



# 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 your experiments in the most eco-friendly manner possible.



**ISF1-Z** – The best system for any application: find your perfect model!

### ISF1-Z(C) Basic

- ▶ Precise temperature control (heating)
- ▶ Reproducible results due to uniform temperature distribution
- ▶ Up to three machines stackable

### ISF1-Z(C) Peltier

- Includes all features of the basic model plus:
- ▶ Uses long-lasting Peltier elements for precise heating, cooling and humidity control
  - ▶ Eco-friendly concept: no coolants or compressors required
  - ▶ Humidity control with vast control range of 50 - 85%
  - ▶ Humidifying and dehumidifying possible

### ISF1-Z(C) EcoDew®

- Includes all features of the basic model plus:
- ▶ Kuhner's innovative EcoDew® technology for active humidity control
  - ▶ Humidifying and dehumidifying possible
  - ▶ Precise and eco-friendly technology

### ISF1-Z(C) Compressor

- Includes all features of the basic model plus:
- ▶ Vast temperature range: from 3 to 80°C
  - ▶ Fast cooling and heating
  - ▶ Low temperatures for storage and inoculum preparation
  - ▶ Two cooling units with eco-friendly natural gas
  - ▶ Humidifying and dehumidifying possible



## C for cell culture

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.



## 5 year warranty

As always, the ISF1-Z incubator shakers come with Kuhner's standard 5-year warranty which guarantees quality and durability.



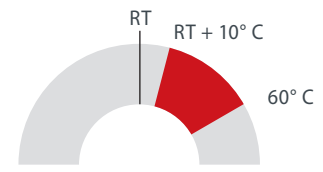
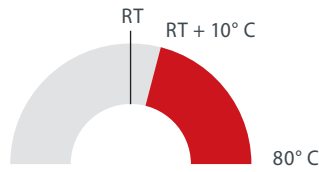
# Overview

## ISF1-Z models and their features

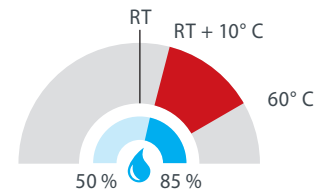
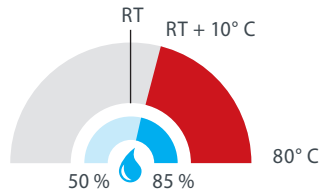
### Cooling / Heating without CO<sub>2</sub> Control

### Cooling / Heating with CO<sub>2</sub> control

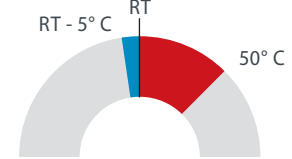
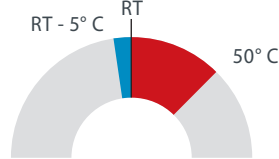
#### - Basic



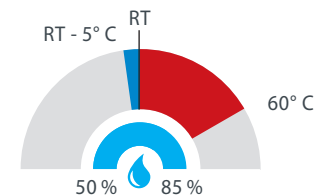
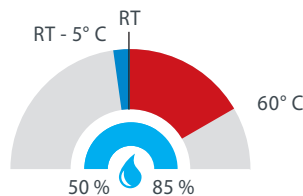
#### - EcoDew®



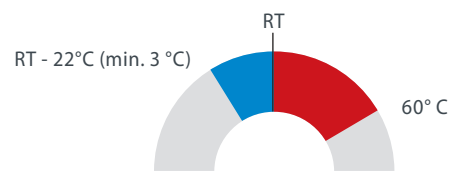
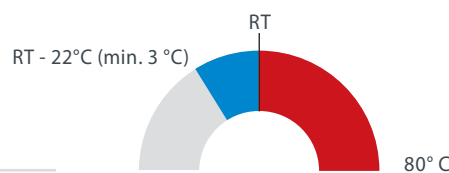
#### - Peltier



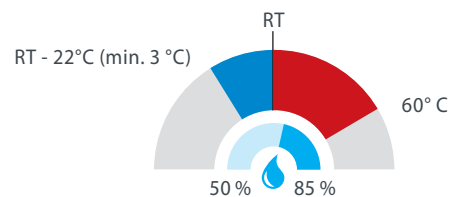
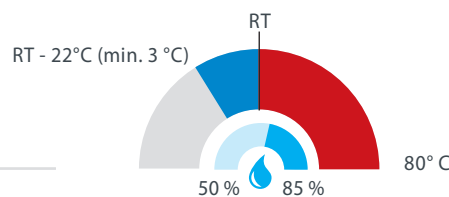
#### - Peltier with humidity control



#### - Compressor



#### - Compressor with humidity control



RT = room temperature



## Environment-friendly

Kuhner products are designed as eco-friendly and sustainable as possible. Choosing a Kuhner product means deciding in favor of long-lasting quality and ecologically responsible manufacturing.



# 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 their entire life span and at all places 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 and 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 front of the machines 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.



Watch our Video  
on YouTube





## 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.



## 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.

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)



## 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.

**3 mm / 1000 rpm:** This versatile new option for the ISF1-Z Peltier and Compressor enables the user to run cultivations at 3 mm orbit and 1000 rpm frequency. For more information and specific technical data visit our website.

**Kuhner CleanShield:** The disposable inlay for the water bath-Z simplifies the cleaning process, saving user's time, and providing a cleaner environment in our shaker incubators.

**Kuhner SUN:** The Kuhner SUN is the optimal solution for cultivating light-dependent cultures. Two independently controllable channels allow specific wavelength ranges to be precisely adjusted in addition to standard cultivation conditions, enabling targeted influence on light-dependent metabolic pathways. With a light intensity of up to  $320 \mu\text{mol s}^{-1} \text{m}^{-2}$  on the surface and a combination of warm white and cool white light, the module enables flexible adaptation to a wide range of applications – from algal and plant cell cultures to phototrophic bacterial cultures.

### 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

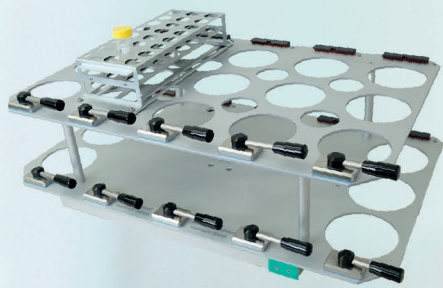
The robust and maintenance-free direct drive system of the ISF1-Z enables very high shaking frequencies which guarantee sufficiently high kLa-values for a good oxygen supply for microbial cultures. By adjusting the shaking diameter, optimal shaking conditions can be achieved and reproduced e. g. out 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



## Accessories

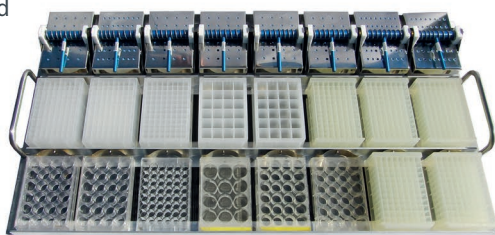
### Universal tray

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 × 3L Corning Fernbach culture flasks, 7 × 5L Corning Erlenmeyer flasks or 7 × 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.



### 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:

- **Single and dual instrument**
- **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**



# Custom-made solutions for automation

Would you prefer to combine your measuring system or liquid handling system with one of our shakers? Do you require a shaking machine with an unconventional feature? We will adapt our shakers to fit your needs. Tailor-made solutions for automated processes are our business. We will work with you to create the optimal solution for your lab.

Furthermore, Kuhner offers several standard options for automated processes such as the automated door or the Tray Positioning System (Kuhner TPS+).



## ISF1-Z Basic Beluga Designed for automation

The newly offered ISF1-Z Basic Beluga was a customized project specifically designed for automation and robotic systems. A robot arm can reach into the chamber with its generous interior space and grab any vessel of the tray.

The incubator shaker also includes the two options automatic door and the newly developed Kuhner Tray Positioning System (Kuhner TPS+) which are ideal for robotic applications. The ISF1-Z Basic Beluga can be integrated into many areas of automation, such as screening for an optimal cell line, for media development or analytical applications.



## TPS+ Tray Positioning System

The drive stops at but one exact stop position which is useful for robotic applications.

Watch our Video  
on YouTube



## Interfaces Stay connected

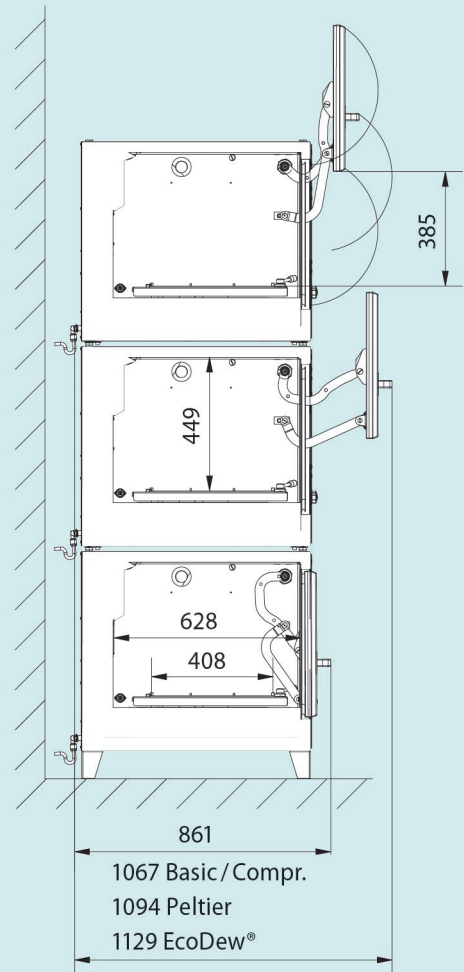
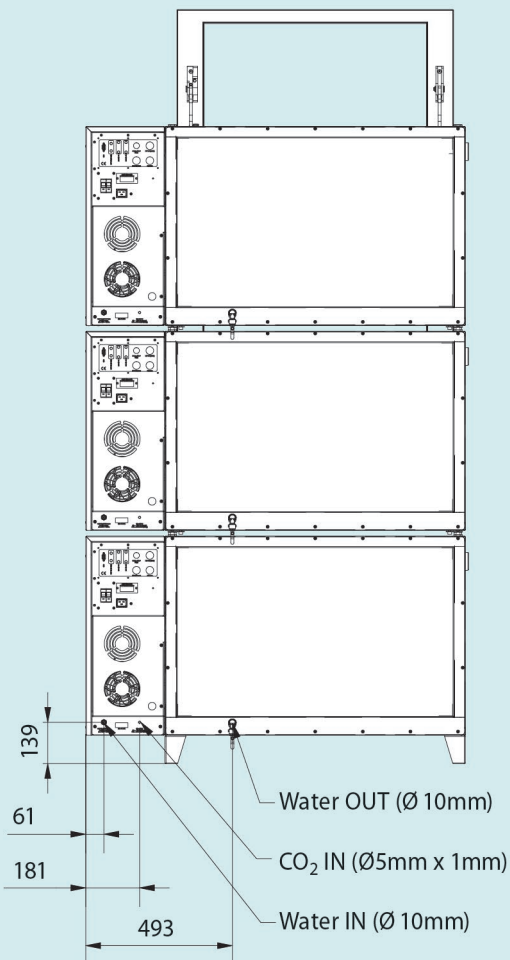
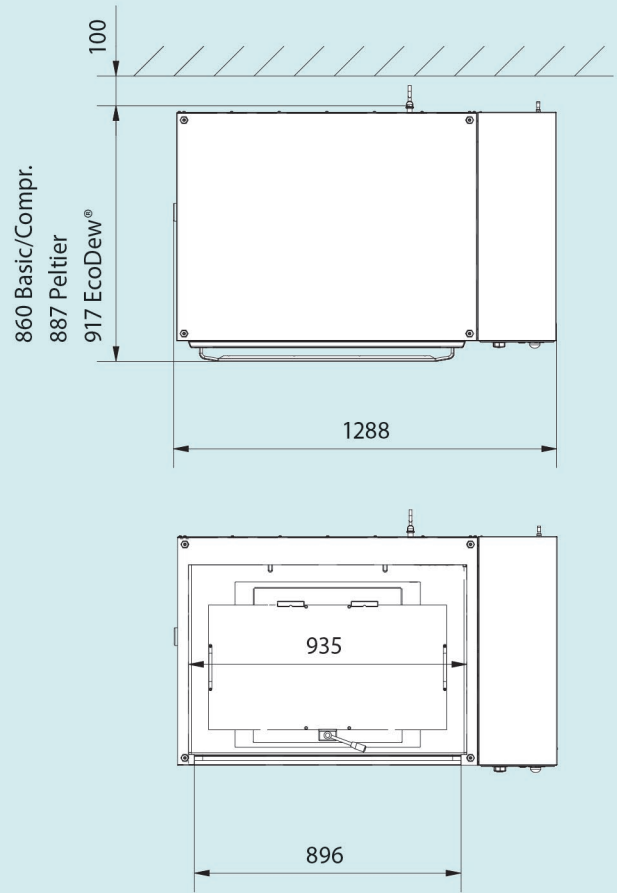
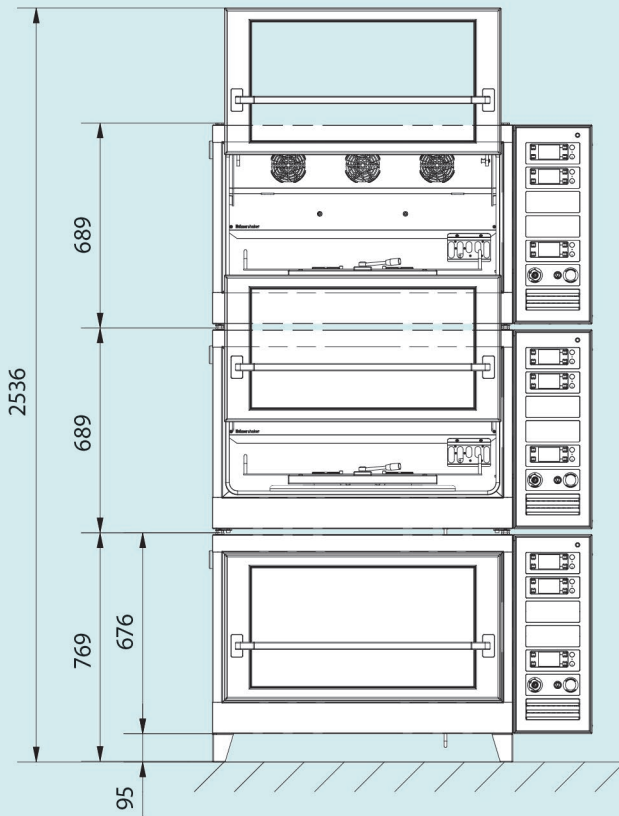
Independently of the bus system your monitoring system is using, our flexible NET-60 interface connects all conventional bus systems to the Kuhner shaker internal CAN-bus.

Further  
infos at:



# Dimensions

(in mm)



# Technical data

	Unit	ISF1-Z Basic (SMZ1500) ISF1-ZC Basic* (SMZ1500C)	ISF1-Z EcoDew® (SMZ1502) ISF1-ZC EcoDew* (SMZ1502C)	ISF1-Z Peltier (SMZ1501P) ISF1-ZC Peltier* (SMZ1501PC)
<b>Temperature Control</b>				
Cooling	yes/no	no	no	yes
Temp. minimum	°C	RT + 10	RT + 10	RT - 5
Temp. maximum	°C	80 (60 with CO <sub>2</sub> control)	80 (60 with CO <sub>2</sub> control)	50
Setting, digital	°C	0.1	0.1	0.1
Temperature distribution at 37°C/85% r.H.	± °C	< 0.20	< 0.20	< 0.20
Power of heating	W	800 (resistance)	800 (resistance)	384 (peltier)
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	570	570	380
<b>Humidity Control</b>				
Humidity max. at 25 - 55 °C	% r.H.	-	85	-
Humidity min. at 25 - 55 °C	% r.H.	-	depends on temperature (70 - 80%)	-
Setting, digital	% r.H.	-	1	-
Accuracy absolute	± % r.H.	-	2	-
Power of waterbath heater	W	-	180	-
Power of door and frame heater	W	-	140	-
Water refill		-	automatic	-
Principle of hum. sensor	type	-	capacitive	-
Principle of hum. control	type	-	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***, on request)	0/20-500 (700 HS***, on request)	0/20-500 (700 HS***)
Shaking frequency range at 25 mm	rpm	0/20-400 (550 HS***, on request)	0/20-400 (550 HS***, on request)	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	≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min	≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min	≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min
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-Z/EM-Z (HP/HS))	W	70/140	70/140	70/140
<b>General</b>				
Power consumption typical	W	approx. 220	approx. 230	approx. 250
Power consumption max.	W	approx. 1000	approx. 1000	approx. 1000
Incubation gas volume	L	378	378	366
Weight	kg	200	202	210
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 859 x 771	1288 x 917 x 771	1288 x 887 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	449	449	449
Door glass and frame		-	heated	-

ISF1-Z Peltier with humidity control (SMZ1503P) ISF1-ZC Peltier* with humidity control (SMZ1503PC)	ISF1-Z Compressor (SMZ1501) ISF1-ZC Compressor* (SMZ1501C)	ISF1-Z Compressor with humidity control (SMZ1503) ISF1-ZC Compressor* with humidity control (SMZ1503C)
yes	yes	yes
RT - 5	3 (at RT above 25°C, RT -22)	3 (at RT above 25°C, RT -22)
60	80 (60 with CO <sub>2</sub> control)	80 (60 with CO <sub>2</sub> control)
0.1	0.1	0.1
< 0.20	< 0.30	< 0.25
384 (peltier)	800 (resistance)	800 (resistance)
approx. 150 (peltier)	approx. 1 cooling 125 / 2 coolings 307	approx. 1 cooling 125 / 2 coolings 307
Pt-100	Pt-100	Pt-100
380	570	570
85	-	85 (up to 40 °C!)
50	-	approx. 70 (up to 40 °C!)
1	-	1
2	-	2
180	-	180
140	-	140
automatic	-	automatic
capacitive	-	capacitive
evaporation & recondensation	-	evaporation & recondensation
20	20	20
0	0	0
0.1	0.1	0.1
0.40 at 5% CO <sub>2</sub>	0.40 at 5% CO <sub>2</sub>	0.40 at 5% CO <sub>2</sub>
up to 60	up to 60	up to 60
max. 2 bar overpressure	max. 2 bar overpressure	max. 2 bar overpressure
Infrared	Infrared	Infrared
direct drive	direct drive	direct drive
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)
orbital	orbital	orbital
0/20-500 (700 HS***)	0/20-500 (700 HS***)	0/20-500 (700 HS***)
0/20-400 (550 HS***)	0/20-400 (550 HS***)	0/20-400 (550 HS***)
0/20-300 (400 HS***)	0/20-300 (400 HS***)	0/20-300 (400 HS***)
0/20-250 (300 HS***)	0/20-250 (300 HS***)	0/20-250 (300 HS***)
F (800 x 420 mm)	F (800 x 420 mm)	F (800 x 420 mm)
25 (up to 60**)	25 (up to 60**)	25 (up to 60**)
1 ≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min	≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min	≤ 800 rpm = ± 0.5 U/min > 800 rpm = ± 1.0 U/min
0,5	0,5	0,5
1 s - 999 h	1 s - 999 h	1 s - 999 h
controlled	controlled	controlled
adjustable	adjustable	adjustable
yes	yes	yes
70/140	70/140	70/140
approx. 250	approx. 250	approx. 250
approx. 1000	approx. 1000	approx. 1000
366	372	372
210	225	225
LED	LED	LED
DE, FR, EN, IT, ES	DE, FR, EN, IT, ES	DE, FR, EN, IT, ES
EN	EN	EN
CAN-Bus	CAN-Bus	CAN-Bus
USB, Ethernet, digital, analogue	USB, Ethernet, digital, analogue	USB, Ethernet, digital, analogue
10-35	10-35	10-35
40	40	40
1288 x 887 x 771	1288 x 859 x 771	1288 x 859 x 771
stainless steel	stainless steel	stainless steel
painted stainless steel	painted stainless steel	painted stainless steel
449	449	449
heated	-	heated

# Kuhner shaker

## Shakers & Accessories

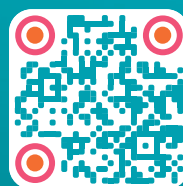
Represented by:



**Adolf Kühner AG • since 1949**

Dinkelbergstrasse 1  
CH – 4127 Birsfelden (Basel)  
Switzerland

phone +41 (0) 61 319 93 93  
fax +41 (0) 61 319 93 94  
office@kuhner.com



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