

The MRTbundle

L^AT_EX Templates for the MRT, University of Bayreuth

by

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Contents

	Page
List of Figures	IV
List of Tables	IV
1 Introduction	1
1.1 Feature Requests and Bug Reports	1
1.2 Individual Versions	2
2 Downwards Incompatibilities	3
2.1 MRTtab	3
3 The MRTthesis class	4
3.1 Options	4
3.1.1 Load time options	4
3.1.2 Setup options	6
3.1.2.1 Options concerning automatically added contents	10
3.2 Macros	12
3.3 Dependencies	14
4 The MRTbeam class	15
4.1 Random chatter	15
4.2 Frame contents	15
4.3 Options	16
4.3.1 Footnote related	18
4.3.2 Bibliography related	19
4.4 Macros	19
4.4.1 Footnote related	20
4.4.2 Bibliography related	21
4.5 Dependencies	22
5 The MRTalone class	23
5.1 Options and Setup Files	23
5.2 Options	23
5.2.1 Load time options	23
5.2.2 Setup options	25
5.3 Macros	25
5.4 Dependencies	25
6 The MRTtab package	27
6.1 The MRTtabular environment	27
6.1.1 Known Bugs	28
6.2 The \MRTcline macro	28
6.3 The MRTtable environment	30
6.4 Explicit head rows	30
6.5 Other package macros	31

6.6 Options	31
6.6.1 Setup Options	31
6.6.1.1 longtable related options [PLANNED]	34
6.7 Dependencies	35
7 The MRTif package	36
7.1 Macros	36
7.2 Dependencies	39
8 The MRTwuline package	40
8.1 Options	40
8.2 Macros	40
8.3 Dependencies	40
9 The MRTsfacc package	41
9.1 Options	41
9.2 height Variant	42
9.2.1 Macros	42
9.3 list Variant	43
9.3.1 Macros	43
9.4 Additional macros	44
9.5 Dependencies	45
10 The MRTlmscale package	46
10.1 Dependencies	46
11 The MRTutil package	47
11.1 Defining Macros	47
11.2 Optional Argument Parsing	47
11.2.1 Example	49

List of Figures

	Page
4-1 The basic layout of a frame in MRTbeam	15
10-1 Effects of the MRTlmscale package.	46

List of Tables

	Page
1-1 Versions of Individual Packages	2
2-1 Downwards Incompatibilities in MRTtab introduced by Date and Version	3
3-1 Indents of different ToC entry types and the macro they are stored in	13
4-1 Available Progress Bar Styles for \ProgressBarStyle	18
9-1 Comparison of shifted accents against original placement with the use of the height variant.	42
9-2 Comparison of shifted accents against original placement with the use of the list variant.	43
9-3 Available shift definition lists	44
11-1 Usage examples of \ourmacro	50

1 Introduction

This bundle provides three \LaTeX classes, one for theses and one for presentations, which both aim to match the corresponding MS Office templates of the Chair of Measurement and Control Engineering (Lehrstuhl für Mess- und Regeltechnik; MRT) of the University of Bayreuth, hence the name. Along the two major classes `MRTthesis` and `MRTbeam` there are another class to create stand alone images and minor auxiliary packages contained in this distribution.

The classes are originally created for use with `pdf \LaTeX` and give the best results with it. This is caused by the available fonts. The classes were created for use with the `helvet` font which is not a good choice for `Lua \LaTeX` and `X \LaTeX` . Therefore, if you're using those engines, you'll be encouraged to choose a system font matching Helvetica or Arial.

This bundle makes no claim to be complete, comprehensive, or correct. For formatting errors I don't take any responsibility. Each author takes full liability for his work and its formatting.

You're allowed to share this work with fellow students working at the MRT, though official distribution channels might be better suited as they assure up to date versions.

I'd feel guilty distributing this bundle without saying the following: I'm not responsible for the overall look of this. I tried to match the Word template of the institution where possible and as a result, this is non-optimal typography, in my humble opinion.

Of course this documentation is created with one of the provided classes, namely `MRTthesis`, in use.

If you're not yet familiar with \LaTeX you should stop reading at this point (meaning the end of this paragraph) and either read a *good* and *up-to-date* introduction to \LaTeX and afterwards read on or use MS Word for your thesis. Personally I think the time reading an introduction in order to use \LaTeX is well spend, but there certainly are different opinions on that – unfortunately opinions are prone to be biased, mine is no exception. A viable introduction is `lshort` which is available in several languages at the following link: <https://www.ctan.org/pkg/lshort>

1.1 Feature Requests and Bug Reports

You can request features or report bugs at gitlase: <https://gitlase.de/jonathan/MRTbundle>

You can request features or report bugs if you find some via email, too: mrt_depp@yahoo.de. Please use a descriptive subject containing "MRTbundle" (e.g. "MRTbundle – bug report").

1.2 Individual Versions

Table 1-1: Versions of Individual Packages

Package	Date	Version
MRTthesis	2019-02-22	0.0.11
MRTbeam	2019-02-05	0.0.5
MRTalone	2018-02-09	0.0.6
MRTtab	2018-02-09	0.0.5
MRTif	2019-02-02	0.0.7
MRTwuline	2019-02-03	0.0.3
MRTsfacc	2019-01-30	0.0.5
MRTlmscale	2019-02-05	0.0.1
MRTutil	2019-02-09	0.0.3

2 Downwards Incompatibilities

Though I try to avoid it as much as possible, there might sometimes be a backwards incompatibility, which is necessary to implement new features I deem worth it or fix bugs. Where possible I'll try to provide means to switch back to something close to the old behaviour.

This chapter should list all those ground breaking changes (which might be really minor, though).

2.1 MRTtab

Table 2-1: Downwards Incompatibilities in MRTtab introduced by Date and Version

Date	Version	Affected	Description
2019-02-09	v0.0.5	\MRTcline	By default the entire line is coloured first and then the effects of \MRTcline are applied. Reversible with the <code>cline version</code> key (see subsection 6.6.1).

3 The MRTthesis class

MRTthesis provides the template to write a thesis at the MRT. It sports a layout which looks confusingly similar to the MS Word template provided by the chair. Of course there are some minor differences and the typesetting algorithm of TeX should create better line breaking than Word's but if one doesn't know on what to pay attention or for an untrained eye the distinction won't be possible (at least I hope so, as that was the goal in the first place).

3.1 Options

3.1.1 Load time options

The class features a few load time options.

<u>longtable</u>	–NoArgument– Is forwarded to MRTtab see its description in section 6.6 .
<u>hidelinks</u>	–NoArgument– If used the hyperref option of the same name will be used. By default this is used. You can negate it with showlinks.
<u>mathsizes</u>	–NoArgument– Opposite of no mathsizes. If used (which it by default is) the maths sizes are set according to the MS Word template. Note that those weren't set by mrtarbeit and if you alter the default font size won't be set.
<u>minimal</u>	–NoArgument– If this option is passed some packages are not loaded and therefore related configurations not set. See section 3.3 .
<u>no geometry</u>	–NoArgument– If this option is passed the geometry package is not loaded (and of course the page dimensions passed to geometry otherwise are not set).
<u>no mathsizes</u>	–NoArgument– Opposite of mathsizes. If used the maths sizes are not changed from the defaults of scrreprt.
<u>showlinks</u>	–NoArgument– If used the hyperref option hidelinks will not be used. This is the negation of hidelinks of this package.
<u>tikzunderline</u> <u>tUline</u>	–NoArgument– This option is forwarded to MRTwuline.

<u>british</u>	–NoArgument–
<u>english</u>	If used the document will be using the <code>british</code> definition of <code>babel</code> . Many strings used in the package will be in English, but some might be missed out. If you find any of which you think should be translated, please contact me as described in section 1.1 . English simplified (US) is not supported by the class.
<u>UKenglish</u>	
<u>sfacc</u>	<p>= $\langle choice \rangle$</p> <p>$\langle choice \rangle$ must be <code>height</code> or <code>list</code>. Sets the approach used by <code>MRTsfacc</code> (see chapter 9) and if <code>list</code> is in use the shift list for <code>helvet</code> will also be loaded. If it is not specified the <code>list</code> variant is used.</p>
<u>font</u>	<p>= $\langle font \rangle$</p> <p>This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code>. With this you can set the used sans serif font, which will be used as the default font. It should be a font resembling Helvetica or Arial. Per default the font <code>TeX Gyre Heros</code> will be used.</p>
<u>serif font</u>	<p>= $\langle font \rangle$</p> <p>This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code>. With this you can set the used serif font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a Roman font anyway. Per default the font <code>Latin Modern Roman</code> will be used.</p>
<u>mono font</u>	<p>= $\langle font \rangle$</p> <p>This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code>. With this you can set the used mono font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a mono font anyway. Per default the font <code>Latin Modern Mono</code> will be used.</p>
<u>new maths</u>	<p>= $\langle choice \rangle$</p> <p>This is only available if you're using <code>pdfTeX</code>. With this you can specify whether some special maths fonts are loaded. The result looks closer to the MS Word template for Greek letters and operators.</p> <p>Available $\langle choice \rangle$s are <code>off</code> or <code>false</code> to turn this off, <code>on</code> or <code>true</code> to turn this on, and a valid float, to set the scale of the Greek letters and activate the feature. By default <code>1.05</code> will be used.</p> <p>The number of usable fonts will be used exhaustively. The <code>newpxmath</code> will be loaded with its <code>upint</code> and <code>slantedGreek</code>, the math letters of <code>mathptmx</code> will be loaded with a scale factor. <code>bm</code> will be loaded so that you can use the bold symbols of the Latin Modern fonts for Greek letters.</p>
<u>scale maths</u>	<p>= $\langle choice \rangle$</p> <p>This is only available if you're using <code>pdfTeX</code>. With this you can specify whether the <code>MRTlmscale</code> package should be loaded. Available $\langle choice \rangle$s are no argument, resulting in <code>MRTlmscale</code> being used with its default, <code>on</code> or <code>true</code></p>

resulting in the same, `off` or `false` resulting in `MRTlmscale` not being used, and any valid float, resulting in `MRTlmscale` being used with the specified float as its scale factor. See [chapter 10](#) for more about `MRTlmscale`. By default, `MRTlmscale` will be used with its default scale factor.

Every other given option will be passed on to `scrreprt`.

3.1.2 Setup options

The following options are accessible with `\MRTthesisSetup`.

<u>advisor</u>	<code>= <name></code> Sets the name of the advisor of this thesis. One typical value could be <code>Dipl.-Ing. Alice Fischerauer</code>
<u>author</u>	<code>= <name></code> Sets the name of the author or authors as the macro <code>\author</code> does. Separate authors with <code>\and</code> . You can give the surname first followed by a comma and the given name, in which case the parsing for the abbreviation works better (especially with name affixes). The following two options are fine: <code>author={Duck, Donald \and Mouse, Mickey}</code> or <code>author={Donald Duck \and Mickey Mouse}</code> ; both should result in the abbreviation <code>D. Duck, M. Mouse</code> . Another example would be <code>zu Guttenberg, Karl-Theodor</code> or <code>Karl-Theodor zu Guttenberg</code> . Here the parsing would result in <code>K.-T. zu Guttenberg</code> or <code>K.-T. z. Guttenberg</code> – the first one seems correct, the second one fails. Remember to surround the argument with braces if you use a comma.
<u>caption above</u>	<code>–NoArgument–</code> Is forwarded to <code>MRTtab</code> . See subsection 6.6.1 .
<u>caption below</u>	<code>–NoArgument–</code> Is forwarded to <code>MRTtab</code> . See subsection 6.6.1 .
<u>citation width</u>	<code>= <dimen></code> The width of the citation indications on the title page. Default is <code>.5\textwidth</code> .
<u>degree</u>	<code>= <degree></code> The degree you aim to achieve with the thesis. If you don't use this option it is tried to be guessed from the type of thesis you can specify with the <code>thesis</code> key. An error is thrown if the degree can't be guessed. If you don't want to achieve any degree, use the option <code>no degree</code> . Typical values would be <code>Bachelor of Science</code> or <code>Master of Science</code> .
<u>examiner</u>	<code>= <name></code> The examiner of the thesis. The initial value is set to <code>Univ.-Professor Dr.-Ing. Gerhard Fischerauer</code> .

<u>logoL</u>	= $\langle file \rangle$ The image file for the left logo on the titlepage. MRTthesis_logo_UBT2.pdf is the initial value. If $\langle file \rangle$ is an empty argument no left logo will be used.
<u>logoL height</u>	= $\langle dimen \rangle$ The height the left logo is displayed in. Initial value is 10.85mm.
<u>logoR</u>	= $\langle file \rangle$ The image file for the right logo on the titlepage. MRTthesis_logo_MRT2.pdf is the initial value. If $\langle file \rangle$ is an empty argument no right logo will be used.
<u>logoR height</u>	= $\langle dimen \rangle$ The height the right logo is displayed in. Initial value is 11.9mm.
<u>no advisor</u>	= $\langle bool \rangle$ If true no advisor will be displayed on the title page. Default is true, initially is false.
<u>no citation</u>	= $\langle bool \rangle$ If true no citation indications are displayed at the bottom of the title page. Default is true, initially is false.
<u>no degree</u>	= $\langle bool \rangle$ If true no degree will be displayed on the title page. Default is true, initially is false. Also the paragraph corresponding to the degree in the affidavit will be left out.
<u>no examiner</u>	= $\langle bool \rangle$ If true no examiner will be displayed on the title page. Default is true, initially is false.
<u>no chair</u>	= $\langle bool \rangle$ If true no chair will be displayed on the title page. Default is true, initially is false.
<u>no logos</u>	–NoArgument– If used logoL={},logoR={} is used, which results in no logos on the title page.
<u>no thesis</u>	= $\langle bool \rangle$ If true no thesis type will be displayed on the title page. Default is true, initially is false.

<u>no usage</u>	= $\langle bool \rangle$ If true no usage rights are given to the MRT in the affidavit text. Default is true, initially is false. If you need a custom paragraph and don't want to leave it out completely you should redefine <code>\affidavittext@usagerights</code> .
<u>number</u>	= $\langle number \rangle$ The MRT report number displayed in the citation indications. Initially is empty. The typical pattern of these numbers is something like: TT-yy-mm-nn with TT the thesis type, e. g. BA or MA, yy the last two digits of the year, mm the month, and nn the number of the thesis in this month.
<u>pos figure</u>	= $\langle placement \rangle$ The $\langle placement \rangle$ of floats of type figure.
<u>pos float</u>	= $\langle placement \rangle$ The $\langle placement \rangle$ of floats of both types, figure and table. Initially set to tbp.
<u>pos MRTtable</u>	= $\langle placement \rangle$ The $\langle placement \rangle$ of floating MRTtables, forwarded to MRTtab's option pos. See subsection 6.6.1 .
<u>pos table</u>	= $\langle placement \rangle$ The $\langle placement \rangle$ of floats of type table.
<u>short advisor sadvisor</u>	= $\langle abbreviation \rangle$ The abbreviated name of the advisor. This is needed for the citation indications and not parsed automatically from the <code>advisor</code> , as the name contains academic titles, but the abbreviation should not and the parsing would be hard to do correctly.
<u>short author sauthor</u>	= $\langle abbreviation \rangle$ The abbreviated name or names of the author or authors. If you don't use this option it is tried to parse those automatically. If the parsing does something wrong you'll have to use this option giving the correct abbreviations with each name separated with commas from the others, e. g. <code>short author={D. Duck, M. Mouse}</code> .
<u>short examiner sexaminer</u>	= $\langle abbreviation \rangle$ The abbreviated name of the examiner. This is needed for the citation indications and not parsed automatically from the <code>examiner</code> , as the name contains academic titles, but the abbreviation should not and parsing would be hard to do correctly. Initially value is G. Fischerauer.

<u>sign height</u>	= $\langle \textit{dimen} \rangle$ The height reserved for each signature below the affidavit text. Initial value is 9mm.
<u>sign separation</u> <u>sign sep</u>	= $\langle \textit{dimen} \rangle$ If <code>sign width max</code> is not given (or 0pt) the maximum width is calculated from the text width and the width of the date and location. The minimum distance from the date and location to the signature lines is then enforced to be at least $\langle \textit{dimen} \rangle$. Initial value is 2em.
<u>sign width max</u>	= $\langle \textit{dimen} \rangle$ You can enforce a maximum width for the signature lines below the affidavit using this option. If it is not used, the maximum width is calculated.
<u>sign width min</u>	= $\langle \textit{dimen} \rangle$ You can enforce a minimum width for the signature lines using this option. Initially this is set to 7cm.
<u>stretch caption</u> <u>stretch cap</u>	= $\langle \textit{float} \rangle$ Uses <code>\setkomafont</code> to enforce a specific line spread using <code>\setstretch</code> for captions.
<u>stretch tabular</u> <u>stretch tab</u>	= $\langle \textit{float} \rangle$ Is forwarded to MRTtab's option <code>stretch tab</code> . See subsection 6.6.1 .
<u>stretch text</u>	= $\langle \textit{float} \rangle$ Uses <code>\setstretch</code> to set a specific line spread in the document.
<u>stretches</u>	= $\langle \textit{float} \rangle$ Sets <code>stretch cap</code> , <code>stretch tab</code> , and <code>stretch text</code> in one go. Initially set to 1.408.
<u>subtitle</u>	= $\langle \textit{title} \rangle$ The title page might include a subtitle. If you really want to use it, you'd have to use with <code>subtitle</code> . You can also use <code>\subtitle</code> to set it.
<u>thesis</u>	= $\langle \textit{thesis type} \rangle$ Sets the $\langle \textit{thesis type} \rangle$. Typical arguments would be <code>Bachelorarbeit</code> or <code>Bachelor Thesis</code> (the former if you're writing in German, the latter if you're writing in English).
<u>title</u>	= $\langle \textit{title} \rangle$ Sets the title of the thesis. You might also use <code>\title</code> to set this.

<hr/> <code>toc ChapIndent</code> <hr/>	<code>= $\langle dimen \rangle$</code>	Sets the indentation of chapter entries in the table of contents. Initially set to 0.01em.
<hr/> <code>toc SecIndent</code> <hr/>	<code>= $\langle dimen \rangle$</code>	Sets the indentation of section entries in the table of contents. Initially set to 1.32em. The width is also used for entries in the list of figures and list of tables.
<hr/> <code>toc sSecIndent</code> <hr/>	<code>= $\langle dimen \rangle$</code>	Sets the indentation of subsection entries in the table of contents. Initially set to 3.38em.
<hr/> <code>toc ssSecIndent</code> <hr/>	<code>= $\langle dimen \rangle$</code>	Sets the indentation of subsubsection entries in the table of contents. Initially set to 6.38em.
<hr/> <code>with subtitle</code> <hr/>	<code>= $\langle bool \rangle$</code>	If true a subtitle can be used on the title page. Default is true, initially is false.

3.1.2.1 Options concerning automatically added contents

The following additional options can be set with `\MRTthesisSetup`. They all resolve around automatically added contents.

<hr/> <code>backmatter</code> <hr/>	<code>= $\langle choice \rangle$</code>	<p>A $\langle choice \rangle$ whether you want the back matter to be added automatically. Possible values are <code>auto</code> and <code>manual</code>. If set to <code>auto</code> the appendix will automatically be included at <code>\end{document}</code>. It might contain the following (dependent on the values of other keys; in correct order):</p> <ul style="list-style-type: none"> • bibliography (option <code>bib</code>) • list of figures (option <code>lof</code>) • list of tables (option <code>lot</code>) • contents added with <code>\MRTthesisAddToBack</code> • the contents of your appendix file (option <code>appendix</code>) • contents added with <code>\MRTthesisAddAfterBack</code> • the affidavit (option <code>affidavit</code>) <p>It also includes the necessary formatting switches otherwise contained in <code>\appendix</code>. Default is <code>manual</code>.</p>
<hr/> <code>frontmatter</code> <hr/>	<code>= $\langle choice \rangle$</code>	<p>A $\langle choice \rangle$ whether you want the front matter to be added automatically. Possible values are <code>auto</code> and <code>manual</code>. If set to <code>auto</code> the front matter will automatically be included at <code>\begin{document}</code>. It might contain the following (dependent on the values of other keys; in correct order):</p>

- title page
- the affidavit (option `affidavit`)
- the acknowledgements (option `acknowledgement`)
- table of contents (option `toc`)
- list of figures (option `lof`)
- list of tables (option `lot`)
- contents added with `\MRTthesisAddToFront`

It also includes the necessary formatting switches otherwise contained in `\mainpart`. Default is `manual`.

<u>acknowledgement</u>	= $\langle file \rangle$ Sets the acknowledgements file added if <code>frontmatter=auto</code> is used. If $\langle file \rangle$ (the argument) is empty no file will be added. By default it is empty.
<u>affidavit</u>	= $\langle choice \rangle$ Sets where the <code>\affidavit</code> is added. Possible $\langle choice \rangle$ s are <code>front</code> , <code>back</code> and <code>off</code> . If <code>off</code> is used it doesn't get added automatically. Default value is <code>front</code> . <code>front</code> and <code>back</code> will only take effect if <code>frontmatter</code> and <code>backmatter</code> are set to <code>auto</code> , respectively.
<u>appendix</u>	= $\langle file \rangle$ Sets the appendix file added if <code>backmatter=auto</code> is used. If $\langle file \rangle$ (the argument) is empty no file will be added. By default it is empty.
<u>appendix ragged</u>	= $\langle bool \rangle$ If set <code>true</code> the contents of the appendix file will be typeset <code>\raggedbottom</code> . Default is <code>true</code> .
<u>bib bibliography</u>	= $\langle bool \rangle$ Sets whether the bibliography should be added automatically if <code>backmatter=auto</code> is used. It gets set to <code>false</code> if the class option <code>minimal</code> is used.
<u>lof</u>	= $\langle choice \rangle$ Sets where the list of figures is added. Possible $\langle choice \rangle$ s are <code>front</code> , <code>back</code> and <code>off</code> . If <code>off</code> is used it doesn't get added automatically. Default value is <code>front</code> . <code>front</code> and <code>back</code> will only take effect if <code>frontmatter</code> and <code>backmatter</code> are set to <code>auto</code> , respectively.
<u>lot</u>	= $\langle choice \rangle$ Sets where the list of tables is added. Possible $\langle choice \rangle$ s are <code>front</code> , <code>back</code> and <code>off</code> . If <code>off</code> is used it doesn't get added automatically. Default value is <code>front</code> . <code>front</code> and <code>back</code> will only take effect if <code>frontmatter</code> and <code>backmatter</code> are set to <code>auto</code> , respectively.

`toc` = $\langle choice \rangle$

Sets where the list of tables is added if `frontmatter=auto` is used. Possible $\langle choice \rangle$ s are `front` and `off`. If `off` is used it doesn't get added automatically. Default value is `front`.

3.2 Macros

The following macros are provided:

`\ifNoWidthTF` Usage: `\ifNoWidthTF{ $\langle arg \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }`

Typesets the argument in a box (so the code is actually executed). If the produced box has a width of 0pt the $\langle true \rangle$ branch is executed, else the $\langle false \rangle$ branch.

`\vfillmult` Usage: `\vfillmult{ $\langle num \rangle$ }`

Same as if you'd use $\langle num \rangle$ instances of `\vfill`.

`\hfillmult` Usage: `\hfillmult{ $\langle num \rangle$ }`

Same as if you'd use $\langle num \rangle$ instances of `\hfill`.

`\MRTafterhyperref` Usage: `\MRTafterhyperref{ $\langle content \rangle$ }`

Places $\langle content \rangle$ after `hyperref` is loaded. This is important for the relatively few packages that need to be loaded after `hyperref`. So if you have one of these, you should use something like `\MRTafterhyperref{\usepackage{cleveref}}`. This macro has to be used prior to `\begin{document}`.

`\MRTthesisAddToFront` Usage: `\MRTthesisAddToFront{ $\langle content \rangle$ }`

Adds $\langle content \rangle$ to a hook executed during the front matter if `frontmatter=auto` was used. See [subsubsection 3.1.2.1](#) for more information.

`\MRTthesisAddToBack` Usage: `\MRTthesisAddToBack{ $\langle content \rangle$ }`

Adds $\langle content \rangle$ to a hook executed during the back matter if `backmatter=auto` was used. See [subsubsection 3.1.2.1](#) for more information.

`\MRTthesisAddAfterBack` Usage: `\MRTthesisAddAfterBack{ $\langle content \rangle$ }`

Adds $\langle content \rangle$ to a hook executed during the back matter if `backmatter=auto` was used. See [subsubsection 3.1.2.1](#) for more information.

`\DeclareTOCStyleEntryMRTChapterLike` Usage: `\DeclareTOCStyleEntryMRTChapterLike[$\langle indent \rangle$]{ $\langle entry-layer \rangle$ }`

See the description of `\DeclareTOCStyleEntryMRTSectionLike`. The difference is that this sets the entries how the chapters are formatted. Also the $\langle indent \rangle$ defaults to the one of chapters.

Table 3-1: Indents of different ToC entry types and the macros they are stored in. Use the options described in [subsection 3.1.2](#) to change the values.

entry-layer	macro name	default length
chapter	<code>\l_MRTthesis_toc_chapter_indent_tl</code>	0.01em
section	<code>\l_MRTthesis_toc_section_indent_tl</code>	1.32em
subsection	<code>\l_MRTthesis_toc_subsection_indent_tl</code>	3.38em
subsubsection	<code>\l_MRTthesis_toc_subsubsection_indent_tl</code>	6.38em
table	<code>\l_MRTthesis_toc_section_indent_tl</code>	1.32em
figure	<code>\l_MRTthesis_toc_section_indent_tl</code>	1.32em

<code>\DeclareTOCStyleEntryMRTSectionLike</code>	Usage: <code>\DeclareTOCStyleEntryMRTSectionLike[$\langle indent \rangle$]{$\langle entry-layer \rangle$}</code>
--	--

The macro calls the KOMA macro `\DeclareTOCStyleEntry` and sets the options how they are used for the section entries in the table of contents. $\langle indent \rangle$ defaults to the indent length of section entries. It is possible to use an $\langle indent \rangle$ but give more options in that optional argument afterwards (comma separated). [Table 3-1](#) shows an overview of the class's default indentations.

<code>\MRTthesisSetup</code>	Usage: <code>\MRTthesisSetup{$\langle options \rangle$}</code>
------------------------------	---

You can use this macro to set the options listed in [subsection 3.1.2](#).

<code>\sethead</code>	Usage: <code>\sethead{$\langle content \rangle$}</code>
-----------------------	--

Sets the head marks for both sides to $\langle content \rangle$. It is the same as `\markboth{ $\langle content \rangle$ }{ $\langle content \rangle$ }`. You might use this (or any similar macro provided by KOMA script) to manually set the head marks, e. g. if your section title gets too long.

<code>\affidavit</code>	Usage: <code>\affidavit</code>
-------------------------	--------------------------------

Prints a chapter “Eidesstattliche Erklärung” (stored in `\affidavittitle`, you might redefine it to change the title) and the affidavit text (as stored in `\affidavittext`) and the location and date, followed by a signature line for each author. `\maketitle` has to be used prior to it, else the lines won't be printed. This is a bug I might fix in the future.

<code>\mainpart</code>	Usage: <code>\mainpart</code>
------------------------	-------------------------------

<code>\mainmatter</code>	Switches the formatting from the one at the beginning to the one used in the main part of the document. Should be used after <code>\tableofcontents</code> , <code>\listoffigures</code> , and <code>\listoftables</code> .
--------------------------	---

`\appendix` Usage: `\appendix`

Switches the formatting to the one used in the appendix. This includes switching to alphabetically numbered sections and setting the option `no float` in `\MRTtabSetup`.

Additionally the macros `\author`, `\title`, and `\subtitle` have been redefined to internally use `\MRTthesisSetup` to set the corresponding options.

3.3 Dependencies

As this class is based on `scrreprt`, it depends on that class and all of its dependencies, of course. Additionally the following packages are loaded (used options given in brackets). Those are quite some but unfortunately most of these are required (or help a lot) to achieve certain formatings in order to match the MS Word template of the MRT best.

Some of the used packages are not necessarily needed to match the MS Word template, but provide useful features – e.g. `hyperref` which allows the use of `\autoref` and cross linking but is not needed to match any specific formatting.¹

- `expl3` [main = british, ngerman]
- `xparse`
 - `scrlayer-scrpage` [single spacing = true]
- `MRTif`
 - `geometry` (with correct options)
- `MRTutil`
 - `setspace`
- `MRTsfacc`
 - `xcolor`
- `MRTtab`
 - `graphicx`
- `MRTwuline`
 - `enumitem`
- If \LaTeX or \LuaTeX are used
 - `fontspec` and `\defaultfontfeatures` {`Ligatures=TeX`}
 - the fonts `TeX Gyre Heros`, `Latin Modern Roman` and `Latin Modern Mono`, dependent on the font keys.
 - `mathtools`
 - `mathastext` [italic, defaultmathsizes]
 - `isomath`
 - `hyperref`
 - if the minimal option is not used:
 - `siunitx` [detect-all, per-mode=reciprocal-positive-first]
If `babel's british` is used [locale = UK] will be used, if `ngerman` [locale=DE]. Additionally the `range-phrase` will be set to either `to` or `bis` with spaces around it.
 - `biblatex` [backend = biber, natbib = true, citestyle = numeric, bibstyle = numeric, sorting=none, giveninits=true, sortcites] (with URLs being line breakable at any place)
- else
 - `fontenc` [T1]
 - `inputenc` [utf8]
 - `lmodern`
 - `helvet`
 - `MRTlmscale` dependent on the `scale maths` key.
 - If new maths is used
 - * `bm`
 - * `newpxmath` [upint, slantedGreek]
 - * The `zmtcm` font
- `babel` [ngerman] or if `british` is used with
 - `csquotes`

¹Don't remove it though, the current code for section headings relies on it.

4 The MRTbeam class

The MRTbeam class is a class build upon beamer. It should mimic the style of the MS Powerpoint template of the MRT which was in use when I held my Bachelor's presentation. I heard the requirements to match a specific template are less strict today, but at least I'll still use this template.

Many of the features described here are also available if one uses `\usetheme{MRTbeam}` within a document using the `beamer` class. There however is no dedicated documentation for that possibility provided. You're encouraged to also use the corresponding MRTbeam class if your using the eponymous theme.

If there is a new institution template which should be matched that doesn't match this beamer template please contact me as described in [section 1.1](#).

4.1 Random chatter

The creation of a presentation using beamer is not everyone's cup of tea. Refer to the beamer manual to get a basic idea of how to use it, as MRTbeam only adds some stuff that is not basic beamer stuff. The main idea of creating a presentation remains that of beamer.

MRTbeam doesn't follow the way beamer does things everywhere. As a result some stuff may not work out as you expect if you're used to beamer. Especially the customization might require you to actually read the sources of MRTbeam and its beamer themes. Also MRTbeam is only for presentation mode as of now.

Special thanks are due to the TeX.SX user samcarter, who helped me ram my head through beamer's walls in order to get my will.

4.2 Frame contents

The class builds up frames as shown in [Figure 4-1](#) (not true to scale).

You can specify the used logos using `\uselogo`. The default is the UBT logo on the left, no logo in the centre, and the MRT logo on the right side.

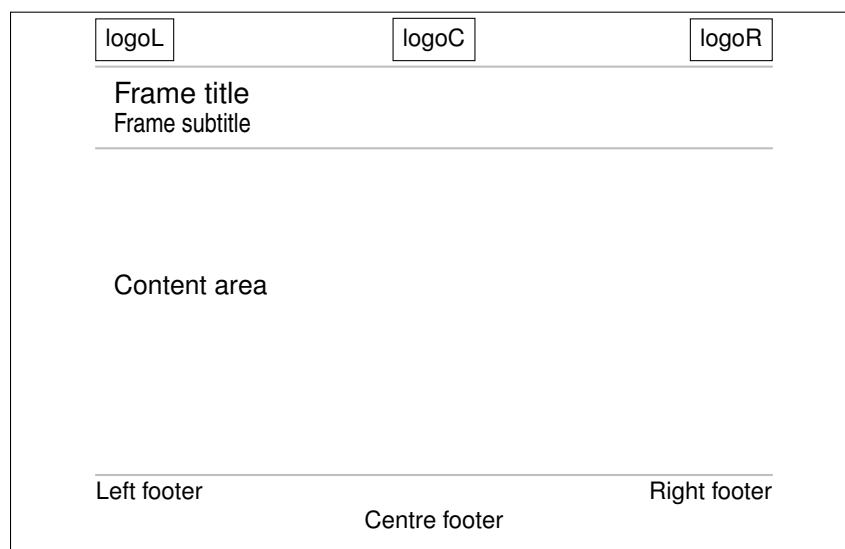


Figure 4-1: The basic layout of a frame in MRTbeam

If you specify no or an empty frame title the current section is used (with its numbering). The frame's subtitle can be prepended with the current subsection (with its numbering) followed by a colon. This depends on the current value of `\ifPrependSubsections`.

The left footer contains the `occasion`, the `shorttitle`, and the `shortauthor`. If no short title or no short author is given, the title and the author, respectively, are used instead. If you give a `*` for the short author or the short title, they are left out (e.g. with using `\title[*]{foo}`).

The centre footer contains the frame number and if you want a progress bar. The progress bar is shown if `\ifProgressBar` is true.

In the right footer the following is displayed atop of each other: Persistent MRT footnotes, volatile MRT footnotes, citation MRT footnotes, normal footnotes. The right footer has enough space for three entries. If you need more they are scaled to the available vertical space. MRT footnotes might be displayed in a tabular manner with the labels in the left and the actual notes in the right column. This depends on the value of `\ifTabularNotes`.

Neither of the footers is restricted in horizontal size. As a result they might overlap if you specify really long contents.

4.3 Options

The class passes almost all options given to it on to `beamer`. The few handled by the class are:

<hr/> <code>sfacc</code> <hr/>	<code>= \langle choice \rangle</code> <code>\langle choice \rangle</code> must be <code>height</code> or <code>list</code> . Sets the approach used by <code>MRTsfacc</code> (see chapter 9) and if <code>list</code> is in use the shift list for <code>helvet</code> will also be loaded. If it is not specified the <code>list</code> variant is used.
<hr/> <code>font</code> <hr/>	<code>= \langle font \rangle</code> This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code> . With this you can set the used sans serif font, which will be used as the default font. It should be a font resembling Helvetica or Arial. Per default the font <code>TeX Gyre Heros</code> will be used.
<hr/> <code>serif font</code> <hr/>	<code>= \langle font \rangle</code> This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code> . With this you can set the used serif font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a Roman font anyway. Per default the font <code>Latin Modern Roman</code> will be used.
<hr/> <code>mono font</code> <hr/>	<code>= \langle font \rangle</code> This is only available if you're using <code>LuaTeX</code> or <code>X₃TeX</code> . With this you can set the used mono font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a mono font anyway. Per default the font <code>Latin Modern Mono</code> will be used.
<hr/> <code>new maths</code> <hr/>	<code>= \langle choice \rangle</code> This is only available if you're using <code>pdfTeX</code> . With this you can specify whether some special maths fonts are loaded. The result looks closer to the MS Word

template for Greek letters and operators.

Available $\langle choice \rangle$ s are `off` or `false` to turn this off, `on` or `true` to turn this on, and a valid float, to set the scale of the Greek letters and activate the feature. By default 1.05 will be used.

The number of usable fonts will be used exhaustively. The `newpxmath` will be loaded with its `upint` and `slantedGreek`, the math letters of `mathptmx` will be loaded with a scale factor. `bm` can't be loaded if you use this in `MRTbeam`, as this will take up too many fonts, so no bold Greek letters for you.

`scale maths` = $\langle choice \rangle$

This is only available if you're using pdf \TeX . With this you can specify whether the `MRTlmscale` package should be loaded. Available $\langle choice \rangle$ s are `no` argument, resulting in `MRTlmscale` being used with its default, `on` or `true` resulting in the same, `off` or `false` resulting in `MRTlmscale` not being used, and any valid float, resulting in `MRTlmscale` being used with the specified float as its scale factor. See [chapter 10](#) for more about `MRTlmscale`. By default, `MRTlmscale` will be used with its default scale factor.

There are still some more class specific options which you can set with some macros. The macros in this section are only provided to set specific options, other macros are described in [section 4.4](#).

`\advisor` Usage: `\advisor{*}[\langle title \rangle]{\langle name \rangle}`

Sets $\langle name \rangle$ as the current advisor. It also redefines itself, any consecutive call will not take any arguments but return the $\langle name \rangle$. The $\langle title \rangle$ shall be the title used on the title frame defaulting to 'Betreuerin' if the starred version is used, else it defaults to 'Betreuer'.

`\occasion` Usage: `\occasion{\langle occasion \rangle}`

Defines the occasion of the presentation. If used the occasion will be displayed in the left footer.

`\uselogo` Usage: `\uselogo{\langle pos \rangle}[\langle options \rangle]{\langle file \rangle}`

Specifies the logo used at the position $\langle pos \rangle$. There are `l`, `c`, and `r` available. The $\langle file \rangle$ is included using `\includegraphics` with the specified $\langle options \rangle$ (defaulting to `height=0.056\paperwidth`). If $\langle file \rangle$ is an empty argument there is no logo used at the specified position. `MRTbeam_logo_UBT2.pdf` is used for the left logo and `MRTbeam_logo_MRT2.pdf` for the right one by default. The centre logo is initially empty.

`\ShowGrid` Usage: `\ShowGrid[\langle options \rangle]`

Globally activates a `TikZ` grid displayed in the background of the frames. You can specify the `TikZ`-style used for the grid with $\langle options \rangle$. The default is: `xstep=.05\paperwidth`, `ystep=.1\paperheight`, `help lines`.

Table 4-1: Available Progress Bar Styles for \ProgressBarStyle

style	align	length	height	voffset	description
default	c	30pt	font size	-1.65ex	a thick and relatively short bar around the frame number
Spratte	c	\paperwidth	2pt	3pt	A thin line spanning the whole page width at the bottom of the frame

`\HideGrid`

Usage: `\HideGrid{<*>}`

Globally deactivates the background grid and restores the package's default options for that grid. If the starred version is used, the options are not reset.

`\ifPrependSubsections`
`\PrependSubsectiontrue`
`\PrependSubsectionsfalse`

Usage: `\ifPrependSubsections`

If set true each frame's subtitle is prepended by the current subsection.

`\ifOnlyOneTopRule`
`\OnlyOneTopRuletrue`
`\OnlyOneTopRulefalse`

Usage: `\ifOnlyOneTopRule`

If set true in each frame the title and subtitle will not be displayed and the lower top rule will be omitted, significantly enlarging the content area. If you use `\OnlyOneTopRuletrue` or `\OnlyOneTopRulefalse` `\contentheight` will be adjusted.

`\ifProgressBar`
`\ProgressBartrue`
`\ProgressBarfalse`

Usage: `\ifProgressBar`

If set true a progress bar will be shown in the middle of the slides foot at the frame number. You can customize the progress bar shown using `\SetProgressBar` or `\ProgressBarStyle`.

`\SetProgressBar`

Usage: `\SetProgressBar{<*>}{<align>}{<length>}{<height>}{<voffset>}`

This changes the default values of `\ProgressBar`. If the starred version is used the changes are made locally, else they are applied globally. Take a look at the description of `\ProgressBar` for an explanation what each of the parameters mean. If you use a * as one of the arguments the corresponding default value will remain unchanged.

`\ProgressBarStyle`

Usage: `\ProgressBarStyle{<*>}{<style>}`

This sets the progress bar options to a predefined `<style>` using the unstarred version of `\SetProgressBar`. If the starred version of `\ProgressBarStyle` is used `\ProgressBartrue` is issued. Available styles are listed in [Table 4-1](#).

4.3.1 Footnote related

`\ifTabularNotes`
`\TabularNotestru`
`\TabularNotesfalse`

Usage: `\ifTabularNotes`

If set true the MRT footnotes will be displayed in a tabular manner with two columns. MRT footnotes are those footnotes set with the footnote related macros in [subsection 4.4.1](#).

<code>\ColumnsTabularNotes</code>	Usage: <code>\ColumnsTabularNotes{<specification>}</code>
	With this macro you can specify the column specifications used by MRT footnotes. Your definition should contain two columns.

4.3.2 Bibliography related

<code>\ifExplicitCiteOnce</code>	Usage: <code>\ifExplicitCiteOnce</code>
<code>\ExplicitCiteOncetrue</code>	If set to true for every used key the citation is in an explicit manner only once. For each following citation of the same key only the number is used.
<code>\ExplicitCiteOncefalse</code>	

<code>\ifNoExplicitCite</code>	Usage: <code>\ifNoExplicitCite</code>
<code>\NoExplicitCitetrue</code>	If set to true there will never be an explicit citation at the frame, only the citation number will be used.
<code>\NoExplicitCitefalse</code>	

4.4 Macros

<code>\PlaceAt</code>	Usage: <code>\PlaceAt{<*>}<pos>[<node options>]{<content>}</code>
	The starred version differs fundamentally from the unstarred one. The unstarred one places <code><content></code> at the specified position <code><pos></code> in the background inside a <code>TikZ</code> node with the optionally specified <code><node options></code> . The coordinates default to multiples of <code>\pagewidth</code> and <code>\pageheight</code> for <code>x</code> and <code>y</code> , respectively. You can use anything <code>TikZ</code> understands as coordinates for <code><pos></code> .
	The starred version places the <code>tikzpicture</code> where you currently are. It uses <code>remember picture</code> and <code>overlay</code> as options. The <code><pos></code> must match the pattern <code>((<x>,<y>))</code> . <code><x></code> is in multiples of <code>\pagewidth</code> and <code><y></code> in multiples of <code>\pageheight</code> and you can't change that. The node still gets <code><node options></code> .
	In both cases <code>(0,0)</code> is the bottom left corner of the slide.

<code>\AddToPlaced</code>	Usage: <code>\AddToPlaced{<TikZ code>}</code>
	Adds the specified <code><TikZ code></code> to the background of the current slide. <code>(0,0)</code> is the bottom left corner of the slide. Coordinates are by default in multiples of <code>\pagewidth</code> and <code>\pageheight</code> . It uses the same <code>tikzpicture</code> as <code>\PlaceAt</code> and is stored in the same macro.

<code>\ProgressBar</code>	Usage: <code>\ProgressBar[<align>]<length>[<height>][<voffset>]</code>
	Prints a progress bar. <code><align></code> is the horizontal alignment as you would pass it to a <code>\makebox</code> , the initial default is <code>c</code> . <code><length></code> is the overall length the progress bar should have (defaulting to 30pt), <code><height></code> its height, defaulting to the current font size. <code><voffset></code> allows you to offset the progress bar vertically. With positive values the shift is downwards, the default is <code>-1.65ex</code> . The progress bar uses the <code>xcolor</code> colours <code>progressed</code> and <code>noprogress</code> . All arguments are optional.

<u>\StartOfProgress</u> <u>\EndOfProgress</u>	<p>Usage: \StartOfProgress</p> <p>Denotes the start and end of the progress bars gauge. The frame after the call of \StartOfProgress is the first frame filling the gauge, the frame prior to \EndOfProgress is the first frame in which the gauge is fully filled. The macros should be used outside of the frame environment. If \StartOfProgress is not used the first frame starts filling the gauge, if \EndOfProgress is not used the last frame is the only one with a completely filled gauge.</p>
<u>\contentwidth</u> <u>\contentheight</u>	<p>Usage: \contentwidth</p> <p>These are lengths which are set to match the height and width of the content block of a frame (the space between the bottom rule and the lower top rule). \textwidth should match \contentwidth if you're outside of a minipage or similar, but \textheight will most likely not match the actual height of the content area.</p>
<u>\UseAndIfEmptyTF</u>	<p>Usage: \UseAndIfEmptyTF[<i><pre></i>]{<i><arg></i>}{<i><true></i>}{<i><false></i>}</p> <p>The <i><arg></i> is expanded inside a box. If that box has a width not equal 0pt <i><pre></i> is used followed by the contents of the box. Then the <i><false></i> branch is executed. If the box's width equals 0pt the <i><true></i> branch is used instead and neither <i><pre></i> is used nor the box containing <i><arg></i> placed.</p>
<u>\cursec</u>	<p>Usage: \cursec[*]</p> <p>If the current section is starred or you used the optional * for \cursec, this macro inserts the current sections name, else the name is prepended by the current sections number.</p>
<u>\curssec</u>	<p>Usage: \curssec[*]</p> <p>This macro is very similar to \cursec. If you used the starred version of it or the current subsection is starred, this macro inserts the current subsections name, else the name is prepended by the current subsections number.</p>
<u>whiteframes</u>	<p>Usage: \begin{whiteframes} ... \end{whiteframes}</p> <p>In this environment \ifwhiteframes is set true.</p>

4.4.1 Footnote related

The term footnotes relates to the special MRT footnotes in this subsection.

<u>\AddToRightFoot</u>	<p>Usage: \AddToRightFoot[*]{+}<overlay>[<i><pre></i>]{<i><note></i>}</p> <p>This macro adds stuff to the right footer. If [*] is given, the content is added to the persistent footnotes, else if {+} is given added to the cite related footnotes, else to the ordinary ones. <overlay> is used for any overlay specifications using \uncover. <i><pre></i> is added left to <i><note></i>. If tabular footnotes are used <i><pre></i> is in the left, <i><note></i> in the right column. If tabular footnotes are not</p>
------------------------	--

used the distance between $\langle pre \rangle$ and $\langle note \rangle$ is 0.5\tabcolsep . The starred variant should only be used outside of the `frame` environment. If you get strange errors during compilation a `\noexpand` in front of some macros (e.g. stuff like `\href`) you give as arguments might help.

`\ClearRightFoot` Usage: `\ClearRightFoot<*>`

Clears the footnotes. If the `*` is given only the volatile footnotes are cleared, else all of them.

4.4.2 Bibliography related

`\cite` Usage: `\cite<overlay>[<opt1>][<opt2>]{<key>}`

$\langle overlay \rangle$ is handled by `\uncover`, which affects only the footnote not the footnote mark. The usage of the two optional arguments and $\langle key \rangle$ match those known from biblatex's `\cite`. The citation's contents are dependent on `\ifNoExplicitCite` and `\ifExplicitCiteOnce`, an explicit citation contains the citation number, authors' names, the journal, and the year.

`\framecite` Usage: `\framecite<*><overlay>[<pre>]{<key>}[<post>]`

Places a citation in the footnotes, if the starred version is used using the persistent footnotes, else the volatile non-cite related footnotes. Use the starred version prior to the `frame` it should first be shown in. $\langle overlay \rangle$ specifications are interpreted by `\uncover`. $\langle pre \rangle$ is put in front of the citation with a distance of `\`, (unaffected by tabular footnotes options), $\langle post \rangle$ with a distance of `\`, after the citation. The citation contains the authors' names, the journal, and the year.

`\bibliographyframe` Usage: `\bibliographyframe<*>[<bibfont>]{<title>}{<subtitle>}`

Prints the bibliography. The starred variant uses `\whiteframestrue`. The $\langle bibfont \rangle$ defaults to `\small`, you might give any font related commands here. Both $\langle title \rangle$ and $\langle subtitle \rangle$ are optional though delimited by curly braces. $\langle title \rangle$ defaults to 'Quellen', $\langle subtitle \rangle$ is initially empty. The `\bibliographyframe` is printed using `allowframebreaks`.

`\inlinecite` Usage: `\inlinecite[<opt1>][<opt2>]{<key>}`

Gives the citation which would be placed in the text by `\cite` without any `\textcolor`. In fact `\cite` uses this internally.

`\insertcite` Usage: `\insertcite{<key>}`

Gives the citation which would be placed in the footnote by `\cite`. In fact `\cite` uses this internally.

`\insertframecite` Usage: `\insertframecite{<key>}`

Gives the citation which would be placed in the footnote by `\framecite`. In

fact `\framecite` uses this internally.

4.5 Dependencies

The class uses `beamer` as its basis. Additionally the following packages are loaded:

- `MRTsfacc`
 - `inputenc [utf8]`
- `MRTutil`
 - `lmodern`
- `xparse`
 - `helvet`
- If \XeTeX or \LuaTeX are used
 - `MRTlmscale` dependent on the `scale` `maths` key.
 - If new `maths` is used
 - * `newpxmath [upint, slantedGreek]`
 - * The `ztmlcm` font
- `TikZ`
- `biblatex` (with URLs being line breakable at any place)
 - `fontenc [T1]`

`biblatex` uses `biber` as its backend.

5 The MRTalone class

The standalone version of MRTthesis. The aim is to provide a class to produce simple \LaTeX based images which match the look of MRTthesis.

5.1 Options and Setup Files

MRTalone allows you to use a shared options file and a shared setup file for your project. The files get sourced if they are available.

The shared options might be placed into the file `./MRTalone.option.tex`. This file can include any number of `\MRTaloneOptions` calls. It is loaded in the midst of the class file. See [section 5.3](#) for a description of `\MRTaloneOptions` and [subsection 5.2.1](#) for the available options.

The additional setup file should be `./MRTalone.setup.tex`. It is sourced at the end of the class and might contain any valid \LaTeX code, of course including some `\MRTaloneSetup` instructions. See [section 5.3](#) for `\MRTaloneSetup` and [subsection 5.2.2](#) for the available setup options.

5.2 Options

5.2.1 Load time options

The class features a few load time options.

<u>longtable</u>	–NoArgument– Is forwarded to MRTtab see its description in section 6.6 .
<u>mathsizes</u>	–NoArgument– Opposite of <code>no mathsizes</code> . If used (which it by default is) the maths sizes are set according to the MS Word template. Note that those weren't set by <code>mrtarbeit</code> and if you alter the default font size won't be set.
<u>minimal</u>	–NoArgument– If this option is passed some packages are not loaded and therefore related configurations not set. See section 5.4 .
<u>no mathsizes</u>	–NoArgument– Opposite of <code>mathsizes</code> . If used the maths sizes are not changed from the defaults of <code>scrreprt</code> .
<u>tikzunderline</u> <u>tUline</u>	–NoArgument– This option is forwarded to MRTwuline. See its description in section 8.1 .
<u>british</u> <u>english</u> <u>UKenglish</u>	–NoArgument– If used the document will be using the <code>british</code> definition of <code>babel</code> . Many strings used in the package will be in English, but some might be missed out. If you find any of which you think should be translated, please contact me as described in section 1.1 . English simplified (US) is not supported by the class.

`sfacc` = $\langle choice \rangle$

$\langle choice \rangle$ must be `height` or `list`. Sets the approach used by `MRTsfacc` (see [chapter 9](#)) and if `list` is in use the shift list for `helvet` will also be loaded. If it is not specified the `list` variant is used.

`font` = $\langle font \rangle$

This is only available if you're using `LuaTeX` or `X3TeX`. With this you can set the used sans serif font, which will be used as the default font. It should be a font resembling Helvetica or Arial. Per default the font `TeX Gyre Heros` will be used.

`serif font` = $\langle font \rangle$

This is only available if you're using `LuaTeX` or `X3TeX`. With this you can set the used serif font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a Roman font anyway. Per default the font `Latin Modern Roman` will be used.

`mono font` = $\langle font \rangle$

This is only available if you're using `LuaTeX` or `X3TeX`. With this you can set the used mono font. This isn't too important as the default fonts will suffice. You shouldn't have too much text with a mono font anyway. Per default the font `Latin Modern Mono` will be used.

`new maths` = $\langle choice \rangle$

This is only available if you're using `pdfTeX`. With this you can specify whether some special maths fonts are loaded. The result looks closer to the MS Word template for Greek letters and operators.

Available $\langle choice \rangle$ s are `off` or `false` to turn this off, `on` or `true` to turn this on, and a valid float, to set the scale of the Greek letters and activate the feature. By default `1.05` will be used.

The number of usable fonts will be used exhaustively. The `newpxmath` will be loaded with its `upint` and `slantedGreek`, the math letters of `mathptmx` will be loaded with a scale factor. `bm` will be loaded so that you can use the bold symbols of the Latin Modern fonts for Greek letters.

`scale maths` = $\langle choice \rangle$

This is only available if you're using `pdfTeX`. With this you can specify whether the `MRTlmscale` package should be loaded. Available $\langle choice \rangle$ s are no argument, resulting in `MRTlmscale` being used with its default, `on` or `true` resulting in the same, `off` or `false` resulting in `MRTlmscale` not being used, and any valid float, resulting in `MRTlmscale` being used with the specified float as its scale factor. See [chapter 10](#) for more about `MRTlmscale`. By default, `MRTlmscale` will be used with its default scale factor.

Every other given option will be passed on to `standalone`.

5.2.2 Setup options

The following options are accessible with `\MRTaloneSetup`.

<u>caption above</u>	–NoArgument– Is forwarded to <code>MRTtab</code> and its <code>\MRTtabSetup</code> . See its description in subsection 6.6.1 .
<u>caption below</u>	–NoArgument– Is forwarded to <code>MRTtab</code> and its <code>\MRTtabSetup</code> . See its description in subsection 6.6.1 .
<u>stretch caption</u> <u>stretch cap</u>	<code>= <float></code> Currently does nothing.
<u>stretch tabular</u> <u>stretch tab</u>	<code>= <float></code> Is forwarded to <code>MRTtab</code> and its <code>\MRTtabSetup</code> . See its description in subsection 6.6.1 .
<u>stretch text</u>	<code>= <float></code> Uses <code>\setstretch</code> to set a specific line spread in the document.
<u>stretches</u>	<code>= <float></code> Sets <code>stretch cap</code> , <code>stretch tab</code> , and <code>stretch text</code> in one go. Initially set to 1.408.

5.3 Macros

<u><code>\MRTaloneSetup</code></u>	Usage: <code>\MRTaloneSetup{<options>}</code> You can use this macro to set the options listed in subsection 5.2.2 .
<u><code>\MRTaloneOptions</code></u>	Usage: <code>\MRTaloneOptions{<options>}</code> You can use this macro to set the options listed in subsection 5.2.1 . It is only available inside of the <code>./MRTalone.option.tex</code> file (see section 5.1).

5.4 Dependencies

The class is based on `standalone`, therefore it naturally depends on that and all its dependencies. Additional dependencies are:

- `expl3`
- `xparse`
- `MRTwuline`
- `MRTsfacc`
- If $\text{\X}\text{\TeX}$ or $\text{\Lua}\text{\TeX}$ are used
 - `fontspec` and `\defaultfontfeatures{Ligatures=TeX}`
- `MRTtab` for which `in text sep` is set to 0pt and the option `no float` is set. Take a look at [subsection 6.6.1](#) to see what those do.

- the fonts TeX Gyre Heros, Latin Modern Roman and Latin Modern Mono, dependent on the font keys.
 - else
 - fontenc [T1]
 - inputenc [utf8]
 - lmodern
 - helvet
 - MRTlmscale dependent on the scale maths key.
 - If new maths is used
 - * bm
 - * newpxmath [upint, slantedGreek]
 - * The ztmcm font
 - babel [ngerman] or if british is used with
 - [main=british, ngerman]
 - setspace
 - enumitem
 - mathtools with the fleqn option
 - mathastext with the defaultmathsizes and italic options
 - isomath
 - if the minimal option is not used:
 - siunitx [detect-all, per-mode=reciprocal-positive-first]
- If babel's british is used [locale=UK] will be used, if ngerman [locale=DE]. Additionally the range-phrase will be set to either to or bis with spaces around it.

6 The MRTtab package

MRTtab provides means to typeset tables in a style similar to the ones in the scripts of the MRT. This includes:

- delimited by horizontal rules on top and below
- head rows are light grey and delimited by horizontal rules
- all horizontal rules have the same thickness
- no vertical rules (though not enforced)

The package provides an environment similar to `tabular` (section 6.1), an enhanced version of `\cline` (section 6.2), and an environment to typeset displayed tables with many options available (section 6.3).

6.1 The MRTtabular environment

The MRTtabular environment calls a patched `tabular` environment. The following differences exist:

- a hook is provided at the beginning and the end of each line
- above and below of it a `\hline` is placed
- it has an additional optional argument specifying the number of rows to be formatted as head rows.
- you can access the current row number
- automatic application of a stretch factor based on the `stretch` `tabular` key in subsection 6.6.1.

Any `tabular` environments inside of an MRTtabular are ordinary `tabulars` which neither have hooks nor row numbers. They might be affected by an outer `\rowcolor` or similar, though.

An ordinary description as done with other environments in this documentation:

MRTtabular Usage: `\begin{MRTtabular}[\langle valign \rangle]{\langle preamble \rangle}[\langle head rows \rangle] \dots`
`\end{MRTtabular}`

The first optional argument as well as the mandatory argument match the ones of a regular `tabular` environment. `\langle head rows \rangle` specifies how many rows at the beginning of the environment should be formatted as head rows. If `\langle head rows \rangle` is not specified, no head row will be formatted. No further markup is required for this formatting to take place. You should end your rows only with `\\` to make the hook mechanism work (on which the head row markup relies).

\head Usage: `\head{\langle num \rangle}`

Additionally to the optional argument of `MRTtabular` to set the first n rows as head rows, you can use `\head` to set the next `\langle num \rangle` rows as head rows. This does not only work at the beginning of the environment but anywhere you want. Alternatively you can use the macros described in section 6.4.

\MRTtabAddtoBoLHook Usage: `\MRTtabAddtoBoLHook{\langle content \rangle}`

You can add `\langle content \rangle` to the Begin-of-Line hook with this macro. Bear in

mind that the $\langle content \rangle$ should be fully expandable and not produce any text, if you want to use stuff like `\multicolumn`, `\rowcolor`, or `\cline` at the beginning of the line – as this hook will be executed prior to that and `\noalign` and `\omit` won't work in that case. If you need something unexpandable you can enclose it in `\noalign`. The addition is made locally.

`\MRTtabClearBoLHook` Usage: `\MRTtabClearBoLHook`
 Clears the Begin-of-Line hook locally.

`\MRTtabAddtoEoLHook` Usage: `\MRTtabAddtoEoLHook{\langle content \rangle}`
 You can also add $\langle content \rangle$ to the End-of-Line hook. Here it should not matter whether the contents are expandable or not, as it is impossible that something follows in the same row which can't follow something unexpandable. The addition is made locally.

`\MRTtabClearEoLHook` Usage: `\MRTtabClearEoLHook`
 Clears the End-of-Line hook locally.

`\MRTtabCurrentRow` Usage: `\MRTtabCurrentRow`
 Returns the current row number in an `MRTtabular` expandably.

6.1.1 Known Bugs

Currently only one bug is known: If after the last head row there is only one additional row the bottom `\hline` will only be drawn if you end that last row with `\\`. If you have more rows following the last head row, it won't matter whether you end the last row with `\\` or not.

6.2 The `\MRTcline` macro

`\MRTcline` Usage: `\MRTcline\![\langle color \rangle]{\langle * \rangle[\langle color \rangle]\langle [\langle left skip \rangle] \rangle \langle [\langle right skip \rangle] \rangle \langle cols \rangle}`

Sets something like a `\cline` in the specified $\langle cols \rangle$.

In the mandatory argument the only mandatory element is the affected $\langle cols \rangle$.

The mandatory argument can include a comma separated list in which you can repeat every optional argument you like as many times as you like. Additionally you can enclose the $\langle cols \rangle$ in curly braces and give another comma separated list there which then can only contain column specifications and none of the optional arguments using the optional arguments specified before that list. A valid column specification is a single column, or a column range separated by a `-`, so something like $\langle start-end \rangle$.

Both $\langle color \rangle$ arguments have the same effect, but the first applies to every specification in the list, while the second only affects the current list item. The $\langle color \rangle$ doesn't change the color of the line, but the color of the optional fill arguments. It defaults to either `tabulargray` if used inside the scope of head rows, or `white` else. If you give a $\langle * \rangle$ the current list item will be completely in

the specified `<color>`.

You can introduce a small skip on the left side if you specify a `<>` which defaults to `.5\tabcolsep`, with the optional `<left skip>` you can customize that length. A small skip to the right can be introduced with `<>`, again of customizable width using `<right skip>`.

You should only use one `\MRTcline` per line and specify every column you want in that.

If you don't give the optional `<!>` after `\MRTcline`, before anything else something like a `\hline` using `<color>` will be used to cover the full width of the tabular. This way you don't have to specify every column you want to color with `<color>` using the `<*>` type argument.

I hope you got that rather cryptic description (if you can supply a better description, message me as noted in [section 1.1](#)).

Here are a few examples of usage with comparison to a correct `\cline` usage. The source of each table is printed below it. The last example of `\MRTcline` is not possible with the standard `\cline` as far as I know.

a	b	c
d	e	f
g	h	i
j	k	l

```
\begin{MRTtabular}{lll}
a & b & c\\
\MRTcline{1-2}
d & e & f\\
g & h & i\\
j & k & l\\
\end{MRTtabular}
```

a	b	c
d	e	f
g	h	i
j	k	l

```
\begin{MRTtabular}{lll}
a & b & c\\
\cline{1-2}
\clineReveal
d & e & f\\
g & h & i\\
j & k & l\\
\end{MRTtabular}
```

a	b	c
d	e	f
g	h	i
j	k	l

```
\begin{MRTtabular}{lll}[2]
a & b & c\\
\MRTcline{1-2}
d & e & f\\
g & h & i\\
j & k & l\\
\end{MRTtabular}
```

a	b	c
d	e	f
g	h	i
j	k	l

```
\begin{MRTtabular}{lll}[2]
a & b & c\\
\MRTcline{<>1-2}
d & e & f\\
g & h & i\\
j & k & l\\
\end{MRTtabular}
```

a	b	c
d	e	f
g	h	i
j	k	l

```
\begin{MRTtabular}{lll}[2]
  a & b & c\\
  \cline{1-2}
  \arrayrulecolor{tablegray}
  \cline{3-3}
  \arrayrulecolor{black}
  \clineReveal
  \rowcolor{tablegray}
  d & e & f\\
  g & h & i\\
  j & k & l\\
\end{MRTtabular}
```

6.3 The MRTtable environment

The MRTtable environment is a wrapper around an MRTtabular inside of a table environment. There might be a severe difference in the implementation of the long version, but as of now it is *not implemented*.

MRTtable Usage: `\begin{MRTtable}[\langle key=value \rangle] \dots \end{MRTtable}`
MRTtable sets its contents in an MRTtabular environment. It features several $\langle key \rangle$ s you are encouraged to use.
All available $\langle key \rangle$ s are listed in [subsection 6.6.1](#).

6.4 Explicit head rows

It is possible to mark head rows explicitly. For this the following macros are provided:

\headS Usage: `\headS`
Start of the head rows. Sets a `\hline` above the current row except if the current row is the first row in a MRTtabular environment. Additionally the current row is coloured with `\rowcolor{tablegray}`.

\headR Usage: `\headR`
An additional head row should be started with this macro. It sets the current row's colour to `tablegray`.

\headE Usage: `\headE`
The end of the head rows. Should be used after the last row of the table's head but prior to the next row (immediately after `\\`).

<u>\MRTtabDeclareHeadMacros</u>	Usage: \MRTtabDeclareHeadMacros
---------------------------------	---------------------------------

By default the above macros are only available inside of MRTtabular and in the body of MRTtable. \MRTtabDeclareHeadMacros will make them locally available.

6.5 Other package macros

<u>\MRTtabSetup</u>	Usage: \MRTtabSetup{<key=value>}
---------------------	----------------------------------

This is the interface to set the options listed in [subsection 6.6.1](#) outside of MRTtable.

<u>\clineReveal</u>	Usage: \clineReveal
---------------------	---------------------

As you can see in [section 6.2](#) the macro \clineReveal is used. This is done because a \cline doesn't take up any vertical space (by issuing \noalign{\vskip-\arrayrulewidth}) as opposed to a \hline. This is done so that multiple \clines can be used in the same row. As a result the spacing is inconsistent and a \cline is overlapped by a following \rowcolor or \cellcolor. \clineReveal does introduce a vertical skip which reveals the lines (issuing \noalign{\vskip\arrayrulewidth}). It is also used by \MRTcline.

<u>\MRTtabRepeatCols</u>	Usage: \MRTtabRepeatCols
--------------------------	--------------------------

This macro is to be used in column definitions of tabulars or arrays and other macros and environments using these internally (e.g. MRTtabular and MRTtable). The effect is that the column definitions which follow this macro are repeated indefinitely to match the required columns for the tables body. E.g., `1 \MRTtabRepeatCols c` does set the first column left aligned and every following column centred. It has to be preceded by at least one valid column definition.

6.6 Options

The package only features one load time option, which is `longtable`. If it is specified the `longtable` package is loaded and some more options of MRTtable become available which are focused around the usage of `longtable` inside of MRTtable. Note however that the `long` version of MRTtable is not yet implemented.

6.6.1 Setup Options

The following options are available for \MRTtabSetup and MRTtable.

<u>align</u>	= <align>
--------------	-----------

If no float has been used, a minipage is used around the MRTtable. With the align option you can specify the vertical alignment of that minipage.

<hr/> caption above <hr/>	<p>–NoArgument–</p> <p>If specified the caption will be put above the MRTtabular in MRTtable. If \KOMAOPTIONS is available the KOMA option captions=tableheading is used.</p>
<hr/> caption below <hr/>	<p>–NoArgument–</p> <p>If specified the caption will be put below the MRTtabular in MRTtable. If \KOMAOPTIONS is available the KOMA option captions=tablesigsature is used.</p>
<hr/> bare <hr/>	<p>= $\langle bool \rangle$</p> <p>If set to true the potential caption and the tabular like environment in MRTtable are neither surrounded by a minipage nor a figure. Only a \centering is issued.</p>
<hr/> BoL <hr/>	<p>= $\langle content \rangle$</p> <p>Sets the MRTtabular Begin-of-Line hook using \MRTtabAddtoBoLHook</p>
<hr/> EoL <hr/>	<p>= $\langle content \rangle$</p> <p>Sets the MRTtabular End-of-Line hook using \MRTtabAddtoEoLHook</p>
<hr/> caption cap <hr/>	<p>= $\langle caption \rangle$</p> <p>Specifies the content of the caption in an MRTtable. If it is blank, no caption will be used.</p>
<hr/> cline version <hr/>	<p>= $\langle choice \rangle$</p> <p>set the behaviour of \MRTcline. Choices are 1 and 2. 2 is the behaviour currently described in section 6.2. If you specify 1 the behaviour of the optional $\langle ! \rangle$ of \MRTcline is reversed.</p>
<hr/> columns col <hr/>	<p>= $\langle preamble \rangle$</p> <p>Specifies the MRTtabular preamble (the column specifications). Defaults to first column l, others c.</p>
<hr/> env <hr/>	<p>= $\langle name \rangle$</p> <p>Uses the tabular like environment $\langle name \rangle$ instead of MRTtabular. If an empty argument is provided, no inner environment will be used. This is useful if you want to use an environment that grabs its contents and has to be explicitly used, e.g. tabularx can only be used like this.</p>
<hr/> env begin <hr/>	<p>= $\langle begin \rangle$</p> <p>Uses $\langle begin \rangle$ as the start of the tabular like environment. This way you can specify some options. Note that any outer braces are stripped. If you want to use an environment you have to include \begin in the argument. Note that if</p>

the argument you provide is not empty, the column specification as defined with `columns` is inserted in braces after `\begin`.

<u>env end</u>	= $\langle end \rangle$ Uses $\langle end \rangle$ as the end of the tabular like environment. This way you can specify some options. Note that any outer braces are stripped. If you want to use an environment you have to include <code>\end</code> in the argument.
<u>float</u>	= $\langle bool \rangle$ If set true (the default and initial value) the MRTtable floats.
<u>head rows</u> <u>head</u>	= $\langle num \rangle$ The number of rows which should be formatted as head rows as in MRTtabular. In each MRTtable it is initially 1 – this differs from the behaviour of a stand alone MRTtabular which defaults to 0 rows.
<u>in text sep</u>	= $\langle skip \rangle$ This controls the vertical space around a non-floating MRTtable. It is initially set to <code>\intextsep</code> . If it is equal to 0pt the <code>\vskip</code> is not issued.
<u>label</u>	= $\langle label \rangle$ If caption is used the MRTtable will get the specified $\langle label \rangle$.
<u>no float</u>	= $\langle bool \rangle$ The opposite of <code>float</code> . If set true the MRTtable will not float which is the default (but not initial) value.
<u>no inner env</u>	–NoArgument– Same result as <code>env begin={}, env end={}</code> , so no tabular like environment is used at all.
<u>pos</u>	= $\langle pos \rangle$ The placement of a floating MRTtable. Initially <code>tbp</code> .
<u>post tab</u> <u>post</u>	= $\langle content \rangle$ A hook which is executed right after the <code>\end</code> of the inner MRTtabular.
<u>pre tab</u> <u>pre</u>	= $\langle content \rangle$ A hook which is executed right before the <code>\begin</code> of the inner MRTtabular.
<u>short caption</u> <u>short cap</u> <u>scap</u>	–NoArgument– If caption and this option are used the list of tables will get this short caption instead of the caption.

<hr/> stretch tabular	= $\langle float \rangle$
stretch tab	Sets the stretch in MRTtabular to the specified $\langle float \rangle$ using <code>\setstretch</code> .
stretch	
<hr/> stretch caption	= $\langle float \rangle$
stretch cap	Sets the stretch in the caption using <code>\setkomafont</code> and <code>\setstretch</code> . Doesn't
cstretch	work if KOMA script is not used but issues a warning in that case.
<hr/>	
<hr/> striped	= $\langle bool \rangle$
	If set to true the inner MRTtabular will be striped with stripe color 1 and stripe color 2, beginning in line stripe start. It uses <code>\rowcolors</code> internally.
<hr/>	
stripe color 1	= $\langle color \rangle$
stripe 1	Defines the $\langle color \rangle$ of the first color argument of <code>\rowcolors</code> if striped is
scolor 1	true. Initially set to <code>tablegray!50</code> .
scolor1	
<hr/>	
stripe color 2	= $\langle color \rangle$
stripe 2	Defines the $\langle color \rangle$ of the second color argument of <code>\rowcolors</code> if striped
scolor 2	is true. Initially set to <code>white</code> .
scolor2	
<hr/>	
stripe invert	–NoArgument–
sinvert	Exchanges the current values of stripe color 1 and stripe color 2.
<hr/>	
stripe start	= $\langle row \rangle$
sstart	Defines the starting row of a potentially striped MRTtabular. Initially set to 2.

6.6.1.1 longtable related options



Not Implemented yet! Everything in this subsection is mostly inside of the documentation to remind me that I still have to code this and to give me a specification what has to be inside the final version.

The following options are only available if the `longtable` option was used during package load time.

<hr/> long	= $\langle bool \rangle$
	If set true the MRTtable uses <code>longtable</code> internally. It doesn't float and gets page breakable. You should specify the columns of MRTtable manually as the automatic detection might fail terribly in conjunction with <code>longtable</code> .
<hr/>	
continue caption	= $\langle caption \rangle$
cont cap	If specified following pages use this $\langle caption \rangle$ instead of the short caption or the normal caption.

continue with caption	= $\langle bool \rangle$
cont with cap	If set true, the following pages use the caption and not the short caption
cont w cap	or continue caption. Defaults to true and initially is set to false.

6.7 Dependencies

The package requires the following packages and their dependencies:

- expl3
- array
- xcolor with option table
- xparse
- setspace
- potentially longtable

7 The MRTif package

The MRTif package provides a number of expandable tests. In the following macros *TF* is used to specify that the macros exist with the endings T, F, and TF. The T ending stands for a *<true>* branch, F for the *<false>* branch.

If a macro name contains a G prior to *TF*, it strips any outermost groups prior to the test using `\MRTifGroupTF`. An N denotes that the first token in the argument is expanded once prior to any test. If a macro which takes two arguments ends with NN prior to the *TF* in both arguments the first token is expanded once, Nn and nN mean that only for the first and second argument, respectively, an expansion is made.

MRTif uses a special marker in some of its tests which expands to the undefined control sequence

`\MRTif@IfYouSeeThisContactTheMaintainer`

If you ever see this in your log or console output, please contact me as stated in [section 1.1](#) and include a minimal example producing this behaviour in your contacting. Please do the same if you get any other undefined control sequence errors containing MRTif in the control sequence's name.

7.1 Macros

<code>\MRTifEmptyTF</code>	Usage: <code>\MRTifEmptyTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifEmptyGTF</code>	Tests if <i><arg></i> is completely empty.
<code>\MRTifEmptyNTF</code>	
<code>\MRTifEmptyGNTF</code>	
<code>\MRTifGroupTF</code>	Usage: <code>\MRTifGroupTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifGroupNTF</code>	Tests if <i><arg></i> is a single group no matter what the contents of that group are. It ignores spaces around the group.
<code>\MRTifGroupNoSpacesTF</code>	Usage: <code>\MRTifGroupNoSpacesTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifGroupNoSpacesNTF</code>	Tests if <i><arg></i> is a single group no matter what the contents of that group are. It doesn't ignore spaces around the group.
<code>\MRTifStringsMatchTF</code>	Usage: <code>\MRTifStringsMatchTF{<string₁>}{<string₂>}{<true>}{<false>}</code>
<code>\MRTifStringsMatchNNTF</code>	
<code>\MRTifStringsMatchNnTF</code>	Tests if <i><string₁></i> and <i><string₂></i> match, the strings are <code>\detokenized</code> prior to the comparison.
<code>\MRTifStringsMatchnNTF</code>	
<code>\MRTifStringsMatchGTF</code>	
<code>\MRTifStringsMatchGNTF</code>	
<code>\MRTifStringsMatchGNnTF</code>	
<code>\MRTifStringsMatchGnNTF</code>	

<hr/> \ MRTifStringsMatchXXTF \ MRTifStringsMatchXXGTF <hr/>	<p>Usage: \MRTifStringsMatchXXTF{<string₁>}{<string₂>}{<true>}{<false>}</p> <p>Tests if <string₁> and <string₂> match, the strings are fully expanded.</p>
<hr/> \ MRTifOneTokenTF \ MRTifOneTokenGTF \ MRTifOneTokenNTF \ MRTifOneTokenGNTF <hr/>	<p>Usage: \MRTifOneTokenTF{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is only a single token or group.</p>
<hr/> \ MRTifOneTokenNoGroupTF \ MRTifOneTokenNoGroupNTF <hr/>	<p>Usage: \MRTifOneTokenNoGroupTF{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is only a single token. A single group is also <false>. A G version is not supplied for obvious reasons.</p>
<hr/> \ MRTifTwoTokenTF \ MRTifTwoTokenGTF \ MRTifTwoTokenNTF \ MRTifTwoTokenGNTF <hr/>	<p>Usage: \MRTifTwoTokenTF{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is exactly two tokens or groups.</p>
<hr/> \ MRTifNumTokenTF \ MRTifNumTokenGTF \ MRTifNumTokenNTF \ MRTifNumTokenGNTF <hr/>	<p>Usage: \MRTifNumTokenTF{<num>}{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is exactly <num> tokens long. It uses \MRTtllength internally. Compared to \MRTifOneToken and \MRTifTwoToken this macro takes longer and the longer the tested <arg> the longer it takes. The G and N variants only work on <arg>, <num> will not be changed.</p>
<hr/> \ MRTifLetterTF \ MRTifLetterGTF \ MRTifLetterNTF \ MRTifLetterGNTF <hr/>	<p>Usage: \MRTifLetterTF{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is a letter, meaning of category code 11.</p>
<hr/> \ MRTifTokensMatchTF \ MRTifTokensMatchNNTF \ MRTifTokensMatchNnTF \ MRTifTokensMatchnNTF \ MRTifTokensMatchGTF \ MRTifTokensMatchGNNTF \ MRTifTokensMatchGNnTF \ MRTifTokensMatchGnNTF <hr/>	<p>Usage: \MRTifTokensMatchTF{<arg₁>}{<arg₂>}{<true>}{<false>}</p> <p>Tests if <arg₁> and <arg₂> are single tokens and if so compares them whether both tokens match. The variants without G test if one of the arguments is contained in a group. If that's the case the <false> branch is executed.</p>
<hr/> \ MRTifDigitTF \ MRTifDigitGTF \ MRTifDigitNTF \ MRTifDigitGNTF <hr/>	<p>Usage: \MRTifDigitTF{<arg>}{<true>}{<false>}</p> <p>Tests if <arg> is a single token and a digit. The implementation might be suboptimal.</p>

<code>\MRTifNumberTF</code>	Usage: <code>\MRTifNumberTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifNumberGTF</code>	Tests if <code><arg></code> is a number, meaning it consists out of an optional + or – sign and digits. The implementation might be suboptimal.
<code>\MRTifNumberNTF</code>	
<code>\MRTifNumberGNTF</code>	

<code>\MRTifNumberNoSignTF</code>	Usage: <code>\MRTifNumberNoSignTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifNumberNoSignGTF</code>	Same as <code>\MRTifNumberTF</code> but also returns <code><false></code> for a leading sign.
<code>\MRTifNumberNoSignNTF</code>	
<code>\MRTifNumberNoSignGNTF</code>	

<code>\MRTifFloatTF</code>	Usage: <code>\MRTifFloatTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifFloatGTF</code>	Tests if <code><arg></code> is a float, meaning it consists out of an optional + or – sign, optional digits, an optional decimal marker (.) and digits (which are again optional if there were digits prior to a decimal marker). The implementation might be suboptimal.
<code>\MRTifFloatNTF</code>	
<code>\MRTifFloatGNTF</code>	

<code>\MRTifFloatNoSignTF</code>	Usage: <code>\MRTifFloatNoSignTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifFloatNoSignGTF</code>	Same as <code>\MRTifFloatTF</code> but also returns <code><false></code> for a leading sign.
<code>\MRTifFloatNoSignNTF</code>	
<code>\MRTifFloatNoSignGNTF</code>	

<code>\MRTifContainsGroupTF</code>	Usage: <code>\MRTifContainsGroupTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifContainsGroupGTF</code>	Tests if <code><arg></code> contains any braced groups.
<code>\MRTifContainsGroupNTF</code>	
<code>\MRTifContainsGroupGNTF</code>	

<code>\MRTifContainsSpaceTF</code>	Usage: <code>\MRTifContainsSpaceTF{<arg>}{<true>}{<false>}</code>
<code>\MRTifContainsSpaceGTF</code>	Tests if <code><arg></code> contains spaces which are not enclosed by inner groups.
<code>\MRTifContainsSpaceNTF</code>	
<code>\MRTifContainsSpaceGNTF</code>	

<code>\MRTtllength</code>	Usage: <code>\MRTtllength{<arg>}</code>
<code>\MRTtllengthN</code>	Expands to the number of tokens or groups inside of <code><arg></code> . Unprotected spaces are ignored. The ordinary version needs two expansions while the N version needs four.

<code>\MRTifFexp</code>	Usage: <code>\MRTifFexp{<MRTif test>}{<branches>}</code>
<code>\MRTifFexpI</code>	These macros take an arbitrary expandable test and expand it in exactly two steps of expansion. <code>\MRTifFexp</code> can be applied to any test, while <code>\MRTifFexpI</code> is meant to be used for tests having only one – a true or a false – branch and <code>\MRTifFexpII</code> is meant to be used for tests having two branches. <code><MRTif test></code> doesn't necessarily have to be a test provided by MRTif but can be any
<code>\MRTifFexpII</code>	

fully expandable test. Inside of $\langle \text{MRTif test} \rangle$ all the arguments necessary for the test should be contained but not the true or false branch. An example:

```
\MRTifFexp{\MRTifEmptyF{abc}}{false}
\MRTifFexp{\MRTifEmptyTF{abc}}{true}{false}
\MRTifFexpI{\MRTifEmptyF{abc}}{false}
\MRTifFexpII{\MRTifEmptyTF{abc}}{true}{false}
```

all expand to `false` after exactly two steps of expansion. `\MRTifFexpI` and `\MRTifFexpII` are more than thrice as fast as `\MRTifFexp` and of course each test takes longer with these added than without.¹ The advantage is the control over the needed expansion steps.

7.2 Dependencies

MRTif loads the `pdftexcmds` package to make the pdfTeX primitive `\pdfstrcmp` available as `\pdf@strcmp` for LuaTeX. Additionally it uses MRTutil.

¹Benchmarking done with pdfTeX, version 3.14159265-2.6-1.40.19 (TeX Live 2018), on an Intel® Core™ i5-2540M with `\MRTifEmptyT` and `\MRTifEmptyTF` utilizing the `l3benchmark` package. To give some numbers: 2 `\MRTifFexpI` and 2 `\MRTifFexpII` added roughly 1.2μs to the compile time of 1.8μs for 2 `\MRTifEmptyT` and 2 `\MRTifEmptyTF` tests, each once empty and once not with empty branches, while 4 `\MRTifFexp` added 4.2μs.

8 The MRTwuline package

The package provides a MS Word like looking line breakable underlining. It does so by using `ulem` or `stackengine`.

8.1 Options

<code>tUline</code>	–NoArgument–
<code>tikzunderline</code>	If this option is passed <code>TikZ</code> will be added as a required package and an alternative underlining macro defined called <code>\tUline</code> , see its description in section 8.2 .

8.2 Macros

<code>\WUline</code>	<p>Usage: <code>\WUline[⟨height⟩]{⟨text⟩}</code></p> <p>This sets <code>⟨text⟩</code> and underlines it in a way that looks like MS Word underlining – at least in the headings. It is usable both in math mode and in text mode. Though in math mode you should use <code>\underline</code>.</p> <p>In text mode the <code>ulem</code> package is used for the underline. In math mode <code>stackengine</code> is employed. In both cases you can use <code>⟨height⟩</code> to change the default height of the underlining. In text mode and math mode the needed <code>⟨height⟩</code> to achieve the same height of the line differs quite a lot. By default in math mode <code>0.21ex</code> is used, in text mode <code>-0.42ex</code>.</p>
<code>\tUline</code>	<p>Usage: <code>\tUline[⟨height⟩][⟨overhang⟩][⟨thickness⟩]{⟨text⟩}</code></p> <p>This macro can be used to underline bigger portions of text. You should never need it, I guess. Just use <code>\WUline</code> instead. If you need it, you'll have to use the package option <code>tUline</code>.</p> <p>If you think you can use this one instead: It underlines <code>⟨text⟩</code> at the given <code>⟨height⟩</code> (default <code>-0.35ex</code>) with the given <code>⟨thickness⟩</code> (default <code>0.185ex</code>). You can specify <code>⟨overhang⟩</code> (default <code>0pt</code>) which is the width the line should be wider than a text line on each side. If you let any optional argument empty, the default is used. It is assumed that the lines are equally separated with <code>\baselineskip</code> – so if your material does stretch the baseline skip, you can't use <code>\tUline</code>. It needs at least two runs to be displayed correctly.</p>

8.3 Dependencies

- `expl3`
- `xparse`
- `stackengine`
- `scalerel`
- `MRTif`
- `MRTutil`
- `ulem` with the `normalem` option
- if the `tUline` option is used:
 - `TikZ`
 - `tikzpagenodes`
 - The `TikZ` library `calc`

9 The MRTsfacc package

This package is provided to remedy an issue related with sans serif maths, to be more precise to fix the placement of `\mathaccentV`, which is internally used by macros such as `\hat` and `\dot` with `amsmath` loaded. It is therefore loaded by all three, `MRTthesis`, `MRTbeam` and `MRTalone`. The `beamer` class provides a fix for the same issue which is unfortunately only working for `beamer`'s default font by fixing the font metrics (and as far as I know only works with `pdfLATEX`).

`MRTsfacc` has two different approaches by patching `\mathaccentV` to move the accent horizontally – either depending on the height of the accented character or a defined offset in a list of possible arguments.

The package is designed with `mathastext` with the `italics` option in mind. It might work for other sans serif maths solutions as well. It requires `amsmath` to be loaded.

Independent on the used approach the accent macros check whether their argument is one meeting a special criterion (a character of category 11 or a known element). Furthermore both versions should detect whether the argument is just another accent macro nested so that in `\dot{\bar{a}}` the `\dot` would still find the `a` as a known argument. This nested usage works only if the nested macro uses `\mathaccentV` internally and each level of nesting is an exact match of the approach's criterion or does only contain two tokens or groups (so in above example the `\bar` and the `{a}`) with the first one being a `\mathaccentV` using macro.

9.1 Options

The package has the following options:

<u>height</u>	–NoArgument– If this option is used the offset is dependent on the height of the accented character. Read the description in section 9.2 .
<u>list</u>	–NoArgument– If this option is used the offset is defined by a list of known arguments. Read the description in section 9.3 .
<u>notest</u>	–NoArgument– By default the package does test whether the definition of <code>\mathaccentV</code> meets the known definition from the <code>amsmath</code> package. If something does redefine <code>\mathaccentV</code> or the definition has changed but you're sure that <code>MRTsfacc</code> still works with (it redefines it anyway) you can deactivate that test with this option. If <code>amsmath</code> 's definition of <code>\mathaccentV</code> has changed, please contact the me as described in section 1.1 .

Every other option is passed on to `\MRTsfaccSet`, its description is included in [subsection 9.2.1](#). This will have no effect if the `list` option is used.

Table 9-1: Comparison of shifted accents against original placement with the use of the `height` variant.

original	shifted	original	shifted
\hat{a}	\hat{A}	\hat{a}	\hat{A}
\hat{b}	\hat{B}	\hat{b}	\hat{B}
\hat{c}	\hat{C}	\hat{c}	\hat{C}
\hat{d}	\hat{D}	\hat{d}	\hat{D}
\hat{e}	\hat{E}	\hat{e}	\hat{E}
\hat{f}	\hat{F}	\hat{f}	\hat{F}
\hat{g}	\hat{G}	\hat{g}	\hat{G}
\hat{h}	\hat{H}	\hat{h}	\hat{H}
\hat{i}	\hat{I}	\hat{i}	\hat{I}
\hat{j}	\hat{J}	\hat{j}	\hat{J}
\hat{k}	\hat{K}	\hat{k}	\hat{K}
\hat{l}	\hat{L}	\hat{l}	\hat{L}
\hat{m}	\hat{M}	\hat{m}	\hat{M}
\hat{n}	\hat{N}	\hat{n}	\hat{N}
\hat{o}	\hat{O}	\hat{o}	\hat{O}
\hat{p}	\hat{P}	\hat{p}	\hat{P}
\hat{q}	\hat{Q}	\hat{q}	\hat{Q}
\hat{r}	\hat{R}	\hat{r}	\hat{R}
\hat{s}	\hat{S}	\hat{s}	\hat{S}
\hat{t}	\hat{T}	\hat{t}	\hat{T}
\hat{u}	\hat{U}	\hat{u}	\hat{U}
\hat{v}	\hat{V}	\hat{v}	\hat{V}
\hat{w}	\hat{W}	\hat{w}	\hat{W}
\hat{x}	\hat{X}	\hat{x}	\hat{X}
\hat{y}	\hat{Y}	\hat{y}	\hat{Y}
\hat{z}	\hat{Z}	\hat{z}	\hat{Z}

9.2 `height` Variant

This variant checks whether the argument is a single character with category code 11. If this test does not return true, the shift isn't applied.

Table 9-1 shows the results of this approach. While this approach is easier to adapt to other fonts – one has to change only one parameter – it is always a compromise trying to match every character as good as possible.

9.2.1 Macros

`\<accent>` Usage: `\<accent>\<*/!\>\{<arg>\}`

`\<accent>` can be any of the maths accent macros using `\mathaccentV` internally (e.g. `\bar`, `\dot`, etc.).

The `\<*/!\>` can either be `*` or `!` or omitted entirely. If the starred version is used, the shift is enforced regardless of the argument, if the exclamation mark is given it is prohibited.

`\MRTsfaccSet` Usage: `\MRTsfaccSet\{<float>\}`

The shift width depends on a multiple of the box's height. The multiple can be set with this macro and should be a valid float. This is tested using `\MRTifFloatTF`. The package default for this share is 0.25.

Table 9-2: Comparison of shifted accents against original placement with the use of the `list` variant.

original	shifted	original	shifted
\hat{a}	\hat{A}	\hat{a}	\hat{A}
\hat{b}	\hat{B}	\hat{b}	\hat{B}
\hat{c}	\hat{C}	\hat{c}	\hat{C}
\hat{d}	\hat{D}	\hat{d}	\hat{D}
\hat{e}	\hat{E}	\hat{e}	\hat{E}
\hat{f}	\hat{F}	\hat{f}	\hat{F}
\hat{g}	\hat{G}	\hat{g}	\hat{G}
\hat{h}	\hat{H}	\hat{h}	\hat{H}
\hat{i}	\hat{I}	\hat{i}	\hat{I}
\hat{j}	\hat{J}	\hat{j}	\hat{J}
\hat{k}	\hat{K}	\hat{k}	\hat{K}
\hat{l}	\hat{L}	\hat{l}	\hat{L}
\hat{m}	\hat{M}	\hat{m}	\hat{M}
\hat{n}	\hat{N}	\hat{n}	\hat{N}
\hat{o}	\hat{O}	\hat{o}	\hat{O}
\hat{p}	\hat{P}	\hat{p}	\hat{P}
\hat{q}	\hat{Q}	\hat{q}	\hat{Q}
\hat{r}	\hat{R}	\hat{r}	\hat{R}
\hat{s}	\hat{S}	\hat{s}	\hat{S}
\hat{t}	\hat{T}	\hat{t}	\hat{T}
\hat{u}	\hat{U}	\hat{u}	\hat{U}
\hat{v}	\hat{V}	\hat{v}	\hat{V}
\hat{w}	\hat{W}	\hat{w}	\hat{W}
\hat{x}	\hat{X}	\hat{x}	\hat{X}
\hat{y}	\hat{Y}	\hat{y}	\hat{Y}
\hat{z}	\hat{Z}	\hat{z}	\hat{Z}

9.3 `list` Variant

This variant checks whether the argument is a known element from a list in which the offset is defined in the unit of `mu`.

It has the advantage that you can define individual offsets for every argument. In addition not only characters can be added to the list but almost arbitrary stuff. The drawback is that everything has to be added that you want to be recognized. Table 9-2 shows the results of this approach.

9.3.1 Macros

`\<accent>` Usage: `\<accent>[<opt>]{<arg>}`

`\<accent>` can be any of the maths accent macros using `\mathaccentV` internally (e.g. `\bar`, `\dot`, etc.).

`<opt>` can either be a defined element from the list or a length in the unit of `mu`. So with `foo` a defined list element, both `\hat[foo]{bar}` and `\hat[4mu]{bar}` would be valid. If `<opt>` is a known element the offset of that element is used regardless of the given `<arg>` else (if it is used) the given length is used as the offset. If the optional argument isn't used at all, it'll be tested whether `<arg>` is a known element and if so the appropriate offset will be used. Else no offset will be applied.

`\MRTsfaccShift` Usage: `\MRTsfaccShift{<element>}{<shift>}`

Adds `<element>` to the list of known arguments and saves `<shift>` for it. If `<element>` is already known it'll get redefined. `<shift>` has to be given in `mu`.

Table 9-3: Available shift definition lists

List	To be used with
helvet	helvet and [italic,defaultmathsizes]mathastext

\MRTsfaccShiftLet Usage: \MRTsfaccShiftLet{<element₁>}{<element₂>}
 Adds <element₁> to the list of known arguments and defines the offset to be the one currently used by <element₂>. <element₂> has to be known, if it isn't an error will be thrown.

\MRTsfaccLoadShiftList Usage: \MRTsfaccLoadShiftList{<list>}
 The package comes with definitions for some fonts (see [Table 9-3](#)). With this macro you can load them. If you define a list for a font (or font combination) not listed in the table you might contact me as described in [section 1.1](#) and I'll gladly add it to the package.

9.4 Additional macros

The package provides macros to use the accents used in text mode additionally in maths. Since the placement proves somewhat difficult – this might be caused by the bundle's author's insufficient knowledge – there is no really automated way to do so with a few macros. Instead you can define macros which will produce a symbol which is accented by one of the text accents.

\newsfhatmacro Usage: \newsfhatmacro<horizontal>[<vertical>]{<cs>}[<type>]
\defsfhatmacro {<symbol>}
\newsfcheckmacro The difference between the \def... and the \new... variant is that the
\defsfcheckmacro former will not check whether the macro <cs> is already defined or not. With
\newsftildemacro these macros you can locally create a <cs> that gets displayed as <symbol>
\defsfildemacro with an accent based on the text font's variant of the accents. hat uses ^,
\newsfacutemacro check uses \v, tilde uses \~, acute uses \', grave uses \', dot uses \.,
\defsfacutemacro ddot uses \", breve uses \u and bar uses \=.
\newsfgravemacro You can control the horizontal positioning of the accent using <horizontal>,
\defsfgravemacro which should be a length in mu. If you don't provide <horizontal> the offset
\newsfdotmacro will be determined based on the rules of the used variant (see [section 9.2](#) and
\defsfdotmacro [section 9.3](#)). <vertical> specifies the vertical shift of the accent and should
\newsfddotmacro be given in ex. If <vertical> is not given nothing special will happen (this
\defsfddotmacro might change in the future – for now it is best if you specify 0ex if you don't
\newsfbre vemacro want to change the accents vertical placement).
\defsfbre vemacro <type> is the math atom type to be used for the newly created <cs>. You
\newsfbarmacro could use \mathord, \mathop, \mathbin, \mathrel, \mathopen, \mathclose,
\defsfbarmacro \mathpunct, \mathinner, or any other macro taking one argument.

\newsfaccmacro Usage: \newsfaccmacro<horizontal>[<vertical>]{<cs>}[<type>]
\defsfaccmacro {<accent>}{<symbol>}

This is a more general variant of \newsfhatmacro and the like. With this

macro you can specify the macro responsible for typesetting the accent using the $\langle accent \rangle$ argument. The specified $\langle accent \rangle$ should take at most one argument and this one will be empty.

The results of these macros heavily depend on the used font. For MRTthesis, using pdfL^AT_EX, the results don't look too bad. For example one can define a $\backslash hateq$:

```
\defsfhatmacro[-0.3ex]{\hateq}{\mathrel}{=}
```

We use $\backslash mathrel$ since $a =$ is a relation and should be spaced like that. Additionally we move the accent down by 0.3ex, which should give a good result in this case. The following formula uses this $\backslash hateq$ definition, $\backslash mathrel{\hat{=}}$ and the default $=$ for comparison:

$$a \hat{=} a \hat{=} a = a$$

Unfortunately these accents don't look good in combination with Greek letters (see for yourself: $\hat{\alpha}$ vs. α), and one shouldn't mix the two types of accents in a document. The decision which approach you use is up to you.

9.5 Dependencies

MRTsfacc loads the MRTif package and uses its tests $\backslash MRTifLetterGTF$, $\backslash MRTifFloatTF$, $\backslash MRTifStringsMatchXXTF$ and $\backslash MRTifTwoTokenTF$. It also depends on amsmath being loaded. Additionally it uses the MRTutil package for some of its macros' definitions.

10 The MRTlmscale package

This package provides the option to scale the maths font of `lmodern` in a similar way `helvet` is scalable. It is only meant to be used with the `pdfTeX` engine.

If you load it it applies the default scale of 1.17647. This scale leads to a matching height of the Greek maths font compared to `helvet` when used in combination with `mathastext`. You can provide any other scale as a package option. The package only takes this one option and it is checked whether this option is a valid float with `\MRTifFloatTF`.

Here are the results of this scale:



Figure 10-1: Effects of the `MRTlmscale` package. On the left the unscaled font, right with the default scale applied.

10.1 Dependencies

The package uses the `MRTutil` package and `\MRTifFloatTF` from the `MRTif` package.

11 The MRTutil package

This package provides some utility functions. Those are meant to aid people defining their own macros and are used throughout other packages of this bundle. Every macro this package provides is at the code level so there are no real user facing macros. As a general rule of thumb the user level is therefore moved one layer down, user facing macros have a single @ in their names, while internal macros have at least two.

11.1 Defining Macros

Since the author of this bundle often finds the possibilities of the $\text{\LaTeX}2_{\epsilon}$ macro family of `\newcommand` too restricting, the package provides some macros which use the syntax of \TeX 's `\def` but still check whether the macro is already defined.

<code>\MRTutil@def</code>	Usage: <code>\MRTutil@def[<i><prefixes></i>]<i><cs></i><i><args></i>{<i><definition></i>}</code>
<code>\MRTutil@edef</code>	Those are versions of <code>\def</code> and <code>\edef</code> . You can define <i><prefixes></i> like <code>\long</code> or <code>\protected</code> . <i><cs></i> is the new control sequence's name, <i><args></i> is the argument specification and <i><definition></i> is the replacement text of the macro. Both check whether the macro is already defined and will raise an error if they are. They are like a fusion of <code>\newcommand</code> and <code>\def</code> in that they only define a new command but keep the versatility of <code>\def</code> . There is a usage example in subsection 11.2.1 .

11.2 Optional Argument Parsing

Since the author really likes what `xparse` allows in defining macros with many optional arguments but doesn't want to force the complete `expl3` onto the user (since it's huge), if a user is only interested in one or two of the small packages of this bundle there are some macros in those packages which have multiple optional arguments. To define those the following macros were created to provide a very limited subset of `xparse`'s functionality. Note that none of the provided macros allow expandable definitions and none checks for matched delimiters (so if you want to pass in a `[` and a `]` to a macro with an optional argument delimited by `[]` you'll need to use `[{[foo]}]`, this is the same behaviour encountered in $\text{\LaTeX}2_{\epsilon}$'s optional arguments).

<code>\MRTutil@Oarg</code>	Usage: <code>\MRTutil@Oarg{<i><default></i>}{<i><continue></i>}</code> checks for a following optional argument in <code>[]</code> . If there is none it provides the <i><default></i> . <i><continue></i> will be executed after the argument has been parsed. The value of the optional argument will be provided to <i><continue></i> in braces <code>{}</code> .
<code>\MRTutil@oarg</code>	Usage: <code>\MRTutil@oarg{<i><continue></i>}</code> Like <code>\MRTutil@Oarg</code> , but provides a special marker if there is no optional argument. You can check whether the special marker was provided with <code>\MRTutil@ifmark</code> . There is a usage example in subsection 11.2.1 .
<code>\MRTutil@Darg</code>	Usage: <code>\MRTutil@Darg<token₁><token₂>{<i><default></i>}{<i><continue></i>}</code> Like <code>\MRTutil@Oarg</code> , but the optional argument is delimited by <i><token₁></i> and

$\langle token_2 \rangle$. So `\MRTutil@Darg<>\foo` will check whether there is an optional argument delimited by `<>` and if there is none will use an empty one. The result is provided to `\foo`.

`\MRTutil@darg` Usage: `\MRTutil@darg $\langle token_1 \rangle \langle token_2 \rangle \{ \langle continue \rangle \}$`

Like `\MRTutil@darg`, but provides a special marker if there is no optional argument. You can check whether the special marker was provided with `\MRTutil@ifmark`.

`\MRTutil@Targ` Usage: `\MRTutil@Targ $\langle token \rangle \{ \langle default \rangle \} \{ \langle continue \rangle \}$`

checks for a following optional argument which is indicated by a leading $\langle token \rangle$. If there is a $\langle token \rangle$ following, the following argument will be grabbed according to T_EX's rules (so a single token might follow or a group delimited by `{}`). If there is no $\langle token \rangle$ following it provides $\langle default \rangle$. $\langle continue \rangle$ will be executed after the argument has been parsed. The value of the optional argument will be provided to $\langle continue \rangle$ as it is present in the input stream (so if it is braced there will be braces, if it's just a single token, there will be only a single token).

`\MRTutil@targ` Usage: `\MRTutil@targ $\langle token \rangle \{ \langle continue \rangle \}$`

Like `\MRTutil@Targ`, but if there is no $\langle token \rangle$ following instead of a default, a special marker will be provided. You can check whether the special marker was provided with `\MRTutil@ifmark`.

`\MRTutil@ifmark` Usage: `\MRTutil@ifmark $\{ \langle test \rangle \} \{ \langle true \rangle \} \{ \langle false \rangle \}$`

Tests whether $\{ \langle test \rangle \}$ is the special mark provided by `\MRTutil@oarg` and `\MRTutil@darg` and if so expands to $\langle true \rangle$. If not it expands to $\langle false \rangle$.

`\MRTutil@defOargpair` Usage: `\MRTutil@defOargpair $\{ \langle cs_1 \rangle \} \{ \langle cs_2 \rangle \} \langle token_1 \rangle \langle token_2 \rangle$`

This defines $\langle cs_1 \rangle$ to be similar to `\MRTutil@Oarg` and $\langle cs_2 \rangle$ to be similar to `\MRTutil@oarg`, but using $\langle token_1 \rangle$ and $\langle token_2 \rangle$ as delimiters. The resulting macros should be faster than `\MRTutil@Darg` and `\MRTutil@darg`. Additionally to $\langle cs_1 \rangle$ and $\langle cs_2 \rangle$ a macro called $\langle \backslash cs_1 \rangle$ (with an additional backslash in its name) will be defined that does the argument grabbing. $\langle cs_1 \rangle$ and $\langle cs_2 \rangle$ should include the leading backslash.

`\MRTutil@defOarg` Usage: `\MRTutil@defOarg $\{ \langle cs \rangle \} \langle token_1 \rangle \langle token_2 \rangle$`
`\MRTutil@defoarg`

These can be used if only one of the equivalents of `\MRTutil@Oarg` or `\MRTutil@oarg` is needed. Additionally to $\langle cs \rangle$ a macro called $\langle \backslash cs \rangle$ (with an additional backslash in its name) will be defined that does the argument grabbing. $\langle cs \rangle$ should include the leading backslash. There is a usage example in [subsection 11.2.1](#).

11.2.1 Example

In the following example we'll define a macro that takes two optional arguments – one delimited by `[]` and one delimited by `<>` – and a mandatory one. We'll need one auxiliary macro per optional argument.

First we define the front facing macro named `\ourmacro`. It is defined `\protected`, because it isn't expandable since `\MRTutil@oarg` isn't.

```
\makeatletter
\MRTutil@def[\protected]\ourmacro{\MRTutil@oarg{\ourmacro@a}}
```

Next we define the second step that looks for the second optional argument, again defined `\protected`, but this time also `\long`, because it takes arguments and those might contain an explicit or implicit `\par`. We pipe through the first optional argument. Since we think that `\ourmacro` is gonna be used pretty often we want the argument grabbing for the second optional argument to be fast, so instead of using `\MRTutil@darg<>` we define our own test macro `\ourmacro@opt`.

```
\MRTutil@defoarg\ourmacro@opt<>
\MRTutil@def[\protected\long]\ourmacro@a#1{\ourmacro@opt{\ourmacro@b{#1}}}
```

The last step is the one which takes both optional arguments and the mandatory one. This one doesn't have to be defined `\protected`, because it is expandable.

```
\MRTutil@def[\long]\ourmacro@b#1#2#3%
{%
  \MRTutil@ifmark{#1}
  {No 1st optional argument provided}
  {1st optional argument: #1}%
  \par
  \MRTutil@ifmark{#2}
  {No 2nd optional argument provided}
  {2nd optional argument: #2}%
  \par
  Mandatory argument: #3%
}
\makeatother
```

As you can see, the macro doesn't do anything special, it just lists its arguments. A few usage examples are shown in [Table 11-1](#).

Table 11-1: Usage examples of `\ourmacro`

Macro call	Output
<code>\ourmacro{baz}</code>	No 1st optional argument provided No 2nd optional argument provided Mandatory argument: baz
<code>\ourmacro[foo]{baz}</code>	1st optional argument: foo No 2nd optional argument provided Mandatory argument: baz
<code>\ourmacro<bar>{baz}</code>	No 1st optional argument provided 2nd optional argument: bar Mandatory argument: baz
<code>\ourmacro[foo]<bar>{baz}</code>	1st optional argument: foo 2nd optional argument: bar Mandatory argument: baz