

# DIN EN ISO 23783-2:2024-04 (E)

## Automated liquid handling systems - Part 2: Measurement procedures for the determination of volumetric performance (ISO 23783-2:2022)

---

<b>Contents</b>		<b>Page</b>
<b>European foreword</b> .....		<b>3</b>
<b>Foreword</b> .....		<b>4</b>
<b>Introduction</b> .....		<b>5</b>
<b>1</b>	<b>Scope</b> .....	<b>6</b>
<b>2</b>	<b>Normative references</b> .....	<b>6</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>6</b>
<b>4</b>	<b>Abbreviated terms</b> .....	<b>6</b>
<b>5</b>	<b>Measurement methods</b> .....	<b>7</b>
5.1	Overview of methods suitable for measuring ALHS performance .....	7
5.2	Photometric methods .....	14
5.2.1	Dual-dye ratiometric photometric method .....	14
5.2.2	Single-dye photometric method .....	14
5.2.3	Fluorescence method .....	14
5.3	Gravimetric methods .....	14
5.3.1	Single channel method .....	14
5.3.2	Regression analysis .....	15
5.4	Hybrid photometric/gravimetric method .....	15
5.5	Dimensional methods .....	15
5.5.1	Optical image analysis of droplets .....	15
5.5.2	Optical image analysis of capillaries .....	16
<b>6</b>	<b>Equipment and preparation</b> .....	<b>16</b>
6.1	Test equipment .....	16
6.2	Manually operated single- and multi-channel pipettes .....	17
6.3	Preparation for testing .....	17
<b>7</b>	<b>Thermal expansion</b> .....	<b>18</b>
<b>8</b>	<b>Traceability and measuring system uncertainty</b> .....	<b>18</b>
8.1	Traceability .....	18
8.2	Estimation of measuring system uncertainty .....	18
8.2.1	Whole system approach .....	18
8.2.2	Measurement model approach .....	18
<b>9</b>	<b>Reporting</b> .....	<b>19</b>
<b>Annex A (normative) Calculation of liquid volumes from balance readings</b> .....		<b>20</b>
<b>Annex B (normative) Dual-dye ratiometric photometric procedure</b> .....		<b>23</b>
<b>Annex C (normative) Single dye photometric procedure</b> .....		<b>29</b>
<b>Annex D (normative) Gravimetric procedure, single channel measurement</b> .....		<b>34</b>
<b>Annex E (normative) Gravimetric regression procedure</b> .....		<b>38</b>
<b>Annex F (normative) Photometric/gravimetric hybrid procedure</b> .....		<b>44</b>
<b>Annex G (normative) Optical image analysis of droplets</b> .....		<b>53</b>
<b>Annex H (normative) Fluorescence procedure</b> .....		<b>62</b>
<b>Annex I (normative) Optical image analysis of capillaries</b> .....		<b>75</b>
<b>Bibliography</b> .....		<b>81</b>