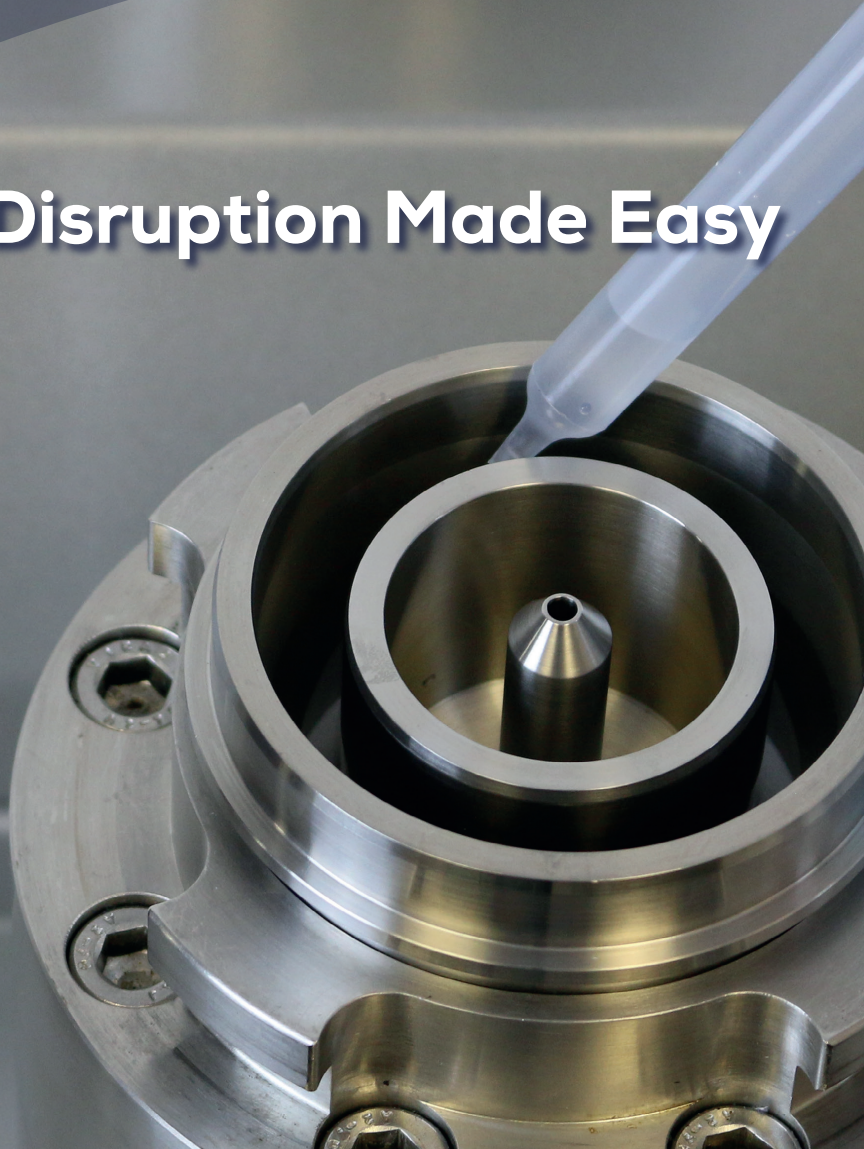




# Cell Disruption Made Easy



**AstraZeneca** - "We are very happy with our new CF2 system. We routinely use this to process large volumes of insect and E.Coli cells. The system is extremely easy to use and maintain and even faster than our previous system.

We hugely appreciate all of the help and support we've received from the Constant Systems customer service and engineer teams. They have responded to queries extremely quickly with all required information and gone above and beyond to help when required. When service engineers have attended site, they've been brilliant to work with and we hugely appreciate the additional training to all available members of staff when they visit."

Thank you for all your ongoing excellent service!

Sarah Caswell - Associate Principal Scientist at AstraZeneca

**NPL** - "For the Protein Production team of the Biometrology group at the National Physical Laboratory, cell lysis is a crucial step in protein extraction before purification. We have a CF1 model with a 900 mL chilled reservoir, which was installed in October 2020. The equipment is straightforward to use, regardless of the sample we process (bacteria, yeast, archaea, insect and mammalian cells). When cleaning the equipment, we follow the suggested cleaning protocol and find that it is adequate for our usage."

Ines Camacho, PhD, MSc - Higher Research Scientist, Laboratory Manager at National Physical Laboratory (NPL)

**RCaH** - "We are very pleased with the service provided by your team. Your engineers are a pleasure to work with, taking time to explain everything and offering advice from their experience working with other clients. Aftermarket support is also excellent, always fast to respond to messages and ensuring paperwork is sent over to us. I have no comments for improvement - you are all very friendly and helpful, so many thanks to everyone for helping me keep the equipment running smoothly"

Lauren Cater - Senior Technician at Research Complex at Harwell (RCaH)

About Constant Systems Ltd.	4
Efficacy of Constant Systems Ltd Cell Disruptors	6
OS	10
MC	11
CF Range	12
HFR	13
Notes	14

# About Constant Systems

## Why choose Constant Systems Ltd?

Constant Systems Ltd. was established in 1989 and is based in Daventry, England.

Continual research and development has allowed Constant Systems Ltd. to design and manufacture highly reliable cell disruptors used in laboratory, biomedical and pharmaceutical fields worldwide.

Constant Systems Ltd. works with distributors across the globe, providing them with the skills needed to represent the company and its products in their given territory.

Constant Systems Ltd's products are well known for their reliability, reproducibility, efficacy and consistency, whatever the application they are used for.

The complete range of systems are fully scalable, offering solutions from research through to pilot and production scales.

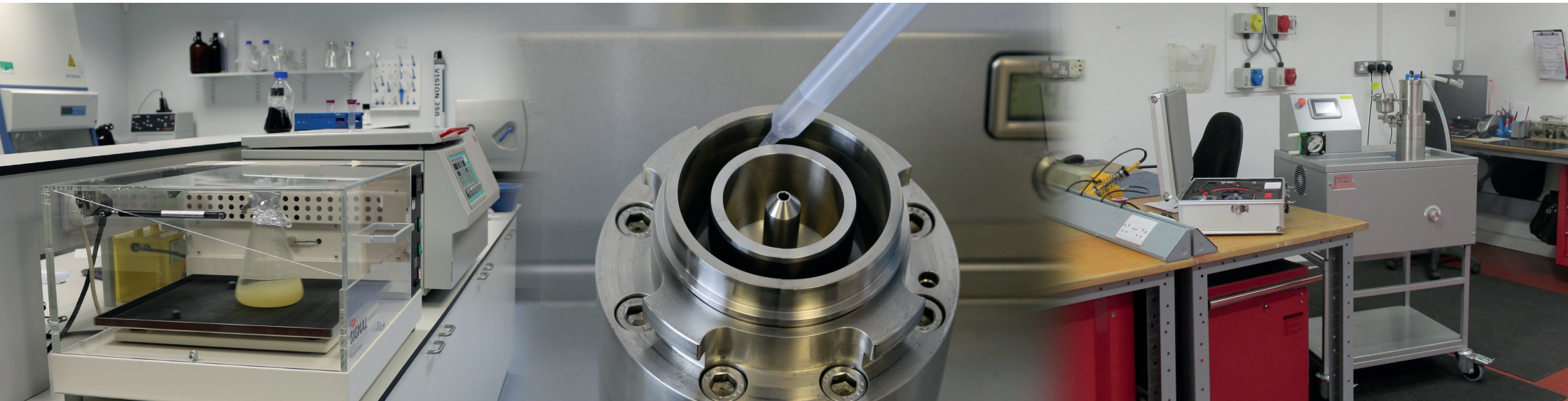
## What's on offer?

Constant Systems Ltd. is committed to its products and clients with the priority of ensuring clients are satisfied with their purchase. Therefore, to give you peace of mind a 12 month warranty is standard from installation.

Trained engineers and our After Market Support Department are on hand to assist you with any questions you may have once you have received your new equipment.

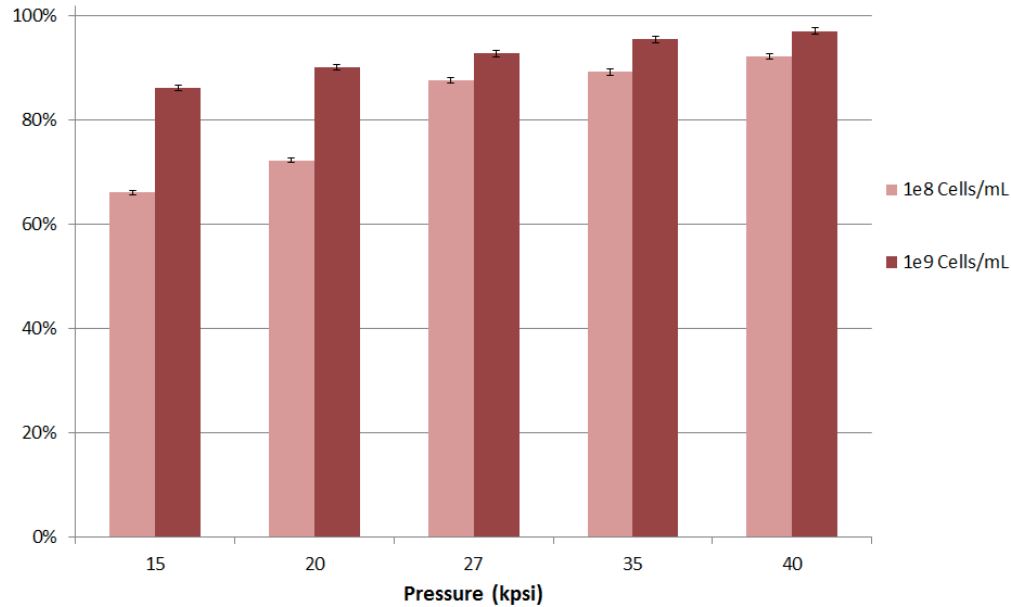
By having regular service maintenance visits you will be assured that your equipment will be working at optimum level. Clients receive fantastic benefits for looking after their equipment.

Constant Systems Ltd. has always been driven by constant improvement of the business process and products. The commitment in this area has enabled the company to meet the standard of ISO 9001:2015. This is a guarantee of professional attitude and reliability. All of our equipment is designed and assembled at our Northamptonshire site in the UK and built using the highest quality components manufactured by precision engineers.



# Efficacy of Constant Systems Cell Disruptors

Lysis of *Saccharomyces cerevisiae* at Different Cell Counts and Pressures

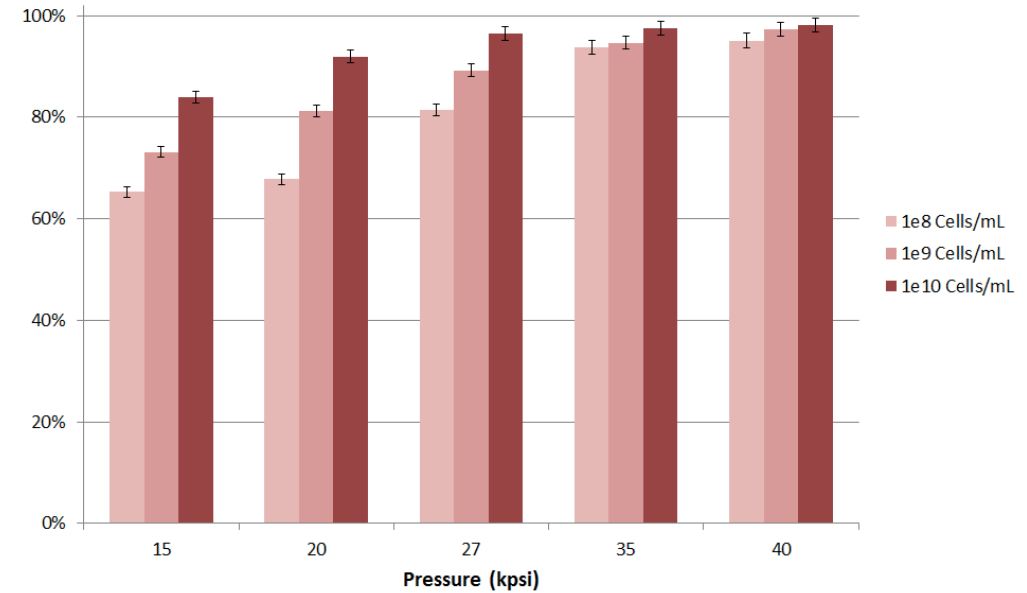


Lyophilised Baker's Yeast (*Saccharomyces cerevisiae*) was used to inoculate 200mL sterile YMB (Yeast Mold Broth: Peptone 5g/L, Dextrose 10g/L, Maltose 3g/L, Yeast Extract 3g/L) in 1L flasks which were then incubated at 30°C with shaking at approximately 100rpm for 24 hours until a cell count of approximately 109 cells/mL was reached. A sample of this culture was then diluted by a factor of 10 with sterile YM.

The resulting culture was passed in 30mL aliquots through a Constant Systems Ltd CF1 Cell Disruptor at pressures indicated. The equipment was rinsed with 30mL deionised water between each use.

After being passed through the equipments, 10µL of lysate was mixed 1:1 with the viability stain Trypan Blue. White live cells and blue dead cells were counted using a hemocytometer. A sample of unlysed cells from the same culture was used as a control, from which the complete lysis percentage was calculated.

Lysis of *Escherichia coli* at Different Cell Counts and Pressures

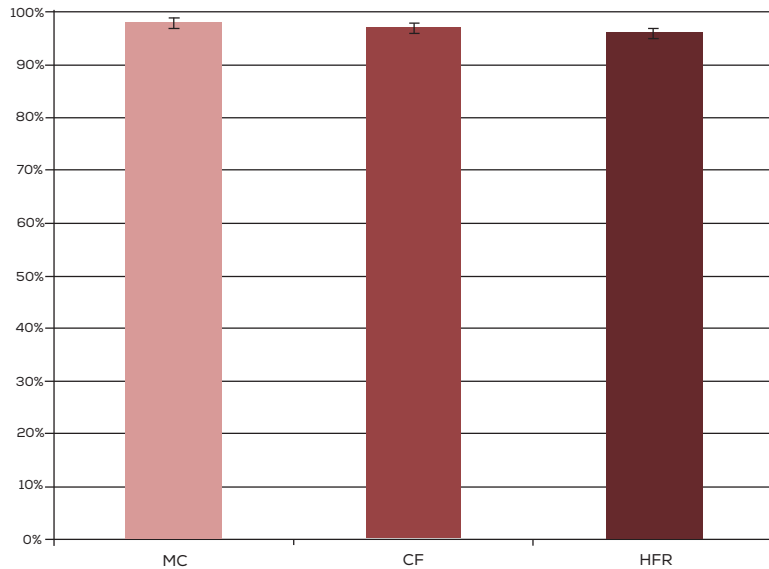


A single colony of *Escherichia coli* ATCC 8739 was used to inoculate 10mL sterile LB (Lysogeny Broth: Tryptone 10 g/L, Sodium Chloride 10 g/L, Yeast Extract 5 g/L) and was grown overnight at 37°C with shaking at approximately 180rpm. This starter culture was used in a ratio of 1% to inoculate 200 mL sterile LB in 1L flasks. These flasks were incubated under the same conditions until cell densities of approximately 108, 109 and 1010 cells/mL were reached, with each flask being stored in a refrigerator once it had reached the assigned cell density.

The resulting culture was passed in 30mL aliquots through a Constant Systems Ltd CF1 Cell Disruptor at pressures indicated. The equipment was rinsed with 30mL deionised water between each use.

After being passed through the equipments, 10µL of lysate was mixed 1:1 with the viability stain Trypan Blue. Live cells were counted using a hemocytometer. A sample of unlysed cells from the same culture was used as a control, from which the lysis percentage was calculated.

Maximum Achievable Lysis of *Saccharomyces cerevisiae* ( $10^9$  cells/mL)

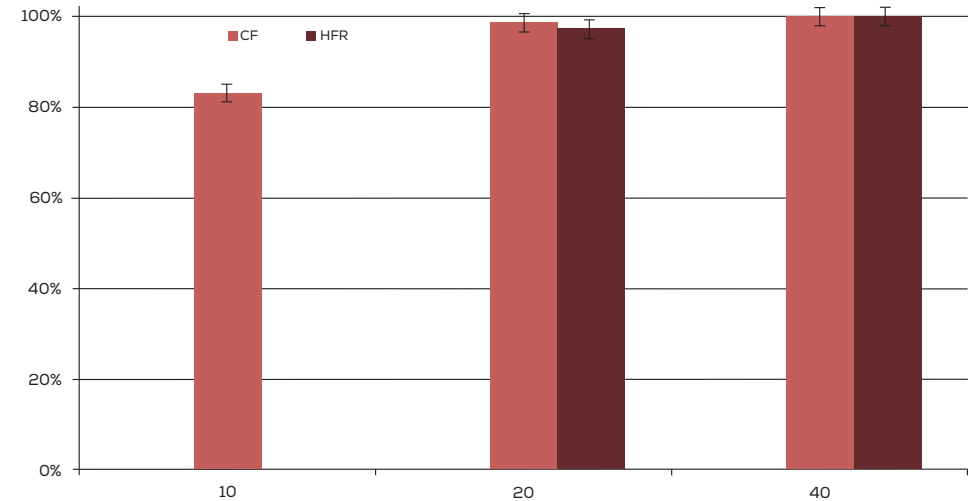


Cultures of *Saccharomyces cerevisiae* were grown in YM as previously described on Page 6 until cell densities of approximately  $10^9$  cells/mL were reached.

These cultures were then processed individually by the four available equipment models, all of which were operated at their maximum functional pressure. Samples of lysate were taken and cells were counted using a hemocytometer as previously described in order to provide comparative figures for maximum achievable lysis using the standard equipment configurations.

Lysis of *Nannochloropsis oculata* ( $7.1 \times 10^8$  cells/mL) by equipment

Constant Systems Ltd. Range of Cell Disruptors



A 500 mL starter culture of *Nannochloropsis oculata* was added to 5 L of dH<sub>2</sub>O along with Reefphyto modified Guillard F/2 medium according to manufacturer's instructions. The culture was aerated and incubated in direct sunlight. Cell density was measured daily via hemocytometer readings and the culture was left until the cell density plateaued at approximately  $10^7$  cells/mL. The culture was then diluted to a total volume of 10L and more Reefphyto medium was added accordingly. The culture was then again left in direct sunlight with aeration until the cell density plateaued once more at approximately  $10^7$  cells/mL.

A sample of the resulting culture was processed individually by Constant Systems Ltd. 'CF1' and 'HFR' systems at the pressures indicated.

Immediately after completing the run on each equipment, 10 µL of each effluent sample was analysed and cells counted using a haemocytometer. A sample of unlysed cells from the same culture was used as a control, from which the complete lysis percentage was calculated.

The OS will process 0.5–8mL and is ideal for clients working with up to 24mL of sample.

This system also has the ability to process liquid, solid and frozen samples such as plant/mammalian tissue meaning you do not always need to add a buffer/solution to your sample!



- 99% cell lysis efficiency with *Saccharomyces cerevisiae*
- Minimal dead loss of 0.1mL
- Quick & easy to use, simply plug in and switch on
- No need to prime
- Collection cups provided can be transferred to and from ice/fridge for temperature control
- Consistent pressure giving you repeatable results
- Full containment
- Pipette or pour your sample from the collection cup after processing
- Can be dismantled for autoclaving

The MC will process 1–40mL over 5 cycles and is ideal for clients working with up to 80mL of sample.

This system also has the ability to process 1–8mL of liquid, solid and frozen samples such as plant/mammalian tissue in 1 cycle. This means you do not always need to add a buffer/solution to your sample!



- 99% cell lysis efficiency with *Saccharomyces cerevisiae*
- Minimal dead loss of 0.1mL
- Quick & easy to use, simply plug in and switch on
- No need to prime
- Collection cups provided can be transferred to and from ice/fridge for temperature control
- Consistent pressure giving you repeatable results
- Full containment
- Pipette or pour your sample from the collection cup after processing
- Can be dismantled for autoclaving

## CF Range

The CF1 will process up to 100mL per minute (at maximum pressure) and is ideal for clients working with up to 10L of sample.

The CF2 will process up to 400mL per minute (at maximum pressure) and is ideal for clients working with upto 100L.

There is also the option to process solid and frozen samples on this equipment along with smaller volumes from 0.5-10mL with the One Shot Head Adaptor.



- 99% cell lysis efficiency with *Saccharomyces cerevisiae*
- Minimal dead loss of up to 2mL
- Quick & easy to use, simply plug in and switch on
- No need to prime
- Touch screen control
- Cooling jacket surrounds the disruption head, simply fit your chiller to the disruption head to keep your sample cool whilst it is being processed
- Consistent pressure giving you repeatable results
- Automatic shutdown allowing you to continue with other tasks once sample has been processed
- Disruption head can easily be dismantled for autoclaving
- CIP and SIP options available upon request
- Peristaltic pump fitted as standard on CF2 equipment to automate larger volume processing. Pump can be fitted to CF1 if requested

## HFR

Constant Systems Ltd's production system can process up to 150L per hour which is perfect for clients who produce high volumes of cell derived product.

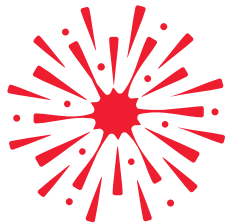
This equipment can be tailored to your needs as there are various configurations available.



- Over 95% lysis efficiency with *Saccharomyces cerevisiae*
- Incorporates Constant Systems Ltd.'s unique disruption mechanism and precise hydraulic operating control system
- Flow rate up to 150 L/hr at maximum pressure
- Various flow rates are available depending on desired maximum pressure
- Pressure consistent and stable during the disruption cycle
- Various configurations available for inlet and outlet, allowing direct connections to upstream and downstream equipment







# CONSTANT SYSTEMS

CELL DISRUPTION MADE EASY

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