



# Kuhner shaker



## ISF1-Z

a **safe** home for your **cells**

# ISF1-Z

**The perfect solution** for shaken cultivation processes. Every time, any application.



## ISF1-Z Models

Each model provides distinct features to suit your applications perfectly. Designed specifically with the environment in mind – handling the experiments you must do in the most eco-friendly manner possible.

### ISF1-Z - Basic model

The standard version of Kuhnert's stackable shaker incubator with precise temperature control (heating) and distribution.



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

Each ISF1-Z model is available with CO<sub>2</sub> control. The ZC incubator shakers are optimised for cell culture processes, e.g. with mammalian, human or plant cell cultures.



### ISF1-Z EcoDew®

Includes precise temperature control (heating) and Kuhnert's EcoDew® technology for active humidity control. Cooling compressor unit is not required for the precise and eco-friendly EcoDew® technology.



### ISF1-Z Peltier

This innovation uses long-lasting Peltier elements for precise heating, cooling and humidity control. This eco-friendly concept makes coolants or compressors unnecessary. The humidity control of the ISF1-Z Peltier has a vast control range of 50 - 85% (humidifying and dehumidifying possible) and precisely keeps the set value.

## ISF1-Z Models:

- **ISF1-Z Basic**

Control of temperature (heating)

- **ISF1-ZC Basic**

Control of temperature (heating) and CO<sub>2</sub>

- **ISF1-Z EcoDew®**

Control of temperature (heating) and humidity

- **ISF1-ZC EcoDew®**

Control of temperature (heating), humidity and CO<sub>2</sub>

- **ISF1-Z Peltier**

Control of temperature (heating/cooling) and humidity

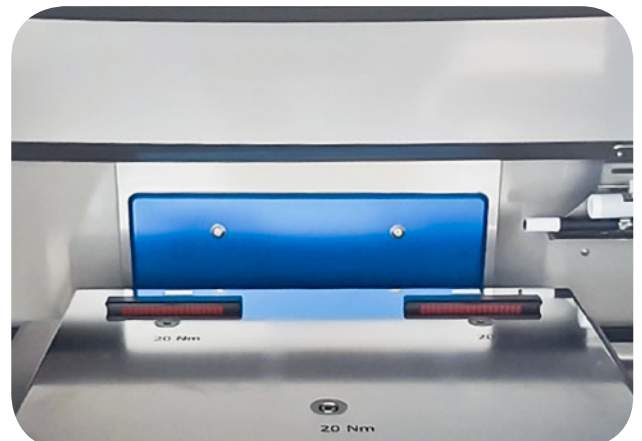
- **ISF1-ZC Peltier**

Control of temperature (heating/cooling), humidity and CO<sub>2</sub>



## 5 year warranty

As all ISF1-Z models come with a five year warranty, they are a cost-effective investment in quality.





# Multiple options for all your needs

## Key options

**Pull-out table:** This remarkable device facilitates the loading and unloading of shaking trays and therefore enhances the ergonomic handling of cultures.

**Touchscreen:** This option includes a fixed, or tiltable, 10.1-inch touchscreen connected to an integrated computer with our Kuhner Insight Software. The touchscreen has been designed for simple operation, monitoring and programming.

**Dual shaking-table:** The dual-table is an easy and economical solution to double the shaking capacity. The dual shaking-table consists of two levels. The distance between the two levels of the dual-table is adjustable. With the dual-table the shaking speed is limited depending on your application.

**Kuhner TOM:** Kuhner TOM (Transfer-Rate Online Measurement) measures online oxygen transfer rate (OTR), carbon dioxide transfer rate (CTR) and the respiratory quotient (RQ) in up to 16 individual shake flasks for better process understanding and informed process development. TOM is easily installed in any Kuhner shaker and can be operated with various flask types, and sizes, including single use shake flasks.

## Other options at a glance

- UV lamp
- Light shade plate
- Black window
- Automatic door
- Stainless steel
- IQ/OQ
- Foot switch (for hands-free operation)
- EPFL table



## Application areas

### • Mammalian / human cell cultures

The ISF1-Z is ideally suited for the cultivation of mammalian and human cell cultures due to its accurate and efficient CO<sub>2</sub> and humidity control. Every machine is factory calibrated (with performance certification) and Kuhner guarantees a precise control of the environmental parameters over the complete lifespan of the machine – for reliable and reproducible cultivation processes.

### • Microbial cultures

The robust and maintenance-free direct drive system of the ISF1-Z enables very high shaking frequencies which guarantee sufficiently high kLa-values for a good oxygen supply for microbial cultures. By adjusting the shaking diameter, optimal shaking conditions can be achieved and reproduced e. g. out of phase phenomena can be prevented by installing a 70mm shaking diameter for cultivations with higher viscosity (fungi).

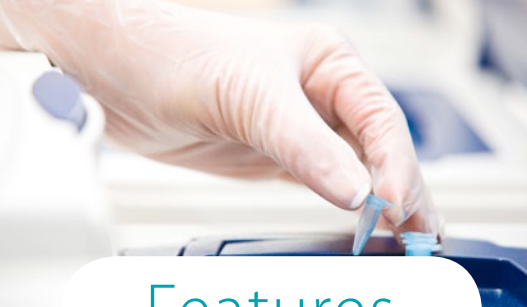
### • Plant cell cultures

For the cultivation of phototrophic plant cell cultures, the ceiling of the ISF1-Z incubator shaker can be fitted with an illumination unit for photosynthesis (LED modules). The control module allows full programming of night/day cycles and variable light intensity.

For all applications in

- Laboratories
- Research centres
- Production facilities
- Automatization
- GMP





## Features of the ISF1-Z series at a glance



### **Reproducible conditions** Independent of the shaking machine

Due to stringent quality control, machines leaving the Kuhner factory guarantee reproducible cultivation results for the entire life span and at all place of installations over the world.



### **Direct-drive system** Reliability guaranteed

Kuhner's robust and maintenance-free direct-drive guarantees accurate control and low energy consumption/heat dissipation, even at high speeds. Kuhner's direct-drive system, and our newly designed shaking table, allows your shaking diameters to be changed at any time – quickly and easily.



### **Flexibility:** Options and accessories

Numerous options and accessories are available for the ISF1-Z incubator shaker to fulfill any need of our customers regarding cultivations in shaken bioreactors (microtiter plates, tubes, flasks, etc.).



### **Handling:** Easy and intuitive

The ISF1-Z has clearly arranged displays on the front side (e.g. for shaking speed) with color change and an acoustic signal when an error/alarm occurs. Serial interfaces (e.g. CAN) are arranged on the machines front and internal sensors are easily accessible for a fast and comfortable work flow.



### **Automation Process:** Ready for integration

The ISF1-Z has a fixed stop position and optional automatic door, which are especially useful for automated processes and enables the integration in a liquid handling system.



### **Good Manufacturing Practice (GMP)**

The ISF1-Z complies with GMP requirements and regulations. Kuhner products have established a global reputation of excellence under GMP requirements. Documentation, development and production along with the full life cycle of our products are continuously enhanced to match the requirements of 21 CFR and GAMP 5.



### **IQ/OQ - Documentation**

IQ-OQ (Installation Qualification and Operation Qualification) is an equipment qualification according to GMP procedure. Kuhner offers this service which can also be carried out at the customer's premises.





## Large shaking capacity with small footprint

The ISF1-Z has a large shaking capacity and offers even more interior space than its predecessor ISF1-X, enabling dual-table (double-capacity) for a wider range of applications. Up to three ISF1-Z incubators can be stacked providing more shaking capacity without consuming floor space in the lab. Stacking is a simple procedure without the need for special tools or stacking kits. Each machine operates fully-independent of one-another. The ISF1-Z incubator shakers are mixable in stack with ISF1-X/W incubators.



## Hygienic Design: All stainless steel for easy cleaning

The ISF1-Z is made of stainless steel inside and outside for easy and fast cleaning with lifetime durability. The interior was designed according to DIN EN ISO 14159 "Hygienic design" – including rounded corners and a rear drain for removal of unwanted liquids. The direct-drive system is completely covered and therefore protected from spills. A condensation-free operation is ensured due to heated door glass and frame.



Kuhner shaker



## Kuhner shaker – a family-owned business

Kuhner shaker, founded in 1949 in Basel, Switzerland, is a science-first shaker manufacturer renowned worldwide for our uncompromising shakers, incubator shakers, and orbitally-shaken bioreactors. From bench top shakers to large scale industrial shaking machines, we offer machines of the highest quality. We commit to earning trusting client relationships which will span decades.



## Custom-made solutions

Does our existing range of products not meet your requirements? Simply contact us - custom-solutions are our daily business and we would like to hear about your distinct request. We generate the optimal solution for your shaking machine or orbitally-shaken bioreactor system (OSB).



## Comprehensive **consulting**, lab **trainings** and **seminars**

Consultations are free of charge for our customers and are confidential. Based on our long-time experience and our partnerships with research facilities, we provide application-oriented support and lab trainings for our products. Kuhner also offers quality workshops either at the customer's premises or at our head office in Basel.

The Shaking Technology Forum operated by Kuhner is a helpful resource for users of shaken bioreactors, providing support, information and a publication database. [www.shakingtechnology.com](http://www.shakingtechnology.com)



## Services

We provide support and advice for each customer right from the start. Our services are performed by our trained service team personally at your premises. We support our customers in implementation, maintenance and repair of all Kuhner products. This includes upgrades of functionalities and updates of software for all Kuhner shakers. We offer one-time services or service contracts extending over several years, depending on our customer's needs. We also perform calibrations specific to our customer's requirements.



# Accessories

## Trays:

- **Universal tray**
- **Special universal tray**
- **Tray with fixed clamps**
- **Tray for microtiter plates**
- **Tray for microtiter plates (springs)**
- **Tray with pins**
- **Tray with rubber mat**
- **Tray with sticky strips**
- **Tray with PC-plate for sticky strips**
- **Dual tray**
- **Tray with support bars**
- **Tray for separating vessels**
- **Tray for centrifuge tubes**
- **2D-Bag-tray (Cryo)**
- **2D-Bag-tray (Flex)**

## Floor stands:

- **Floor stands**
- **Floor stands with wheels**

## Stacking adapter:

- **Universal stacking adapter**  
(to stack with non-Kuhner machines)
- **Stacking adapter**  
(to stack a LT-X on a ISF1-Z machine)

## Software:

- **Kuhner Insight Software**
- **Interfaces**

## More:

- **Static internal shelf**
- **Water bath**

## Universal tray

The universal tray can be fitted with clamps for Erlenmeyer flasks, test tube holders, microtiter plates, or custom made holders to suit your requirements. Rearranging these clamps and holders is quick and simple. The tray is available in four sizes.



## Tray for microtiter plates (springs)

This tray is fitted with springs which allows each microtiter plate to be loaded and unloaded individually. The tray is available in three sizes.



## Tray with pins

The tray with pins is ideally suited for cell culture. It allows parallel shaking of 7 x 3L Corning Fernbach culture flasks, 7 x 5L Corning Erlenmeyer flasks or 7 x 5L Thomson Optimum Growth flasks. Flasks are held in position by pins and are easily placed on the tray and removed just as quickly.



## Tray or dual tray with sticky strips

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. The dual tray with sticky strips offers two shaking levels and doubles the capacity. It is available in different sizes and the upper tray can be removed. Sticky strips are available individually or in sets and can also be supplied already fitted to a tray.





# Technical data

	Unit	ISF1-Z Peltier (SMZ1503P) ISF1-ZC Peltier* (SMZ1503PC)	ISF1-Z EcoDew® (SMZ1502) ISF1-ZC EcoDew* (SMZ1502C)	ISF1-Z Basic (SMZ1500) ISF1-ZC Basic* (SMZ1500C)
<b>Temperature Control</b>				
Cooling	yes / no	yes	no	no
Temp. minimum	°C	RT - 5	RT + 10	RT + 10
Temp. maximum	°C	60	80 (60 with CO <sub>2</sub> )	80 (60 with CO <sub>2</sub> )
Setting, digital	°C	0.1	0.1	0.1
Temperature distribution at 37°C / 85% r. f.	± °C	< 0.20	< 0.20	< 0.20
Power of heating	W	384 (peltier)	800 (resistance)	800 (resistance)
Power of cooling	W	approx. 150 (peltier)	-	-
Principle of temp. sensor	type	Pt-100	Pt-100	Pt-100
Gas circulation	m <sup>3</sup> / h	380	570	570
<b>Humidity Control</b>				
Humidity max. at 25 - 55 °C	% r. H.	85	85	-
Humidity min. at 25 - 55 °C	% r. H.	50	depends on temperature (70 - 80 %)	-
Setting, digital	% r. H.	1	1	-
Accuracy absolute	± % r. H.	2	2	-
Power of waterbath heater	W	180	180	-
Power of door and frame heater	W	140	140	-
Water refill		automatic	automatic	-
Principle of hum. sensor	type	capacitive	capacitive	-
Principle of hum. control	type	evaporation & recondensation	evaporation & recondensation	-
<b>CO<sub>2</sub> Control*</b>				
CO <sub>2</sub> max.	%	20	20	20
CO <sub>2</sub> min.	%	0	0	0
Setting, digital	%	0.1	0.1	0.1
Accuracy absolute	± %	0.40 at 5 % CO <sub>2</sub>	0.40 at 5 % CO <sub>2</sub>	0.40 at 5 % CO <sub>2</sub>
Temperature range	°C	up to 60	up to 60	up to 60
CO <sub>2</sub> supply	bar	max. 2 bar overpressure	max. 2 bar overpressure	max. 2 bar overpressure
Principle of sensor	type	Infrared	Infrared	Infrared
<b>Shaking Control</b>				
Motor	type	direct drive	direct drive	direct drive
Shaking diameter (user-adjustable, all incl.)	mm	3 / 6 / 9 / 12.5 / 19 / 25 / 50 / 70 (0 - 70 mm, stepless)	3 / 6 / 9 / 12.5 / 19 / 25 / 50 / 70 (0 - 70 mm, stepless)	3 / 6 / 9 / 12.5 / 19 / 25 / 50 / 70 (0 - 70 mm, stepless)
Shaking motion	type	orbital	orbital	orbital
Shaking frequency range at 12.5 mm	rpm	0 / 20 - 500 (700 HS)	0 / 20 - 500 (700 HS)	0 / 20 - 500 (700 HS)
Shaking frequency range at 25 mm	rpm	0 / 20 - 400 (550 HS)	0 / 20 - 400 (550 HS)	0 / 20 - 400 (550 HS)
Shaking frequency range at 50 mm	rpm	0 / 20 - 300 (400 HS)	0 / 20 - 300 (400 HS)	0 / 20 - 300 (400 HS)
Shaking frequency range at 70 mm	rpm	0 / 20 - 250 (300 HS)	0 / 20 - 250 (300 HS)	0 / 20 - 250 (300 HS)
Tray size max.	mm	F (800 × 420 mm)	F (800 × 420 mm)	F (800 × 420 mm)
Loading max.	kg	25 (up to 60**)	25 (up to 60**)	25 (up to 60**)
Setting, digital	rpm	1	1	1
Accuracy absolute	± rpm	0,5	0,5	0,5
Timer	s:h	1 s - 999 h	1 s - 999 h	1 s - 999 h
Acceleration		controlled	controlled	controlled
Active brake		adjustable	adjustable	adjustable
Stop on position		yes	yes	yes
Power of standard motor (EM-60/160)	W	70 / 140	70 / 140	70 / 140
<b>General</b>				
Power consumption typical	W	approx. 250	approx. 230	approx. 220
Power consumption max.	W	approx. 1000	approx. 1000	approx. 1000
Incubation gas volume	L	366	378	378
Weight	kg	210	202	200
Illumination	type	LED	LED	LED
Operation menu MMI		DE, FR, EN, IT, ES	DE, FR, EN, IT, ES	DE, FR, EN, IT, ES
Operation menu Insight		EN	EN	EN
Interface, standard		CAN-Bus	CAN-Bus	CAN-Bus
Interface, optional		USB, Ethernet, digital, analogue	USB, Ethernet, digital, analogue	USB, Ethernet, digital, analogue
Ambient temperature	°C	10 - 35	10 - 35	10 - 35
Cable feedthrough port	mm	40	40	40
Dimensions (L x D x H)	mm	1288 x 887 x 771	1288 x 917 x 771	1288 x 859 x 771
Material incubation chamber		stainless steel	stainless steel	stainless steel
Material outer chamber		painted stainless steel	painted stainless steel	painted stainless steel
Useful height above shaker tray	mm	460	460	460
Door glass and frame		heated	heated	heated

Technical data subject to change

\* option with CO<sub>2</sub> control

\*\* depends on shaking speed and diameter (specification sheet available)

# Kuhner shaker

## Shakers & Accessories

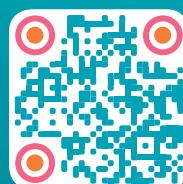
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