

The numodel-plot package*

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Abstract

A PGFPlots engine that auto-sizes plots to a whole number of tick intervals, supports configurable axis-label formats (IEEE-style by default; ISO 80000-1 also supported), and automatically selects label placement for 1-, 2-, and 4-quadrant graphs. Part of the numodel package suite, but can be loaded standalone as an independent PGFPlots styling layer.

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1 Introduction

numodel-plot fills a gap between bare PGFPlots and the heavy styling required for physics-teaching material: it sizes every axis to an integer number of centimetre ticks, lays out the axis origin according to which quadrants of the coordinate plane contain data, and renders axis labels as either **quantity (unit)** (IEEE, the default) or one of four alternative conventions selectable at package level. It was extracted from a Dutch high-school physics test set where uniform plot appearance across hundreds of graphs is more valuable than per-graph tweaking, and hence adopts an opinionated default style. Users who need one-off deviations are expected to drop to plain PGFPlots with the variable macros `\xmin`, `\xmax`, ... exposed by this package.

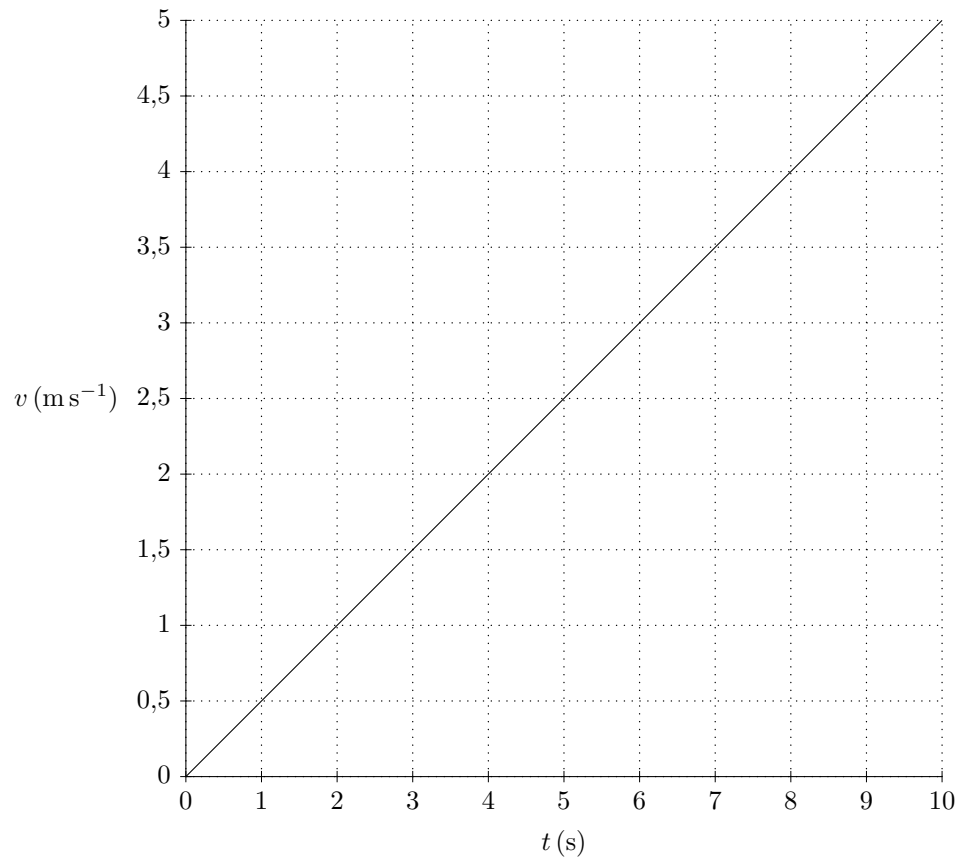
2 Usage

Minimum working example:

```
\usepackage{numodel-plot}
...
\def\xmin{0} \def\xmax{10}
\def\ymin{0} \def\ymax{5}
\def\xlabelqty{t} \def\xlabelunit{\s}
\def\ylabelqty{v} \def\ylabelunit{\m\per\s}
\drawplot{\addplot[domain=\xmin:\xmax]{0.5*x};}
```

renders as

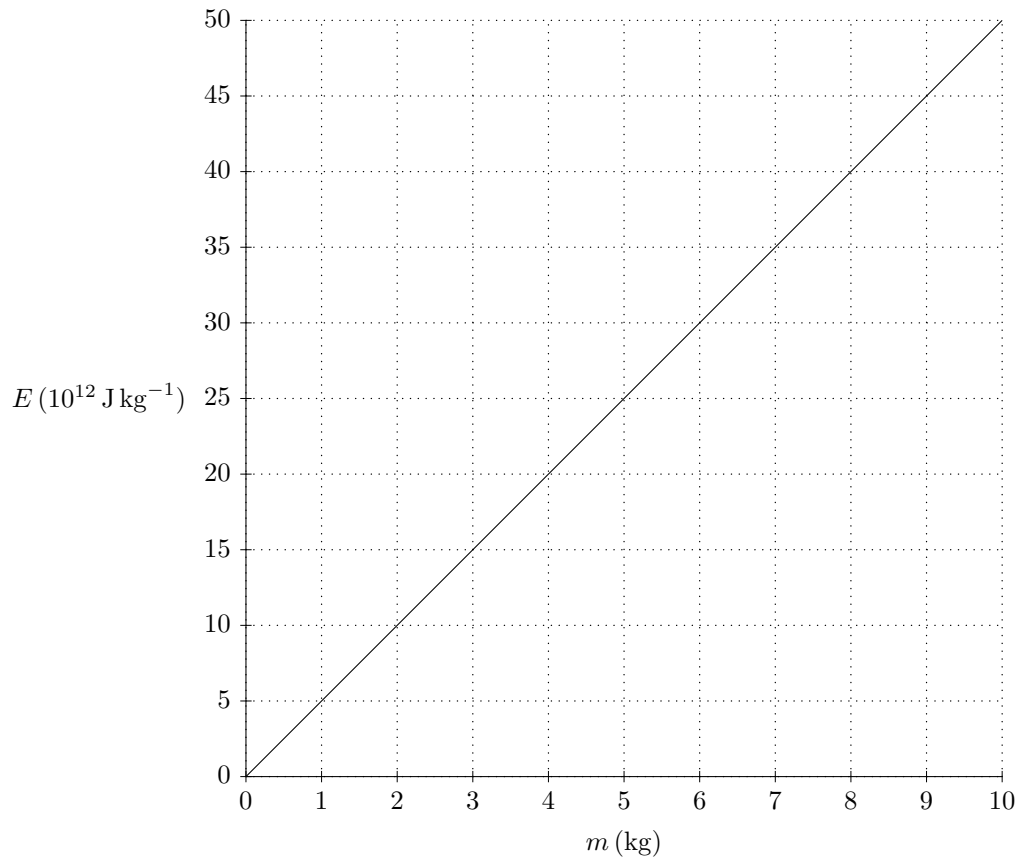
*This document corresponds to numodel-plot v0.4.0, dated May 19, 2026.



The user sets the data range (`\xmin... \ymax`) and optionally a quantity symbol plus `siunitx` unit for each axis. `\drawplot` internally calls `\calcplotdims` to round the range to a clean tick lattice and compute the axis size in centimetres, then renders a full `tikzpicture+axis` environment whose body is the argument (one or more `\addplot` lines).

Labels are built automatically from `\xlabelqty+\xlabelunit` (and likewise for the y -axis). If the data magnitude exceeds 10^4 or is below 10^{-2} , a factor 10^n is injected into the label and PGFPlots' own `scaled ticks` are configured so that tick numbers remain small. In the next example the data magnitude is 5×10^7 and the unit `\mega\joule\per\kilo\gram` already carries two engineering prefixes; the package extracts every prefix and combines them with the magnitude into a single power-of-ten factor:

```
\def\xmin{0}    \def\xmax{10}
\def\ymin{0}    \def\ymax{5e7}
\def\xlabelqty{m}  \def\xlabelunit{\kilo\gram}
\def\ylabelqty{E}  \def\ylabelunit{\mega\joule\per\kilo\gram}
\drawplot{\addplot[domain=\xmin:\xmax]{5e6*x};}
```



Users preferring full control can omit `\xlabelqty/\xlabelunit` and set `\xlabel/\ylabel` directly; the package will use them verbatim.

3 Configuration

`\numodelplotsetup` Configuration is set through a single key-value interface:

```
\numodelplotsetup{axis-label-format=ieee, grid=mm-dots}
```

3.1 Keys

axis-label-format Default `ieee`. Determines the notation emitted for axis labels built from `\xlabelqty` and `\xlabelunit`:

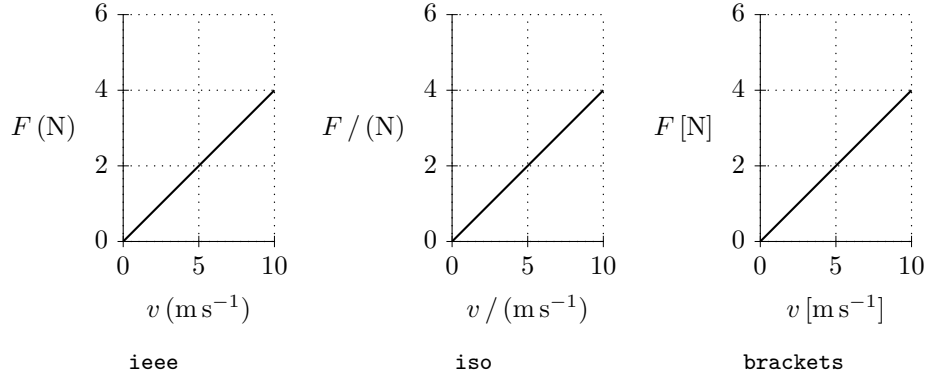
<code>ieee</code>	<code>v (m/s)</code>	IEEE (default)
<code>iso</code>	<code>v / (m/s)</code>	ISO 80000-1
<code>brackets</code>	<code>v [m/s]</code>	older physics convention
<code>qty-only</code>	<code>v</code>	quantity symbol only
<code>unit-only</code>	<code>m/s</code>	unit only

When scaling is applied (data exceeds 10^4 or below 10^{-2}), the factor is integrated into the label, e.g. `v (10-4 m/s)` for IEEE. Under `qty-only` the exponent remains in PGFPlots' scaled-tick label instead (otherwise the scale information would be lost).

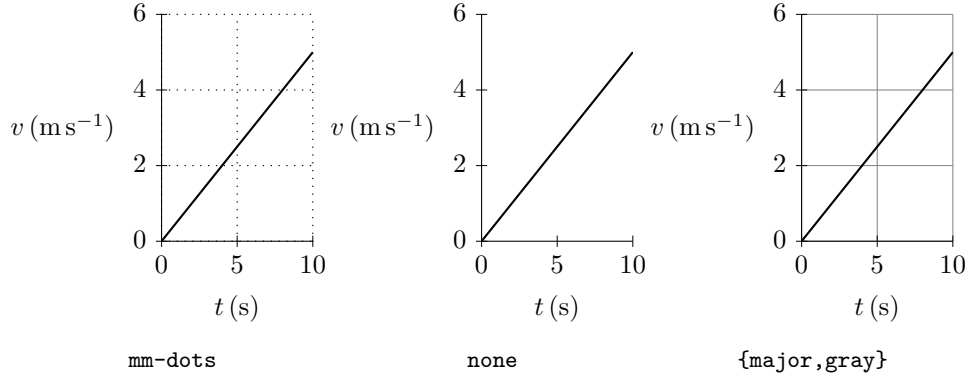
grid Default `mm-dots` (black millimetre dots, matching engineering millimetre paper). Accepts `none`, or any PGFPlots style list which will be passed verbatim to the `numodel/grid` style.

xcmmax, ycmmax Maximum axis width and height in centimetres (defaults 12 and 10).

The first three axis-label formats render as follows. Each plot uses `\numodelplotsetup{xcmmax=3, ycmmax=3}` so the axis itself is trimmed to a 2 cm by 3 cm tick lattice (the package's invariant 1 cm major-grid spacing is preserved):

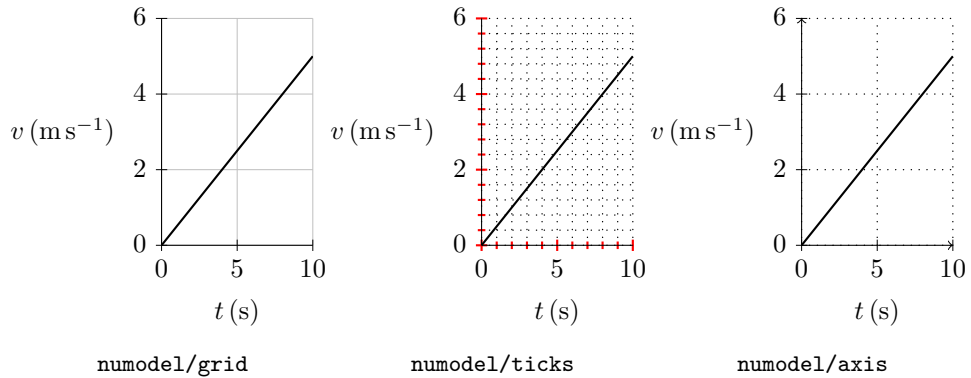


Three grid variants, sized the same way:



3.2 PGFPlots styles

The package defines three PGFPlots styles applied by `\drawplot`: `numodel/grid`, `numodel/ticks`, `numodel/axis`. These can be overridden wholesale through `\pgfplotsset{numodel/axis/.style={...}}` from the calling preamble, giving projects a single choke point for house-style customisation. One override per style, on the same plot:



4 Public API

<code>\drawplot</code>	Renders a <code>tikzpicture</code> containing an <code>axis</code> whose body is the single mandatory argument. Typically a block of <code>\addplot</code> and <code>\addlegendentry</code> lines. Calls <code>\calclotdims</code> internally, so the user does not need to invoke it separately.
<code>\calclotdims</code>	Reads <code>\xmin</code> , <code>\xmax</code> , <code>\ymin</code> , <code>\ymax</code> , and (if set) <code>\xlabelqty</code> / <code>\xlabelunit</code> / <code>\ylabelqty</code> / <code>\ylabelunit</code> . Writes <code>\xcm</code> , <code>\ycm</code> , <code>\xtickdistance</code> , <code>\ytickdistance</code> , <code>\xlabel</code> , <code>\ylabel</code> , and may rewrite <code>\xmin...ymax</code> to align with the tick lattice (floor/ceil to the nearest tick). It also appends axis-positioning styles to <code>numodel/axis</code> based on which quadrants the data occupies. <code>\drawplot</code> invokes it automatically; expose for advanced cases where dimensions are needed before rendering (overlay TikZ, custom <code>axis</code> environment).
<code>\xlabelqty</code> <code>\xlabelunit</code> <code>\ylabelqty</code> <code>\ylabelunit</code>	Input hooks for automatic label construction. <code>\xlabelqty</code> is the mathematical quantity symbol

(e.g. v, F, E); the corresponding `\xlabelunit` is a bare `siunitx` unit macro sequence (e.g. `\m\per\s, \J, \N\m`) *without* a surrounding `\si{}` or `\qty{}` wrapper.

`\xcmmax` Maximum axis dimensions in centimetres. Can be set directly through `\def` for backwards compatibility, or via `\numodelplotsetup`.

`\ycmmax` Like `siunitx`'s `\qty` but prints no numeric mantissa when the final output after prefix extraction has mantissa 1 and exponent 0. Used internally to inject scale factors into axis labels; exposed because the same need recurs in other scaled-axis contexts.

`\qtyPlain` Boolean conditional testing whether a unit macro sequence contains a non-engineering SI prefix (`\centi`, `\deci`, `\deca`, `\hecto`, plus the `siunitx` short forms `\cm`, `\dm`, `\hPa`, ...). Used internally to suppress scaling on units where the user has already encoded the order of magnitude; exposed for completeness.

`\pzuIfUnitNonEngTF` Boolean conditional testing whether a unit macro sequence contains a non-engineering SI prefix (`\centi`, `\deci`, `\deca`, `\hecto`, plus the `siunitx` short forms `\cm`, `\dm`, `\hPa`, ...). Used internally to suppress scaling on units where the user has already encoded the order of magnitude; exposed for completeness.

5 Requirements

`numodel-plot` requires `expl3`, `xparse`, `l3keys2e`, `siunitx` (mandatory, for quantities in labels), and `pgfplots` (with the `fillbetween` library). LuaLaTeX is not required at the plot layer (it is required by the sibling `numodel` package).

6 Implementation

All internal helper macros use the `\nmp@...` prefix (standard LaTeX internal convention). Because the package may be loaded through `\input` as well as `\usepackage`, an explicit `\makeatletter` wraps the body so that `@` is a letter regardless of caller.

```

1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{numodel-plot}[2026/05/19 v0.4.0 Auto-sizing PGFPlots engine]
3
4 \makeatletter
5
6 \RequirePackage{expl3}
7 \RequirePackage{xparse}
8 \RequirePackage{l3keys2e}
9 \RequirePackage{siunitx}
10 \RequirePackage{pgfplots}
11 \usepgfplotslibrary{fillbetween}
12
13 \pgfplotsset{
14   compat=1.18,
15   numodel/grid/.style={
16     grid=both,
17     grid style={
18       line width=0.5pt,
19       draw=black,
20       line cap=round,
21       dash pattern=on 0pt off 1mm
22     },
23     major grid style={
24       line width=0.5pt,
25       draw=black,
26       line cap=round,
27       dash pattern=on 0pt off 1mm}
28   },
29   numodel/ticks/.style={
30     tick style={black}
31   },
32   numodel/axis/.style={
33     xticklabel style={/pgf/number format/.cd, fixed, precision=6, fixed zerofill=false, use comma, 1000},
34     yticklabel style={/pgf/number format/.cd, fixed, precision=6, fixed zerofill=false, use comma, 1000},
35     axis lines=left,
36     xlabel near ticks,
37     ylabel near ticks,
38     ylabel style={rotate=-90},
39     axis line style={-}

```

```

40 }
41 }
42
43 \ExplSyntaxOn
44
45 \tl_new:N \g__numodelplot_axislabel_tl
46 \tl_gset:Nn \g__numodelplot_axislabel_tl {ieee}
47
48 \providecommand{\xcmmx}{12}
49 \providecommand{\ycmmx}{10}
50
51 \keys_define:nn { numodel-plot }
52 {
53   axis-label-format .choice:,
54   axis-label-format / iso .code:n =
55     \tl_gset:Nn \g__numodelplot_axislabel_tl {iso},
56   axis-label-format / ieee .code:n =
57     \tl_gset:Nn \g__numodelplot_axislabel_tl {ieee},
58   axis-label-format / brackets .code:n =
59     \tl_gset:Nn \g__numodelplot_axislabel_tl {brackets},
60   axis-label-format / qty-only .code:n =
61     \tl_gset:Nn \g__numodelplot_axislabel_tl {qty-only},
62   axis-label-format / unit-only .code:n =
63     \tl_gset:Nn \g__numodelplot_axislabel_tl {unit-only},
64
65   grid .choice:,
66   grid / mm-dots .code:n =
67     \pgfplotsset{ numodel/grid/.style={
68       grid=both,
69       grid-style={line-width=0.5pt, draw=black, line-cap=round,
70         dash-pattern=on~0pt~off~1mm},
71       major-grid-style={line-width=0.5pt, draw=black, line-cap=round,
72         dash-pattern=on~0pt~off~1mm}
73     } },
74   grid / none .code:n =
75     \pgfplotsset{ numodel/grid/.style={grid=none} },
76   grid / unknown .code:n =
77     \pgfplotsset{ numodel/grid/.style={#1} },
78
79   xcmmx .code:n = \def\xcmmx{#1},
80   ycmmx .code:n = \def\ycmmx{#1},
81 }
82
83 \NewDocumentCommand{\numodelplotsetup}{m}
84 { \keys_set:nn { numodel-plot } {#1} }
85
86 \ExplSyntaxOff
87
88 \ExplSyntaxOn
89 \bool_new:N \g__pzu_suppress_qp_bool
90 \cs_new_eq:NN \__pzu_orig_int_output:nnn \__siunitx_number_output_integer:nnn
91 \cs_new_eq:NN \__pzu_orig_qty_print_unit:n \__siunitx_quantity_print_unit:n
92 \NewDocumentCommand{\qtyPlain}{0{} m m}{%
93   \group_begin:
94     \bool_gset_false:N \g__pzu_suppress_qp_bool
95     \cs_set:Npn \__siunitx_number_output_integer:nnn ##1##2##3 {
96       \bool_lazy_all:nTF
97         {
98           { \str_if_eq_p:nn { ##1 . ##2 } { 1. } }
99           { \str_if_eq_p:nn { ##3 } { 0 } }
100           { ! \l__siunitx_number_zero_exponent_bool }
101           { ! \l__siunitx_number_unity_mantissa_bool }
102         }
103         { \bool_gset_true:N \g__pzu_suppress_qp_bool }
104         { \__pzu_orig_int_output:nnn {##1} {##2} {##3} }
105     }

```

```

106 \cs_set_protected:Npn \__siunitx_quantity_print_unit:n ##1 {
107   \bool_if:NTF \l__siunitx_quantity_break_bool
108     { \penalty \binoppenalty }
109     { \nobreak }
110   \bool_if:NF \g__pzu_suppress_qp_bool
111     { \tl_use:N \l__siunitx_quantity_product_tl }
112   \siunitx_print_unit:n {##1}
113 }
114 \qty[#1]{#2}{#3}%
115 \group_end:
116 }
117 \ExplSyntaxOff
118
119 \ExplSyntaxOn
120 \bool_new:N \l__pzu_noneng_bool
121 \tl_const:Nn \c__pzu_noneng_tokens_tl {
122   \centi \deci \deca \hecto
123   \cm \cg \cL
124   \dm \dg \dL
125   \dam \dag \daL
126   \hm \hg \hL \hPa
127 }
128 \prg_new_protected_conditional:Npnn \__pzu_unit_has_noneng:n #1 { TF } {
129   \bool_set_false:N \l__pzu_noneng_bool
130   \tl_map_inline:Nn \c__pzu_noneng_tokens_tl {
131     \tl_if_in:nnT {#1} {##1}
132     { \bool_set_true:N \l__pzu_noneng_bool \tl_map_break: }
133   }
134   \bool_if:NTF \l__pzu_noneng_bool
135     { \prg_return_true: }
136     { \prg_return_false: }
137 }
138 \prg_generate_conditional_variant:Nnn \__pzu_unit_has_noneng:n { o } { TF }
139 \NewDocumentCommand{\pzuIfUnitNonEngTF}{m m m}{%
140   \__pzu_unit_has_noneng:oTF {#1} {#2} {#3}%
141 }
142 \ExplSyntaxOff
143
144 \ExplSyntaxOn
145
146 \cs_new_protected:Npn \__numodelplot_xlabel_emit_unscaled:
147 {
148   \str_case:Vn \g__numodelplot_axislabel_tl
149   {
150     {iso}
151     { \def \xlabel { $\nmp@savexlabelqty \, /\, ( \si{\nmp@savexlabelunit} )$ } }
152     {ieee}
153     { \def \xlabel { $\nmp@savexlabelqty \, ( \si{\nmp@savexlabelunit} )$ } }
154     {brackets}
155     { \def \xlabel { $\nmp@savexlabelqty \, [ \si{\nmp@savexlabelunit} ]$ } }
156     {qty-only}
157     { \def \xlabel { $\nmp@savexlabelqty$ } }
158     {unit-only}
159     { \def \xlabel { $\si{\nmp@savexlabelunit}$ } }
160   }
161 }
162
163 \cs_new_protected:Npn \__numodelplot_xlabel_emit_scaled:
164 {
165   \str_case:Vn \g__numodelplot_axislabel_tl
166   {
167     {iso}
168     {
169       \edef\xlabel{\noexpand$\noexpand\nmp@savexlabelqty
170         \noexpand\,/\noexpand\,(\noexpand\qtyPlain
171         [evaluate-expression=false, round-mode=none,

```

```

172         prefix-mode=extract-exponent,
173         extract-mass-in-kilograms=true,
174         print-zero-exponent=false,
175         print-unity-mantissa=false]%
176         {1e\nmp@xlabelexpuse}{\noexpand\nmp@savexlabelunit}}\noexpand$}%
177     }
178 {ieee}
179 {
180     \edef\xlabel{\noexpand$\noexpand\nmp@savexlabelqty
181     \noexpand\,(\noexpand\qtyPlain
182     [evaluate-expression=false, round-mode=none,
183     prefix-mode=extract-exponent,
184     extract-mass-in-kilograms=true,
185     print-zero-exponent=false,
186     print-unity-mantissa=false]%
187     {1e\nmp@xlabelexpuse}{\noexpand\nmp@savexlabelunit}}\noexpand$}%
188 }
189 {brackets}
190 {
191     \edef\xlabel{\noexpand$\noexpand\nmp@savexlabelqty
192     \noexpand\, [\noexpand\qtyPlain
193     [evaluate-expression=false, round-mode=none,
194     prefix-mode=extract-exponent,
195     extract-mass-in-kilograms=true,
196     print-zero-exponent=false,
197     print-unity-mantissa=false]%
198     {1e\nmp@xlabelexpuse}{\noexpand\nmp@savexlabelunit}}\noexpand$}%
199 }
200 {qty-only}
201 { \def \xlabel { $\nmp@savexlabelqty$ } }
202 {unit-only}
203 {
204     \edef\xlabel{\noexpand$\noexpand\qtyPlain
205     [evaluate-expression=false, round-mode=none,
206     prefix-mode=extract-exponent,
207     extract-mass-in-kilograms=true,
208     print-zero-exponent=false,
209     print-unity-mantissa=false]%
210     {1e\nmp@xlabelexpuse}{\noexpand\nmp@savexlabelunit}}\noexpand$}%
211 }
212 }
213 }
214
215 \cs_new_protected:Npn \__numodelplot_ylabel_emit_unscaled:
216 {
217     \str_case:Vn \g__numodelplot_axislabel_tl
218     {
219         {iso}
220         { \def \ylabel { $\nmp@savedylabelqty \, /\, ( \si{\nmp@savedylabelunit} )$ } }
221         {ieee}
222         { \def \ylabel { $\nmp@savedylabelqty \, ( \si{\nmp@savedylabelunit} )$ } }
223         {brackets}
224         { \def \ylabel { $\nmp@savedylabelqty \, [ \si{\nmp@savedylabelunit} ]$ } }
225         {qty-only}
226         { \def \ylabel { $\nmp@savedylabelqty$ } }
227         {unit-only}
228         { \def \ylabel { $\si{\nmp@savedylabelunit}$ } }
229     }
230 }
231
232 \cs_new_protected:Npn \__numodelplot_ylabel_emit_scaled:
233 {
234     \str_case:Vn \g__numodelplot_axislabel_tl
235     {
236         {iso}
237         {

```



```

238         \edef\ylabel{\noexpand$\noexpand\nmp@savedylabelqty
239         \noexpand\,/ \noexpand\,(\noexpand\qtyPlain
240         [evaluate-expression=false, round-mode=none,
241         prefix-mode=extract-exponent,
242         extract-mass-in-kilograms=true,
243         print-zero-exponent=false,
244         print-unity-mantissa=false]%
245         {1e\nmp@ylabelexpuse}{\noexpand\nmp@savedylabelunit}}\noexpand$}%
246     }
247 {ieee}
248 {
249     \edef\ylabel{\noexpand$\noexpand\nmp@savedylabelqty
250     \noexpand\,(\noexpand\qtyPlain
251     [evaluate-expression=false, round-mode=none,
252     prefix-mode=extract-exponent,
253     extract-mass-in-kilograms=true,
254     print-zero-exponent=false,
255     print-unity-mantissa=false]%
256     {1e\nmp@ylabelexpuse}{\noexpand\nmp@savedylabelunit}}\noexpand$}%
257 }
258 {brackets}
259 {
260     \edef\ylabel{\noexpand$\noexpand\nmp@savedylabelqty
261     \noexpand\,[\noexpand\qtyPlain
262     [evaluate-expression=false, round-mode=none,
263     prefix-mode=extract-exponent,
264     extract-mass-in-kilograms=true,
265     print-zero-exponent=false,
266     print-unity-mantissa=false]%
267     {1e\nmp@ylabelexpuse}{\noexpand\nmp@savedylabelunit}}\noexpand$}%
268 }
269 {qty-only}
270 { \def \ylabel { $\nmp@savedylabelqty$ } }
271 {unit-only}
272 {
273     \edef\ylabel{\noexpand$\noexpand\qtyPlain
274     [evaluate-expression=false, round-mode=none,
275     prefix-mode=extract-exponent,
276     extract-mass-in-kilograms=true,
277     print-zero-exponent=false,
278     print-unity-mantissa=false]%
279     {1e\nmp@ylabelexpuse}{\noexpand\nmp@savedylabelunit}}\noexpand$}%
280 }
281 }
282 }
283
284 \ExplSyntaxOff
285
286 \newcommand{\pznmpAppendXScaleTicks}[1]{%
287     \pgfplotsset{numodel/axis/.append style={scaled x ticks=base 10:#1}}%
288 }
289 \newcommand{\pznmpAppendYScaleTicks}[1]{%
290     \pgfplotsset{numodel/axis/.append style={scaled y ticks=base 10:#1}}%
291 }
292 \newcommand{\pznmpSuppressXScaleLabel}{%
293     \pgfplotsset{numodel/axis/.append style={every x tick scale label/.style={opacity=0, inner sep=0pt,
294 }
295 \newcommand{\pznmpSuppressYScaleLabel}{%
296     \pgfplotsset{numodel/axis/.append style={every y tick scale label/.style={opacity=0, inner sep=0pt,
297 }
298
299 \ExplSyntaxOn
300
301 \cs_new_protected:Npn \__numodelplot_suppress_xscale_label:
302 {
303     \str_if_eq:VnF \g__numodelplot_axislabel_tl {qty-only}

```

```

304     { \pznmpSuppressXScaleLabel }
305 }
306 \cs_new_protected:Npn \__numodelplot_suppress_yscale_label:
307 {
308     \str_if_eq:VnF \g__numodelplot_axislabel_tl {qty-only}
309     { \pznmpSuppressYScaleLabel }
310 }
311
312 \ExplSyntaxOff
313
314 \ExplSyntaxOn
315 \NewDocumentCommand{\xlabelbuild}{*}{
316     \let\nmp@savexlabelqty\xlabelqty
317     \let\nmp@savexlabelunit\xlabelunit
318     \pzuIfUnitNonEngTF{\xlabelunit}{
319         \__numodelplot_xlabel_emit_unscaled:
320         \def\nmp@xlabelexp{0}
321     }{
322         \edef\nmp@xmag{\fpeval{max(abs(\xmin),abs(\xmax))}}
323         \edef\nmp@xlabelexp{\fpeval{
324             \nmp@xmag > 0 ? 3*floor(ln(\nmp@xmag)/ln(10)/3) : 0
325         }}
326         \ifnum\nmp@xlabelexp=0\relax
327             \__numodelplot_xlabel_emit_unscaled:
328         \else
329             \edef\nmp@xlabelexpuse{\nmp@xlabelexp}
330             \__numodelplot_xlabel_emit_scaled:
331             \edef\nmp@xlabelexpneg{\fpeval{-\nmp@xlabelexp}}
332             \pznmpAppendXScaleTicks{\nmp@xlabelexpneg}
333             \__numodelplot_suppress_xscale_label:
334         \fi
335     }
336     \global\let\xlabelqty\undefined
337     \global\let\xlabelunit\undefined
338 }
339
340 \NewDocumentCommand{\ylabelbuild}{*}{
341     \let\nmp@savelylabelqty\ylabelqty
342     \let\nmp@savelylabelunit\ylabelunit
343     \pzuIfUnitNonEngTF{\ylabelunit}{
344         \__numodelplot_ylabel_emit_unscaled:
345         \def\nmp@ylabelexp{0}
346     }{
347         \edef\nmp@ymag{\fpeval{max(abs(\ymin),abs(\ymax))}}
348         \edef\nmp@ylabelexp{\fpeval{
349             \nmp@ymag > 0 ? 3*floor(ln(\nmp@ymag)/ln(10)/3) : 0
350         }}
351         \ifnum\nmp@ylabelexp=0\relax
352             \__numodelplot_ylabel_emit_unscaled:
353         \else
354             \edef\nmp@ylabelexpuse{\nmp@ylabelexp}
355             \__numodelplot_ylabel_emit_scaled:
356             \edef\nmp@ylabelexpneg{\fpeval{-\nmp@ylabelexp}}
357             \pznmpAppendYScaleTicks{\nmp@ylabelexpneg}
358             \__numodelplot_suppress_yscale_label:
359         \fi
360     }
361     \global\let\ylabelqty\undefined
362     \global\let\ylabelunit\undefined
363 }
364 \ExplSyntaxOff
365
366 \newcommand{\calcplothdims}{%
367 \edef\nmp@xlog{\fpeval{floor(ln(\xmax-\xmin)/ln(10))}}%
368 \edef\nmp@ylog{\fpeval{floor(ln(\ymax-\ymin)/ln(10))}}%
369 \edef\nmp@xS{\fpeval{(\xmax-\xmin) / (10^\nmp@xlog)}}%

```

```

370 \edef\nmp@yS{\fpeval{(\ymax-\ymin) / (10^\nmp@ylog)}}%
371 \edef\xcm{\fpeval{%
372   \nmp@xS <= \xcmmx/10 ? 10 * \nmp@xS :%
373   \nmp@xS <= \xcmmx/5 ? 5 * \nmp@xS :%
374   \nmp@xS <= \xcmmx/4 ? 4 * \nmp@xS :%
375   \nmp@xS <= \xcmmx/2 ? 2 * \nmp@xS :%
376   \nmp@xS <= \xcmmx ? \nmp@xS :%
377   \nmp@xS / 2%
378 }}%
379 \edef\ycm{\fpeval{%
380   \nmp@yS <= \ycmmx/10 ? 10 * \nmp@yS :%
381   \nmp@yS <= \ycmmx/5 ? 5 * \nmp@yS :%
382   \nmp@yS <= \ycmmx/4 ? 4 * \nmp@yS :%
383   \nmp@yS <= \ycmmx/2 ? 2 * \nmp@yS :%
384   \nmp@yS <= \ycmmx ? \nmp@yS :%
385   \nmp@yS / 2%
386 }}%
387 \edef\nmp@xtickdiv{\fpeval{\nmp@xS / \xcm}}%
388 \edef\nmp@ytickdiv{\fpeval{\nmp@yS / \ycm}}%
389 \edef\xtickdistance{\fpeval{\nmp@xtickdiv * 10^\nmp@xlog}}%
390 \edef\ytickdistance{\fpeval{\nmp@ytickdiv * 10^\nmp@ylog}}%
391 \edef\xmax{\fpeval{ceil(\xmax / \xtickdistance) * \xtickdistance}}%
392 \edef\ymax{\fpeval{ceil(\ymax / \ytickdistance) * \ytickdistance}}%
393 \edef\xmin{\fpeval{floor(\xmin / \xtickdistance) * \xtickdistance}}%
394 \edef\ymin{\fpeval{floor(\ymin / \ytickdistance) * \ytickdistance}}%
395 \edef\xcm{\fpeval{(\xmax - \xmin) / \xtickdistance}}%
396 \edef\ycm{\fpeval{(\ymax - \ymin) / \ytickdistance}}%
397 \edef\nmp@yStraddles{\fpeval{(\ymin<0 && \ymax>0) ? 1 : 0}}%
398 \edef\nmp@yAllNonPos{\fpeval{\ymax<=0 ? 1 : 0}}%
399 \edef\nmp@xStraddles{\fpeval{(\xmin<0 && \xmax>0) ? 1 : 0}}%
400 \edef\nmp@xAllNonPos{\fpeval{\xmax<=0 ? 1 : 0}}%
401 \ifnum\nmp@yStraddles=1
402   \pgfplotsset{numodel/axis/.append style={axis x line*=middle}}%
403 \else
404   \ifnum\nmp@yAllNonPos=1
405     \pgfplotsset{numodel/axis/.append style={axis x line*=top}}%
406   \fi
407 \fi
408 \ifnum\nmp@xStraddles=1
409   \pgfplotsset{numodel/axis/.append style={axis y line*=middle}}%
410 \else
411   \ifnum\nmp@xAllNonPos=1
412     \pgfplotsset{numodel/axis/.append style={axis y line*=right}}%
413   \fi
414 \fi
415 \edef\nmp@axisMoved{\fpeval{(\nmp@yStraddles || \nmp@yAllNonPos || \nmp@xStraddles || \nmp@xAllNonPos)}%
416 \ifnum\nmp@axisMoved=1
417   \pgfplotsset{numodel/axis/.append style={%
418     every x tick scale label/.style={at={(xticklabel cs:1.05)}, anchor=south west},%
419     every y tick scale label/.style={at={(yticklabel cs:1.05)}, anchor=south east}}%
420 }}%
421 \fi
422 \edef\nmp@fourQuad{\fpeval{(\nmp@xStraddles && \nmp@yStraddles) ? 1 : 0}}%
423 \ifnum\nmp@fourQuad=1
424   \pgfplotsset{numodel/axis/.append style={%
425     xlabel style={at={(xticklabel cs:1.05)}, anchor=west},%
426     ylabel style={at={(yticklabel cs:1.05)}, anchor=south, rotate=0}}%
427 }}%
428 \fi
429 \edef\nmp@qIandII{\fpeval{(\nmp@xStraddles && \ymin>=0) ? 1 : 0}}%
430 \ifnum\nmp@qIandII=1
431   \pgfplotsset{numodel/axis/.append style={%
432     ylabel style={at={(yticklabel cs:1.05)}, anchor=south, rotate=0}}%
433 }}%
434 \fi
435 \edef\nmp@qIIandIII{\fpeval{(\nmp@yStraddles && \nmp@xAllNonPos) ? 1 : 0}}%

```

```

436 \ifnum\nmp@qIIandIII=1
437 \pgfplotsset{numodel/axis/.append style={%
438   xlabel style={at={(xticklabel cs:-0.05)}, anchor=east}%
439 }}%
440 \fi
441 \edef\nmp@qIIIandIV{\fpeval{(\nmp@xStraddles && \nmp@yAllNonPos) ? 1 : 0}}%
442 \ifnum\nmp@qIIIandIV=1
443 \pgfplotsset{numodel/axis/.append style={%
444   ylabel style={at={(yticklabel cs:-0.05)}, anchor=north, rotate=0}%
445 }}%
446 \fi
447 \edef\nmp@qIVandI{\fpeval{(\nmp@yStraddles && \xmin>=0) ? 1 : 0}}%
448 \ifnum\nmp@qIVandI=1
449 \pgfplotsset{numodel/axis/.append style={%
450   xlabel style={at={(xticklabel cs:1.05)}, anchor=west}%
451 }}%
452 \fi
453 \ifdefined\xlabelqty\ifdefined\xlabelunit\xlabelbuild\fi\fi
454 \ifdefined\ylabelqty\ifdefined\ylabelunit\ylabelbuild\fi\fi
455 }
456
457 \newcommand{\drawplot}[1]{
458   \calcplotdims
459   \begin{tikzpicture}
460     \begin{axis}[
461       numodel/grid,
462       numodel/ticks,
463       numodel/axis,
464       xlabel=\xlabel,
465       ylabel=\ylabel,
466       xmin=\xmin, xmax=\xmax,
467       ymin=\ymin, ymax=\ymax,
468       xtick distance=\xtickdistance,
469       ytick distance=\ytickdistance,
470       width=\xcm cm,
471       height=\ycm cm,
472       scale only axis
473     ]
474       #1
475     \end{axis}
476   \end{tikzpicture}
477 }
478
479 \makeatother

```