

## Vacuum Weighing Technology Assured Traceability



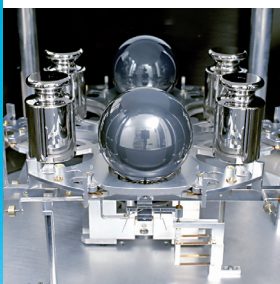
### Continuously Stable

The unique Artefact Storage & Transport Vessel (ASTV) ensures artefacts are always kept in stable conditions: under vacuum or in inert gas. The risk of contamination from the air is eliminated.



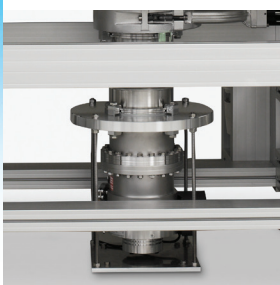
### Contamination-free Transfer

Artefacts are kept perpetually within a protected environment by placing the ASTV into the Artefact Transfer Device (ATD). The Load Lock system transfers the artefact to the measurement chamber whilst the controlled atmosphere is maintained.



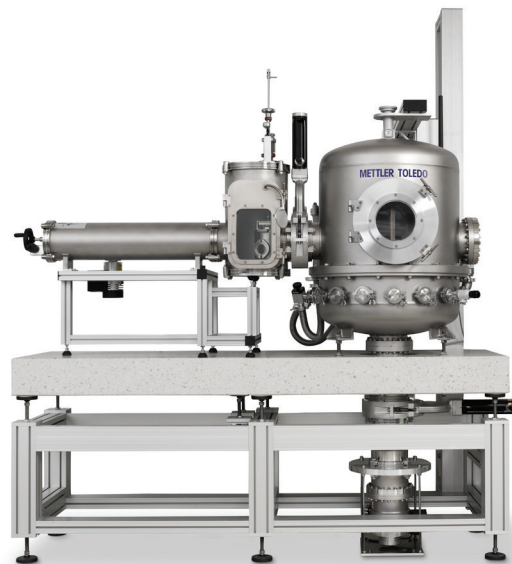
### Star-shaped Turntable

Automated gravimetric centering ensures each artefact is positioned correctly to minimize eccentricity and ensure high repeatability. OIML weights from 100 g up to 1 kg, silicon spheres up to 100 mm in diameter and density artefacts do not require support plates.



### Controlled Conditions

The vacuum pumping system sits directly beneath the vacuum chamber and enables mass comparisons under a controlled environment starting at ambient pressure and going down to a vacuum level of  $10^{-6}$  mbar.



### The M<sub>one</sub> Ready for the 'New' Kilogram

The M<sub>one</sub> is the benchmark in mass comparison, delivering results accurate to 0.1  $\mu\text{g}$  with typical repeatability of 0.3  $\mu\text{g}$ . The new generation M<sub>one</sub> succeeds by minimizing all sources of uncertainty from the environment, the process and even the instrument itself.

The flexible, modular system enables the mass of weights, artefacts and silicon spheres up to 1 kg to be determined at a controlled pressure down to a vacuum level of  $10^{-6}$  mbar.

Over 28 National Metrology Institutes rely on the M<sub>one</sub> for calibrating weights with the smallest uncertainties. The M<sub>one</sub> is playing a vital role in the race to define the new kilogram and will be fundamental to its future dissemination.

# The Four M<sub>one</sub> Mass Comparator Configurations

## Based on pressure range and Load Lock type

### Technical Specifications

|   |  |
|---|--|
| Maximum load  | 1001.5 g                               |
| Readability   | 100 ng                                 |
| Readability for value evaluation                    | 10 ng (integrated)                     |
| Repeatability at nominal load (5x ABA, measured at) | 500 ng (1 kg)                          |
| Repeatability typical ABA                           | 300 ng                                 |
| Electrical weighing range                           | 1.5 g                                  |
| Settling time                                       | 30 s                                   |
| Built-in weighing range adjustment (motorized)      | Adjustment possible at multiple points |
| Adjustment weight                                   | 1 g, or other nominal upon request     |
| Weighing turntable                                  | 6 positions                            |
| Substitution weighing pan                           | Accommodates weights from 1 mg – 1 kg  |
| Automated Gravimetric Centering of weights          | AGC on all positions                   |
| Instrument controller with m6control software       | Windows®-based operation               |

### Vacuum Properties

|                                |                                |
|--------------------------------|--------------------------------|
| Vacuum pressure range          | 10 <sup>-6</sup> – 1000 mbar   |
| Vacuum-optimized chamber shape | Round bell enclosure           |
| Vacuum access flanges          | 15 flanges                     |
| Standard quick loading door    | Round                          |
| Vacuum chamber dimensions      | 720 x 1030 x 930 mm            |
| Loading system                 | Load Lock / Load Lock with ATD |

### Artefact Dimensions

|   |                                  |
|---|----------------------------------|
| Cylindrical (e.g. national prototype, OIML, ASTM) | Ø 22 – 90 mm (no plates needed)  |
| Spheres (e.g. Avogadro project)                   | Ø 40 – 100 mm (no plates needed) |
| Density artefacts and disc weights                | Ø 22 – 90 mm (no plates needed)  |
| Weight dissemination disc                         | Ø 90 mm (maximum)                |
| Maximum artefact height                           | 100 mm                           |

### Mass Determination and Applications

|   |  |
|---|--|
| National prototype / national standards / "E0" weights    | Yes                                    |
| Weight dissemination 1 mg – 1 kg                          | Yes, Dissemination Weight Set required |
| Density determination with buoyancy artefacts             | Yes                                    |
| Silicon sphere determination                              | Yes                                    |
| Surface effects analysis of artefacts                     | Yes                                    |
| Mass analysis in controlled or vacuum environment         | Yes                                    |
| Research work in relation to the redefinition of the 1 kg | Yes                                    |

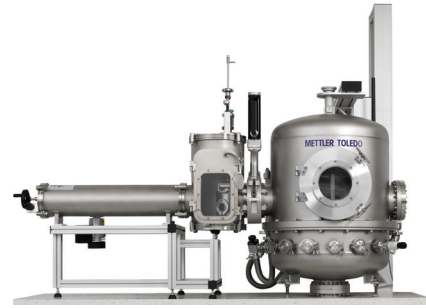
### Additional Options

|   |   |
|---|---|
| ASTV – Artefact Storage & Transport Vessel  |   |
| Exchangeable ASTV inserts   | For spheres and cylindrical shapes        |
| Lifting Device for safe operation of the ASTV   |   |
| Handle for ASTV   |   |
| Adjustment weights  | 50 mg, 93 mg, 100 mg, 200 mg, 500 mg, 1 g |
| Substitution weights (disc)   | 100 g, 200 g, 500 g                       |
| Lifting Device for vacuum enclosure   |   |
| Aluminum table frame  |   |
| Stone plate   |   |
| Equipment rack  |   |
| Air buoyancy artefacts (to evaluate air density)  | Part Nr. 11125348                         |
| Climate measuring system KLIMET A30V (incl. 1 x temperature sensor, 1 x humidity sensor, 1 x pressure sensor) | Certified / Non-certified                 |
| Additional temperature sensor (up to 3)   | Certified / Non-certified                 |
| CO <sub>2</sub> sensor  | Certified / Non-certified                 |
| Dissemination Weight Set (200 g, 200 g, 100 g)  | Part Nr. 222404                           |
| m6control software add-on: "Air Buoyancy Post Processor"  | Calculates True Mass / Conventional Mass  |

### Mettler-Toledo GmbH

Laboratory Weighing  
CH-8606 Greifensee, Switzerland  
Tel +41 44 944 22 11  
Fax +41 44 944 30 60

Subject to technical changes  
© 06/2016 Mettler-Toledo GmbH  
11795928A  
Global MarCom 1980 RK



### M<sub>one</sub> 6V-ATD

- 10<sup>-6</sup> to 1000 mbar
- Load Lock with Artefact Transfer Device
- Artefact Storage & Transport Vessel
- Prepumps and Turbopumps



### M<sub>one</sub> 6V-LL

- 10<sup>-6</sup> to 1000 mbar
- Load Lock
- Prepumps and Turbopumps



### M<sub>one</sub> 6V

- 10<sup>-6</sup> to 1000 mbar
- Prepumps and Turbopumps

### M<sub>one</sub> 6A

- 500 to 1000 mbar

|       |  |
|-------|--|
| 1 kg  |  |
| 500 g |  |
| 200 g |  |
| 100 g |  |
| 50 g  |  |
| 20 g  |  |
| 10 g  |  |
| 5 g   |  |
| 2 g   |  |
| 1 g   |  |

|                        |     |
|------------------------|-----|
| Support weights needed | RS* |
|                        | E1  |
|                        | E2  |
|                        | F1  |

\* Reference Standard with 1/3 uncertainty contribution of the E1 tolerance limit.



The Lifting Device ensures the ASTV is handled safely.



The KLIMET A30V measures temperature, humidity, pressure and CO<sub>2</sub>.

[www.mt.com/m\\_one](http://www.mt.com/m_one)

For more information



\* 1 1 7 9 5 9 2 8 \*