Repeatability: Mean, Standard Deviation and Standard Uncertainty

Mean, standard deviation, standard uncertainty of the mean and the 95 % interval of up to ten repeated readings (Type A evaluation of uncertainty).

Method: JCGM 100:2008 (GUM) §4.2; Type A evaluation

Input parameters

Unit system: SI

Parameter	Value	Unit
Reading 1	100.20	
Reading 2	100.50	
Reading 3	99.800	
Reading 4	100.10	
Reading 5	100.40	
Reading 6	100.00	
Reading 7	99.900	
Reading 8	100.30	
Reading 9	100.20	
Reading 10	100.10	
Number of readings to use (2 to 10)	10.000	

Calculated results

Parameter	Value	Unit
Mean	100.15	
Standard deviation (n − 1)	0.21731	
Standard uncertainty of the mean s/√n	0.068718	
Coefficient of variation	0.21698	%
Range (largest − smallest)	0.70000	

Notes for this case

- The 95 % interval of the mean is about ±t u with Student's t for n − 1 degrees of freedom (2.26 for 10 readings).

Formula and method

$$\bar{x} = \frac{1}{n}\sum x_i, \quad s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}, \quad u = \frac{s}{\sqrt{n}}$$

Variables

x_1	Reading 1	-
x_2	Reading 2	-
x_3	Reading 3	-
x_4	Reading 4	-
x_5	Reading 5	-
x_6	Reading 6	-
x_7	Reading 7	-

x_8	Reading 8	-
x_9	Reading 9	-
x_{10}	Reading 10	-
n	Number of readings to use (2 to 10)	-
$\bar{x}$	Mean	-
s	Standard deviation (n − 1)	-
u	Standard uncertainty of the mean s/√n	-
$s/\bar{x}$	Coefficient of variation	-
R	Range (largest − smallest)	-

Method and standards

Type A evaluation of the GUM.

Assumptions and limits

- Independent readings.

References

- JCGM 100:2008 (GUM) §4.2
- Type A evaluation

Report details

Report reference	FCC-YGCW-F4W4 (the same inputs always give the same reference)
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Calculator	Repeatability: Mean, Standard Deviation and Standard Uncertainty
Method last reviewed	12 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/signals-calibration/repeatability-standard-deviation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.