

## SPECIFICATIONS DATA PROCESSOR

SR-09-002EN

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### 1. GENERAL

Installed on MinebeaMitsumi's LTS-\*NB type testing machine, this data processor performs various kinds of tests according to the test conditions set previously, show the test force-elongation diagrams during the test, and test results of the test force-elongation diagrams can be stored.

Input for test conditions can be available by using a mouse and keyboard.

Selected test conditions can perform various setting for the testing machine through the USB.

During the test, the various calculations capture the data of the test force and position (displacement).

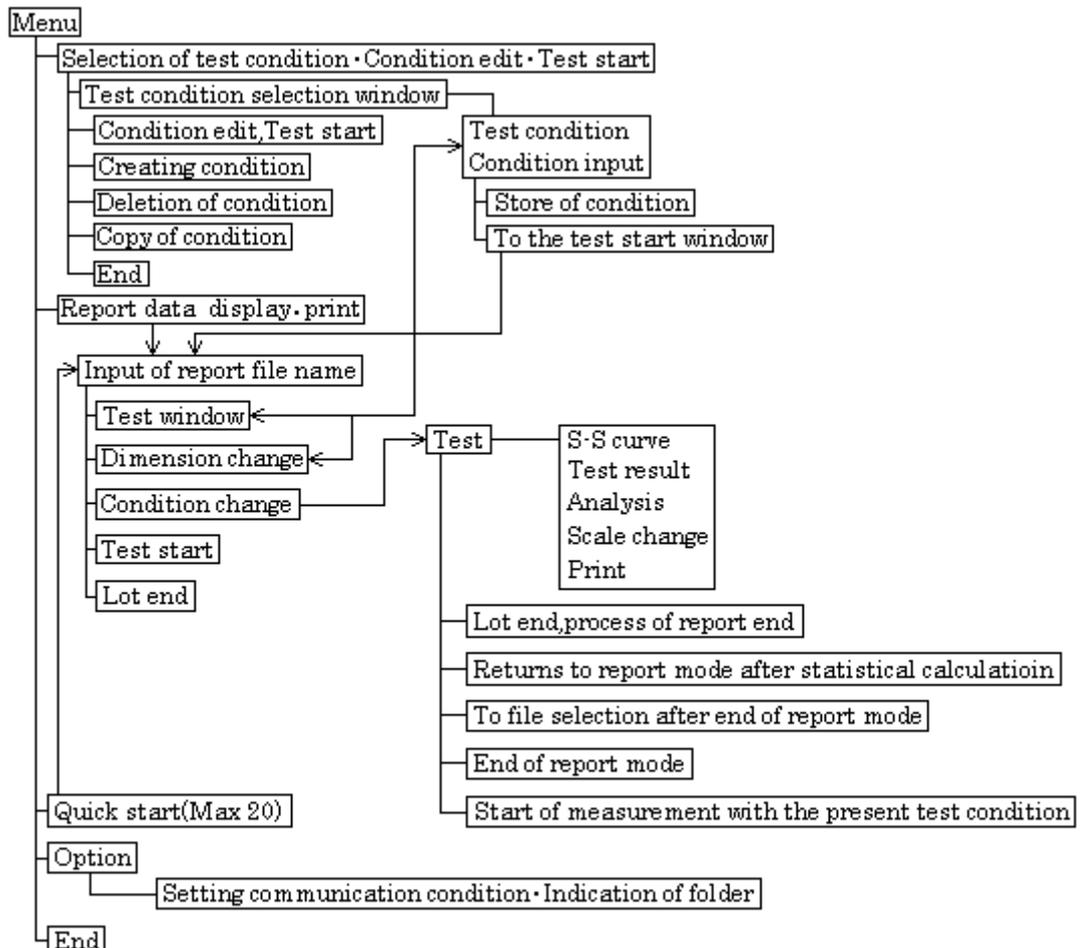
During test (at the time of test end for each sample), analysis can be provide so you can proceed to the test without wasting the samples. In this case, re-calculation can be made (can be selectable) by re-acquired samples on the changed conditions, so you can proceed to the test without wasting the samples.

After the test is over, it's possible for the S-S curves to output into the Windows metafiles, you can make use of them into other application software.

Moreover, analysis can be available on the display of report data.

### 2. Specifications

#### 2 - 1 Specifications for software



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### 2-2 Specifications for hardware

When you can supply by customer's side, the following performances should satisfy your Personal computer at least.

**\* This software doesn't guarantee the operation with all PC.**

#### Personal computer

OS : Windows XP , Vista , 7,8,8.1,10 (English Version : 32bit,64bit)

CPU : 1 GHz or more (recommended)

Minimal operating memory : Windows XP : 512 MB or more (recommended)

Windows Vista,7,8,8.1,10 : 2.0 GB or more (recommended)

Hard disk : 1 GB or more (recommended)

CD-ROM drive : Required at the time of installation.

USB port : Required when connecting USB cable.

Mouse, Keyboard :

Display : Color display with the resolution of 1280×1024 mm is recommended.

Color printer : Required during printing. (Even if not connected, test operation is provided.)

USB cable : The communication cable between the PC and Testing machine.

### 2-3 Test mode

Peel 90°,135°,180°peel

### 2-4 Process items (Process items can be selectable at the time of output.)

#### 2-4-1 Process items

##### 1) The maximum peak point

Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point

##### 2) The minimum bottom point

Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point

##### 3) The 1st peak point

Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point

##### 4) The 1st bottom point

Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point

##### 5) Break point

Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point

##### 6) Integration average

The average value of all the test force within the analysis sections.

Test force, Converted test force, Unit test force, Coefficient of friction at each point

##### 7) Simple average

The average of all of the test force with in the analysis sections shall be simple average.

Test force, Converted test force, Unit test force, Coefficient of friction at each point

##### 8) Average of peak point

Test force, Converted test force, Unit test force, Coefficient of friction at each point

##### 9) Average of bottom point

Test force, Converted test force, Unit test force, Coefficient of friction at each point

##### 10) Average of peak and bottom point

Test force, Converted test force, Unit test force, Coefficient of friction at each point

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- 11) Tear test force  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 12) Tearing Strength
  - 13) Static coefficient of friction (1st peak point)  
Calculate from the formula, 1st peak point / Mass of Weight(unit : g)
  - 14) Dynamic coefficient of friction (simple average)  
Calculate from the formula, Simple average / Mass of Weight(unit : g)
  - 15) Average of 6 points of max. peak and min. bottom points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 16) Energy
  - 17) Average of 6 displacement points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 18) Average of 5 displacement points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 19) Average of 4 displacement points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 20) Average of 3 displacement points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 21) Average of 2 displacement points  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 22) Average of collection from 1 to 6  
Test force, Converted test force, Unit test force, Coefficient of friction at each point
  - 23) Displacement Point-1~6  
Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point
  - 24) Initial Point Selection  
Test force, Converted test force, Unit test force, Displacement, Peel distance, Coefficient of friction at each point
  - 25) No. of the peak points
  - 26) No. of the bottom points
  - 27) Sample name
  - 28) Sample width
  - 29) Sample thickness
- 2-4-2 Sample No.  
Sample No. Automatic from 1 to 50.
- 2-4-3 Statistical process
- 1) Average value of one lot
  - 2) Standard deviation  $\sigma(N-1)$
  - 3) Maximum value
  - 4) Minimum value
  - 5) Median
  - 6) Maximum value - (minus) minimum value
  - 7) Coefficient of variation,
  - 8) 3 times of standard deviation
  - 9) Average of JIS K6301
  - 10)  $\sum X_i^2$
  - 11)  $\sum XI$
  - 12) Number of data

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### 2-5 Data sampling (Data capture)

Capture the data by repeat transmitted and received of data.

Set the sampling cycle. : 50ms, Long term read 100ms, Long term read 250ms, Long term read 500ms, Long term read 1s, Long term read 2s, Long term read 2.5s, Long term read 5s, Long term read 10s

※ You can get up to the maximum 30000 data per one (sample) test.

### 2-6 Data analysis

- Test results can be analyzed from the sample data by the following methods.
- Analysis can be made during testing and also displaying report as well.

#### (1) Initial point selection (elongation)

The elongation at each analysis point can be obtained by the Initial point selection as a base.

The Initial point of test force (the point where the test force has passed the value set by the Initial test force) will be supposed to be the Initial point selection.

#### (2) Measurement start point

One item shall be set among the three items.

- ① \* \* mm from the Initial test force point
- ② \* \* mm from the 1<sup>st</sup> peak point
- ③ \* \* mm from the 1<sup>st</sup> bottom point

#### (3) End point of measurement

One item shall be set among the three items.

- ① \* \* mm from the starting point of measurement
- ② \* \* mm before the break point
- ③ \* \* mm prior to the final peak point

#### (4) Definitions of the peak point and the bottom point

Set the ineffective amplitude of test force.

As for the setting, setting can be made by the test force value or percent (%) for the full scale of test force value of measuring range. When collecting the small peak /bottom point the ineffective amplitude test force should be set to the smaller value.

#### (5) Break point

The break point is considered as the point when occurred at first among the phenomena of the four as follows:

- ① When the suspending signal for the test is detected.
- ② When the test force exceeds the full scale of set value.
- ③ When the test force exceeds 7 % of full scale and the test force becomes less than 5 % of full scale at the same time.
- ④ When detected with the detectable sensitivity for break.

(Compared to the test force sampling point just before, the sampling point just before the decrease exceeds over the set value.)

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(6) The maximum peak point

It's considered the maximum peak point within the measuring section.

When the max. peak points exist so many, the max. displacement point will be considered as the maximum peak point.

(7) The minimum peak point

It's considered the minimum peak point within the measuring section.

When the min. peak points exist so many, the max. displacement point will be considered as the minimum peak point.

(8) The 1st peak point

The 1st peak point within all of the sections.

(9) The 1st bottom point

The 1st bottom point within all of the sections.

(10) Displacement point 1~6

Whichever equal to the specified Displacement or the point of first increasing sampling is called as the Displacement point. However, when the test is completed with less than the specified Displacement, it is considered as impossible data to measure.

(11) Integration average

It's considered as the average of all of the test force within the measuring section.

(12) Average of the peak points

It's considered as the average of peak points within the measuring section.

(13) Average of bottom points

It's considered as the average test force of bottom points within the measuring section.

(14) Average of the peak and bottom point

It's considered as the average of test force from the peak point and bottom point within the measuring section.

(15) Tear test force

Calculation can be made whichever method among the 3 as follows, depending to the number of peak points within the measuring section.

①When the number of peak points is less than 5, the median of the peak points.

②When the number of the peak points is between more than 5 and less than 20, the median of peak values, with 10 % of displacement from start of measurement and 10 % of displacement from the end of measurement are excluded.

③When the number of the peak points are more than 20, divides the section into 10 starting from the starting point of measurement to the end of measurement, and obtains the median from the peak points each near to the 9 points of displacement, with the first and the last displacement points excluded. Median : The value of data its position is located at the place where the number of data is divided into 2, when the data are arranged according to size of the value. For example, the median will be "10", when the values are in the order to size, 15, 13, 10, 8 and 7. And the median will become " $(13+10)/2=11.5$ ", when the values are 15, 13, 10 and 8 in the order of size.

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(16) Average of 6 points from the large and small peak points

The average test force from 3 larger peak points and 3 smaller points within the measuring section.

(17) Average of \*point(s) of displacement point

Based on the displacement point set at the displacement point 1~6,

Average of 2 points is considered as the average value from displacement point 1 and displacement point 2.

Average of 3 points is considered as the average value from displacement point 1, displacement point 2 and displacement point 3.

Average of 4 points is considered as the average value from displacement point 1, displacement point 2, displacement point 3 and displacement point 4.

Average of 5 points is considered as the average value from displacement point 1, displacement point 2, displacement point 3, displacement point 4 and displacement point 5.

Average of 6 points is considered as the average value from displacement point 1, displacement point 2, displacement point 3, displacement point 4, displacement point 5 and displacement point 6.

(18) Energy

It's considered as the multiplied value, the test force by displacement within the measuring section.

(19) Number of peak points

It's considered as the number of peak points within the measuring section.

(20) Number of bottom points

It's considered as the number of bottom points within the measuring section.

(21) Average of collection

Select each analysis point and peak points and bottom points optionally, calculates the average of the items selected. Selectable items are as follows:

- The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> peak point in largeness of test force
- The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> peak point in smallness of test force
- The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> bottom point in largeness of test force
- The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> bottom point in smallness of test force
- The maximum peak point, the minimum bottom point
- The 1<sup>st</sup> peak point, the 1<sup>st</sup> bottom point
- Break point
- Displacement point 1, displacement 2, displacement 3, displacement point 4, displacement point 5, and displacement point 6.
- Integral average
- Average of peak points, average of bottom points, average of peak and bottom points
- Tare test force
- 6 points of average of large and small peak points
- Average of 2 displacement points, average of 3 displacement points, average of 4 displacement points, average of 5 displacement point and average of 6 displacement points.

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### (22) How to obtain the average S-S curve

Obtains the S-S curve at the time of lot end. (The end of measurement of n number of samples in a lot)

The average S-S curve calculates the average of test force from the initial test force point for each test data to the minimum break elongation within the sample of one lot.

### (23) Re-analysis

The following re-analysis on the data can be possible during the test and report display.

- ① Break point
- ② The 1st peak point
- ③ The 1st bottom point
- ④ Measurement start point
- ⑤ Ending point of measurement
- ⑥ Ineffective amplitude test force

The condition that re-analysis has made, can reflect on all of the sample data.

### (24) Statistical process items

Average value of one lot, standard deviation( $\sigma_{n-1}$ ), maximum value, minimum value, 3 times of standard deviation, maximum value-(minus) minimum value, median, average of JIS K6301, coefficient of variation,  $\Sigma x_i$ ,  $\Sigma x_i^2$  and Number of data.

### (25) Random draw

Creates graphs of random draw automatically from the sample data selected, whatever for the same lot or another lot.

### (26) File output of data

Depending on the test condition, the following file output can be provided.

- ① The test data are output with the format of text file.
- ② The graphs are output with the format of Window's metafile.