

1. Introduction

Allows to modify the measuring value table of a characteristic, which will overwrite the existing measurement values.

All of these measuring value corrections must be executed per correction step (action) and per characteristic.

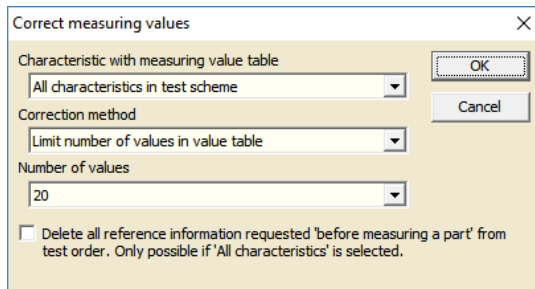
If you intend to keep your original measurement values, we recommend copying these by using the function “Copy measuring values between characteristics” to another characteristic and work on these.

This expansion module allows operation in multiple different modes (see below)

2. Setup settings

- Open the test scheme by selecting the menu “Test scheme → Create / Change”.
- Add an additional test step or open an existing test step.
- Add the function “Correct measuring values” in the “Expert mode”.

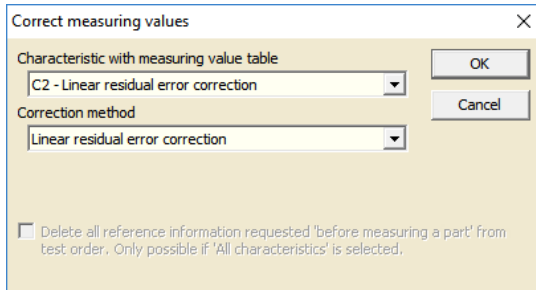
The following setup window is opened by clicking the Setup button :



- Select the *characteristic with measuring table* to modify. The Measurement data of the selected characteristic becomes modified.
- Select the *correction method*. Either select
 - Linear residual error correction
 - Remove average from value table
 - Remove middle point shift from value table
 - Save correction values for middle point correction
 - Save value table as correction values in CSV-file
 - Correct value table with correction values from CSV-file
 - Limit number of values in value table
 - Limit number of values by registers
 - Delete value range defined by registers
 - Remove Min-Value from value table
 - Remove Max-Value from value table
 - Add values from value table 2 to value table
 - Subtract values from value table 2 to value table
 - Convert value table to n values
 - Moving average filter for value table
- The assigned reference information of the corrected measurement values will be removed during correction. If you collect reference information *before measuring a part*, the option *Delete all reference information requested 'before measuring a part' [...]* will purge the reference information tables of the current test order.

3. Description of correction modes

3.1. Linear residual error correction



Correct measuring values

Characteristic with measuring value table
C2 - Linear residual error correction

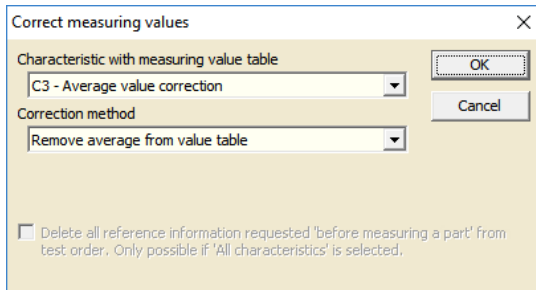
Correction method
Linear residual error correction

☐ Delete all reference information requested 'before measuring a part' from test order. Only possible if 'All characteristics' is selected.

OK Cancel

The corrected values are calculated according the standard linear residual error correction method.

3.2. Remove average from value table



Correct measuring values

Characteristic with measuring value table
C3 - Average value correction

Correction method
Remove average from value table

☐ Delete all reference information requested 'before measuring a part' from test order. Only possible if 'All characteristics' is selected.

OK Cancel

The corrected values are calculated according the standard linear residual error correction method.

The average value of all saved values is calculated. This “overall” average value is then subtracted from each single saved value.

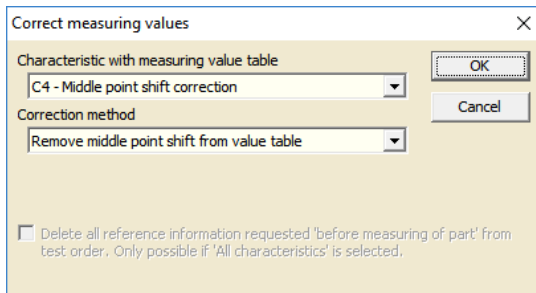
Exemplary table of saved measurement values *before* correction :

1 ->	20.300
2 ->	19.300
3 ->	20.200
4 ->	20.000
5 ->	20.020
6 ->	19.800
7 ->	19.700
8 ->	19.600
9 ->	20.000
10 ->	20.000
11 ->	20.800
12 ->	19.500
13 ->	20.000
14 ->	20.000
15 ->	19.200
16 ->	20.200

Exemplary table of saved measurement values *after executing function / after* correction :

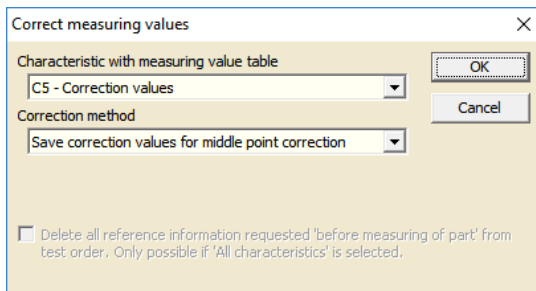
1 ->	0.381
2 ->	-0.618
3 ->	0.281
4 ->	0.081
5 ->	0.101
6 ->	-0.118
7 ->	-0.218
8 ->	-0.318
9 ->	0.081
10 ->	0.081
11 ->	0.881
12 ->	-0.418
13 ->	0.081
14 ->	0.081
15 ->	-0.718
16 ->	0.281

3.3. Remove middle point shift from value table



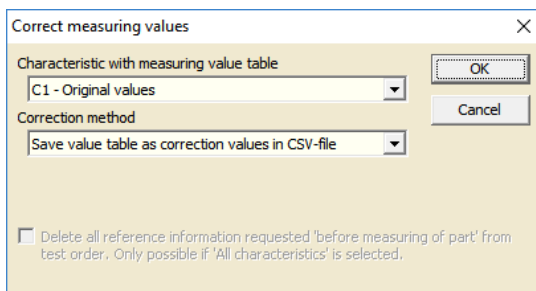
The middle point correction value for each single saved value is calculated by using the "Least squares" method over all saved values. The calculated middle point correction value for each single saved value is then subtracted from the appropriate saved value. After executing this function, the Tir(Cx) function can be used to calculate the roundness of the corrected characteristic.

3.4. Save correction values for middle point correction



The middle point correction value for each single saved value is calculated by using the "Least squares" method over all saved values. The calculated middle point correction value for each single saved value is then saved as the characteristic's saved values.

3.5. Save value table as correction values in CSV-file

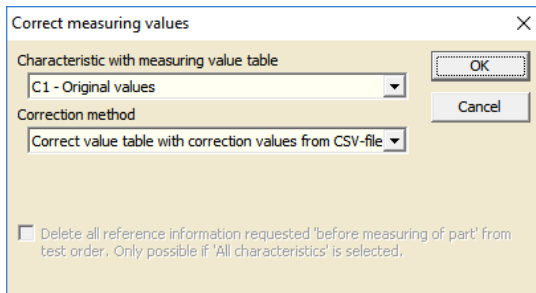


Stores the saved measurement values of the selected characteristic as correction values to the file

<Test scheme name>_<Characteristic number>.csv

Thus, by using this method you could execute a measurement data collection with a master piece and file the values of the master piece at different (e.g. 32) positions as correction values for a characteristic.

3.6. Correct value table with correction values from CSV-file



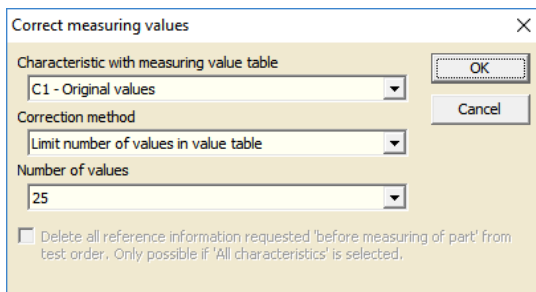
The dialog box 'Correct measuring values' has a title bar with a close button. It contains two dropdown menus: 'Characteristic with measuring value table' set to 'C1 - Original values' and 'Correction method' set to 'Correct value table with correction values from CSV-file'. There are 'OK' and 'Cancel' buttons. At the bottom, there is a checkbox labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

Loads correction values for the characteristic from the file

<Test scheme name>_<Characteristic number>.csv.

These correction values are then subtracted from the currently saved values of the characteristic.

3.7. Limit number of values in value table



The dialog box 'Correct measuring values' has a title bar with a close button. It contains two dropdown menus: 'Characteristic with measuring value table' set to 'C1 - Original values' and 'Correction method' set to 'Limit number of values in value table'. Below the second dropdown is a text input field for 'Number of values' containing '25'. There are 'OK' and 'Cancel' buttons. At the bottom, there is a checkbox labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

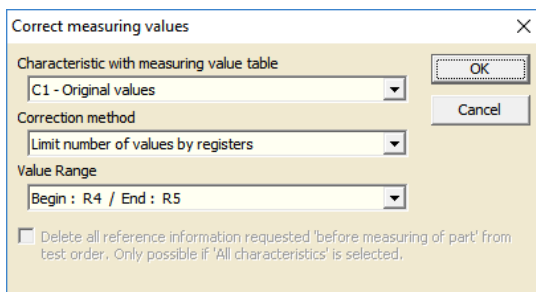
Limits the number of saved values for the selected characteristic to the number selected in the function.

If there was a larger number of values saved before the function is executed, the last (newest) values remain saved while all surplus (older) values are deleted.

Thus, by using this method you could programme a “shift register” function for the selected characteristic.

The characteristic will then always have the last (newest) values saved, up to the max. number of values selected in the function. The example below shows a programmed “shift register” function for the last 25 values of characteristic C1.

3.8. Limit number of values by registers

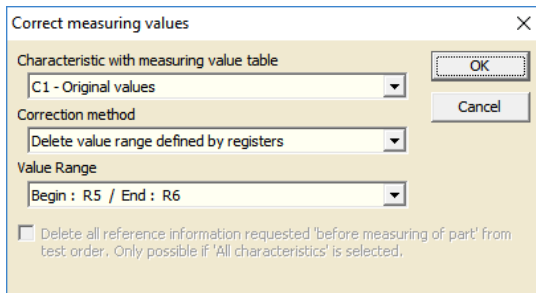


The dialog box 'Correct measuring values' has a title bar with a close button. It contains two dropdown menus: 'Characteristic with measuring value table' set to 'C1 - Original values' and 'Correction method' set to 'Limit number of values by registers'. Below the second dropdown is a dropdown menu for 'Value Range' set to 'Begin : R4 / End : R5'. There are 'OK' and 'Cancel' buttons. At the bottom, there is a checkbox labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

Limits the number of saved values for the selected characteristic to the range of values (dataset numbers) given by the register values of the registers selected in the “Value Range” dropdown list of the function.

See exemplary illustration above. All saved values outside the value range defined by the selected registers are deleted. The registers must be handled in the test steps of the test scheme. Thus, by using this method you could control selection of a specific group of saved values within a known number of saved values.

3.9. Delete value range defined by registers



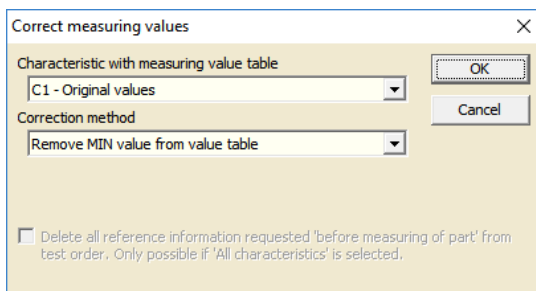
The dialog box 'Correct measuring values' has a title bar with a close button. It contains three main sections: 'Characteristic with measuring value table' with a dropdown menu showing 'C1 - Original values' and 'OK'/'Cancel' buttons; 'Correction method' with a dropdown menu showing 'Delete value range defined by registers'; and 'Value Range' with a dropdown menu showing 'Begin : R5 / End : R6'. At the bottom, there is a checkbox labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

This mode allows to remove a range of measurement values from Characteristic's measuring table. Select the registers containing the value range to remove and ensure that the registers are set to the proper values.

In Example, if the measuring value table has 30 entries [1..30], the function call is defined as above and you intend to delete measuring values no. 20 to 24, you need to set the registers R5 to 20 and register R6 to 25.

When the function is called, the measuring value table contains only 25 values [1..25], where the measurement values [20..25] are the former measurement values [25..30].

3.10.Remove Min-Value from value table

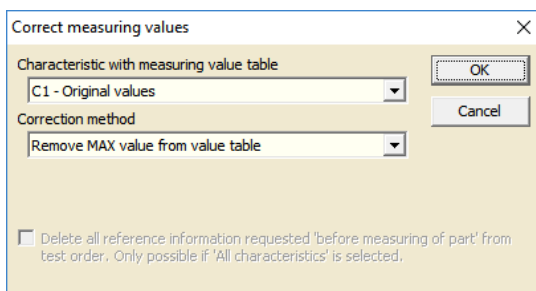


The dialog box 'Correct measuring values' has a title bar with a close button. It contains three main sections: 'Characteristic with measuring value table' with a dropdown menu showing 'C1 - Original values' and 'OK'/'Cancel' buttons; 'Correction method' with a dropdown menu showing 'Remove MIN value from value table'; and a checkbox at the bottom labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

This mode searches for the minimum value of the Characteristic's measuring value table (C1) and subtracts it from each measuring value of the measuring value table.

The result is: $C1[i] = C1[i] - \text{Min}(C1)$, where i is the index of the measuring value in the measuring value table and $\text{Min}(C1)$ is the minimum value from C1.

3.11.Remove Max-Value from value table

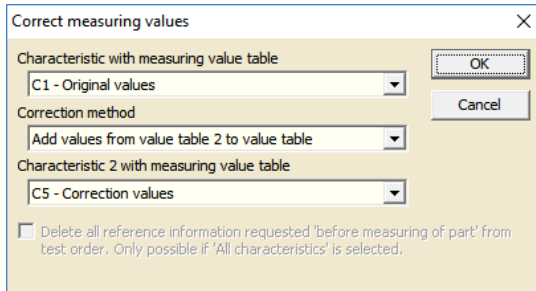


The dialog box 'Correct measuring values' has a title bar with a close button. It contains three main sections: 'Characteristic with measuring value table' with a dropdown menu showing 'C1 - Original values' and 'OK'/'Cancel' buttons; 'Correction method' with a dropdown menu showing 'Remove MAX value from value table'; and a checkbox at the bottom labeled 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.'

This mode searches for the maximum value of the Characteristic's measuring value table (C1) and subtracts it from each measuring value of the measuring value table.

The result is: $C1[i] = C1[i] - \text{Max}(C1)$, where i is the index of the measuring value in the measuring value table and $\text{Max}(C1)$ is the maximum value from C1.

3.12. Add values from value table 2 to value table



The dialog box 'Correct measuring values' has a close button (X) in the top right. It contains the following fields and controls:

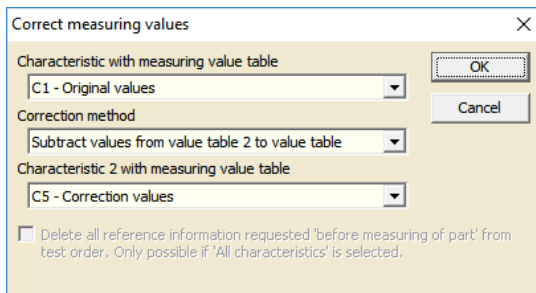
- 'Characteristic with measuring value table': A dropdown menu showing 'C1 - Original values'.
- 'Correction method': A dropdown menu showing 'Add values from value table 2 to value table'.
- 'Characteristic 2 with measuring value table': A dropdown menu showing 'C5 - Correction values'.
- Buttons: 'OK' and 'Cancel'.
- Checkbox: 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.' (unchecked).

This mode allows you to define a second characteristic (C5) with measuring value table whose measuring values are added to the measuring values of the selected Characteristic (C1).

The result is: $C1[i] = C1[i] + C5[i]$, where i is the index of the measuring value in the measuring value table.

If $C5[i]$ is an invalid value, it will not be added to $C1[i]$, also if one of the measuring value tables has less measuring values the subtraction is only computed as far as both values ($C1[i]$ and $C5[i]$) are available.

3.13. Subtract values from value table 2 to value table



The dialog box 'Correct measuring values' has a close button (X) in the top right. It contains the following fields and controls:

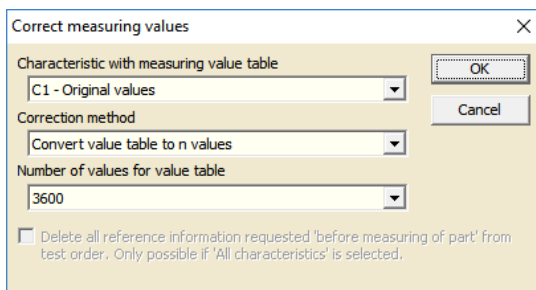
- 'Characteristic with measuring value table': A dropdown menu showing 'C1 - Original values'.
- 'Correction method': A dropdown menu showing 'Subtract values from value table 2 to value table'.
- 'Characteristic 2 with measuring value table': A dropdown menu showing 'C5 - Correction values'.
- Buttons: 'OK' and 'Cancel'.
- Checkbox: 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.' (unchecked).

This mode allows you to define a second characteristic (C5) with measuring value table whose measuring values are subtracted from the measuring values of the selected Characteristic (C1).

The result is: $C1[i] = C1[i] - C5[i]$, where i is the index of the measuring value in the measuring value table.

If $C5[i]$ is an invalid value, it will not be subtracted from $C1[i]$ also if one of the measuring value tables has less measuring values the subtraction is only computed as far as both values ($C1[i]$ and $C5[i]$) are available.

3.14. Convert value table to n values

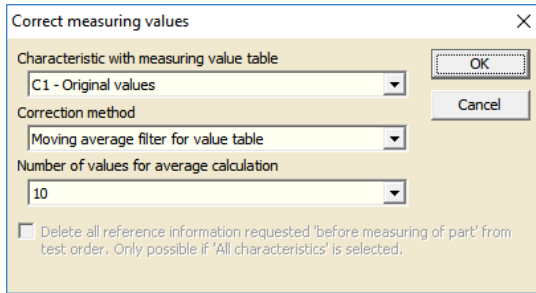


The dialog box 'Correct measuring values' has a close button (X) in the top right. It contains the following fields and controls:

- 'Characteristic with measuring value table': A dropdown menu showing 'C1 - Original values'.
- 'Correction method': A dropdown menu showing 'Convert value table to n values'.
- 'Number of values for value table': A dropdown menu showing '3600'.
- Buttons: 'OK' and 'Cancel'.
- Checkbox: 'Delete all reference information requested 'before measuring of part' from test order. Only possible if 'All characteristics' is selected.' (unchecked).

This mode converts the measuring value table to a definable number of measuring values.

3.15.Moving average filter for value table



This mode applies a moving average filter to a measuring table. The number of values for the average calculation can be configured from 1..200.

The result is calculated as follows : $i < n : C1[i] = C1[i]$

$$i \geq n : C1[i] = \sum_{x=i-n}^i \frac{C1[x]}{n}$$

where i is the index of the measuring value and n is the number of values for average calculation.

If the number of measuring values is less than the configure number, no calculation is done.