

NIR Moisture Analyzer KB-30



Software Operating Manual

● Before use

Thank you for purchasing Software for NIR Moisture Analyzer KB-30 ("this software" hereafter).

Please read this operating manual thoroughly in order to fully use the functions of this software. To run this software, an operating system such as ©Microsoft Windows XP/7 needs to be installed.

During operation of this software, the main unit of NIR Moisture Analyzer KB-30 needs to be operated as well. For details of operation, refer to the operating manual of the analyzer.

● Purpose of use

This software analyzes moisture measurement data obtained using NIR Moisture Analyzer KB-30 and displays calibration curves.

It is a comprehensive support software to be used for zero-calibration, storing trend data, and setting the current output.

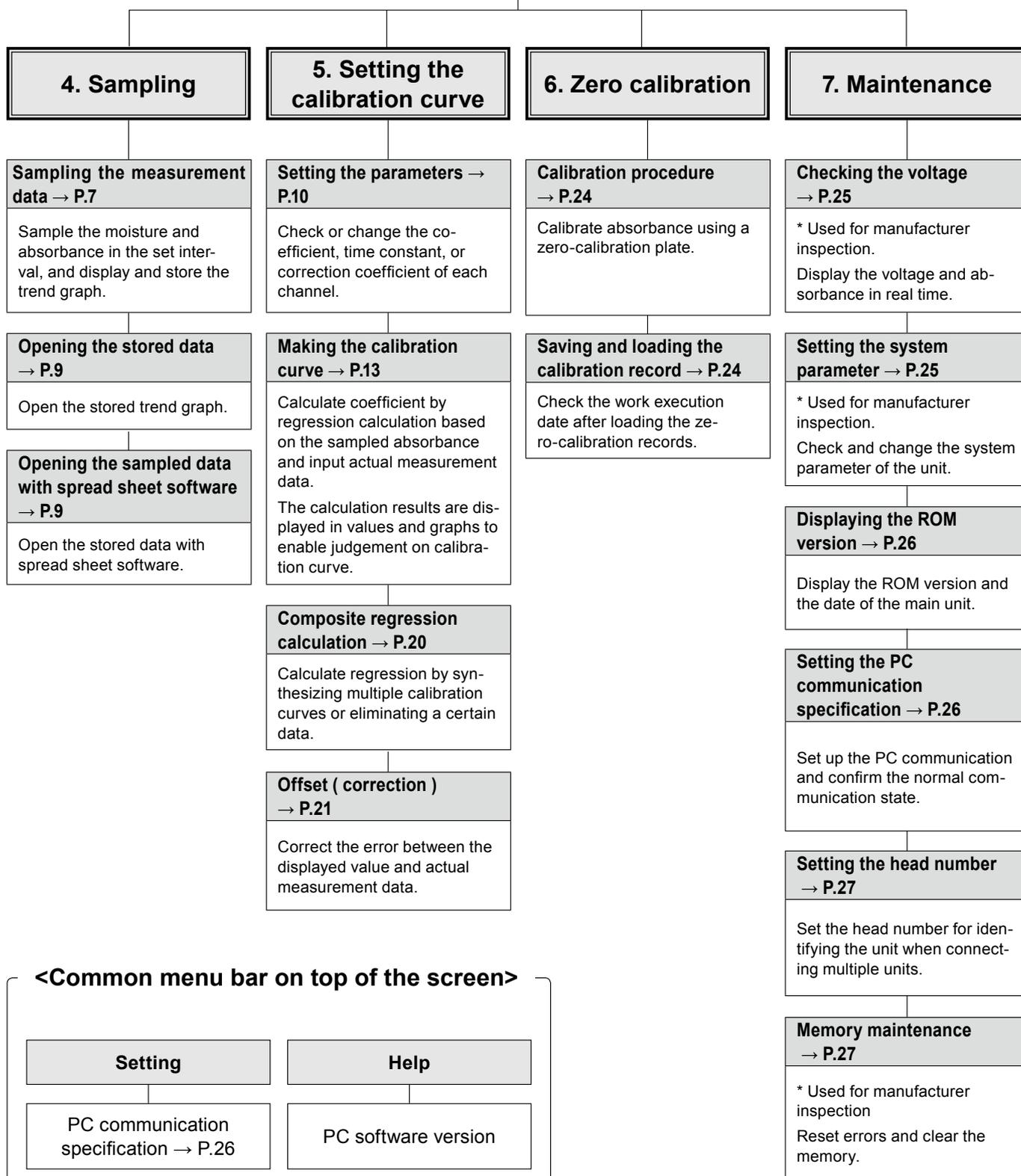
* Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

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1. Configuration and summary

Software registration icons

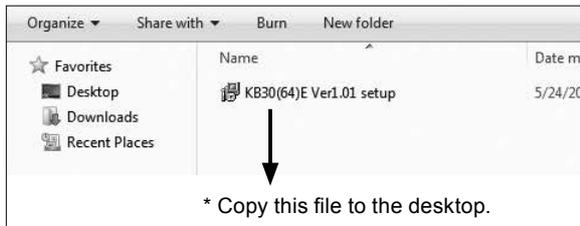


2. Installation

* This software can be operated on Windows XP/7. In this document, the screen shots are taken from Windows 7. There is no special constraints other than OS to run this software. In order to install this software, log in by the administrator authority.

(1) Set the disk to the CD drive.

Double-click [Start] → [Computer] → [Disk drive]. Copy the file in the disk to the desktop, and double-click.



(2) Start the setup.

Click the [Next] button.



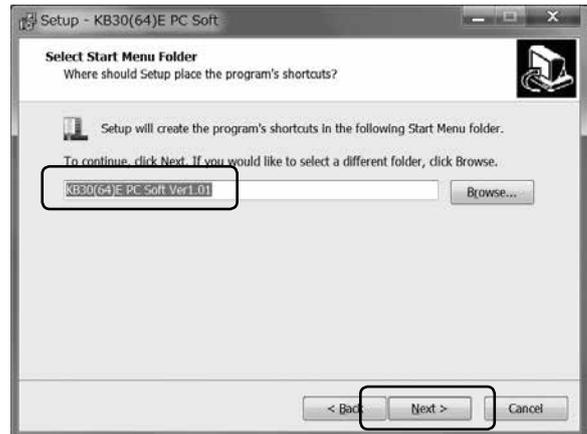
(3) Specify the installation folder.

If not changing the installation folder, click the [Next] button. To change the folder, click [Browse].



(4) Specify where to create a shortcut.

If not changing the place for shortcut, click the [Next] button. To change the place, click [Browse].



(5) Start the installation.

Click the [Install] button.



(6) Exit the installation.

Click the [Finish] button.



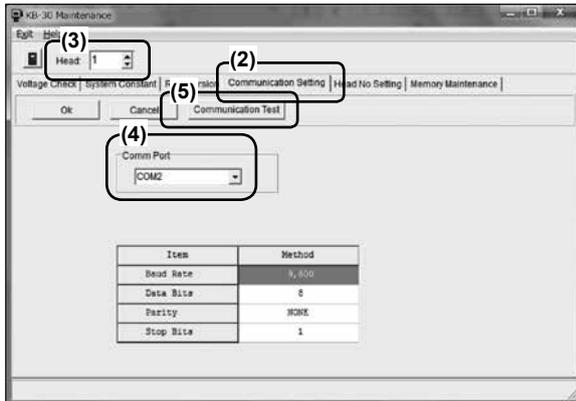
3. Initial setting

* To exit this software, click " " or "x" on the each screen.

3-1. Connecting the main unit and PC

The following describes items to be set to connect between main unit and the PC. Use the supplied RS-232C cable.

(Refer to P.8 - P.9. of the operating manual (the separate volume) of NIR Moisture Analyzer KB-30.)



* The specification of the communication is fixed.

(1) Start up "Maintenance" of the software.

(2) Set the PC communication.

Double-click [Communication Setting].

(3) Set the head number.

Click the keys of the head, and enter the number.

* The default setting is "1".

(4) Select the serial port (COM port).

Select the serial port number (COM1 to 10) using keys.

* If your PC is equipped with a RS-232C port, changing the port is not required, since normally the COM1 is used.

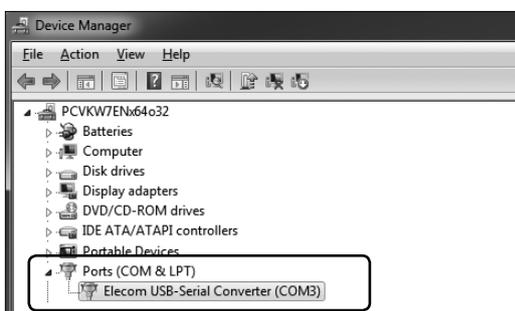
* If only a USB port is available, not equipped with a RS-232C port, use the optional USB-RS232C converter. A virtual COM port will be registered and become selectable.

* After changing the port, click the [Set] button to determine the setting.

* Checking the COM port

Click [Control Panel] → [System and Security] → [Device Manager]. The following screen will be displayed.

Ex.) The available COM port number (COM2) will be displayed.



(5) Check the communication.

When the [Communication Test] button is clicked, "OK!" will be displayed.

* When "Communication error" is displayed, check the communication again after checking the connection and breaks in the communication cable.

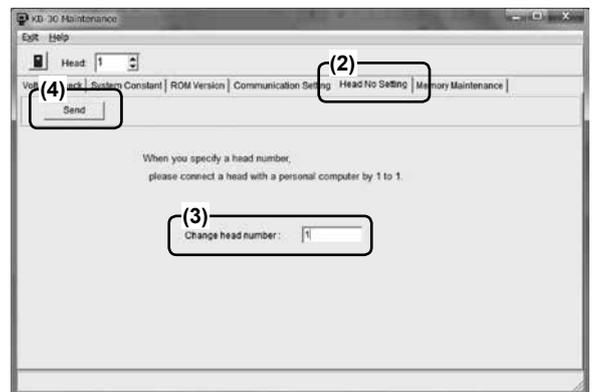


3-2. Connecting multiple units

In order to identify the unit, allocate the head number.

* The default setting is "1".

* Before setting up, connect each pair of a PC and a sensor head.



(1) Start up "Maintenance" of the software.

(2) Set the head number.

Click the [Head No. Setting] tab.

(3) Enter the head number to change.

Enter an arbitrary number in "Changing head number".

(4) Determine the change of the head number.

Click the [Send] button.

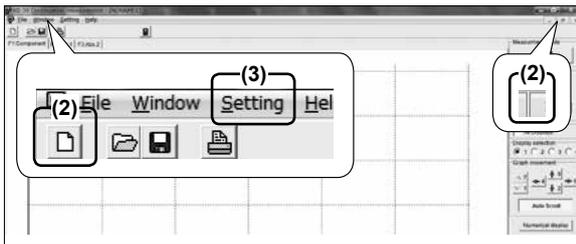
4. Sampling

It is a function to sample the moisture and absorbance in the set interval, and display the trend graph.

- Four samplings at maximum can be performed simultaneously with the main unit head and the channels.
- Sampled data will be saved in the designated folder automatically. The files are automatically updated in every 24 hours.
- The saved trend data can be displayed in the screen.
- The statistical result, such as average value in the specified area on the trend graph, can be displayed.

4-1. Sampling the measurement data

4-1-1. Start sampling



(1) Start up "Sampling" of the software.

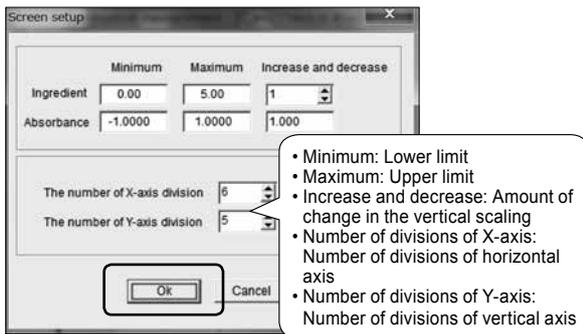
(2) Click (New).

Click the maximize button () on the trend graph.

(3) Click the [Setting] button and select [Display Setting].

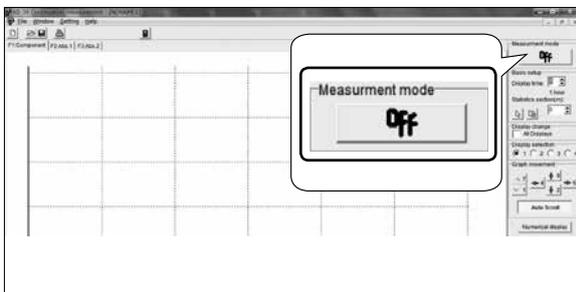
(4) Set the initial value for each item.

Enter the value, and click the [OK] button to determine the setting. If the [Cancel] button or "x" is clicked, the previous value before entering the value will be maintained. The values can be changed after starting the measurement.



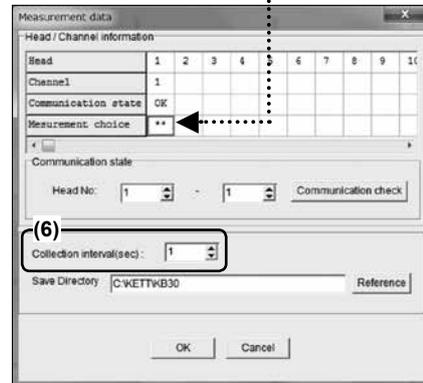
(5) Specify the data for sampling.

When the [OFF] button is clicked, the button indication will be changed to [ON].



The Head No. and Channel No. will be displayed in the "Measurement data" screen.

Click the [Measurement choice] button to display "**". It will be the sampling target.



(6) Set the sampling interval and save destination.

Click the button of the "Collection interval(sec)". The setting range is 2 to 999 sec. It varies depending on the connected number of units.

<Indication of data collection interval>

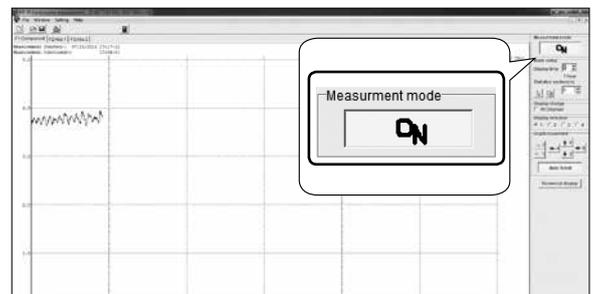
Connected number of units	Indication of collection interval
1	2 or more
2 to 4	5 or more

* The sampling interval setting may not be effective depending on the PC environment. Specially when executing sampling for long hours, set a larger display time. (If the sampling hour is 5 hours, for example, set the display time 6 hours.) If executing over 24 hours of sampling, set the display time 24 hours (maximum).

* The default save folder is "C:¥KETT¥KB30". To change the folder, click [Brows] and specify the folder. (The data file will be automatically created in every 24 hours.)

(7) Start sampling.

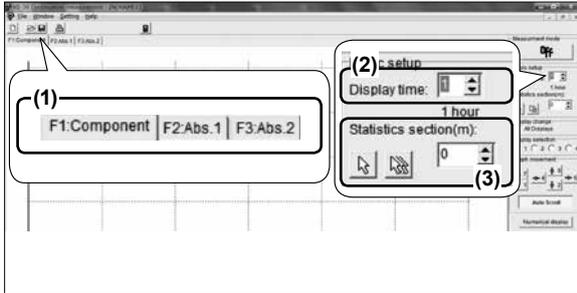
Click the [Measurement mode] and change the indication to "ON".



4-1-2. Operating the trend graph

(1) Trend graph data display switching

The display can be changed by clicking the [F1: Component] [F2: Abs.1] [F3: Abs.2].



(2) Display time

To change the horizontal scale of the trend graph, click  on the "Display time". The table below describes the relation between the set values and the full scale.

Full scale	Value to be displayed	Full scale	Value to be displayed
1 min.	-6	1 hour	1
5 min.	-5	2 hour	2
10 min.	-4	.	.
20 min.	-3	.	.
30 min.	-2	.	.
40 min.	-1	.	.
50 min.	0	24 hour	24

(3) Statistic section (m)

After executing the statistical calculation of the specified section, the following (1) to (4) items will be displayed at the side of the trend graph. Two methods of designation are available.

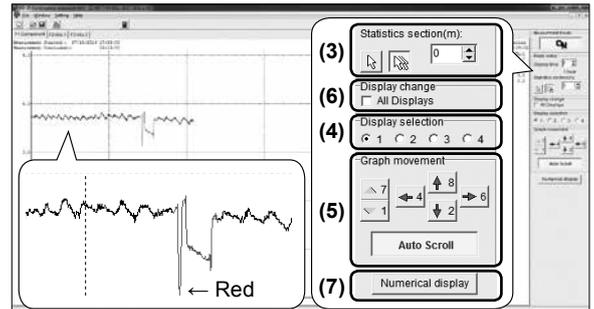
- (1) Pv (Value of the rightmost point)
- (2) Max
- (3) Min
- (4) S.D (Standard deviation)

I. Procedure to display statistical calculation of the previously set section data from the selected point on the trend graph

- Set with the  button of the "Statistic section(m)". When "0" is set, all the data prior to specifying the point will become the target of calculation.
- Click the  button of the "Statistic section(m)". (Select the last data.)
- Click the point of the last data that you wish to display on the trend graph. The statistical calculation of the red-lined section (displayed on the right top of the trend graph) will be displayed.

II. Procedure to display statistical calculation of the section data specified by the selected points on the trend graph

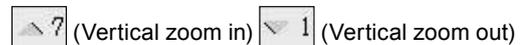
- Click the  button of the "Statistic section(m)". (Specify the range by the mouse operation.)
- Drag the mouse from one point to another, where you wish to display on the trend graph.
- The statistical calculation of the red-lined section (displayed on the right top of the trend graph) will be displayed.



* When statistical calculation target is specified (red section)

(4) Select the display (scaling the trend graph).

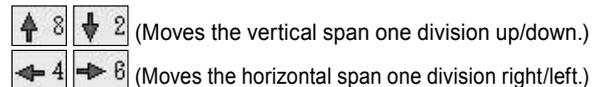
It is available only for the channel selected with "Display selection". The vertical scaling of the trend graph is performed. The horizontal scaling can be set in "(2) Display time".



* Every click zooms in or out in the set span.

(5) Move the graph.

It is available only for the channel selected with "Display selection". The vertical and the horizontal scaling of the trend graph can be moved. First, click the [Auto Scroll] button to switch the button indication to [Manual Scroll]. (The indication changes every time the button is clicked.) After the adjustment, change the indication to [Auto Scroll].



(6) Switch the display.

The display of the trend graph can be switched between four displays (All Displays) or one display.

<Display all>

Every time the [All display] check box is checked or unchecked, the display switches between four displays and one display.

<Select display>

To display trend graph in one display, select the number with "Display selection".

(7) Display values based on the sampled data.

To display the sampled data, click the [Numerical display] button.

4-1-3. Stop sampling and saving data

(1) Terminate sampling.

Click the [ON] button of the "Measurement mode" to stop sampling.

(2) Save the data.

Generally, the file will be automatically saved in the following name.

Ex.) 1 6 0 8 0 1 0 1 . k30
 Year | Month | Date | Serial numbers within a day

- To change the file name, click  and specify the name.

4-2. Opening the stored data

Open the data of the saved trend graph.

(1) Start up "Sampling" of the software.

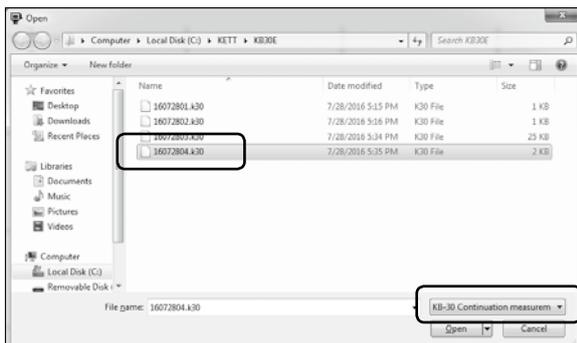
(2) Load the saved file.

Click the [Open] button to load the saved data.



(3) Select data.

Click the [Open] button after selecting the file. The trend graph will be displayed.



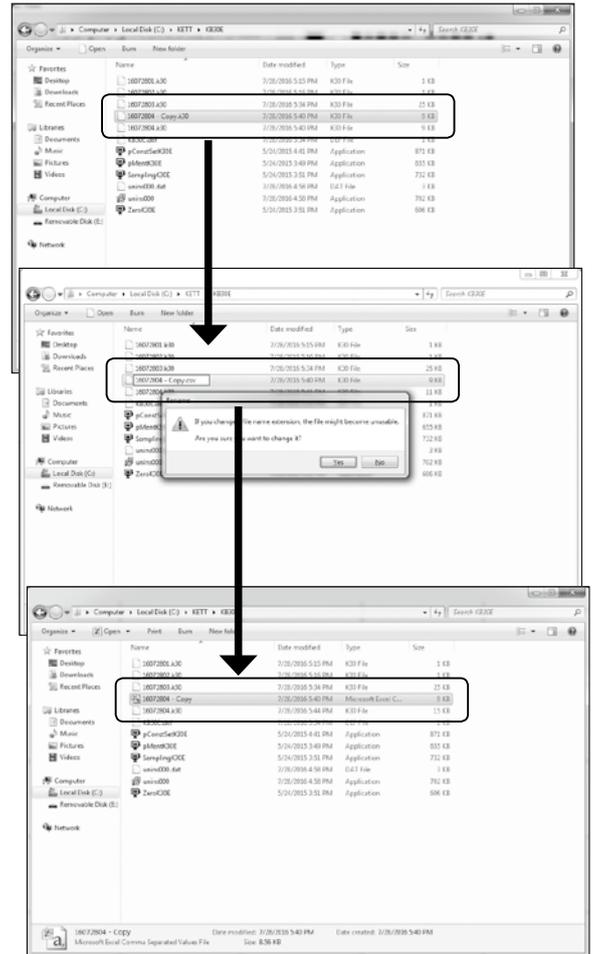
- * For how to operate the trend graph data, refer to "4-1-2. Operating the trend graph" (P.8).

4-3. Opening the sampled data with spread sheet software

The following describes how to open the saved sampling data using Excel*. The extension of the file is ".k30", but the format is ".csv". Right-click the target file. Then, select [Change name], and change the extension to ".csv".

Make sure to copy the file before changing the extension.

The default save folder is "C:\¥KETT¥KB30".



*1 Microsoft and Excel are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

	A	B	C	D
1	START=2014/06/19 11:38:57			
2	INTERVAL=3			
3	1	TRUE	1	1
4	2	FALSE	0	0
5	3	FALSE	0	0
6	4	FALSE	0	0
7	0	3.61	-0.0008	-0.0001
8	3	3.61	-0.0005	0.0003
9	6	3.61	-0.0003	0.0006
10	9	3.63	0	0.0004
11	12	3.64	0.0006	0.0009
12	15	3.62	0.0001	0.0007
13	18	3.63	0.0003	0.0006
14	21	3.62	-0.0002	0.0003
15	24	3.64	0.0001	0.0002
16	27	3.63	-0.0001	0
17	30	3.63	-0.0004	-0.0003

Time (sec.) Display Absorbance 1 Absorbance 2

5. Setting the calibration curve

The following operations are available in the calibration curve setup mode.

5-1. Setting the parameters → P.10

- Display the channel parameter after receiving it from the unit.
- Set up or change the channel parameter on the screen.
- Send the channel parameter displayed on the screen to the unit.
- Save the channel parameter data.
- Display the saved parameter data.
- The setting range for the channel numbers is 1 to 50CH.

5-2. Making the calibration curve → P.13

- Display the absorbance data after receiving it from the unit (calibration data).
- Save the calibration data.
- Display the saved data.
- Calculate the coefficient of the calibration curve from its calculation data to which actual data is entered.
- Display the graph and statistics from the calculation result.
- Set the coefficient or correction coefficient in the [constant setting] screen.
- Up to 100 data sets can be calculated.

5-3. Composite regression calculation → P.20

- For multiple channels, calculate the coefficient of the calibration curve from its calculation data.
- Save the composite calibration curve data, or display the saved data.
- Display the graph and statistics from the calculation result.
- Set the coefficient in the [constant setting] screen.
- Up to 200 data sets can be calculated.

5-4. Offset (calibration curve compensation) → P.21

- Receive absorbance from KB-30, and display the component values calculated from channel parameter values. (correction data)
- Save the correction data, or display the saved data.
- Calculate the coefficient of the calibration curve from its correction data to which actual data is entered.
- Display the graph and statistics from the calculation result.
- Set the correction coefficient in the [constant setting] screen.
- Up to 30 data sets can be calculated.

5-1. Setting the parameters

5-1-1. Procedure for setting the parameters

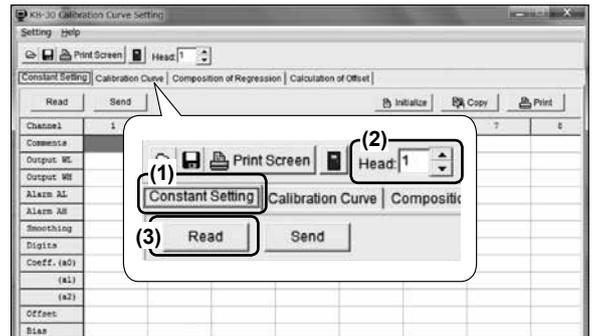
It is a function to set or change the channel parameters.

(1) Start up "KB-30 Calibration Curve Setting".

Click the [Constant Setting] tab.

(2) Set the head number.

Click the  keys of "Head" to select a number.



(3) Load and display the current channel parameters to the PC.

- Click the [Read] button to display the "Channel No. setting" screen.



- Set the channel number in the range between 1 to 50CH with  keys, or by key entry.
- Click the [OK] button. The channel parameter data will be loaded and displayed in the list.

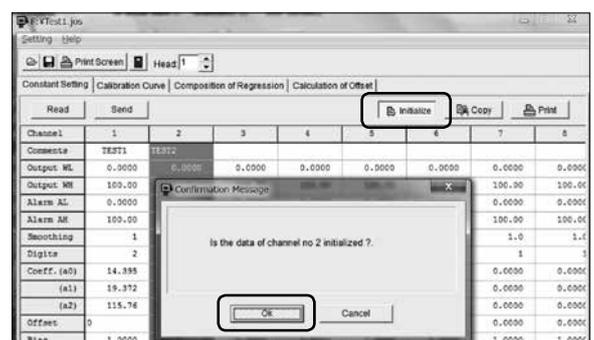
(4) Enter/change the parameter of calibration curve.

Click the column and enter the value.

(5) Initialize the channel parameter.

It is a function to initialize the currently set parameters.

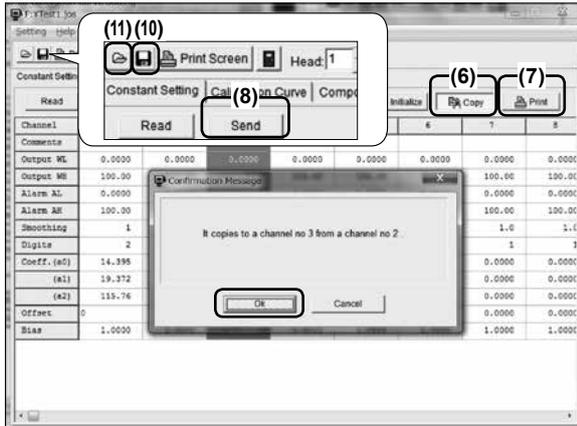
- Click the [Initialize] button to select the channel row to be initialized.
- Click the [OK] button when the confirmation message is displayed.



(6) Copy the channel parameter.

It is a function to copy the currently set parameters all at once to a different channel.

- Click the [Copy] button to select the row to be copied.
- Click the [OK] button when the confirmation message is displayed.



(7) Print out the channel parameter.

Clicking the [Print] button will print out all the channels (1 to 50 CH).

(8) Write input or changed channel parameter to the unit.

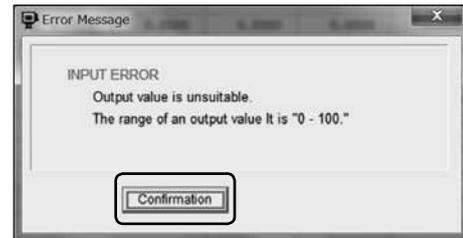
- Clicking the [Write] button will display the "Channel No. setting" screen.
- Set the channel number to between 1 to 50 with keys, or by key entry.
- Click the [OK] button. The channel parameter data will be written to the unit.



(9) Check the error.

When any of the error message is displayed, it indicates that the writing to the sensor head is failed. Correct the error, and retry writing.

Ex.) Error message (for a setting of WL≥WH)

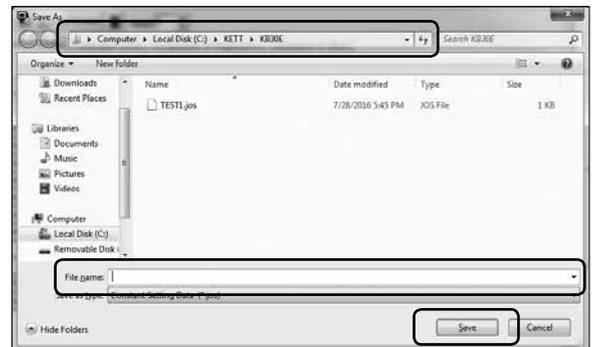


<Items to be checked>

- Pv Current output corresponding display value: output WL < WH, also WH≤100%
- Display value alarm: output AL < WH, also AH≤100%
- Time constant: 0 to 99.9 sec.
- Decimal place of the display: 0 to 3rd

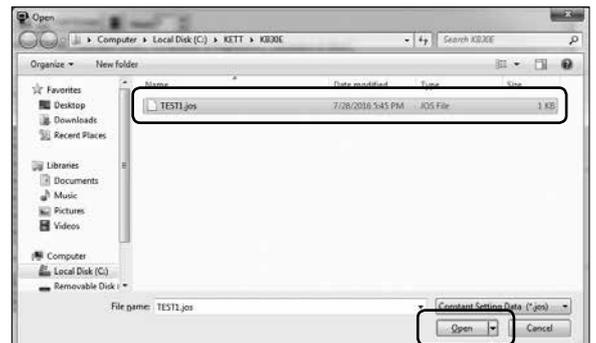
(10) Save the channel parameter data file.

- Click the [Save] button.
- Specify the save destination and the file name, and then click the [Save] button.



(11) Load the channel parameter data file.

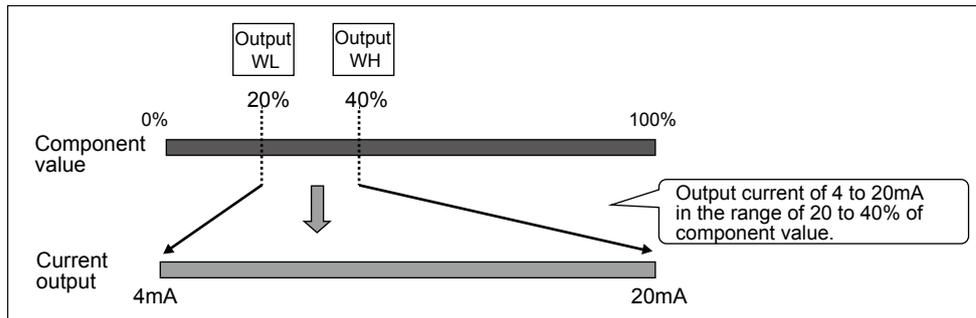
- Click the [Open] button.
- Clicking the [Open] button after selecting the file will load the channel parameter data to the PC.



5-1-2. Items of parameter setting

(1) Current output upper/lower limit (WH/WL)

It sets the component values for 4 to 20mA of the current output of the sensor head.



(2) Alarm upper/lower limit (AH/AL)

When the measured value falls below the lower limit (Alarm L), or exceeds the upper limit (Alarm H), "AL" or "AH" will be displayed on the monitor.

Also, the alarm contact of the interface board will be set ON.

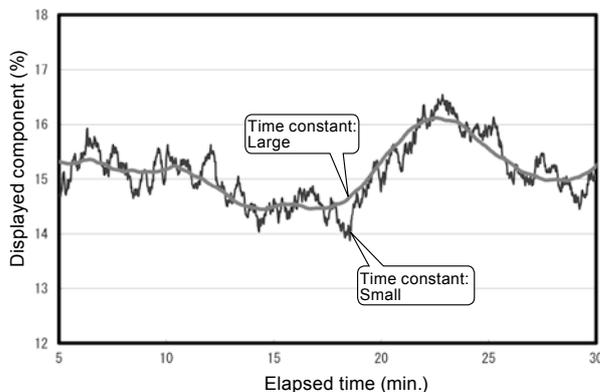
(3) Time constant (smoothing)

It is used to minimize the fluctuation of display and the current output when measuring a moving object. If the time constant is set large, gradual fluctuation is eliminated and the trend will show the gent slope. (Fig.A)

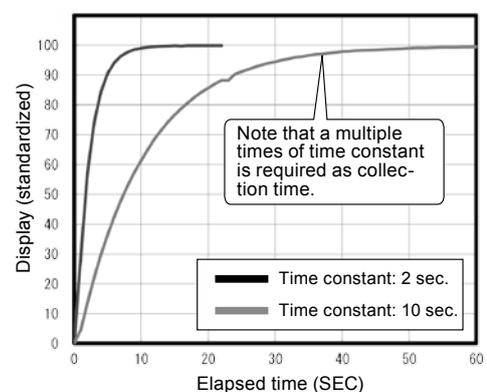
However, it will be attended with delay in the start. Therefore, it should be avoided to set unnecessarily larger value. If moisture value is suddenly changed, it requires five to six times longer time than the time constant to collect measurement values, resulting in poor response. (Fig.B)

It is recommend to set the time constant with the number whose decimal points are easy to read. (Normally, 2 to 5 seconds, and 5 to 15 seconds if the sample has large variation.) However, when creating the calibration curve, set the smaller value than the above in order to avoid sample's absorption and desorption of moisture.

<Fig.A> Smoothing with time constant



<Fig.B> Time constant step response



(4) Number of display digits

Set the number of digits of moisture display of KB-30 after decimal point in the range of 0 to 3.

If the number of digits after decimal point is 3, and the value to be displayed exceeds 10%, note that the most significant digit (digit of 10%) of the sensor head LED will not be displayed.

(5) Correction coefficient (offset, bias 0)

The correction coefficient compensates the difference between the actual moisture value and the measurement.

When the offset is "A" and bias is "B":

$Y = A + Y' \times B$ (Y': Measurement value calculated only with coefficient / Y: Corrected measurement value)

If correction is not required, input "0" for "Offset", and "1" for "Bias".

(6) Coefficient

Set the calculation results obtained using the coefficient calculation function of the software. It is not required to set the coefficients by manual input since they will be read via the PC communication.

* When manually setting the coefficient from the analysis result using commercially available spread sheet software, set "0" for the coefficient of the absorbance not being used.

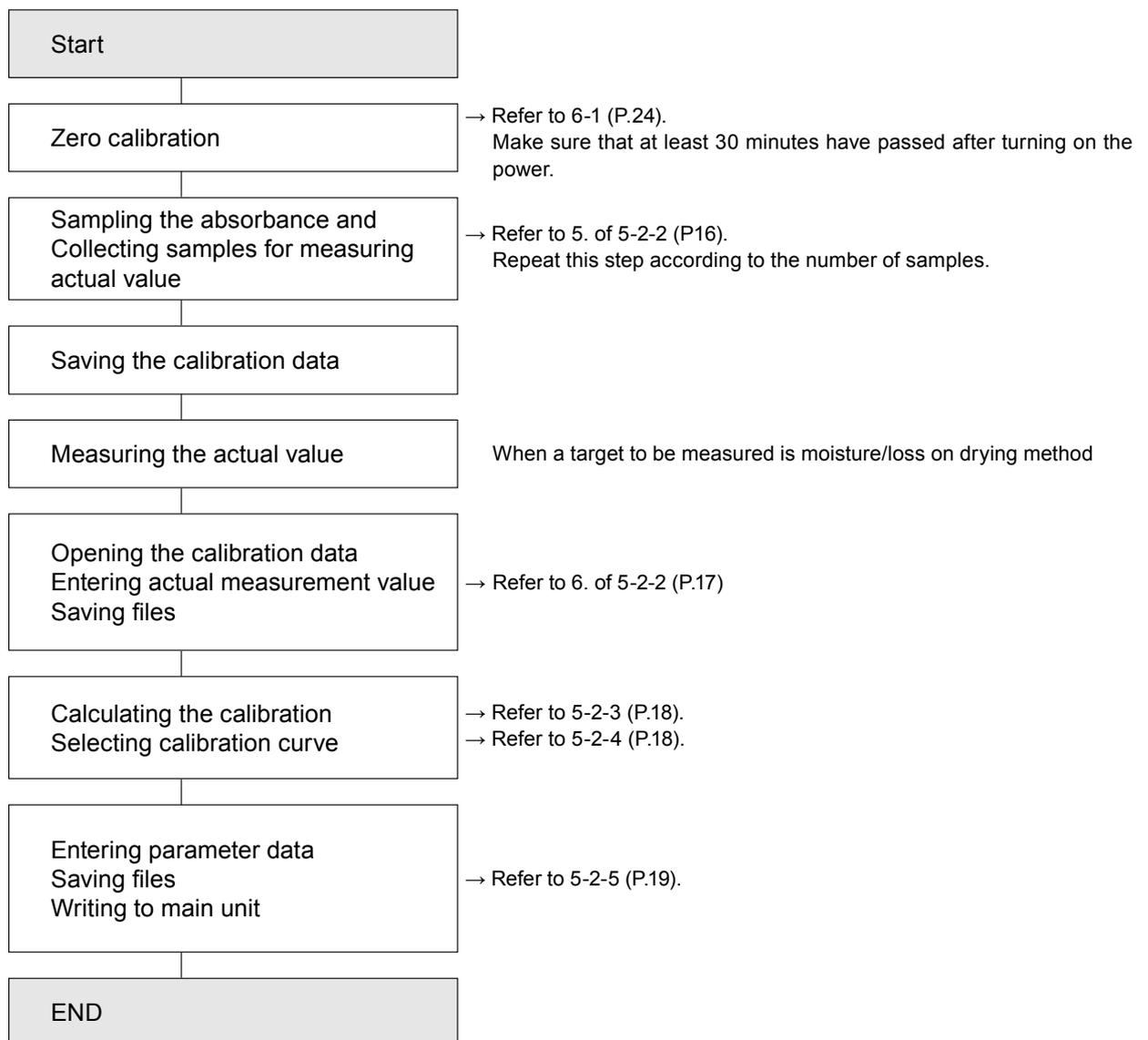
5-2. Making the calibration curve

5-2-1. Operation flow and summary of making calibration curve

Sample the absorbance from the samples of different moisture levels, and at the same time, collect the samples for measuring the actual values. After sampling the absorbance of the specified number of samples, save the data as a calibration data file.

After measuring actual values, input the actual values into the calibration data file, and calculate the coefficient of the calibration curve. Also, calculate the calibration curve after reading the calibration data that are saved in a hard disk or others. Write the calculated coefficient of calibration curve on the main unit. Up to 100 sets of data can be input.

When calculating a coefficient of the calibration curve, the specified parts of data in plural calibration curve data files are synthesized into one calibration curve data. In this case, the number of data is up to 200 sets (see "5-3. Composite regression calculation" (P.20)).



* If measurement takes multiple days, leave the power switch of the moisture meter in the on position and start measurement from "zero calibration".

5-2-2. Inputting the calibration data

A calibration data (file) can be created by inputting the absorbance measured with the main unit into the PC via communication, and also inputting the actual moisture obtained through the criterial measuring method.

1. Sample preparation

To create a calibration curve, the moisture that is a target for measurement needs to be prepared in a certain range in advance.

The types of target samples for measurement need to be all included.

(1) Level of sample moisture

Prepare with a fluctuation of approximately 20 percent wider in both upper and lower direction than the moisture range to be actually measured.

Ex.) When the measured range is 10 to 20%, the moisture of a prepared sample is 8 to 22%.

(2) Number of levels

5 or more levels (the more the number of levels is, the higher the reliability becomes)

Ex.) When the level range is as described above, the moisture level is 8, 12, 16, 20, 22, ...%.

(3) Preparation method

The standard preparation method is described as follows (varies depending on samples):

<A case of powdery sample>

Add water with multiple actions using an atomizer or the like and mix together well at each action. Addition of water in a plastic bag can reduce moisture volatilization (measure the moisture before preparation previously, and calculate the amount of water to be added). Add water in approximately 10 parts to decrease unevenness, and agitate the solution well at each time. After preparation, store it for adequate time (if the moisture is high, refrigeration may be required).

<A case of sheet-shaped sample>

Because the moisture is easy to fluctuate, use a desiccator or a thermo-hygrostat to attain equilibrium moisture. It is necessary to examine the equilibrium moisture characteristics with respect to temperatures and relative humidities in advance (by actual measurement, or referring to documents, etc.).

To create a calibration curve, 20 sets of data including repetition are required at minimum.

Regarding actual measurement values, perform measurements twice at least and use a value of their average.

One set = Actual measurement value / Absorbance 1 / Absorbance 2

Example:		
Number of kinds : 4		
Moisture level : 5 →→→	Number of data sets $3 \times 2 \times 4 = 24$ sets	Number of actual value
Repetition : 2		measuring points
		$24 \times 2 = 48$ points

2. Main unit installation

(1) Connect the unit and a PC.

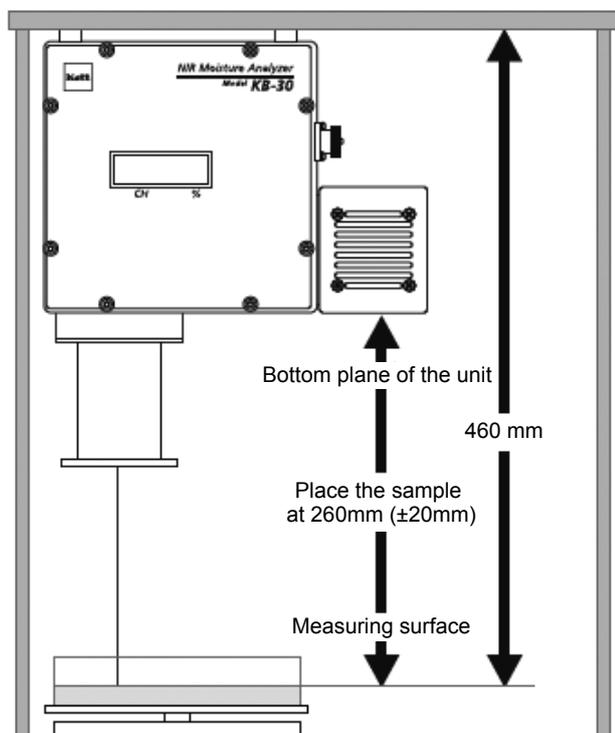
(2) Place a sample.

Set the distance between the bottom plane of the unit and the measuring surface in accordance with the environment where this product is installed.

The measurement accuracy of the absorbance of the following samples can be improved by rotating the sample container and leveling the absorbance.

- The shape of the particle to be measured is large.
- Moisture differences among measurement points cannot be ignored.
- The measuring surface is not flat.

<Example of installation for reference>



Put a sample in a container with 200 to 300 mm in diameter, rotate it on a turntable, and place the measurement position along the outer edge side.

This method can be performed with the sample being leveled. Therefore, more certainty can be obtained compared to data collection in an actual line.

3. Main unit preparation

(1) Initial setting

Set the default of the following items referring to "3. Initial setting" (P.6).

- Setting the PC communication specification
- Setting the head number

Read the parameter of the main unit referring to 5-1-1. of "5-1. Setting the parameters" (P.10).

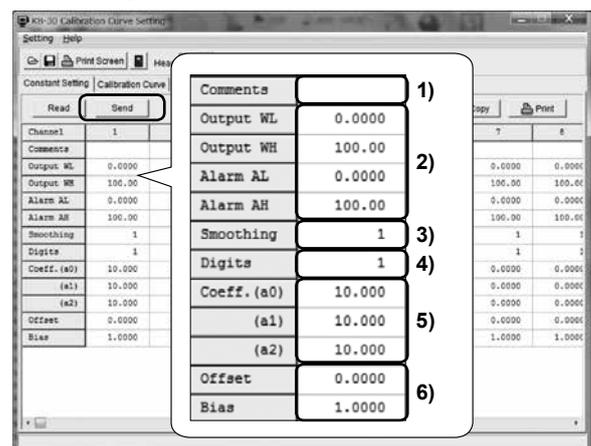
* To create only one calibration curve, just read 1 CH.

- 1) Up to 8 half-width alphanumeric can be input as an arbitrary comment.
- 2) Set the maximum and minimum values of the current output and alarm output.
- 3) Set the time constant.
Input "1" when creating a calibration curve.
- 4) Set the number of digits after decimal point in the range of 0 to 3.
- 5) The coefficient is automatically attached after making calibration curve.
Any number can be assigned at this moment.
- 6) It is a correction coefficient.
In the initial setting, input "0" for "Offset", and "1" for "Bias".

* Refer to "5-1-2. Items of parameter setting" for further information.

All of those values can be changed after calibration curve creation, but 3) is necessary at creating a calibration curve. Be sure to click the [Send] button after value input.

After writing, move to calibration curve creation.



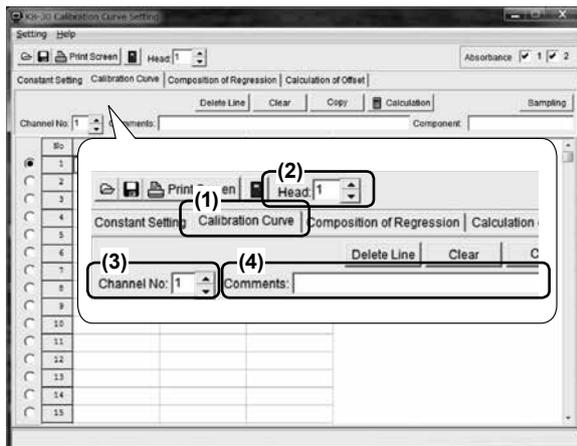
(2) Zero calibration

Perform calibration referring to "6-1. Calibration procedure" (P.24). Before performing a calibration, make sure that at least 30 minutes have passed after turning on the power. If calibration curve creation takes multiple days, be sure to perform a calibration at the start of test on each day.

4. Setting the PC

(1) Open the "Calibration Curve Setting" screen.

Click the [Calibration Curve] tab.



(2) Set the head number.

Click the keys of "Head" to select a number.

(3) Set the channel number for calibration data.

Set the channel number in the range between 1 to 50 CH with keys, or by key entry.

(4) Input a comment (sample name) and component names.

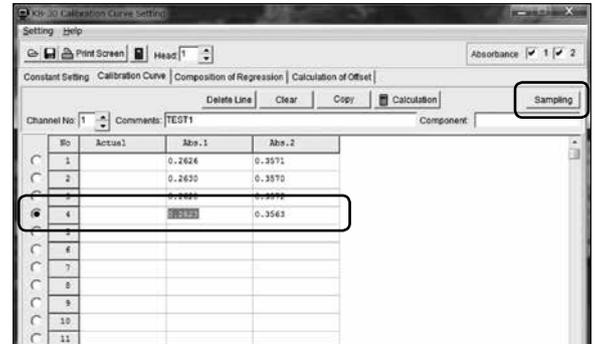
Click the cell and input a comment.

5. Sampling the absorbance and collecting samples for measuring actual values

(1) Set a sample.

Put a sample whose humidity has been controlled in a container, and place it on the measuring position.

(2) Sample absorbance.



- Click the [F1] key on the keyboard or the [Sampling] button on the screen. The absorbance is read, updated, and displayed at regular intervals until next click (the absorbance data is read in the ●-marked line).
- Update of the absorbance data will be stopped when the [F1] key on the keyboard is pressed or the [Sampling] button on the screen is clicked after a certain time since the sample is set.
- Press the [ENT] key to determine the setting. (The indication "●" will move to the next line.)
- When the [ENT] key is pressed without pressing the [F1] key or clicking the [Sampling] button, the absorbance will be set at the moment (the ●-marked position moves to the next line), and the update of the absorbance is continued.
- The time period between sample setting and sampling is 6 times longer than the time constant as a reference. (time constant 1 second: $1 \times 6 = 6$)
- Up to 100 sets of data (the number of sets of actual measurement values and absorbances) can be input in a channel.

(3) Collect samples for measuring the actual value.

Remove the sample container from the measuring position, and collect an actual moisture sample. Collect the sample from the surface layer to which the measuring beam is irradiated as much as possible.

<Examples of methods for measurement of actual moisture>

• Ustulation method

This is a moisture measuring method used as a standard measurement technique in a wide range of fields such as JIS, JAS, the Food Sanitation Law, and the Agricultural Products Inspection Law. With this method, water is evaporated by heating with oven, and the moisture is calculated using the weight change between before drying and after drying.

• Karl Fischer titration method

This is a chemical moisture measuring method using reagent, which is used in the Japanese Pharmacopoeia.

• Ustulation method (simplified)

This is a measuring method using an infrared moisture meter. The principle of this method is the same as the ustulation method mentioned above, and this method can shorten the measuring time.

(4) Download the absorbance to the PC.

Repeat the above (1) to (3).

(5) Exit the measurement.

Click [Save] to save the calibration data.

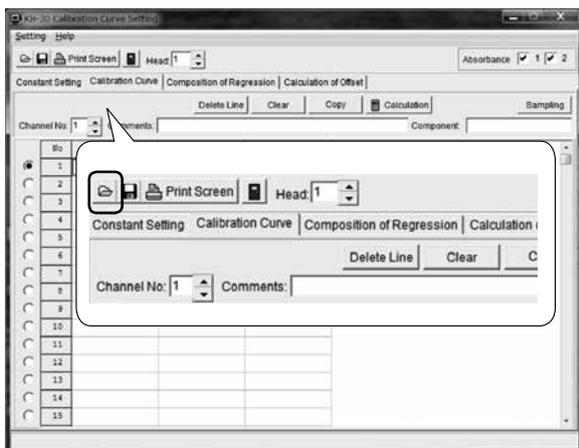
(6) Measure the actual moisture of the collected sample.

Perform measurement 2 times or more for 1 moisture sample if possible, and use their average for the making calibration curve.

6. Input of actual value

(1) Load the saved file.

Click the [Open]  button to load the saved data in 5 - (5).



(2) Input and save the moisture value.

Click the cell of the "actual measurement value" corresponding to the absorbance, and input the actual measurement value. Then, press the [ENT] key.

Repeat the steps (1) and (2) above to input actual measurement values, and save the file again.

• When deleting the calibration data displayed on the screen

The purpose of this operation is to delete all the displayed data when an old data is displayed. (The comment and component names are also deleted.)

When the [Clear] button is clicked, the confirmation message will be displayed. Then, click the [OK] button to perform deletion.



[Supplement]

• When duplicating the calibration data (absorbance)

To calculate the coefficient of the calibration curve using the same absorbance after changing the actual measurement data, repeat the following steps by the required number of times. (Only the comment cell and absorbance data are duplicated)

(1) Specify the channel number of the duplication destination.

Set the channel number to which the calibration curve data is duplicated using  keys.



(2) Specify the channel number of the duplication source.

Use  keys to set the channel number, and click the [OK] button. The absorbance data will be duplicated to the set channel (the actual measurement value is not duplicated).

(3) Input the actual measurement value.

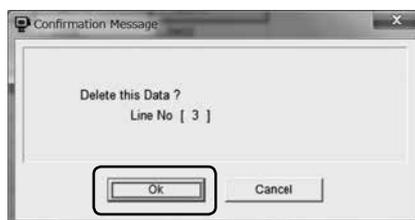
Click the cell of the "actual measurement value". Input the actual measurement value corresponding to the absorbance, and press the [ENT] key.

Repeat the above steps (1) to (3) and input actual measurement values.

• Delete unnecessary data in a set-by-set manner.

Click the [Delete Line] button, and click the line to be deleted. When the confirmation message is displayed, click the [OK] button to perform deletion.

* Be aware that the deleted data cannot be restored.



• Correct the input of the actual measurement value.

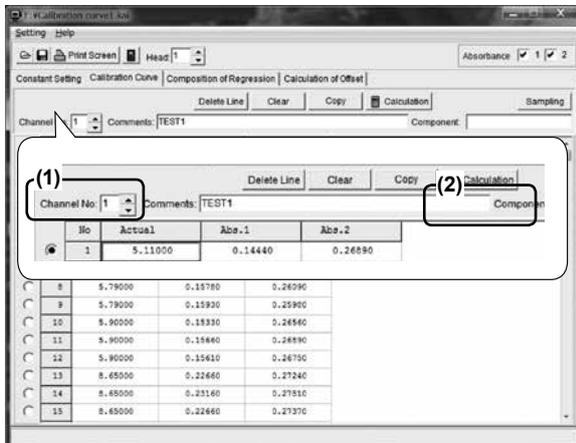
Click the cell of the "actual measurement value" to be corrected, and reenter a value.

5-2-3. Calculating the coefficient

Input the actual measurement value, and calculate the coefficient of the calibration curve.

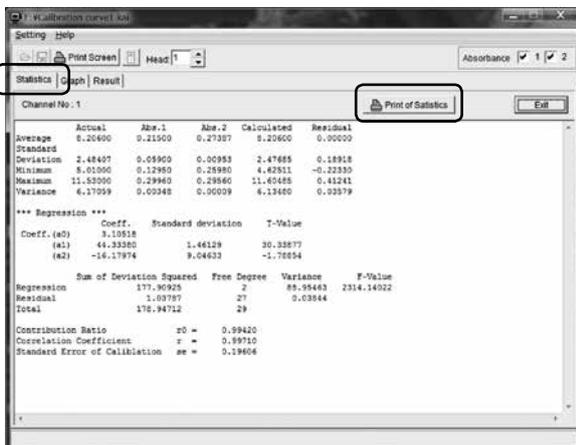
(1) Set the channel number for calibration data.

Use  keys to select the channel number of the calibration data to be calculated.



(2) Automatic calculation

- Click the [Calculation] button. The calculation results will be displayed.
- Click the [Statistics] tab. The statistical values will be displayed.
- To print out the calibration data and statistical values, click the [Print of Statistics] button.

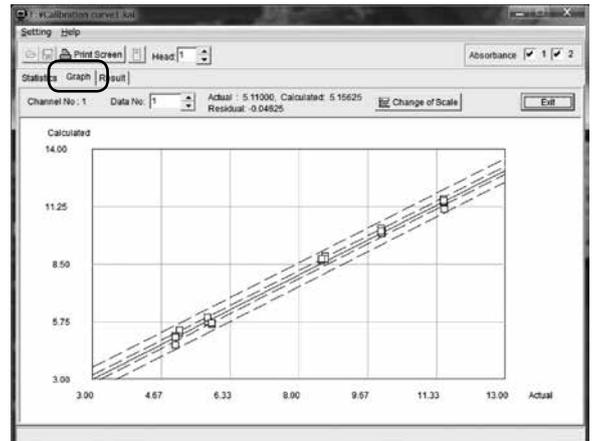


<Evaluation criteria for calibration curve>

Evaluate the statistical values on the basis of the following:

- Correlation coefficients : Closer to "1" is better (reference: over 0.90)
- Variance from regression : Closer to "0" is better
- Absolute value of "T" : "2" or more
- Number of digits of coefficient (integer) : Less digits is better

- Click the [Graph] tab. The graph will be displayed.



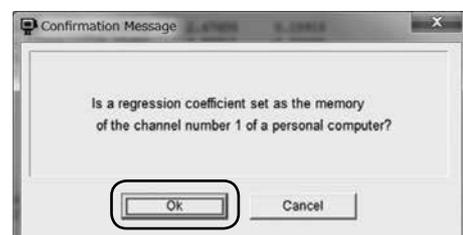
- The yellow plots in the graph show the data whose residual is out of $\pm se$ range (se: dispersion from regression).
- The dotted lines indicate the $\pm se$ ($\pm \sigma$) and $\pm 3se$ ($\pm 3\sigma$) lines.
- Use  keys to specify the data number. The actual measurement value, displayed value, and residual will be displayed (the plots corresponding to the selected data turn red).
- Click a plot in the graph (and the plot turns red). The number and value will be displayed in the data number cell. It allows users to pick up abnormal data and check the data.
- Double-click a plot in the graph. The screen to display the calculation results will be displayed. The applicable data line is indicated with the cursor.

No.	Actual	Abe.1	Abe.2	Calculated	Residual
1	5.11000	0.14440	0.26890	5.15625	-0.04625
2	5.11000	0.14740	0.27110	5.25365	-0.14365
3	5.11000	0.14640	0.26990	5.32627	-0.21627
4	5.01000	0.12950	0.26090	4.62511	0.38489
5	5.01000	0.14030	0.26380	5.35699	-0.34699
6	5.01000	0.13680	0.26220	5.00751	0.00249
7	5.79000	0.15470	0.26020	5.75365	0.03635
8	5.79000	0.15780	0.26090	5.87976	-0.08976
9	5.79000	0.15930	0.25990	5.96405	-0.17405
10	5.90000	0.15330	0.26560	5.60421	0.29579
11	5.90000	0.15640	0.26890	5.69512	0.00288
12	5.90000	0.15610	0.26780	5.69740	0.00240
13	5.65000	0.22640	0.27240	5.74395	-0.09395
14	5.65000	0.23160	0.27810	5.87330	-0.22330
15	5.65000	0.22640	0.27370	5.72252	-0.07252
16	5.56000	0.22500	0.27180	5.68263	-0.12263

- To print out the graph, click the [Print Screen] button.
- Click the [Result] tab. The value data will be displayed.

(3) Set the coefficient.

When the [Exit] button is clicked in the "Statistics", "Graph", or "Result" screen, the confirmation message will be displayed. Click the [OK] button to set an arbitrary channel number.



5-2-4. Point to note at calibration curve selection

Samples (kinds) to be used for the calibration curve creation are on the precondition that all the targets to be measured in the process are included. If a calibration curve is created based on a few biased samples, the curve applies only to certain kinds and has no versatility.

An absorbance can be manually selected, but both of absorbances 1 and 2 under normal conditions and at least absorbance 1 at change should be indispensably selected (check the upper right side of the "Calibration Curve Setting" screen). The absorbance 1 is the wavelength of the principal axis that is highly correlated to moisture, and the absorbance 2 is the wavelength for correction.

5-2-5. Writing the coefficient to the main unit

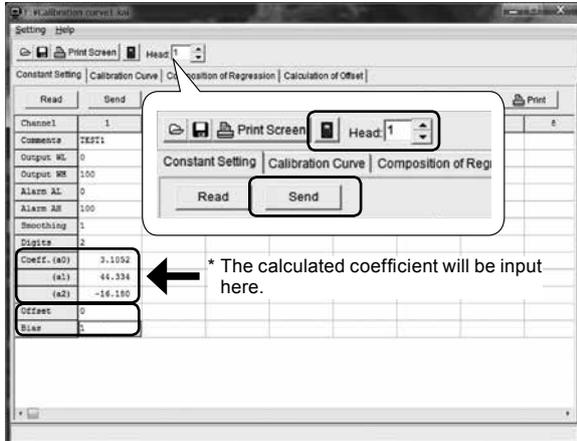
After calculating in the "Constant Setting" screen, check the coefficient of calibration curve, enter comments if necessary, and then write the data on the main unit.

(1) Check the coefficient of the calibration curve, comments, etc.

When a blank cell is present in the cell of the coefficient or in the input channel line, or when changing the value, click the cell and input a comment or data.

Input "0" for offset A, and input "1" for bias B.

* If initialization is performed, these input operations are not necessary because these settings are initial settings.



(2) Write channel parameters set on the PC to the main unit.

- Click the [◀] keys of the head, and enter the number.
- Clicking the [Write] button will display the "Channel setting" screen.
- Set the channel number to be written and click the [OK] button. The channel parameter data will be written to the main unit.

5-2-6. Saving various data

(1) Save the set parameter.

Click the [Constant Setting] tab. When the "Constant Setting" screen is displayed, click the [Save] button.

(2) Save the calibration data.

Click the [Calibration Curve] tab. When the "Calibration Curve Setting" screen is displayed, click the [Save] button.

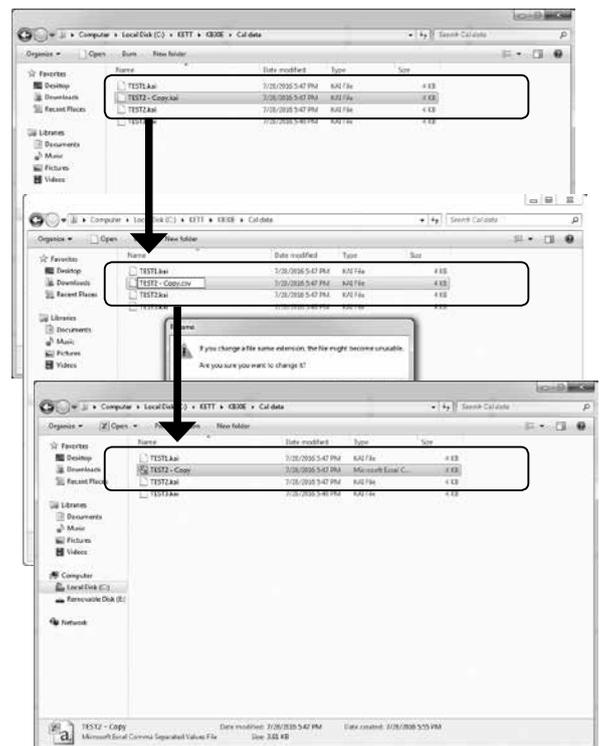
[Supplement]

- Open the calibration curve file using spreadsheet software.

This is a procedure to open the saved calibration curve data using ExcelTM or the like. The extension of the file is ".kai", but the format is ".csv". Right-click the target file. Then, select [Change name], and change the extension to ".csv".

Make sure to copy the file before changing the extension.

The default save folder is "C:\¥KETT¥KB30".



*1 Microsoft and Excel are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

	A	B	C	D
1	KB-30			
2	Head	1		
3	CH	1		
4	Comment	TEST 1		
5	Component			
6	Absorbanc	TRUE	TRUE	
7	Data Cour	30		
8	1	5.11	0.1444	0.2689
9	2	5.11	0.1474	0.2711
10	3	5.11	0.1486	0.2699
11	4	5.01	0.1295	0.2609
12	5	5.01	0.1403	0.2638
13	6	5.01	0.1386	0.2622
14	7	5.79	0.1547	0.2602
15	8	5.79	0.1578	0.2609
16	9	5.79	0.1593	0.2598
17	10	5.9	0.1533	0.2656

5-3. Calculation of composite regression

It is a function to calculate a new coefficient by synthesizing calibration data of the multiple channels.

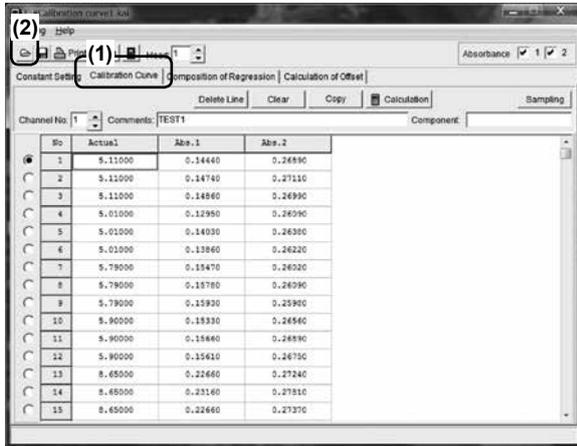
5-3-1. Inputting the calibration data

(1) Open the "Calibration Curve Setting" screen.

Click the [Calibration Curve] tab.

(2) Open the calibration data.

Click the [Open ] button to open the calculation data files to be synthesized.



(5) Synthesize the data.

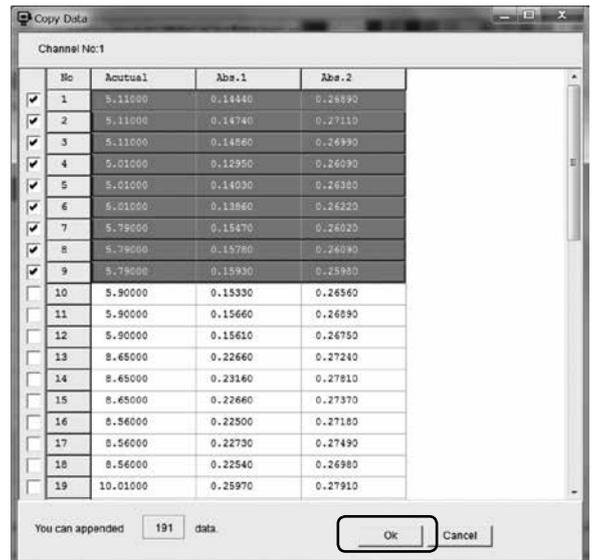
- Click the [Composition] button to display the "Additional channel No. Setting" screen.
- Using  keys, select the channel number to which calculation data for composition are recorded.



(6) Select the data.

Display the set channel number.

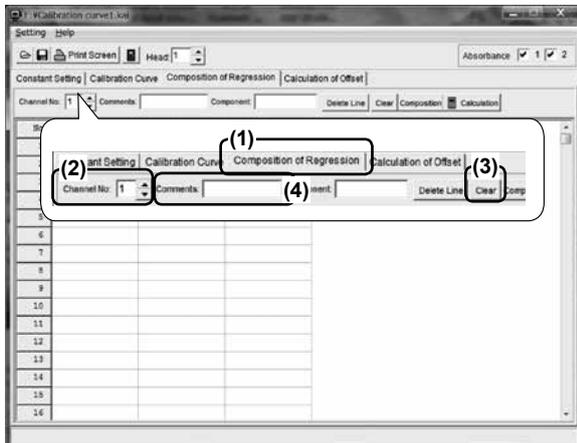
- When the line to be synthesized is clicked, mark is displayed, and the line will be highlight. To select consecutive data, drag and select the lines.
- After selecting data, click the [OK] button.



5-3-2. Synthesizing the calibration data and calculating the coefficient

(1) Open the "Composition of Regression" screen.

Click the [Composition of Regression] tab.



(2) Set the channel number as the saving destination of the composition data.

Click the  keys of "Channel No." to select a number.

(3) Delete displayed data table.

The purpose of this operation is to delete all the displayed data when the previous data is displayed.

- When [Clear] button is clicked, the confirmation message will be displayed. Then, click the [OK] button to perform deletion.

(4) Enter comments.

(7) Synthesize other channel data.

Repeat the above step (6). Up to 200 sets of data can be selected.

(8) Display and check the calculation results, set the coefficient (regression coefficient), and then write them to the unit.

For details, refer to the previously described "making calibration curve".

5-3-3. Saving various data

(1) Save the set parameter.

Click the [Constant Setting] tab, and then click the [Save ] button.

(2) Save the composite calibration curve data.

Click the [Composition of Regression] tab, and then click the the [Save ] button.

5-4. Offset (correction)

5-4-1. Summary of correction

If there is difference between the measurement value and the actual value, or when moving the calibration curve to other devices, maintain the coefficient as it is and correct the calibration curve with offset value or in the primary formula. It is called "correction", performed with offset and bias settings.

The correction formulas are as follows:

- Displayed moisture value (%) = A + B × Calculated moisture value (%)
- Displayed moisture value (%) = Offset + Calculated moisture value (%)
- A, B: Correction coefficient (A: Offset / B: Bias)
- Displayed moisture value: KB-30, Component value displayed on the PC monitor
- Calculated moisture value: Component value calculated from absorbance and coefficient

<Correction procedure>

- (1) **Sample the displayed moisture values using the correction function of the software. At the same time, collect the sample for measuring the actual value.**

Perform measurements at least a few times (more than 10 times if correcting the bias) and save data. To correct the calibration curve, the correction coefficient of the corresponding channel should be the initial setting (without correction, A=0 and B=1).

- (2) **Measure the actual value using a specified method such as ustulation.**

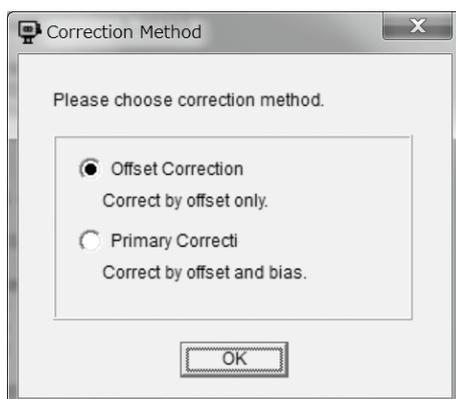
Perform measurement twice at least per sample, and use a value of their average for analysis.

- (3) **Call a previous file, and input actual value.**

- (4) **Calculate the correction coefficient.**

- (5) **To exit the correction, the "Correction Method" screen will be displayed.**

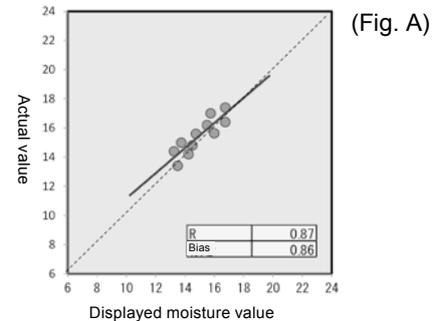
Select either "Offset Correction" or "Primary Correction", and set the result of calculation to the channel parameter.



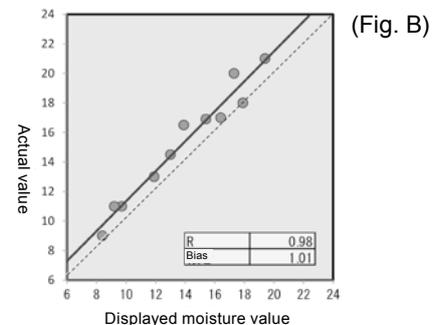
- (6) **Select a correction method.**

<Offset correction>

When the correlation coefficient of the statistics calculation result cannot be increased due to small variation of actual value



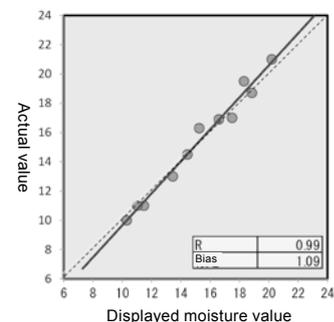
When the bias of the statistics calculation result is closer to "1" (reference: within ± 0.05), correlation coefficient of the statistics calculation result is large (0.9 or more), and the movement is limited to parallel translation



In above cases, set the average of differences between the actual value and the displayed moisture value as the offset (bias: 1).

<Primary correction>

If the correlation coefficient of the statistics calculation result is large (0.9 or more), and the bias is not in the range of approximately "1 \pm 0.05", set A and B based on the single regression analysis of the actual value and the displayed moisture value. The primary correction can also be applied to the case of <Fig. B>.



The required number of data set for the offset correction is a couple at least, and more than 10 data in the case of primary correction. If selecting the offset correction, give consideration to the standard deviation.

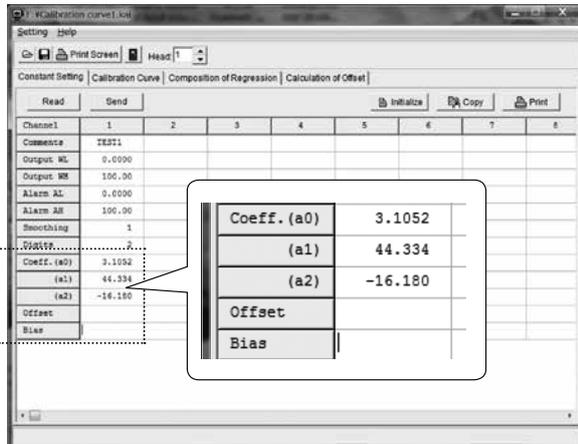
If the value is too large comparing to the actual values, it indicates that the reliability of offset has been lost. Detect the cause, and reset.

	Actual	Calculated	Offset
Average	4.50000	4.87500	-0.37500
Standard Deviation	1.29099	1.20658	0.15000
Minimum	3.00000	3.50000	-0.50000
Maximum	6.00000	6.20000	-0.20000
Variance	1.66667	1.45583	0.02250

5-4-2. Inputting the correction data

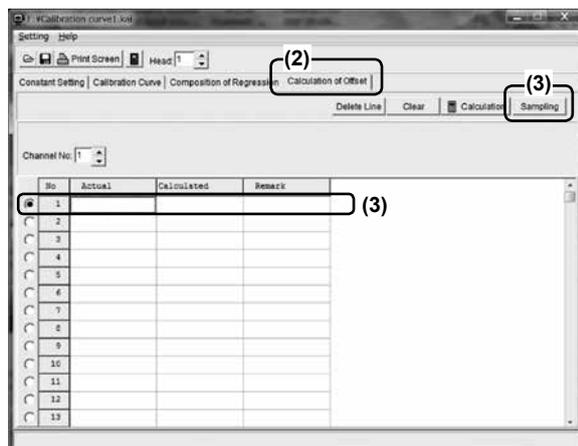
(1) Read channel parameters targeted for correction .

Delete the values of offset and bias after reading the channel parameters referring to "5-1. Setting the parameters" (P.10).



(2) Open the "Calibration of Offset" screen.

Click the [Calculation of Offset] tab.

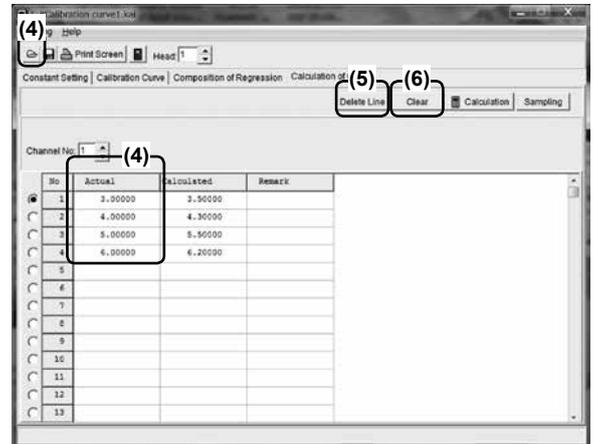


(3) Sample the displayed values.

- Clicking the leftmost white button (○ mark) will change the mark to black (● mark).
(In ●-marked line, the displayed value before the correction will be entered.)
- Press the [F1] key on the keyboard or click the [Sampling] button on the screen. The value will be read, updated, and displayed at regular intervals until next click.
- Update of the display will be stopped when the [F1] key on the keyboard is pressed or the [Sampling] button on the screen is clicked.
- Press the [ENT] key on the keyboard. The setting will be determined, and the ● mark moves to the next line.
- Repeat the above steps and input display values.
- By pressing the [ENT] key, it is possible to set data and move to the next line without stopping the sampling every time.
- The value can be input manually in an arbitrary cell.

(4) Input the actual measurement value.

- Click the [Open] button to open the correction data file.
- Click the cell of the "actual measurement value" corresponding to the display value, and input the actual measurement value.
- Repeat the above steps and input actual measurement values.



(5) When deleting abnormal data

Click the [Delete Line] button, and click the line to be deleted. When the confirmation message is displayed, click the [OK] button to perform deletion.

- * When a line is deleted, the same line of all the channels will be deleted at the same time. Be aware that the deleted data cannot be restored.

(6) When deleting displayed table on the screen

The purpose of this operation is to delete all the displayed data (per channel) when an old data is displayed.

- Click the [Clear] button, and then click the column to delete. When the confirmation message is displayed, click the [OK] button to perform deletion.

5-4-3. Saving the correction data

Click the [Save] button.

5-4-4. Calculating the correction coefficient

(1) Open the correction data file.

Click the [Open]  button to open the correction data file.

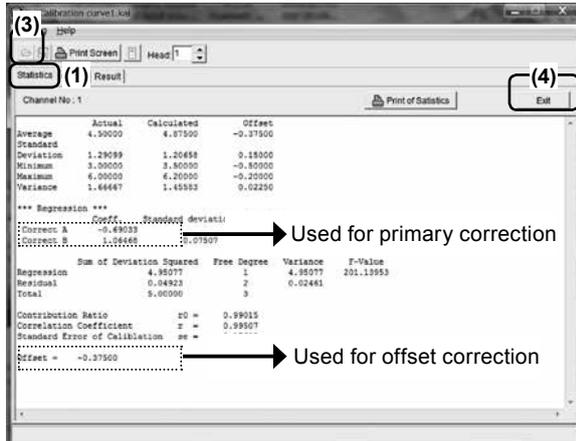
(2) Calculate the offset value.

Click the [Calculate] button.

(3) Display calculation result, and review.

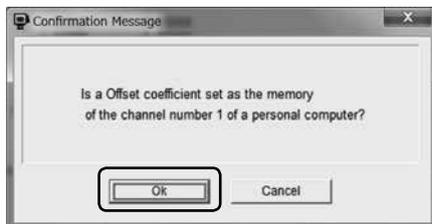
<Statistics calculation result>

Click the [Statistics] tab to display the analysis result.



(4) Set the correction coefficient.

- Click the [Exit] button to display the correction method setting screen.
- Select "Offset Correction" or "Primary Correction" referring to "5-4-1 (5) Select a correction method" (P.21). When the [OK] button is clicked, the confirmation message will be displayed.

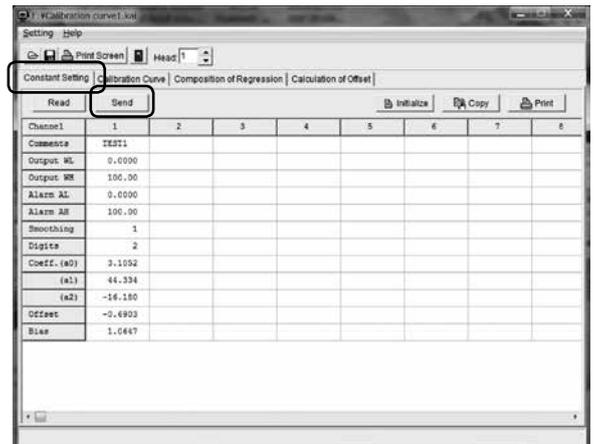


- Click the [OK] button. The correction coefficient will be set to the channel number. If the offset and bias is already set, the following message will be displayed.



5-4-5. Writing the coefficient to the main unit

Click the [Constant Setting] tab, and check the set offset and bias. If required, input comments and click the [Send] button to write the data to the unit.



5-4-6. Saving various data

(1) Save the set parameter.

Click the [Constant Setting] tab, and then click the [Save]  button.

(2) Save the correction data.

Click the [Calculation of Offset] tab, and then click the [Save]  button.

6. Zero calibration

The zero calibration is required even after the unit is being used. If errors occur in the measurement results, read the absorbance obtained from reflection on the reference plate. The measurement result will be stabilized by setting the absorbance as zero. Also, when creating calibration curve, make sure to perform this calibration right before sampling.

6-1. Calibration procedure

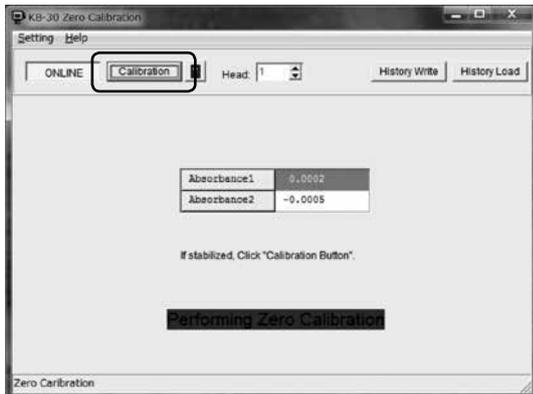
- (1) Insert the reference plate to the slot provided at the tip of the hood of KB-30.
- (2) Start up "KB-30 Zero Calibration" of software.
Make sure that at least 30 minutes have passed after turning on the power.
- (3) Display "Absorbance 1" and "Absorbance 2" in real time.

Click the [ONLINE] button.



(4) Calibration

When the absorbance is stabilized, click the [Calibration] button.



(5) Termination

When "Absorbance 1" and "Absorbance 2" display values closer to "0.0000" after indication of "Performing Zero Calibration" is turned off, it means that the calibration is completed.



6-2. Saving and loading the calibration record

The calibration execution date can be checked after loading the zero-calibration records.

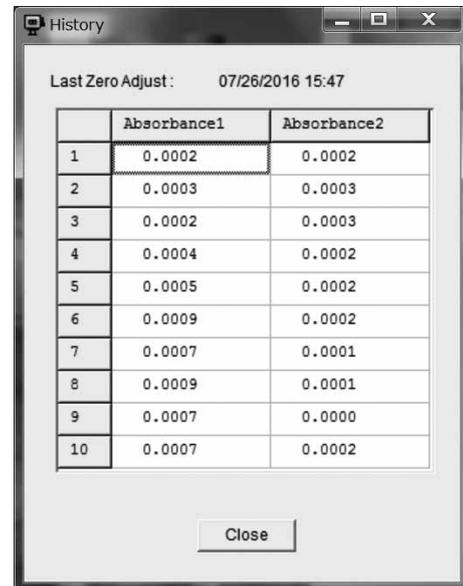
(1) Save the calibration record.

After performing a zero calibration, click the [Save] button. Then, when the confirmation message is displayed, click the [Yes] button to save the data.



(2) Load the calibration record.

Click the [History Load] button. The date of last calibration performance and latest ten data will be loaded.



Saving calibration history enables understanding of how much absorbance error occurred comparing with the previous calibration. It will be an indication of calibration interval.

7. Maintenance

7-1. Checking the voltage

Display the voltage and absorbance in real time.

(1) Start up "Maintenance" of the software.

(2) Check the voltage.

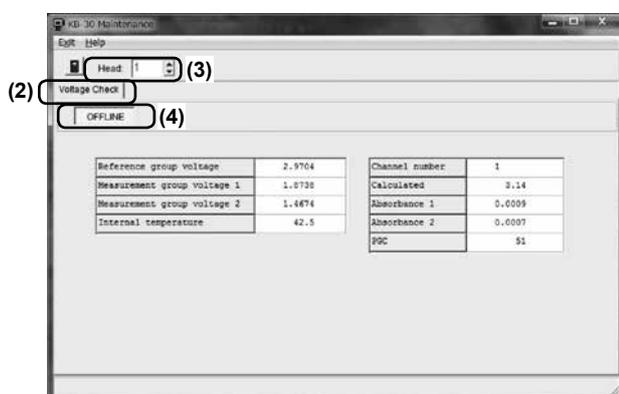
Click the [Voltage Check] tab to display each data.

(3) Set the head number.

Click the  keys of "Head" to select a number.

(4) Display each value in real time.

Click the [ONLINE] button to display each value in real time. The realtime display stops when the indication is changed to "OFFLINE".



7-2. Setting the system parameter

* In the system parameter setting mode, internal compensation coefficients can be displayed and the compensation coefficients specific to the unit are set. Normally, do not perform setting in this mode (except for special cases such as troubleshooting). Contact the dealer to avoid misoperation which may cause difficulties in measurement.

(1) Start up "Maintenance" of the software.

(2) Display the system parameters.

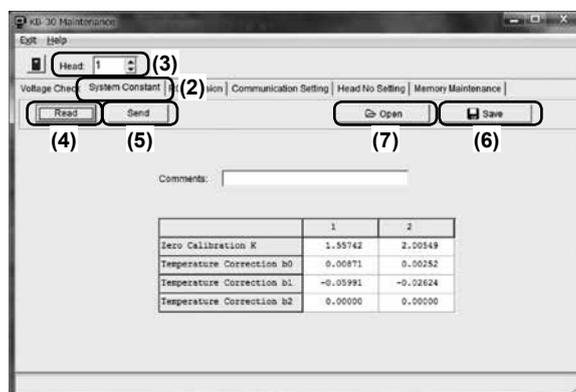
Click the [System Constant] tab.

(3) Set the head number.

Click the  keys of "Head" to select a number.

(4) Display each system parameter.

Click the [Read] button to display each system parameter.



(5) Change the system parameter and send it to the unit.

Click the column to change, and enter the value. Click the [Send] button to send each system parameter data to the unit.

(6) Save the system parameter data.

Click the [Save] button to save the data.

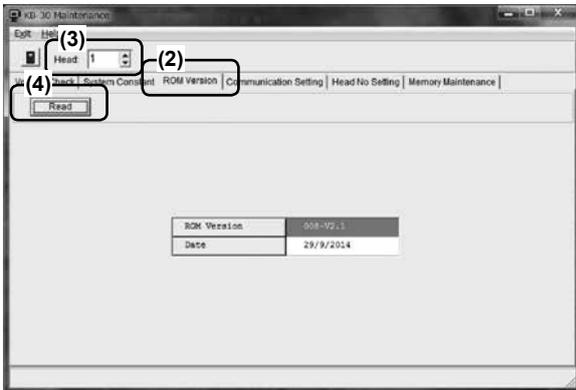
(7) Display the saved system parameter data.

Click the [Open] button to open the file.

7-3. Displaying the ROM version

Display the software version of the sensor head and the controller.

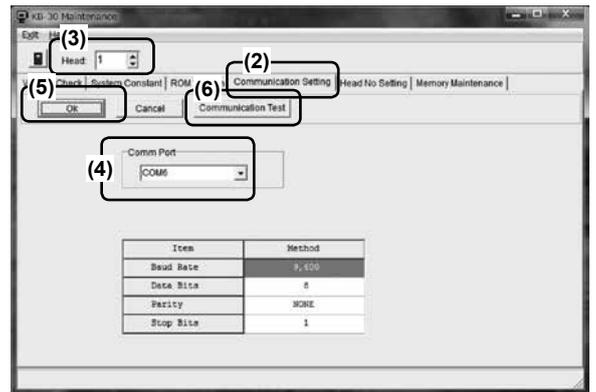
- (1) Start up "Maintenance" of the software.
- (2) Display the ROM version.
Click the [ROM Version] tab.
- (3) Set the head number.
Click the  keys of "Head" to select a number.
- (4) Display the ROM version and the date.
Click the [Read] button.



7-4. Setting the PC communication specification

Set up the PC communication according to the communication specification of the unit.

- (1) Start up "Maintenance" of the software.
- (2) Display the PC communication specification.
Double-click [Communication Setting].
- (3) Set the head number.
Click the  keys of "Head" to select a number.



- (4) Select the COM port.
Select a COM port with the pull-down button of "COM Port".
* Refer to "3. Initial setting" (P.6) for checking the available COM port.
- (5) Set the PC communication specification.
Click the [Set] button to determine the selection.
- (6) Check the communication
 - Click the [Communication Test] button.
 - When the [Communication Test] button is clicked on the "Communication Test" screen, "OK!!" will be displayed.
 - When an communication error is detected, check the communication again after checking the connection and breaks in the communication cable.



7-5. Setting the head number

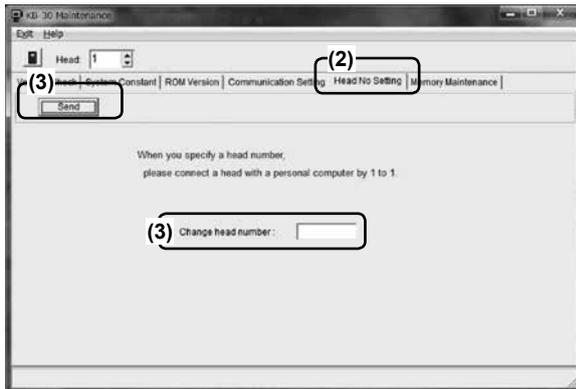
When connecting a multiple sensor heads with the controller, assign the number to each sensor head for identification.

* To perform this setting, make sure to connect each pair of a PC and a sensor head.

(1) Start up "Maintenance" of the software.

(2) Display the head number setting.

Click the [Head No. Setting] tab.



(3) Enter the head number to change.

Enter an arbitrary number in "Change head number", and click the [Send] button.

(4) Check the setting.

Make sure that the head number displayed with a 7-seg LED on the sensor head has been changed to the set number.

7-6. Memory maintenance

* Normally, do not perform setting in this mode (since this mode includes a function to clear all the compensation coefficients specific to the unit). Contact the dealer to avoid misoperation which may cause difficulties in measurement.

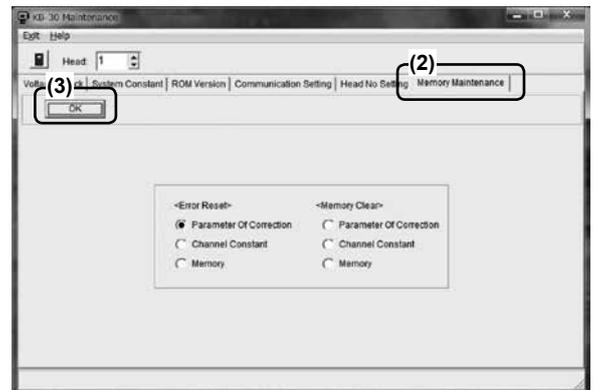
(1) Start up "Maintenance" of the software.

(2) Display [KB-30 Maintenance].

Click the [Memory Maintenance] tab.

(3) Select the range to clear.

Select items from "Error Reset" and "Memory Clear", and then click the [OK] button.



MEMO

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