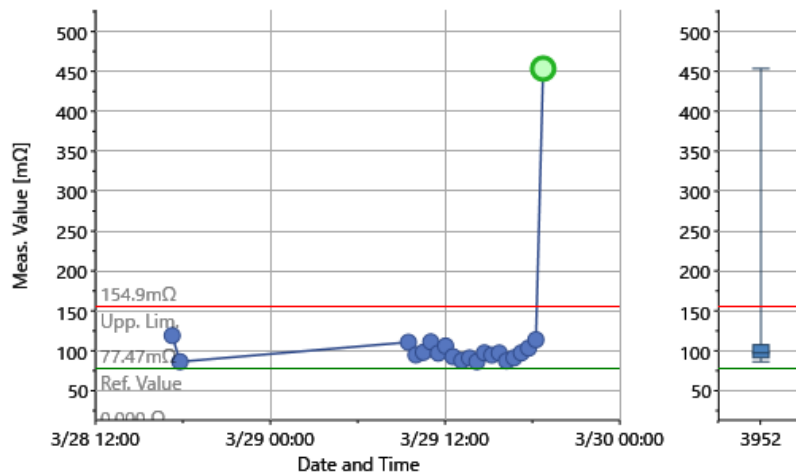
Step Statistics List

Reset Disp.

Results Group	Step	Step (Rel.)	CV ( $\sigma$ /Mean)	Median	MAD (Median)	Cp	Cpk	Step: Judg. Code					
								(null)		GOOD		HIGH	
[Lot 3]	4968	720	10.7%	223.6mΩ	18.31mΩ	2.2	1.2	0	0.0%	8	100.0%	0	0.0%
[Lot 2]	4968	720	13.0%	209.1mΩ	18.94mΩ	1.9	1.3	0	0.0%	7	100.0%	0	0.0%
[Lot 1]	4968	720	18.2%	216.4mΩ	30.57mΩ	1.2	0.6	0	0.0%	6	100.0%	0	0.0%

### 3. Check the details with a line chart, etc.

For the location with a low process capability index, the cause may be identified by checking changes in chronological value.



## 5.4 Looking for a Location Suspected to Have a Potential Failure (Pro version only)

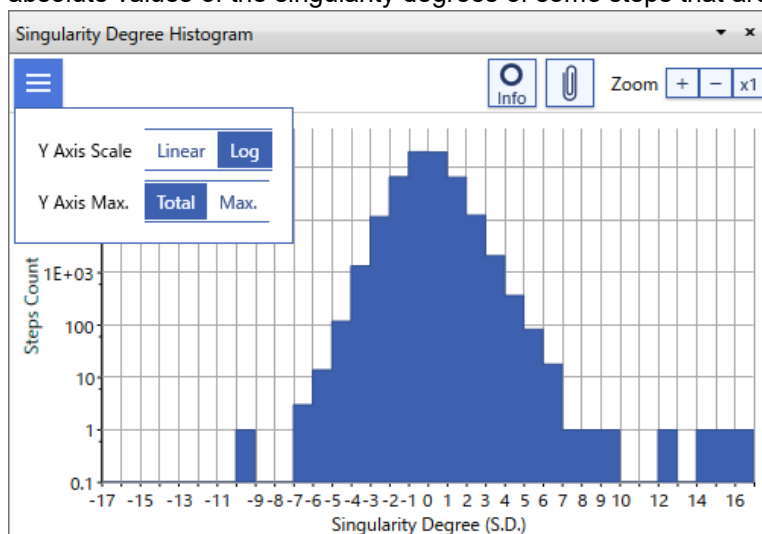
When checking the singularity degree (p. 92), you can use the test instrument to look for a location suspected to have a potential failure from the PASS steps in which the reference values are satisfied.

### Analysis tools to be used

- Singularity Degree Histogram (p. 67)
- Singularity Degree List (p. 66)
- Point Visualizer (p. 24)
- Net Visualizer (p. 27)

### 1. Check the distribution of the singularity degree with the singularity degree histogram.

Variations in singularity degree of all steps of all result data whose singularity degrees in the results group have been calculated are displayed in a histogram. When the singularity degree is closer to 0, it is correct. Normally, the singularity degrees of most steps are concentrated around 0. However, the absolute values of the singularity degrees of some steps that are statistically abnormal become large.



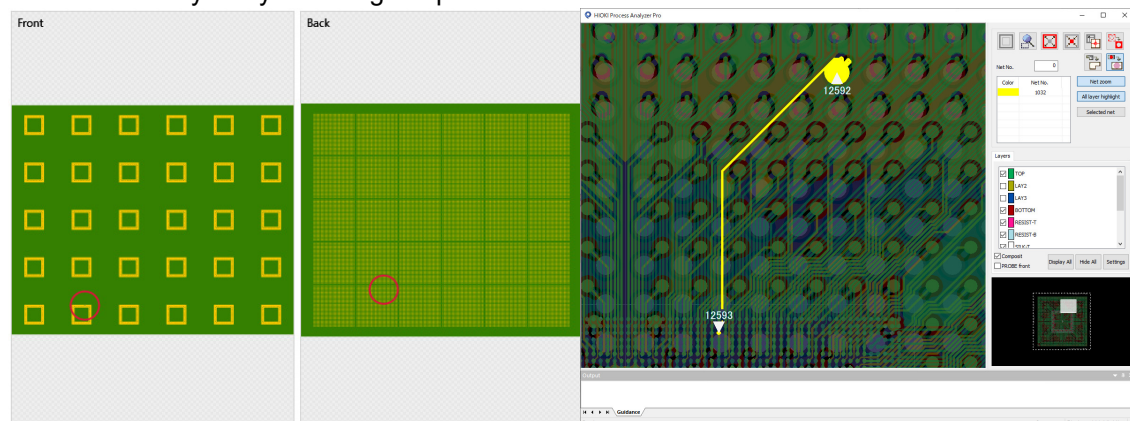
## 2. Specify actual steps with the singularity degree list.

In the singularity degree list, all steps whose singularity degrees in the results group have been calculated are displayed in the order of singularity degree. You can specify steps with large absolute value of the singularity degree in the singularity degree list.

Singularity Degree List										
Result No.	Step	Step (Rel.)	S.D.	Meas. Category	Step (Cate.)	Block	Piece	Meas. Mode	R	Judg. Code
6	6937	1273	16.358	4WCont.	6937	5	5	R-CC	3	GOOD
15	20649	825	15.625	4WCont.	20649	15	15	R-CC	3	GOOD
14	36206	806	14.627	4WCont.	36206	26	26	R-CC	3	GOOD
15	37786	970	12.300	4WCont.	37786	27	27	R-CC	3	GOOD
2	24667	595	9.161	4WCont.	24667	18	18	R-CC	3	GOOD
1	5265	1017	8.521	4WCont.	5265	4	4	R-CC	2	GOOD
8	5932	268	7.163	4WCont.	5932	5	5	R-CC	3	GOOD
1	23899	1243	6.857	4WCont.	23899	17	17	R-CC	3	GOOD
11	36449	1049	6.812	4WCont.	36449	26	26	R-CC	3	GOOD
4	14578	418	6.714	4WCont.	14578	11	11	R-CC	2	GOOD
3	4670	422	6.699	4WCont.	4670	4	4	R-CC	2	GOOD
5	6625	961	6.683	4WCont.	6625	5	5	R-CC	2	GOOD
21	22371	1131	6.610	4WCont.	22371	16	16	R-CC	3	HIGH

## 3. Specify positions on the board with Point Visualizer or Net Visualizer.

When analyzing the steps in more detail using the X-ray after specifying the steps, they can be moved to the next analysis by checking the positions on the board with Point Visualizer or Net Visualizer.



## 6 Specifications

### 6.1 General Specifications

#### 6.1.1 Operating environment

OS	Windows10 (64-bit)
CPU	x64 processor, 1.0 GHz or more (2.0 GHz or more is recommended.)
Memory	2 GB (4 GB is recommended) or more
Screen resolution	SXGA (1280 × 1024) or more (FullHD [1920 × 1080] or more is recommended.)
.NET Framework	Microsoft .NET Framework 4.6 and language pack corresponding to the execution environment have been installed.

#### 6.1.2 Others

Supported language	English, Japanese, Simplified Chinese, Traditional Chinese, and Korean
--------------------	--

### 6.2 Data Configuration

Item	Description	Max.
Block data	Step-and-repeat data	None
Piece data	Piece data of test board	None
Step data	Minimum unit of the test.	None
Point data	Test coordinate value information	None
Sheet result data	Sheet judgment	None
Piece result data	Piece judgment	None
Step result data	Step judgment, measurement value	None

### 6.3 Licenses

Sales license	License with the expiration date specified by the USB hardware key. All functions for the Pro version can be used.
Trial license	License with the expiration date specified by the license file. All functions for the Pro version can be used. However, all of the result data shown below cannot be read. <ul style="list-style-type: none"><li>• Result data of which the test date and time is after the specified period</li><li>• Result data of which the test date and time is after the current time of the OS.</li></ul>
No license	The functions for the Pro version cannot be used.

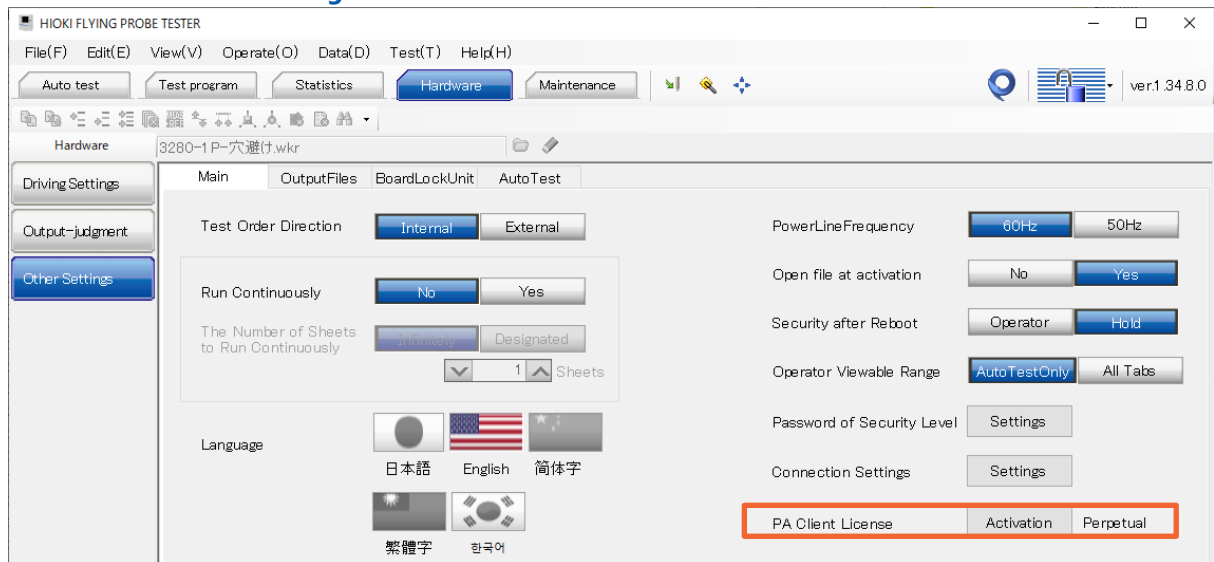
# 7 Process Analyzer Client

Process Analyzer Client is an optional function of the FA1800 series test instrument. All of the following descriptions are related to PC software installed in the test instrument.

## 7.1 License Activation

You have to activate the license (p.111) to use the functions of the Process Analyzer Client.

**Hardware -> Other Settings -> Main**

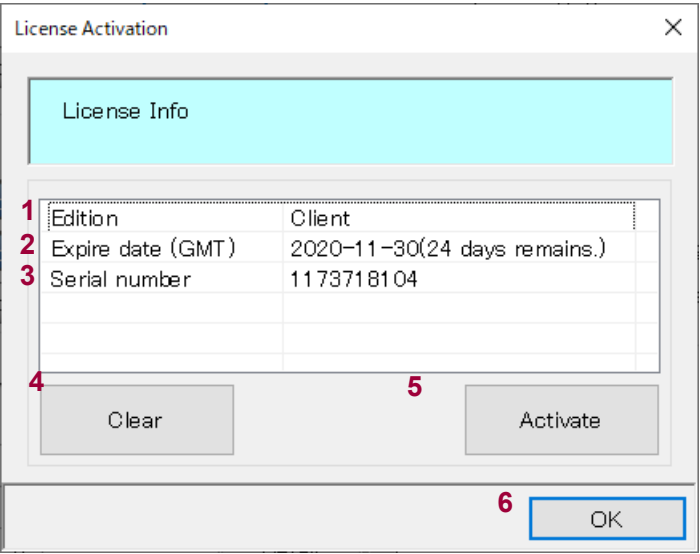


### PA Client License

Displays the current license status. Click the **Activation** button to display the **License Activation** dialog (p. 102).

### 7.1.1 License Activation dialog

This dialog displays the current license information related to Process Analyzer Client.



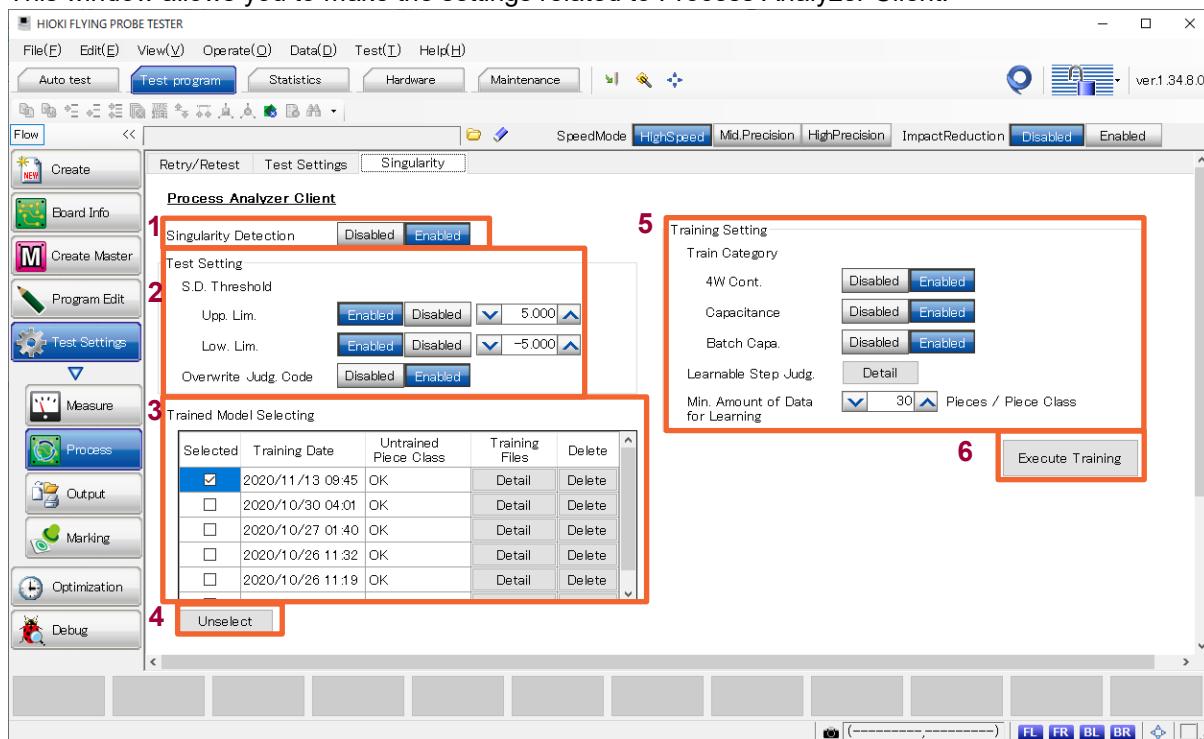
1 Edition	Displays the current license type.
2 Expire date (GMT)	Displays the expiration date of the license.
3 Serial number	Displays the serial number of the license. The serial number is not displayed for the trial license.
4 Clear button	Cancels the activation of the license for the trial license.
5 Activate button	Selects the trial license file and activates the license.
6 OK button	Closes the dialog.

## 7.2 Config Window

### 7.2.1 Singularity detection window

Test program -> Test Settings -> Process -> Singularity

This window allows you to make the settings related to Process Analyzer Client.

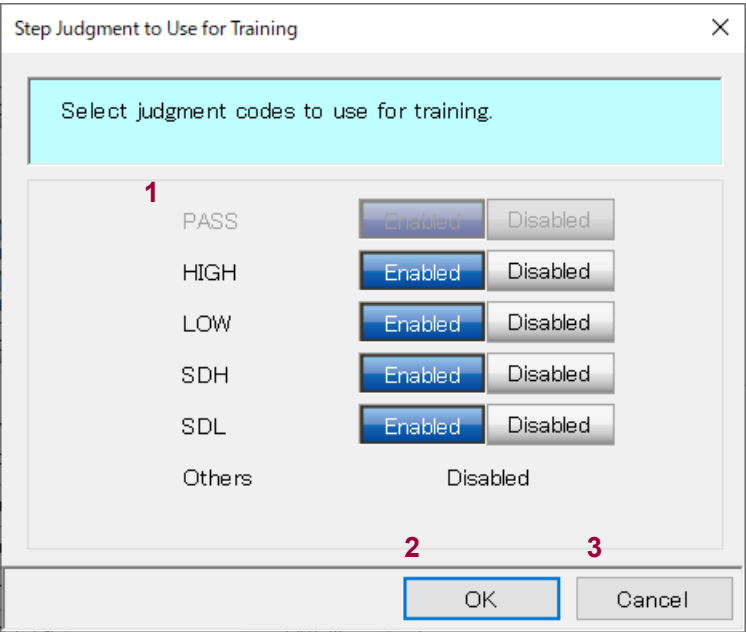


1 Singularity Detection	Set whether to detect the singularity.	
2 Test Setting	S.D. Threshold	A step whose singularity degree is above the set upper limit value or below the set lower limit value is judged to be the singularity.
	Overwrite Judg. Code	When <b>Disabled</b> is set, the statistics judgment of the singularity is SDH or SDL, but the value at the time of testing is maintained for the judgment code. When <b>Enabled</b> is set, the judgment code of the singularity is overwritten with the statistics judgment and the original judgment code is saved as the original judgment at the time of statistics judgment.

<b>3 Trained Model Selecting</b>	The distribution of the measurement values that is trained from the test result data is called a “model”. The singularity degree is calculated based on the model during auto test. When multiple models are trained, select one of them to use for the singularity detection.	
	<b>Selected</b>	Select the specified model.
	<b>Training Date</b>	Displays the date and time when the model was trained.
	<b>Untrained Piece Class</b>	Displays the untrained piece class number since the trained data is insufficient.
	<b>Training Files</b>	Displays a list of the files used for training the model.
	<b>Delete</b>	Delete the model.
<b>4 Unselect button</b>	Unselects all models. In this case, the singularity detection is not performed during auto test.	
<b>5 Training Setting</b>	<b>Train Category</b>	Select whether to train the model for each test category. The category that does not need to detect the singularity is set to <b>Disabled</b> .
	<b>Learnable Step Judg.</b>	Specify the judgment code used for training the model. The piece including the judgment code that is disabled here cannot be used for training. Click the <b>Detail</b> button to display the <b>Step Judgment to Use for Training</b> dialog (p. 105).
	<b>Min. Amount of Data for Training</b>	The piece class whose total number of pieces is less than the specified number during training execution is not trained.
<b>6 Execute Training button</b>	Displays the <b>Execute Training</b> dialog (p. 106).	

7.2.2 Step Judgment to Use for Training dialog

This dialog allows you to select the judgment code of the step used for training the model.



1 Judg. Code Select	Select whether to use each judgment code for training the model.
2 OK button	Changes the setting and closes this dialog.
3 Cancel button	Closes this dialog without changing the setting.

## 7.2.3 Execute Training dialog

This dialog is used to train the model.

The 'Execute Training' dialog box contains the following elements:

- 1 How to select files:** A group box containing three buttons: 'Same as Result File Output Folder', 'Select any folders' (highlighted), and 'Select any files'.
- 2 Include subdirectories:** Two buttons, 'Yes' (highlighted) and 'No'.
- 3 Files to learn:** A group box containing 'All' (highlighted), 'Latest N files', a numeric input field set to '100', and a 'files' label.
- 4 Selected Folders:** A section with an 'Add' button and a table with columns 'Unselect' and 'Selected Folder'. One row is visible with the path 'D:\SampleData\Sample1\ResultData'.
- 5 Selected files:** A section with a table with columns 'Selected File'. Four rows are visible, each containing a file path ending in '.csv'. The first row is highlighted.
- 6 Start Training** and **7 Cancel** buttons at the bottom right.

When **Select any files** is selected in **How to select files**, the **Add** and **Unselect** buttons are displayed.

This inset shows the 'Selected files' section of the dialog. It includes an 'Add' button and a table with columns 'Unselect' and 'Selected File'. The table contains five rows, each with an 'Unselect' button and a file path.

<b>1 How to select files</b>	<b>Same as Result File Output Folder</b>	Select the folder specified as the result output destination of the test instrument.
	<b>Select any folders</b>	Select a desired folder.
	<b>Select any files</b>	Select a desired file regardless of the folder.
<b>2 Include subdirectories</b>	When <b>Same as Result File Output Folder</b> or <b>Select any folders</b> is selected in <b>How to select files</b> , select whether to also search sub-folders of the selected folder.	
<b>3 Files to learn</b>	<b>All</b>	Uses all selected files for training.
	<b>Latest N files</b>	Uses only the specified number of files from the selected files with the newest test date and time for training.

<b>4 Selected Folders</b>	Displays a list of the currently selected folders.	
	<b>Add</b> button	Selects a desired folder to add it. This button is displayed only when <b>Select any folders</b> is selected in <b>How to select files</b> .
	<b>Unselect</b> button	Excludes the specified folder from the selected folders. This button is displayed only when <b>Select any folders</b> is selected in <b>How to select files</b> .
<b>5 Selected files</b>	Displays a list of the currently selected files. The result file displayed here is used for training the model.	
	<b>Add</b> button	Selects a desired file to add it. This button is displayed only when <b>Select any files</b> is selected in <b>How to select files</b> .
	<b>Unselect</b> button	Excludes the specified file from the selected files. This button is displayed only when <b>Select any files</b> is selected in <b>How to select files</b> .
<b>6 Start Training</b> button	Starts the model training.	
<b>7 Cancel</b> button	Closes the dialog without training the model.	

## 7.3 Usage

### 7.3.1 Workflow for singularity detection

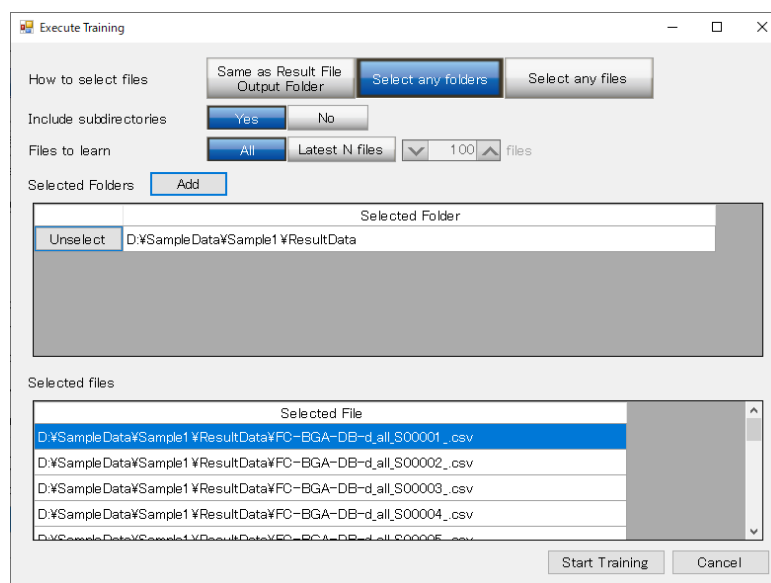
#### Step 1 Testing the sample boards for training

For the board used to detect the singularity, prepare multiple sample boards for training, and then test them. It is not necessary that all samples are PASS. However, the PASS pieces that are preset **Min. Amount of Data for Training** or more need to be included.

At this time, the setting of Process Analyzer Client is not needed. However, follow “2.3 Setting the Test Instrument Output (p. 10)” to output all of the necessary result data.

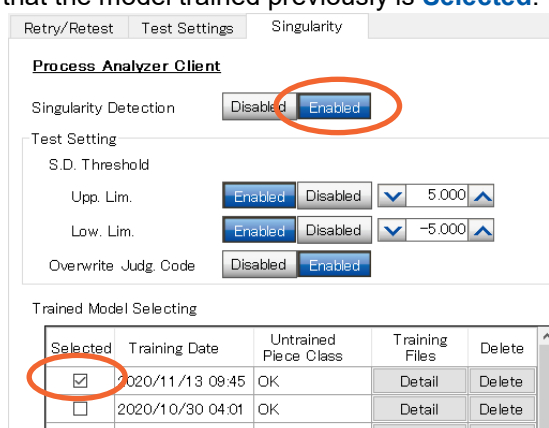
#### Step 2 Training the model

Click the **Execute Training** button in the singularity detection window (p. 103) to display the **Execute Training** dialog (p. 106). Select the result data file of the sample boards in Step 1, and click the **Start Training** button.



#### Step 3 Setting the singularity detection

Check the setting in the singularity detection window (p. 103). In particular, check that **Singularity Detection** is **Enabled** and that the model trained previously is **Selected**.



#### Step 4 Performing the auto test of the board

When the setting is complete, start the auto test of the board again.

## Step 5 Checking the singularity

In the step of the PASS piece, the singularity degree is calculated. The statistics judgment of the singularity (step in which the singularity degree is outside the upper and lower limit values) is SDH or SDL. When **Overwrite Judg. Code** is **Enabled** on the singularity detection window (p. 103), the judgment before singularity detection is saved to the **StOrg Judg.** field and the **Judg.** is overwritten with the **Stat. Judg.**.

### Overwrite Judg. Code: Disabled

Cont.		Ins.	4WCont.	Component		<input type="checkbox"/> Multiselection									
4WCont.		Piece	1	Step	1	Filter	All	4624							
Step	Judg.	Stat. Judg.	StOrg Judg.	J	Mode	R	Reference	Measure	Upp.Lim.	Low.Lim.	S.D.	H Point			
												Point	Net	4W	2A
1	PASS	PASS		<input type="checkbox"/>	R-CC	3	68.34 mΩ	54.97 mΩ	30.0 %	-30.0 %	1.357	418	1	<input checked="" type="checkbox"/>	
2	PASS	PASS		<input type="checkbox"/>	R-CC	3	12.73 mΩ	13.39 mΩ	30.0 %	-30.0 %	1.904	2380	1	<input checked="" type="checkbox"/>	
3	PASS	PASS		<input type="checkbox"/>	R-CC	3	427.4 mΩ	444.5 mΩ	30.0 %	-30.0 %	1.608	2379	1	<input checked="" type="checkbox"/>	
4	PASS	SDL		<input type="checkbox"/>	R-CC	3	486.9 mΩ	503.9 mΩ	30.0 %	-30.0 %	-5.200	2378	2	<input checked="" type="checkbox"/>	
5	PASS	PASS		<input type="checkbox"/>	R-CC	3	142.0 mΩ	152.3 mΩ	30.0 %	-30.0 %	-1.764	423	2	<input checked="" type="checkbox"/>	
6	PASS	PASS		<input type="checkbox"/>	R-CC	3	335.2 mΩ	330.2 mΩ	30.0 %	-30.0 %	0.353	424	2	<input checked="" type="checkbox"/>	
7	PASS	SDH		<input type="checkbox"/>	R-CC	3	385.8 mΩ	367.9 mΩ	30.0 %	-30.0 %	5.700	291	3	<input checked="" type="checkbox"/>	
8	PASS	PASS		<input type="checkbox"/>	R-CC	3	459.5 mΩ	500.8 mΩ	30.0 %	-30.0 %	-0.347	2376	3	<input checked="" type="checkbox"/>	
9	PASS	PASS		<input type="checkbox"/>	R-CC	3	139.7 mΩ	130.7 mΩ	30.0 %	-30.0 %	2.865	2375	3	<input checked="" type="checkbox"/>	
10	PASS	PASS		<input type="checkbox"/>	R-CC	3	113.8 mΩ	110.4 mΩ	30.0 %	-30.0 %	-1.358	2374	4	<input checked="" type="checkbox"/>	

### Overwrite Judg. Code: Enabled

Cont.		Ins.	4WCont.	Component		<input type="checkbox"/> Multiselection									
4WCont.		Piece	1	Step	1	Filter	All	4624							
Step	Judg.	Stat. Judg.	StOrg Judg.	J	Mode	R	Reference	Measure	Upp.Lim.	Low.Lim.	S.D.	H Point			
												Point	Net	4W	2A
1	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	68.34 mΩ	54.97 mΩ	30.0 %	-30.0 %	1.357	418	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	12.73 mΩ	13.39 mΩ	30.0 %	-30.0 %	1.904	2380	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	427.4 mΩ	444.5 mΩ	30.0 %	-30.0 %	1.608	2379	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SDL	SDL	PASS	<input type="checkbox"/>	R-CC	3	486.9 mΩ	503.9 mΩ	30.0 %	-30.0 %	-5.200	2378	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	142.0 mΩ	152.3 mΩ	30.0 %	-30.0 %	-1.764	423	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	335.2 mΩ	330.2 mΩ	30.0 %	-30.0 %	0.353	424	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	SDH	SDH	PASS	<input type="checkbox"/>	R-CC	3	385.8 mΩ	367.9 mΩ	30.0 %	-30.0 %	5.700	291	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	459.5 mΩ	500.8 mΩ	30.0 %	-30.0 %	-0.347	2376	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	139.7 mΩ	130.7 mΩ	30.0 %	-30.0 %	2.865	2375	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	113.8 mΩ	110.4 mΩ	30.0 %	-30.0 %	-1.358	2374	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	PASS	PASS	PASS	<input type="checkbox"/>	R-CC	3	318.8 mΩ	321.8 mΩ	30.0 %	-30.0 %	1.358	128	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### 7.3.2 Retesting the singularity

The resistance value may be slightly large in the range where the judgment may be PASS depending on the contact state between the probe and board. Since the increase in this resistance value may appear as a singularity, retesting the singularity may improve the symptom. Make the following setting to retest the singularity.

**Test program -> Test Settings -> Process -> Retry/Retest -> Retest: Enabled**

**Test program -> Test Settings -> Process -> Singularity -> Overwrite Judg. Code: Enabled**

The screenshot shows the 'Retry/Retest' settings window. The 'Retest' option is circled in red and set to 'Enabled'. Other settings include 'Measure Retry' (Disabled), 'Quasi-open Retry' (Disabled), 'Applied Voltage' (1 V), 'Applying Time' (1 msec), 'Limit of Fail' (Disabled), 'Flying' (Disabled), 'Up-Down Retry' (Disabled), and 'Moving Retry' (Disabled).

The screenshot shows the 'Singularity' settings window. The 'Overwrite Judg. Code' option is circled in red and set to 'Enabled'. Other settings include 'Singularity Detection' (Disabled), 'S.D. Threshold' (5.000), 'Upp. Lim.' (5.000), 'Low. Lim.' (-5.000), and 'Trained Model Selecting'.

Selected	Training Date	Untrained Piece Class	Training Files	Delete
<input checked="" type="checkbox"/>	2020/11/13 09:45	OK	Detail	Delete
<input type="checkbox"/>	2020/10/30 04:01	OK	Detail	Delete

## 7.4 Related Data

The following summarizes the data that is related to Process Analyzer Client and added to the PC software of the FA1800 series instrument main unit.

### 7.4.1 Step data

Singularity degree	Singularity degree calculated from the measurement values during auto test.
Statistics judgment	Dedicated judgment when the singularity is detected.
Original judgment of statistics judgment	When <b>Overwrite Judg. Code</b> is performed during singularity detection, the judgment code is overwritten with the statistics judgment. At this time, the original judgment code is saved as the original judgment at the time of statistics judgment.

### 7.4.2 Judgment code and output judgment

Judgment code	SDH	The singularity degree is above the upper limit value.
	SDL	The singularity degree is below the lower limit value.
O-Judg.	STH_4W	The singularity degree is above the upper limit value in the 4-wire continuity step.
	STL_4W	The singularity degree is below the lower limit value in the 4-wire continuity step.
	STH_C	The singularity degree is above the upper limit value in the capacity or batch capacity step.
	STL_C	The singularity degree is below the lower limit value in the capacity or batch capacity step.

### 7.4.3 File

Type	Extension	Description
Statistics data	.hps	Statistics data used for singularity detection in the Process Analyzer This data is generated automatically during model training and saved to the dedicated folder in the same folder as the test data.

## 7.5 Licenses

Sales license	License with the expiration date specified by the USB hardware key All functions for the Client version can be used.
Trial license	License with the expiration date specified by the license file All functions for the Client version can be used. However, all of the result data shown below cannot be read. <ul style="list-style-type: none"><li>• Result data of which the test date and time is after the expiration date.</li><li>• Result data of which the test date and time is after the current time of the OS.</li></ul>
No license	The functions for the Client version cannot be used.

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# UA1801 Data Analysis Software Process Analyzer Pro

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  - 2. The Software has the functions of Process Analyzer which can be downloaded from our website (hereinafter referred to as Process Analyzer). If you use the functions of Process Analyzer alone, the license terms of Process Analyzer have priority over this Agreement.
-



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<http://www.hioki.com>



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