

METROLOGY DIVISION

SMALL ENOUGH
TO CARE
BIG ENOUGH
TO DARE



www.kambicmetrology.com



Who we are

A Slovenian-based family company.

With 35 years of experience, Kambič is a specialized supplier in the field of design, production and validation of metrology equipment.

Our goal is to be the preferred partner delivering the ideal balance between optimized solutions, quality and investment costs.

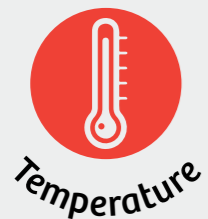


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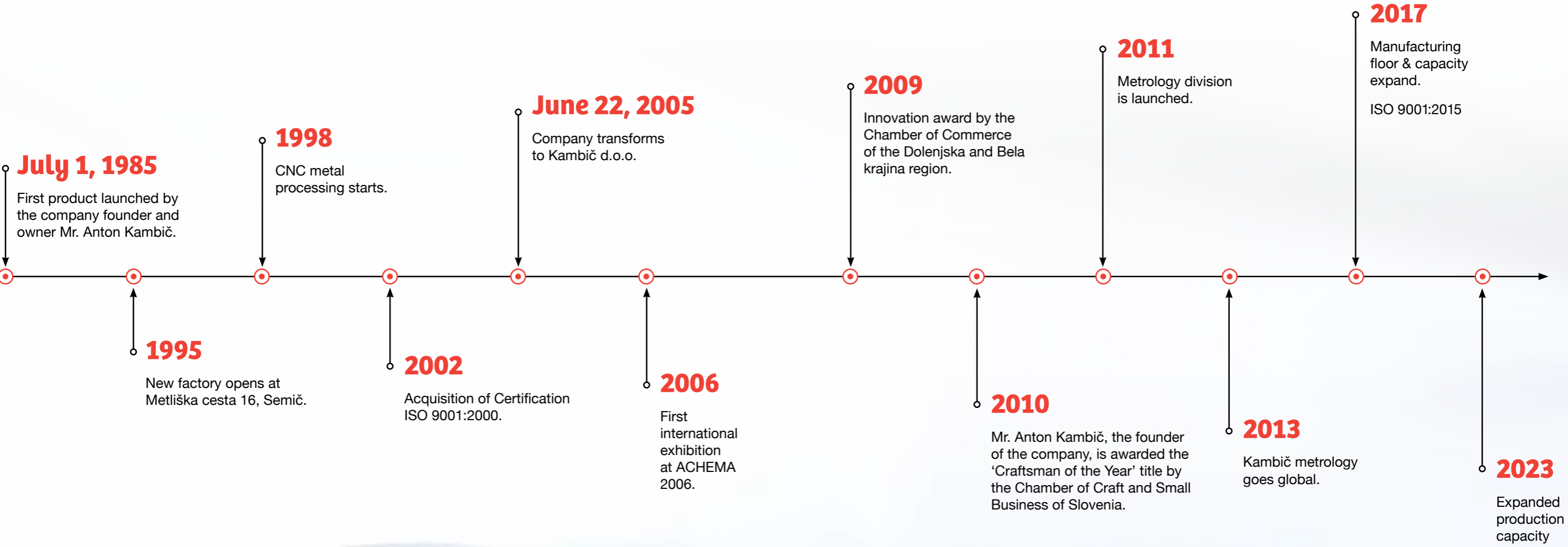
What we do

All under one roof:

- R&D of mechanical components and solutions
- R&D of electronics and SW
- Manufacturing
- Testing, calibrating and validating
- Customer support, on-site service



Tradition



Product families

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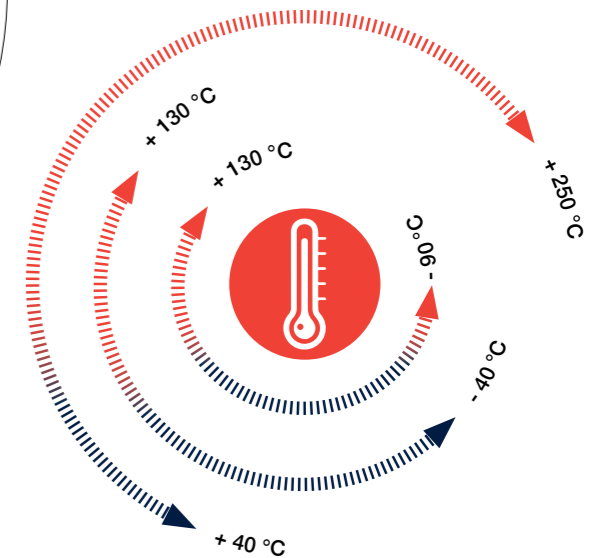


Calibration Baths

- Uniformity and stability in mK range
- Calibrate sensors of any dimension
- Fluid ensures perfect heat transfer
- Immersion depth of up to 500 mm
- Unique vertical flow design
- Several bath sizes and additional equipment available
- Three different temperature ranges

OB (+ 40 °C ...+ 250 °C)	OB-LT (- 40 °C ...+ 130 °C)	OB-ULT (- 90 °C ...+ 130 °C)
Models:	Models:	Models:
OB-7/2	OB-7/2 LT	/
OB-22/2	OB-22/2 LT	OB-22/2 ULT
OB-50/2	OB-50/2 LT	OB-50/2 ULT
OB-200/2	OB-200/2 LT	OB-200/2 ULT

Model: **OB-22/2 ULT**
 Volume: ~ 22 L
 Temperature range: - 90 °C ...+ 130 °C
 Temperature stability: ± 0.005 °C @ - 90 °C
 Temperature uniformity: ± 0.007 °C @ - 90 °C



BATH TYPE	REQUIRED FLUID FOR OPERATION [liters]	WORKING CHAMBER DIMENSIONS [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
OB-7/2 (LT)	~10	Φ 100 x h 270	480 x 1080 x 470
OB-22/2 (LT,ULT)	~25	Φ 147 x h 500	600 x 1240 x 550
OB-50/2 (LT,ULT)	~65	Φ 320 x h 500	745 x 1240 x 495
OB-200/2 (LT,ULT)	~260	Φ 600 x h 650	1264 x 1485 x 995

*More details in the dedicated Technical Data Sheet.



Micro Calibration Baths

- Smallest portable calibration baths – metrology performance
- Conventional compressor based refrigeration system
- Fluid ensures perfect heat transfer
- Uniformity and stability in mK range
- Unique vertical flow design
- Calibrate sensors of any dimension
- Take it anywhere

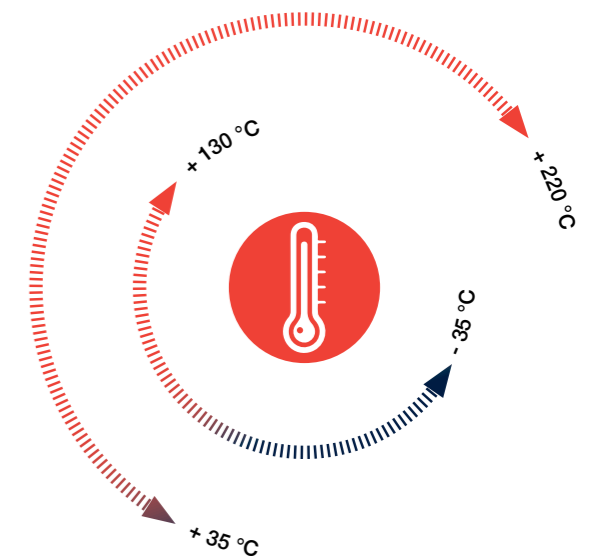
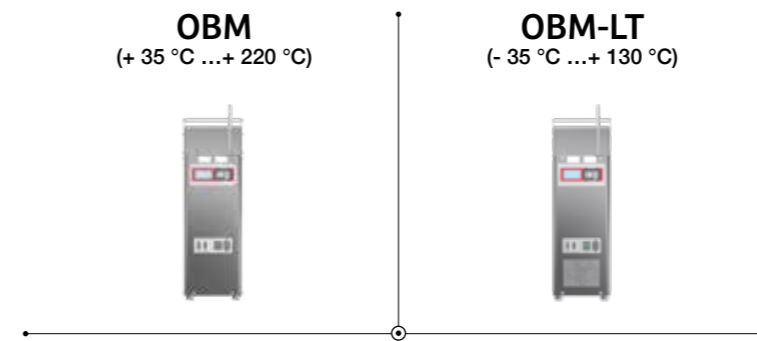
Micro Calibration Bath



Model: **OBM-LT**
 Volume: ~ 4 L
 Temperature range: - 35 °C ... + 130 °C
 Temperature stability: ± 0.007 °C @ - 35 °C
 ± 0.005 °C @ + 50 °C
 ± 0.008 °C @ + 100 °C
 Temperature uniformity: ± 0.02 °C @ + 50 °C
 Communication ports: **USB and RS-232 as standard**



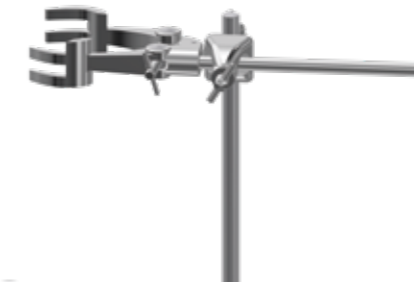
Optional accessory:
 Adjustable multiple probe fixture



Most used accessories:



Adjustable multiple probe fixture



Vertical fixture and clip on holder



Transportation case

BATH TYPE	REQUIRED FLUID FOR OPERATION [liters]	WORKING CHAMBER DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
OBM	~4	□ 80 x 290 immersion depth	225 x 685 x 330
OBM-LT	~4	□ 80 x 290 immersion depth	225 x 685 x 330

*More details in the dedicated Technical Data Sheet.



Black Body Cavity Ready Calibration Baths

- Perfect solution for calibrating IR thermometers and other thermographic equipment
- Fluid ensures perfect heat transfer
- Various standard and tailored blackbody cavity shapes available
- Unique vertical flow design
- Metrological uniformity and stability in mK range
- Three temperature ranges
- State of the art solution

Model: **OB-15/2 BBLT**

Volume: ~ 15 L

Temperature range: - 20 °C ...+ 130 °C

Temperature stability: ± 0.006 °C @ - 20 °C

± 0.005 °C @ 0 °C

± 0.003 °C @ + 100 °C

Temperature uniformity: ± 0.007 °C @ - 20 °C

Model: **OB-15/2 BBC**

Volume: ~ 15 L

Temperature range: +30 °C ...+ 130 °C

Temperature stability: ± 0.002 °C @ 30 °C

± 0.002 °C @ 37 °C

± 0.002 °C @ 50 °C

± 0.003 °C @ 70 °C

Temperature uniformity: < ± 0.007 °C



Black Body Cavity Ready Calibration Baths

Non Contact Thermometer Calibrator

OB-15/2 BB
(+ 40 °C ...+ 250 °C)



OB-15/2 BBLT
(- 20 °C ...+ 130 °C)



OB-15/2 BBC
(+ 30 °C ...+ 130 °C)



Available Black Body Cavity types:



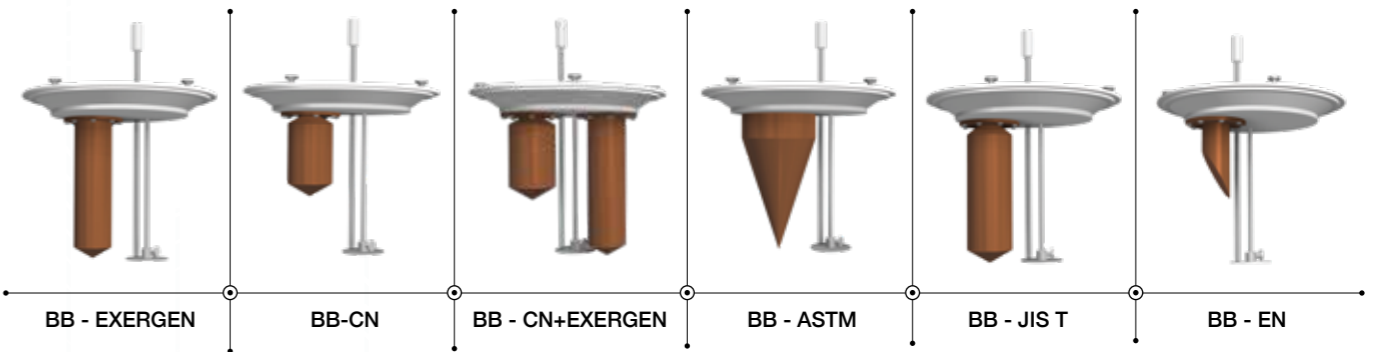
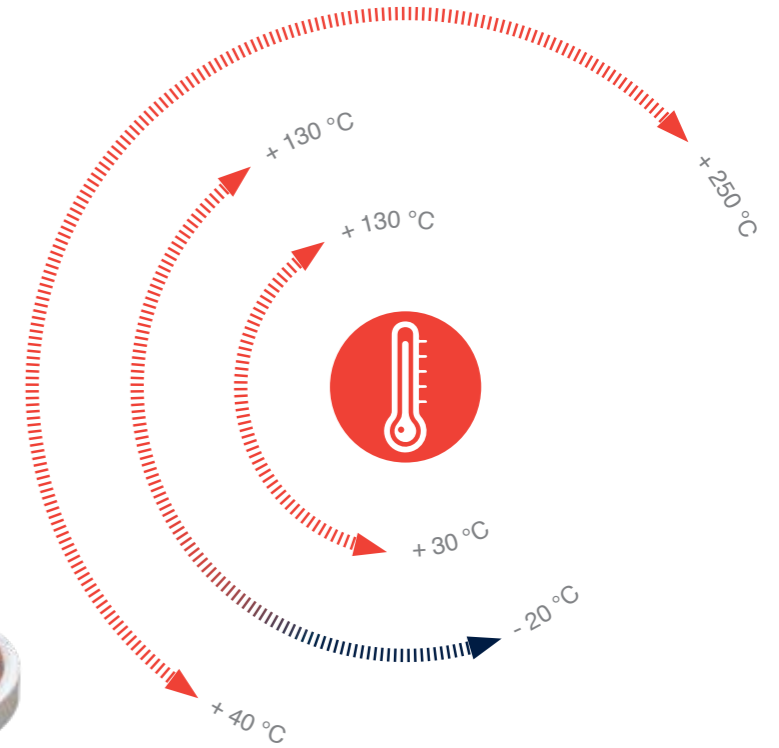
ASTM Designation
E 1965-98



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4207:2005



CEN 2003 EN
12470-5



BATH TYPE	REQUIRED FLUID FOR OPERATION [liters]	WORKING CHAMBER DIMENSIONS [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
OB-15/2	~ 18	Φ 225 x h 270	530 x 1090 x 470
OB-15/2 BBLT	~ 18	Φ 225 x h 270	530 x 1090 x 470
OB-15/2 BBC	~ 18	Φ 225 x h 270	530 x 535 x 470

*More details in the dedicated Technical Data Sheet.



Triple Point of Water Maintenance Baths

- Prepared for TPW cells insertion
- Uniformity and stability in mK range
- 500 mm immersion depth
- Fluid ensures perfect heat transfer
- State of the art solution
- Independent frost protection
- Cycling function
- Unique vertical flow design
- Two bath sizes

Model: **OB-50/2 TPW**

Volume: ~ 65 L

Temperature range: - 5 °C ...+ 130 °C

Temperature stability: ± 0.002 °C @ 0 °C
 ± 0.005 °C @ + 20 °C
 ± 0.002 °C @ + 100 °C

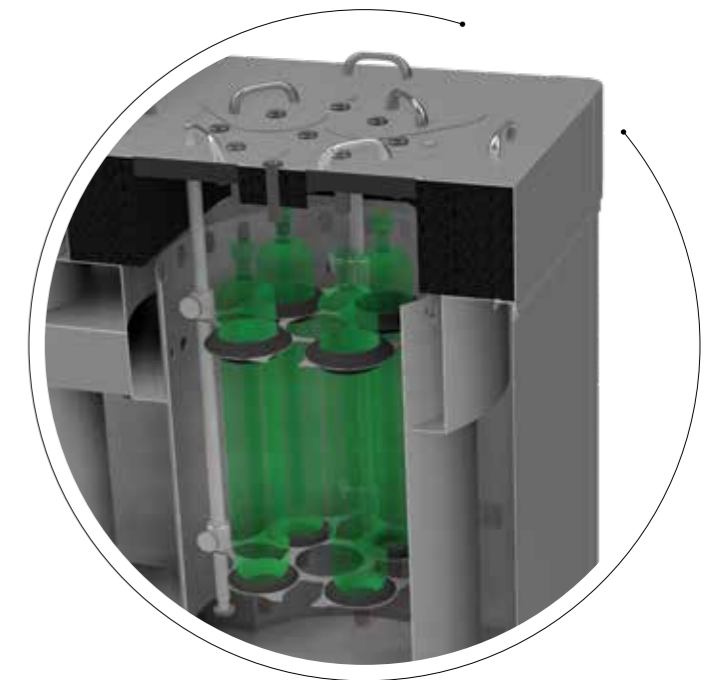
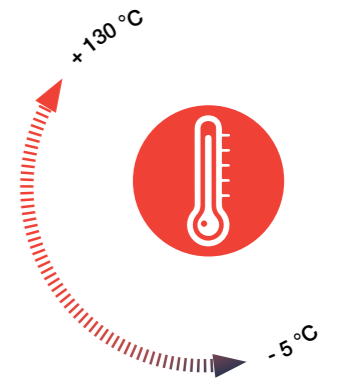
Temperature uniformity: $< \pm 0.007$ °C @ -20 °C



OB-22/2 TPW
(- 5 °C ...+ 130 °C)



OB-50/2 TPW
(- 5 °C ...+ 130 °C)



BATH TYPE	REQUIRED FLUID FOR OPERATION [liters]	WORKING CHAMBER DIMENSIONS [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
OB-22/2 TPW (capacity 1 TPW cell)	~25	Φ 147 x h 500	600 x 1240 x 550
OB-50/2 TPW (capacity up to 4 TPW cells)	~65	Φ 320 x h 500	745 x 1240 x 495

*More details in the dedicated Technical Data Sheet.



Ultra Stable Standard Resistor Maintenance Baths

- Standard resistor maintenance baths with exceptional metrology performance
- Uniformity and stability in mK range
- State of the art solution
- Unique vertical flow design
- Multiple access ports
- Hinged transparent cover
- Three bath sizes available

Model: **OB-100/2 LTUS**
 Volume: ~ 115 L
 Temperature range: + 5 °C ...+ 60 °C
 Temperature stability: ± 0.003 °C @ + 23 °C
 Temperature uniformity: < ± 0.007 °C @ + 23 °C



Ultra Stable Standard Resistor Maintenance Bath

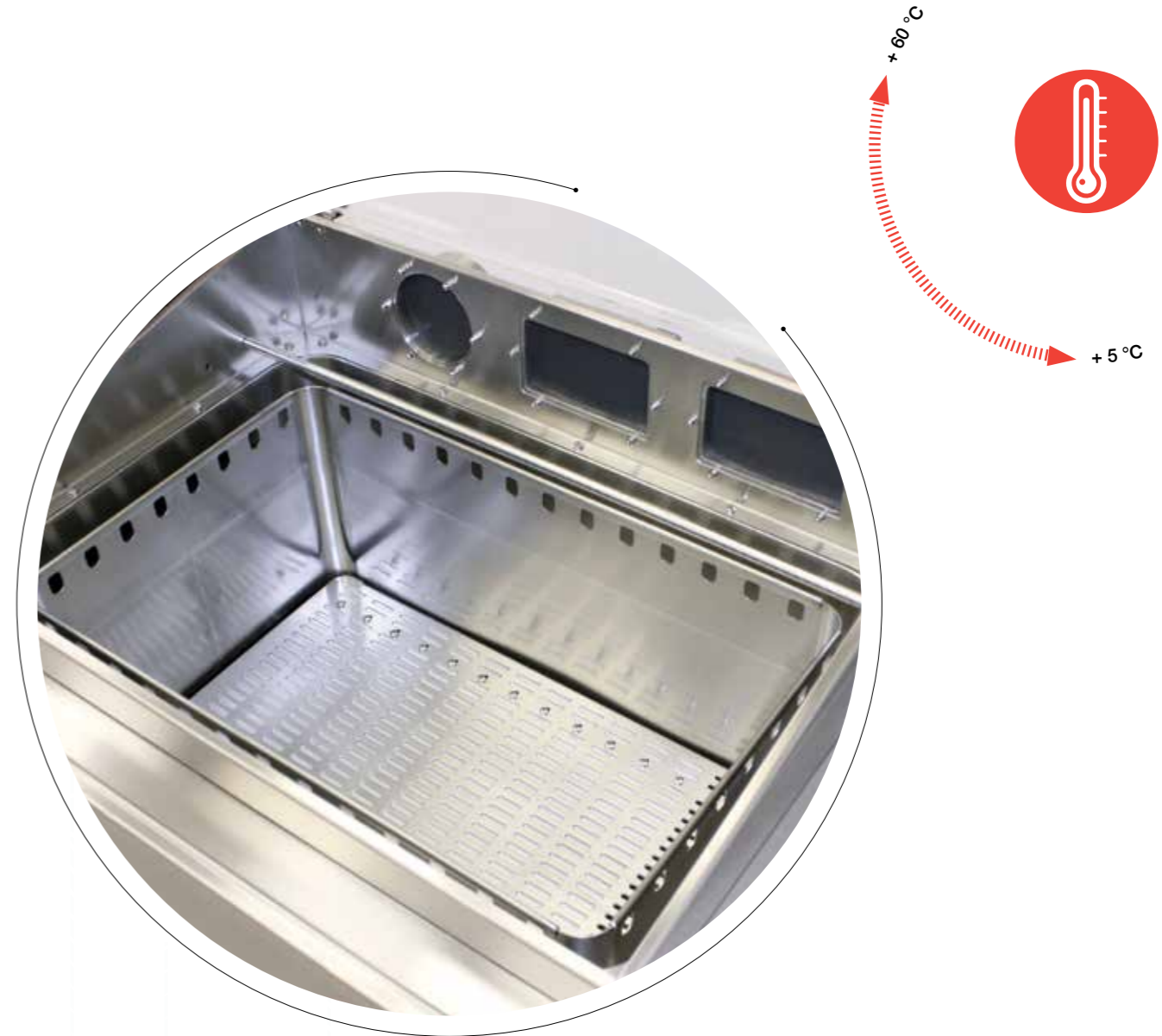
OB-60/2 LTUS
(+ 5 °C ...+ 60 °C)



OB-100/2 LTUS
(+ 5 °C ...+ 60 °C)



OB-110/2 LTUS
(+ 5 °C ...+ 60 °C)



BATH TYPE	REQUIRED FLUID FOR OPERATION [liters]	WORKING CHAMBER DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
OB-60/2 LTUS	~78	550 x 268 x 320	1000 x 1035 x 550
OB-100/2 LTUS	~115	640 x 268 x 400	1100 x 1035 x 650
OB-110/2 LTUS	~155	640 x 350 x 500	1100 x 1122 x 750

*More details in the dedicated Technical Data Sheet.



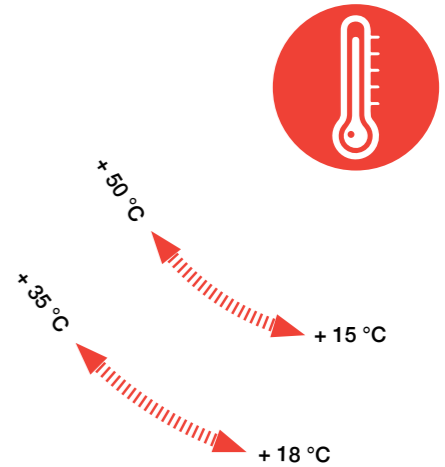
Air Baths

- Refined solution for ultra-stable temperature environment 24/7, 365
- Dry, clean, stable, silent, storage for standard resistors
- Perfect for checking temperature coefficients
- Peltier driven technology
- Keeping the temperature within 10mK over months
- Cascade PID control
- Side access ports for Cables & Probes

Model: **TK-190 US**
 Volume: ~ 190 L
 Temperature range: + 15 °C ...+ 50 °C
 Temperature stability: ± 0.005 °C @ + 23 °C
 Temperature uniformity: ± 0.02 °C @ + 23 °C



TK-300 US



CHAMBER SIZE = CHAMBER VOLUME [liters]	INTERIOR DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
8	160 x 330 x 157	230 x 578 x 332
50	400 x 375 x 350	705 x 865 x 640
105	400 x 640 x 410	705 x 1130 x 700
190	570 x 810 x 410	875 x 1300 x 700
300	601 x 1000 x 500	905 x 1490 x 800

*More details in the dedicated Technical Data Sheet.



19" Server Rack Units

- Refined solution for ultra-stable air / fluid temperature environment 24/7, 365
- 19-inch server rack size
- Stable, silent, storage for standard resistors
- Access for Cables via two section upper cover
- Uniformity and stability in mK range
- Peltier driven technology
- Cascade PID control

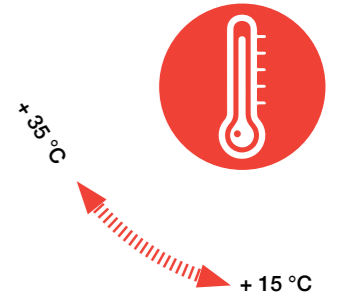
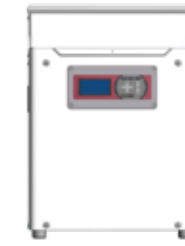
Model: **TK-19 R Air bath**
 Volume: ~ 13 L
 Temperature range: + 15 °C ...+ 35 °C
 Temperature stability: ± 0.003 °C @ 23 °C
 Temperature uniformity: ± 0.006 °C @ 23 °C



TK-19 T
 (+ 15 °C ...+ 35 °C)



OB-19 R
 (+ 15 °C ...+ 35 °C)



Model: **OB-19 R Fluid bath**
 Volume: ~ 10 L
 Temperature range: + 15 °C ...+ 35 °C
 Temperature stability: ± 0.002 °C @ 23 °C
 Temperature uniformity: ± 0.006 °C @ 23 °C



19" Server Rack Unit

RACK UNIT	VOLUME [liters]	INTERIOR DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
TK-19 R	~ 13 (Capacity of up to 4 Tinsley standard resistors)	208 x 266 x 235	355 x 403 x 467
OB-19 R	~10 (Capacity of up to 4 Tinsley standard resistors)	230 x 220 x 200	355 x 495 x 467

*More details in the dedicated Technical Data Sheet.



Temperature Chambers

- Material temperature resistance and product testing
- Temperature controlled test polygon
- Maintaining superior temperature stability
- World class metrology performance
- Sample conditioning prior to other tests
- Accelerated ageing
- Data loggers and sensors calibration

Model: **TK-68 CKLT**

Volume: ~ 68 L

Temperature range: - 40 °C ... + 180 °C

Temperature stability: ± 0.3 °C @ - 40 °C

± 0.05 °C @ 50 °C

± 0.05 °C @ 90 °C

± 0.1 °C @ 180 °C

Temperature uniformity: ± 1.5 °C @ - 40 °C

± 0.3 °C @ 50 °C

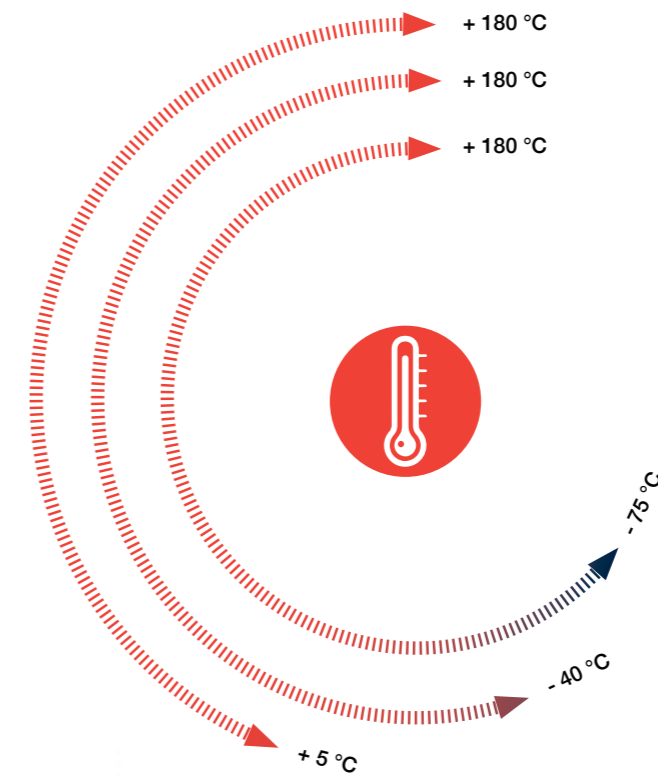
± 0.4 °C @ 90 °C

± 1.5 °C @ 180 °C



Temperature Chamber

TK-CK (+ 5 °C...+ 180 °C)	TK-CKLT (- 40 °C...+ 180 °C)	TK-CKULT (- 75 °C...+ 180 °C)
Models:	Models:	Models:
TK-68 CK	TK-68 CKLT	TK-105 CKULT
TK-190 CK	TK-190 CKLT	TK-190 CKULT
TK-340 CK	TK-340 CKLT	TK-340 CKULT
TK-500 CK	TK-500 CKLT	TK-500 CKULT
TK-1000 CK	TK-1000 CKLT	TK-1000 CKULT



CHAMBER SIZE = CHAMBER VOLUME [liters]	CHAMBER INTERIOR DIMENSIONS (WxHxD) [mm] for CK & CKLT models	CHAMBER INTERIOR DIMENSIONS (WxHxD) [mm] for CKULT models
68	410 x 475 x 350	/
105	/	530 x 500 x 460
190	600 x 615 x 510	620 x 590 x 515
340	600 x 835 x 685	620 x 810 x 690
500	800 x 835 x 800	870 x 800 x 800
1000	1000 x 1000 x 1000	1000 x 1000 x 1000

*More details in the dedicated Technical Data Sheet.



Climatic Chambers



- Temperature and relative humidity control
- Maintaining superior temperature & Rh stability
- Data loggers and sensors calibration
- World-class metrology performance
- Accelerated ageing
- Stress tests



Model: **KK-340 CHLT**
 Volume: ~ 340 L
 Temperature range: - 40 °C ...+ 180 °C
 Temperature stability:
 ± 0.5 °C @ - 40 °C
 ± 0.08 °C @ 50 °C 50 % Rh
 ± 0.1 °C @ 90 °C 90 % Rh
 ± 0.2 °C @ 180 °C
 Temperature uniformity:
 ± 1.0 °C @ - 40 °C
 ± 0.3 °C @ 50 °C 50 % Rh
 ± 0.4 °C @ 90 °C 90 % Rh
 ± 1.5 °C @ 180 °C

KK-CH
 (+ 5 °C...+ 180 °C)



Models:

KK-68 CH
KK-190 CH
KK-340 CH
KK-500 CH
KK-1000 CH

KK-CHLT
 (- 40 °C...+ 180 °C)



Models:

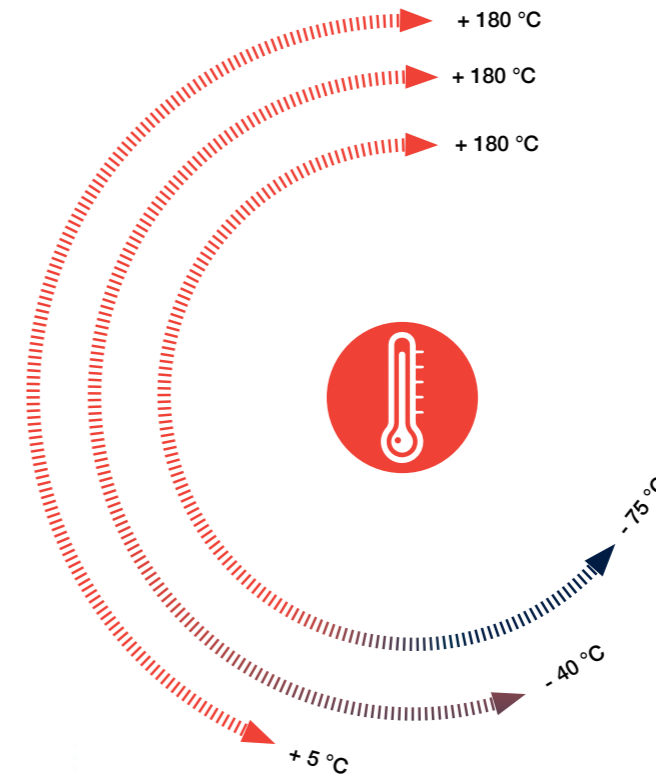
KK-68 CHLT
KK-190 CHLT
KK-340 CHLT
KK-500 CHLT
KK-1000 CHLT

KK-CHULT
 (- 75 °C...+ 180 °C)



Models:

KK-105 CHULT
KK-190 CHULT
KK-340 CHULT
KK-500 CHULT
KK-1000 CHULT



CHAMBER SIZE = CHAMBER VOLUME [liters]	CHAMBER INTERIOR DIMENSIONS (WxHxD) [mm] for CH & CHLT models	CHAMBER INTERIOR DIMENSIONS (WxHxD) [mm] for CHULT models
68	410 x 475 x 350	/
105	/	530 x 500 x 460
190	600 x 615 x 510	620 x 590 x 515
340	600 x 835 x 685	620 x 810 x 690
500	800 x 835 x 800	870 x 800 x 800
1000	1000 x 1000 x 1000	1000 x 1000 x 1000

*More details in the dedicated Technical Data Sheet.



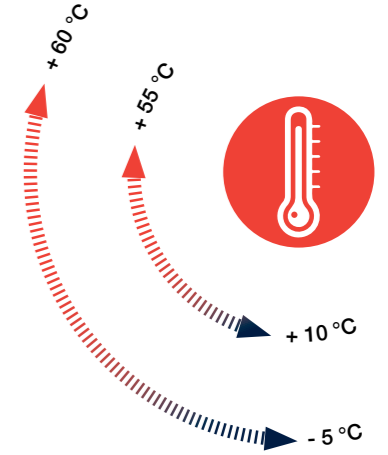
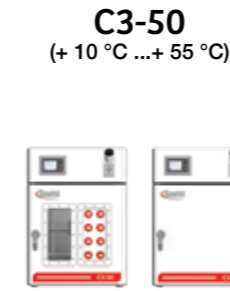
Calibration Climatic Chamber

- Perfect for calibration of air temperature and relative humidity sensors
- Superior temperature & humidity control and uniformity
- Data loggers and sensors calibration
- World-class metrology performance

Model: **C3-50**
 Volume: ~ 57 L
 Temperature range: + 10 °C ...+ 55 °C
 Temperature stability: ± 0.03 °C @ + 21 °C, 50 % Rh
 (better than ± 0.08 °C in full temp. range)
 Temperature uniformity: ± 0.2 °C @ + 21 °C, 50 % Rh
 Accessories: **Door with 2 flanged ports**
 (1 multilayer isolative glass & 1 isolative block with ports)



Calibration Climatic Chamber



Model:	C3-50
Standard	
Door with 2 flanged ports & 2 multilayer isolative glass	
Door with 2 flanged ports & 1 multilayer isolative glass & 1 isolative block with ports	
Door with 2 flanged ports & 2 isolative blocks with ports	

CHAMBER SIZE = CHAMBER VOLUME [liters]	INTERIOR DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
50	400 x 400 x 360	570 x 800 x 615
90	480 x 460 x 411	650 x 1223 x 793

*More details in the dedicated Technical Data Sheet.



Peltier Based Climatic Chambers

- Solely Peltier based temperature and humidity control
- Convenient– side access for cables & probes
- Stable, silent, vibration free climatic conditions
- Cascade PID control
- Keeping superior temperature & Rh stability

Peltier Based Climatic Chamber

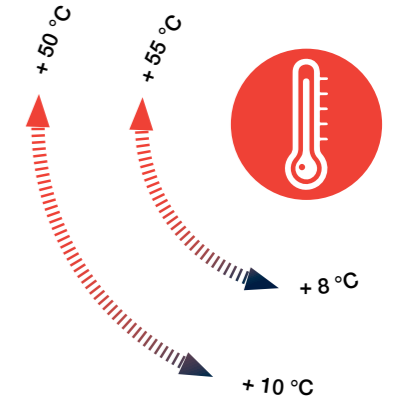


Model: **PKK-125**
 Volume: ~ 125 L
 Temperature range: + 10 °C ... + 50 °C
 Temperature stability: ± 0.08 °C @ + 15 °C, 75 % Rh
 ± 0.05 °C @ + 20 °C, 60 % Rh
 ± 0.05 °C @ + 30 °C, 65 % Rh
 ± 0.10 °C @ + 50 °C, 75 % Rh
 ± 0.10 °C @ + 50 °C, 15 % Rh
 Relative humidity range: 10 %...95 %
 Temperature uniformity: ± 0.30 °C @ + 15 °C, 75 % Rh
 ± 0.25 °C @ + 20 °C, 60 % Rh
 ± 0.50 °C @ + 30 °C, 65 % Rh
 ± 0.60 °C @ + 50 °C, 75 % Rh
 ± 1.30 °C @ + 50 °C, 15 % Rh
 Accessories: Observation window with chamber illumination

PKK-50
 (+ 8 °C ... + 55 °C)



PKK-125
 (+ 10 °C ... + 50 °C)



Model: **PKK-50**

With accessories: Trolley
 Observation window with chamber illumination



CHAMBER SIZE = CHAMBER VOLUME [liters]	INTERIOR DIMENSIONS (WxHxD) [mm]	EXTERIOR DIMENSIONS (WxHxD) [mm]
50	400 x 400 x 360	570 x 800 x 660
125	500 x 500 x 500	670 x 1135 x 755

*More details in the dedicated Technical Data Sheet.



Tailored Equipment

- Custom-made calibration baths in any given temperature range
- Tailored black body cavities
- A wide variety of standard and made to fit accessories
- Extra-small to extra-large climatic chambers to fit any DUT
- Equipment compatibility with open communication protocols

Climatic Chamber with removable intermediate glass door and IRIS hand ports



Model: **KK-500 CHLT**

Volume: ~500 L

Temperature range: - 40 °C ... + 180 °C

Temperature stability: ± 0.5 °C @ - 40 °C

± 0.06 °C @ 50 °C 50% Rh

± 0.1 °C @ 90 °C 90 % Rh

± 0.2 °C @ 180 °C

Relative humidity range: 10 %...95 %

Temperature uniformity: ± 0.7 °C @ - 40 °C

± 0.3 °C @ 50 °C 50 % Rh

± 0.4 °C @ 90 °C 90 % Rh

Calibration Bath with deep working chamber and low working access



Model: **OB-85/2 LT**

Exterior dimensions (WxHxD) [mm]: 1200 x 959 x 650

Interior dimensions [mm]: Φ 320 x 700

Required fluid volume for operation: ~ 80 L

Temperature range: - 20 °C ... + 180 °C

Temperature stability: < ± 0.005 °C

Temperature uniformity: < ± 0.007 °C

Model: **OB-35/2 SLT**

Exterior dimensions (WxHxD) [mm]: 700 x 984 x 500

Interior dimensions [mm]: 280 x 300 x 340

Required fluid volume for operation: ~ 43 L

Temperature range: - 40 °C ... + 130 °C

Temperature stability: ± 0.004 @ - 40 °C

± 0.005 @ 20 °C

± 0.002 @ 100 °C

Temperature uniformity: ± 0.007 °C @ - 40 °C



Calibration Bath with square working chamber

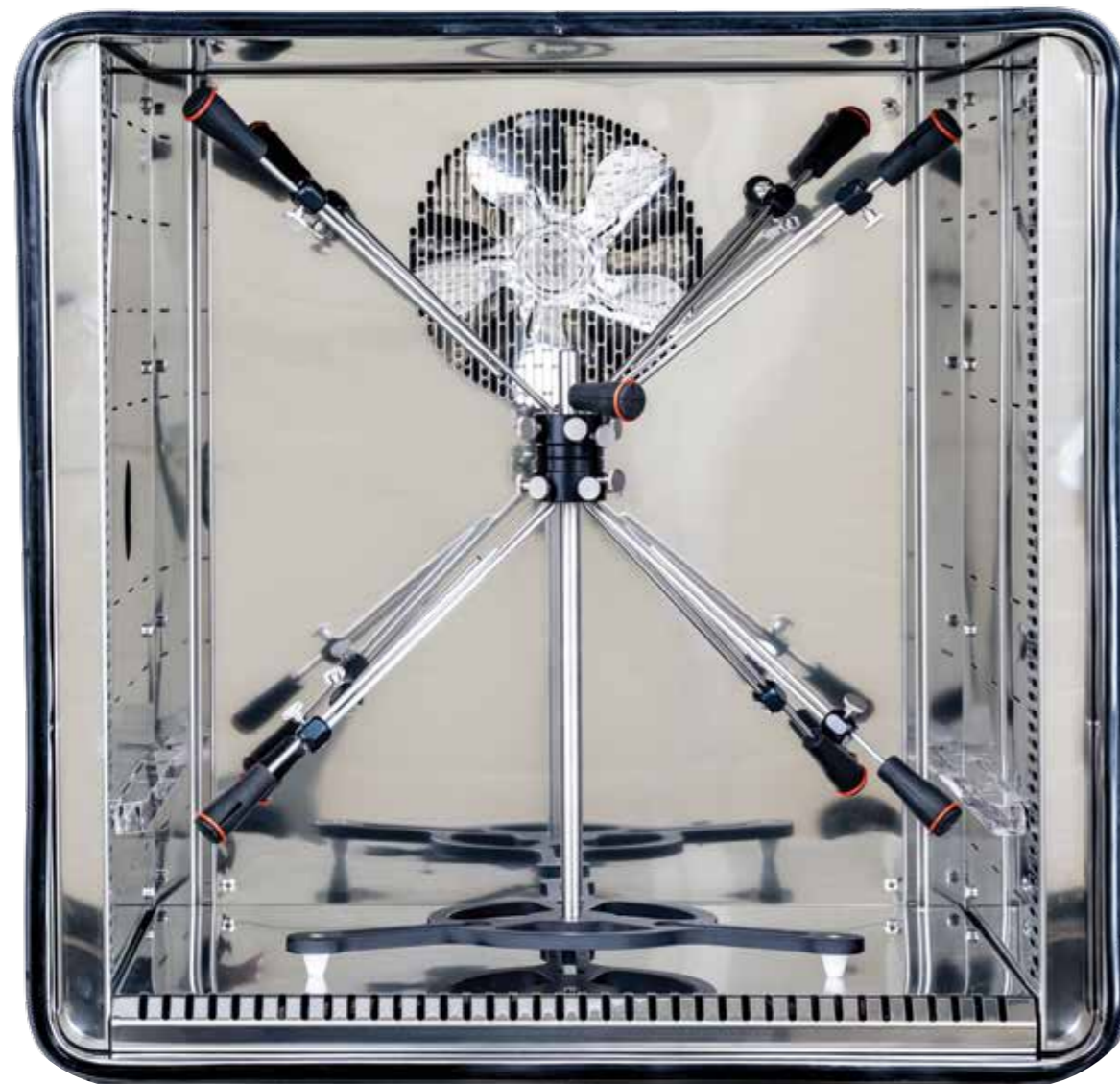


Accessories Spider

Mounting System for Temperature Sensors in Temperature and Climatic Chambers

Applications:

- Temperature and Climatic Chamber mapping
- Chamber validation
- Chamber calibration
- Uniformity studies



Concept

The Spider facilitates flexible positioning of temperature sensors in climatic chambers. It simplifies the setup of chamber temperature tests, calibration and validation. It features eleven (11) sensor mounts made from flexible and insulating silicone that isolates the temperature sensor from stainless-steel mounting rods.

Compatibility

The Spider is suitable for temperature sensors from 3 to 6 mm in diameter, and working temperatures from - 100 to + 200 °C. It is suitable for use with any type of multichannel temperature measurement systems.

Models:	MAX VOLUME (WxHxD) [mm]	MIN VOLUME (WxHxD) [mm]
SPIDER 600	720 x 720 x 720	480 x 480 x 480
SPIDER 1000	1200 x 1200 x 1200	720 x 720 x 720
SPIDER COMBO	1200 x 1200 x 1200	480 x 480 x 480

Silicone oils



Silicone oil fluid KDC ULT (- 100 °C ... + 30 °C)

Silicone oil fluid KDC 200.05 (- 40 °C ... + 130 °C)

Silicone oil fluid KDC 200.20 (+ 10 °C ... + 230 °C)

Silicone oil fluid KDC 200.50 (+ 30 °C ... + 278 °C)

Silicone oil fluid KDC 710 (+ 80 °C ... + 300 °C)

Worldwide partners & customers:

Industries

- Pharma
- Electronics
- Chemical
- Mechanical
- Automotive
- Aviation
- Weather agencies
- Testing facilities
- R&D institutes
- Universities
- Biotechnology
- Aerospace

References

- BAE Systems
- ESA
- Danfoss
- Samsung
- Trescal
- TDK
- Medico Support
- Mahle
- Novo Nordisk
- Sandoz
- Roche
- Broen Lab
- Exova Metech
- Ellab

National labs

- LMK Slovenia
- MIKES Finland
- DTI Denmark
- DFM A/S Denmark
- PTB Germany
- MBW AG Schweiz
- FPS Belgium
- INTiBS Poland
- INRIM Italy
- BIPM France
- NPL United Kingdom
- NSAI Ireland
- NIST USA
- HMI Croatia
- MBM Montenegro
- KRISS Korea
- NIMT Thailand
- NMC Singapore





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