IEEE MathType Tutorial
for Microsoft Word Users

IEEE Publication Technology

Mathematical Typography and Why It Matters

It is important that you make sure your mathematical equations and formulas display correctly in the published article.

Typographical conventions for mathematical formulas have been developed to provide *uniformity and clarity of presentation across mathematical texts*. This enables the readers of those texts to both understand the author's ideas and to grasp new concepts quickly. While software such as LaTeX and MathType® can produce aesthetically pleasing math when used properly, it is also very easy to misuse the software, potentially resulting in incorrect math display.

IEEE aims to provide authors with the proper guidance on mathematical typesetting style and assist them in writing the best possible article.

As such, IEEE has assembled a set of examples of good and bad mathematical typesetting. You will see how various issues are dealt with. The following publications have been referenced in preparing this material:

- *Mathematics into Type*, published by the American Mathematical Society
- *The Printing of Mathematics*, published by Oxford University Press
- AMS-StyleGuide-online.pdf, published by the American Mathematical Society

A MathType Tutorial for Microsoft Word Users

The purpose of this document is to educate users on the use of the MathType plugin for MSWord. Please follow the installation guidelines at:
https://docs.wiris.com/en/mathtype/mathtype_desktop/installation

The IEEE MathType style file

The IEEETran.eqp preferences file is intended to be used with the IEEE Transactions and Journals Microsoft Word template with the Wiris MathType 7.0 plugin. This file should be copied to your \MathType\Preferences folder.

The IEEETran.eqp preferences file has the settings adjusted to work with the fonts used in the IEEE Transactions and Journals Microsoft Word template. User 1 and User 2 definitions have been defined to call the Caligraphic and Fraktur fonts which will be described later.

Insert Equations Group

Inline and Display Equations, they are different!
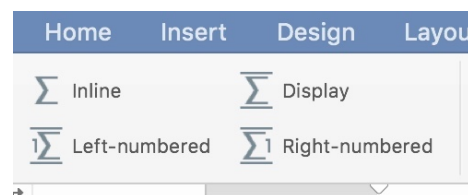
It is important to select "Inline" for equations in paragraphs and "Display" for equations in between paragraphs. If you are numbering your equations, please use the "Right-numbered" option.

Some Useful Keyboard Short-Cuts

The IEEETran style for MathType has been setup with appropriate fonts for Math, Text, Vector-Matrix and custom User 1 and User 2 settings. Keyboard short-cuts from the Style Menu for these are as follows:

Menu Item	Keyboard Short-Cut
Math	ctrl + (plus key)
Text	ctrl + shift, E
Function	ctrl + shift, F
Variable	ctrl + shift, V
Greek	ctrl + shift, G
Vector-Matrix	ctrl + shift, B
User 1 - Caligraphy	ctrl + shift, U
User 2 - Fraktur	ctrl + alt, shift + U

You can verify which **Style** you are currently in by looking at the Status Bar at the bottom of the MathType window.
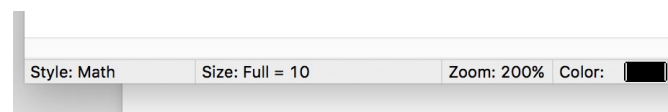
Keyboard Short-Cuts for Common Palettes

Palette Item	Keyboard Short-Cut
Superscript	ctrl + H
Subscript	ctrl + L
Fraction (Full Size)	ctrl + F
Fraction (Small Size)	ctrl T, shift F
Fences (x)	ctrl + 9
Fences $\{x\}$	ctrl + {
Fences $[x]$	ctrl + [
Fences $|x|$	ctrl +T,	
Fences $\langle x \rangle$	ctrl + ,
Sums (limits top and bottom)	ctrl + T, S
Products (limits top and bottom)	ctrl + T, P
Integral (limits top and bottom)	ctrl + T, I
Accents/Embellishments	
tilde	ctrl + ^, ~
hat	ctrl + ^, 6
arc	ctrl + ^, 9
overbar	ctrl + ^, -
prime	ctrl + alt, '
not	ctrl + 6, N
dot	ctrl + alt, .
Over bar	ctrl _
Under bar	ctrl + 6, _
Common Greek Characters	
alpha	ctrl + g, a
beta	ctrl + g, b
chi	ctrl + g, c
delta	ctrl + g, d
epsilon	ctrl + g, e
phi	ctrl + g, j
gamma	ctrl + g, g
eta	ctrl + g, h
kappa	ctrl + g, k
lambda	ctrl + g, l
mu	ctrl + g, m
pi	ctrl + g, p
rho	ctrl + g, r
sigma	ctrl + g, s
tau	ctrl + g, t
theta	ctrl + g, q
psi	ctrl + g, y
zeta	ctrl + g, z
Delta	ctrl + g, shift D
Phi	ctrl + g, shift F
Gamma	ctrl + g, shift G
Omicron	ctrl + g, shift O
Pi	ctrl + g, shift P
Theta	ctrl + g, shift Q

For a full list of MathType keyboard shortcuts see:

Examples

Basic equation
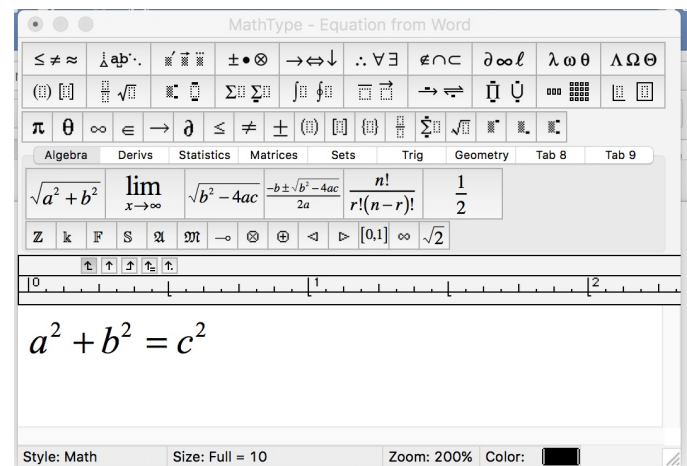
For a simple equation type a + b =c and see the results:
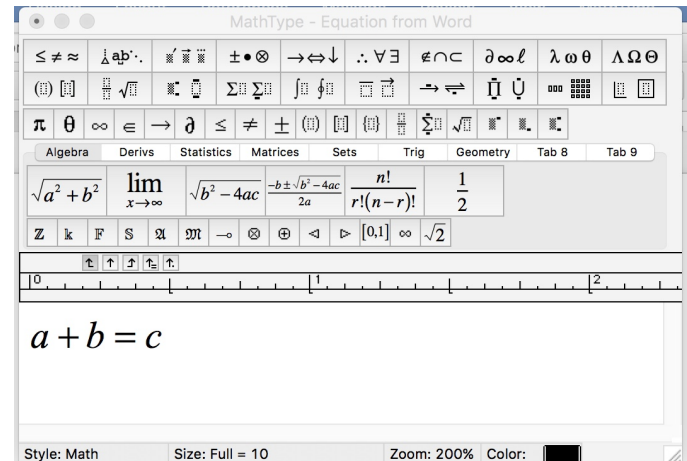
Superscripts, Subscripts

To add superscripts and subscripts, type the following:
1. a ctrl + h, 2
2. right arrow key (to get out of superscript template)
3. + b ctrl + h, 2
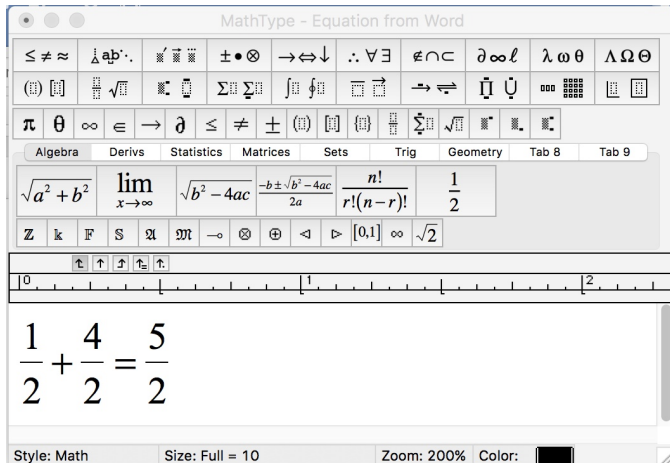4. right arrow key
5. = c ctrl + h, 2

Fractions

To create full-size fractions for display eqs type the following:
1. ctrl + f
2. 1
3. 2
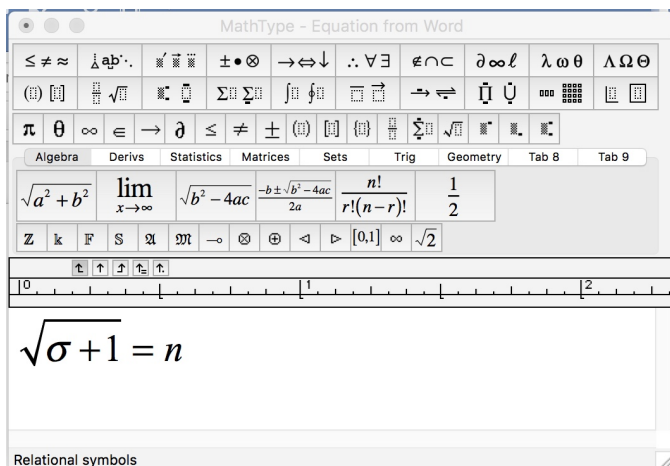4. right arrow key
5. +
6. ctrl + f
7. 3

8. 2
9. right arrow key
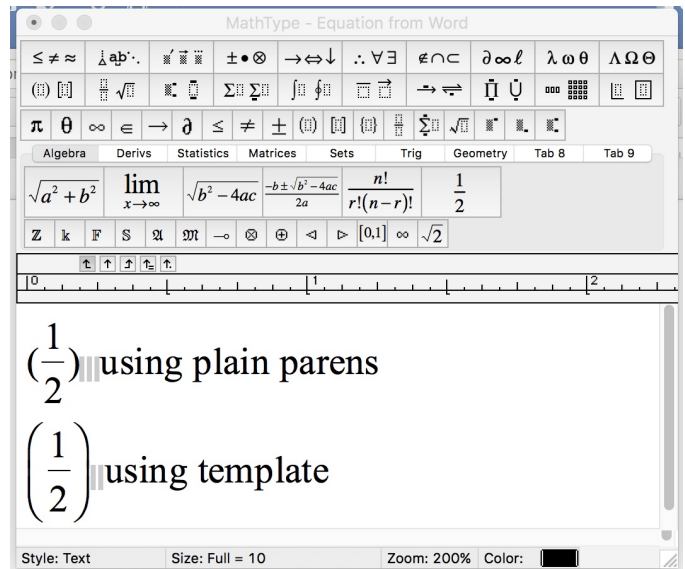10. =
11. ctrl + f
12. 5
13. 4
14. right arrow key

Style: Math   Size: Full = 10   Zoom: 200%   Color:

Square roots

To build a square root, do the following keystrokes:

1. ctrl + s
2. ctrl + g, s
3. +1
4. right arrow key
5. = n

$$\sqrt{\sigma + 1} = n$$

Relational symbols

Fences

It is important for fences to grow with the content in between. The following example shows the difference.

$$\left(\frac{1}{2}\right) \text{using plain parens}$$

$$\left(\frac{1}{2}\right) \text{using template}$$
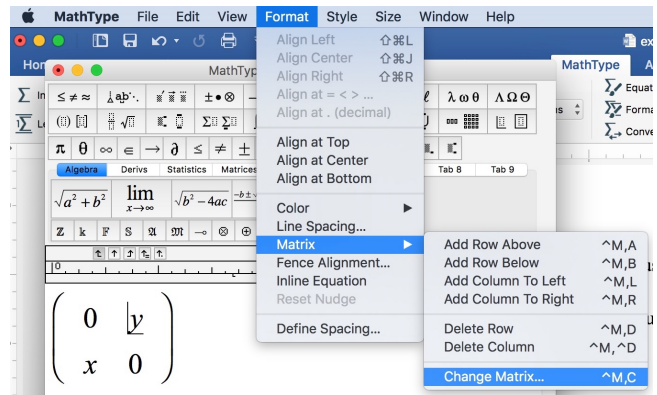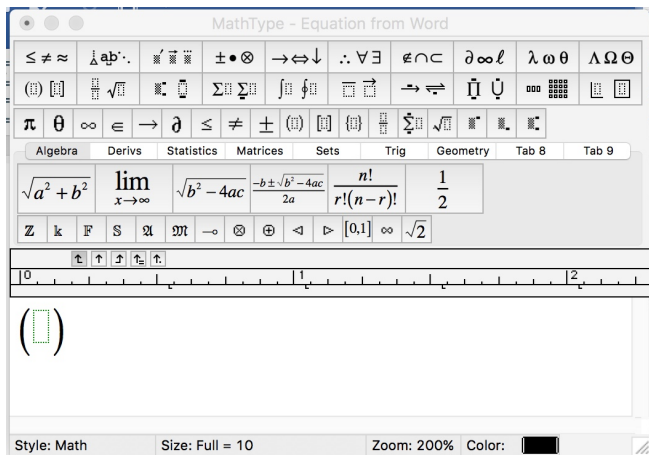
Style: Text   Size: Full = 10   Zoom: 200%   Color:

Text in equations

Alphabetic characters by default are italic. You must change to text mode or select the text you typed and then select text mode by using the Style Menu or keyboard shortcut ctrl + shift, E to correct for style. In the example below, the acronym "MSE" was used in the text and a formula. Their style should match each other.
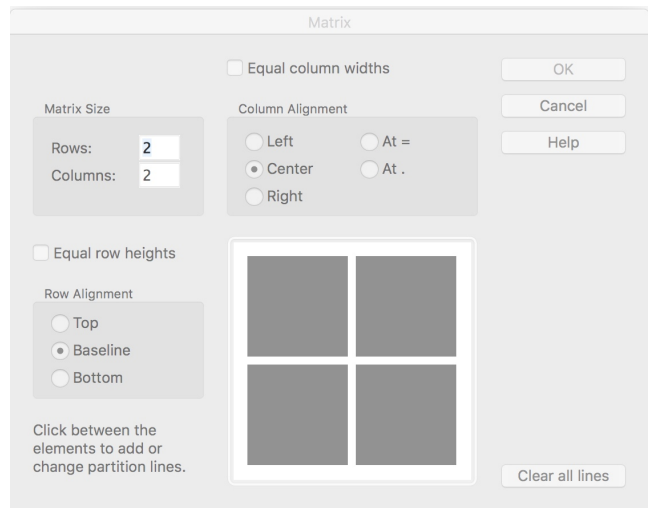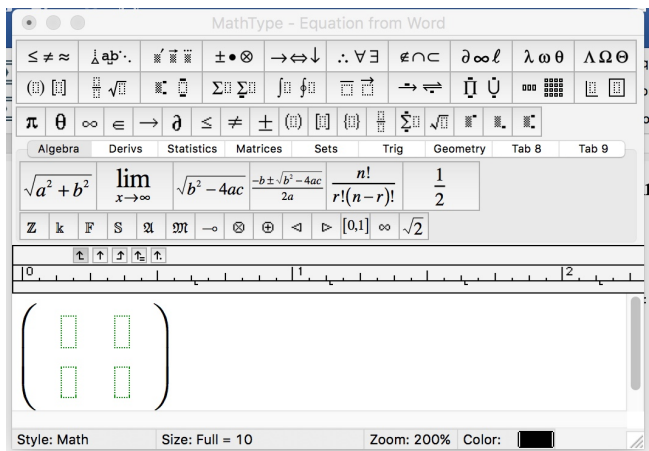

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2$$

Style: Math   Size: Full = 10   Zoom: 200%   Color:
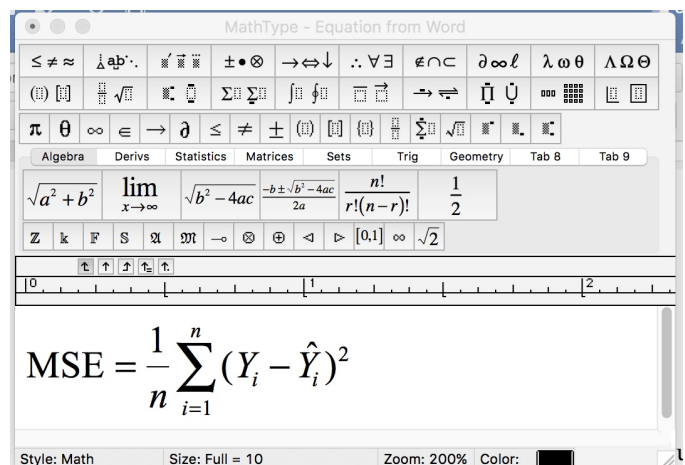
Arrays/Matrices/Cases

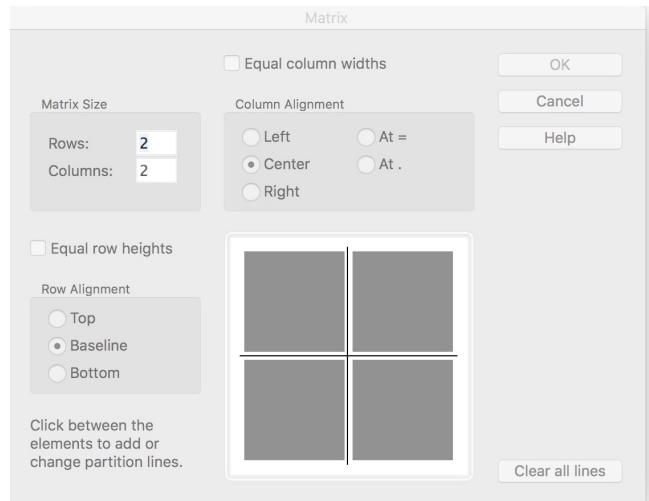To create a matrix, select the appropriate fences from the template ⊞ ⊞ and then select from the matrix template ⊞ ⊞

select the 2 x 2 template.

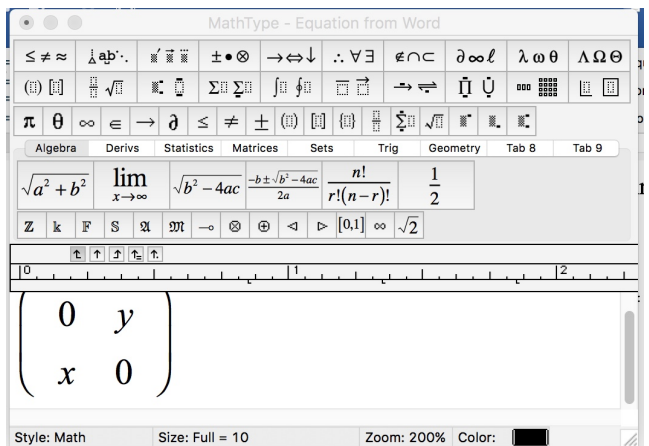
insert your data.

To add horizontal and vertical rules, go to the Format menu and select Matrix, then Change Matrix.

You will see the following dialogue box.

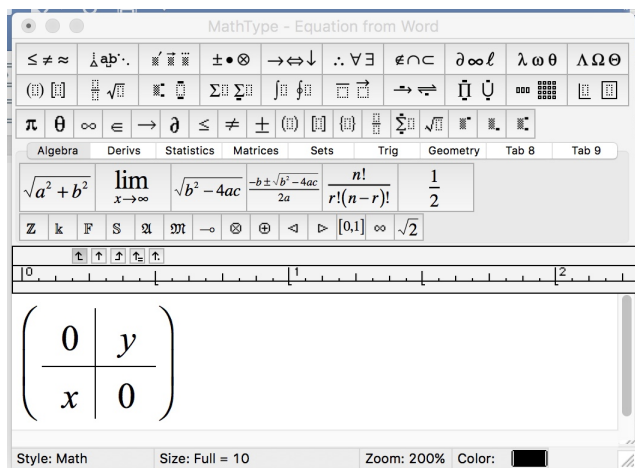click inside the space between the cells to create vertical lines.

Click ok and you have the resulting matrix with horizontal and vertical rules.

Embellishments and Accents

For most embellishments you can select the letter to be embellished and then type the keystrokes to set the embellishment. For some (dot, overbar, underbar), you may need to set the cursor to the right of the character and then type the keystrokes to set the embellishment.

| Description	Keystroke	Result
tilde	x, ctrl+^, ~	$\tilde{x}$
hat	x, ctrl+^, 6	$\hat{x}$
arc	x, ctrl+^, 9	$\overset{\frown}{x}$
overbar	x, ctrl+^,-	$\bar{x}$
prime	ctrl + alt, '	x'
not	a, ctrl + 6, N	$\not{a}$
dot	x, ctrl + alt, .	$\dot{x}$
Overbar	x, ctrl +shift, _	$\bar{x}$
Underbar	x, ctrl + 6, _	$\underline{x}$

Multi-line Equations and Alignment

The alignment of multi-line equations can be a challenge. Here are a few tips to make this easier.
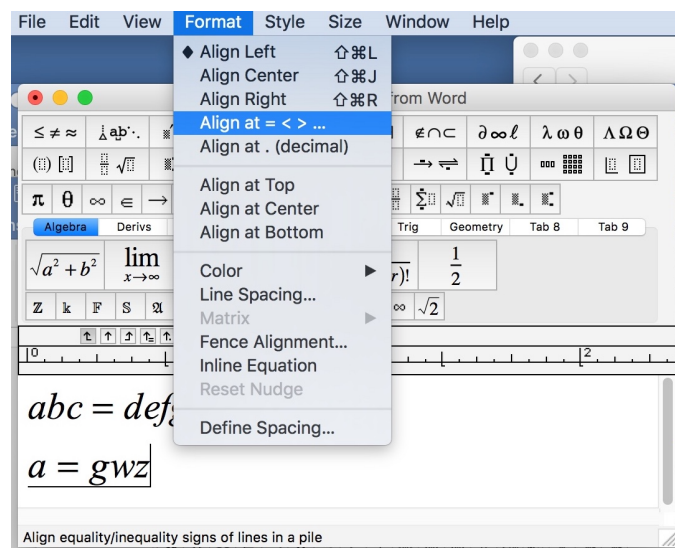
1. Use the alignment tools from the **Format** menu whenever possible.

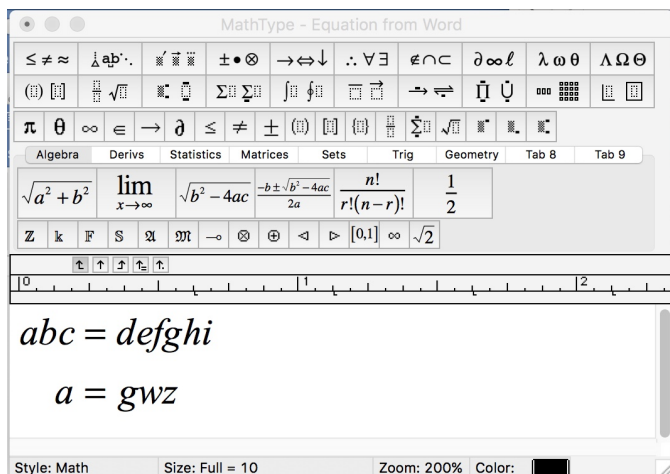Type the following:
 a) abc = defghi [return]
 b) a = gwz
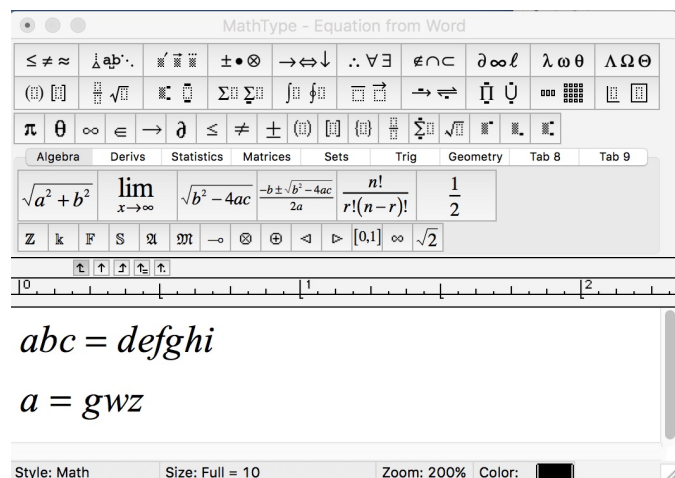
Select the **Format** menu and then **Align at = < > …**

The result below shows that the the lines align on the = sign.

2. Avoid using spaces to force alignment whenever possible. It may be better to use a matrix to align troublesome alignments.

Equation Numbering

Please follow IEEE style guidelines for equation numbering:
Consecutive Numbering: Equations within an article are numbered consecutively from the beginning of the article to the end.
Appendix Equations: Continued consecutive numbering of equations is best in the Appendix, but it is acceptable to start equation numbering over with (A1), (A2), etc., for Appendix equations.

Further reading

For more detailed tutorials and examples please see:

https://docs.wiris.com/en/mathtype/mathtype_desktop/basic_tutorials
and
https://docs.wiris.com/en/mathtype/mathtype_desktop/more_tutorials