Kuhner shaker

www.kuhner.com

The world’s most reliable shaking machines

Kuhner shaker

From bench top shakers to large industrial shakers, Kuhner AG manufactures high quality machines for customers around the world.

www.kuhner.com

Kuhner shaker • since 1949

Our motto: To build the world’s most reliable shakers

Kuhner AG is the leading developer and manufacturer of shaking machines for the international market. Founded in 1949 by Mr Adolf Kühner, this family business is now led by his son Markus Kühner.

The «Kuhner shaker» name stands for functionality, reliability and durability. Kuhner guarantees its machines for 5 years, designing and building many components in-house. All processes are SN EN ISO 9001 certified.

We endeavour to understand your science and cultivation needs to ensure solutions that accelerate your time to market and elevate your results. We commit to earning the trust of our clients and establishing relationships which will span decades. Kuhner fosters close contact with research and development departments in notable universities and companies. We constantly investigate new developments looking for opportunities to further optimise the design and performance of our shakers.

Kuhner offers a personal service for customers including product information, support and on-site visits.

ISO 9001 BUREAU VERITAS Certification

Shaking solutions for research and production

5 YEAR
5 Year Warranty

Incubator Shakers
Available with controlled CO_2 & humidity

LT-X (Lab-Therm)

ISF1-X (Climo-Shaker)

ISF4-X (Climo-Shaker)

Pilot-Shakers
Orbital shaking

RC2-X

SR200-X

OrbShakes
Easy scale-up

SB10-X OrbShake

SB50-X OrbShake

SB200-X OrbShake

Lab-Shakers
Continuous,
maintenance-free operation

LS-X

ES-X

Rack System
Adaptable and extendable

SBM/SS-X

Only Kuhner can provide multiple shaking diameters in a single shaker.

Direct drive

- Low energy consumption
- Smooth running and quiet operation
- Option of 3 direct drives:
  Standard, high speed, high power

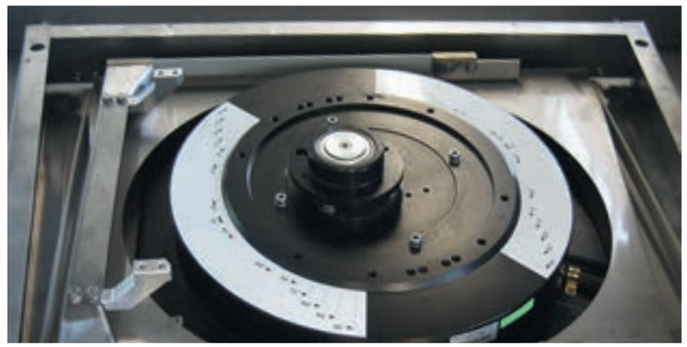
Changeable diameter

Diameter can be adjusted by the user at any time

- Three standard shaking diameters:
  12.5 mm, 25 mm and 50 mm
- Other shaking diameters are also possible:
  e.g. 70 mm for liquids with high viscosity

Parallelogram

The parallelogram ensures identical shaking movement anywhere on the tray, regardless of load distribution. The double steel springs will last a lifetime.



Foamed insulation

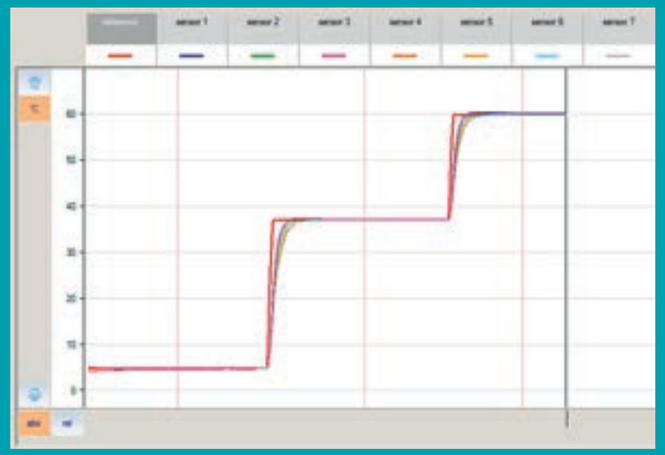
The key to our precise KuhnerControl is the unique insulation process with CFC-free foam.

Foaming is done by hand to ensure:
- Precise control of process parameters
- No condensation between insulation and casing
- Reduced energy consumption
- Silent operation

Silent operation

Temperature control

Homogeneous temperature distribution across the entire shaking tray of a Kuhner incubator shaker ensures reproducible cultivation results. Precise temperature control with low energy consumption is guaranteed.



CO_2 control

Reliable control of CO_2 is essential when working with mammalian or plant cell cultures and also with algae. A CO_2 controlled atmosphere inside the shaker incubator allows exact pH adjustment of the culture medium. Kuhner was the first company to manufacture and supply shakers with CO_2 control, so you can rely on our many years of experience.

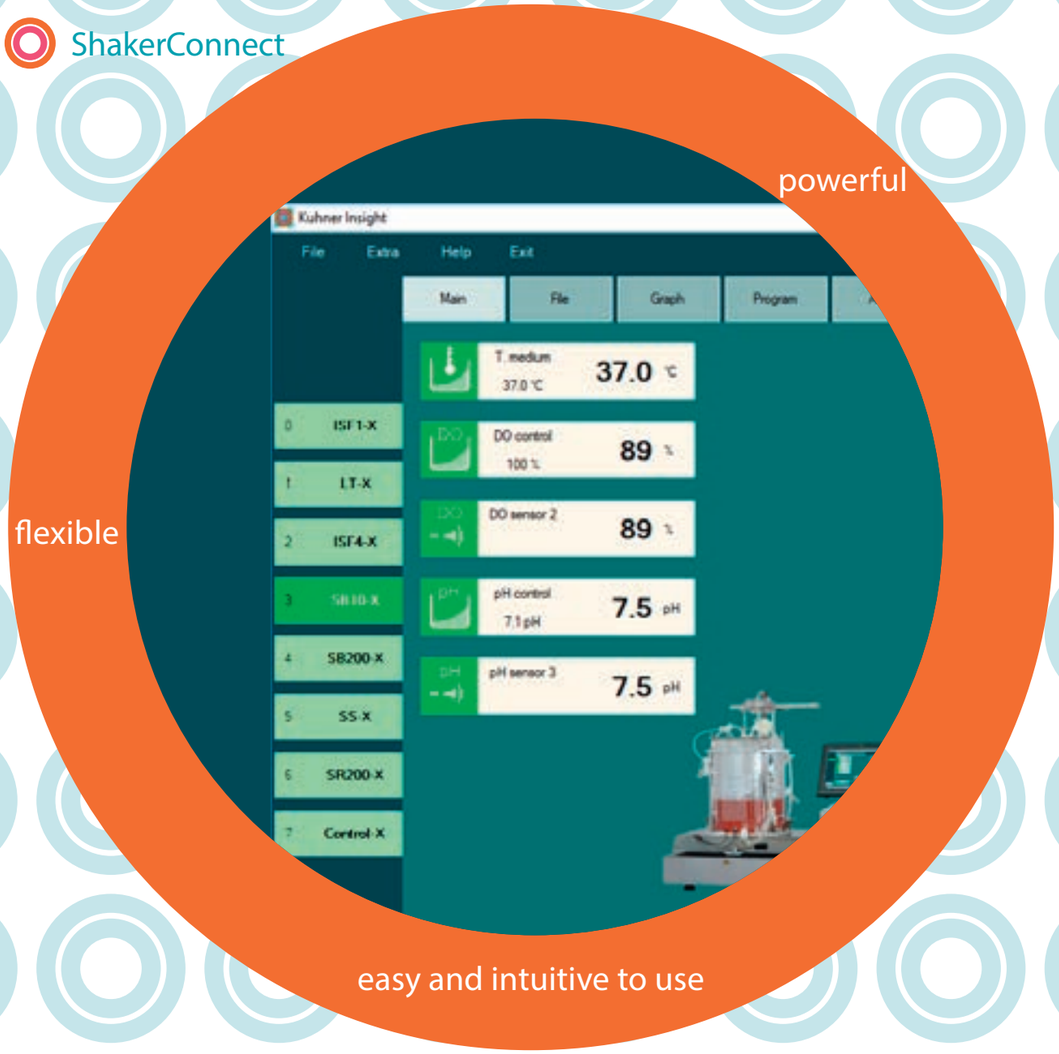
Humidity control

Controlled humidity is an important factor when working with microtiter plates, or when cultivating in flasks for long periods (e.g. cell cultures), as humidity can significantly reduce evaporation. Heated windows and door frames prevent condensation.

Control

Kuhner shakers are characterised by their user friendly controls. Every process parameter has its own controller and navigation is extremely simple.

ShakerConnect



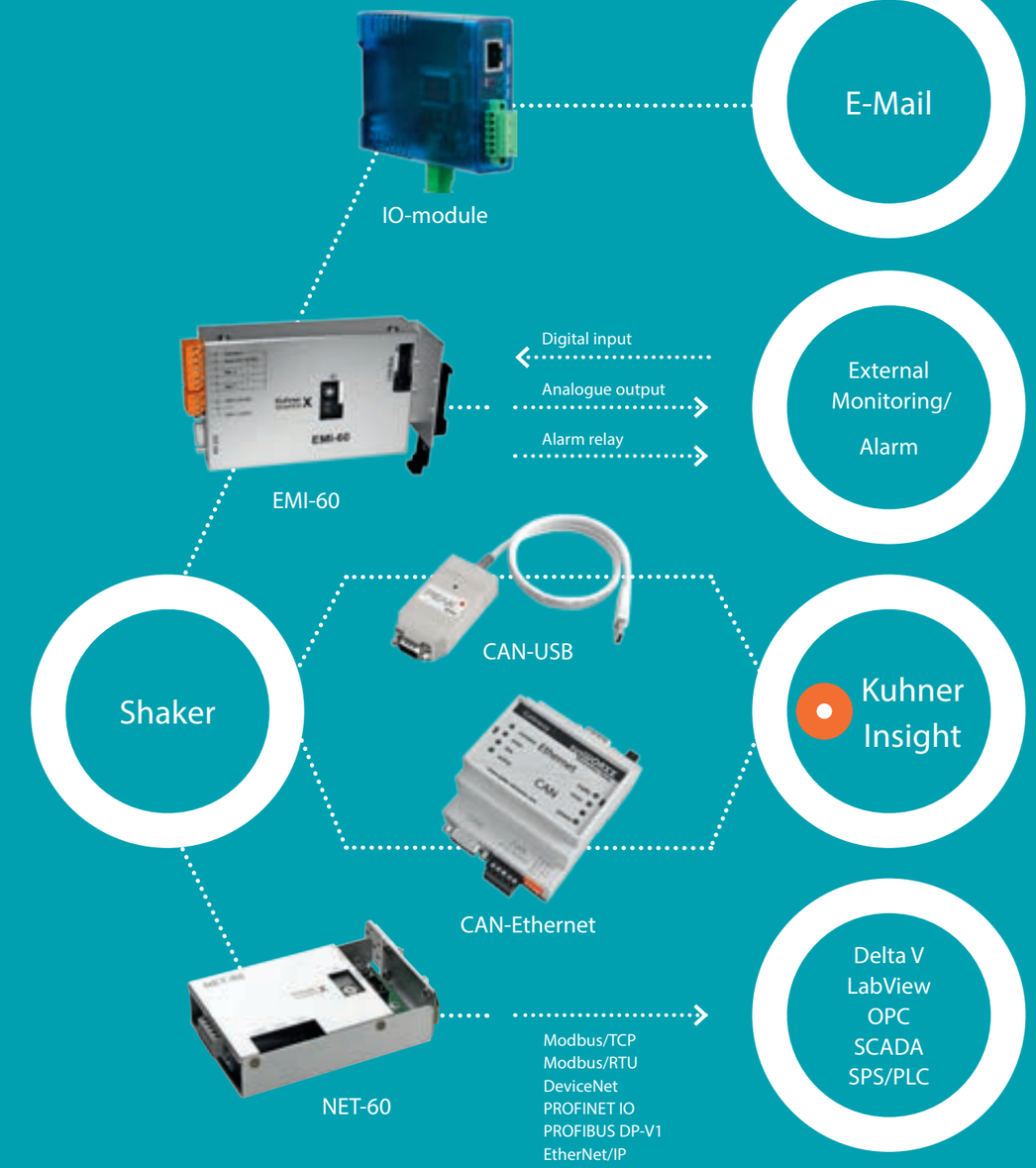
For convenient supervision of the shaker

Kuhner Insight Software

Kuhner Insight is our user-friendly software for data recording, calibration, programming and controlling. Simultaneous recording of process parameters for up to 8 shakers is possible.

Interface

Our wide range of interfaces keep you well connected.



• Order number

SMX856000	Kuhner Insight Software	SMX856501	NET-60 – Modbus/TCP
SMX856035	IO-module for e-mails	SMX856502	NET-60 – Modbus/RTU
SMX856030	External machine interface: EMI-60	SMX856503	NET-60 – DeviceNet
SMX856011	Interface: CAN-USB	SMX856504	NET-60 – PROFINET IO
SMX856020	Interface: CAN-Ethernet	SMX856505	NET-60 – PROFIBUS DP-V1
		SMX856506	NET-60 – EtherNet/IP

LT-X / LT-XC

- Used in biotechnology and pharmaceutical industries
- XC incubator shakers are optimised for cell cultivation

NEW
With O_2 control
(PhysOx control)

- Fits in any laboratory
- Accepts flasks up to 6 litres
- Two units can be stacked without the need for special tools or stacking kits

- CO_2 control option available: essential for mammalian, plant cell cultures and algae
- O_2 control available: essential for cultivating cells and microorganisms with low/no oxygen demand
- Controlled humidity option: essential for cultivation in microtiter plates or when cultivating in flasks for long periods
- Heating and cooling
- Heated window and door frame with controlled humidity option
- User-friendly operation: each parameter has its own control
- Retrofitting possible
- Touchscreen option available

Technical data

• Overview	SMX1700 / SMX1700C*	SMX1701 / SMX1701C*	SMX1703 / SMX1703C*
Cooling	no	yes	yes
Humidity control	no	no	yes
Temperature minimum	ambient + 10 °C	ambient – 15 °C ***(– 10 °C)****	ambient – 15 °C ***(– 10 °C)****
Temperature maximum	80 °C ***(60 °C)****	80 °C ***(60 °C)****	80 °C ***(60 °C)****
Humidity maximum	–	–	85% r.h.
Power consumption	< 800 W	< 950 W	< 1300 W

• Machine	
Gas volume	260 litre
Weight (with cooling)	170 kg
Illumination	LED
Ambient temperature	10 °C up to 35 °C

Display / Interface	
Operating menu in	de, fr, it, en, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue

Temperature	
Setting, digital	0.1 °C
Accuracy, absolute (across the tray)	± 0.30 °C (37 °C) ***± 0.25 °C (37 °C)****
Principle of sensor	Pt-100
Power of heating	500 W
Power of cooling	90…155 W
Air circulation	160 m^3/h

• Shaking unit	
Tray, size	EX (500 × 420 mm)
Loading, maximum	25 kg
Setting, digital	1 rpm
Accuracy, absolute	± 0.1 rpm
Timer	1s … 999h
Acceleration	controlled
Active brake	adjustable
Stop on position	adjustable

Shaking motion	Speed
orbital, Ø 12.5mm *	20…500 rpm
orbital, Ø 25.0mm *	20…400 rpm
orbital, Ø 50.0mm *	20…300 rpm
linear 12.5mm *	20…400 rpm
linear 25.0mm *	20…300 rpm
linear 50.0mm *	20…200 rpm

* can be changed / other diameters on request

Humidity	(SMX1703)
Max. at 25…55 °C	85% r.h.
Setting, digital	1% r.h.
Accuracy, absolute	± 2% r.h.
Principle of sensor	capacitive
Water refill	automatic
Water heater	180 W
Door heater	90 W

CO_2	(SMX1034)
Principle of sensor	Infrared, NDIR
Measuring range	0…20 % CO_2
Setting, digital	0.1%
Accuracy, absolute (including non-linearity, calibration uncertainty and repeatability)	± 0.40% at 5% CO_2
Temperature range	5…60 °C
CO_2-supply	max. 2 bar overpressure

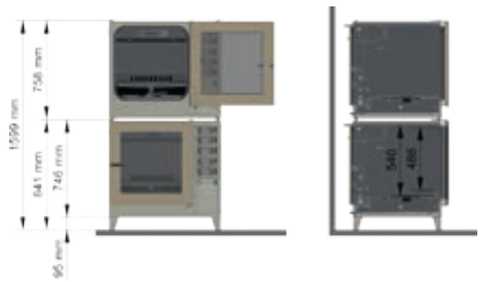
O_2	(SMX1738)
Principle of sensor	Zirkonoxyd
Measuring range	0…20.9 % O_2
Setting, digital	0.1%
Accuracy, absolute	± 0.40% at 5% O_2
Temperature range	-10…80 °C
N2-supply	max. 0.5...0.8 bar overpressure

• Mains connection	
SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

Further Options	
SMX1771	UV lamp
SMX1773	Black window
SMX1742	Unit for photosynthesis (LED)
SMX1712A	TabCom
SMX1772	Shelf
Dual table available on request	Technical data subject to change

*** optimised incubator shaker for cell culture**
+ CO_2 control (SMX1034) included as standard
+ Temperature max.: 60 °C
+ Improved temperature accuracy: ± 0.25 °C (37 °C)

Dimensions (mm)



ISF4-X / ISF4-XC

XC incubator shakers are optimised for cell cultivation

- CO_2 control option available: essential for mammalian, plant cell cultures and algae
- Heating and cooling
- Controlled humidity option: essential for cultivation in microtiter plates or when cultivating in flasks for long periods
- Heated window and door frame with controlled humidity option
- User-friendly operation: each shaking unit and parameter has its own control
- Retrofitting possible
- Touchscreen option available

Four shakers – one footprint

- 4 or even 5 independent, height adjustable shaking units
- Clear view of incubator's contents

High capacity

Technical data

• Overview	SMX1600 / SMX1600C*	SMX1601 / SMX1601C*	SMX1603 / SMX1603C*
Cooling	no	yes	yes
Humidity control	no	no	yes
Temperature minimum	ambient + 10 °C	ambient – 10 °C	ambient – 10 °C
Temperature maximum	80 °C ***(60 °C)****	80 °C ***(60 °C)****	80 °C ***(60 °C)****
Humidity maximum	–	–	85% r.h.
Power consumption	< 1700 W	< 2000 W	< 2600 W

• Machine	
Gas volume	1272 litre
Weight (without SF-X)	520 kg
Illumination	2 fl lamps
Ambient temperature	10 °C up to 35 °C

Display / Interface	
Operating menu in	de, en, fr, it, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue

Temperature	
Setting, digital	0.1 °C
Accuracy, absolute (across the tray)	± 0.30 °C (37 °C)
Principle of sensor	Pt-100
Power of heating	1000 W
Power of cooling	250…420 W
Air circulation	700 m³/h

• Shaking unit SF-X	(SMX1610)
Tray, size	F (800 × 420 mm)
Loading, maximum	25 kg
Setting, digital	1 rpm
Accuracy, absolute	± 0.1 rpm
Timer	1s … 999 h
Acceleration	controlled
Active brake	adjustable
Stop on position	adjustable

Shaking motion	Speed
orbital, Ø 12.5 mm *	20…500 rpm
orbital, Ø 25.0 mm *	20…400 rpm
orbital, Ø 50.0 mm *	20…300 rpm
linear 12.5 mm *	20…400 rpm
linear 25.0 mm *	20…300 rpm
linear 50.0 mm *	20…200 rpm

* can be changed / other diameters on request

Humidity	(SMX1603)
Max. at 25…55 °C	85% r.h.
Setting, digital	1% r.h.
Accuracy, absolute	± 2% r.h.
Principle of sensor	capacitive
Water refill	automatic
Water heater	300 W
Door heater	220 W

CO_2	(SMX1034)
Principle of sensor	Infrared, NDIR
Measuring range	0…20% CO_2
Setting, digital	0.1%
Accuracy, absolute (including non-linearity, calibration uncertainty and repeatability)	± 0.40% at 5% CO_2
Temperature range	5…60 °C
CO_2-supply	max. 2 bar overpressure

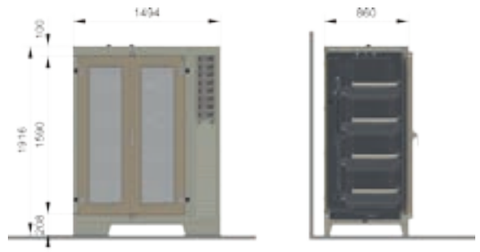
• Mains connection	
SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz

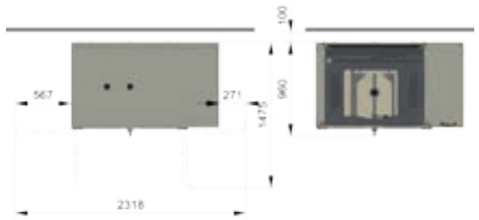
Further Options	
SMX1033	Pull-out table
SMX1671G	Integrated UV lamp
SMX1673	Black window (2x)
SM1642	Unit for photosynthesis (LED)
SMX1612A	TabCom for standard shaking unit
SMX1612B	TabCom for unit with pull-out table
SMX1672	Shelf
Dual table available on request	Technical data subject to change

*** optimised incubator shaker for cell culture**

+ CO_2 control (SMX1034) included as standard
+ Temperature max.: 60 °C

Dimensions (mm)





ISF1-X / ISF1-XC

XC incubator shakers are optimised for cell cultivation

- CO_2 control option available: essential for mammalian, plant cell cultures and algae
- Heating and cooling
- Controlled humidity option: essential for cultivation in microtiter plates or when cultivating in flasks for long periods
- Heated window and door frame with controlled humidity option
- User-friendly operation: each parameter has its own control
- Retrofitting possible
- Touchscreen option available

stack up to 3 shakers
Easy to stack without the need for special tools or stacking kits

Automatic door and foot switch option available for easy handling, maximum comfort and automation

Upward opening door

Technical data

• Overview	SMX1500 / SMX1500C*	SMX1501 / SMX1501C*	SMX1503 / SMX1503C*
Cooling	no	yes	yes
Humidity control	no	no	yes
Temperature minimum	ambient + 10 °C	ambient – 15 °C ***(– 10 °C)****	ambient – 15 °C ***(– 10 °C)****
Temperature maximum	80 °C ***(60 °C)****	80 °C ***(60 °C)****	80 °C ***(60 °C)****
Humidity maximum	–	–	85% r.h.
Power consumption	< 1300 W	< 1500 W	< 2000 W

• Machine	
Gas volume	395 litre
Weight (with cooling)	210 kg
Illumination	LED
Ambient temperature	10 °C up to 35 °C

Display / Interface	
Operation menu in	de, fr, it, en, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue

Temperature	
Setting, digital	0.1 °C
Accuracy, absolute (across the tray)	± 0.30 °C (37 °C) ***± 0.25 °C (37 °C)****
Principle of sensor	Pt-100
Power of heating	1000 W
Power of cooling	155…270 W
Air circulation	300 m^3/h

Humidity	(SMX1503)
Max. at 25…55 °C	85% r.h.
Setting, digital	1% r.h.
Accuracy, absolute	± 2% r.h.
Principle of sensor	capacitive
Water refill	automatic
Water heater	300 W
Door heater	100 W

CO_2	(SMX1034)
Principle of sensor	Infrared, NDIR
Measuring range	0…20% CO_2
Setting, digital	0.1%
Accuracy, absolute (including non-linearity, calibration uncertainty and repeatability)	± 0.40% at 5% CO_2
Temperature range	5…60 °C
CO_2-supply	max. 2 bar overpressure

• Shaking unit	
Tray, size	F (800 × 420 mm)
Loading, maximum	25kg
Setting, digital	1 rpm
Accuracy, absolute	± 0.1 rpm
Timer	1s … 999 h
Acceleration	controlled
Active brake	adjustable
Stop on position	adjustable

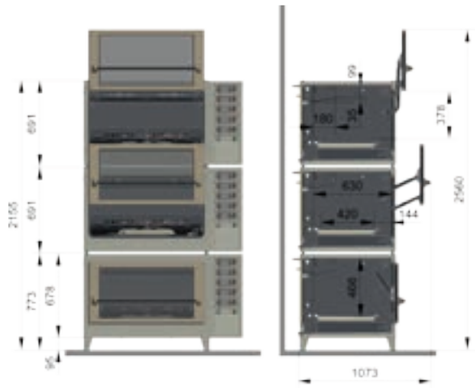
Shaking motion	Speed
orbital, Ø 12.5 mm *	20…500 rpm
orbital, Ø 25.0 mm *	20…400 rpm
orbital, Ø 50.0 mm *	20…300 rpm
linear, 12.5 mm *	20…400 rpm
linear, 25.0 mm *	20…300 rpm
linear, 50.0 mm *	20…200 rpm

* can be changed / other diameters on request

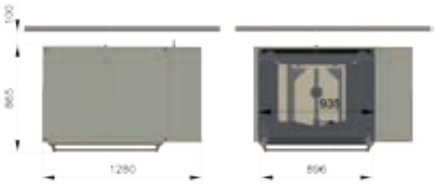
• Mains connection	
SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

Further Options	
SMX1033	Pull-out table
SM1542	Unit for photosynthesis (LED)
SMX1571	UV lamp
SMX1573	Black window
SMX1512A	TabCom for standard shaking unit
SMX1512B	TabCom for unit with pull-out table
SMX1572	Shelf
SMX1540	Automatic door without foot switch
SMX1541	Automatic door with foot switch
Dual table available on request	Technical data subject to change

Dimensions (mm)



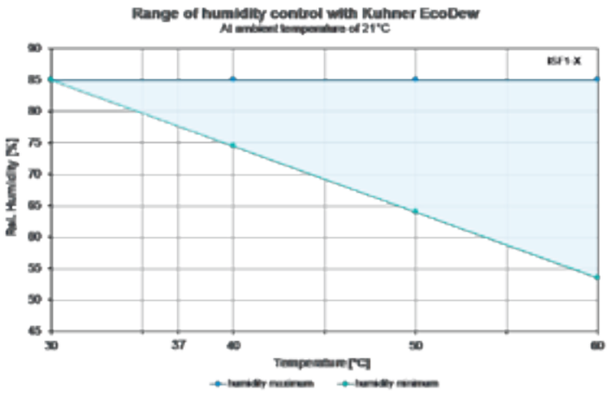
*** optimised incubator shaker for cell culture**
+ CO_2 control (SMX1034) included as standard
+ Temperature max.: 60 °C
+ Improved temperature accuracy: ± 0.25 °C (37 °C)



EcoDew®-Technology

The newly developed EcoDew®-Technology provides precise humidity control without requiring a cooling-compressor-unit. The system was developed especially for customers using higher temperatures (10 °C above room temperature) and humidity, e.g. cell culture cultivations in general or cultivations in microtiter plates.

EcoDew option available for ISF1-X and LT-X



EcoDew® condensation body

Advantages

- eco-friendly (less power consumption, no cooling unit required)
- silent operation
- easy to clean
- retrofittable

Technical data

• Overview	SMX1502 / SMX1502C*	SMX1702 / SMX1702C*
Cooling	no	no
Humidity control	yes	yes
Temperature minimum	ambient + 10 °C	ambient + 10 °C
Temperature maximum	80 °C ***(60 °C)****	80 °C ***(60 °C)****
Humidity maximum	85% r.h.	85% r.h.
Power consumption	< 1700	< 1100

Technical data subject to change

*** optimised incubator shaker for cell culture**
+ CO_2 control (SMX1034) included as standard
+ Temperature max.: 60 °C
+ Improved temperature accuracy: ± 0.25 °C (37 °C)

OrbShakes

Orbital shaken bioreactors for single-use bags

SB10-X OrbShake **SB50-X OrbShake** **SB200-X OrbShake**

Easy scale up

- For use in research, process development and production
- Cultivation of human, mammalian, plant and insect cells
- Online measurement of pH and DO
- Single-use bag: requires no additional mixing device, enables quick set up times and eliminates elaborate cleaning and sterilising procedures
- Heating or cooling
- Fast turnaround
- Control unit with touchscreen monitor, software, gas mixing device & pumps

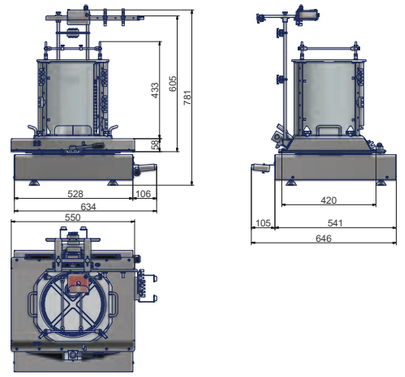
OrbShakes • Technical data

• Overview	SB10-X (SMX7600)	SB50-X (SMX7500)	SB200-X (SMX7100)
Shaker speed	20 rpm – 140 rpm	20 rpm – 150 rpm	20 rpm – 80 rpm
Shaker diameter	50 mm (orbital motion) Shaking diameter is adjustable (12.5 mm, 25 mm, 50mm)	50 mm (orbital motion)	50 mm (orbital motion)
Weight bioreactor incl. shaker	approx. 75 kg without liquid	approx. 340 kg without liquid	approx. 400 kg without liquid
Accuracy, absolute	± 0.1 rpm	± 0.1 rpm	± 0.1 rpm
Setting, digital	1 rpm	1 rpm	1 rpm
Active brake	adjustable	adjustable	adjustable
Interface	CAN-Bus, RS232	CAN-Bus, RS232	CAN-Bus, RS232
Temperature	up to 40 °C	up to 50 °C	up to 50° C
Cooling	–	cooling coils are incorporated for connection to an external cooling system (pressure < 0.2 bar)	cooling coils are incorporated for connection to an external cooling system (pressure < 0.2 bar)
pH and DO input	1× pH / 1× DO	1× pH / 1× DO	2× pH / 2× DO
Single-use bag	SMX760001 Standard disposable bag SB10 (H) SMX760002 Basic disposable bag SB10 (H) SMX760003 Perfusion disposable bag SB10 (H)	SMX750001	SMX710001
• Control unit	**SMX76011** with touchscreen monitor, Kuhner Insight Software, gas mixing device & pumps	**SMX 7110** with touchscreen monitor, Kuhner Insight Software, gas mixing device & pumps	
• pH and DO control	**Integrated in tray module SMX76001**	**Integrated in Reader Box SMX7130**	
pH measurement	principle: optical chemosensor	principle: optical chemosensor	
Range	pH 5.5 – pH 8.5	pH 5.5 – pH 8.5	
Accuracy (chemosensor)	± pH 0.05 at pH 7 with one point calibration ± pH 0.10 at pH 7 with pre-calibration	± pH 0.05 at pH 7 with one point calibration ± pH 0.10 at pH 7 with pre-calibration	
Drift	< pH 0.005 per day	< pH 0.005 per day	
Temperature range	up to 50 °C	up to 50 °C	
DO measurement	principle: optical chemosensor	principle: optical chemosensor	
Range	0% – 100% DO	0% – 100% DO	
Accuracy (chemosensor)	± 0.1% O_2 at 20.9% O_2	± 0.1% O_2 at 20.9% O_2	
Accuracy (system)	± 10% DO	± 10% DO	
Drift	< 0.015% O_2 per day	< 0.015% O_2 per day	
Temperature range	up to 50 °C	up to 50 °C	
• Filter heater	**SMX76020**	**SMX7120**	
Capacity	1 exhaust filter	2 exhaust filters	
Casing	polycarbonate		
Heating	resistance heater (6 W)		
Max. temperature	approx. 40 °C at 23 °C ambient temperature	approx. 45 °C at 23 °C ambient temperature	
Control	orange LED lights indicate that filter heater is active and working	controlled by Kuhner Insight Software	
• Mains connection			
SMX1021	220 – 240 V / 50 – 60 Hz		
SMX1023	110 – 120 V / 50 – 60 Hz		
SMX1024	95 – 105 V / 50 – 60 Hz		

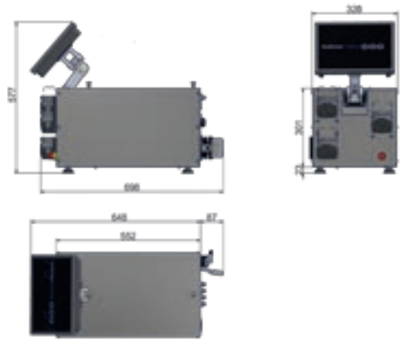
Technical data subject to change

Dimensions (mm)

SB10-X OrbShake

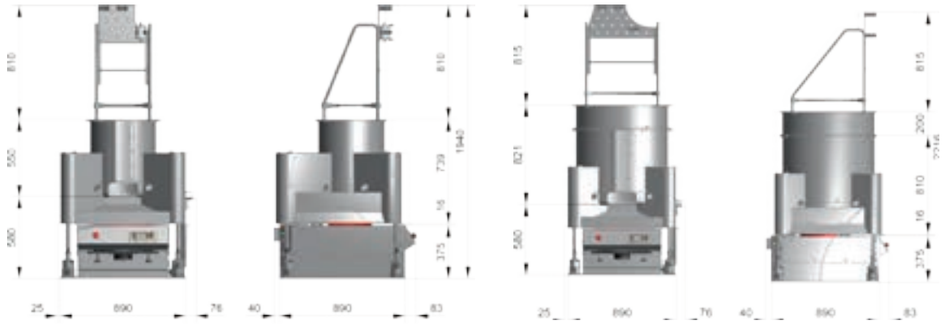


Control unit SB10-X OrbShake

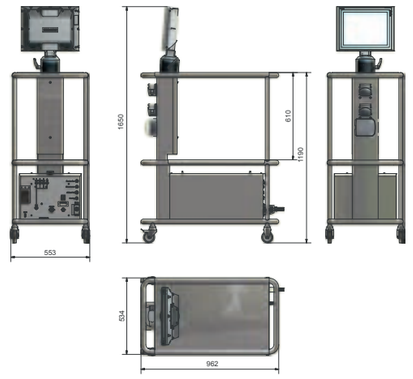


SB50-X OrbShake

SB200-X OrbShake



Control unit SB50-X OrbShake and SB200-X Orbshake



Knowledge transfer

Shaker Laboratory

Kuhner AG offers advice on cultivations in shaken bioreactors. Our in-house laboratory uses a number of online-measuring methods and computer based models to support our customers.

Collaboration with universities, especially with academic partners Prof. Büchs (AVT, RWTH Aachen, Germany) and Prof. em. Wurm (LBTC, EPFL Lausanne, Switzerland), can also provide answers to complex questions. This consultation service is confidential of course and free of charge for Kuhner customers.

Seminars and Trainings

Furthermore, Kuhner carries out seminars which address questions about cultivation conditions and offer suggestions for optimising the operation of your shaken bioreactors (shake flasks, microtiter plates, tubespins etc.). Kuhner owns Mas Boada, a science resort near Barcelona, where product trainings and seminars about shaken cultivation are held.

A scientific poster gallery on our website completes our support service. Posters can be enlarged and downloaded. Take a look at: www.kuhner.com

Mas Boada Science Resort with conference rooms and laboratory space

Lab-Shakers

LS-X
Sturdy bench top shaker

- Accepts loads up to 25 kg
- Large display and touch pad control
- Ideal base for customised trays and holders

ES-X
For use in incubators with humidity

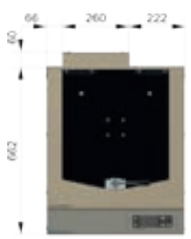
- Separate control unit
- Ideal for cell culture applications
- Special version available for robotic systems
- Minimal heat transfer and low energy consumption

Technical data

• Overview	LS-X (SMX1200)	ES-X (SMX1300)
Weight	58 kg	60 kg
Operating menu in	de, fr, it, en, es	de, fr, it, en, es
Interface, standard	CAN-Bus	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue	USB, Ethernet, digital, analogue
Ambient temperature	0 °C up to 60 °C	–20 °C up to 80 °C
Control unit		0 °C up to 60 °C
Consumption, maximum	65 W (130 W with high torque drive SMX1031)	65 W (130 W with high torque drive SMX1031)
Consumption, typical	25 W	25 W

Technical data subject to change

Dimensions (mm)



(Details for both Lab-Shakers)

• Shaking unit		
1 × Tray, size	E	(420 × 420 mm)
or	EX	(500 × 420 mm)
or	F	(800 × 420 mm)
Loading, maximum	25 kg	
Setting, digital	1 rpm	
Accuracy, absolute	± 0.1 rpm	
Timer	1s … 999 h	
Acceleration	controlled	
Active brake	adjustable	
Stop on position	adjustable	

• Shaking motion	Speed
orbital, Ø 12.5 mm *	20…500 rpm
orbital, Ø 25.0 mm *	20…400 rpm
orbital, Ø 50.0 mm *	20…300 rpm
linear, 12.5 mm *	20…400 rpm
linear, 25.0 mm *	20…300 rpm
linear, 50.0 mm *	20…200 rpm

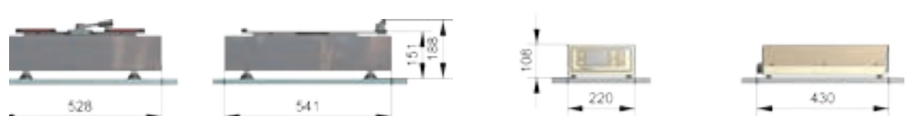
* can be changed/other diameters on request

• Mains connection	
SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

• Further Options	
SMX1311	On/Off-Switch at shaker
SMX1312	Terminal box (SMX1300)
SMX1313	2 thin cables (SMX1300)

Technical data subject to change

Dimensions (mm)



Rack System

Extendable Rack System

SBM/SS-X

- Ideal for temperature controlled rooms, laboratories and corridors
- Each shaking unit has its own direct drive
- Size and configuration can be altered at any given time

• Technical data	SBM: SMX1900 / SEM: SMX1901
Weight SBM	54 kg
Consumption, maximum	240 W (4 machines, max. acceleration)
Consumption, maximum	480 W (4 machines with high torque drive)
Consumption, typical	50 W (4 machines)
Ambient temperature	0 °C up to 60 °C

Display / Interface

Operating menu in	de, fr, en, it, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue

• Shaking unit SS-X	SMX1910
Weight SS-X	60 kg
Tray, size	F (800 × 420 mm)
Loading, maximum	25 kg
Setting, digital	1 rpm
Accuracy, absolute	± 0.1 rpm
Timer	1s … 999 h
Acceleration	controlled
Active brake	adjustable
Stop on position	adjustable

• Shaking motion	Speed
orbital, Ø 12.5 mm *	20…500 rpm
orbital, Ø 25.0 mm *	20…400 rpm
orbital, Ø 50.0 mm *	20…300 rpm
linear 12.5 mm *	20…400 rpm
linear 25.0 mm *	20…300 rpm
linear 50.0 mm *	20…200 rpm

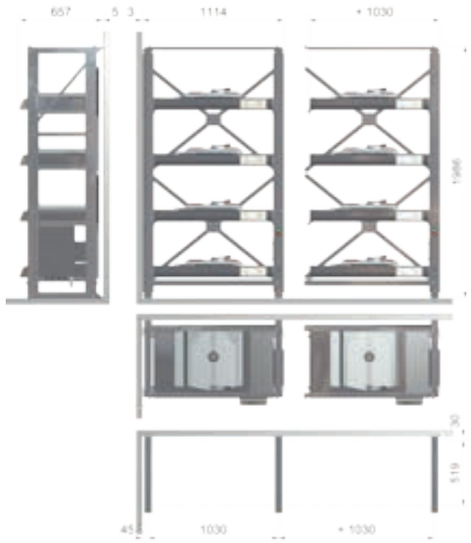
* can be changed / other diameters on request

• Mains connection

SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

Technical data subject to change

Dimensions (mm)



Pilot-Shakers

- Ideal for climate controlled rooms
- Orbital shaking with maximum speed of 400 rpm
- Standard orbital shaking diameter of 50 mm

RC2-X

Two large C-size trays (800 × 660 mm)

• Technical data	SMX2120
Dimensions W × D × H	950 × 1013 × 1023
Speed	20 – 300 rpm up to 400 rpm on request
Diameter	50 mm (orbital motion) other diameters on request
Weight	330 kg
Accuracy, absolute	0.1 rpm
Setting, digital	1 rpm
Active brake	adjustable
Interface	CAN-Bus, RS232
Loading, maximum	100 kg
Tray size	2x C-tray (800 × 660 mm)

Kuhner Insight Software

Monitoring	shaking speed

• Mains connection

SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

Technical data subject to change

SR200-X

For heavy loads and use of various vessels

•Technical data	SMX2102
Dimensions W × D × H	950 × 1013 × 892
Speed	20 – 300 rpm
Diameter	50 mm (orbital motion) other diameters on request
Weight	340 kg
Accuracy, absolute	0.1 rpm
Setting, digital	1 rpm
Active brake	adjustable
Interface	CAN-Bus, RS232
Loading, maximum	100 kg

Kuhner Insight Software

Monitoring	shaking speed

• Mains connection

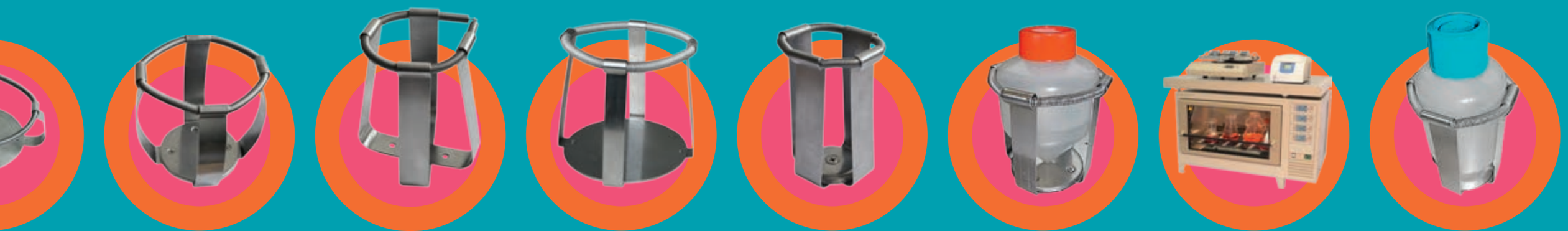
SMX1021	220 – 240 V / 50 – 60 Hz
SMX1022	190 – 210 V / 50 – 60 Hz
SMX1023	110 – 120 V / 50 – 60 Hz
SMX1024	95 – 105 V / 50 – 60 Hz

Technical data subject to change

Custom-made

Tell us your requirements!

Send us a sample of the container that needs to be shaken.
We will build a suitable holder.



Custom-made accessories, an everyday occurrence for us.

High performance Swiss Technology
by Kuhner AG

Options

UV lamp

The chamber of an incubator shaker can be sterilized with an integrated UV lamp. The UV lamp has a clearly labelled external switch.

Black window

Available for light sensitive medium or organisms. Any Kuhner incubator shaker can be delivered with blackened windows to prevent unwanted daylight or UV radiation inside the incubator.

Pull-out table

With a pull-out table loading and unloading trays is much easier.

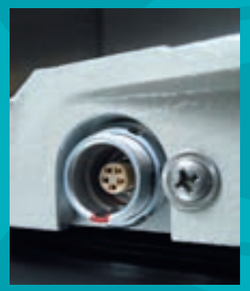
Dual table

The dual table is an easy and economical way of doubling the shaking capacity. It consists of two levels. Each level will accept an E, EX or F size tray. However, the shaking speed is limited.

Illumination unit for photosynthesis (LED)

The ceiling of any Kuhner incubator shaker can be fitted with LED modules for the cultivation of phototrophic organisms. The control module allows full programming of night/day cycles and variable light intensity.

- Order this unit together with cooling.



Standard shaking unit

Pull-out table

TabCom

The TabCom option from Kuhner consists of a cable for power and data with the connection port integrated in the shaking table (CAN-Bus & 24 V power supply).

A cable guide prevents the cable breaking and ensures secure data recording. Online measuring technologies offered by Kuhner that use TabCom include BPM-60 (pH, dissolved oxygen) and RAMOS (OTR, CTR). The flexibility of TabCom means other measurement systems can be easily integrated.

Shelf

The incubator shakers as well as the Rack System can be fitted with a shelf allowing cultivation in petri dishes. The shelf is fitted above the shaking table.

IQ/OQ Documentations

IQ-OQ (Installation Qualification and Operation Qualification) is an equipment qualification required for GMP procedures.

Documentation is available from Kuhner and Qualification services can also be provided at the customer's premises.

- Available for each shaker

Options

EPFL-table

This table accepts for example up to five tube holders, each with a capacity of 24 x 50 ml tubes. The EPFL table is available for the ISF1-X, ISF4-X, LT-X and ES-X.

Light shade

Available for light sensitive medium or organisms to prevent unwanted daylight or UV radiation inside the incubator. The Light shade can be removed.

Touchscreen

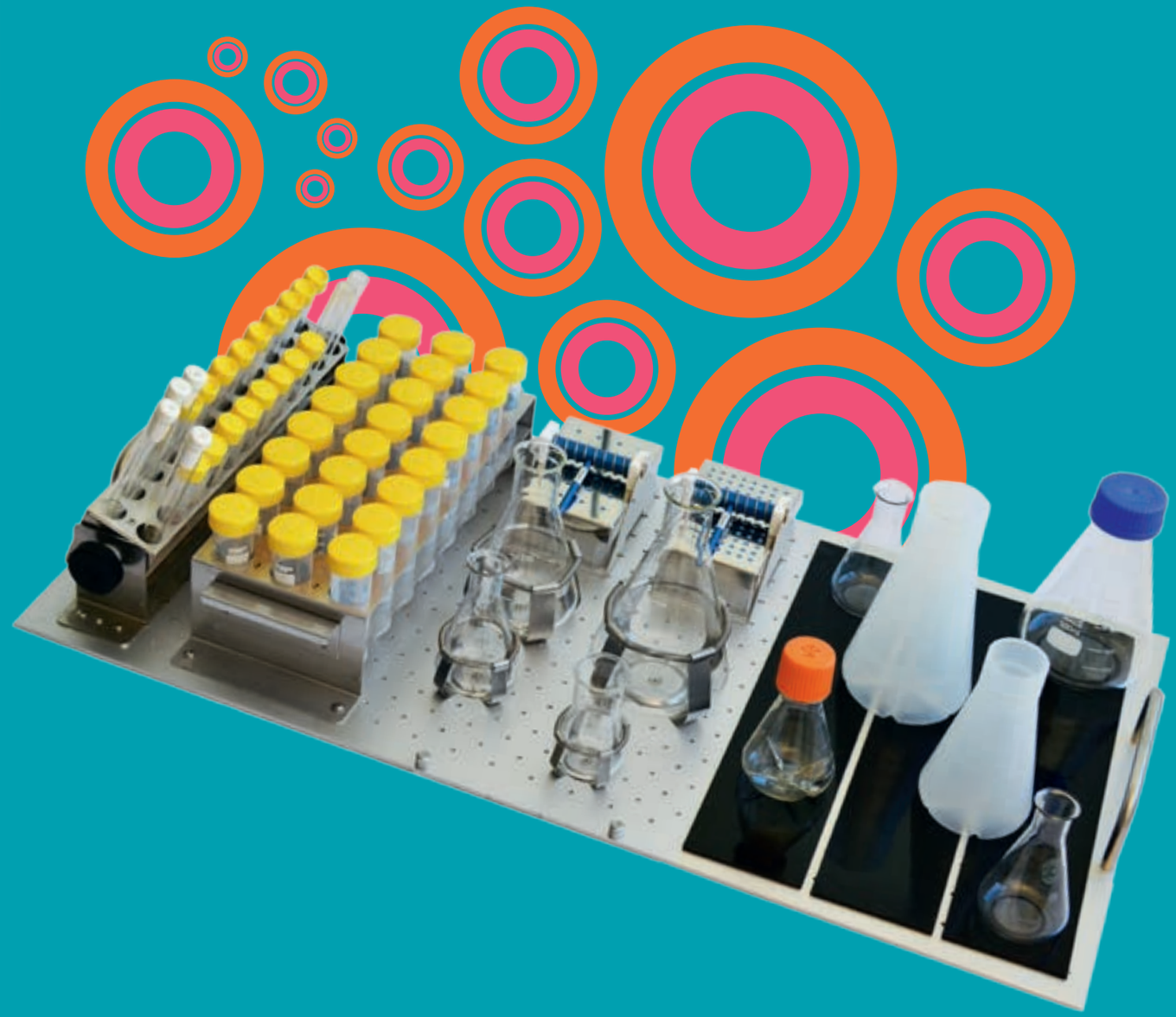
Touchscreen with Kuhner Insight Software for advanced operation. Available for ISF1-X, ISF4-X and LT-X.

Floor stands with wheels

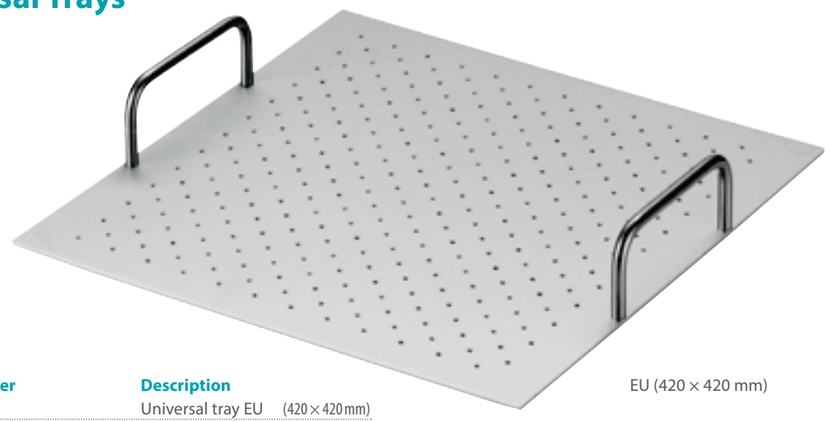
This floor stands with wheels for the ISF1-X enables moving the machine easily. Also available for the LT-X.

Accessories

Universal system
FU-tray with various holders



Universal Trays



EU (420 × 420 mm)

• Order number	Description	
SM3002	Universal tray EU	(420 × 420 mm)
SMX3002	Universal tray EXU	(500 × 420 mm)
SM3003	Universal tray FU	(800 × 420 mm)
SM3004	Universal tray CU	(800 × 660 mm)

Clamps

• Clamps for Erlenmeyer flasks		Number of clamps per Universal tray *			
Order number	Erlenmeyer flask size	Tray EU 420 × 420 mm	Tray EXU 500 × 420 mm	Tray FU 800 × 420 mm	Tray CU 800 × 660 mm
SM310025	25 ml	80	90	113	175
SM310050	50 ml	49	56	100	143
SM310100	100 ml	36	45	72	88
SM310125	125 ml	26	35	50	99
SM310150	150 ml	26	35	50	96
SM310200	200 ml	24	27	44	64
SM310250	250 ml	20	24	40	58
SM310300	300 ml	18	22	37	56
SM310500	500 ml	14	16	27	42
SM311000	1000 ml	9	10	16	20
SM311500	1500 ml	5	6	12	16
SM312000	2000 ml	5	5	9	12
SM312800F	2800 ml Fernbach	2	3	5	8
SM313000F	5L Thomson/ 3L Corning Fernbach	2	2	5	8
SM313000	3000 ml	4	5	8	11
SM314000	4000 ml	2	3	5	8
SM315000	5000 ml	2	3	4	6
SM316000	6000 ml	1	2	4	6

* This information on U-trays is not guaranteed due to flask size variation from different manufacturers.

Test tube holders

			Number of holders per Universal tray		
Order number	Tube size	Description	EU (420 × 420 mm)	EXU (500 × 420 mm)	FU (800 × 420 mm)
SM317016	16 mm dia. (15 ml Falcon)	RGH-16 24 tubes	5	6	9
SM317018	18 mm dia.	RGH-18 24 tubes	5	6	9
SM317020	20 mm dia.	RGH-20 18 tubes	5	6	9
SM317025	25 mm dia.	RGH-25 16 tubes	3	4	6
SM317028	28 mm dia. (50 ml Falcon)	RGH-28 16 tubes	3	4	6
SM317030	30 mm dia.	RGH-30 14 tubes	3	4	6
SM317032	32 mm dia.	RGH-32 14 tubes	3	4	6
SM317034	34 mm dia.	RGH-34 14 tubes	3	4	6

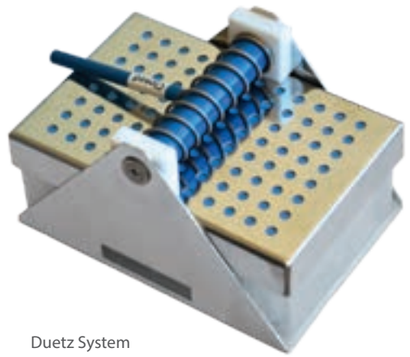
High capacity tube holders

		Number of holders per Universal tray		
Order number	Description	EU (420 × 420 mm)	EXU (500 × 420 mm)	FU (800 × 420 mm)
SMX3805	Holder for 24 × 50 ml Falcon/TPP tubes	2	3	5
SM317098	Holder for 3 × 600 ml reactors	2	3	5

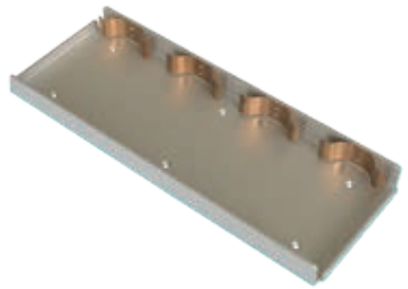
Sticky strips

• Order number	Description
SMX837001	1 sticky strip (385 × 85 × 3 mm)
SMX833001	Set of sticky strips for E-size tray (4 strips)
SMX834001	Set of sticky strips for EX-size tray (5 strips)
SMX835001	Set of sticky strips for F-size tray (8 strips)

Holder for deep well microtiter plates



Duetz System

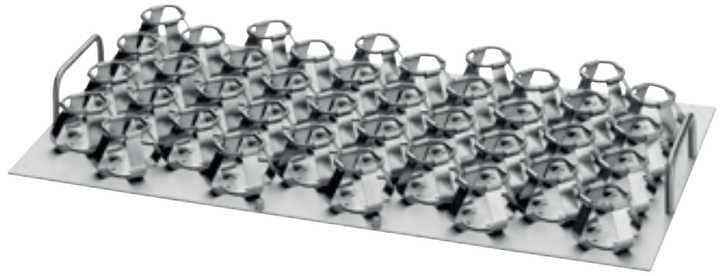


Order number	Description	Number of holders per Universal tray EU (420 × 420 mm)	EXU (500 × 420 mm)	FU (800 × 420 mm)
SM318000	Single Duetz Holder	8	10	16
SM318040	MTP holder 4 (Universal)	3 (12 MTP)	4 (16 MTP)	5 (20 MTP)

Special tray

• Order number	Description
SMX310001	Special universal tray, FUM-V with V support (Clamps not included)
SM313000F	U-3000F clamp for Fernbach flasks: 1 × 5L Thomson flask or 1 × 3L Corning Fernbach flask
SM335000S	F-size tray with pins (800 x 420 mm) for seven flasks: 3L / 5L Corning 5L Thomson

Trays with fixed clamps



• E-tray (420 × 420 mm)

Order number	Description	Number of clamps
SM320025	E- 25 ml	81
SM320050	E- 50 ml	50
SM320100	E- 100 ml	39
SM320125	E- 125 ml	30
SM320150	E- 150 ml	30
SM320200	E- 200 ml	20
SM320250	E- 250 ml	18
SM320300	E- 300 ml	15
SM320500	E- 500 ml	12
SM321000	E-1000 ml	9
SM321500	E-1500 ml	5
SM322000	E-2000 ml	5
SM323000	E-3000 ml	4
SM324000	E-4000 ml	2
SM325000	E-5000 ml	2
SM326000	E-6000 ml	1

• EX-tray (500 × 420 mm)

Order number	Description	Number of clamps
SMX320025	EX- 25 ml	90
SMX320050	EX- 50 ml	60
SMX320100	EX- 100 ml	42
SMX320125	EX- 125 ml	36
SMX320150	EX- 150 ml	32
SMX320200	EX- 200 ml	25
SMX320250	EX- 250 ml	21
SMX320300	EX- 300 ml	18
SMX320500	EX- 500 ml	14
SMX321000	EX-1000 ml	9
SMX321500	EX-1500 ml	8
SMX322000	EX-2000 ml	5
SMX323000	EX-3000 ml	4
SMX324000	EX-4000 ml	3
SMX325000	EX-5000 ml	3
SMX326000	EX-6000 ml	2

• F-tray (800 × 420 mm)

Order number	Description	Number of clamps
SM330025	F- 25 ml	153
SM330050	F- 50 ml	100
SM330100	F- 100 ml	74
SM330125	F- 125 ml	60
SM330150	F- 150 ml	60
SM330200	F- 200 ml	40
SM330250	F- 250 ml	40
SM330300	F- 300 ml	30
SM330500	F- 500 ml	26
SM331000	F-1000 ml	16
SM331500	F-1500 ml	12
SM332000	F-2000 ml	9
SM332800	F-2800ml	6
SM333000	F-3000 ml	8
SM334000	F-4000 ml	5
SM335000	F-5000 ml	4
SM336000	F-6000 ml	3

• C-tray (800 × 660 mm)

Order number	Description	Number of clamps
SM340025	C- 25 ml	238
SM340050	C- 50 ml	153
SM340100	C- 100 ml	116
SM340125	C- 125 ml	96
SM340150	C- 150 ml	96
SM340200	C- 200 ml	75
SM340250	C- 250 ml	65
SM340300	C- 300 ml	55
SM340500	C- 500 ml	42
SM341000	C-1000 ml	24
SM341500	C-1500 ml	18
SM342000	C-2000 ml	15
SM343000	C-3000 ml	11
SM344000	C-4000 ml	8
SM345000	C-5000 ml	6
SM346000	C-6000 ml	6

Trays for microtiter plates

• E-tray (420 × 420 mm)

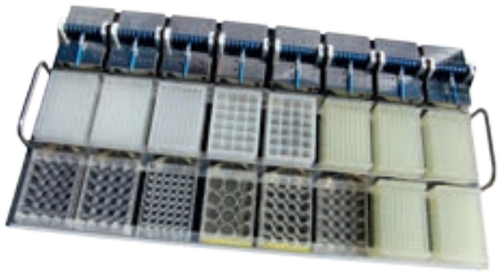
Order number	Description	Number of MTP
SM3502.22	E-MT.22	12 – 24
SM3502.47	E-MT.47	12 – 48
SM3502.77	E-MT.77	12 – 72

• F-tray (800 × 420 mm)

Order number	Description	Number of MTP
SM3503.22	F-MT.22	24 – 48
SM3503.47	F-MT.47	24 – 96
SM3503.77	F-MT.77	24 – 144

• C-tray (800 × 660 mm)

Order number	Description	Number of MTP
SM3504.22	C-MT.22	35 – 70
SM3504.47	C-MT.47	35 – 140
SM3504.77	C-MT.77	35 – 210



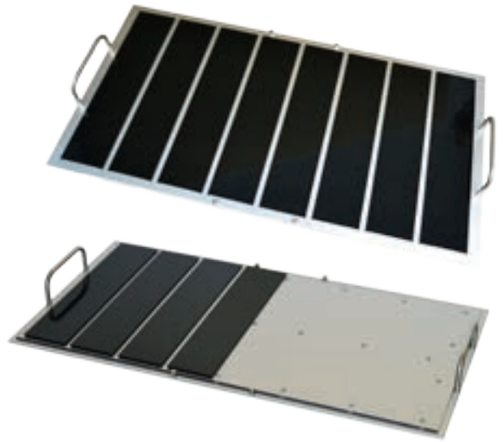
• Trays for microtiter plates

Order number	Description	Number of MTP
SM3502A	E-tray (420 × 420 mm) for deepwell or microtiter plates	1 – 12
SM3501A	EX-tray (500 × 420 mm) for deepwell or microtiter plates	1 – 15
SM3503A	F-tray (800 × 420 mm) for deepwell or microtiter plates	1 – 24

• F-2D-Bag-tray

Order number	Description
SMX350302	Tray (flex) for 2D-bag with 1/5/10L working volume
SMX350301	Tray (cryo) for 2D-bag with 1/5/10L working volume

Trays with sticky strips



• Order number	Description	# of sticky strips
SMX330001	E-size tray	4
SMX340001	EX-size tray	5
SMX350001	F-size tray	8

Sticky strip: 385 × 85 × 3 mm

• Order number	Description	# of sticky strips
SMX350009	EX-size tray with PC-plate	5
SMX350007	F-size tray with PC-plate	8

1 sticky strip: 385 × 85 × 3 mm
1 big sticky strip: 395 × 385 × 3 mm

Trays with rubber mat

• Order number	Description	
SM3602	Rubber mat EG	420 × 420 mm
SMX3602	Rubber mat EXG	500 × 420 mm
SM3603	Rubber mat FG	800 × 420 mm

Dual tray

• Order number	Description	
SMX3015	Dual tray FU	height 180 mm
SMX3016	Dual tray F	height 180 mm
SMX3020	Dual tray EXU	height 200 mm
SMX3021	Dual tray EX	height 200 mm

Add-ons

Trays with support bars

• Order number	Description	# of longitudinal girders
SM4120.4	EA-tray with rubber mat and 4 cross supports	2
SMX4120.4	EXA-tray with rubber mat and 4 cross supports	2
SM4130.6	FA-tray with rubber mat and 6 cross supports	2

Floor stands

For a comfortable working height Kuhner offers floor stands for both the ISF1-X and LT-X incubator shakers. These are available in a choice of 400 mm or 765 mm high.

• Order number	Description
SM1560	400 mm high for 2 × ISF1-X
SM1561	765 mm high for 1 × ISF1-X
SMX1760	400 mm high for 2 × LT-X
SMX1761	765 mm high for 1 × LT-X

Water baths

To reduce evaporation from shake flasks or microtiter plates a stainless steel water bath can be placed inside the incubator.
This water bath is not fitted with an automatic water supply and must be topped up manually.

• Order number	Description
SMX1533	ISF1-X
SMX1733	LT-X

BPM-60

Online measurement of dissolved oxygen and pH

BPM-60 (Bioprocess Monitoring) is a non-invasive, online measurement of dissolved oxygen and pH in shaken flasks.

- A socket integrated in the shaking table makes simple data communication and power supply possible without the risk of wiring breaking. With this technology no battery is required.
- DO and/or pH can be monitored simultaneously in four/eight different flasks
- Continuous recording with Kuhner Insight Software
- Made for PAT (initiative of the FDA)
- Optimised cultivation conditions

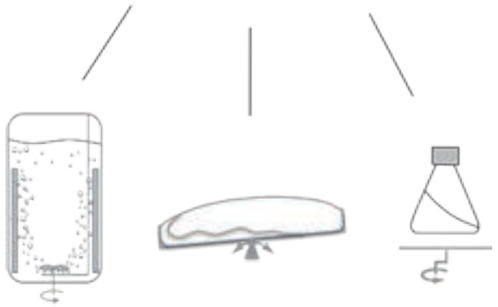
Feed Beads® / Feed Plates® / Feed Tubes®

Controlled glucose delivery by slow release technology

FeedBeads provide substrate limited fed-batch conditions in shake flasks or microtiter plates without the need for enzymes or additional equipment such as tubing or pumps.

- Easy handling
- Polymer based slow release system
- Suitable for high throughput screening (HTS)
- Improves screening security
- Reproducible pre-culture
- Synchronisation of pre-cultures
- Reduces overflow mechanism of the culture

Add-ons



FlowCon 2/3/4

Gas mixing device

The FlowCon is used for stabilizing the pH in cell cultivations with CO_2 or reducing oxygen concentration for microaerophilic organisms.

- Mixing up to four gases (gas mixtures can also be connected)
- Selectable flow rates: 0 – 2 [sL/min], 0 – 20 [sL/min], 0 – 200 [sL/min]

The FlowCon can be used as a stand-alone device or can be integrated with the Kuhner equipment family (Incubator shakers and OrbShakes).

For more information and further add-ons please visit: www.kuhner.com

Shaking Technology Forum

Ask Dr. Shaker

Go!

Find answers at shakingtechnology.com

Kuhner is part of the Forum Shaking Technology, a collection of partner companies involved in different areas of the laboratory & biotechnology industry. Its website is a helpful resource for users of shaken bioreactors, providing support, information and a publication data base focusing on shaken bioreactors.

www.shakingtechnology.com

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