4–20 mA Signal Scaling Calculator

Converts a 4–20 mA signal to engineering units and back, for linear transmitters and square-root (DP flow) signals, from the range values.

Method: Live-zero 4–20 mA signal (IEC 60381-1); NAMUR NE 43 (signal levels for failure information)

Input parameters

Unit system: SI

Parameter	Value	Unit
Signal current	12.000	mA
Value at 4 mA (any unit)	0	
Value at 20 mA (same unit)	16.000	
Signal law	Linear	
Value to convert to mA (same unit)	10.000	

Calculated results

Parameter	Value	Unit
Process value at the signal	8.0000	
Share of range	50.000	%
Signal for the value to convert	14.000	mA

Formula and method

$$f = \frac{I - 4\ \text{mA}}{16\ \text{mA}} \qquad PV = LRV + (URV - LRV)\, f \ \ (\text{or } \sqrt{f}) \qquad I_x = 4\ \text{mA} + 16\ \text{mA} \cdot \frac{x - LRV}{URV - LRV} \ \ (\text{squared for } \sqrt{\ })$$

Variables

I	signal current	A
LRV	value at 4 mA	any
URV	value at 20 mA	any
law	linear or square root	–
x	value to convert	any
PV	process value	any
f	share of range	–
I_x	signal for the value	A

Method and standards

Linear scaling of the 4–20 mA live-zero signal; square-root extraction for differential-pressure flow.

Assumptions and limits

- Ideal linear transmitter; no damping or saturation limits.
- The 3.8–20.5 mA band used for the warning is the measuring range of NAMUR NE 43; transmitters that do not follow NE 43 may saturate or signal faults at other levels.

References

- Live-zero 4–20 mA signal (IEC 60381-1); NAMUR NE 43 (signal levels for failure information)

Report details

Report reference	FCC-6VVS-TAJW (the same inputs always give the same reference)
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Calculator	4–20 mA Signal Scaling Calculator
Method last reviewed	11 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/instrumentation/control-loops/signal-scaling-4-20ma

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.