# Freedom EVO®.

## SPECIFICATIONS

## SYSTEM OVERVIEW

| Instruments | Freedom EVO 100 | Freedom EVO 150 | Freedom EVO 200 |
|---|---|---|---|
| **Outer Dimensions** | | | |
| height | 870 mm/34.3" | 870 mm/34.3" | 870 mm/34.3" |
| width | 1,075 mm/42.3" | 1,450 mm/57.0" | 2,050 mm/80.7" |
| depth | 780 mm/30.7" | 780 mm/30.7" | 780 mm/30.7" |
| Weight (base unit only) | 110 kg/242 lbs | 130 kg/286 lbs | 182 kg/400 lbs |
| **No. of robotic arms** | 1–2 | 1–3* | 1–3* |
| 7 different robotic arms available | Liquid LiHa (Liquid displacement Liquid Handling arm) with 2,4 or 8 channels, Air LiHa (Air displacement Liquid Handling arm) with 4 or 8 channels, Robotic Manipulator arm, Robotic Manipulator extended Z arm , Pick and Place (PnP) arm, MCA (MultiChannel Arm™) 96 or MCA 384 | | |
| Precision of movement | LiHa/ Air LiHa: ± 0.4 mm on X,Y,Z axes RoMa and PnP arm: ± 0.4 mm on X axes, ± 0.5 mm on Y  axes, ± 0.3 mm on Z axes MCA96/ MCA 384: ± 0.5 mm on X,Y,Z axes | | |

*Dual Liquid LiHa or Liquid and Air LiHa possible.

| | |
|---|---|
| Positive sample identification | Fully automated barcode scanner (PosID) for tubes, plates, reagents and carriers |
| Full safety screens | User activated, interlocked screens prevent non-intentional access to work area or non-intentional system halt |
| Password protection | Three password levels: operator, application specialist and administrator |
| Regulatory compliance | Compliant to Directives 2014/35/EU, 2014/30/EU, CSA compliant |
| Operating conditions | Temp. 15–32 °C/59–90 °F, relative humidity 30–80% (non-condensing) |
| Pipetting conditions | Temp. 20–27 °C/68–80.6 °F, relative humidity 30–60% (non-condensing) |
| General liquid handling conditions | Single pipetting mode, tap water with a conductivity of 0.3 mS/cm to 1 mS/cm, 8 channels, 12 replicates, CV and accuracy calculated over each channel and complete 96 well plate unless otherwise stated. |

| Software features | |
|---|---|
| Operating software | Freedom EVOware – for full access to application development environment |
| | Freedom EVOware Plus – additionally provides advanced process scheduling capabilities |
| Operating system | Windows® 7 / 64 bit |
| Computer Requirements | 3 GHz, minimum 1 GB RAM, 5 GB of unused harddisk space; 1 USB port for software hardlock, 1 USB or RS232 for instrument control, 1 unused port for printer, SVGA monitor with 32768 colors or more and minimum resolution of 1024 x 768 pixels, CD-ROM |

| Power requirements | | | |
|---|---|---|---|
| Power | 600 VA | 1200 VA | 1200 VA |
| Voltage | 100 – 240 VAC, frequency: 50/60 Hz | | |

# 7 DIFFERENT ROBOTIC ARMS AVAILABLE

| | |
|---|---|
| **1. Robotic Manipulator arm (RoMa)** | To transport labware or disposable tips |
| | Choice of gripper fingers: Eccentric, eccentric-long or centric |
| | max. 400 g can be transported |
| | Gripper range: 58 to 140 mm |

| | |
|---|---|
| **2. Robotic Manipulator arm long Z (RoMa long-Z-axes)** | Identical to RoMa. Additional: Access below worktable: 350 mm<br>To transport labware or disposable tips |

| | |
|---|---|
| **3. Pick and Place (PnP) arm** | To transport tubes or other cylindrical containers |
| | max. 100 g can be transported |
| | Possible tube diameter: 11 to 18 mm |
| | Rotation angle: 360° (unlimited rotation) |

| | |
|---|---|
| **4. Liquid displacement Liquid Handling arm (Liquid LiHa)** | 2, 4 or 8 pipetting channels; independent Z movement;<br>Y-tip spacing on 4- and 8-tip arm – automatically 9 to 38 mm between tips;<br>2-tip arm – between tip spacing variable 9 to 418 mm |
| Volume range | 0.5 to 5000 µl |
| Disposable tips (DiTi) sizes | 10, 50, 200, 1000, 5000 µl – with or without filters; 350 µl nested DiTi without filter |
| Tip Ejection System | Ejection of disposable tips in contained environment to prevent aerosol;<br>Also used for tip re-racking |
| Fixed Tips | Washable fixed tips: Standard (PTFE®-coated stainless steel), ceramic coating,<br>hard PTFE coating with full DMSO compatibility, short/long low volume,<br>Te-PS tips for access to 1536-well microplates |
| Syringe sizes | 50, 250, 500, 1000, 2500, 5000 µl mounted on Tecan XP Smart dilutor |
| Fast Wash | Fast delivery of system liquid by diaphragm pump |
| Liquid waste vigilance option | Active monitoring of liquid levels in system and waste containers |
| Liquid level detection | Choice of capacitive for conductive liquids or pressure based technology<br>for non-conductive liquids |
| | Down to 50 µl in a round bottom 96-well microplate on standard carriers with cLLD |
| Tip occlusion detection | Part of integrated liquid detection (ILID) |
| Pressure Monitored Pipetting (PMP) | Real-time quality control of the liquid transfer process<br>Detects pipetting faults like clots and air aspiration |
| Disposable tip sensing | Confirmation of tip pick-up and tip ejection |

**Standard volume**

| Pipetting performance* (Precision, CV):<br>Typical results** | | Pipetting performance* (Precision, CV):<br>Manufacturer's field guarantee*** | |
|---|---|---|---|
| Standard washable fixed tips | 10 µl < 2.5% | Standard washable fixed tips | 10 µl < 3.5% |
| Standard washable fixed tips | 100 µl < 0.5% | Standard washable fixed tips | 100 µl < 0.75% |
| 200 µl disposable tips<br>without filter | 10 µl < 3.0% | 200 µl disposable tips<br>without filter | 10 µl < 3.5% |
| 200 µl disposable tips<br>without filter | 100 µl < 0.5% | 200 µl disposable tips<br>without filter | 100 µl < 0.75% |
| Non-contact dispense | Volumes down to 10 µl | | |

*Free dispense, 1000 ul syringe, gravimetric method
**Worst value of at least 3 tested instruments in production
***Values tested at IQ/OQ in the field to show that the instrument is within its specifications

**Low volume option**

| Pipetting performance* (Precision, CV):<br>Typical results** | | Pipetting performance* (Precision, CV):<br>Manufacturer's field guarantee*** | |
|---|---|---|---|
| Low-volume washable fixed tips | 1 µl < 8.0% | Low-volume washable fixed tips | 1 µl < 10% |
| Low-volume washable fixed tips | 10 µl < 2.0% | Low-volume washable fixed tips | 10 µl < 3.5% |
| 10 µl disposable tips<br>without filter | 1 µl < 8.0% | 10 µl disposable tips without filter | 1 µl < 10% |
| 10 µl disposable tips<br>without filter | 10 µl < 2.0% | 10 µl disposable tips without filter | 10 µl < 3.5% |
| Non-contact dispense | Volumes down to 1 µl | | |

*Free dispense, 500 ul syringe, low volume pipetting tubing, solenoid valve, gravimetric method
**Worst value of at least 3 tested instruments in production
***Values tested at IQ/OQ in the field to show that the instrument is within its specifications

| 5. Air displacement Liquid Handling arm (Air LiHa) | 4 or 8 pipetting channels; independent Z movement; Y-tip spacing automatically 9 to 38 mm between tips |
|---|---|
| Volume range | 0.5 to 1000 µl |
| Non-contact dispense | Down to 0.5µl |
| Disposable tips (DiTi) sizes | 10, 50, 200, 1000 µl – with or without filters; 350 µl nested DiTi without filter |
| Tip Ejection System | Ejection of disposable tips in contained environment to prevent aerosols; Also used for tip re-racking |
| Liquid level detection | Choice of capacitive for conductive liquids or pressure based technology for non-conductive liquids |
| | Down to 50 µl in a round bottom 96-well micro-plate on standard carriers with cLLD |
| Tip occlusion detection | Part of integrated liquid detection (ILID) |
| Pressure Monitored Pipetting (PMP) | Real-time quality control of the liquid transfer process Detects pipetting faults like clots and air aspiration |
| Disposable tip sensing | Confirmation of tip pick-up and tip ejection |

**Pipetting performance* (Precision, Accuracy): Typical results****

**Pipetting performance* (Precision, CV): Manufacturer's field guarantee*****

| | | CV | Accuracy | | |
|---|---|---|---|---|---|
| 10 µl disposable tips without filter | 0.5 µl | < 6% | ± 9.5% | | |
| 10 µl disposable tips without filter | 1 µl | < 4% | ± 7.0% | 10 µl disposable tips without filter | 1 µl ≤ 8.0% |
| 10 µl disposable tips without filter | 10 µl | < 1% | ± 1.5% | | |
| 50 µl disposable tips without filter | 1 µl | < 4% | ± 10.0% | | |
| 50 µl disposable tips without filter | 50 µl | < 0.5% | ± 1.0% | | |
| 200 µl disposable tips without filter | 100 µl | < 0.5% | ± 1.0% | 200 µl disposable tips without filter | 10 µl ≤ 2.0% |
| 350 µl disposable tips without filter | 3 µl | < 3.0% | ± 7% | 200 µl disposable tips without filter | 100 µl ≤ 0.5% |
| 350 µl disposable tips without filter | 350 µl | < 0.5% | ± 1.0% | | |
| 1000 µl disposable tips without filter | 100 µl | < 0.5% | ± 1.0% | | |
| 1000 µl disposable tips without filter | 1000 µl | < 0.5% | ±-1.0% | | |

*Free dispense, gravimetric method
**Worst CV or accuracy value of at least 3 tested instruments in production (standard liquid classes; for 10 µl and 50 µl DiTis single channel calibration required below 5 µl)
***Values tested in production and at IQ/OQ in field to show that the instrument is within its specifications

| 6. Multiple Channel Arm 96 (MCA 96) | Washable fixed tip blocks or disposable tips can be interchanged during a run; row-, column- and quadrant wise pipetting possible with both |
|---|---|
| Volume range | 1 to 200 µl |
| Disposable tips (DiTi) sizes | 50, 100, 150 and 200 µl with and without filters and 200µl wide bore |

**Pipetting performance* (Precision, CV): Typical results**

| Disposable tips | | CV | Washable steel tips | | CV |
|---|---|---|---|---|---|
| 50 µl disposable tips without filter | 1 µl | < 6.0% | 50 µl washable fixed tips uncoated | 1 µl | < 10.0% |
| 50 µl disposable tips without filter | 5 µl | < 4.0% | 50 µl washable fixed tips uncoated | 2 µl | < 6.0% |
| 50 µl disposable tips without filter | >10 µl | < 3.0% | 50 µl washable fixed tips uncoated | >10 µl | < 3.0% |
| 100 µl disposable tips without filter | 1.5 µl | < 6.0% | | | |
| 100 µl disposable tips without filter | 5 µl | < 4.0% | | | |
| 100 µl disposable tips without filter | >10 µl | < 3.0% | | | |
| 200 µl disposable tips without filter | 2 µl | < 6.0% | 200 µl washable fixed tips uncoated | 5 µl | < 4.0% |
| 200 µl disposable tips without filter | 5 µl | < 4.0% | 200 µl washable fixed tips uncoated | >10 µl | < 3.0% |
| 200 µl disposable tips without filter | >10 µl | < 3.0% | | | |

*Contact dispense, photometric measurement of color solution , CV calculated over complete 96 well plate, 3 replicates, typical pipetting precision/accuracy are defined as the worst CV/accuracy value of at least three tested instruments (standard liquid classes)

| 7. Multiple Channel Arm 384 (MCA 384) | Automatically interchangeable head adapters for 384 or 96 formats, fixed or disposable tips. Row-, column- and quadrant wise pipetting with DiTis possible |
|---|---|
| Volume range | 0.5 to 125 µl in 384 format; 1 to 500 µl in 96 format |
| Disposable tips (DiTi) sizes | 15, 50 and 125 µl in 384 format; 50, 100, 150, 200 and 500 µl in 96 format with and without filters |

**Pipetting performance\* (Precision, Accuracy): Typical results**

**Aqueous solutions:**

| | | CV | Accuracy |
|---|---|---|---|
| 15 µl disposable tips without filter | 0.5 µl | < 4% | ± 10.0% |
| 50 µl disposable tips without filter | 1 µl | < 4% | ± 5.0% |
| 125 µl disposable tips without filter | 2 µl | < 3% | ± 5.0% |
| 384 low volume fixed tip adapter (SC) | 1 µl | < 8% | ± 5.0% |
| 384 large volume fixed tip adapter (LC) | 3 µl | < 5% | ± 5.0% |

**DMSO solutions:**

| | | | |
|---|---|---|---|
| 15 µl disposable tips without filter | 0.5 µl | < 4% | ± 5.0% |
| 50 µl disposable tips without filter | 0.5 µl | < 4% | ± 5.0% |
| 125 µl disposable tips without filter | 2 µl | < 3% | ± 5.0% |
| 384 low volume fixed tip adapter (SC) | 0.5 µl | < 6% | ± 5.0% |
| 384 large volume fixed tip adapter (LC) | 2 µl | < 5% | ± 5.0% |

\*Contact dispense with COMBO adapter in 384 format, photometric measurement of color solution, CV calculated over complete 384 well plate, 3 replicates, typical pipetting precision/accuracy are defined as the worst CV/ accuracy value of at least three tested instruments (standard liquid classes)

**The Freedom EVO is an open automation platform product for general laboratory use. It is intended for routine laboratory tasks, such as general purpose pipetting and general purpose liquid handling and robotic processes. Not all options are available in all markets. Certain options when combined with Freedom EVO are for research use only. Consult your local Tecan office.**

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