

DUOS TRANSMITTERS CALIBRATION TOOL



CALIBRATION MANUAL

DS_DUOS_PROBE_CALIB_E01A

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01

HOW TO USE THE CALIBRATION TOOL TO CALCULATE THE CALIBRATION VALUES

INTRODUCTION

The sensors and probes used in th DUOS system are calibrated in the manufacturing process but over the time, users will need to make minor adjustments to the values acquired to take advantage of the best performance from DUOS transmitters. Understanding this need for the user, the [Tekon Configurator](#) software is enabled with advanced properties for linear calibration related to the transmitters. In order to make the most of this functionality, an auxiliary tool has been developed to help this calibration process.

The oppotunity to further calibrate the probes shows added value to the solution as a whole, as it has advantages that enhance the entire monitoring process:

-  Sensor aging compensation;
-  Sensor lifetime extension;
-  Sensor accuracy improvement;
-  Sensor gain and offset correction via software;

TOOL DESCRIPTION

Our calibration method is a process based on a linear equation. In this context, it is understood the use of a mathematical methodology to assist in the calculation of gain (m) and offset (b). The mathematical formula $Y=mX+b$ is the applicable basis for this solution.

The calculation procedure is based on the reference values (1) and values recorded (2) by th sensor of the DUOS transmitters. You will need at least two reference values and two measured values to calculate the gain and offset values.

1	2	Absolute Measured Error	% Measured Error	Compensated Value	Absolute Compensated Error	% Compensated Error
Reference Value	Measured Value					

Table 1 - Data analysis template

The other fields in the table are automatically filled. In the next example, we will simulate the calibration of a DUOS CO2 probe, which normally equips this type of transmitter. The reference values refer to the capacity of 20%, 40%, 60% and 80% of the measuring range of our probe with a 2000ppm limit.

Reference Value	Measured Value	Absolute Measured Error	% Measured Error	Compensated Value	Absolute Compensated Error	% Compensated Error
400.00	395.00	5.00	1.25%	395.90	4.10	1.03%
800.00	791.00	9.00	1.13%	806.76	6.76	0.85%
1200.00	1169.00	31.00	2.58%	1198.95	1.05	0.09%
1600.00	1554.00	46.00	2.88%	1598.39	1.61	0.10%

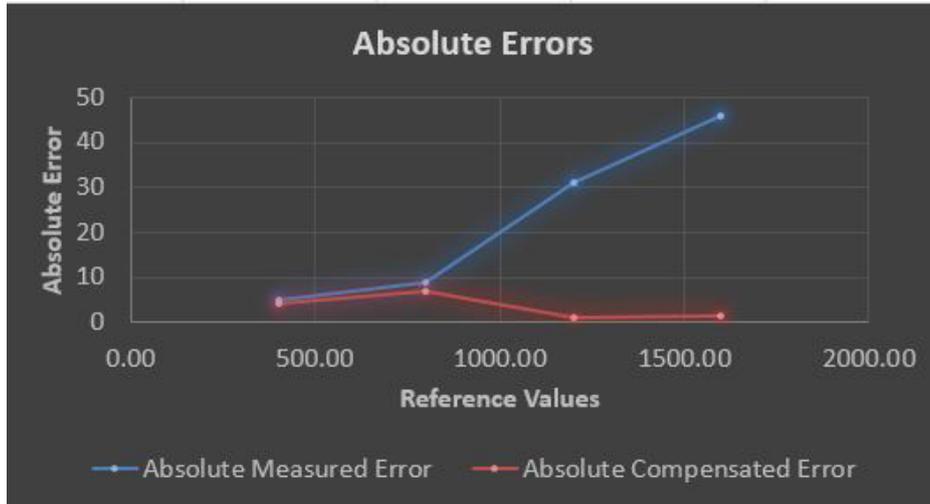
Table 2 - Data analysis template with calculated values

For a better graphical perception of the values, the calibration tool automatically creates two types of graphs. In the graphic chart A, we can observe the measured absolute error and the compensated absolute error.

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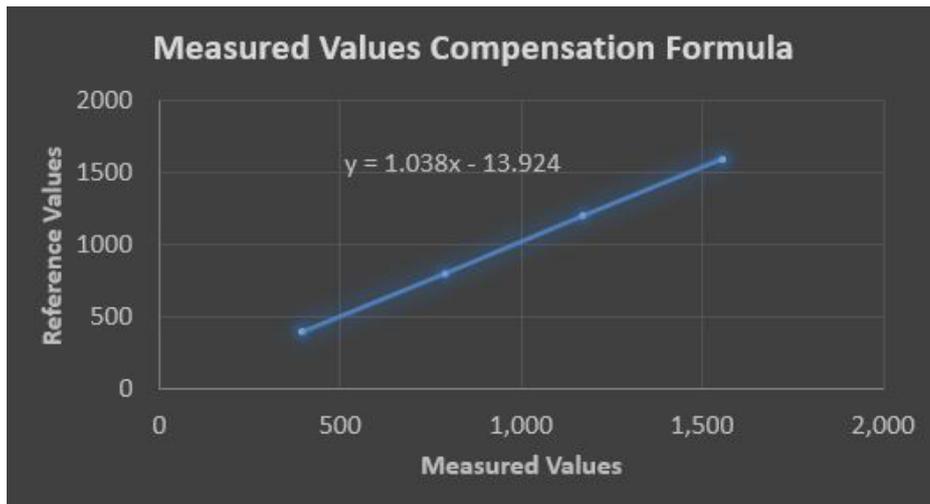
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Graphic chart A - Absolute errors

In the next graphic chart, we observe the application of the formula for the calculation of gain and offset, previously mentioned.



Graphic chart B - Measured values compensation formula

At the end, a table is automatically filled in to display the final values to be used for calibration.

Linear Calibration	Value
m	1.03753
b	-13.92386
R ²	0.99992

Table 3 - Example of DUOS CO2 calibration results.

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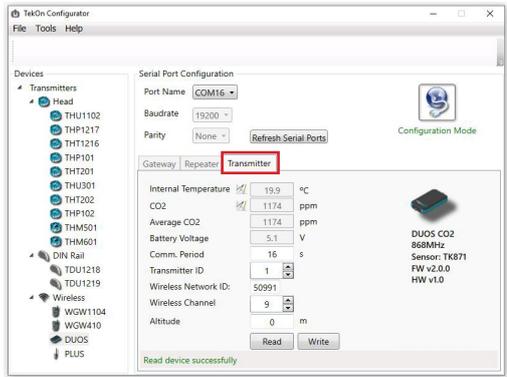
INSERT CALIBRATION VALUES IN TEKON CONFIGURATOR SOFTWARE

CALIBRATION VALUES APPLICATION

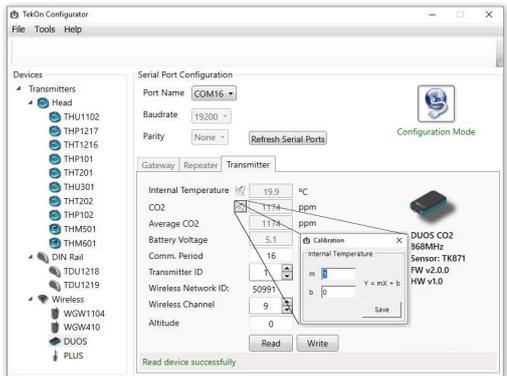
01 Execute **Tekon Configurator** software.



02 Enter in configuration mode.
When your transmitter is in configuration mode, the software will automatically detect the transmitter type and show the variables that you can calibrate.



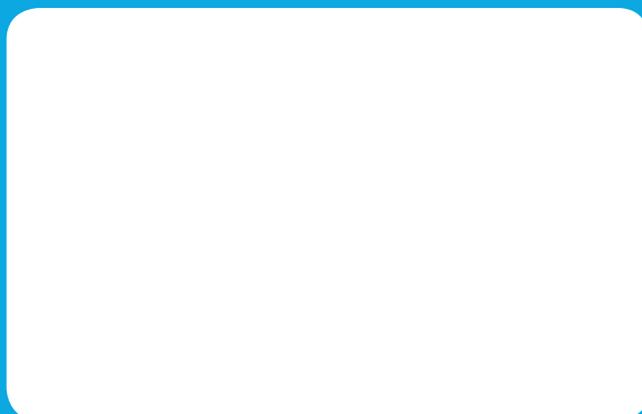
03 Click on the calibration option ().
A new window will show up.
Insert the gain (**m**) and the offset (**b**) values returned by the calibration calculation tool.
Click on the **Save** button to save the changes.



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