

Comparator Balances



Comparator Balances

Vacuum Technology

Robotic Solutions

Automated and Manual Operation

Solutions up to 5,400 kg

Innovative Solutions
For Lifetime Accuracy

METTLER TOLEDO



Index	■	Comparator Applications	4–5
	■	Vacuum Comparators	6–7
	■	Automated Comparators	8–9
	■	Robotic Comparators	10–11
	■	Manual Comparators	12–17
	■	Volume Comparators	18–19
	■	Software Solutions	20–21
	■	Accessories	22–23
	■	Reference Weights	24–25
	■	Comparator Services	26–27
	■	Select the Right Comparator	28–29
	■	Technical Specifications	30–39

Comparator Applications

High Performance for Every Weighing Task

In addition to traditional mass calibration, manual mass comparators can be used for every-day weighing applications in the same way as a standard balance. However, manual mass comparators are particularly suited to applications which have a low net sample weight combined with a heavy tare vessel or where exceptional repeatability is required. In such situations, a comparator balance eliminates the need to have two balances to meet the accuracy and capacity requirements of the application.

- Highest weighing performance with minimized corner load and eccentricity errors
- Efficient touchscreen operation with easy access to personal weighing methods
- Seamless processes with easy connectivity and data transfer



Mass Calibration

METTLER TOLEDO is the trusted partner for National Metrology Institutes, research center and countless calibration laboratories. Our mass comparators are one of the world's most accurate instruments for mass calibration.



One-Balance Formulation

With high capacity and high readability, mass comparator balances make it possible to use just one balance for many formulation applications. Small quantities can be weighed accurately into larger containers.



Heavy Tare, Small Sample

With a wide weighing range and low net sample weight, comparator balances excel in applications in which the tare and sample weights differ substantially. E.g. gas filling, determining non-volatile residue, and many more.



Flow Meter Calibration

Gravimetric calibration of a mass flow meter of any capacity.

Formulation

Formulations of any scale with demands for increased "safe weighing range" or smallest process uncertainties.



Specialty Gas Filling

Manufacturing of reference and specialty gas compositions.

Abrasion

Abrasion analysis of movable mechanical parts, determining mechanical stress or lubricant performance.



Volume/Density Determination

Analysis of density and volume of solid artefacts by the Archimedes principle.



Weight Calibration

Calibration of OIML and ASTM weights, ensuring the traceability of weights and balances.



Mass Determination

Determine the mass of artefacts for legal or scientific metrology.

Semiconductor Coating

Differential weighing to determine the amount of applied coating on semiconductors.



Filter Weighing

When extremely small differences in weight must be determined, our ultra-micro-comparators are the perfect solution. With a readability of 0.1 µg, they are perfect for weighing the very small quantities of particulate matter on filters.



Abrasion Weighing

With very high readability, our comparators are perfect for determining the level of abrasion on parts such as cog wheels, gear boxes, and levers among others.



Conserve Precious Materials

XPR comparators offer the lowest minimum weight values in their class enabling you to use the smallest quantities possible of your most valuable materials.

Vacuum Weighing Technology For Best Conditions and Results

National Metrology Institutes achieve the lowest measurement uncertainty by measuring under vacuum or in constant pressure. The M_one and M_10 mass comparators establish such conditions for determining mass, including artefacts such as cylindrical weights and silicon spheres. Artefacts are maintained in a contamination-free environment, under vacuum or in inert gas, throughout the measurement process.

The M_one is a key worldwide reference instrument for the calibration and determination of mass at the highest accuracy, and also has a vital role in scientific work related to the redefinition of the kilogram.



M_10



M_one

Model	Max. Load	Readability	Calibration Ranges (see theory on page 28 for further explanation)				
			"E0"*	E1	E2	F1	F2
M_one	1,001.5 g	0.1 µg	100 g–1 kg	100 g–1 kg	100 g–1 kg	100 g–1 kg	100 g–1 kg
M_10	10,011 g	1 µg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg

* 1/5 uncertainty contribution of the E1 tolerance limit



Measure Various Artefacts

Thanks to the unique STAR shaped pan, OIML weights from 100 g up to 1 kg, silicon spheres up to 100 mm in diameter, and density artefacts can be placed directly on the turntable for automated weighing.



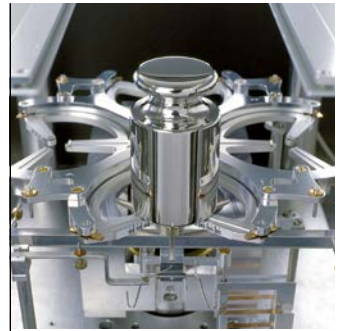
Direct Easy Access

Thanks to ergonomic design, you have a clear view and easy access via the quick-loading door to place items directly on the 6-place turntable.



Vacuum Transfer

The Artefact Storage and Transport Vessel (ASTV) enables the transportation of artefacts to the M_one under a controlled atmosphere, preventing contamination from air, or other external sources.



Automated Centering

The Automated Gravimetric Centering (AGC) centers all positions before determining the mass to reduce eccentricity influence to a minimum.

Automated Comparators For Unrivaled Accuracy

Achieve the ultimate in accuracy with AX automated weighing systems. With automated weight handlers and separate electronics, AX systems deliver extraordinary resolution and incomparable repeatability for mass determination of OIML E1 and Reference Mass Standards ("EO"). Windows® based software controls the 4-position weight handlers in a fully automated procedure, reducing handling effort and eliminating the risk of human error from the weighing process.

With up to 0.1 µg resolution and mass determination of weight pieces up to 64 kg, AX weighing systems meet highest accuracy requirements.



Model	Max. Load	Readability	Calibration Ranges (see theory on page 28 for further explanation)				
			"EO" ^{**}	E1	E2	F1	F2
AX107H	111 g	0.1 µg	10 g–100 g	10 g–100 g	10 g–100 g	10 g–100 g	10 g–100 g
AX106H	111 g	1 µg	10 g–100 g	10 g–100 g	10 g–100 g	10 g–100 g	10 g–100 g
AX1007CP	1,001.5 g	0.1 µg	100 g–1 kg	100 g–1 kg	100 g–1 kg	100 g–1 kg	100 g–1 kg
AX1006	1,011 g	1 µg	50 g–1 kg	20 g–1 kg	20 g–1 kg	20 g–1 kg	20 g–1 kg
AX10005	10,011 g	10 µg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg
AX16004	16,260 g	0.1 mg	5 kg–10 kg	2 kg–10 kg	1 kg–10 kg	1 kg–10 kg	1 kg–10 kg
AX32004	32,260 g	0.1 mg	5 kg–20 kg	2 kg–20 kg	1 kg–20 kg	1 kg–20 kg	1 kg–20 kg
AX64004	64,260 g	0.1 mg	5 kg–50 kg	5 kg–50 kg	1 kg–50 kg	1 kg–50 kg	1 kg–50 kg

* 1/5 uncertainty contribution of the E1 tolerance limit



Unrivaled Accuracy

Thanks to METTLER TOLEDO's weighing and manufacturing expertise, AX automated comparators are being continuously developed to ensure you get peak measurement performance and reliability.



Continuous Weighing Ranges

The clever, continuous range technology of the 16, 32 and 64 kg mass comparators enable readability of 0.1 mg up to an impressive 64 kg. This provides an ideal solution for measuring non-metric weights, pressure discs for force measurements, gas-capsules or small bottles.



Direct Weight Dissemination

With the automated AX line, efficiency is increased by placing several weights on the turntable at each weighing position, enabling the calibration of decades from 1 kg–64 kg by dissemination.



Secure Operation

The Windows® based software controls all your weighing jobs which can be imported directly from LIMS. Autostart several jobs in a row and calculate air buoyancy. Data can be exported to a database giving you full traceability at a keystroke.

Robotic Mass Calibration

Increase Accuracy and Productivity

The flexible and efficient e_Line and a_Line robotic systems can be combined according to your specific requirements to create a flawless and high-throughput weight calibration process, suitable for one-to-one calibrations, or for weight disseminations from 0.05 mg up to 20 kg. The systems offer 24-hour operation capability by deploying magazines with up to 100 weight positions, maximizing time efficiency and productivity.

The Efficiency Pack software option, in conjunction with an environmental monitoring station, automatically processes all mass calibration results and compensates for the influences of air buoyancy.



e5/e100

a10XL/a107/a1006XL

AX32004-M10

Model	Max. Load	Readability	Calibration Ranges (see theory on page 28 for further explanation)				
			"E0" ^{**}	E1	E2	F1	F2
e5	6.1 g	0.1 µg	1 mg–5 g	1 mg–5 g	1 mg–5 g	1 mg–5 g	1 mg–5 g
e100	111 g	1 µg	1 g–100 g	1 g–100 g	1 g–100 g	1 g–100 g	1 g–100 g
a10XL	10.1 g	0.1 µg	1 mg–10 g	50 µg–10 g	50 µg–10 g	50 µg–10 g	50 µg–10 g
a107	111 g	0.1 µg	1 g–100 g	1 g–100 g	1 g–100 g	1 g–100 g	1 g–100 g
a1006XL	1,011 g	1 µg	10 g–1 kg	10 g–1 kg	10 g–1 kg	10 g–1 kg	10 g–1 kg
AX32004-M10	21,260 g	0.1 mg	5 kg–20 kg	2 kg–20 kg	1 kg–20 kg	1 kg–20 kg	1 kg–20 kg

* 1/5 uncertainty contribution of the E1 tolerance limit



Reduce Errors

Automated weight handling prevents errors caused by the mix-up of weights or eccentric loading. Thanks to software control, reports are generated automatically, thus eliminating transcription errors.



Increase Throughput

Increase efficiency by combining up to 3 robotic systems that can carry up to 100 weights per magazine and calibrate weights from 50 µg to 20 kg simultaneously.



Simplified Dissemination

By combining automation with innovative weighing technologies, seamless traceability is delivered for decades from 0.05 mg up to 1 kg with the smallest achievable uncertainties.



Save Time – Reduce Cost

Investing in automation enables labor-intensive processes to be completed much faster and with consistent quality. Technicians gain additional time to focus on other valuable tasks.

AX Manual Comparators

Highest Accuracy up to 12 kg

The AX comparator range enables you to achieve the highest level of accuracy in manual mass calibration up to 12 kg. Continuous weighing range technology provides a wide weighing range for calibrating standard or customized weights and artefacts. With state-of-the-art mechanics, a hanging weighing pan, full metal housing and separate electronics, AX comparators offer world-class performance.



AX106 and AX206



AX1005 and AX2005



AX1004



AX12004

Model	Max. Load	Readability	Calibration Ranges (see theory on page 28 for further explanation)				
			E1	E2	F1	F2	M1
AX106	111 g	1 µg	1 g–100 g	50 mg–100 g	1 mg–100 g	1 mg–100 g	1 mg–100 g
AX206	211 g	1 µg	5 g–200 g	100 mg–200 g	1 mg–200 g	1 mg–200 g	1 mg–200 g
AX1005	1,109 g	0.01 mg	200 g–1 kg	20 g–1 kg	1 g–1 kg	100 mg–1 kg	1 mg–1 kg
AX1004	1,109 g	0.1 mg	1 kg	500 g–1 kg	100 g–1 kg	10 g–1 kg	200 mg–1 kg
AX2005	2,109 g	0.01 mg	500 g–2 kg	100 g–2 kg	10 g–2 kg	1 g–2 kg	20 mg–2 kg
AX12004	12,111 g	0.1 mg	2 kg–10 kg	1 kg–10 kg	500 g–10 kg	500 g–10 kg	500 g–10 kg



Hanging Pan

Influences from eccentricity are efficiently eliminated. The large surface enables easy weight placement for dissemination.



Faster Results

The motorized integrated draft shield reduces environmental influences, improving stabilization and overall performance. Measurements are fast and efficient, and results are more reliable.



2-Position Manual Turntable

The unique weight-exchanging design of the AX12004 enables higher loads to be handled easily and safely. Environmental influences are minimized, providing efficient and accurate mass determination.



Straightforward Results

MC Link is the all-in-one solution for weight calibration offering total flexibility and full compliance while maximizing productivity. Achieve accurate results whilst streamlining your calibration processes.

XPR Manual Comparators

Best Performance up to 64 kg

XPR full-range mass comparators offer convenient full weighing ranges coupled with short processing times to fulfill the highest demands for routine mass determination. The high performance MonoBloc™ weighing cell delivers up to 23 million points of resolution for highly precise results. The LevelMatic™ and hanging weighing pans eliminate eccentricity influences, guaranteeing outstanding performance.

In addition, thanks to MC Link software, your results are automatically documented securely.



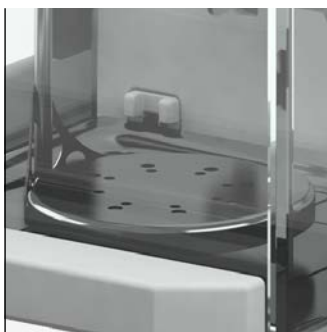
XPR6U

XPR36C and XPR56C

XPR2004SC, XPR5004SC
and XPR5003SC

XPR26003LC and XPR64003LD5C

Model	Max. Load	Readability	Calibration Ranges (see theory on page 28 for further explanation)				
			E1	E2	F1	F2	M1
XPR6U	6.1 g	0.1 µg	1 mg–5 g	1 mg–5 g	1 mg–5 g	1 mg–5 g	1 mg–5 g
XPR36C	32 g	1 µg	100 mg–20 g	1 mg–20 g	1 mg–20 g	1 mg–20 g	1 mg–20 g
XPR56C	52 g	1 µg	100 mg–50 g	1 mg–50 g	1 mg–50 g	1 mg–50 g	1 mg–50 g
XPR226CDR	220 g/121 g	10 µg/5 µg	100 g–200 g	2 g–200 g	50 mg–200 g	1 mg–200 g	1 mg–200 g
XPE505C	520 g	10 µg	200 g–500g	10 g–500 g	500 mg–500 g	10 mg–500 g	1 mg–500 g
XPR2004SC	2,300 g	0.1 mg	2 kg	500 g–2 kg	200 g–2 kg	20 g–2 kg	500 mg–2 kg
XPR5004SC	5,100 g	0.1 mg	5 kg	1 kg–5 kg	500 g–5 kg	200 g–5 kg	10 g–5 kg
XPR2003SC	2,300 g	1 mg	–	–	1 kg–2 kg	500 g–2 kg	200 g–2 kg
XPR5003SC	5,100 g	1 mg	–	5 kg	1 kg–5 kg	500 g–5 kg	200 g–5 kg
XPR10003SC	10,100 g	1 mg	10 kg	5 kg–10 kg	1 kg–10 kg	500 g–10 kg	200 g–10 kg
XPR26003LC	26.1 kg	1 mg	20 kg	10 kg–20 kg	2 kg–20 kg	1 kg–20 kg	500 g–20 kg
XPR32003LD5C	32.1 kg	5 mg	–	–	20 kg	5 kg–20 kg	2 kg–20 kg
XPR64003LD5C	64.1 kg	5 mg	–	20 kg–50 kg	5 kg–50 kg	2 kg–50 kg	1 kg–50 kg
XPR64002LC	64.1 kg	10 mg	–	–	50 kg	10 kg–50 kg	5 kg–50 kg
XPR64002LC-T	64.1 kg	10 mg	–	–	50 kg	10 kg–50 kg	5 kg–50 kg



Unrivaled Accuracy

The innovative LevelMatic™ and hanging weighing pans eliminate corner load effects increasing the accuracy of your weighing results.



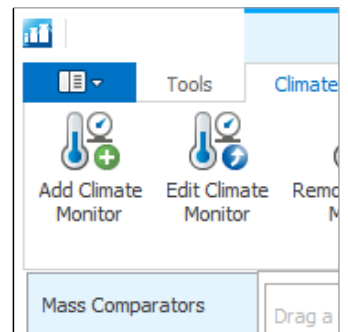
One-Click Certificate

The MC Link software automatically stores all your weight calibration data in a secure database. Calibration certificates can be issued with one click at the end of the weighing process.



Secure Data Transfer

The integrated USB and Ethernet interfaces make it easy to connect to a PC or network. Data transfer to the MC Link mass calibration software is secure, fast and error-free.



Effortless Compliance

Sophisticated monitoring of metrological relevant parameters within MC Link helps you ensure your results meet regulatory requirements.

XPE-KC Manual Comparators

The Ultimate Solution for up to 5 tons

XPE-KC comparators conquer the challenges of demanding high-load applications that requiring highest precision, such as filling gas cylinders, calibrating flow-meters, weighing high-speed train wheels and calibrating masses of up to 5 tons. In addition to full weighing ranges, all platforms have an integrated centering aid for easier and more precise placement of artifacts. The high-grade steel construction provides long-lasting everyday precision and reduces magnetic influences.

Furthermore, touchscreen operation makes operating these comparators as easy as any other METTLER TOLEDO balance.



Model	Max. Load	Readability	Weighing Ranges (See theory on page 28 for further explanation)			
			F1	F2	M1	M2
XPE155KSC/LM1000*	150 kg	0.05 g	–	50 kg–100 kg	20 kg–100 kg	5 kg–100 kg
XPE155KSC				100 kg	50 kg–100 kg	10 kg–100 kg
XPE604KMC/LM1000*	600 kg	0.1 g	200 kg–500 kg	100 kg–500 kg	50 kg–500 kg	10 kg–500 kg
XPE604KMC			–	500 kg	200 kg–500 kg	50 kg–500 kg
XPE1003KMC/LM5000*	1,100 kg	0.5 g	–	500 kg–1,000 kg	200 kg–1,000 kg	50 kg–1,000 kg
XPE1003KMC				1,000 kg	500 kg–1,000 kg	100 kg–1,000 kg
XPE2003KLC/LM5000*	2,500 kg	1 g	–	–	1,000 kg–2,000 kg	200 kg–2,000 kg
XPE2003KLC				–	1,000 kg–2,000 kg	500 kg–2,000 kg
XPE6002KLC/LM5000*	5,400 kg	10 g	–	–	–	5,000 kg

* Optional accessory



Unrivaled Performance

Accomplish demanding calibrations and mass determination at peak accuracy. XPE-KC comparators offer top resolution and excellent repeatability at highest loads.



Precise Centering

With the integrated centering aid, precise placement of weights is enabled and reproducibility improved.



Utmost Reliability

The optional innovative LevelMatic mechanism eliminates corner load effects, significantly increasing the accuracy of your weighing results.



ATEX Approved Versions

With the ATEX II 3G c Ex ic IIC T5 approved versions, demanding weighing tasks can be performed in hazardous environments at peak accuracy.

Volume and Density Determination To Eliminate Significant Influences

OIML states that the volume or density of test weights must be known. This is required for E1 and E2 weights above 330 m elevation, and F1 weights above 800 m. Without this data, the air buoyancy correction will be incorrect, leading to calibration errors and potential non-compliance with regulations.

METTLER TOLEDO's VMS systems offer easy and reliable determination of volume of masses up to 20 kg. Their modular design integrates XPR comparators, enabling the calibration of both mass and density.



VC1005X



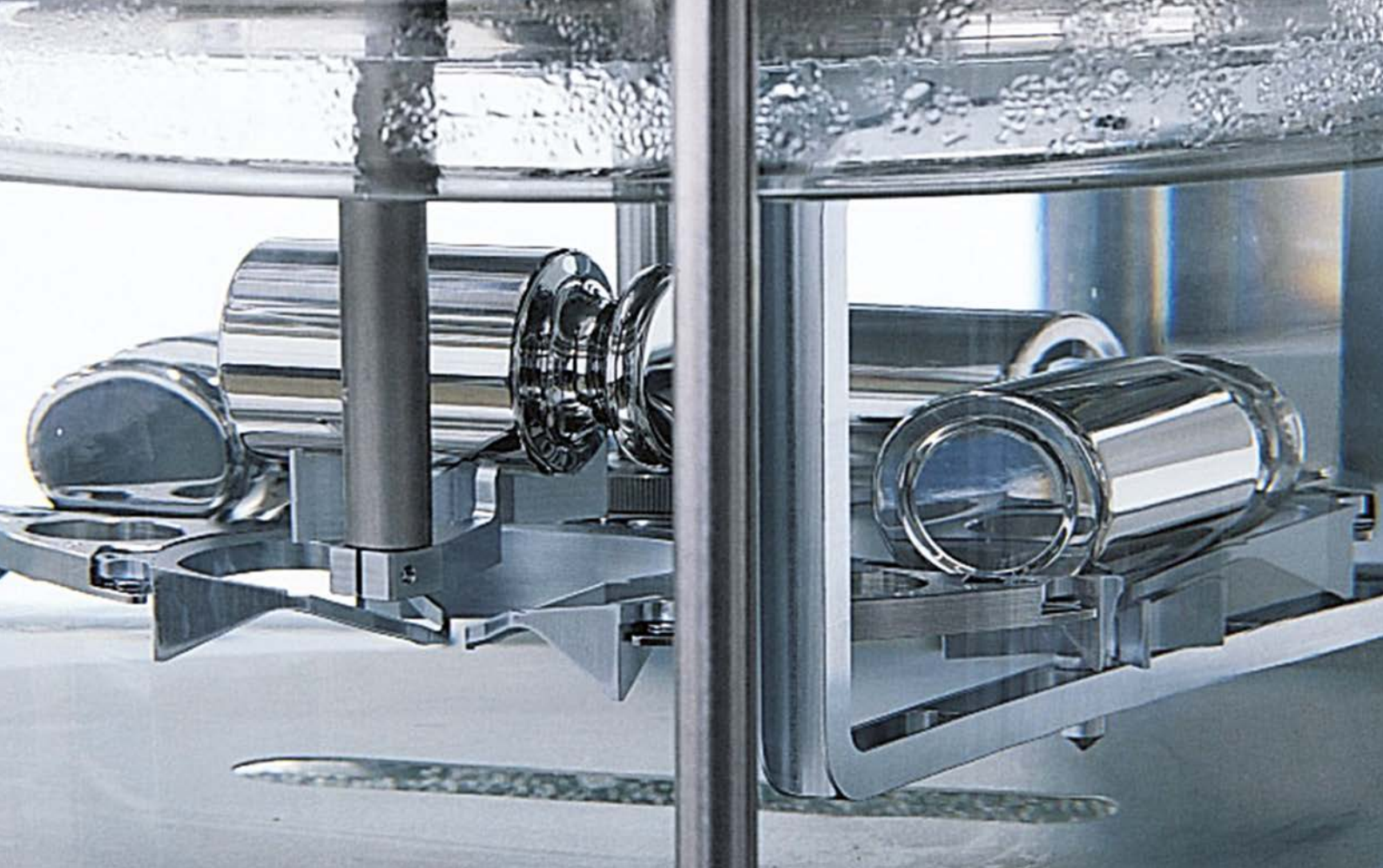
VMS2



VMS20

Model	Max. Load	Density Uncertainty (k = 2)	Volume Uncertainty (k = 2)	Calibration Ranges (see theory on page 28 for further explanation)				
				"E0"*	E1	E2	F1	F2
VC1005X	1 kg	1.2 kg/m ³	0.00015 cm ³	1 g–1 kg	1 g–1 kg	1 g–1 kg	1 g–1 kg	1 g–1 kg
VMS2	2 kg	25–400 kg/m ³	0.0063–0.781 cm ³	–	–	1 g–2 kg	1 g–2 kg	1 g–2 kg
VMS20	20 kg	1–5 kg/m ³	0.0781–0.3125 cm ³	–	1 kg–20 kg	1 kg–20 kg	1 kg–20 kg	1 kg–20 kg

* 1/5 uncertainty contribution of the E1 tolerance limit



Unrivaled Performance

The fully automatic VC1005X enables fast and accurate volume and density determination of weights from 1 g to 1 kg.



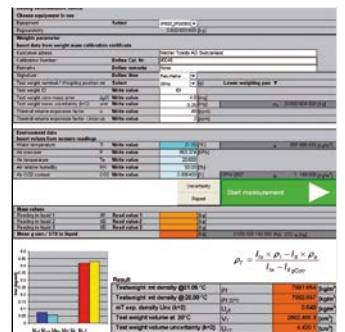
Dual Use

VMS systems are designed to support standard mass determination and buoyancy force measurement for density determination. Smooth weight handling in air and water is enabled by the weight handlers.



Air Bubble Removal

VMS systems include an advanced water jet to remove residual air bubbles, significantly improving the calibration result.



Straightforward Results

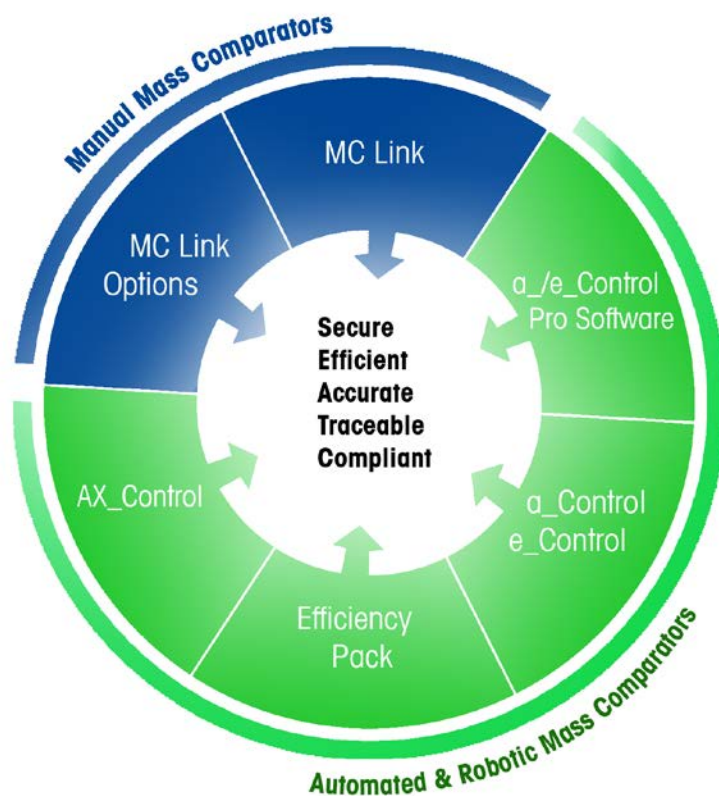
The supplied software simplifies the density determination process and enables you to quickly and easily generate highly detailed reports.

Software Solutions

For Efficient Mass Determination

For flawless traceability of weights to the International Prototype of the Kilogram (IPK), it takes the most accurate mass comparator and a highly intelligent software solution to eliminate the risk of human error.

When comparing weights with reference standards, you can rely on METTLER TOLEDO's unique expertise in the world of mass determination: Tailored software solutions for mass comparators guarantee efficient and accurate workflows, secure results, and assured full traceability at all times.



For safer and simpler weight calibration, select the ideal software solution for your mass comparator line.



Connectivity

With up to eight different interfaces, you have the flexibility to connect your comparator to any state-of-the-art solution as well as your network. USB, WLAN, Bluetooth and other options available.



Traceable Results

Using METTLER TOLEDO software, all weighing results can be sent directly to a PC or database for safe storage. All calibration data is fully traceable and available at any time for quality and accreditation purposes.



MC Link

The intuitive software solution for weight calibration guarantees efficient workflows, accurate and secure results, full traceability, and regulatory compliance at all times.

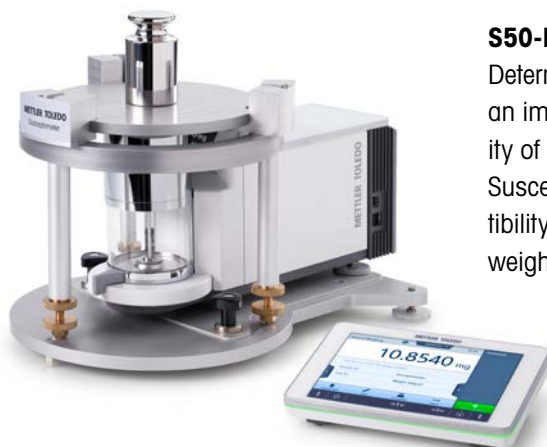


Professional Certificates

Calibration certificates at a keystroke: process information, references, environmental details, and results can be easily transferred into a certificate for a professional sign-off.

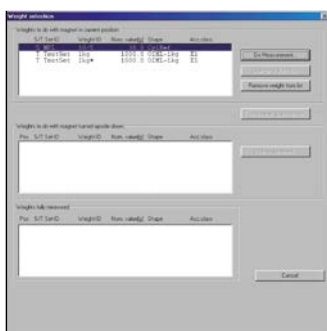
Specially Designed Accessories For Enhanced Usability

To meet your individual requirements and improve your laboratory's overall performance, METTLER TOLEDO offers a range of innovative accessories. These ergonomically designed solutions improve your mass calibration performance while significantly increasing your process safety, accuracy and efficiency.



S50-K Susceptometer

Determination of magnetic characteristics is an important prerequisite to ensure the quality of reference and test standards. The S50-K Susceptometer accurately measures susceptibility and permanent magnetization of weights up to 50 kg in one measurement.



Guided Workflow

The user-guided Susceptometer software calculates magnetic properties of artefacts according to OIML R111.



Complete Traceability

METTLER TOLEDO gauge blocks, which are easily recalibrated, and susceptibility references, can be used in combination with accurately measured magnets to ensure traceability to international standards.



Intelligent SmartGeo

Select OIML standard shapes or define specific weight geometries for automatic calculation of geometry correction factors.

Part nr.	XPR6U	XPR36C/XPR56C	XPR226CDR	AX106/AX206	XPE505C	AX2005/AX1005/AX1004	XPR2003SC	XPR2004SC/XPR5003SC/ XPR5004SC	XPR10003SC	AX12004	XPR26003LC	XPR32003LD5C/ XPR64002LC	XPR64003LD5C	XPR64002LC-T	XPE155KSC	XPE604KMC	XPE1003KMC	XPE2003KLC/XPE6002KLC
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Draft Shields

Draft Shield AX	11115915		• ¹⁾	• ¹⁾	•	•												
Draft Shield XP W5	11116043	•																
Draft Shield W12	11134430						•	•	• ²⁾									
Draft Shield XP W64	11134470									• ²⁾	•	• ²⁾						
Draft Shield XP-WKS	11116556														•			
Draft Shield XP-WKM	11116557															•	•	
Draft Shield XP-WKL	11116558																	•
Inner Draft Shield AX1004	222159					•												

Self Centering Pan

LevelMatic for XPR2003SC	11131123						•	• ²⁾										
LevelMatic 1000	22001940														•	•		
LevelMatic 5000	11116554																•	•

Software Solutions

MC Link Options	Various	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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Climate Monitoring Stations

ClimaLog 30	30078423	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DataLog30	30078424		•	•	•	•	•			•								•

Susceptometer

Susceptometer Hardware S50-K	11116880	•																
Susceptometer Software	11116870	•																
Susceptometer Reference	11116858	•																
Magnet Calibration Set	11116866	•																

¹⁾ XPR Terminal extension cable required (30300920)

²⁾ Included in standard delivery

Part nr.	M_one	M_10	AX1007CP	AX107H /AX107H	AX1006	AX10005	AX16004 / AX32004 / AX64004	e5	e100	a10XL	a107	a1006XL	AX32004-M10
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Software Solutions

Efficiency Pack includes	11116875	•	•	•	•	•	•	•	•	•	•	•	•
- TaskManager										•	•	•	•
- AirBuoyancyPostProcessor		•	•	•	•	•	•	•	•	•	•	•	•
a/e_Control Professional	11107519								•	•	•	•	•

Climate Monitoring Stations

ClimaLog 30	30078423								•	•	•	•	•
DataLog30	30078424								•	•	•	•	•
Klimet A30 Non-Certified	222011				•	•	•	•	•	•	•	•	•
Klimet A30 Certified	222012				•	•	•	•	•	•	•	•	•
Klimet A30V Non-Certified	11116513	•	•	•									
Klimet A30V Certified	11116514	•	•	•									
Klimet CO ₂ Sensor	11116518	•	•	•									
Klimet Temp. Sensor (2.5 meter cable length) – non-certified ³⁾	222013				•	•	•	•	•	•	•	•	•
Klimet Temp. Sensor (5 meter cable length) – non-certified ³⁾	222014				•	•	•	•	•	•	•	•	•
Klimet Temp. Sensor A30V	11116526	•	•	•									
Klimet Temp. Sensor Calibration	11116520	•	•	•	•	•	•	•	•	•	•	•	•

Weight Set for Dissemination

Disc Weight Set (2 × 200 g, 1 × 100 g)	222404	•		•									
Disc Weight Set (1 × 5 kg, 2 × 2 kg, 1 × 1 kg)	222420			•						•			
Air Buoyancy Artefacts	11125348	•	•	•									

³⁾ For calibrated temperature sensors, please select Klimet Temp. Sensor Calibration (11116520)

Expertly Crafted Reference Weights For Highest Metrological Performance

METTLER TOLEDO is a world leader in metrology and precision weighing equipment. Thanks to decades of weighing expertise and experience, you can trust our reference weights and calibration services to be of the highest quality and excellent value for money.

Our high-grade stainless steel test weights satisfy the most demanding calibration requirements. Each reference weight is delivered with a calibration certificate produced in accordance with ISO/IEC 17025 requirements to fulfill metrological traceability requirements.

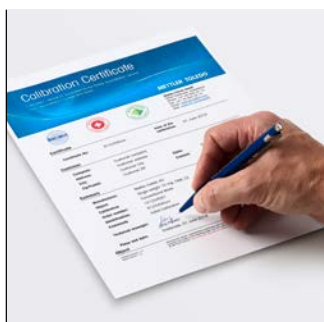
- OIML Classes E1, E2, F1, F2, M1
- ASTM Classes 1–4

National Metrology Institutes (NMIs) strive for measurements with the smallest uncertainty. "EO" calibration weights, which have a higher accuracy than E1, enable calibration of mass standards to be done with the highest metrological performance. To produce "EO" weights, METTLER TOLEDO hand selects suitable E1 weights which are then calibrated by an NMI to provide an extremely low uncertainty of $\frac{1}{5}$ * MPE (E1). These reference weights are supplied with the NMI calibration certificate.



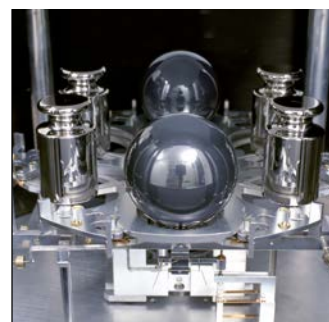
Robotic Calibration

Computer-controlled processes with cutting-edge robot technology, combined with decades of experience, guarantee consistent and reproducible results with low uncertainty values.



Calibration Certificate

Our accredited mass calibration laboratories meet or exceed ISO/IEC 17025 standards. Weight calibration is the only way to obtain accurate and reliable data.



Recalibration

Our global network of weight calibration laboratories guarantees a fast and cost-effective weight calibration service wherever you are based.



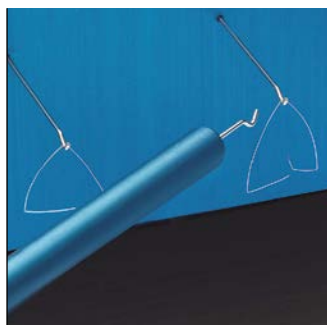
Microgram Weights For Specialized Applications

The weights, combined with their specially designed set of accessories and handling tools, offer the complete solution for customers who go beyond traditional boundaries. These weights are mainly used by National Metrology Institutes for scientific research and calibrations, but they also aid general industry research in areas where equipment calibration with milligram weights is no longer sufficiently precise.



Protective Storage

Easy-to-clean aluminum boxes protect weights against electrostatic charge. To avoid unintentional mis-storage of weights, each box is laser marked with the nominal value.



Stable Weights

Precise and distinguishable shapes for each nominal weight. To ensure accuracy, an automated process is used to bend wires with diameters as small as 0.05 mm into the desired shape.



Nifty Tools

Tweezers with a special hook and ceramic tips ensure proper handling. The miniature draft shield protects the weights during acclimatization and pre-weighing preparations.

► www.mt.com/weights

Comparator Services For Lifetime Peak Performance

Take advantage of our worldwide services to ensure you get the most out of your mass comparator. You can ensure accurate results, full traceability and worry-free operation thanks to our comprehensive service solutions suiting your specific needs. Our factory-trained and authorized service technicians help guarantee:

- Continuous highest accuracy
- Maximum equipment uptime
- Regulatory compliance through accredited qualification
- Audit-proof and fully traceable electronic certificates



Installation

Professional installation ensures your comparator is optimized to better suit your applications and performs according to the manufacturer's specifications. On-site operator training and an installation certificate are included.



Preventive Maintenance

Preventive maintenance realigns your comparator to manufacturing specifications to consistently achieve accurate results and avoid unexpected downtime. Save money and choose the maintenance plan (Care Package) best suiting your needs.



Qualification and Certification

Qualifying your manual mass comparator during installation or preventive maintenance with the mass comparator certificate proves that all relevant (or required) parameter meet manufacturer's specification. Therefore the continuous instrument verification by ISO 17025 is met.

Service

Installation

Available for:

- Automatic Mass Comparator
- Robotic Mass Comparator
- Vacuum Mass Comparator
- Manual Mass Comparator

Care Packages

Available for:

- Automatic Mass Comparator
- Robotic Mass Comparator
- Vacuum Mass Comparator
- Manual Mass Comparator

Mass Comparator Certificate

Available for:

- Manual Mass Comparator



Support and Repair

Our technical support staff is available to assist you with operational queries. We can also visit you on-site for 1:1 consultations. Any repairs required are carried out by our trained technical specialists using only original parts.

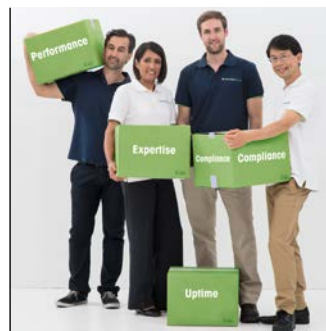
- Telephone Helpline
- On-site Support
- Adjustment and Repair



Education and Training

Individually customizable to meet your needs, our classroom and hands-on training (on-site) courses ensure your whole comparator team is proficient and confident. Ideal for metrologists, lab managers, supervisory and operations personnel.

- User Training
- Technical Seminars
- Metrology Know-how



Relocation

Certified technical specialists prepare, supervise the transfer and install your comparator in a new on-site location. A relocation certificate and final system performance test are included.

- On-site Comparator Relocation
- Final System Performance Test

Select the Right Comparator For the Calibration of Your Weights

In Mass Metrology, weights are used according to OIML or ASTM guidelines which are categorized into accuracy classes E1, E2, F1, F2, M1, M2 and M3 or class 1 to 7 respectively. When determining the mass of a weight, the maximum allowed measurement uncertainty of the whole process must be equal to or less than 1/3 of the maximum tolerance (MPE) of the weight under test with level of confidence $k = 2$ or 95%. The main uncertainty contribution factors when calibrating weights are the following:

Uncertainty of the Weighing

$$u_w(\overline{\Delta m_c}) = \frac{s(\Delta m_{ci})}{\sqrt{n}}$$

The uncertainty of the weighing is the repeatability of the comparator with a defined number of weight comparisons per process. The more repetitions of ABA/ABBA which are performed, the impact of repeatability to the overall weighing uncertainty is reduced. METTLER TOLEDO's calculations are based on repeatabilities in ABA weighing mode.

Uncertainty of the Reference Weight

The reference weight being used should be at least one class higher than the test object, e.g. E2 standard weights should be used to calibrate weights in class F1. The uncertainty contribution of the mass standard is therefore only 1/3 of the MPE of the calibrated test weight.

Uncertainty of Air Buoyancy Correction

The density of the weights and air density have a strong influence on measurement uncertainty. To achieve smallest uncertainties, the density of weights and air should be measured. According to OIML, this applies to E1 and E2 weights above 330 m elevation and F1 weights above 800 m.

Uncertainty of the Comparator

Smallest readability and eccentricity ensure a minimum effect on comparator uncertainty.

METTLER TOLEDO Definitions

The Weight Calibration ranges of Mass Comparators are defined to typical customer processes using OIML or ASTM standards.

- Number of repetitions according to OIML standards:
 - E1: 5 ABA
 - E2: 3 ABA
 - F1: 2 ABA
 - F2–M3: 1 ABA

Uncertainty Analysis

For all models, the calibration ranges are calculated for zero meter altitude based on the complete uncertainty analysis ensuring realistic calibration ranges.

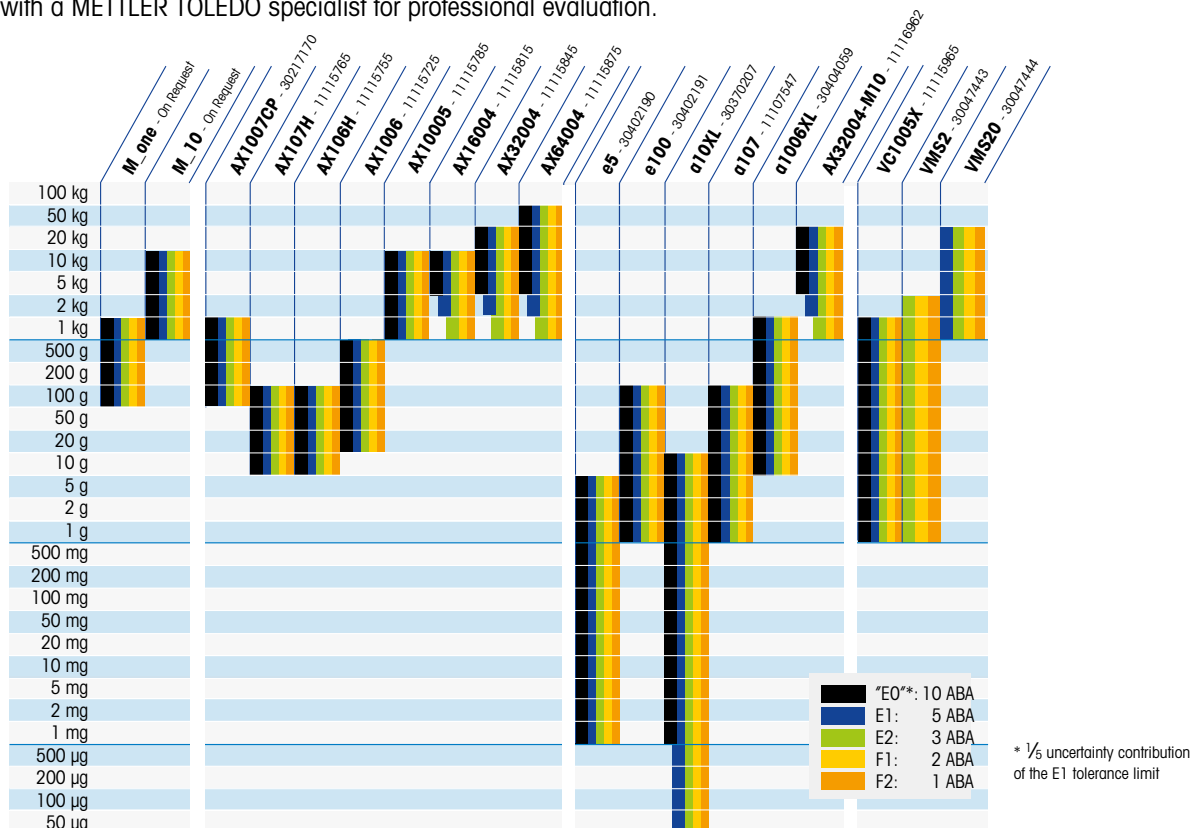
Tolerance Limits

The maximum permissible errors on verification for conventional masses are:

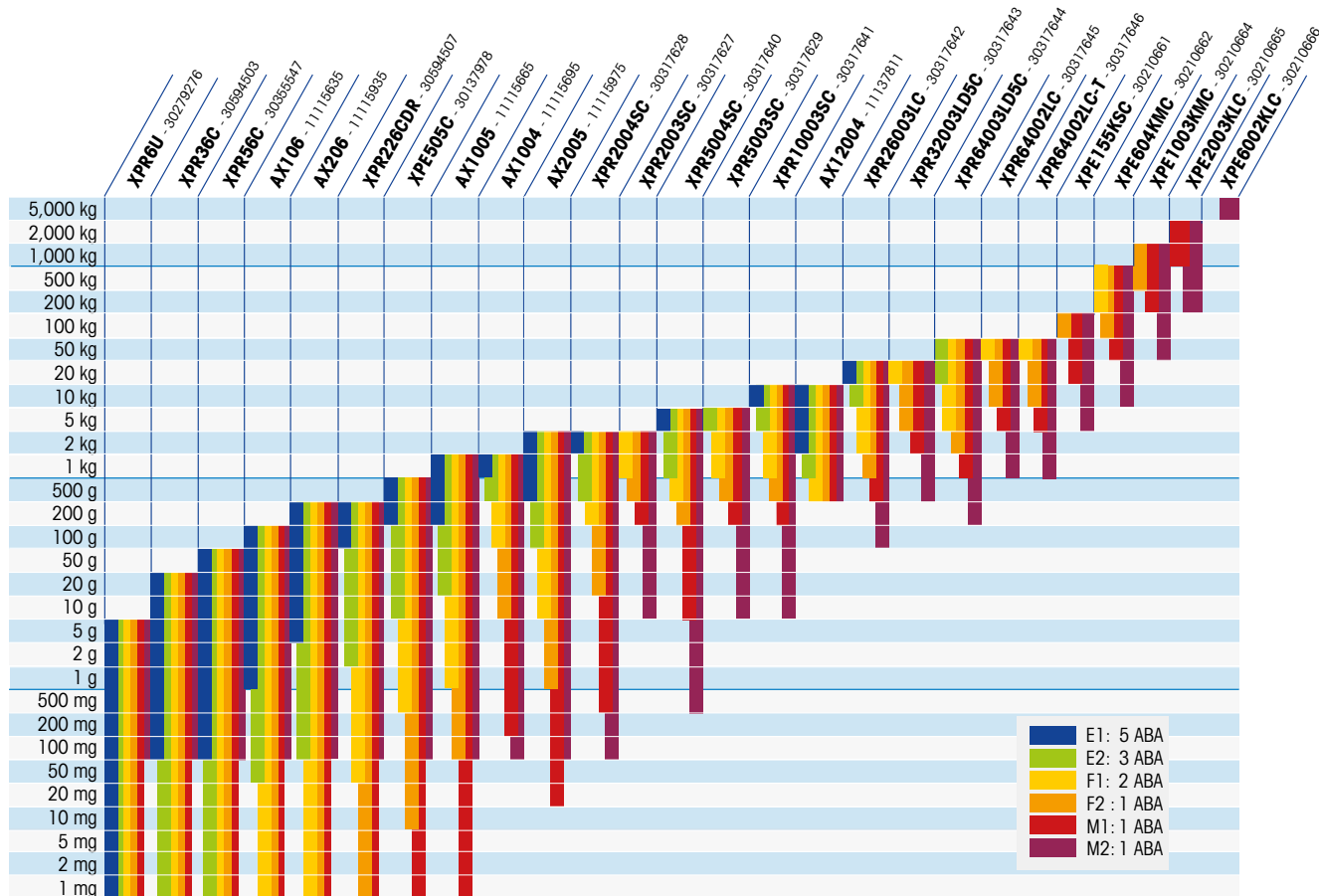
Weight	E1 ± mg	E2 ± mg	F1 ± mg	F2 ± mg	M1 ± mg	M2 ± mg	M3 ± mg
1 mg	0.003	0.006	0.02	0.06	0.2		
2 mg	0.003	0.006	0.02	0.06	0.2		
5 mg	0.003	0.006	0.02	0.06	0.2		
10 mg	0.003	0.008	0.025	0.08	0.25		
20 mg	0.003	0.01	0.03	0.1	0.3		
50 mg	0.004	0.012	0.04	0.12	0.4		
100 mg	0.005	0.016	0.05	0.16	0.5	1.6	
200 mg	0.006	0.02	0.06	0.2	0.6	2	
500 mg	0.008	0.025	0.08	0.25	0.8	2.5	
1 g	0.01	0.03	0.1	0.3	1	3	10
2 g	0.012	0.04	0.12	0.4	1.2	4	12
5 g	0.016	0.05	0.16	0.5	1.6	5	16
10 g	0.02	0.06	0.2	0.6	2	6	20
20 g	0.025	0.08	0.25	0.8	2.5	8	25
50 g	0.03	0.10	0.3	1	3	10	30
100 g	0.05	0.16	0.5	1.6	5	16	50
200 g	0.1	0.3	1	3	10	30	100
500 g	0.25	0.8	2.5	8	25	80	250
1 kg	0.5	1.6	5	16	50	160	500
2 kg	1	3	10	30	100	300	1,000
5 kg	2.5	8	25	80	250	800	2,500
10 kg	5	16	50	160	500	1,600	5,000
20 kg	10	30	100	300	1,000	3,000	10,000
50 kg	25	80	250	800	2,500	8,000	25,000
100 kg		160	500	1,600	5,000	16,000	50,000
200 kg		300	1,000	3,000	10,000	30,000	100,000
500 kg		800	2,500	8,000	25,000	80,000	250,000
1,000 kg		1,600	5,000	16,000	50,000	160,000	500,000
2,000 kg			10,000	30,000	100,000	300,000	1,000,000
5,000 kg			25,000	80,000	250,000	800,000	2,500,000

Comparator Application Ranges

The illustrations below show the calculated calibration ranges for OIML weights according OIML R111 at zero meter altitude. To select the right comparator just take the OIML Class of your test weights and the calibration ranges you wish to calibrate and look them up in the tables below. Laboratories at altitudes higher than zero meter altitude should consult with a METTLER TOLEDO specialist for professional evaluation.



Vacuum, Robotic, Automated and Volume Comparators



Manual Comparators



Comparator	M_one	M_10	AX1007CP	AX107H	AX106H
Material No.	On request	On request	30217170	11115765	11115755
OIML Calibration Range "E0"*	100 g–1 kg	1 kg–10 kg	100 g–1 kg	10 g–100 g	10 g–100 g
OIML Calibration Range E1	100 g–1 kg	1 kg–10 kg	100 g–1 kg	10 g–100 g	10 g–100 g
OIML Calibration Range E2	100 g–1 kg	1 kg–10 kg	100 g–1 kg	10 g–100 g	10 g–100 g
OIML Calibration Range F1	100 g–1 kg	1 kg–10 kg	100 g–1 kg	10 g–100 g	10 g–100 g
OIML Calibration Range F2	100 g–1 kg	1 kg–10 kg	100 g–1 kg	10 g–100 g	10 g–100 g
Maximum load	1,001.5 g	10,011 g	1,001.5 g	111 g	111 g
Readability	0.1 µg	1 µg	0.1 µg	0.1 µg	1 µg
Repeatability (5×ABA)	0.5 µg (1 kg)	8 µg (10 kg)	0.5 µg (1 kg)	0.8 µg (100 g)	1.5 µg (100 g)
Repeatability typical ABA	0.3 µg	4 µg	0.4 µg	0.6 µg	1.2 µg
Electrical weighing range	0–1.5 g	0–11 g	0–1.5 g	0–11 g	0–11 g
Dial weights	External	External	500, 200, 200, 100 g	50, 30, 10, 10 g	50, 30, 10, 10 g
Linearity	2 µg	8 µg	2 µg	8 µg	8 µg
Eccentric load deviation (at test load)	0.0 ng (1 g)	0.0 ng (10 g)	0.0 µg (1 g)	0.0 ng (10 g)	0.0 µg (10 g)
Settling time	30 s	30 s	30 s	30 s	10 s
Adjustment built-in	Motorized	Motorized	Motorized	Motorized	Motorized
Adjustment with external weight	1 g	10 g	1 g	10 g	10 g

Standard Equipment

Turntable	6 positions	4 positions	4 positions	4 positions	4 positions
Round bell chamber	Vacuum	Vacuum	Constant pressure	–	–
Draft shield	–	–	–	Motorized	Motorized
Self centering pan	Integrated	Integrated	Integrated	Integrated	Integrated
Weighing pan	Hanging pan	Hanging pan	Hanging pan	Hanging pan	Hanging pan
SmartScreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen
SmartSens	Standard	Standard	Standard	Standard	Standard
Separate display	Standard	Standard	Standard	Standard	Standard
Windows® PC with control software	Standard	Standard	Standard	Standard	Standard
Rack for control & display unit	Optional	Optional	Optional	–	–

Admissible Ambient Conditions

Temperature (°C)	17–27	17–27	17–27	17–27	17–27
Max. temperature change (°C/12 h)	0.1	0.1	0.5	0.5	0.5
Relative humidity (%)	45–60	45–60	45–60	45–60	45–60

Dimensions

Comparator (W×D×H, mm)	Varies upon configuration.	684×884×930	252×340×573	346×514×432	346×514×432
Comparator weight (kg)		350	90	23	23
Control unit for weight handler (W×D×H, mm)	202×197×92	202×197×92	226×370×155	226×370×155	226×370×155
Weight diameter (D, mm)	Cylindrical: 22–90 Spherical: 40–100	Cylindrical: 18–105 Spherical: 18–110	18–80	8–30	8–30
Weight height (H, mm)	100	195	90	70	70

* 1/5 uncertainty contribution of the E1 tolerance limit

Note: All values are guaranteed unless otherwise specified.



Comparator	AX1006	AX10005	AX16004	AX32004	AX64004
Material No.	11115725	11115785	11115815	11115845	11115875
OIML Calibration Range "E0"*	50 g–1 kg	1 kg–10 kg	5 kg–10 kg	5 kg–20 kg	5 kg–50 kg
OIML Calibration Range E1	20 g–1 kg	1 kg–10 kg	2 kg–10 kg	2 kg–20 kg	5 kg–50 kg
OIML Calibration Range E2	20 g–1 kg	1 kg–10 kg	1 kg–10 kg	1 kg–20 kg	1 kg–50 kg
OIML Calibration Range F1	20 g–1 kg	1 kg–10 kg	1 kg–10 kg	1 kg–20 kg	1 kg–50 kg
OIML Calibration Range F2	20 g–1 kg	1 kg–10 kg	1 kg–10 kg	1 kg–20 kg	1 kg–50 kg
Maximum load	1,011 g	10,011 g	16,260 g	32,260 g	64,260 g
Readability	1 µg	10 µg	0.1 mg	0.1 mg	0.1 mg
Repeatability (5 × ABA)	2 µg (1 kg)	20 µg (10 kg)	0.2 mg (10 kg)	0.2 mg (20 kg)	0.4 mg (50 kg)
Repeatability typical ABA	1.5 µg	15 µg	0.1 mg	0.1 mg	0.2 mg
Electrical weighing range	0–11 g	0–11 g	0–260 g	0–260 g	0–260 g
Dial weights	500, 300, 100, 100, 50, 30, 10, 10 g	5, 3, 1 kg	0.25, 0.25, 0.25, 0.25, 0.5, 0.5, 2, 2, 2, 4, 4 kg	0.25, 0.25, 0.25, 0.25, 0.5, 0.5, 2, 2, 2, 4, 4, 8, 8 kg	0.25, 0.25, 0.25, 0.25, 0.5, 0.5, 2, 2, 2, 8, 8, 8, 8, 8, 8 kg
Linearity	8 µg	0.05 mg	0.5 mg	0.5 mg	0.5 mg
Eccentric load deviation (at test load)	0.0 µg (10 g)	0.0 µg (10 g)	0.0 mg (260 g)	0.0 mg (260 g)	0.0 mg (260 g)
Settling time	10 s	15 s	25 s	25 s	25 s
Adjustment built-in	Motorized	Motorized	Motorized	Motorized	Motorized
Adjustment with external weight	10 g	10 g	200 g	200 g	200 g
Standard Equipment					
Weight handler	4 positions	4 positions	4 positions	4 positions	4 positions
Draft shield	Motorized	Standard	Glass bells	Glass bells	Glass bells
Self centering pan	Integrated	Integrated	Integrated	Integrated	Integrated
Weighing pan	Hanging pan	Hanging pan	LevelMatic	LevelMatic	LevelMatic
SmartScreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen
SmartSens	Standard	Standard	Standard	Standard	Standard
Separate display	Standard	Standard	Standard	Standard	Standard
Windows® PC with control software	Standard	Standard	Standard	Standard	Standard
Rack for control & display unit	–	–	Standard	Standard	Standard
Admissible Ambient Conditions					
Temperature (°C)	17–27	17–27	17–27	17–27	17–27
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	45–60	45–60	45–60	45–60	45–60
Dimensions					
Comparator (W × D × H, mm)	346 × 514 × 432	315 × 720 × 850	1,200 × 1,200 × 1,500	1,200 × 1,200 × 1,500	1,200 × 1,200 × 1,500
Comparator weight (kg)	25	85	230	260	290
Control unit for weight handler (W × D × H, mm)	226 × 370 × 155	226 × 370 × 155	226 × 370 × 155	226 × 370 × 155	226 × 370 × 155
Weight diameter (D, mm)	12–60	16–110	40–340	40–340	40–340
Weight height (H, mm)	95	200	350	350	350

* 1/5 uncertainty contribution of the E1 tolerance limit

Note: All values are guaranteed unless otherwise specified.

Important

The stated specifications and technical data apply only under good ambient conditions. Disruptive factors at the place of installation, such as strong drafts (especially from air conditioning equipment), excessive vibrations, physical effects of the items being weighed (e.g. magnetic fields or electrostatic charges), or ambient conditions outside the allowable tolerances, may adversely affect on the specifications.



Comparator	e5	e100	a10XL	a107	a1006XL	AX32004-M10
Material No.	30402190	30402191	30370207	11107547	30404059	On request
OIML Calibration Range "E0"*	1 mg–5 g	1 g–100 g	1 mg–10 g	1 g–100 g	10 g–1 kg	5 kg–20 kg
OIML Calibration Range E1	1 mg–5 g	1 g–100 g	0.05 mg–10 g	1 g–100 g	10 g–1 kg	2 kg–20 kg
OIML Calibration Range E2	1 mg–5 g	1 g–100 g	0.05 mg–10 g	1 g–100 g	10 g–1 kg	1 kg–20 kg
OIML Calibration Range F1	1 mg–5 g	1 g–100 g	0.05 mg–10 g	1 g–100 g	10 g–1 kg	1 kg–20 kg
OIML Calibration Range F2	1 mg–5 g	1 g–100 g	0.05 mg–10 g	1 g–100 g	10 g–1 kg	1 kg–20 kg
Maximum load	6.1 g	111 g	10.1 g	111 g	1,011 g	21,260 g
Readability	0.1 µg	1 µg	0.1 µg	0.1 µg	1 µg	0.1 mg
Repeatability (5×ABA)	0–1 g: 0.15 µg >1–2 g: 0.25 µg >2–6 g: 0.4 µg	1.6 µg	0–1 g: 0.15 µg >1–2 g: 0.25 µg >2–6 g: 0.4 µg >6–10 g: 0.6 µg	1 µg	10–100 g: 3 µg >100–500 g: 4.5 µg >500–1,000 g: 8 µg	0.2 mg
Repeatability typical ABA	0–1 g: 0.08 µg >1–2 g: 0.12 µg >2–6 g: 0.25 µg	1.3 µg	0–1 g: 0.08 µg >1–2 g: 0.12 µg >2–6 g: 0.25 µg >6–10 g: 0.4 µg	0.9 µg	10–100 g: 2 µg >100–500 g: 3.5 µg >500–1,000 g: 5 µg	0.1 mg
Electrical weighing range	0–6.1 g	0–11 g	0–10.1 g	0–11 g	0–11 g	0–260 g
Dial weights	–	50, 30, 10, 10 g	–	50, 30, 10, 10 g	500, 300, 200, 100, 50, 30, 10, 10 g	0.25, 0.25, 0.25, 0.25, 0.5, 0.5, 2, 2, 2, 4, 4 kg
Linearity	4 µg	8 µg	2 µg	8 µg	8 µg	0.5 mg
Eccentric load deviation (at test load)	0.0 ng (5 g)	0.0 µg (10 g)	0.0 ng (5 g)	0.0 µg (10 g)	0.0 µg (100 g)	0.0 mg (260 g)
Settling time	20 s	20 s	20 s	30 s	30 s	20 s
Adjustment built-in	Motorized	Motorized	Motorized	Motorized	Motorized	Motorized
Adjustment with external weight	5 g	10 g	10 g	10 g	10 g	200 g
Standard Equipment						
Weight handler	3-axis robot	3-axis robot	3-axis robot	3-axis robot	3-axis robot	3-axis robot
Weight magazine	60 positions	27 positions	100 positions	30 positions	21 positions	10 positions
Draft shield	Motorized	Motorized	Motorized	Motorized	Motorized	Standard
Weighing pan	Fork/Hook-shaped	Fork-shaped	Fork/Hook-shaped	Fork-shaped	Fork-shaped	LevelMatic
SmartScreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen
SmartSens	Standard	Standard	Standard	Standard	Standard	Standard
Separate display	Standard	Standard	Standard	Standard	Standard	Standard
Windows® PC with control software	Standard	Standard	Standard	Standard	Standard	Standard
Rack for control & display unit	–	–	–	–	–	Standard
Admissible Ambient Conditions						
Temperature (°C)	17–27	17–27	17–27	17–27	17–27	17–27
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	45–60	45–60	45–60	45–60	45–60	45–60
Dimensions						
Comparator (W×D×H, mm)	1,080×700×760	1,280×900×760	1,672×897×1,870	1,430×890×1,730	1,672×897×1,870	2,700×1,400×2,158
Comparator weight (kg)	50	60	290	290	290	480
Weight diameter (D, mm)	Cylindrical: 4–14 Wire: 5.5–18 Sheet: 4–14	6–26	Cylindrical: 4–14 Wire: 5.5–18 Sheet: 4–14	6–26	10–60	Cylindrical: 48–200 Block: 23×200
Weight height (H, mm)	Cylindrical: 16 Wire: 6	50	Cylindrical: 16 Wire: 6	50	85	235

* = 1/5 uncertainty contribution of the E1 tolerance limit

Note: All values are guaranteed unless otherwise specified.



	VC1005X	VMS2	VMS20	Susceptometer S50-K
Material No.	11115965	30047443	30047444	11116880
OIML Calibration Range *E0**	1 g–1 kg	–	–	–
OIML Calibration Range E1	1 g–1 kg	–	1 kg–20 kg	1 g–50 kg
OIML Calibration Range E2	1 g–1 kg	1 g–2 kg	1 kg–20 kg	1 g–50 kg
OIML Calibration Range F1	1 g–1 kg	1 g–2 kg	1 kg–20 kg	1 g–50 kg
OIML Calibration Range F2	1 g–1 kg	1 g–2 kg	1 kg–20 kg	1 g–50 kg
OIML Calibration Range M1	–	–	–	1 g–50 kg
Recommended comparator	Built-in	XPR2004SC	XPR26003LC	XPR6U
Weight handler	Turntable, 4 positions	Manual, 1 position	Manual, 2 positions	–
Readability	10 µg	0.1 mg	1 mg	0.1 µg
Electrical range	109 g	2,300 g	26.1 kg	6.1 g
Dial weights	500, 300, 100, 100 g	–	–	–
Disc weights (support weight <100 g)	4 pieces	–	–	–
Measuring time	15 s	15 s	15 s	15 s
External adjustment	100 g	1–2 kg	10–25 kg	5 g
Object diameter (D, mm)	12–94	6–70	45–140	≤260
Object height (H, mm)	1–94	5–130	70–270	≤500
Sphere diameter (D, mm)	12–94	–	–	–

Susceptometer Specific

Dipole moment of magnets	–	–	–	≤0.1 Am ²
Distance platform/center of magnet Z ₀	–	–	–	18.8–60.0
Magnetizing field strength (max.)	–	–	–	2,000, 800 A/m
Res. magnetization for 1 digit µT (E1)	–	–	–	≥0.001/0.01
Res. susceptibility x for 1 digit (E1)	–	–	–	≥0.000,001/0.000,01

Operation

Comparator	Standard, built-in	Required option	Required option	Required option
Operating software – user guided	Standard	Standard, Windows® PC	Standard, Windows® PC	Required option
Controller – storage of processes	Standard, Windows® PC	Optional	Optional	Required option
SmartGeo – weight geometries database	–	–	–	With optional software
Touchscreen with SmartSens	Standard	With XPR comparator	With XPR comparator	With XPR comparator
Precision thermometer	Standard	Standard	Standard	–
Fluid	Standard	–	–	–
Susceptometer hardware bridge	–	–	–	Standard
Low permeability/susceptibility reference	–	–	–	Required option
Susceptometer magnet calibration set	–	–	–	Optional

Admissible Ambient Conditions

Temperature (°C)	17–27	17–27	17–27	17–27
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5
Relative Humidity (%)	40–70	40–70	40–70	40–70

Dimensions

Equipment (W×D×H, mm)	810×760×1,500	380×810×890	765×1,000×1,840	270×425×160
Equipment net weight (kg)	94	44	215	5

* = 1/5 uncertainty contribution of the E1 tolerance limit

Note: All values are guaranteed unless otherwise specified.

Important

The stated specifications and technical data apply only under good ambient conditions. Disruptive factors at the place of installation, such as strong drafts (especially from air conditioning equipment), excessive vibrations, physical effects of the items being weighed (e.g. magnetic fields or electrostatic charges), or ambient conditions outside the allowable tolerances, may adversely affect on the specifications.



Comparator	XPR6U	XPR36C	XPR56C	AX106	AX206
Material No.	30279276	30594503	30355547	11115635	11115935
OIML Calibration Range E1	0.05 mg–5 g	50 mg–20 g	100 mg–50 g	1 g–100 g	5 g–200 g
OIML Calibration Range E2	0.05 mg–5 g	0.05 mg–20 g	0.05 mg–50 g	50 mg–100 g	100 mg–200 g
OIML Calibration Range F1	0.05 mg–5 g	0.05 mg–20 g	0.05 mg–50 g	1 mg–100 g	1 mg–200 g
OIML Calibration Range F2	0.05 mg–5 g	0.05 mg–20 g	0.05 mg–50 g	1 mg–100 g	1 mg–200 g
OIML Calibration Range M1	1 mg–5 g	1 mg–20 g	1 mg–50 g	1 mg–100 g	1 mg–200 g
OIML Calibration Range M2	100 mg–5 g	100 mg–20 g	100 mg–50 g	100 mg–100 g	100 mg–200 g
Maximum load	6.1 g	32 g	52 g	111 g	211 g
Readability	0.1 µg	1 µg	1 µg	1 µg	1 µg
Repeatability absolute	0.4 µg	2.5 µg	4 µg	–	–
Repeatability Nominal Load (5×ABA)	0.4 µg (5 g)	1.5 µg (20 g)	2 µg (50 g)	3 µg (100 g)	4 µg (200 g)
Repeatability Low Load (5×ABA)	0.25 µg (0.2 g)	0.7 µg (1 g)	0.8 µg (2 g)	3 µg (5 g)	4 µg (10 g)
Repeatability typical ABA	0.27 µg (5 g)	0.6 µg (1 g)	0.7 µg (2 g)	2 µg (100 g)	2.5 µg (200 g)
Electrical weighing range	0–6.1 g	0–32 g	0–52 g	0–11 g	0–11 g
Dial weights	–	–	–	50, 30, 10, 10 g	50, 30, 10, 10 g 100 g disc weight
Linearity (typical)	2 µg	5 µg	5 µg	8 µg	8 µg
Eccentric load deviation	0.0 mg (hook pan)	0.00 mg (20 g)	0.00 mg (50 g)	0.0 µg (10 g)	0.0 µg (10 g)
Settling time	<15 s	3.5 s	3.5 s	5 s	5 s
Adjustment built-in	ProFACT	ProFACT	ProFACT	ProFACT	ProFACT
Adjustment with external weight	1–6 g	5–20 g	10–50 g	10 g	10 g

Standard Equipment

Mass calibration software	MC Link	MC Link	MC Link	MC Link	MC Link
Draft shield	Motorized	Motorized	Motorized	Motorized	Motorized
Self centering pan	Hook pan	Hanging pan	Hanging pan	Hanging pan	Hanging pan
Below the balance weighing	Ready	Ready	Ready	Included	Included
Weighing pan	Round pan & hook	Hanging & grid pan	Hanging & grid pan	Hanging/top load	Hanging/top load
Touchscreen terminal	7" Color touchscreen & SmartView	7" Color touchscreen	7" Color touchscreen	Touchscreen	Touchscreen
SmartSens/LevelControl	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
USB-Host/USB/LAN/RS232	1/3/1/–	1/3/1/–	1/3/1/–	–/–/–/1	–/–/–/1

Admissible Ambient Conditions

Temperature (°C)	10–30	10–30	10–30	10–30	10–30
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	40–70	40–70	40–70	40–70	40–70

Dimensions

Comparator (W×D×H, mm)	128×287×113	195×485×292	195×485×292	241×353×291	241×353×291
Comparator weight (kg)	7.5	10.1	10.1	13.5	13.5
Weighing pan (mm)	∅ 14 Hook/16	∅ 35/40×40	∅ 35/40×40	∅ 60 (45)	∅ 60 (45)
Object diameter (D, mm)	0–9/13	0–35	0–35	0–45	0–45
Object height (H, mm)	0–26/50	0–70 (235)	0–70 (235)	0–85 (120)	0–85 (120)

Note: All values are guaranteed unless otherwise specified.



Comparator	XPR226CDR	XPE505C	AX1005	AX1004	AX2005
Material No.	30594507	30137978	11115665	11115695	11115975
OIML Calibration Range E1 ■	100 g–200 g	200 g–500 g	200 g–1 kg	1 kg	500 g–2 kg
OIML Calibration Range E2 ■	2 g–200 g	10 g–500 g	20 g–1 kg	500 g–1 kg	100 g–2 kg
OIML Calibration Range F1 ■	50 mg–200 g	500 mg–500 g	1 g–1 kg	100 g–1 kg	10 g–2 kg
OIML Calibration Range F2 ■	1 mg–200 g	10 mg–500 g	100 mg–1 kg	10 g–1 kg	1 g–2 kg
OIML Calibration Range M1 ■	1 mg–200 g	1 mg–500 g	1 mg–1 kg	200 mg–1 kg	20 mg–2 kg
OIML Calibration Range M2 ■	100 mg–200 g	100 mg–500 g	100 mg–1 kg	100 mg–1 kg	100 mg–2 kg
Maximum load	220 g/121 g	520 g	1,109 g	1,109 g	2,109 g
Readability	0.01 mg/0.005 mg	0.01 mg	0.01 mg	0.1 mg	0.01 mg
Repeatability absolute	0.025 mg	0.06 mg	–	–	–
Repeatability Nominal Load (5×ABA)	0.02 mg (200 g)	0.035 mg (500 g)	0.02 mg (1 kg)	0.07 mg (1 kg)	0.04 mg (2 kg)
Repeatability Low Load (5×ABA)	0.005 mg (10 g)	0.01 mg (20 g)	0.02 mg (50 g)	0.07 mg (1 kg)	0.04 mg (100 g)
Repeatability typical ABA	0.012 mg (200 g)	0.008 mg + 4×10 ⁻⁸ • Rgr	0.015 mg (1 kg)	0.05 mg (1 kg)	0.025 mg (2 kg)
Electrical weighing range	0–220 g	0–520 g	0–109 g	0–109 g	0–109 g
Dial weights	–	–	500, 300, 100, 100 g	500, 300, 100, 100 g	500, 300, 100, 100 g
Linearity (typical)	0.1 mg	0.2 mg	0.06 mg	0.08 mg	0.06 mg
Eccentric load deviation	0.06 mg (200 g)	0.2 mg (500 g)	0.0 µg (100 g)	0.0 µg (100 g)	0.0 µg (100 g)
Settling time	5 s	5 s	5 s	5 s	5 s
Adjustment built-in	ProFACT	ProFACT	ProFACT	ProFACT	ProFACT
Adjustment with external weight	100–200 g	100–500 g	100 g	100 g	100 g

Standard Equipment

Mass calibration software	MC Link	MC Link	MC Link	MC Link	MC Link
Draft shield	Motorized	Motorized	Motorized	Motorized	Motorized
Self centering pan	–	–	Hanging pan	Hanging pan	Hanging pan
Below the balance weighing	Ready	Ready	Included	Included	Included
Weighing pan	Grid pan	Grid pan	Hanging/top load	Hanging/top load	Hanging/top load
Touchscreen terminal	7" Color touchscreen	Color touchscreen	Touchscreen	Touchscreen	Touchscreen
SmartSens/LevelControl	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
USB-Host/USB/LAN/RS232	1/3/1/–	–/–/–/1	–/–/–/1	–/–/–/1	–/–/–/1

Admissible Ambient Conditions

Temperature (°C)	10–30	10–30	10–30	10–30	10–30
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	40–70	40–70	40–70	40–70	40–70

Dimensions

Comparator (W×D×H, mm)	195×485×292	263×482×322	241×353×291	241×353×291	241×353×291
Comparator weight (kg)	9.4	10.0	13.5	13.5	13.5
Weighing pan (mm)	78×73	78×73	∅ 100	∅ 100	∅ 100
Object diameter (D, mm)	0–73	0–73	0–80	0–80	0–80
Object height (H, mm)	0–235	0–235	0–135	0–135	0–135

Note: All values are guaranteed unless otherwise specified.

Important

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Comparator	XPR2004SC	XPR2003SC	XPR5004SC	XPR5003SC	XPR10003SC	AX12004
Material No.	30317628	30137627	30317640	30317629	30317641	11137811
OIML Calibration Range E1 ■	2 kg	–	5 kg	–	10 kg	2 kg–10 kg
OIML Calibration Range E2 ■	500 g–2 kg	–	1 kg–5 kg	5 kg	5 kg–10 kg	1 kg–10 kg
OIML Calibration Range F1 ■	200 g–2 kg	1 kg–2 kg	500 g–5 kg	1 kg–5 kg	1 kg–10 kg	500 g–10 kg
OIML Calibration Range F2 ■	20 g–2 kg	500 g–2 kg	200 g–5 kg	500 g–5 kg	500 g–10 kg	500 g–10 kg
OIML Calibration Range M1 ■	500 mg–2 kg	200 g–2 kg	10 g–5 kg	200 g–5 kg	200 g–10 kg	500 g–10 kg
OIML Calibration Range M2 ■	100 mg–2 kg	10 g–2 kg	500 mg–5 kg	10 g–5 kg	10 g–10 kg	500 g–10 kg
Maximum load	2,300 g	2,300 g	5,100 g	5,100 g	10,100 g	12,111 g
Readability	0.1 mg	1 mg	0.1 mg	1 mg	1 mg	0.1 mg
Repeatability absolute	0.6 mg	1 mg	1.3 mg	1.5 mg	3.5 mg	–
Repeatability Nominal Load (5×ABA)	0.25 mg (2 kg)	0.8 mg (2 kg)	0.5 mg (5 kg)	0.8 mg (5 kg)	1.5 mg (10 kg)	0.25 mg (10 kg)
Repeatability Low Load (5×ABA)	0.1 mg (100 g)	0.6 mg (100 g)	0.5 mg (200 g)	0.8 mg (200 g)	1.2 mg (500 g)	0.25 mg (1 kg)
Repeatability typical 5×ABA (at test load)	0.15 mg (2 kg)	0.5 mg (2 kg)	0.4 mg (5 kg)	0.7 mg (5 kg)	0.8 mg (10 kg)	0.15 mg (10 kg)
Electrical weighing range	0–2,300 g	0–2,300 g	0–5,100 g	0–5,100 g	0–10,100 g	0–111 g
Dial weights	–	–	–	–	–	5, 3, 2, 1, 1 kg
Linearity (typical)	0.5 mg	0.7 mg	1.0 mg	1 mg	3.2 mg	0.45 mg
Eccentric load deviation	Eliminated through LevelMatic	2.6 mg (1 kg)	Eliminated through LevelMatic	Eliminated through LevelMatic	Eliminated through LevelMatic	0.0 mg
Settling time	3.5 s	3.5 s	3.5 s	3.5 s	3.5 s	10 s
Adjustment built-in	ProFACT	ProFACT	ProFACT	ProFACT	ProFACT	Built in 100 g E2
Adjustment with external weight	1–2 kg	1–2 kg	1–5 kg	1–5 kg	2–10 kg	100 g
Standard Equipment						
Mass calibration software	MC Link	MC Link	MC Link	MC Link	MC Link	MC Link
Draft shield	Standard	Standard	Standard	Standard	Standard	Standard
Self centering pan	LevelMatic	Optional	LevelMatic	LevelMatic	LevelMatic	Hanging pan
Below the balance weighing	Included	Included	Included	Included	Included	–
Weighing pan	LevelMatic/ square/SmartPan	Square/SmartPan	LevelMatic/ square/SmartPan	LevelMatic/ square/SmartPan	LevelMatic/ square/SmartPan	Hanging with 10 kg weight handler
Touchscreen terminal	7" capacitive Color	7" capacitive color	7" capacitive color	7" capacitive color	7" capacitive color	Touchscreen
SmartSens/LevelControl	–/Yes	–/Yes	–/Yes	–/Yes	–/Yes	–/Yes
USB-Host/USB/LAN/RS232	1/3/1/–	1/3/1/–	1/3/1/–	1/3/1/–	1/3/1/–	–/–/–/1
Admissible Ambient Conditions						
Temperature (°C)	10–30	10–30	10–30	10–30	10–30	10–30
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	40–70	40–70	40–70	40–70	40–70	40–70
Dimensions						
Comparator (W×D×H, mm)	214×260×368	214×260×368	214×260×368	214×260×368	385×478×614	837×614×952
Comparator weight (kg)	8.3	8.3	8.3	8.3	17.2	62.5
Weighing pan (mm)	∅ 130	127×127	∅ 130	∅ 130	∅ 130	∅ 220
Object diameter (D, mm)	0–130	0–125	0–030	0–130	0–130	34–220
Object height (H, mm)	0–228	0–248	0–228	0–228	0–335	0–230

Note: All values are guaranteed unless otherwise specified.



Comparator	XPR26003LC	XPR32003LD5C	XPR64003LD5C	XPR64002LC	XPR64002LC-T
Material No.	30317642	30317643	30317644	30317645	30317646
OIML Calibration Range E1 ■	20 kg	–	–	–	–
OIML Calibration Range E2 ■	10 kg–20 kg	–	20 kg–50 kg	–	–
OIML Calibration Range F1 ■	2 kg–20 kg	20 kg	5 kg–50 kg	50 kg	50 kg
OIML Calibration Range F2 ■	1 kg–20 kg	5 kg–20 kg	2 kg–50 kg	10 kg–50 kg	10 kg–50 kg
OIML Calibration Range M1 ■	500 g–20 kg	2 kg–20 kg	1 kg–50 kg	5 kg–50 kg	5 kg–50 kg
OIML Calibration Range M2 ■	100 g–20 kg	500 g–20 kg	200 g–50 kg	1 kg–50 kg	1 kg–50 kg
Maximum load	26.1 kg	32.1 kg	64.1 kg	64.1 kg	64.1 kg
Readability	1 mg	5 mg	5 mg	10 mg	10 mg
Repeatability absolute	6 mg	15 mg	15 mg	35 mg	35 mg
Repeatability Nominal Load (5×ABA)	2.5 mg (20 kg)	8 mg (20 kg)	8 mg (50 kg)	25 mg (50 kg)	25 mg (50 kg)
Repeatability Low Load (5×ABA)	2 mg (1 kg)	5 mg (2 kg)	4 mg (2 kg)	10 mg (5 kg)	10 mg (5 kg)
Repeatability typical 5×ABA (at test load)	2 mg (20 kg)	5 mg (20 kg)	7 mg (50 kg)	20 mg (50 kg)	20 mg (50 kg)
Electrical weighing range	0–26,100 g	0–32,100 g	0–64,100 g	0–64,100 g	0–64,100 g
Linearity (typical)	11 mg	18 mg	28 mg	28 mg	28 mg
Eccentric load deviation (at test load)	Eliminated through LevelMatic	0.25 g (10 kg)	Eliminated through LevelMatic	0.4 g (25 kg)	0.5 g (25 kg)
Settling time	8–12 s	8–12 s	8–12 s	8–12 s	8–12 s
Adjustment built-in	ProFACT	ProFACT	ProFACT	ProFACT	ProFACT
Adjustment with external weight	5–25 kg	5–30 kg	10–60 kg	10–60 kg	10–60 kg

Standard Equipment

Mass calibration software	MC Link	MC Link	MC Link	MC Link	MC Link
Draft shield	Standard	Optional	Standard	Optional	–
Self centering pan	LevelMatic	–	LevelMatic	–	–
Below the balance weighing	Ready	Ready	Ready	Ready	–
Weighing pan	LevelMatic	Square	LevelMatic	Square	Round
Touchscreen terminal	7" capacitive color	7" capacitive color	7" capacitive color	7" capacitive color	7" capacitive color
SmartSens/LevelControl	–/Yes	–/Yes	–/Yes	–/Yes	–/Yes
USB-Host/USB/LAN/RS232	1/3/1/–	1/3/1/–	1/3/1/–	1/3/1/–	1/3/1/–

Admissible Ambient Conditions

Temperature (°C)	10–30	10–30	10–30	10–30	10–30
Max. temperature change (°C/12 h)	0.5	0.5	0.5	0.5	0.5
Relative humidity (%)	40–70	40–70	40–70	40–70	40–70

Dimensions

Comparator (W×D×H, mm)	360×280×185	360×280×130	360×280×185	360×280×130	845×445×295
Comparator weight (kg)	15.7	10.7	15.7	10.7	22
Weighing pan (mm)	∅ 220	360×280	∅ 220	360×280	∅ 220
Object diameter (D, mm)	0–220	0–280	0–220	0–280	0–220
Object height (H, mm)	0–395	–	0–395	–	–

Note: All values are guaranteed unless otherwise specified.

Important

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Comparator	XPE155KSC XS155KSX	XPE604KMC XS604KMX	XPE1003KMC XS1003KMX	XPE2003KLC XS2003KLX	XPE6002KLC XS6002KLX
Part No.	30210661 22026938	30210662 22026939	30210664 22026941	30210665 22026942	30210666 22026943
OIML Calibration Range E1	–	–	–	–	–
OIML Calibration Range E2	–	–	–	–	–
OIML Calibration Range F1	–	200 kg–500 kg/ –kg	–	–	–
OIML Calibration Range F2	50 kg–100 kg 100 kg*	100 kg–500 kg 500 kg*	500 kg–1,000 kg 1,000 kg*	–	–
OIML Calibration Range M1	20 kg–100 kg 50 kg–100 kg*	50 kg–500 kg 200 kg–500 kg*	200 kg–1,000 kg 500 kg–1,000 kg*	1,000 kg–2,000 kg 1,000 kg–2,000 kg*	–
OIML Calibration Range M2	5 kg–100 kg 10 kg–100 kg*	10 kg–500 kg 50 kg–500 kg*	50 kg–1,000 kg 100 kg–1,000 kg*	200 kg–2,000 kg 500 kg–2,000 kg*	5,000 kg
Maximum load	150 kg	600 kg	1,100 kg	2,500 kg	5,400 kg
Readability	0.05 g	0.1 g	0.5 g	1 g	10 g
Repeatability absolute	0.15 g	0.3 g	2 g	10 g	100 g
Repeatability Nominal Load (5×ABA)	0.12 g (100 kg)	0.23 g (500 kg)	1.5 g (1,000 kg)	7 g (2,000 kg)	70 g (5,000 kg)
Repeatability Low Load (5×ABA)	0.09 g (5 kg)	0.15 g (20 kg)	1 g (50 kg)	4 g (100 kg)	50 g (500 kg)
Repeatability typical 5×ABA (at test load)	0.07 g + 3.2 × 10 ⁻⁰⁷ • Rgr	0.11 g + 1.5 × 10 ⁻⁰⁷ • Rgr	0.6 g + 4.2 × 10 ⁻⁰⁷ • Rgr	3 g + 1.3 × 10 ⁻⁰⁶ • Rgr	40 g + 4.2 × 10 ⁻⁰⁶ • Rgr
Electrical weighing range	0–150 kg	0–600 kg	0–1,100 kg	0–2,500 kg	0–5,400 kg
Linearity (typical)	2 g	10 g	20 g	100 g	300 g
Eccentric load deviation (at test load)	5 g (50 kg)	40 g (200 kg)	40 g (500 kg)	120 g (1,000 kg)	240 g (2,000 kg)
Settling time	5 s	5 s	5 s	5 s	5 s
Adjustment built-in	ProFACT	ProFACT	ProFACT	ProFACT	ProFACT
Adjustment with external weight	50 kg–150 kg	200 kg–600 kg	200 kg–1,000 kg	500 kg–2,500 kg	1,000 kg–5,000 kg

Standard Equipment

Mass calibration software	MC Link	MC Link	MC Link	MC Link	MC Link
Draft shield	Optional, 11116556	Optional, 11116557	Optional, 11116557	Optional, 11116558	Optional, 11116558
LevelMatic	Optional, 22001940	Optional, 22001940	Optional, 11116554	Optional, 11116554	Optional, 11116554
Weighing pan	Square	Square	Square	Square	Square
Touchscreen terminal	Standard	Standard	Standard	Standard	Standard
SmartSens/LevelControl	–/–	–/–	–/–	–/–	–/–
USB-Host/USB/LAN/RS232	–/–/–/1	–/–/–/1	–/–/–/1	–/–/–/1	–/–/–/1

Admissible Ambient Conditions

Temperature (°C)	10–30	10–30	10–30	10–30	10–30
Max. temperature change (°C/12 h)	1	1	1	1	1
Relative humidity (%)	40–70	40–70	40–70	40–70	40–70

Dimensions

Comparator (W×D×H, mm)	800×600×130	1,000×800×115	1,000×800×115	1,500×1,252×182	1,500×1,252×182
Comparator weight (kg)	40	91	91	353	353
Weighing pan (mm)	800×600	1,000×800	1,000×800	1,500×1,250	1,500×1,250
Object diameter (D, mm)	0–600	0–800	0–800	0–1,250	0–1,250

* Without LevelMatic

Note: All values are guaranteed unless otherwise specified.

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Climate Stations	ClimaLog30	DataLog30	Klimet A30
	30078423 (Certified)	30078424 (Certified)	222011 (Non-certified) 222012 (Certified)
Application Range			
E1	0–330 m	0–330 m	0–2,000 m
E2**	0–800 m	0–800 m	0–2,000 m
F1–M3**	0–2,000 m	0–2,000 m	0–2,000 m
Temperature			
Resolution (°C)	0.1	0.1	0.001
Range (°C)	–20 to 50	–20 to 50	15 to 25
Accuracy (°C)	±0.3	±0.3	±0.05
Relative Humidity			
Resolution (%)	0.5	–	0.01
Range (%)	10–95	–	10–80
Accuracy (%)	±2	–	±0.15
Pressure			
Resolution (hPa)	0.1	–	0.001
Range (hPa)	300–1,300	–	600–1,060
Accuracy (hPa)	±0.5	–	±0.04
Included Accessories			
	Air pressure sensor		Air pressure sensor
	Relative humidity sensor		Dew point mirror system
	Air temperature sensor	2 external temperature probes	Air temperature sensor
	USB and LAN interface	USB and LAN interface	1 temperature sensor inputs
	SmartGraph 3 software including: <ul style="list-style-type: none"> Graphical and numerical representation of measured values Export-ready data in *.csv format Data-recording mode 		
	DKD calibration certificate		Available as certified/non-certified system
Optional Accessories			
	DataLog30 for 2 additional external temperature sensors (cable length 1.5 m)		Pressure-tight Klimet A30V system available for special vacuum applications (e.g. M_one)
			CO ₂ content sensor (calibrated)
			Temperature sensor (cable length 2.5 m or 5.0 m)

** Without weight density determination

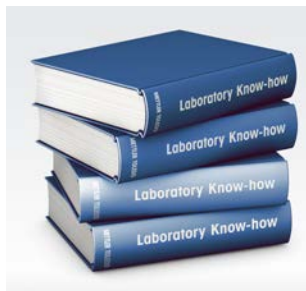


Special Weight Sets

For determination of the first weight decade 1 kg to 10 kg, the weight set for AX10005 is comprising 1 × 5 kg, 2 × 2 kg and 1 × 1 kg cylindrical weights.

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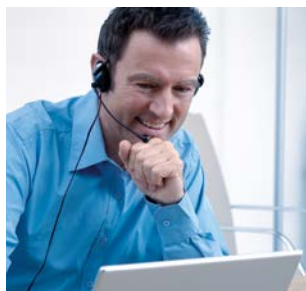


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