

Uncertainty of Simple Weighing

The following uncertainty sources are taken into account:

1. Repeatability of the balance
2. Drift of the balance
3. Readability of the display of the balance (the readability of the balance is 0.1 mg)

Model Equation:

$$m = m_{\text{rep}} + m_{\text{drift}} + m_{\text{read}}$$

List of Quantities:

Quantity	Unit	Definition
m	g	mass of the sample
m_{rep}	g	value of the mass together with repeatability component of uncertainty
m_{drift}	g	drift component of uncertainty of mass
m_{read}	g	readability component of uncertainty of mass

m: Result

m_{rep} : Type A summarized
 Mean: 0.3240 g
 Standard Uncertainty: 0.00017 g
 Degrees of Freedom: 15

This uncertainty estimate was obtained in our lab for our balance. It refers to tared weighing (that is: takes the taring operation into account), so the repeatability of taring neednot be included separately. The users are strongly recommended to determine the repeatability experimentally for their own balance.

m_{drift} : Type B rectangular distribution
 Value: 0 g
 Halfwidth of Limits: 0.0002 g

This uncertainty estimate was obtained in our lab for our balance. It refers to tared weighing (that is: takes the taring operation into account), so the drift of taring neednot be included separately. The users are strongly recommended to determine the drift experimentally for their own balance.

m_{read} : Type B rectangular distribution
 Value: 0 g
 Halfwidth of Limits: 0.00005 g

This uncertainty is plus-minus half of the last digit.

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Uncertainty Budget:

Quantity	Value	Standard Uncertainty	Distribution	Sensitivity Coefficient	Uncertainty Contribution	Index
m_{rep}	0.324000 g	0.000170 g	normal	1.0	0.00017 g	67.1 %
m_{drift}	0.0 g	0.000115 g	rectangular	1.0	0.00012 g	31.0 %
m_{read}	0.0 g	$28.9 \cdot 10^{-6}$ g	rectangular	1.0	$29 \cdot 10^{-6}$ g	1.9 %
m	0.324000 g	0.000208 g				

Result: Quantity: m
 Value: 0.32400 g
 Expanded Uncertainty: ± 0.00042 g
 Coverage Factor: 2.00
 Coverage: manual