RPN Calculator — User Manual

What is RPN?

RPN (Reverse Polish Notation) is a calculation method in which you enter numbers first and then apply the operation. Instead of typing `3 + 4 =`, you type `3 ENTER 4 +`. No parentheses are needed — the stack automatically handles the order of operations.

The display shows four registers: **T** (top), **Z**, **Y**, and **X** (the active input row).

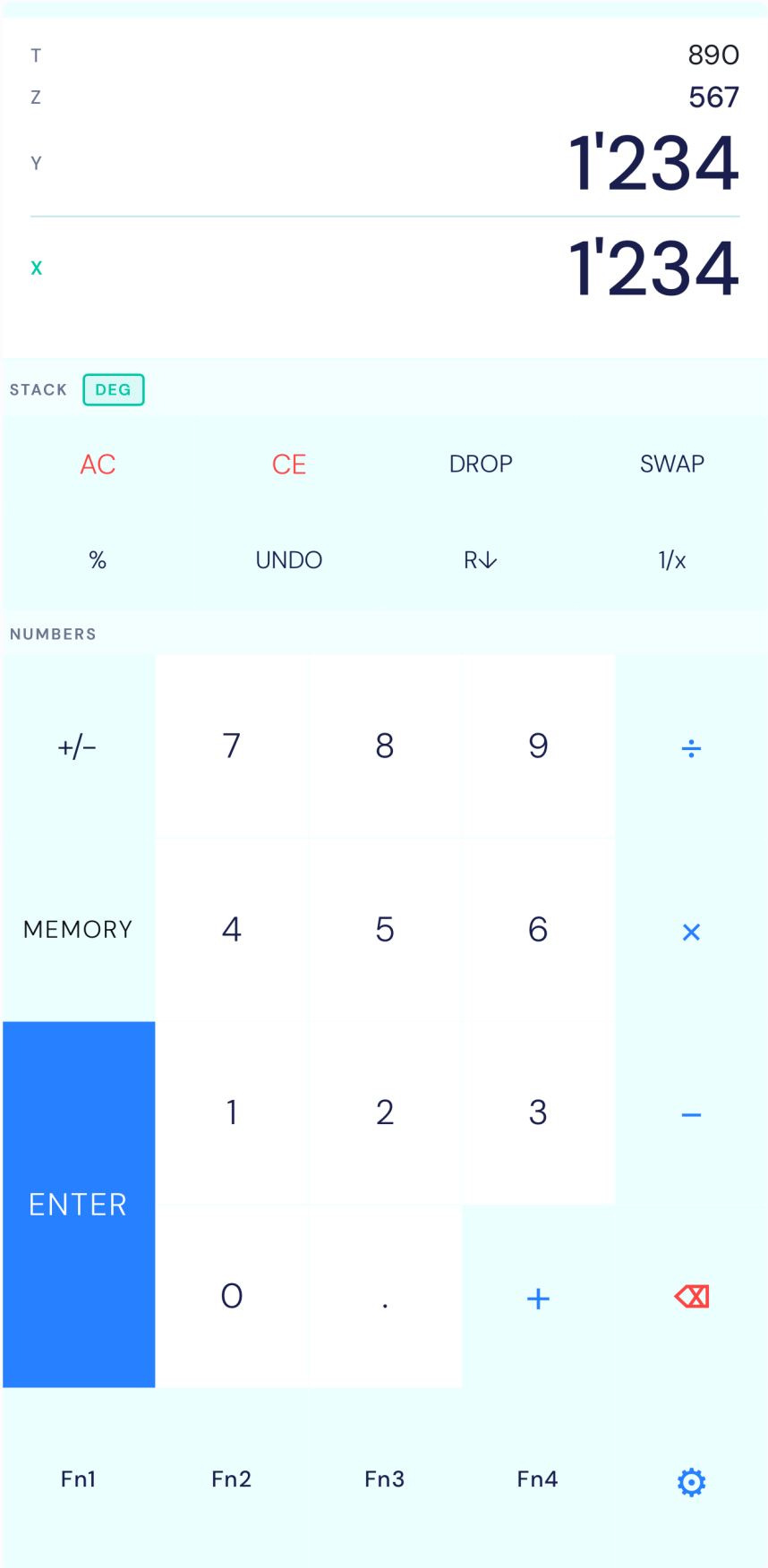
Brief History

The notation is named after Polish logician and philosopher **Jan Łukasiewicz** (1878–1956), who in 1924 invented *Polish notation* — a prefix form in which operators precede operands. RPN is its mirror image, with operators following operands, hence the term "reverse."

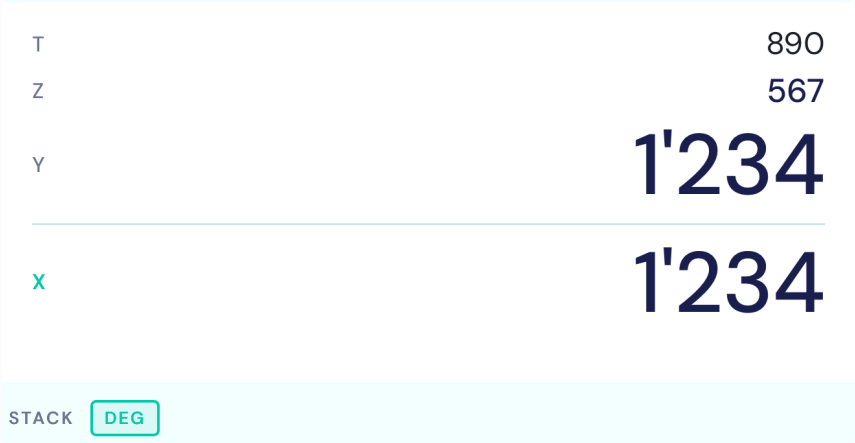
The adaptation to computers was pioneered by Australian philosopher and computer scientist **Charles Leonard Hamblin** (1922–1985), who in 1957 introduced the push-down stack and RPN as a practical method for evaluating expressions on computers — without parentheses or precedence rules.

RPN was then made famous by **Hewlett-Packard**, whose HP-35 (1972) was the first handheld scientific calculator to use it, making this method a reference point for engineers and scientists for decades.

Overview


T
890
Z
567
Y
1'234
X
1'234
STACK
DEG
AC
CE
DROP
SWAP
%
UNDO
R↓
1/x
NUMBERS
+/−
7
8
9
÷
MEMORY
4
5
6
×
ENTER
1
2
3
−
0
.
+
Fn1
Fn2
Fn3
Fn4

The Stack



REGISTER	DESCRIPTION
T	Top of stack — oldest value
Z	Third level
Y	Second level
X	Active input — where you type

Pressing **ENTER** pushes the X value onto the stack and all registers move up one level. Operations always consume X and Y, leaving the result in X.

Basic Operations

KEY	ACTION	EXAMPLE
`0` – `9`, `.`	Digit entry	`3` `.` `1` `4` → X = 3.14
`+/-`	Change sign of X	X = 5 → `+/-` → X = –5
`ENTER`	Push X onto stack	`7 ENTER` → Y = 7, X ready
`+`	Add Y + X	`3 ENTER 4 +` → 7
`-`	Subtract X from Y	`10 ENTER 3 -` → 7
`×`	Multiply Y × X	`6 ENTER 7 ×` → 42
`÷`	Divide Y ÷ X	`22 ENTER 7 ÷` → 3.142…
`⌫`	Delete last digit; clear if in result state	`123` `⌫` → 12
`⚙`	Open Settings	—

Fn0 — Stack & Utilities *(default)*

AC	CE	DROP	SWAP
%	UNDO	R↓	1/x

KEY	ACTION	EXAMPLE
`AC`	Clear all: resets stack, entry, history and statistics	Any state → display to 0
`CE`	Clear entry: resets X to 0, stack intact	X = 123 → `CE` → X = 0
`DROP`	Discard X; Y drops into X	Y = 5, X = 9 → `DROP` → X = 5
`SWAP`	Exchange X and Y	Y = 3, X = 8 → `SWAP` → Y = 8, X = 3
`%`	$Y \times \frac{X}{100}$, restores Y to stack	`200 ENTER 15 %` → Y = 200, X = 30
`UNDO`	Opens the Undo/Redo panel	—
`R↓`	Roll stack down	T=**1** Z=**2** Y=**3** X=**4** → `R↓` → T=**4** Z=**1** Y=**2** X=**3**
`1/x`	$\frac{1}{X}$	X = 4 → `1/x` → 0.25

How `%` works

$$X = Y \times \frac{X_{\text{entered}}}{100}$$

Example: what is 15% of 200?
`200 ENTER 15 %` → Y = 200, X = **30**

How `R↓` works

```
Before:  T=1  Z=2  Y=3  X=4
After:   T=4  Z=1  Y=2  X=3
```

X moves up to T, all others drop one level.

Fn1 — Trigonometry & Powers

sin	cos	tan	x²
sin⁻¹	cos⁻¹	tan⁻¹	√x

Trigonometric functions follow the current angle mode (DEG or RAD). In RAD mode the trig keys are highlighted in red.

KEY	FORMULA	EXAMPLE
`sin`	$\sin(X)$	X = 30° → `sin` → 0.5
`cos`	$\cos(X)$	X = 60° → `cos` → 0.5
`tan`	$\tan(X)$	X = 45° → `tan` → 1
`x²`	X^2	X = 9 → `x²` → 81
`sin⁻¹`	$\arcsin(X)$, domain $[-1, 1]$	X = 0.5 → `sin⁻¹` → 30°
`cos⁻¹`	$\arccos(X)$, domain $[-1, 1]$	X = 0.5 → `cos⁻¹` → 60°
`tan⁻¹`	$\arctan(X)$	X = 1 → `tan⁻¹` → 45°
`√x`	$\sqrt{X}$, requires $X \geq 0$	X = 144 → `√x` → 12

Compound calculation: hypotenuse of a 3-4-5 triangle

$$c = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

`3 ENTER x²` → 9, `4 ENTER x²` → 16, `+` → 25, `√x` → **5**

> *Tap **Fn1** again to return to Fn0.*

Fn2 — Logarithms, Exponentials & More

log₁₀	logₙ	eˣ	yˣ
10ˣ	π	n!	ˣ√y

KEY	FORMULA	EXAMPLE
`log₁₀`	$\log_{10}(X)$, requires $X > 0$	X = 1000 → `log₁₀` → 3
`logₙ`	$\ln(X)$, requires $X > 0$	X = e → `logₙ` → 1
`eˣ`	e^X	X = 1 → `eˣ` → 2.71828...
`yˣ`	Y^X (requires Y on stack)	`2 ENTER 10 yˣ` → 1024
`10ˣ`	10^X	X = 3 → `10ˣ` → 1000
`π`	Inserts $\pi \approx 3.14159\ldots$	`π` → X = 3.14159...
`n!`	$X!$ (factorial), requires $X \geq 0$ integer	X = 5 → `n!` → 120
`ˣ√y`	$\sqrt[X]{Y}$	`3 ENTER 27 ˣ√y` → 3

Inverse relationship log/exponential

$$\ln(e^x) = x \qquad 10^{\log_{10}(x)} = x$$

Example: $\log_{10}(1000)$
`1000 log₁₀` → **3** *(because* $10^3 = 1000$*)*

Factorial example n!

Calculate $5!$:

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

`5` `n!` → **120**

Other examples:

- $4! = 4 \times 3 \times 2 \times 1 = 24$
- $3! = 3 \times 2 \times 1 = 6$
- $1! = 1$
- By definition $0! = 1$

> *Tap **Fn2** again to return to Fn0.*

Fn3 — Percentages & Statistics

%T	Δ%	RND1	MOD
∑+	Last ∑-	x̄	CLRΣ

KEY	FORMULA	EXAMPLE
`%T`	$\frac{X}{Y} \times 100$ — X as % of Y	`500 ENTER 125 %T` → 25%
`Δ%`	$\frac{X-Y}{\lvert Y \rvert} \times 100$ — change from Y to X	`100 ENTER 115 Δ%` → +15%
`RND`	Rounds X to configured step	X = 2.3 → 2 (step 1)
`MOD`	$Y \mod X$ — division remainder	`17 ENTER 5 MOD` → 2
`∑+`	Add X to the statistics accumulator	`12 ∑+`, `15 ∑+`, `18 ∑+` → n=3
`Last ∑-`	Remove last value added with `∑+`	after 3 values above → n=2
`x̄`	$\bar{x} = \frac{\sum x_i}{n}$	after 3 values above → 15
`CLRΣ`	Clear statistics accumulator	n=3 → `CLRΣ` → n=0

How `%T` (Percentage of Total) works

Example: 125 is what percentage of 500?
`500 ENTER 125 %T` → **25%**

How `Δ%` (Percentage Change) works

Δ

Example: a price goes from 80 to 96 — what is the increase?
`80 ENTER 96 Δ%` → **+20%**

Example with decrease: from 200 to 150
`200 ENTER 150 Δ%` → **−25%**

Rounding steps (ROUND)

The step is set in *Settings* → *Rounding Step*:

STEP	EXAMPLE X = 3.7	EXAMPLE X = 2.25
RND 1	→ 4	→ 2
RND ½	→ 3.5	→ 2.5
RND ¼	→ 3.75	→ 2.25

Full statistics example

Measurements: 10, 12, 11, 13, 9

```
10 ∑+   → n=1
12 ∑+   → n=2
11 ∑+   → n=3
13 ∑+   → n=4
 9 ∑+   → n=5
 x̄      → 11
```

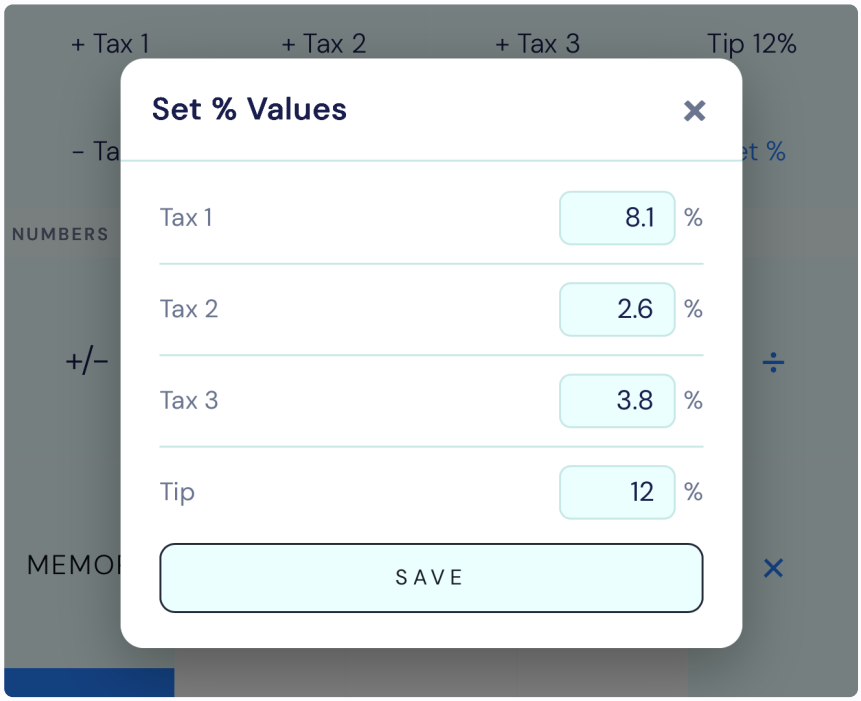
> *Tap **Fn3** again to return to Fn0.*

Fn4 — Tax & Tip

+ Tax 8.1%	+ Tax 2.6%	+ Tax 3.8%	Tip 12%
- Tax 8.1%	- Tax 2.6%	- Tax 3.8%	Set %

Three configurable tax rates (Tax 1, Tax 2, Tax 3) plus a tip percentage, all editable via **Set %**.

KEY	FORMULA	EXAMPLE (TAX 1 = 8.1%)
`+ Tax 1`	$X \times \left(1 + \frac{r}{100}\right)$	`100 + Tax 1` → 108.10
`+ Tax 2`	same with Tax 2	—
`+ Tax 3`	same with Tax 3	—
`Tip n%`	Pushes X to Y, computes $X \times \frac{t}{100}$ in X	`85 Tip 15%` → Y=85, X=12.75
`- Tax 1`	$\frac{X}{1+\frac{r}{100}}$ — reverse VAT	`108.10 - Tax 1` → 100
`- Tax 2`	same with Tax 2	—
`- Tax 3`	same with Tax 3	—
`Set %`	Opens the tax rate editor	—



Adding VAT

$$\text{Gross} = \text{Net} \times \left(1 + \frac{r}{100}\right)$$

`100` → `+ Tax 1` (8.1%) → **108.10**

Removing VAT (reverse)

$$\text{Net} = \frac{\text{Gross}}{1 + \frac{r}{100}}$$

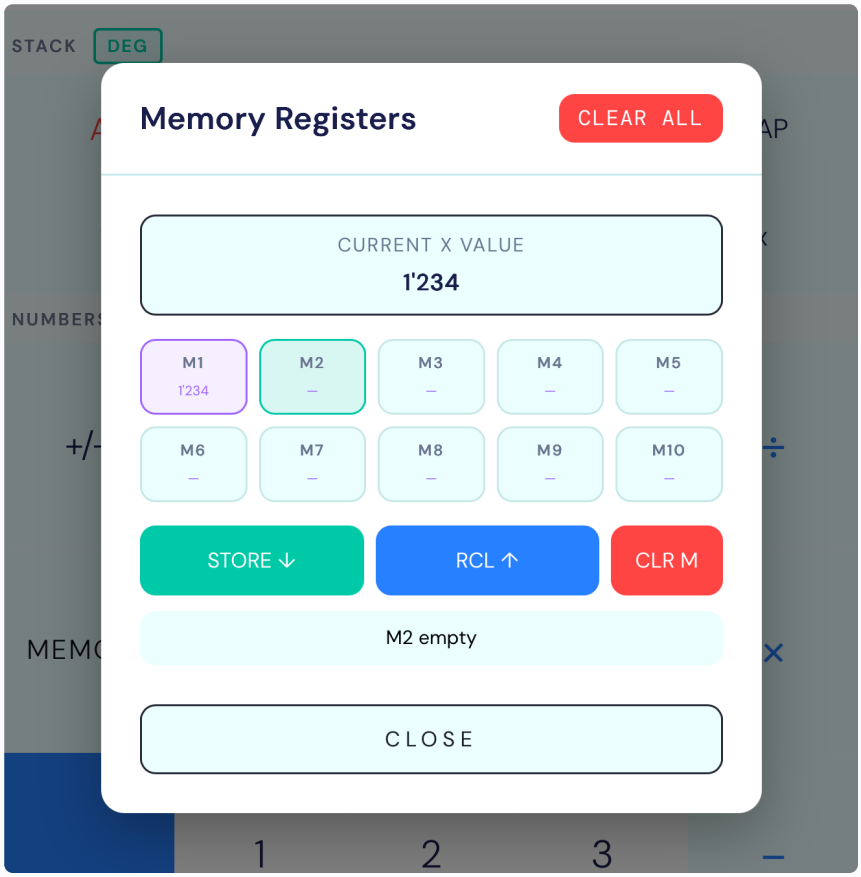
`108.10` → `- Tax 1` (8.1%) → **100.00**

Tip calculation

`85` → Fn4 → `Tip 15%` → Y = 85 (bill), X = **12.75** (tip)

> *Tap **Fn4** again to return to Fn0.*

Memory Registers



Tap **MEMORY** to open the memory panel. Ten registers (M1–M10) are available and persist between sessions.

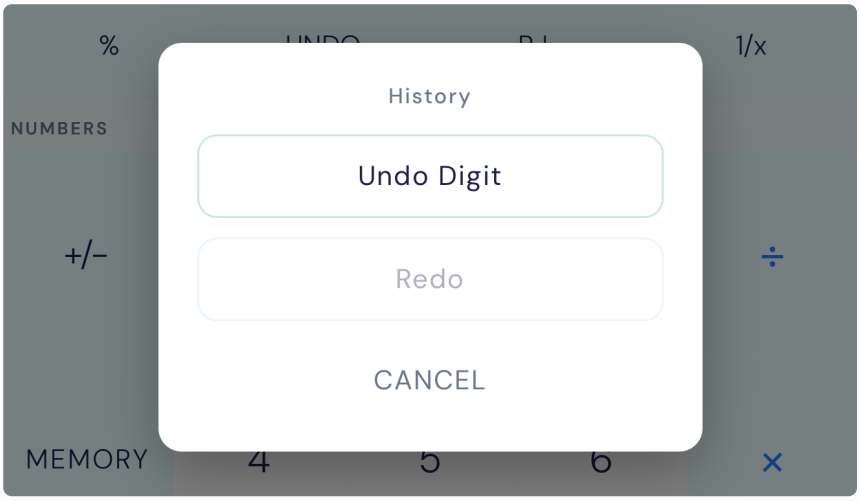
ACTION	HOW
Select a register	Tap a slot M1–M10
Store X → register	Select the slot, tap **STORE ↓**
Recall register → X	Select the slot, tap **RCL ↑**
Clear one register	Select the slot, tap **CLR M**
Clear all registers	Tap **CLEAR ALL**

Example: store a currency conversion rate

`1.08 ENTER` → open MEMORY → select M1 → **STORE ↓**

Later: enter an amount → open MEMORY → select M1 → **RCL ↑** → `×`

Undo / Redo

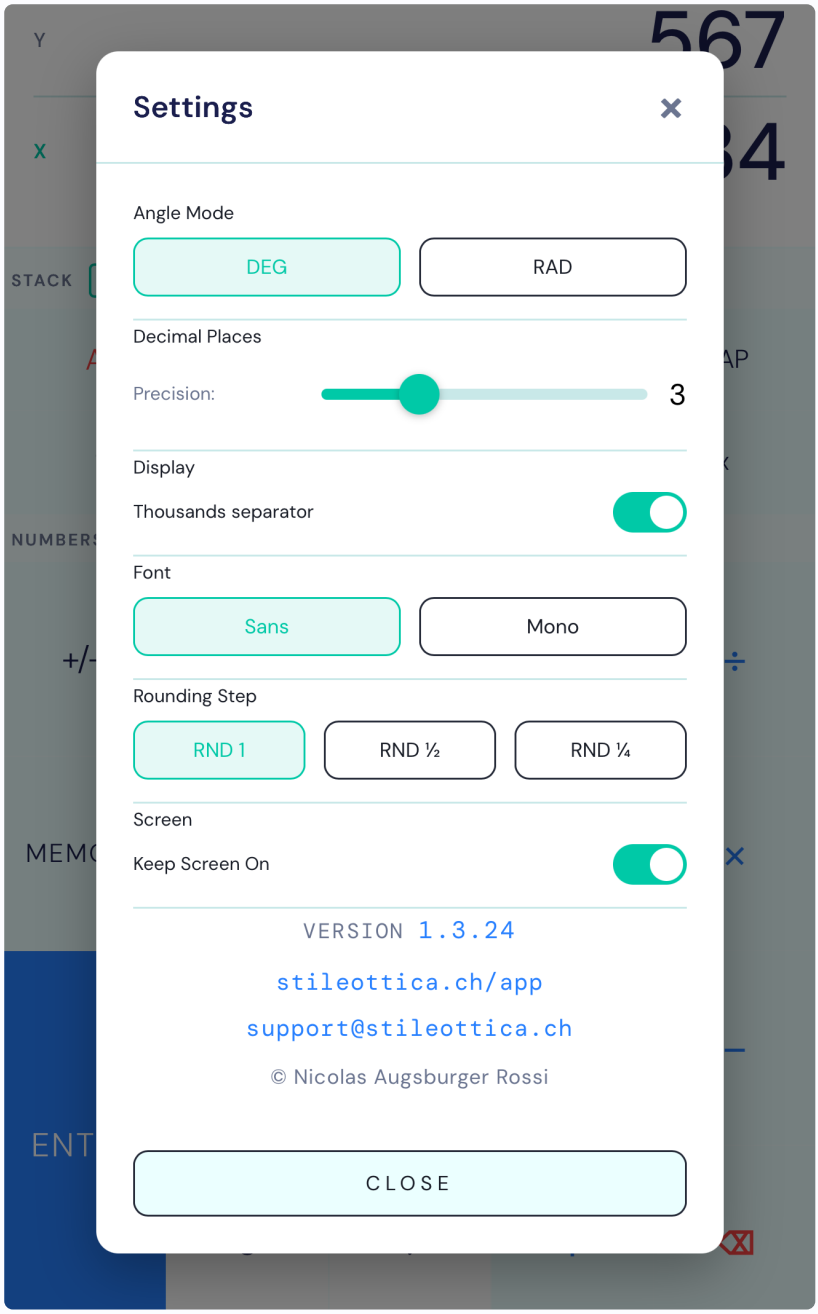


Tap **UNDO** (Fn0) to open the history panel. Every operation is recorded.

- **Undo** — steps back one operation; the button shows what will be undone
- **Redo** — steps forward; available only after an undo
- **AC** clears the entire history

Example: you pressed `÷` by mistake instead of `×`
→ `UNDO` → cancels "Divide" → re-enter `×`

Settings (⚙ key)



SETTING	OPTIONS	NOTES
Angle mode	**DEG** / **RAD**	Affects sin, cos, tan and inverses
Decimal places	0 – 10 via slider	Example: 3 → 3.142
Thousands separator	On / Off	E.g. `1'234.567`
Font	**Sans** (DM Sans) / **Mono** (DM Mono)	Changes display and digit keys
Rounding Step	RND1 / RND½ / RND¼	Used by `ROUND` in Fn2/Fn3

Settings are saved automatically and restored at next launch.

Display & Gestures

- **Swipe left/right** on the display area to browse calculation history
- Numbers too large for the display are shown in scientific notation ($\times 10^n$)
- Numbers $\geq 10^{12}$ or $< 10^{-9}$ switch automatically to exponential format
- The **DEG / RAD** badge in the Stack section shows the current angle mode at a glance

Quick Examples

Simple addition

`12 ENTER 8 +` → **20**

Square root of 2

`2` → Fn1 → `√x` → **1.414**

Compound calculation: $(3 + 4) \times 2$

`3 ENTER 4 + 2 ×` → **14**

15% tip on 85

`85` → Fn4 → `Tip 15%` → Y = 85, X = **12.75**

Remove 8.1% VAT from 108.10

`108.10` → Fn4 → `- Tax 1` → **100.00**

What percentage is 125 of 500?

`500 ENTER 125 %T` → **25%**

A price rose from 80 to 100 — by how much?

`80 ENTER 100 Δ%` → **+25%**

Cube root of 27: $\sqrt[3]{27}$

`3 ENTER 27` → Fn2 → `ˣ√y` → **3**

Compound calculation with memory

Convert 250 EUR to CHF at rate 0.93:

`0.93` → MEMORY → STORE M1 → `250 ENTER` → RCL M1 → `×` → **232.50**
