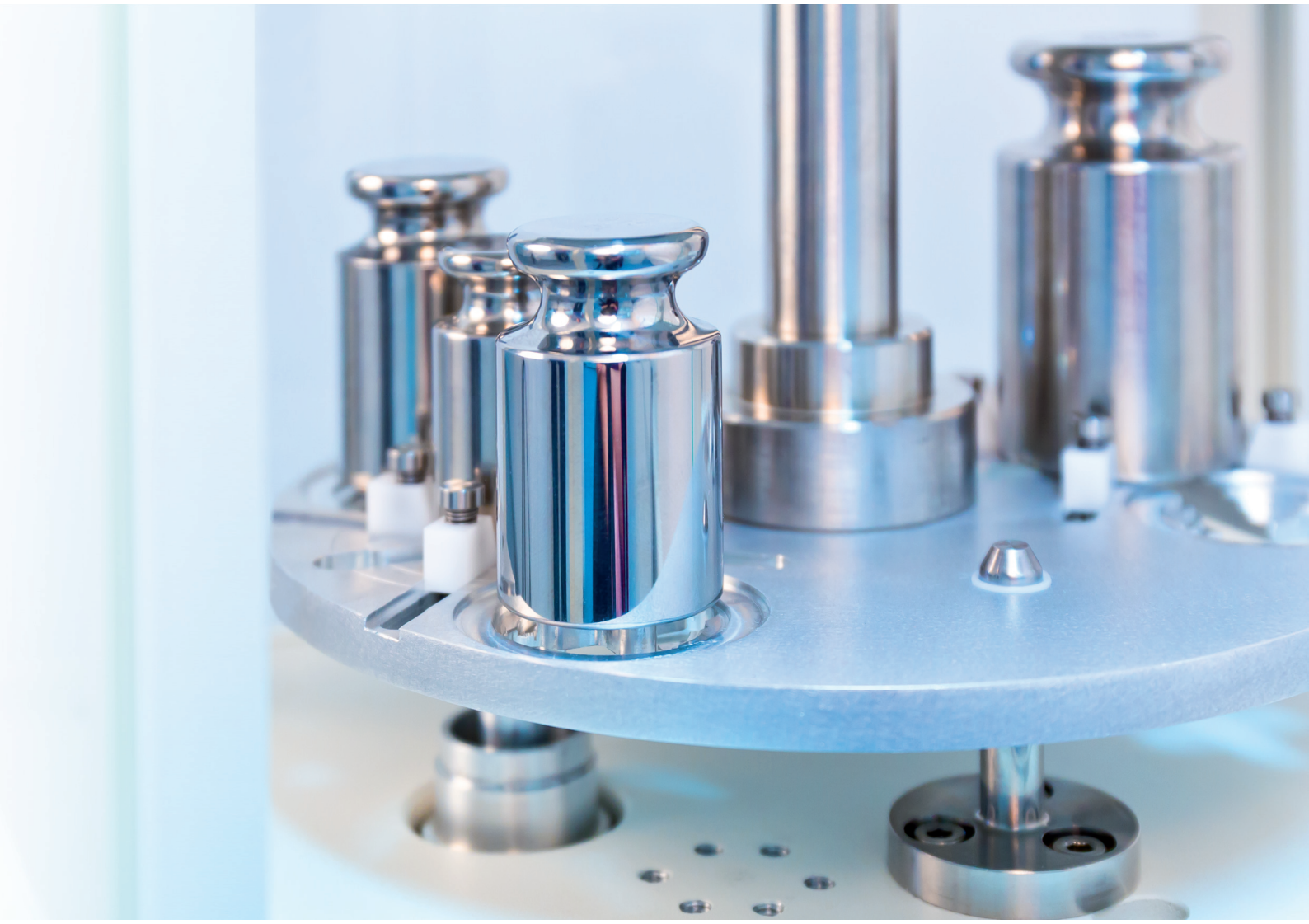
RADWAG BALANCES AND SCALES
ADVANCED WEIGHING TECHNOLOGIES



Mass Comparators

Advanced Radwag solutions for traceability of measurement

Automatic
Mass Comparators

Automatic Mass Comparators
UMA

Mass comparators of UMA series stand for the highest standard of professional automatic mass comparators. They provide comparison of 1 mg – 1000 g weights of E1 and lower classes.

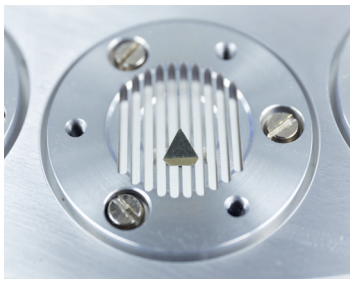
The device is equipped with 18 or 36 magazine positions allowing to deposit up to 36 weights. This solution allows to perform either comparison for complete set of weights carried out within one process or comparison for just a few weights of the same mass.

Owing to elimination of human factor and with temperature changes and air drafts reduced to zero, UMA automatic mass comparators provide the highest possible measurement repeatability.

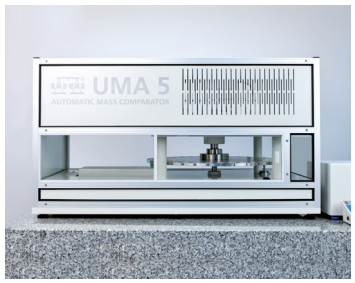
The UMA series, thanks to a vibration sensor inside the electronics, analyses and recognises vibrations origin. The sensor allows to determine whether the vibrations come from ground or other sources affecting the measurement result.

The weighing pan has been designed to enable measurement of very small samples with very high precision. This also secures a weight against wedging.

User-friendly and functional software guides you through preparation process of complete calibration plan within just a few minutes.



Comparison can be carried out for weights of all shapes with use of just one universal weighing pan.



Compact size guarantees operation of the device at any laboratory workstation. Possibility of comparison of many weights at a time adds to comparator's versatility.

		UMA-5	UMA-100	UMA-1000
Calibration range	E1	1 mg – 5 g	1 g – 100 g	100 g – 1000 g
	E2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g
	F1	1 mg – 5 g	1 g – 100 g	10 g – 1000 g
	F2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g
	M1	1 mg – 5 g	1 g – 100 g	10 g – 1000 g
	M2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g
Max capacity [Max]		5.1 g	110 g	1100 g
Readability [d]		0.0001 mg	0.001 mg	0.005 mg
Repeatability [S]*		0.2 µg (0-1 g); 0.3 µg (1-2 g); 0.4 µg (2-5 g)	0.002 mg	0.012 mg

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

Automatic Mass Comparators

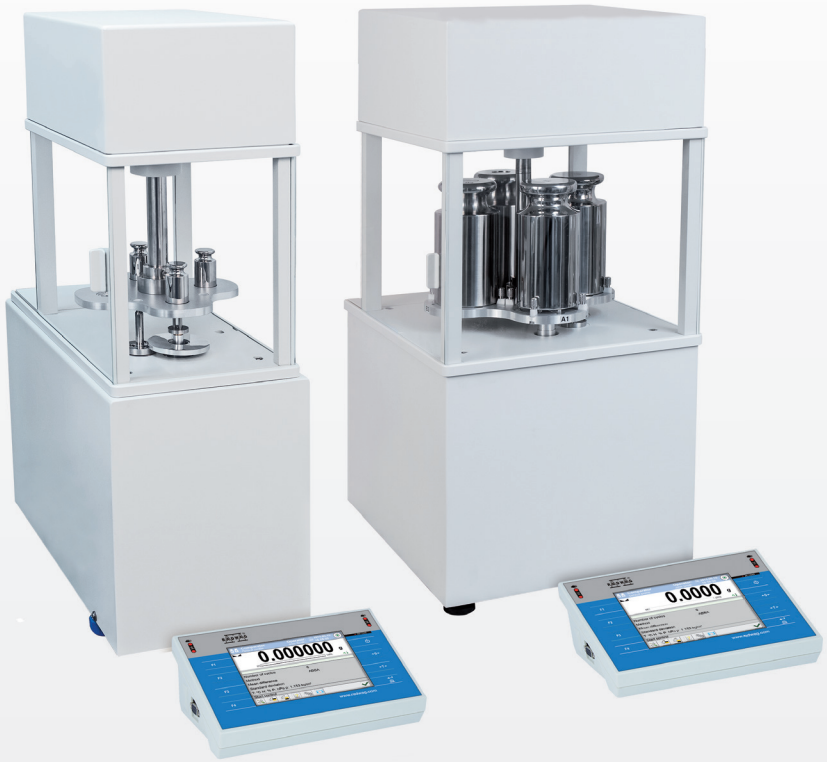
AK-4

Mass comparators of AK-4 series stand for the highest standard of professional automatic mass comparators. They provide comparison of 10 g – 10 kg weights of E1 and lower classes. The comparators are offered in two versions:

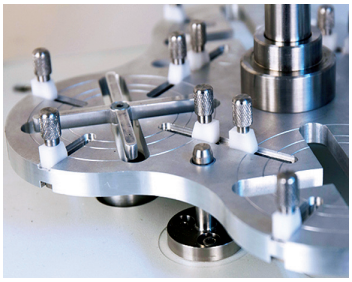
- 4-positional weight alternator: for 1 reference mass standard and 3 tested weights
- 2-positional weight alternator: for reference weight being a combination of mass value of 3 separate weights.

Owing to elimination of human error and with temperature change and air drafts reduced to zero, AK-4 automatic mass comparators provide the highest possible measurement repeatability, incomparable to repeatability offered by manual comparators.

A supplementary external anti-draft chamber comes standard with each AK-4 comparator.



Weight positioning of sliding nature prevents errors of eccentricity.



RADWAG solutions intended for automatic comparators, i.e. positioning mechanism, guarantee extremely precise setting of weight on a weighing pan, performed each time the turntable has been rotated.

Extraordinary design of the weighing pan enables both, comparison of mass being combination of 3 weights, and standard comparison of 1 weight.

Weighing range switch allows you to select different load ranges for weights comparison. Regardless of selected option, constant comparator resolution is maintained.

		AK-4/100	AK-4/1000	AK-4/1001	AK-4/2000	AK-4/5000	AK-4/10000
Calibration range	E1	10 g – 100 g	100 g – 1 kg	100 g – 1 kg	200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg
	E2	10 g – 100 g	100 g – 1 kg	100 g – 1 kg	200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg
	F1	10 g – 100 g	100 g – 1 kg	100 g – 1 kg	200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg
	F2	10 g – 100 g	100 g – 1 kg	100 g – 1 kg	200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg
	M1	–	–	–	–	–	–
	M2	–	–	–	–	–	–
Max capacity [Max]		110 g	1.02 kg	1.02 kg	2.02 kg	5.05 kg	10.02 kg
Readability [d]		0.001 mg	0.005 mg	0.001 mg	0.01 mg	0.01 mg	0.01 mg
Repeatability [S]*		0.002 mg	0.012 mg	0.002 mg	0.015 mg	0.015 mg	0.02 mg

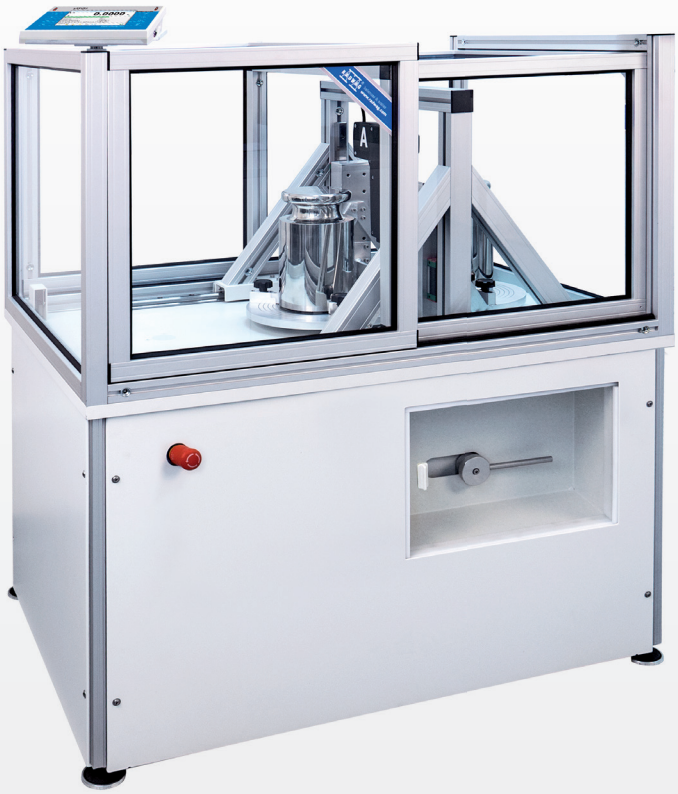
** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

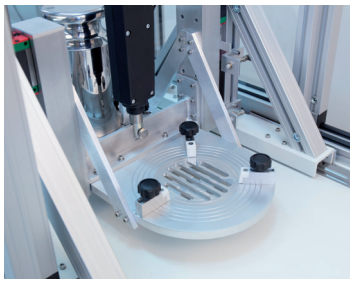
Automatic Mass Comparators
AKM-2

Mass comparators of AKM-2 series stand for the highest standard of professional automatic mass comparators. They provide comparison of 500 g – 50 kg weights of E1 and lower classes. The comparator is offered in a form of 2-positional weight alternator: for 1 reference mass standard and 1 tested weight.

For maximum comfort of operation, the AKM-2 has been equipped with automatic sliding feeding mechanism allowing easy placement of heavy weights.

Owing to elimination of human error and with temperature change and air drafts reduced to zero, AKM-2 automatic mass comparators provide the highest possible measurement repeatability, incomparable to repeatability offered by manual comparators.

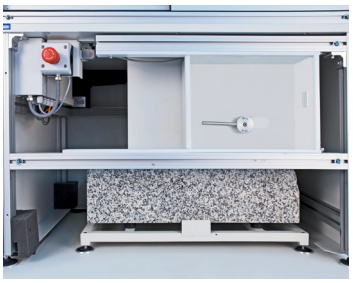




Weight positioning of sliding nature prevents errors of eccentricity.

Dedicated weighing pan design facilitates extremely precise weights comparison, no matter how light the weights are.

Weighing range switch allows you to select different load ranges for weights comparison. Regardless of selected option, constant comparator resolution is maintained.



Sturdy design of the table, featuring heavy granite stone and robust rubber shock absorbers, reduces effect of vibrations to the absolute minimum.

		AKM-2/10	AKM-2/20.1	AKM-2/20.5	AKM-2/50
Calibration range	E1	2 kg – 10 kg	5 kg – 20 kg	5 kg – 20 kg	20 kg – 50 kg
	E2	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
	F1	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
	F2	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
	M1	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
	M2	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
Max capacity [Max]		10.2 kg	20.5 kg	20.5 kg	51 kg
Readability [d]		0.1 mg	0.1 mg	0.1 mg	1 mg
Repeatability [S]*		0.2 mg	0.4 mg	0.4 mg	2 mg

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

Manual
Mass Comparators

COMPARISON OF 1 mg – 5 g WEIGHTS
OF CLASS E1, E2, F1, F2, M1 AND M2

Manual Mass Comparators
UYA 4Y.KO

Mass comparators of UYA 4Y.KO series stand for high standard of professional manual mass comparators. They provide comparison of 1 mg – 5 g weights of E1 and lower classes.

The UYA 4Y.KO series is characteristic for 0.1 µg readability. Significant feature of UYA 4Y.KO comparator is the automatically opened transparent weighing chamber providing maximum resistance to air drafts.

A supplementary external anti-draft chamber comes standard with each UYA 4Y.KO comparator.

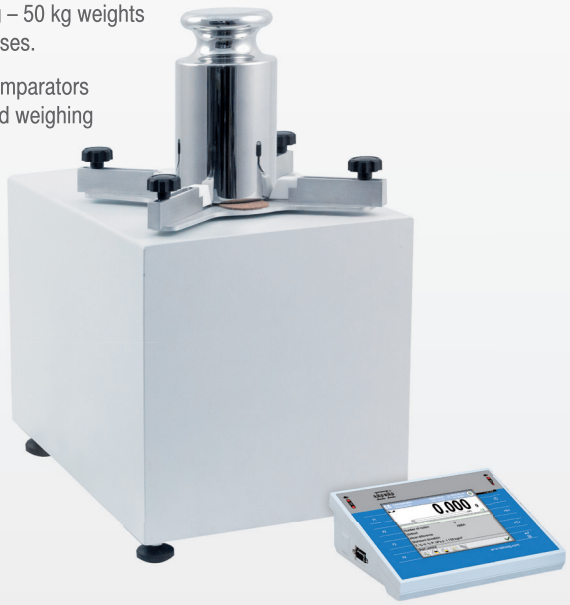
COMPARISON OF 100 g – 50 kg WEIGHTS
OF CLASS E1, E2, F1, F2, M1 AND M2

Manual Mass Comparators
APP 4Y.KO

Mass comparators of APP 4Y.KO series stand for high standard of professional manual mass comparators. They provide comparison of 100 g – 50 kg weights of E1 and lower classes.

APP 4Y.KO mass comparators feature model-related weighing pan type, it is either self-centering pan or weighing pan with mechanical centering aid, the former one allowing for dissemination of weights.

A supplementary external anti-draft chamber comes standard with each APP 4Y.KO comparator.



Automatically opened transparent weighing chamber of UYA 4Y.KO mass comparator provides utmost visibility of the weight subjected to comparison.

Complex databases offer unlimited access to information on mass standards, customers and tasks along with preview of reports on carried out comparisons.

Weighing pan with mechanical centering system facilitates precise placing of mass standards, plus it reduces effect of eccentricity to zero.

Optional “floating” self-centering pan offers reduction of eccentricity effect, plus it supports dissemination of reference mass to more than one weight.

		UYA 5.4Y.KO	APP 10.4Y.KO	APP 30.4Y.KO	APP 64.4Y.KO
Calibration range	E1	1 mg – 5 g	5 kg – 10 kg	20 kg	–
	E2	1 mg – 5 g	1 kg – 10 kg	5 kg – 20 kg	50 kg
	F1	1 mg – 5 g	100 g – 10 kg	2 kg – 20 kg	20 kg – 50 kg
	F2	1 mg – 5 g	100 g – 10 kg	1 kg – 20 kg	5 kg – 50 kg
	M1	1 mg – 5 g	100 g – 10 kg	1 kg – 20 kg	2 kg – 50 kg
	M2	1 mg – 5 g	100 g – 10 kg	1 kg – 20 kg	1 kg – 50 kg
Max capacity [Max]		5.1 g	10.2 kg	30.5 kg	64 kg
Readability [d]		0.0001 mg	0.1 mg	1 mg	10 mg
Repeatability [S]*		0.0003 mg	0.5 mg	2 mg (1 kg); 3 mg (30 kg)	18 mg

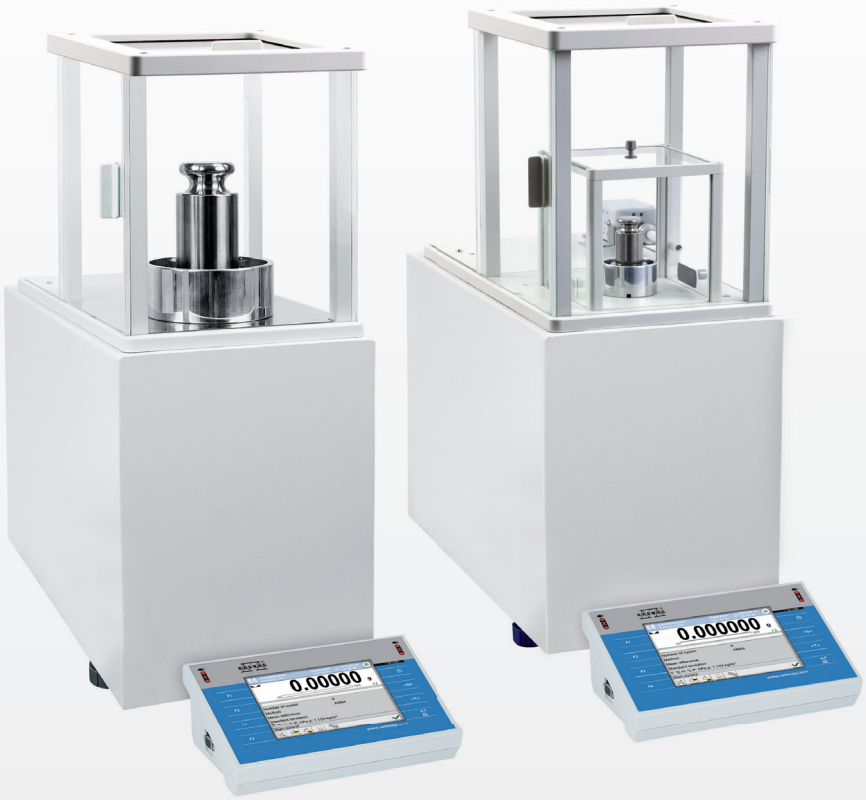
** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

Manual Mass Comparators
WAY 4Y.KO

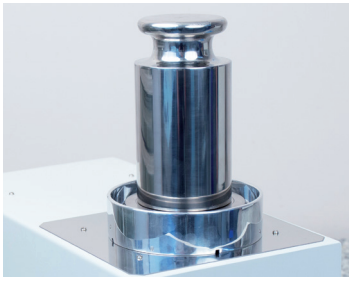
Mass comparators of WAY 4Y.KO series stand for high standard of professional manual mass comparators. They provide comparison of
1 mg – 5 kg weights of E1 and lower classes.

WAY 4Y.KO mass comparators feature transparent weighing chamber and ring-shaped draft shield encircling the weighing pan. Models characterized with the highest accuracy additionally comprise an internal box-shaped draft shield made of glass.

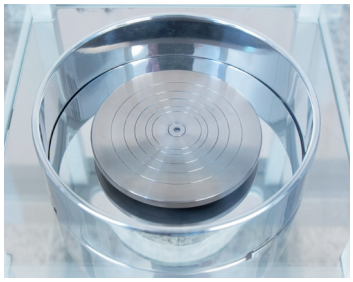
A supplementary external anti-draft chamber comes standard with each WAY 4Y.KO comparator*.



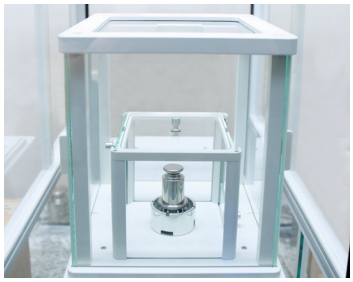
** Not applicable to WAY 1200.4Y.KO comparator.*



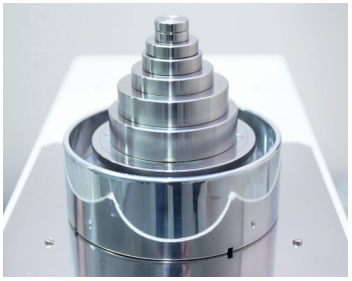
Ring-shaped draft shield encircling the weighing pan, apart from protecting the pan against air drafts, prevents potential shocks that could be applied accidentally to the weighing pan while loading the weight.



Weighing pan, made of the best quality non-magnetic stainless steel, features centrically positioned markings allowing easy and precise weights placement.



Glass draft shield minimizes influence of air drafts on comparison process. The glass with special conductive coating supports discharge of static electricity.



Selected WAY 4Y.KO models allow use of supplementary external loads, with this it is possible to carry out comparison of non-standard weights.

		WAY 100.4Y.KO	WAY 500.4Y.KO	WAY 1.4Y.KO	WAY 2.4Y.KO	WAY 5.4Y.KO
Calibration range	E1	5 g – 100 g	200 g – 500 g	500 g – 1 kg	1 kg – 2 kg	2 kg – 5 kg
	E2	100 mg – 100 g	10 g – 500 g	100 g – 1 kg	500 g – 2 kg	500 g – 5 kg
	F1	1 mg – 100 g	1 g – 500 g	10 g – 1 kg	100 g – 2 kg	100 g – 5 kg
	F2	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	10 g – 2 kg	10 g – 5 kg
	M1	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	1 g – 2 kg	1 g – 5 kg
	M2	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	1 g – 2 kg	1 g – 5 kg
Max capacity [Max]		110 g	520 g	1.02 kg	2.3 kg	5.05 kg
Readability [d]		0.001 mg	0.01 mg	0.01 mg	0.1 mg	0.1 mg
Repeatability [S]*		0.003 mg	0.02 mg	0.035 mg	0.1 mg	0.2 mg

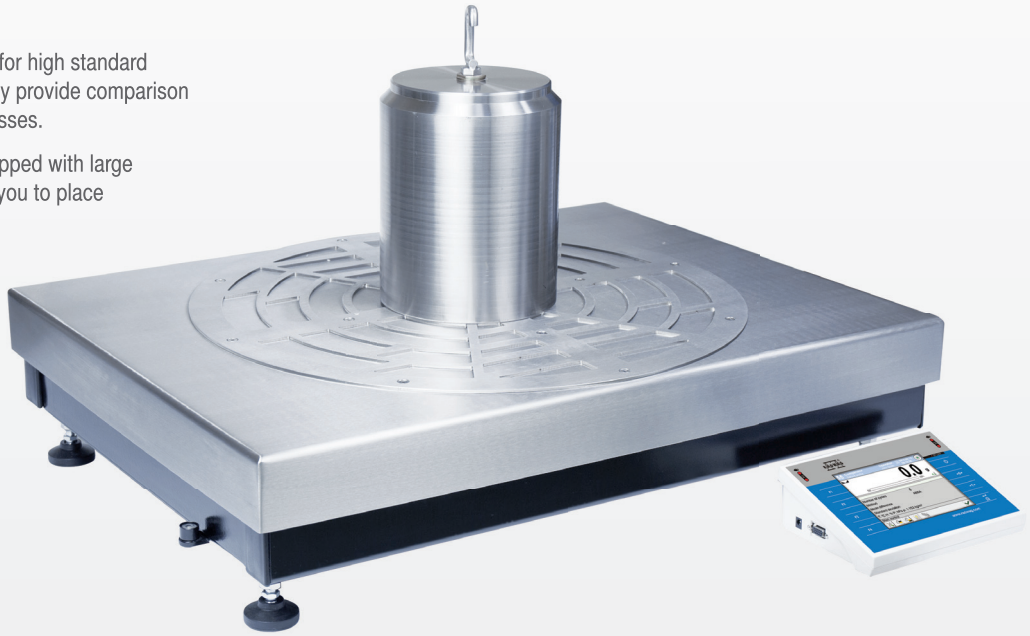
** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

Manual Mass Comparators
HRP 4Y.KO

Mass comparators of HRP 4Y.KO series stand for high standard of professional manual mass comparators. They provide comparison of 50 kg – 2000 kg weights of F2 and lower classes.

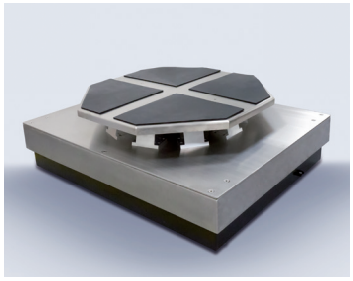
HRP 4Y.KO mass comparators have been equipped with large weighing platform featuring markings allowing you to place the weights centrically and precisely.

HRP 4Y.KO mass comparators serve not only comparison purposes, they can be used for weighing processes and other related operations.

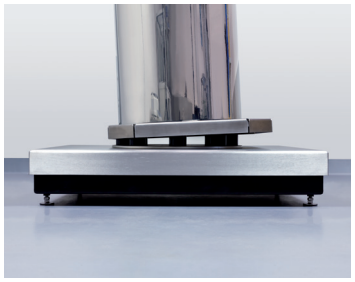


Precisely marked weighing platform of HRP 4Y.KO comparator is of great help when trying to place the weight accurately in the center.

Colour 5.7" touchscreen comes standard with all RADWAG manufactured comparators.



HRP mass comparators have been equipped with special self-centering weighing pan to provide both greater comfort of operation and reduced off-center load error.



The self-centering weighing pan has been designed in order to enable stabilising and levelling of weights that are put off the center, plus to allow comparison of weights of atypical shape.

		HRP 200.4Y.KO	HRP 500.4Y.KO	HRP 1000.4Y.KO	HRP 2000.4Y.KO
Calibration range	E1	–	–	–	–
	E2	–	–	–	–
	F1	–	–	–	–
	F2	100 kg – 200 kg	200 kg – 500 kg	500 kg – 1000 kg	1000 kg – 2000 kg
	M1	50 kg – 200 kg	100 kg – 500 kg	200 kg – 1000 kg	500 kg – 2000 kg
	M2	50 kg – 200 kg	50 kg – 500 kg	100 kg – 1000 kg	200 kg – 2000 kg
Max capacity [Max]		210 kg	510 kg	1050 kg	2100 kg
Readability [d]		0.2 g	0.5 g	1 g	2 g
Repeatability [S]*		0.5 g (50 kg); 0.6 g (200 kg)	0.5 g (50 kg); 1.6 g (500 kg)	1.5 g (100 kg); 2.5 g (1000 kg)	2.5 g (200 kg); 5 g (2000 kg)

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

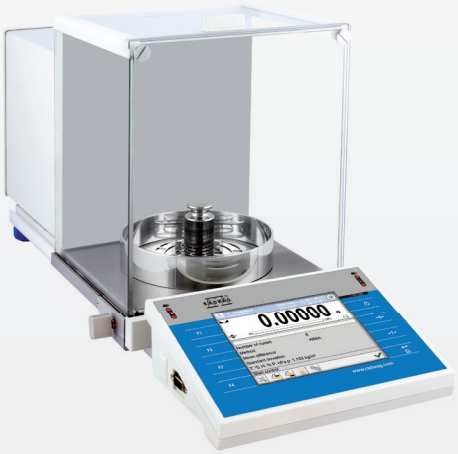
COMPARISON OF 1 mg – 200 g WEIGHTS
OF CLASS F2, M1 AND M2

Manual Mass Comparators
XA 4Y.A.KB

Mass comparators of XA 4Y.A.KB series are standard manual mass comparators. They provide comparison of 1 mg – 200 g weights of F2 and lower classes.

XA 4Y.A.KB mass comparators have been equipped with transparent weighing chamber featuring automatically opened door.

XA 4Y.A.KB mass comparators serve not only comparison purposes, they can be used for weighing processes and other related operations that are typical for standard analytical balances of XA 4Y.A series.



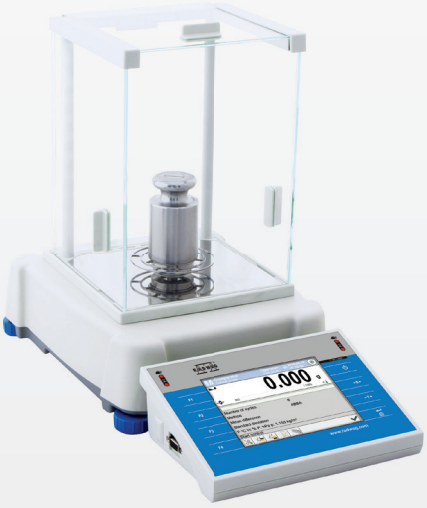
COMPARISON OF 100 g – 1 kg WEIGHTS
OF CLASS F2, M1 AND M2

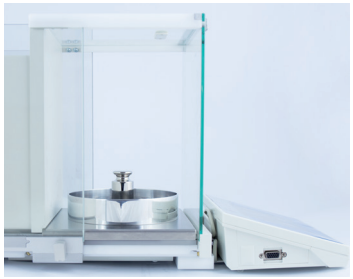
Manual Mass Comparators
PS 4Y.KB

Mass comparators of PS 4Y.KB series are standard manual mass comparators. They provide comparison of 100 g – 1 kg weights of class F2 and lower classes.

PS 4Y.KB mass comparators have been equipped with spacious transparent weighing chamber.

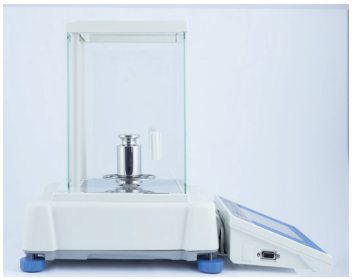
PS 4Y.KB mass comparators serve not only comparison purposes, they can be used for weighing processes and other related operations that are typical for standard precision balances of PS 4Y series.



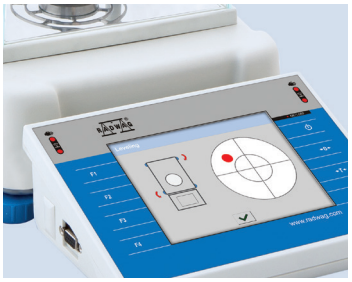


Spacious and airtight weighing chamber of XA 4Y.A.KB mass comparator features automatically opened door.

Openwork weighing pan significantly reduces ambient conditions influence on the measurement.



Transparent weighing chamber of PS 4Y.KB mass comparator, protecting the weighing pan, provides utmost visibility of the tested weight.



Semi-automatic levelling system is a standard feature of each 4Y series mass comparator.

		XA 200.4Y.A.KB	PS 1.4Y.KB
Calibration range	E1	–	–
	E2	–	–
	F1	–	–
	F2	100 mg – 200 g	500 g – 1 kg
	M1	1 mg – 200 g	100 g – 1 kg
	M2	1 mg – 200 g	100 g – 1 kg
Max capacity [Max]		210 g	1.05 kg
Readability [d]		0.01 mg	1 mg
Repeatability [S]*		0.035 mg	1 mg

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

COMPARISON OF 1 kg – 50 kg WEIGHTS
OF CLASS F2, M1 AND M2

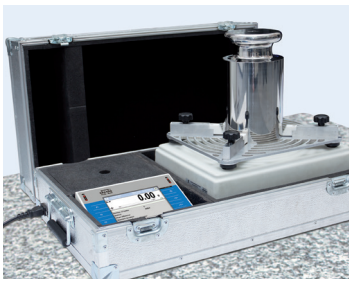
Manual Mass Comparators
PM 4Y.KB

Mass comparators of PM 4Y.KB series are standard manual mass comparators. They provide comparison of 1 kg – 50 kg weights of F2 and lower classes.

PM 4Y.KB mass comparators have been equipped with an open-work weighing pan featuring centering holders that facilitate precise weights placement.

PM 4Y.KB mass comparators serve not only comparison purposes, they can be used for weighing processes and other related operations that are typical for standard precision balances of PM 4Y series.

Centering holders of the openwork weighing pan allow precise placement of the weights, it is especially helpful when working with heavy and large mass standards.



Dedicated box for PM 4Y.KB mass comparator is a warranty for safe transport. With in-built interfaces you have a green light for immediate operation right after opening the box.

		PM 25.4Y.KB	PM 50.4Y.KB
Calibration range	E1	–	–
	E2	–	–
	F1	–	–
	F2	5 kg – 20 kg	50 kg
	M1	2 kg – 20 kg	10 kg – 50 kg
	M2	1 kg – 20 kg	10 kg – 50 kg
Max capacity [Max]		25.5 kg	51 kg
Readability [d]		10 mg	100 mg
Repeatability [S]*		15 mg	100 mg

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*

PC Software
RMCS

Radwag Multiple Comparator Software, RMCS, has been designed to enable management of laboratory-performed calibration procedures, starting from the moment of accepting an order, through its progress, until issuing a calibration certificate.

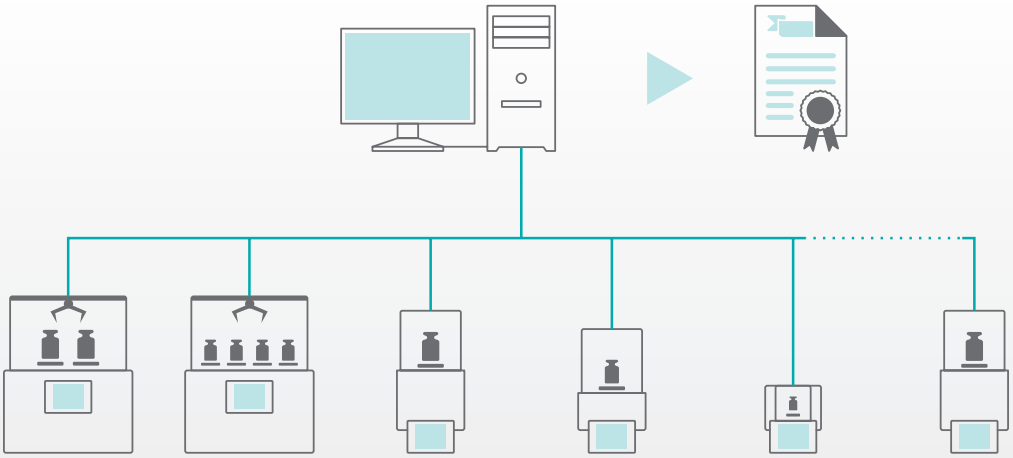
The calibration process supported by means of RMCS provides improved efficiency, reliable measurement results and complete documentation on calibration process, together with lower labour costs.

RMCS PC Software is intended for cooperation with RADWAG manufactured mass comparators. With the software you can carry out calibration processes using ABBA and ABA methods.

Radwag Multiple Comparator Software – operation scheme

RMCS PC software makes it possible to initiate the calibration procedure by means of task sent to a particular mass comparator. Additionally it features option for autonomous performance of calibration process, triggered by the mass comparator itself.

In both cases, data is transferred to the software for the purpose of registering, controlling and finally issuing a calibration certificate.



RMCS System functions

- Complete management of a calibration laboratory calibrating mass standards and weights
- Complex management of RADWAG comparators
- Calibration using ABBA and ABA methods
- Cooperation with monitoring system for ambient conditions
- Databases support: comparators, mass standards, users and calibration orders
- Bilateral data synchronization with RADWAG mass comparators
- Archiving orders, calibration certificates and ambient conditions records
- Record of events and calibration process reporting
- Export of report results and calibration certificates

Mass comparators linked in the RMCS system autonomously cooperate with THB ambient conditions modules recording ambient conditions state (temperature, humidity and atmospheric pressure) throughout the whole control process.

Measurement results are displayed and sent, in real time, to RMCS software for the purpose of process control and data archiving.

Ambient Conditions Monitoring

THB

Maintaining optimal ambient conditions at a workplace is a warranty of precise results for comparison processes.

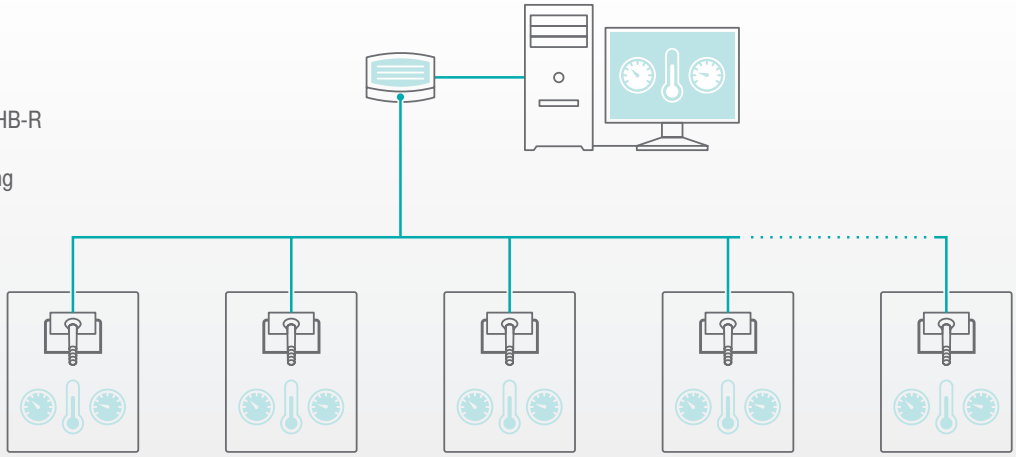
THB monitoring system has been designed to offer option of constant ambient conditions supervision provided at the place of mass comparator operation or in any laboratory room. The system performs real-time measurement of air temperature, relative humidity and atmospheric pressure. The measured values are then used for calculation of air density and dew point temperature.

The measurements carried out for a particular workstation are performed by means of its local sensors – THB Ambient Conditions Modules. Current state of given measurements is displayed on the comparators terminal along with messages informing on critical values, all this thanks to connection established between the THB module and the comparator.

Ambient Conditions Monitoring performed for separate laboratory rooms - operation scheme

Measurements results of particular THB modules are transferred in real time to THB-R recorder. The recorder supports up to 16 modular sensors, thus allowing monitoring of ambient conditions in multiple points in the proximity of up to 1200 m.

THB-Multi software enables displaying the measurements results on the computer screen. Additionally it offers data analysis, reports and graphs preparation and measurements record in database.



Basic parameters for THB Ambient Conditions Modules

Measured temperature range	+5 °C – +45 °C
Temperature measurement accuracy	d = 0.01 °C / error ± 0.1 °C
Measured pressure range	850 – 1050 hPa
Pressure measurement accuracy	d = 0.1 hPa / error ± 2 hPa
Measured humidity range	0 – 100 %
Humidity measurement accuracy	d = 0.1 % / error ± 2 % (from 0 % to 10 % and from 90 % to 100 % the accuracy is 5 %)

Errors for weights
according to OIML and ASTM

According to OIML and ASTM guidelines mass standards and weights, used for mass measurement purposes, are divided into accuracy classes: E1, E2, F1, F2, M1, M2 and M3 (OIML classification) or 1 – 7 (ASTM classification).

In the course of calibration of mass standards and weights the measurement uncertainty for coverage factor k = 2 (with confidence of about 95%) shall not be greater than 1/3 of maximum error value specified for a particular mass standard or weight of a given class or nominal value.

Maximum permissible errors according to OIML R 111-1

±δm in mg

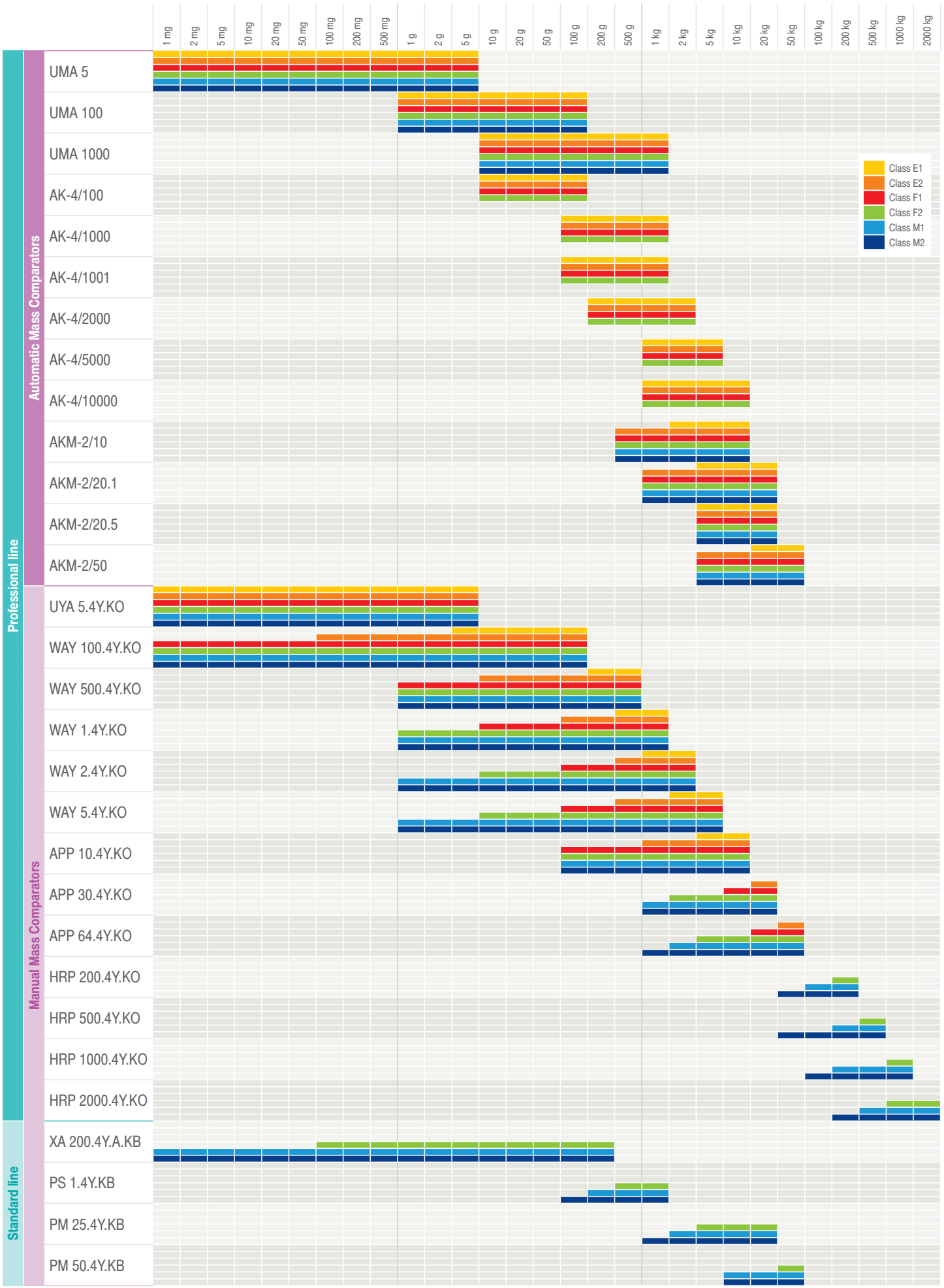
Nominal value	Class E1	Class E2	Class F1	Class F2	Class M1	Class M1–2	Class M2	Class M2–3	Class M3
1 mg	0.003	0.006	0.02	0.06	0.2				
2 mg	0.003	0.006	0.02	0.06	0.2				
5 mg	0.003	0.006	0.02	0.06	0.2				
10 mg	0.003	0.008	0.025	0.08	0.25				
20 mg	0.003	0.01	0.03	0.1	0.3				
50 mg	0.004	0.012	0.04	0.12	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	0.1	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	5 000	8 000	16 000	25 000
100 kg		160	500	1 600	5 000	10 000	16 000	30 000	50 000
200 kg		300	1 000	3 000	10 000	20 000	30 000	60 000	100 000
500 kg		800	2 500	8 000	25 000	50 000	80 000	160 000	250 000
1 000 kg		1 600	5 000	16 000	50 000	100 000	160 000	300 000	500 000
2 000 kg			10 000	30 000	100 000	200 000	300 000	600 000	1 000 000
5 000 kg			25 000	80 000	250 000	500 000	800 000	1 600 000	2 500 000

Maximum permissible errors according to ASTM E617 - 13

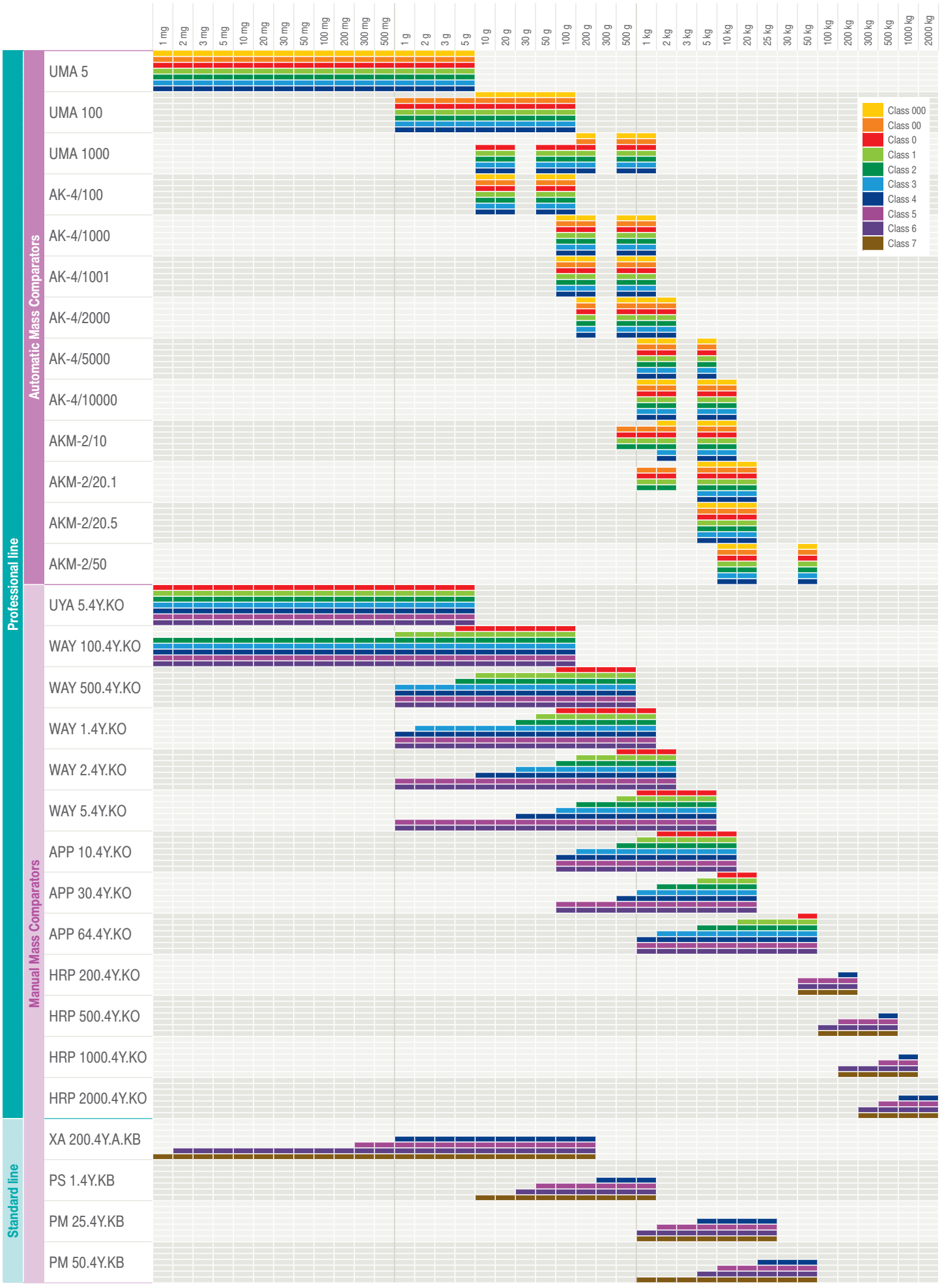
±δm in mg

Nominal value	Class 000	Class 00	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
0.05 mg	0.002	0.003	0.005							
0.1 mg	0.002	0.003	0.005	0.01						
0.2 mg	0.002	0.003	0.005	0.01	0.014					
0.3 mg	0.002	0.003	0.005	0.01	0.014	0.025				
0.5 mg	0.002	0.003	0.005	0.01	0.014	0.025	0.05	0.05	0.1	
1 mg	0.002	0.003	0.005	0.01	0.014	0.025	0.05	0.05	0.1	
2 mg	0.002	0.003	0.005	0.01	0.014	0.025	0.05	0.06	0.2	
3 mg	0.002	0.003	0.005	0.01	0.014	0.026	0.052	0.07	0.2	
5 mg	0.002	0.003	0.005	0.01	0.014	0.028	0.055	0.08	0.2	
10 mg	0.002	0.003	0.005	0.01	0.014	0.03	0.06	0.1	0.5	0.4
20 mg	0.002	0.003	0.005	0.01	0.014	0.035	0.07	0.12	0.5	0.56
30 mg	0.002	0.003	0.005	0.01	0.014	0.038	0.075	0.14	0.5	0.68
50 mg	0.002	0.003	0.005	0.01	0.014	0.042	0.085	0.16	0.5	0.88
100 mg	0.002	0.003	0.005	0.01	0.025	0.05	0.1	0.2	1	1.2
200 mg	0.002	0.003	0.005	0.01	0.025	0.06	0.12	0.26	1	1.8
300 mg	0.002	0.003	0.005	0.01	0.025	0.07	0.14	0.3	1	2.2
500 mg	0.002	0.003	0.005	0.01	0.025	0.08	0.16	0.38	1	3
1 g	0.005	0.01	0.017	0.034	0.054	0.1	0.2	0.5	2	4.5
2 g	0.005	0.01	0.017	0.034	0.054	0.13	0.26	0.75	2	7
3 g	0.005	0.01	0.017	0.034	0.054	0.15	0.3	0.95	2	9.4
5 g	0.005	0.01	0.017	0.034	0.054	0.18	0.36	1.3	2	13
10 g	0.01	0.02	0.025	0.050	0.074	0.25	0.5	2	2	21
20 g	0.013	0.025	0.037	0.074	0.1	0.35	0.7	3	3	33
30 g	0.014	0.026	0.037	0.074	0.15	0.45	0.9	4	5	44
50 g	0.015	0.03	0.06	0.12	0.25	0.6	1.2	5.6	7	62
100 g	0.025	0.05	0.13	0.25	0.5	1	2	9	10	100
200 g	0.05	0.1	0.25	0.50	1	2	4	15	20	160
300 g	0.075	0.15	0.38	0.75	1.5	3	6	20	30	210
500 g	0.13	0.25	0.6	1.2	2.5	5	10	30	50	300
1 kg	0.25	0.50	1.3	2.5	5	10	20	50	100	470
2 kg	0.5	1	2.5	5	10	20	40	100	200	750
3 kg	0.75	1.5	3.8	7.5	15	30	60	150	300	1 000
5 kg	1.3	2.5	6	12	25	50	100	250	500	1 400
10 kg	2.5	5	13	25	50	100	200	500	1 000	2 200
20 kg	5	10	25	50	100	200	400	1 000	2 000	3 800
25 kg	6.25	12.5	31	62	125	250	500	1 200	2 500	4 500
30 kg	7.5	15	38	75	150	300	600	1 500	3 000	4 500
50 kg	13	25	63	125	250	500	1 000	2 500	5 000	7 500
100 kg					500	1 000	2 000	5 000	10 000	15 000
200 kg					1000	2 000	4 000	10 000	20 000	30 000
300 kg					1500	3 000	6 000	15 000	30 000	45 000
500 kg					2 500	5 000	10 000	25 000	50 000	75 000
1 000 kg					5 000	10 000	20 000	50 000	100 000	150 000
2 000 kg					10 000	20 000	40 000	100 000	200 000	300 000
3 000 kg					15 000	30 000	60 000	150 000	300 000	450 000
5 000 kg					25 000	50 000	100 000	250 000	500 000	750 000

Calibration range for weights according to OIML R111



Calibration range for weights according to ASTM E617



Automatic Mass Comparators – PROFESSIONAL LINE

		UMA 5	UMA 100	UMA 1000	AK-4/100	AK-4/1000	AK-4/1001
Calibration range	E1	1 mg – 5 g	1 g – 100 g	100 g – 1000 g	10 g – 100 g	100 g – 1 kg	100 g – 1 kg
	E2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g	10 g – 100 g	100 g – 1 kg	100 g – 1 kg
	F1	1 mg – 5 g	1 g – 100 g	10 g – 1000 g	10 g – 100 g	100 g – 1 kg	100 g – 1 kg
	F2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g	10 g – 100 g	100 g – 1 kg	100 g – 1 kg
	M1	1 mg – 5 g	1 g – 100 g	10 g – 1000 g	–	–	–
	M2	1 mg – 5 g	1 g – 100 g	10 g – 1000 g	–	–	–
Max capacity [Max]		5.1 g	110 g	1100 g	110 g	1.02 kg	1.02 kg
Readability [d]		0.0001 mg	0.001 mg	0.005 mg	0.001 mg	0.005 mg	0.001 mg
Repeatability at low load [S]*		0.2 µg (0 - 1 g) 0.3 µg (1 g - 2 g)	0.002 mg (1 g)	0.012 mg (10 g)	0.002 mg (10 g)	0.012 mg (100 g)	0.002 mg (100 g)
Repeatability at nominal load [S]*		0.4 µg (2 g - 5 g)	0.002 mg (100 g)	0.012 mg (1000 g)	0.002 mg (100 g)	0.012 mg (1 kg)	0.002 mg (1 kg)
Electric compensation range		0 – +5.1 g	-1 g – +10 g	-10 g – +110 g	-1 g – +10 g	-10 g – +20 g	-1 g – +10 g
Internal supplementary weights		–	automatic	automatic	half-automatic	half-automatic	half-automatic
Stabilization time		30 s	30 s	30 s	30 s	30 s	30 s
Adjustment		internal	external	external	external	external	external
Power supply		110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz
Weighing pan size		ø 20 mm	ø 20 mm	ø 50 mm	ø 30 mm	ø 50 mm	ø 50 mm
Weights magazine		36 positions	36 positions	18 positions	4 positions	4 positions	4 positions
Weighing unit size (L×W×H)		950 × 590 × 540 mm	700 × 585 × 720 mm	700 × 585 × 820 mm	385 × 215 × 600 mm	385 × 215 × 600 mm	385 × 215 × 600 mm
Control unit size (L×W×H)		460 × 250 × 195 mm	460 × 250 × 195 mm	460 × 250 × 195 mm	206 × 140 × 70 mm	206 ×140 × 70 mm	206 ×140 × 70 mm
Draft shield size (L×W×H)		–	–	–	560 × 340 × 665 mm	560 × 340 × 665 mm	560 × 340 × 665 mm
Net/gross weight		55 kg / 75 kg	60 kg / 80 kg	70 kg / 90 kg	25 kg / 41 kg	25 kg / 41 kg	25 kg / 41 kg
Comparator packaging size (L×W×H)		1200 × 800 × 950 mm	1200 × 1000 × 1200 mm	1200 × 1000 × 1300 mm	860 × 800 × 560 mm	860 × 800 × 560 mm	860 × 800 × 560 mm
Draft shield packaging size (L×W×H)		–	–	–	950 × 420 × 630 mm	950 × 420 × 630 mm	950 × 420 × 630 mm
Operating temperature		+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C
Operating temperature change rate		±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h
Relative humidity		40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %
Relative humidity change		±2 % / 4 h	±2 % / 4 h	±2 % / 4 h	±2 % / 4 h	±2 % / 4 h	±2 % / 4 h

Manual Mass Comparators – PROFESSIONAL LINE

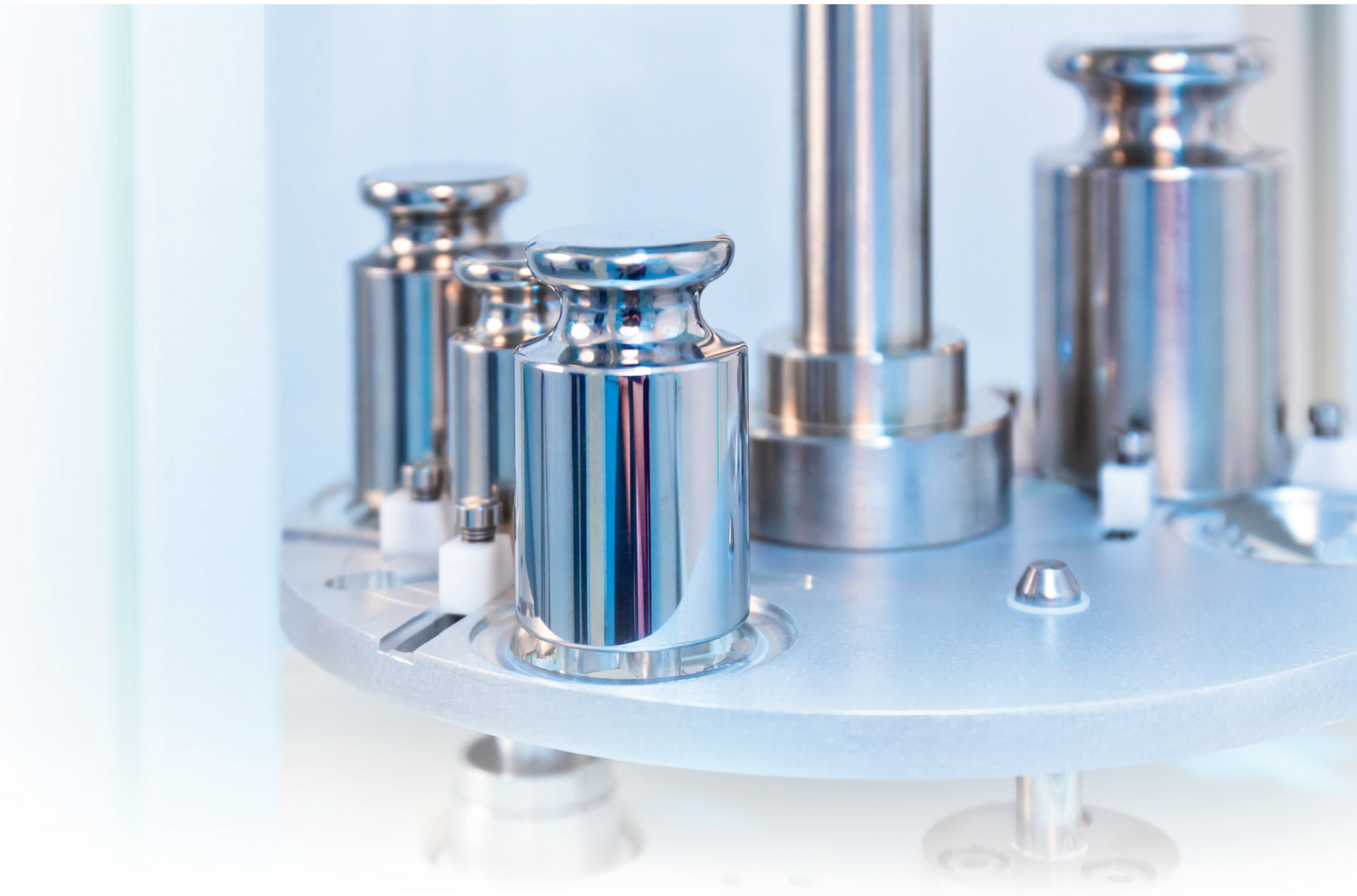
		UYA 5.4Y.KO	WAY 100.4Y.KO	WAY 500.4Y.KO	WAY 1.4Y.KO	WAY 2.4Y.KO	WAY 5.4Y.KO
Calibration range	E1	1 mg – 5 g	5 g – 100 g	200 g – 500 g	500 g – 1 kg	1 kg – 2 kg	2 kg – 5 kg
	E2	1 mg – 5 g	100 mg – 100 g	10 g – 500 g	100 g – 1 kg	500 g – 2 kg	500 g – 5 kg
	F1	1 mg – 5 g	1 mg – 100 g	1 g – 500 g	10 g – 1 kg	100 g – 2 kg	100 g – 5 kg
	F2	1 mg – 5 g	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	10 g – 2 kg	10 g – 5 kg
	M1	1 mg – 5 g	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	1 g – 2 kg	1 g – 5 kg
	M2	1 mg – 5 g	1 mg – 100 g	1 g – 500 g	1 g – 1 kg	1 g – 2 kg	1 g – 5 kg
Max capacity [Max]		5.1 g	110 g	520 g	1.02 kg	2.3 kg	5.05 kg
Readability [d]		0.0001 mg	0.001 mg	0.01 mg	0.01 mg	0.1 mg	0.1 mg
Repeatability at low load [S]*		0.0003 mg (100 mg)	0.003 mg (100 mg)	0.02 mg (100 mg)	0.035 mg (1 g)	0.1 mg (1 g)	0.2 mg (1 g)
Repeatability at nominal load [S]*		0.0003 mg (5 mg)	0.003 mg (100 g)	0.02 mg (500 g)	0.035 mg (1 kg)	0.1 mg (2 kg)	0.2 mg (5 kg)
Electric compensation range		0 – +5.1 g	-1 g – +10 g	-10 g – +20 g	-10 g – +20 g	-50 g – +300 g	-10 g – +50 g
Eccentricity error		1 division per 1 mm	1 division per 1 mm	1 division per 1 mm	1 division per 1 mm	1 division per 1 mm	1.5 division per 1 mm
Internal supplementary weights		–	half-automatic	half-automatic	half-automatic	half-automatic	half-automatic
External supplementary weights		–	10 g	30 g; 10 g (× 2)	50 g; 30 g; 10 g (× 2)	100 g (× 2)	500 g; 300 g; 100 g (× 2)
Stabilization time		30 s	30 s	30 s	30 s	20 s	20 s
Adjustment		internal	external	external	external	external	external
Power supply		110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz
Weighing pan size		ø 16 mm	ø 30 mm	ø 50 mm	ø 60 mm	ø 70 mm	ø 90 mm
Weighing unit size (L×W×H)		370 × 160 × 175 mm	385 × 215 × 500 mm	385 × 215 × 420 mm	385 × 215 × 420 mm	385 × 215 × 420 mm	560 × 340 × 550 mm
Control unit size (L×W×H)		206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm
Draft shield size (L×W×H)		560 × 350 × 255 mm	560 × 340 × 570 mm	560 × 300 × 665 mm	560 × 300 × 665 mm	660 × 470 × 700 mm	560 × 340 × 570 mm
Net/gross weight		10.2 / 14.7 kg	15 kg / 31 kg	15.5 kg / 32 kg	16 kg / 32.5 kg	17 kg / 33.5 kg	21 kg / 37 kg
Comparator packaging size (L×W×H)		600 × 600 × 400 mm	860 × 800 × 550 mm	860 × 800 × 550 mm	860 × 800 × 550 mm	860 × 800 × 550 mm	860 × 800 × 500 mm
Draft shield packaging size (L×W×H)		820 × 840 × 630 mm	820 × 850 × 630 mm	820 × 850 × 630 mm	820 × 850 × 630 mm	820 × 850 × 630 mm	820 × 850 × 630 mm
Operating temperature		+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C
Operating temperature change rate		±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h
Relative humidity		40 % – 80 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %
Relative humidity change		±2 % / 4 h	±3 % / 4 h	±3 % / 4 h	±3 % / 4 h	±3 % / 4 h	±5 % / 4 h

Read QR code
and view complete
technical specification
of Mass Comparators

AK-4/2000	AK-4/5000	AK-4/10000	AKM-2/10	AKM-2/20.1	AKM-2/20.5	AKM-2/50
200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg	2 kg – 10 kg	5 kg – 20 kg	5 kg – 20 kg	20 kg – 50 kg
200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
200 g – 2 kg	1 kg – 5 kg	1 kg – 10 kg	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
–	–	–	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
–	–	–	500 g – 10 kg	1 kg – 20 kg	5 kg – 20 kg	5 kg – 50 kg
2.02 kg	5.05 kg	10.02 kg	10.2 kg	20.5 kg	20.5 kg	51 kg
0.01 mg	0.01 mg	0.01 mg	0.1 mg	0.1 mg	0.1 mg	1 mg
0.015 mg (200 g)	0.015 mg (1 kg)	0.02 mg (1 kg)	0.2 mg (500 g)	0.4 mg (1 kg)	0.4 mg (1 kg)	2 mg
0.015 mg (2 kg)	0.015 mg (5 kg)	0.02 mg (10 kg)	0.2 mg (10 kg)	0.4 mg (20 kg)	0.4 mg (20 kg)	2 mg
-10 g – +20 g	-10 g – +50 g	-10 g – +50 g	-100 g – +200 g	-500 – +500 g	-500 – +500 g	-1000 g – +1000 g
half-automatic	half-automatic	half-automatic	half-automatic	half-automatic	half-automatic	half-automatic
30 s	30 s	30 s	30 s	30 s	30 s	30 s
external	external	external	external	external	external	external
110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz
ø 70 mm	ø 70 mm	ø 100 mm	ø 90 mm	ø 90 mm	ø 90 mm	ø 100 mm
4 positions	4 positions	4 positions	2 positions	2 positions	2 positions	2 positions
385 × 215 × 600 mm	350 × 405 × 650 mm	800 × 500 × 930 mm	950 × 650 × 1150 mm	950 × 650 × 1150 mm	950 × 650 × 1150 mm	1050 × 650 × 1150 mm
206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm
560 × 340 × 665 mm	660 × 470 × 700 mm	800 × 505 × 885 mm	–	–	–	–
25 kg / 41 kg	25 kg / 41 kg	90 kg / 140 kg	230 kg / 350 kg	235 kg / 352 kg	235 kg / 352 kg	260 kg / 380 kg
860 × 800 × 560 mm	1000 × 900 × 685 mm	1000 × 900 × 685 mm	1050 × 800 × 1320 mm	1050 × 800 × 1320 mm	1150 × 800 × 1320 mm	1150 × 800 × 1320 mm
950 × 420 × 630 mm	950 × 420 × 630 mm	850 × 750 × 1000 mm	–	–	–	–
+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+10 – +30 °C	+10 – +30 °C	+10 – +30 °C	+10 – +30 °C
±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h	±0.5 °C / 12 h
40 % – 60%	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %
±2 % / 4 h	±2 % / 4 h	±2 % / 4 h	±2 % / 12 h	±2 % / 12 h	±2 % / 12 h	±2 % / 12 h

APP 10.4Y.KO	APP 30.4Y.KO	APP 64.4Y.KO	HRP 200.4Y.KO	HRP 500.4Y.KO	HRP 1000.4Y.KO	HRP 2000.4Y.KO
5 kg – 10 kg	20 kg	–	–	–	–	–
1 kg – 10 kg	10 kg – 20 kg	50 kg	–	–	–	–
100 g – 10 kg	2 kg – 20 kg	20 kg – 50 kg	–	–	–	–
100 g – 10 kg	1 kg – 20 kg	5 kg – 50 kg	100 kg – 200 kg	200 kg – 500 kg	500 kg – 1000 kg	1000 kg – 2000 kg
100 g – 10 kg	1 kg – 20 kg	2 kg – 50 kg	50 kg – 200 kg	100 kg – 500 kg	200 kg – 1000 kg	500 kg – 2000 kg
100 g – 10 kg	1 kg – 20 kg	1 kg – 50 kg	50 kg – 200 kg	50 kg – 500 kg	100 kg – 1000 kg	200 kg – 2000 kg
10.2 kg	30.5 kg	64 kg	210 kg	510 kg	1050 kg	2100 kg
0.1 mg	1 mg	10 mg	0.2 g	0.5 g	1 g	2 g
0.5 mg (100 g)	2 mg (1 kg)	18 mg (1 kg)	0.5 g (50 kg)	0.5 g (50 kg)	1.5 g (100 kg)	2.5 g (200 kg)
0.5 mg (10 kg)	3 mg (30 kg)	18 mg (50 kg)	0.6 g (200 kg)	1.6 g (500 kg)	2.5 g (1000 kg)	5 g (2000 kg)
-100 g – +200 g	+100 g – +30.5 kg	0 – +64 kg	0 – +210 kg	0 – +510 kg	0 – +1050 kg	0 – +2100 kg
2 divisions per 1 mm	2 divisions per 1 mm	2 divisions per 1 mm	2 division per 1 mm	2 division per 1 mm	1 division per 1 mm	1 division per 1 mm
half-automatic	half-automatic	–	–	–	–	–
300 g; 200 g	–	–	–	–	–	–
30 s	20 s	20 s	10 s	10 s	10 s	10 s
external	external	external	external	external	external	external
110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz	110–230 V AC / 50–60 Hz
ø 190 mm (ø 300 mm)	ø 220 mm (ø 300 mm)	ø 300 mm (ø 400 mm)	800 × 600 mm 600 × 600 mm (self-centering pan)	800 × 600 mm 600 × 600 mm (self-centering pan)	1000 × 800 mm 600 × 600 mm (self-centering pan)	1250 × 1000 mm 920 × 920 mm (self-centering pan)
455 × 300 × 380 mm	455 × 290 × 205 mm	455 × 290 × 205 mm	810 × 600 × 260 mm	810 × 600 × 260 mm	1010 × 800 × 275 mm	1250 × 1000 × 430 mm
206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm	206 × 140 × 70 mm
660 × 440 × 680 mm	700 × 440 × 545 mm	–	–	–	–	–
30 kg / 59 kg	30 kg / 34 kg	14.5 kg / 17 kg	105 kg / 140 kg	105 kg / 140 kg	165 kg / 215 kg	530 kg / 665 kg
1160 × 650 × 700 mm	1170 × 650 × 700 mm	1160 × 650 × 700 mm	1000 × 800 × 355 mm	988 × 800 × 355 mm	1200 × 1000 × 485 mm	1500 × 1200 × 735 mm
960 × 920 × 735 mm	960 × 825 × 730 mm	–	–	–	–	–
+15 – +30 °C	+15 – +35 °C	+10 – +40 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C	+15 – +30 °C
±0.5 °C / 12 h	±0.5°C / 12 h	±0.5°C / 12 h	±1 °C / 12 h	±1 °C / 12 h	±1 °C / 12 h	±1 °C / 12 h
40 % – 60 %	30 % – 70 %	30 % – 70 %	40 % – 60 %	40 % – 60 %	40 % – 60 %	40 % – 60 %
±3 % / 4 h	±5 % / 4 h	±10 % / 4 h	±5 % / 4 h	±5 % / 4 h	±5 % / 4 h	±5 % / 4 h

** Standard deviation of 6 ABBA cycles (acc. to R111 OIML) for maximal mass being subjected to comparison when stable laboratory conditions are maintained.*



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