



## 1.1 Options

### 1.1.1 `normalize-symbols`

Mathematical notation uses variant shapes of some Greek letters as additional symbols. There are separate code points for the symbol variants in Unicode. TeX supports some of the variant shape symbols in mathematical mode ( $\theta|\vartheta, \phi|\varphi, \pi|\varpi, \rho|\varrho, \epsilon|\varepsilon$ ) but not in the LGR font encoding used for Greek text in 8-bit TeX. The variations have no syntactic meaning in Greek text and text fonts may use the variant shapes in place of the “regular” ones as a stylistic choice.

The `normalize-symbols` option merges letters and symbols to Greek letters. This way, text copied from external sources can be compiled without errors even if it contains a GREEK SYMBOL ... in place of a GREEK LETTER ...

The source of this paragraph uses both variants for beta ( $\beta|\beta$ ), theta ( $\theta|\vartheta$ ), phi ( $\phi|\varphi$ ), pi ( $\pi|\varpi$ ), kappa ( $\kappa|\kappa$ ), rho ( $\rho|\varrho$ ), Theta ( $\Theta|\Theta$ ), and epsilon ( $\epsilon|\varepsilon$ ).

This option is ignored with Unicode fonts.

**Attention:** Do not use this option in cases where the distinction between the symbol variants may be important (e.g. in a mathematical or scientific context). Try the `alphabet` package with the respective characters in mathematical mode or use XeTeX/LuaTeX with Unicode fonts in these cases.

### 1.1.2 `keep-semicolon`

LGR is no **standard text font encoding**. Latin characters and some other ASCII symbols are mapped to Greek “equivalents” if LGR is the active font encoding. (See `babel-greek` for a description of this Latin-Greek transliteration.)

Special care is required with the question mark characters: The LGR font encoding uses the Latin question mark as input for the *erotimatiko* and maps the semicolon to a middle dot (*ano teleia*). As a result, Unicode-encoded texts that use the semicolon as *erotimatiko* end up with an *ano teleia* in its place! Without special care, only the deprecated character 037E GREEK QUESTION MARK<sup>3</sup> works with both, Xe/LuaTeX and 8-bit TeX.

The `\textsemicolon` command inserts an *erotimatiko* in LGR and a semicolon else (i.e. always a character that looks like a semicolon):

Latin (TU) a; b, Greek (TU) a; b

With the `keep-semicolon` option, character 003B SEMICOLON can be used for the *erotimatiko* also with LGR encoded fonts:

Latin (TU)	Greek (TU)	question mark character
;	;	037E GREEK QUESTION MARK
;	;	003B SEMICOLON
?	?	003F QUESTION MARK

This option is ignored with Unicode fonts (where the SEMICOLON literal always prints a semicolon character).

Test whether this works as expected in math mode:  $ab; a b, (a;a;2)$ .

## 1.2 Shortcuts for Breathings

`textalpha` defines the shortcut macros `\<` and `\>` for the **dasia** (rough breathing) and **psili** (smooth breathing) diacritics.

<sup>3</sup>The Unicode standard provides the code point 037E GREEK QUESTION MARK but says character 003B SEMICOLON and not 037E is the preferred character for a ‘Greek question mark’ (*erotimatiko*).

## 2 Limitations

If compiling with 8-bit TeX, the internal font encoding switches interfere with other work behind the scenes. Kerning, diacritics and up/down-casing show problems if Greek letters are used without explicit change of the font encoding.

These problems can be avoided by use of *babel* and the correct language setting (greek), an explicit font encoding switch (e.g. wrapping the Greek text in `\ensuregreek`<sup>4</sup>, or XeTeX/LuaTeX with Unicode fonts.

### 2.1 Kerning

With pdfTeX and 8-bit fonts, no kerning occurs between Greek characters in non-Greek text due to the internal font encoding switch: compare `AYA` (TU) to `AYA` (TU).

Compiling with LuaTeX provides kerning also on font encoding boundaries.

### 2.2 Diacritics

Accent macros do not work with Unicode literals as base character under 8-bit TeX engines. Use the Latin transliteration or LICR commands.

Composition of diacritics (like `\accdasia\acctonos` or `\<'`) fails in other font encodings. Long names (like `\accdasiaoxia`) work.

With LGR and TU, pre-composed glyphs are chosen if available. In other font encodings, accent macros do not select pre-composed characters. The difference is a sub-optimal placement of the accent and becomes obvious if you drag-and-drop text from the PDF version of this document.:

`ᾶᾷᾶᾷ ᾹᾺΆᾼ` (TU) vs. `ᾶ Ᾱ` (TU).

Greek diacritics (except the dialytika and sub-iota) are placed before capital letters in Titlecase (Ἀρχιμήδης) and and dropped in uppercase (ΑΡΧΙΜΗΔΗΣ). With the `\MakeUppercase` implementation introduced 2022/06, Greek upcasing rules are only applied to literal characters if the text language is set to Greek with Babel.

With the old `\MakeUppercase` implementation, the above rules are fully applied if the active font encoding is LGR or TU. However, accents input as macros are misplaced if the active font encoding does not support Greek. Pre-composed literal Unicode characters are handled correctly:

	LICR	literal input
TU	ᾶ	ᾶ
TU	Ᾱ	Ᾱ

The dialytika marks a *hiatus* (break-up of a diphthong). It must be present in UPPERCASE even where it is redundant in lowercase (the hiatus can also be marked by an accent or breathing on the first of two consecutive vowels). The auto-hiatus feature works in LGR and TU font encodings only:

`ᾶυ, ἔι`  $\mapsto$  `Aÿ, Eï` (TU) vs. `Aÿ, Eï` (TU)

With the old implementation of `\MakeUppercase`, the auto-hiatus feature works with LICR macros but not Unicode literals. The new implementation works with Unicode literals, too, but only if the text language is Greek (i.e. not in this document that does not load Babel).

`ᾶυπνία`  $\mapsto$  `AÿΠINIA` (LICR macros: OK with LGR or TU)

`ᾶυπνία`  $\mapsto$  `ᾶΥΠINIA` (literal characters: fails without Babel)

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<sup>4</sup>The `\ensuregreek` macro ensures the argument is set in a font encoding supporting Greek.



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
370	◦	◦	◦	◦	´	ˆ	◦	◦			◦	◦	◦	◦	;	
380					´	ˆ	Α	·	Ε	Η	Ι		Ο		Υ	Ω
390	ι	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο
3A0	Π	Ρ		Σ	Τ	Υ	Φ	Χ	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή	ί
3B0	ύ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
3C0	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ	
3D0	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦
3E0	Ϡ	ϡ	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦
3F0	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦

Table 1: Greek and Coptic Unicode Block, input as literal Unicode characters in TU font encoding (legend: ◦ glyph missing in LGR).

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1F00	ά	ά	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	Α	Α	Ά	Ά	Ά	Ά	Ά	Ά
1F10	έ	έ	ἔ	ἔ	ἔ	ἔ	ἔ	ἔ	Ε	Ε	Έ	Έ	Έ	Έ	Έ	Έ
1F20	ή	ή	ἦ	ἦ	ἦ	ἦ	ἦ	ἦ	Η	Η	Ή	Ή	Ή	Ή	Ή	Ή
1F30	ι	ι	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	Ι	Ι	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ
1F40	ο	ο	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	Ο	Ο	Ό	Ό	Ό	Ό	Ό	Ό
1F50	ύ	ύ	ϋ	ϋ	ϋ	ϋ	ϋ	ϋ		Υ		Ϋ		Ϋ		Ϋ
1F60	ώ	ώ	ῶ	ῶ	ῶ	ῶ	ῶ	ῶ	Ω	Ω	Ώ	Ώ	Ώ	Ώ	Ώ	Ώ
1F70	ὰ	ὰ	ἔ	ἔ	ἦ	ἦ	ἰ	ἰ	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ
1F80	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	Ά	Ά	Ά	Ά	Ά	Ά	Ά	Ά
1F90	ἦ	ἦ	ἦ	ἦ	ἦ	ἦ	ἦ	ἦ	Ή	Ή	Ή	Ή	Ή	Ή	Ή	Ή
1FA0	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ
1FB0	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	ὀ	Ό	Ό	Ό	Ό	Ό	Ό	Ό	Ό
1FC0	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	ᾀ	Ά	Ά	Ά	Ά	Ά	Ά	Ά	Ά
1FD0	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	ἰ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ	Ϊ
1FE0	ϋ	ϋ	ϋ	ϋ	ϋ	ϋ	ϋ	ϋ	Υ	Υ	Υ	Υ	Υ	Υ	Υ	Υ
1FF0			ϋ	ϋ	ϋ	ϋ	ϋ	ϋ	Ό	Ό	Ό	Ό	Ό	Ό	Ό	Ό

Table 2: Greek Extended Unicode Block, input as literal Unicode characters in TU font encoding.

### 3.3 PDF strings

With *textalpha* and *greek-inputenc*, there are two options to get Greek letters in PDF strings: LICR macros and literal Unicode input.

#### 3.3.1 λογος, λογος and logos

The subsection title above uses: LICR macros, Unicode input and the LGR transliteration for the Greek word logos.

LICR macros and Unicode literals work fine everywhere, the Latin transliteration remains Latin in the PDF metadata (sidebar table of contents in the PDF viewer) and with Xe/LuaTeX.

3.3.2 α β γ δ ε ζ η θ ι κ λ μ ν ξ ο π ρ σ ς τ υ φ χ ψ ω

3.3.3 Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω

3.3.4 ρF ʹʹ ρQ ʹʹ ς⊗ς · ; ' ,