

Kuhner shaker

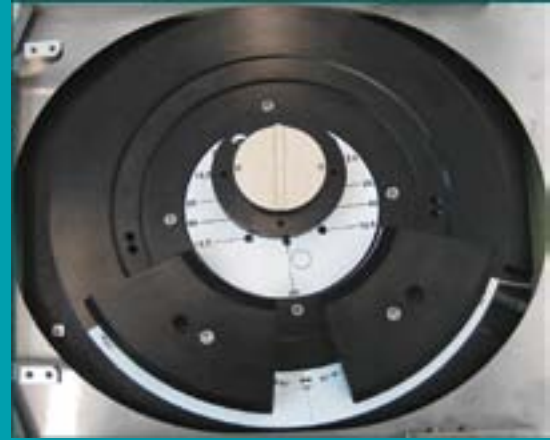
ISF4-X (Climo-Shaker)

Incubator shaker with large shaking capacity



ISF4-X with 4 shaking units

1 Direct drive



- + All stainless steel interior
- + Large shaking capacity
- + Easy access to contents
- + Each shaking unit has its own direct drive
- + Door heating, with controlled humidity

The Kuhner ISF4-X incubator shaker offers large shaking capacity with temperature, humidity and CO₂ control all available. The shaker cabinet can incorporate four or even five independent shaking units which are height adjustable. The shaking diameter and speed of each unit can be individually selected. Standard diameters are 12.5, 25 and 50 mm. Other shaking diameters are possible.

Guaranteed quality

When designing the ISF4-X special emphasis was placed on reliability and durability. The high quality of Kuhner shaking machines is backed with a five year warranty.

Safety and convenience

The large door opening of the ISF4-X allows easy access to the shake flasks inside. The doors are fitted with a safety switch to ensure shaking stops when the doors are opened. The large windows allow a clear view of incubator's contents. The entire ISF4-X chamber is clad in stainless steel making sterilisation with chemicals possible.

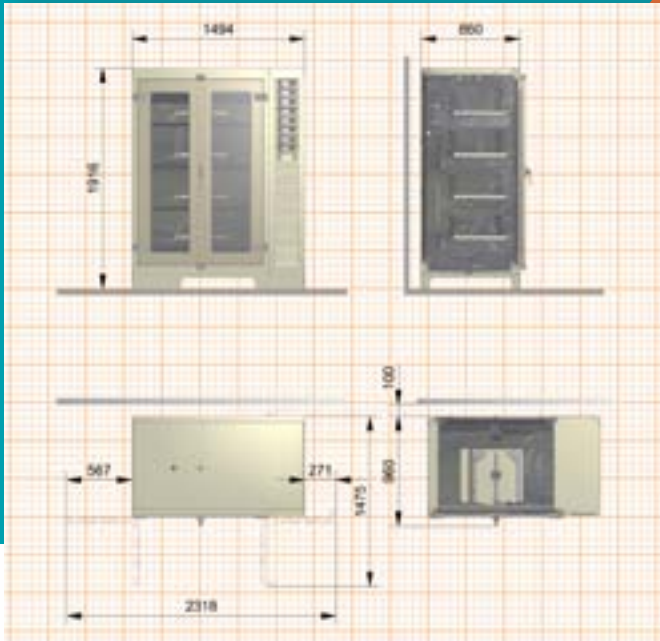
Energy saving operation 1

The highly efficient direct drive system means economic low power consumption and the cooling system is also energy efficient.

Electrical protection

Automatic supervision of the mains voltage protects the shaker and in the event of a voltage spike the unit disconnects from the mains. The machine resumes operation at the set values once power is restored.

Dimensions



Technical data	SMX1600 <i>SMX1600C*</i>	SMX1601 <i>SMX1601C*</i>	SMX1603 <i>SMX1603C*</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	< 1700W	< 2000W	< 2600W

Machine	
Gas volume	1272 l
Weight (with cooling)	520 kg
Weight with 4xSF-X	720 kg
Illumination	2 fl lamps
Operation menu in	de, fr, en, it, es
Interface, standard	CAN-Bus
Interface, optional	USB, Ethernet
	digital, analogue
Ambient temperature	10°C up to 35°C

Shaking unit SF-X (SMX1610)	
Tray, size	F (800x420mm)
Loading, maximum	25kg
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, 50.0 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)
Principle of sensor	Pt-100
Power of heating	1000W
Power of cooling	250...420W
Air circulation	700m ³ /h

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	300W
Door heater	220W

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

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

- + CO₂ control (SMX1034) included as standard
- + Temperature max.: 60°C

Mains connection	
SMX1021:	220 - 240 V / 50-60 Hz
SMX1022:	190 - 210 V / 50-60 Hz

② Illumination unit for photosynthesis (LED)



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 microtiter plates, or when cultivating in flasks for long periods (e.g. cell cultures), can be significantly reduced with humidification.

CO₂ control

CO₂ control is essential when working with mammalian cell cultures. Kuhner was the first company to manufacture and supply incubator shakers with CO₂ control more than ten years ago and continues to offer this option.

Kuhner XC series

Kuhner was the first company to manufacture incubator shakers with controlled CO₂ 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: +/- 0.30°C @ 37°C. The CO₂ controlled atmosphere allows exact pH adjustment of the cell culture medium. With a CO₂ range up to 20%, as well as options for cooling and controlled humidity, the «XC» incubator shakers can be tailored to meet all requirements.

Illumination unit for photosynthesis (LED) ②

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.

3 Pull-out table



Pull-out table 3

The pull-out table is designed for the ISF1-X and ISF4-X incubator shakers as well as the Rack System. This remarkable device makes loading and unloading trays much easier.

Dual table

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 F size tray. However, with the dual table the shaking speed is limited to a maximum of 200 rpm.

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.

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.

4 BPM-60



BPM-60 4

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.

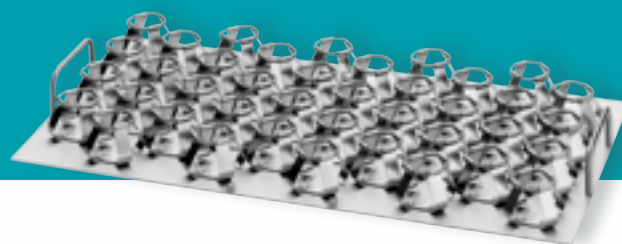
An integrated socket (TabCom option) in the shaking table makes simple data communication and power supply possible without the risk of wiring breaking.

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.

Clamps of different sizes

5 Tray F-250 with fixed clamps



Accessories

To suit your application

Universal tray FU

Order number: SM3003

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 FU
SM310025	25 ml	113
SM310050	50 ml	100
SM310100	100 ml	72
SM310125	125 ml	50
SM310150	150 ml	50
SM310200	200 ml	44
SM310250	250 ml	40
SM310300	300 ml	37
SM310500	500 ml	27
SM311000	1000 ml	16
SM311500	1500 ml	12
SM312000	2000 ml	9
SM313000	3000 ml	8
SM314000	4000 ml	5
SM315000	5000 ml	4
SM316000	6000 ml	4
SM312800F	2800 ml Fernbach	5
SM313000F	5 L Thomson/ 3 L Corning Fernbach	5

F-tray with fixed clamps 5

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	# 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
SM333000	F-3000 ml	8
SM334000	F-4000 ml	5
SM335000	F-5000 ml	4
SM336000	F-6000 ml	3

6 F-tray for microtiter plates



F-tray for microtiter plates 6

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
SM3503.22	F-MT.22	24 - 48
SM3503.47	F-MT.47	24 - 96
SM3503.77	F-MT.77	24 - 144

F-tray with sticky strips

Order number: SMX350001

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. Flasks of all sizes can be used. Sticky strips are available individually or in sets and can also be supplied already fitted to a tray. The F-size tray accepts eight strips.

F-tray for separating vessels

Kuhner has also designed a special tray for shaking separating vessels. This very flexible tray can take vessels of various sizes. It is also possible to add a second layer and double the capacity. Movable retaining rods allow vessels to be installed easily.

Order number	Description	# of vessels
SM430250	FS-250	10
SM4302502	FS-250/2	20 (2 layers)
SM430500	FS-500	8
SM4305002	FS-500/2	16 (2 layers)
SM431000	FS-1000	6
SM4310002	FS-1000/2	12 (2 layers)

7 F-tray for centrifuge tubes



F-tray for centrifuge tubes 7

Order number: SM3805

The use of centrifuge tubes (e.g. 50ml Falcon tubes and TPP 50ml tubes) in cell culture screening is well established. This F-tray has a capacity of 120 x 50ml centrifuge tubes (5 racks of 24).

HOLDERS for 600ml TPP tubes are also available.

F-tray with support bars

Order number: SM4130.6

This tray offers an alternative to both clamps and sticky mats and is ideal for tall containers. The tray is covered with a rubber mat and has an upright at each corner. The F-tray is fitted with six cross supports to securely clamp containers.

F-tray with rubber mat

Order number: SM3603

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

Shelf

Order number: SMX1672

The ISF4-X incubator shakers 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.

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

Kuhner

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