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TEMPERING CHAMBER: INCUBATOR & INCUBATOR SHAKER

///presented by Amber Ong



What is incubator?

///Definition

An incubator is a device used to grow and maintain microbiological cultures or cell cultures. The incubator maintains optimal temperature, humidity and other conditions such as the CO₂ and oxygen content of the atmosphere inside.



Standard incubator



Shaking incubator



Cooled incubator



Humidity chamber



CO₂ incubator



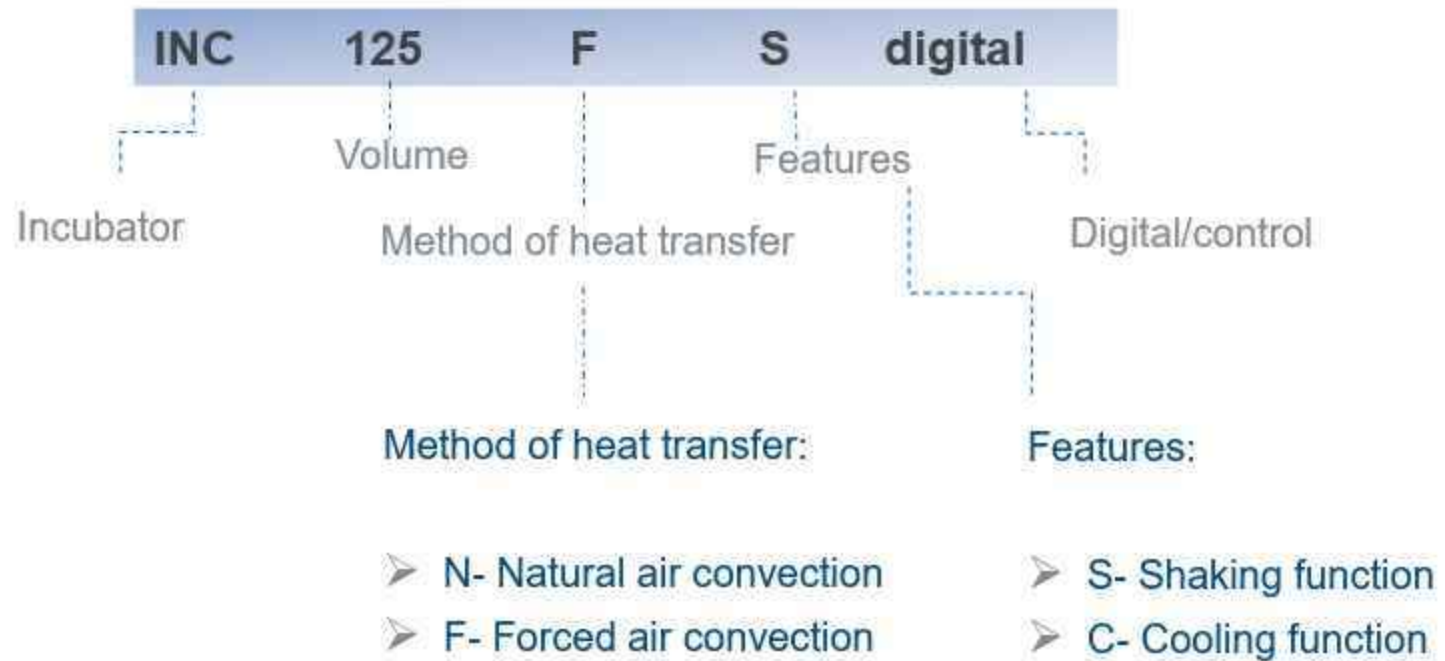
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Nomenclature

/// IKA incubator line

Incubator Line:

- INC 125 N digital
- **INC 125 F digital**
- **INC 125 FS digital**
- INC 125 FC digital
- INC 125 F control



/// INCUBATOR- INC 125 F digital

What is incubator?

///Standard incubator

Incubators are essential for much experimental work in cell biology, microbiology and molecular biology and are used to culture both bacterial and eukaryotic cells.

1 Sample (0.1 mL) poured onto solid medium



2 Spread sample evenly over the surface



Maintain optimal temperature for bacterial to grow



3 Plate incubated until bacterial colonies grow on the surface of the medium





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Target Industries:



Food manufacturing



Pharmaceutical



Cosmetic manufacturing



Medicine



Testing lab



Water testing lab

Development process of new products & Quality test



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INC 125 F digital Incubator

///Key features

User friendly

- **Clear and large LCD display**
- **Counter, timer and timer auto** modes are available
 - Timer auto mode only activate when set temperature achieved
- **Wide inner door opening** up to 172°
- **Decontamination mode at 120°C** available
- **Electronically adjustable ventilation** from 0 % to 100%
- **Accommodate up to 6 wire grid trays**
- **Optional change door open direction**



Temperature performance:

- Wide temperature range from ambient +8 up to **100°C**
- Excellent temperature stability and temperature uniformity of **+/-0.3°C**
- Fan speed adjustment from **0% to 100%**



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INC 125 F digital Incubator

///Key features

Safety

- **Sturdy and clear inner tempered glass door** for sample viewing to reduce contamination and impact on temperature
- **Temperature limit adjustment**
- **Key lock function**
- Sturdy rubber feet for stable placement
- Easy to clean inner chamber with corrosion resistant material AISI 304
- **Lockable door** (optional accessories)



Decontamination strategies inner chamber

/// reduces pathogens on an object or area known to be contaminated

What it means to Disinfect vs. Sterilize vs. Sanitize

These terms can be confusing. There are many differences that you need to know before choosing the best decontamination method for your situation.

Disinfecting	Sterilizing	Sanitizing
Using chemicals to kill germs on surfaces. This process doesn't necessarily clean dirty surfaces or remove germs, but killing germs on a surface after cleaning, can further lower the risk of spreading infection.	A process of destroying or eliminating all forms of microbial life and is carried out in medical facilities by physical or chemical methods.	A process of washing, cleaning or removing dirt, and eliminates dust, debris, and germs on the surface. It doesn't kill germs, but by removing them, it lowers their numbers and the risk of spreading infection.



INC 125 F digital Incubator

///Accessories

- 35001512 Wire grid tray, chrome plated
- 20118202 Perforated tray
- 20118174 Stacking kit ———> Stackable with INC 125 FS digital
- 35004372 Door lock
- 0020024935 IO T 1.00 Wire grid tray, chrome plated
- 0020007600 IO T 1.10 Enhanced wire grid tray
- 0020007601 IO F 1.10 Roller frame
- 0020007602 IO B 1.10 Roller box
- 0020007603 IO P 1.10 Table top work plate
- TBA Change door open direction



Perforated tray



Door lock



/// INCUBATOR SHAKER- INC 125 FS digital

Incubator shaker

A thermostatically controlled shaker incubator is another piece of apparatus used to cultivate microorganisms.

Its advantage is that it provides a rapid and uniform transfer of heat to the culture vessel, and its agitation provides increased aeration, resulting in acceleration of growth.

Suitable for broth or liquid culture media.





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INC 125 FS digital

///incubate, shake or both

User friendly

- Clear and large LCD display
- Counter, timer and timer auto modes are available
- Wide door opening up to **180 °**
- **May fit up to 6 wire grid tray** by remove the shaker platform





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INC 125 FS digital

///incubate, shake or both

Temperature performance

- ✓ Wide temperature range from ambient +8 up to 80°C
- ✓ **Excellent temperature stability of ± 0.1 K and temperature uniformity of ± 0.3 K**
- ✓ Fan speed adjustment from 0% to 100%
- ✓ Well insulated chamber with **triple layer glass window design**

Mixing performance

- ✓ Shaking speed up to **300rpm** which is sufficient for most of the applications.
- ✓ Shaking throw with option of **20mm or 25 mm** for different applications



SP20



SP25



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///incubate, shake or both

Patented detachable shaker platform



- **Automatic attach recognition** - shaker platform
- Ease loading sample design with **sample loading indication line** on the shaker platform
- **Integrated universal attachment design**
 - fit with existing fixing clips from 10ml to 2L or STICKMAX



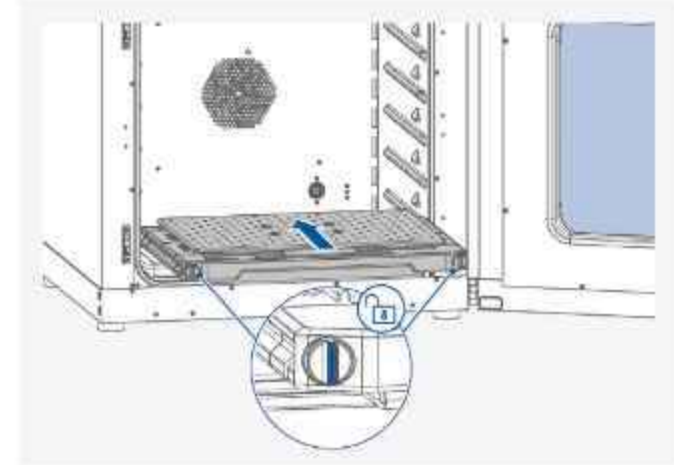
INC 125 FS digital

///incubate, shake or both

Safety and cleaning

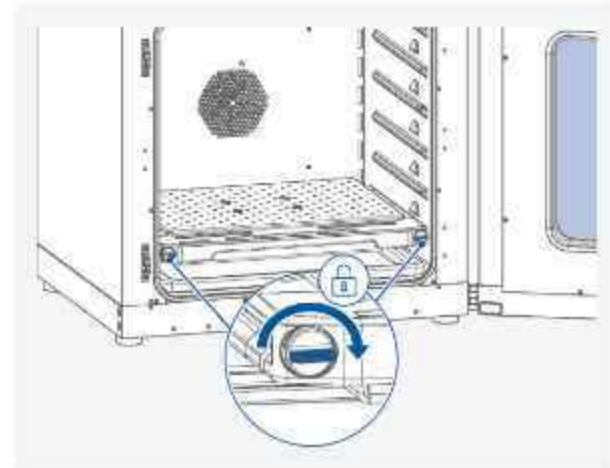
- ✓ **Easy to clean design**
 - Less dead spots compare with a conventional incubator shaker with bottom mounted shaker
- ✓ Interior lighting
- ✓ **Decontamination mode(120°C/ 100°C)**
- ✓ Shaking stop automatically when door is open
- ✓ **Locking knob** on shaker platform
 - Ensure the shaker platform is well coupling to the chamber
- ✓ Extremely Stable
 - **8 pieces of rubber feet** under the chamber to absorb vibration

• Insert the shaker platform



Locking knob on the shaker platform

• Lock the shaker platform



How Orbital Diameter and Shaker Agitation rate affect oxygen transfer rate?

Oxygen transfer rate (OTR) is important factor to ensure there is sufficient aeration for cell growth.

Continuous aeration of the liquid culture is crucial to ensure aerobic respiration of the bacteria. An increase in oxygen concentration speeds up the rate of of bacterial growth.

OTR could be affect by

- Culture volume
- Flask size
- Speed
- Orbit diameter



When same flask and culture volume is used, higher speeds or larger orbits will lead to a better aeration.

Greater aeration increases oxygen transfer rate (OTR), boosting cell growth. The size of the orbit affects OTR linearly.



What is the different between SP20 and SP 25?

///When we need SP 25?

Culturing shear sensitive microorganisms or cells which require low mixing speed.

In order to provide sufficient oxygen transfer, a larger diameter orbits shaker is recommend.

According to Newton's second law of motion, force = mass x acceleration.

- The resulting equation is:

$$r_2 = \sqrt{\left(r_1^2 \times \frac{d_1}{d_2}\right)}$$

r1: agitation speed old shaker
r2: agitation speed new shaker
d1: orbit diameter of old shaker
d2: orbit diameter of old shaker

The equation relating orbital diameter and agitation rate and could be use for calculation when using new shaker with different orbit diameter

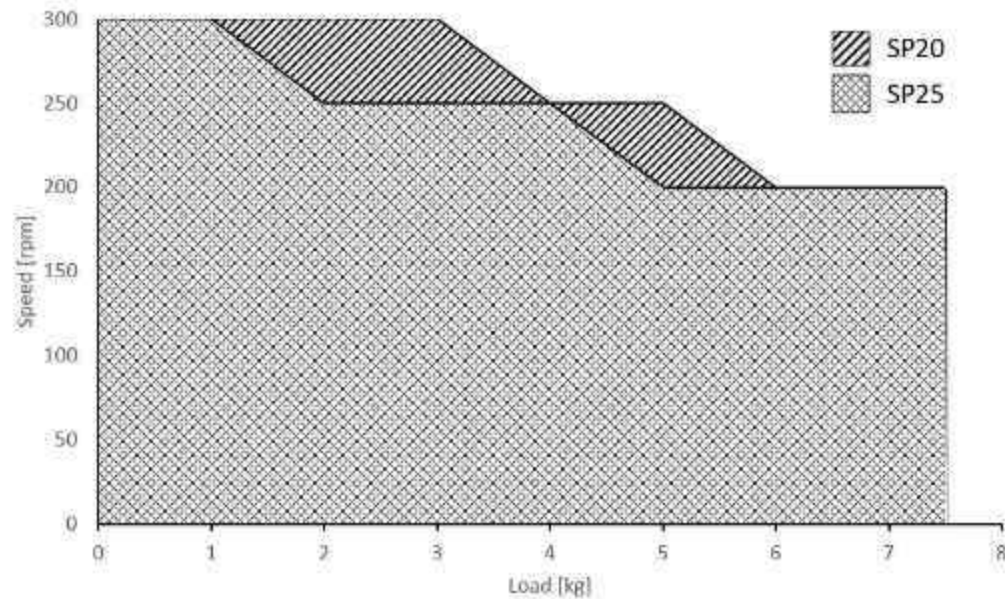


This was corroborated by multiple examples which showed the formula agreed with practical results within 2-3%.

What is the different between SP20 and SP 25?

///when we use SP 20?

- ✓ No concern on the shear force.
- ✓ Higher speed is require to ensure sufficient aeration
- ✓ SP20 can withstand higher load at certain agitation speed compare to SP25.





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Data sheet INC 125 FS digital



Technical data:

Working temperature min. [°C]	Amb +8
Working temperature max. [°C]	80
Outside dimensions W x D x H [mm]	700 x 720 x 630
Operating area inner chamber W x D x H [mm]	550 x 550 x 415
Total volume inner chamber [l]	125
Weight [kg]	60kg
Glass door	yes
Number of tray max.	6
Load for one tray max. [kg]	20kg
Location of door hinge	right

Shaking performance:

Shaking orbit [mm]	20mm or 25mm (please choose)
Speed range [rpm]	10 – 300
permitted load maximum [kg]	7.5
Table size (W x D) [mm]	340 x 480



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Accessories

///support wide applications

35001512	Wire grid tray, chrome plated
20118202	perforated tray
20118174	stacking kit
20118266	drip pan
0020024935	IO T 1.00 Wire grid tray, chrome plated
0020007600	IO T 1.10 Enhanced wire grid tray
0020007601	IO F 1.10 Roller frame
0020007602	IO B 1.10 Roller box
0020007603	IO P 1.10 Table top work plate
TBA	Change door open direction





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Accessories

///support wide applications

For shaker platform:

0003920000	STICKMAX
0020016475	AS 2.0
0001234300	AS 2.1
0001234400	AS 2.2
0001234500	AS 2.3
0001234600	AS 2.4
0001234700	AS 2.5
0003819300	AS 2.6
0020016476	AS 2.7



Load capacity on SP 20/SP 25

Item	Fixing clip	stickmax
10ml	96pcs	
25ml	39pcs	111pcs
50ml	39pcs	66pcs
100ml	24pcs	36pcs
200/250ml	12pcs	20pcs
500ml	12pcs	12pcs
1000ml	6pcs	8pcs
2000ml	2pcs	6pcs

Data from IWS AC team





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Comparison between INC 125 F digital and INC 125 FS digital

	INC 125 F digital	INC 125 FS digital
	Incubator	Incubator shaker
Working temperature	RT+ 8 °C to 100°C	RT+ 8 °C to 80°C
Decontamination mode	120°C	120°C /100°C
Interior lighting	No	Yes
Ventilation flap	Yes	No
Sample viewing	Inner tempered glass door	Triplet layer glass window
Speed		10-300rpm
Shaking stroke		20mm or 25mm



/// Differences of IKA shaking incubator (KS 3000/4000i) with INC 125
FS Digital



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Differences of IKA shaking incubator (KS 3000/4000i) with INC 125 FS Digital



	KS 3000 I control	KS 4000 I control	INC 125 FS digital
Door type	Front lift	Front lift	Front open
Type of movement	orbital	orbital	orbital
Incubator type	benchtop	benchtop	Benchtop/ Under-bench/ Floor stand/ Stackable
Maximum temperature	80°C	80°C	80°C
Speed	10 - 500 rpm	10- 500 rpm	10-300rpm
Total volume inner chamber	50L	90L	125L
Maximum permitted load	7.5kg	20kg	7.5 kg
Support both static and shaking incubation simultaneously	No	No	Yes
Decontamination mode	No	No	Yes
Shaking stroke	20mm	20mm	20mm or 25 mm
Removable shaker platform	No	No	Yes
Cooling option	KS 3000 IC control	KS 4000 IC control	No
External sensor	included	included	Not available



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Potential in Microbiology/ Biotechnology lab

///lab equipment can be offer from IKA

- Incubator
- Drying oven
- Incubator shaker
- Vortex mixer
- Magnetic stirrer with heating function
- Shaker
- Pipette
- Vacuum pump
- Temperature control
- Bioreactor





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