

# circuitikz-dutch

## Drawing Electric Circuits in Dutch Textbooks

Jesse op den Brouw\*

July 16, 2021

This package sets up CircuiTikZ to draw electric circuits with the conventions used in Dutch textbooks. After loading the `circuitikz` package, a number of patches will be applied to CircuiTikZ commands.

### License and warranty

This work may be distributed and/or modified under the conditions of the  $\text{\LaTeX}$  Project Public License, either version 1.3 of this license or (at your option) any later version. The latest version of this license is in <http://www.latex-project.org/lppl.txt> and version 1.3 or later is part of all distributions of  $\text{\LaTeX}$  version 2003/12/01 or later.

This work has the LPPL maintenance status “author-maintained”.

This work consists of the files `circuitikz-dutch.sty` and `circuitikz-dutch-doc.tex`

This software is provided ‘as is’, without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

### Package loading

Load the package by:

```
1 \usepackage{circuitikz-dutch}
```

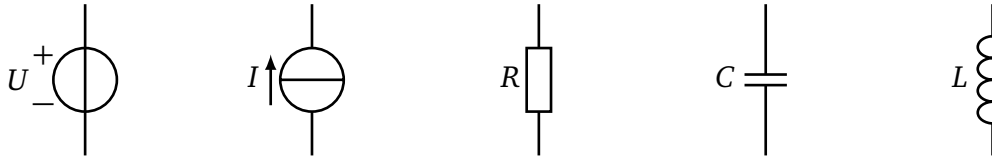
The package has no options. CircuiTikZ will be loaded by this package. Please **do not** (re)load CircuiTikZ after this package.

### The symbols

The symbols for voltage source, current source, resistor, capacitor and inductor are shown in Figure 1.

---

\*Version 0.2, The Hague University of Applied Sciences, [J.E.J.opdenBrouw@hhs.nl](mailto:J.E.J.opdenBrouw@hhs.nl)



**Figure 1:** Dutch symbols for voltage source, current source, resistor, capacitor and inductor.

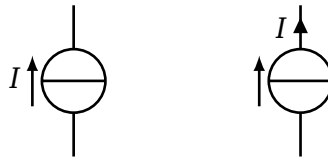
The CircuiTikZ code to produce these symbols is shown below:

```

1 \begin{circuitikz}
2 \draw (0,0) to[V=$U$] ++(0,2);           % independent voltage source
3 \draw (2,0) to[I,label=$I$] ++(0,2);     % independent current source
4 \draw (4,0) to[R=$R$] ++(0,2);           % resistor
5 \draw (6,0) to[C=$C$] ++(0,2);           % capacitor
6 \draw (8,0) to[L=$L$] ++(0,2);           % inductor
7 \end{circuitikz}

```

**Note:** due to the present current drawing strategy, it's mandatory that you use a label when specifying the source's current. See Figure 2 below for the differences.



**Figure 2:** Differences in drawing current sources.

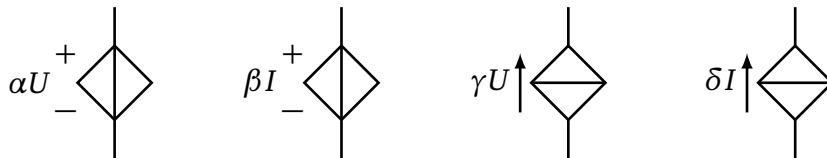
The CircuiTikZ code to produce these symbols is shown below:

```

1 \begin{circuitikz}
2 \draw (3,0) to[I,label=$I$] ++(0,2);
3 \draw (6,0) to[I=$I$] ++(0,2);
4 \end{circuitikz}

```

In Figure 3, the dependent voltage and current sources are shown:



**Figure 3:** Symbols for dependant sources.

The code is shown below:

```

1 \begin{circuitikz}
2 \draw (0,0) to[cvsource=$\alpha U$] ++(0,2);
3 \draw (3,0) to[cvsource=$\beta I$] ++(0,2);
4 \draw (6,0) to[cisource,label=$\gamma U$] ++(0,2);

```

```

5 \draw (9,0) to[cisource,label=\delta I\$] ++(0,2);
6 \end{circuitikz}

```

Sinusiodal sources are shown below:

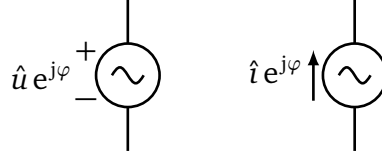


Figure 4: Symbols for sinusiodal sources.

Code to produce these symbols:

```

1 \begin{circuitikz}
2 \draw (0,0) to[sV=\hat{u}\,,\mathrm{e}^{\,,\mathrm{j}}\varphi\$] ++(0,2);
3 \draw (3,0)
   to[sI,label=\hat{\imath}\,,\mathrm{e}^{\,,\mathrm{j}}\varphi\$]
   ++(0,2);
4 \end{circuitikz}

```

Batteries are shown in Figure 5.

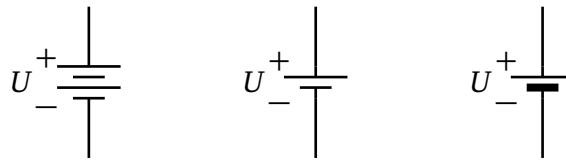


Figure 5: Symbols for batteries.

Code to produce these symbols:

```

1 \begin{circuitikz}
2 \draw (3,0) to[battery=$U$,invert] ++(0,2);
3 \draw (6,0) to[battery1=$U$,invert] ++(0,2);
4 \draw (9,0) to[battery2=$U$,invert] ++(0,2);
5 \end{circuitikz}

```

Voltages across components are displayed with ‘+’ and ‘−’, as shown in Figure 6.

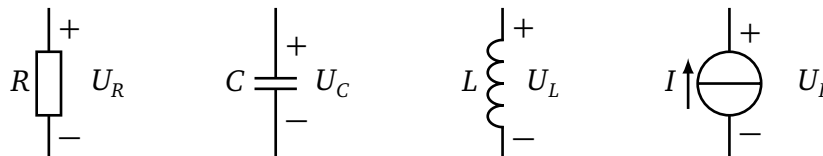


Figure 6: Symbols with voltages.

The code to produce the symbols is shown below:

```

1 \begin{circuitikz}
2 \draw (0,0) to[R=$R$, v<=$U_R$] ++(0,2);
3 \draw (3,0) to[C=$C$, v<=$U_C$] ++(0,2);
4 \draw (6,0) to[L=$L$, v<=$U_L$] ++(0,2);
5 \draw (9,0) to[I,label=$I$, v=$U_I$] ++(0,2);
6 \end{circuitikz}

```

## Displaying values and units

You can use the `siunitx` package to put values and units to the symbols:

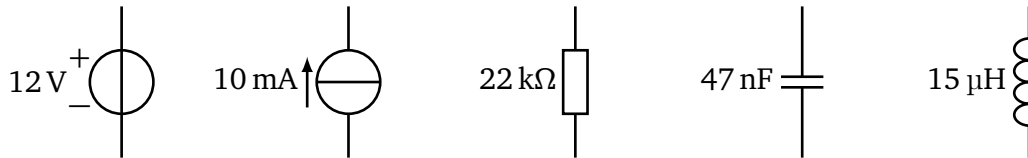


Figure 7: Symbols with values and units.

The code to produce these symbols:

```

1 \begin{circuitikz}
2 \draw (0,0) to[V=\SI{12}{\volt}] ++(0,2);
3 \draw (3,0) to[I,label=\SI{10}{\milli\ampere}] ++(0,2);
4 \draw (6,0) to[R=\SI{22}{\kilo\ohm}] ++(0,2);
5 \draw (9,0) to[C=\SI{47}{\nano\farad}] ++(0,2);
6 \draw (12,0) to[L=\SI{15}{\micro\henry}] ++(0,2);
7 \end{circuitikz}

```

## Rotating current sources

Using the `mirror` and `invert` options, together with using `l_`, it is possible to rotate current sources.

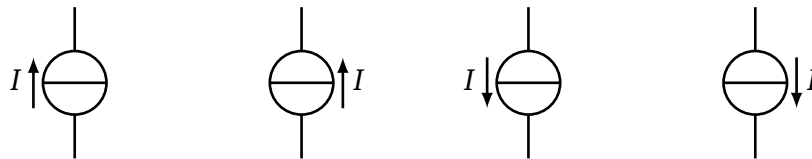


Figure 8: Different orientations of current sources.

The code to produce these symbols:

```

1 \begin{circuitikz}
2 \draw (3,0) to[I,l=$I$] ++(0,2);
3 \draw (6,0) to[I,l_=$I$,mirror] ++(0,2);
4 \draw (9,0) to[I,l=$I$,invert] ++(0,2);
5 \draw (12,0) to[I,l_=$I$,mirror,invert] ++(0,2);
6 \end{circuitikz}

```

## Changes to the `circuitikz` package

The `circuitikz-dutch` package changes the following:

- Voltage sources have ‘+’ and ‘−’ glyphs left or right;
- Current sources have an arrow left or right;
- Resistors are of European type;
- Inductors are of American type;
- Voltages across components have ‘+’ and ‘−’ glyphs left or right;
- Line width is set to 1 pt for all TikZ pictures;
- Relative thickness of bipoles, tripoles and quadpoles are set to 1;
- The proportions of the components are set to better proportions;
- The package `siunitx` is loaded;

## Example network

In Figure 9 you see a network with a simplified model of an opamp.

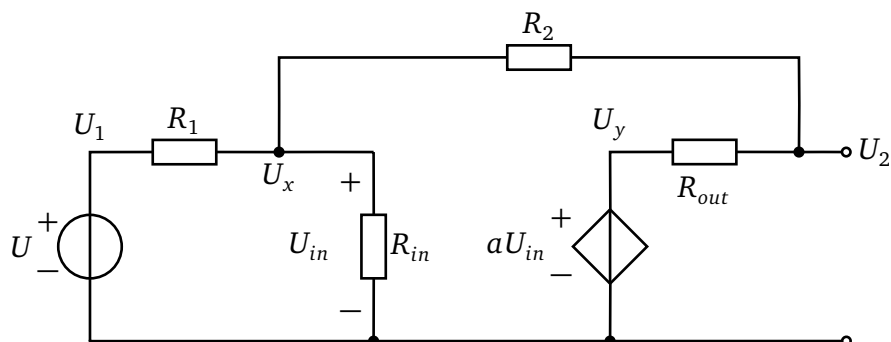


Figure 9: Network with a simplified model of an opamp.

The code to produce this circuit is show below:

```

1 \begin{tikzpicture}[scale=1.25]
2 \draw (0,0) to[V, v=$U_1$] ++(0,2) node[above] {$U_1$}
3         to[R, R=$R_1$, -*] ++(2,0) node (2) {} node[below] {$U_x$}
4 (2.center) to[short] ++(1,0)
5         to[open] ++(0,-2)
6         to[R, a=$R_{in}$, v^<=$U_{in}$, *-] ++(0,2)
7 (2.center) to[short] ++(0,1)
8         to[R=$R_2$] ++(5.5,0)
9         to[short, -*] ++(0,-1) node (3) {}
10        to[short, -o] ++(0.5,0) node[right] {$U_2$}
11 (3.center) to[R=$R_{out}$] ++(-2,0) node [above] {$U_y$}

```

```

12         to[cV, v_<=$aU_{in}$,-*] ++(0,-2)
13         to[open] ++(2.5,0)
14         to[short, o-.] (0,0)
15     ;
16 \end{tikzpicture}

```

## Changelog

Version	Date	What
v0.1	2020/03/08	First release
v0.2	2021/06/12	Compliant with Circuitikz 1.3.7
v0.2 $\alpha$	2021/07/13	Compliant with Circuitikz 1.4.1