

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measured quantity/ Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks	
Volume Piston pipettes, dispensers	0.1 µL to < 1.0 µL	DIN EN ISO 8655-6: 2002 and DKD-R 8-1:2011 Gravimetric method Adjusted by dispensing into the weighing vessel.	8.0 % ^{a)} 6.0 % ^{b)} 4.0 % ^{c)}	The CMC refers to nominal volume. To state the best CMC value the reference temperature shall be set equal to the temperature of the test liquid.	
	1.0 µL to < 10 µL		0.80 % ^{a)} 0.60 % ^{b)} 0.40 % ^{c)}		
	10 µL to < 100 µL		0.35 % ^{a)} 0.26 % ^{b)} 0.18 % ^{c)}		^{a)} Instruments with fixed volume or upper test volume ($V_P = 1.0 \cdot V_N$) for instruments with variable volume
	100 µL bis < 1000 µL		0,15 % ^{a)} 0,11 % ^{b)} 0,08 % ^{c)}		^{b)} Medium test volume (e.g. $V_P = 0.5 \cdot V_N$) for instruments with variable volume
	1 mL < 10 mL		0,15 % ^{a)} 0,11 % ^{b)} 0,08 % ^{c)}		^{c)} Lower test volume (e.g. $V_P = 0.1 \cdot V_N$) for instruments with variable volume
	10 mL to 200 mL		0.15 % ^{a)} 0.11 % ^{b)} 0.08 % ^{c)}		
Multichannel piston pipettes	1.0 µL to < 10 µL		0.80 % ^{a)} 0.60 % ^{b)} 0.40 % ^{c)}	V_N : Nominal volume V_P : Test volume	
	10 µL to < 100 µL		0.45 % ^{a)} 0.34 % ^{b)} 0.23 % ^{c)}		
	100 µL to 1200 µL		0.15 % ^{a)} 0.11 % ^{b)} 0.08 % ^{c)}		

¹⁾ The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measured quantity/ Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Multiple dispensers	2,0 µL bis < 20 µL	DIN EN ISO 8655-6:2002 und DKD-R 8-2:2018 Gravimetric method Adjusted by dispensing into the weighing vessel.	0,60 %	Adjusted by dispensing into the weighing vessel. To state the best CMC value the reference temperature shall be set equal to the temperature of the test liquid.
	20 µL bis < 40 µL		0,40 %	
	40 µL bis < 100 µL		0,30 %	
	100 µL bis < 200 µL		0,20 %	
	200 µL bis < 500 µL		0,15 %	
	500 µL bis < 2500 µL		0,10 %	
	2,5 mL bis 50 mL		0,08 %	

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On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measured quantity/ Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Volume Piston pipettes, dispensers	1.0 µL to < 10 µL	DIN EN ISO 8655-6: 2002 and DKD-R 8-1:2011 Gravimetric method Adjusted by dispensing into the weighing vessel..	0.80 % ^{a)}	The CMC refers to nominal volume. To state the best CMC value the reference temperature shall be set equal to the temperature of the test liquid. ^{a)} Instruments with fixed volume or upper test volume ($V_P = 1.0 \cdot V_N$) for instruments with variable volume ^{b)} Medium test volume (e.g. $V_P = 0.5 \cdot V_N$) for instruments with variable volume ^{c)} Lower test volume (e.g. $V_P = 0.1 \cdot V_N$) for instruments with variable volume V_N : Nominal volume V_P : Test volume
	10 µL to < 100 µL		0.60 % ^{b)} 0.40 % ^{c)}	
	100 µL to < 1000 µL		0.35 % ^{a)} 0.26 % ^{b)} 0.18 % ^{c)}	
	1.0 mL to < 10 mL		0.15 % ^{a)} 0.11 % ^{b)} 0.08 % ^{c)}	
	10 mL bis 200 mL		0.15 % ^{a)} 0.11 % ^{b)} 0.08 % ^{c)}	

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On-site Calibration

Calibration and Measurement Capabilities (CMC)				
Measured quantity/ Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Multiple dispensers	2 µL bis < 20 µL	DIN EN ISO 8655-6:2002 und DKD-R 8-2:2018 Gravimetric method Adjusted by dispensing into the weighing vessel..	0,60 %	Adjusted by dispensing into the weighing vessel. To state the best CMC value the reference temperature shall be set equal to the temperature of the test liquid.
	20 µL bis < 40 µL		0,40 %	
	40 µL bis < 100 µL		0,30 %	
	100 µL bis < 200 µL		0,20 %	
	200 µL bis < 500 µL		0,15 %	
	500 µL bis < 2500 µL		0,10 %	
	2,5 mL bis 50 mL		0,08 %	

Abbreviations used:

CMC	Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DIN	Deutsches Institut für Normung e.V.
DKD-R	Richtlinie des Deutschen Kalibrierdienstes (DKD), herausgegeben von der Physikalisch-Technischen Bundesanstalt

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