

**Kuhner** shaker

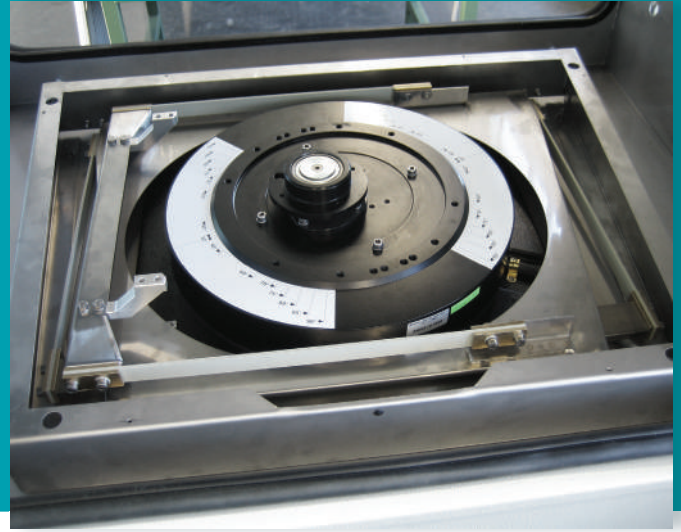
# LT-X (Lab-Therm)

Space saving  
stackable incubator shaker



## Lab-Therm LT-X

## 1 Direct drive



- + Fits into any laboratory
- + Used in biotech and pharmaceutical industries
- + Accepts flasks up to 6 litres
- + Two units can be stacked - no special kits or tools required
- + Humidity and CO<sub>2</sub> control available

The Kuhner LT-X (Lab-Therm) incubator shaker has the same capabilities as the larger ISF1-X and ISF4-X models. The incubator shaker was specially developed to address the shaking needs of the biotechnology and pharmaceutical industries. The practical size of the LT-X means it will fit in any laboratory.

### Extra space

Exceptional chamber height means flasks up to 6 litres capacity can be accommodated. If using smaller flasks, there is sufficient head height to fit one or two shelves above the shaking table. It is also possible to stack two LT-X together without the need for special kits or tools.

### Functionality through direct drive 1

The maintenance-free direct drive guarantees long and economical performance from the LT-X. The shaking diameter can be changed at any time thanks to Kuhner's unique direct drive system. The integrated drive is protected from spills and the all stainless steel interior has a drain at the back for any unwanted liquids. The chamber can be cleaned using chemicals or sterilized with optional UV lighting.

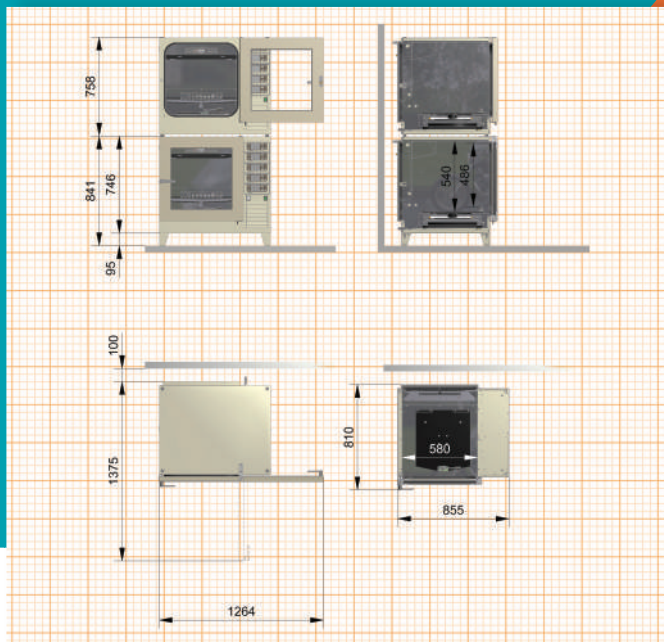
### Safety and quality

A door switch ensures the motor stops as soon as the door is opened. After closing the door properly, the motor restarts. The safety, reliability and quality of our shakers are of personal concern to everyone at Kuhner which is why all our machines are supplied with a 5 year warranty.

### Configuration

The LT-X can be equipped with options for CO<sub>2</sub>, controlled humidity, LED photosynthesis, UV lighting and much more. It is now also possible to integrate measuring data from Kuhner shakers with your company's own network using Kuhner ISIS-software together with the NET-60 interface.

Dimensions



Technical data	SMX1700 <i>SMX1700C*</i>	SMX1701 <i>SMX1701C*</i>	SMX1703 <i>SMX1703C*</i>
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	< 800W	< 950W	< 1300W

Machine	
Gas volume	260 l
Weight (with cooling)	170 kg
Illumination	Halogen (2x10W)
Operation menu in	de, fr, it, en, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet, digital, analogue
Ambient temperature	10°C up to 35°C

Shaking unit	
Tray, size	EX (500x420mm)
Loading, maximum	25kg
Setting, digital	1rpm
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, 50.0 mm	20...200 rpm
* can be changed/other diameters on request	

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	500W
Power of cooling	90...155W
Air circulation	160m <sup>3</sup> /h

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	180W
Door heater	90W

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

**\* XC incubator shakers are optimised for cell cultivation**

- + CO<sub>2</sub> control (SMX1034) included as standard
- + Temperature max.: 60°C
- + Improved temperature accuracy: ± 0.25°C (37°C)

**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

# Options

## Multiple options for your shaker

### Cooling

All Kuhner incubator shakers can be fitted with cooling. The refrigeration system is regulated by a fully digital PID control ensuring minimal energy consumption. The cooling is switched on only when required as determined by the chamber temperature and set point.

### Humidity control

Humidity control is an important factor in successful fermentation. Evaporation from micro-titer plates, or when cultivating in flasks for long periods (e.g. cell cultures), can be significantly reduced with humidification.

### CO<sub>2</sub> control

CO<sub>2</sub> control is essential when working with mammalian cell cultures. Kuhner was the first company to manufacture and supply incubator shakers with CO<sub>2</sub> control more than ten years ago and continues to offer this option.

### 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.

### UV lamp

As in a biological safety cabinet, the chamber of a Kuhner incubator shaker can also be sterilized with an integrated UV lamp. The lamp is positioned for maximum irradiation of the chamber and shaking table. The UV lamp has a clearly marked external switch and when the door is opened, the UV-lighting is automatically switched off.

### 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.



### 2 Dual table



### 3 BPM-60



#### Dual table 2

The dual table is an easy and economical way of doubling the shaking capacity. The dual shaking table consists of two levels. Each level will accept an E or EX size tray. However, with the dual table the shaking speed is limited to a maximum of 200 rpm.

#### Perspex cover

To prevent accidental operation of the controllers, the panel can be protected by a perspex cover.

#### IQ-OQ Documentation

IQ-OQ (Installation Qualification and Operation Qualification) is an equipment qualification required for GMP procedures. This service is available from Kuhner and can also be carried out at the customer's premises.

#### BPM-60 3

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

The system allows for one or both parameters to be recorded in the same flask. The values of dissolved oxygen and/or pH can be monitored simultaneously in eight different flasks. Compared to conventional sample taking, this continuous data logging is automatic and consistent.

An integrated socket (TabCom option) in the shaking table makes simple data communication and power supply possible without the risk of wiring breaking.

#### TabCom

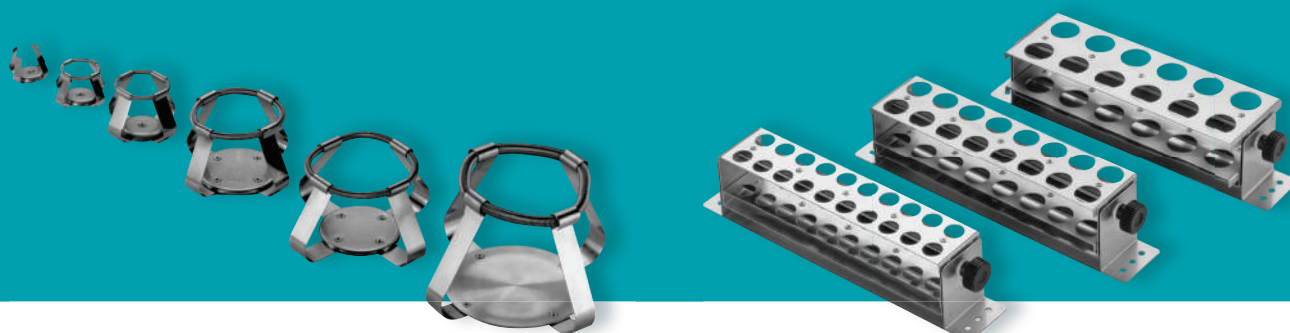
The TabCom option from Kuhner consists of a cable for power and data with the connection port integrated in the shaking table. A cable guide prevents the cable breaking and ensures secure data recording. Online measuring technologies offered by Kuhner that use TabCom include BPM-60 (pH, dissolved oxygen) and RAMOS (OTR, CTR). The flexibility of TabCom means other measurement systems can be easily integrated.

#### Kuhner XC series

Kuhner was the first company to manufacture incubator shakers with controlled CO<sub>2</sub> and humidity for the cultivation of mammalian cells. The «XC» series provides optimised shaking conditions for cell cultures. Improved temperature accuracy is achieved across the tray: +/- 0.25°C @ 37°C. The CO<sub>2</sub> controlled atmosphere allows exact pH adjustment of the cell culture medium. With a CO<sub>2</sub> range up to 20%, as well as options for cooling and controlled humidity, the «XC» incubator shakers can be tailored to meet all requirements.

## Clamps of different sizes

## Test tube holders



## Accessories

To suit your application

### Universal tray EXU

Order number: SMX3002

The universal tray can be fitted with clamps for Erlenmeyer flasks, test tube holders, microtiter plates, sticky strips, or custom made holders to suit your requirements.

Rearranging these clamps and holders is quick and simple.

### Clamps for Erlenmeyer flasks

Order number for 1 clamp	Flask size	Max. number of clamps per EXU
SM310025	25 ml	90
SM310050	50 ml	56
SM310100	100 ml	45
SM310125	125 ml	35
SM310150	150 ml	35
SM310200	200 ml	27
SM310250	250 ml	24
SM310300	300 ml	22
SM310500	500 ml	16
SM311000	1000 ml	10
SM311500	1500 ml	6
SM312000	2000 ml	5
SM313000	3000 ml	5
SM314000	4000 ml	3
SM315000	5000 ml	2
SM316000	6000 ml	2
SM312800F	2800 ml Fernbach	3
SM313000F	5 L Thomson/ 3 L Corning Fernbach	2

### EX-tray with fixed clamps

The clamps are riveted onto these trays and cannot be removed. They offer maximum security and will often hold a larger number of flasks than universal trays. These trays are available in a variety of flask clamp sizes from 25 to 6000ml.

Order number	Description	Clamps
SMX320025	EX-25 ml	90
SMX320050	EX-50 ml	62
SMX320100	EX-100 ml	42
SMX320125	EX-125 ml	36
SMX320150	EX-150 ml	36
SMX320200	EX-200 ml	27
SMX320250	EX-250 ml	22
SMX320300	EX-300 ml	21
SMX320500	EX-500 ml	14
SMX321000	EX-1000 ml	9
SMX321500	EX-1500 ml	8
SMX322000	EX-2000 ml	6
SMX323000	EX-3000 ml	4
SMX324000	EX-4000 ml	3
SMX325000	EX-5000 ml	2
SMX326000	EX-6000 ml	2

3 EX-tray for centrifuge tubes



**EX-tray with sticky strips**

Order number: SMX340001

A tray fitted with sticky strips is especially useful for flasks shaken at low speeds (up to 200 rpm). The flask is placed directly on the sticky strip without the need for any other support. Different flask sizes can be used. Sticky strips are available individually or in sets and can also be supplied already fitted to a tray. The EX-size tray accepts five strips.

**EX-tray for centrifuge tubes 4**

Order number: SMX3804

The use of centrifuge tubes (e.g. 50ml Falcon tubes and TPP 50ml tubes) in cell culture screening is well established. This EX-tray has a capacity of 72 x 50ml centrifuge tubes (3 racks of 24). Holders for 600ml TPP tubes are also available.

**E-tray (420 x 420 mm) for microtiter plates**

Kuhner has designed trays specifically for microtiter plates. Handles at the front of the tray open and close the special clamping mechanism allowing plates to be loaded and unloaded. Trays of different heights (22, 47 and 77mm) allow the stacking of up to four microtiter plates. The tray is suitable for all types of plates (deep well, low well, 24, 48 and 96 well).

Order number	Description	Microtiter plates
SM3502.22	E-MT.22	12 - 24
SM3502.47	E-MT.47	12 - 48
SM3502.77	E-MT.77	12 - 72

**EX-tray with support bars**

Order number: SMX4120.4

These trays offer an alternative to both clamps and sticky mats and are ideal for tall containers. The tray is covered with a rubber mat and has an upright at each corner. The EX size tray is fitted with four cross supports to securely clamp containers.

5 Floor stand



**EX-tray with rubber mat**

Order number: SMX3602

The whole tray is covered with a rubber mat and is particularly suitable for shaking containers at low speed (e.g. blood bags).

**Floor stand 5**

Order numbers: SMX1760 (2 x LT-X), SMX1761 (1 x LT-X)

For a comfortable working height Kuhner offers floor stands for the LT-X. These are available in a choice of 400mm (2 x LT-X) or 765mm (1 x LT-X) high.

**Shelf**

Order number: SMX1772

The Kuhner LT-X incubator shaker can be fitted with a shelf allowing cultivation in petri dishes. One or two shelves can be placed above the shaking table and fixed to the chamber walls with four screws.

**Water bath**

Order number: SMX1733

To reduce evaporation from shake flasks or microtitre 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.

**ISIS-Software**

Kuhner developed the user-friendly ISIS-Software for supervision, monitoring, and recording of data. The software is easy to operate.

**Interfaces**

Kuhner shakers are equipped with a CAN-bus. CAN-USB, CAN-Ethernet, EMI-60 and NET-60 are all well established interfaces.



# Shakers & Accessories

[www.kuhner.com](http://www.kuhner.com)

# Kuhner

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