



**“Cell Disruption, it’s in our Genes”**

**Cell Disruption**

**DNA Extraction**

**Enzyme Release**

**DNA Manipulation**

**Selective Breakage**

**Single Cell Isolation**

**Tissue Disruption**

**Protein Extraction**



"Very simple and easy to use. Simplest machine in the world!"  
Seoul National University



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# About Constant Systems



*"Brilliant piece of equipment, from a brilliant company with great support in all areas. We can not ask for better. We use our Constant System's cell disrupter to break 10-100L batches of bacterial and yeast cells grown in our fermentation facility."*

**Cancer Research UK Fermentation Services**

Constant Systems Limited is a UK company, operating with its headquarters in Daventry, England with a subsidiary Constant Systems Incorporated working out of Atlanta, Georgia in the US.

Working direct and alongside our working partners, Constant Systems provides niche bio-technical products and services to a global client base where the design, development, manufacture and aftermarket support of high-pressure cell disruption equipment has been our passion and focus since 1989. It is this dedication and hard work that is quickly making Constant Systems the first choice supplier for Pharmaceutical and Biotech companies, Research Institutes, Universities and Schools. Our only aim is to create products that provide you the opportunity to disrupt cells in the simplest and most controlled way.

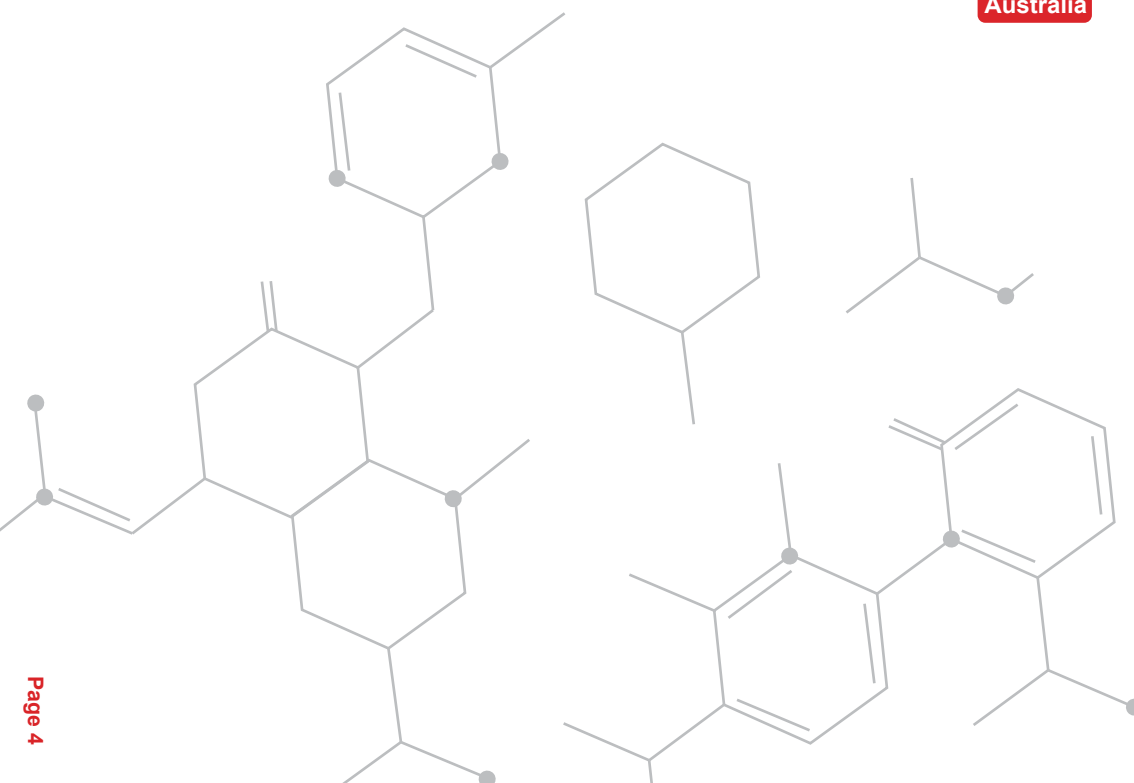
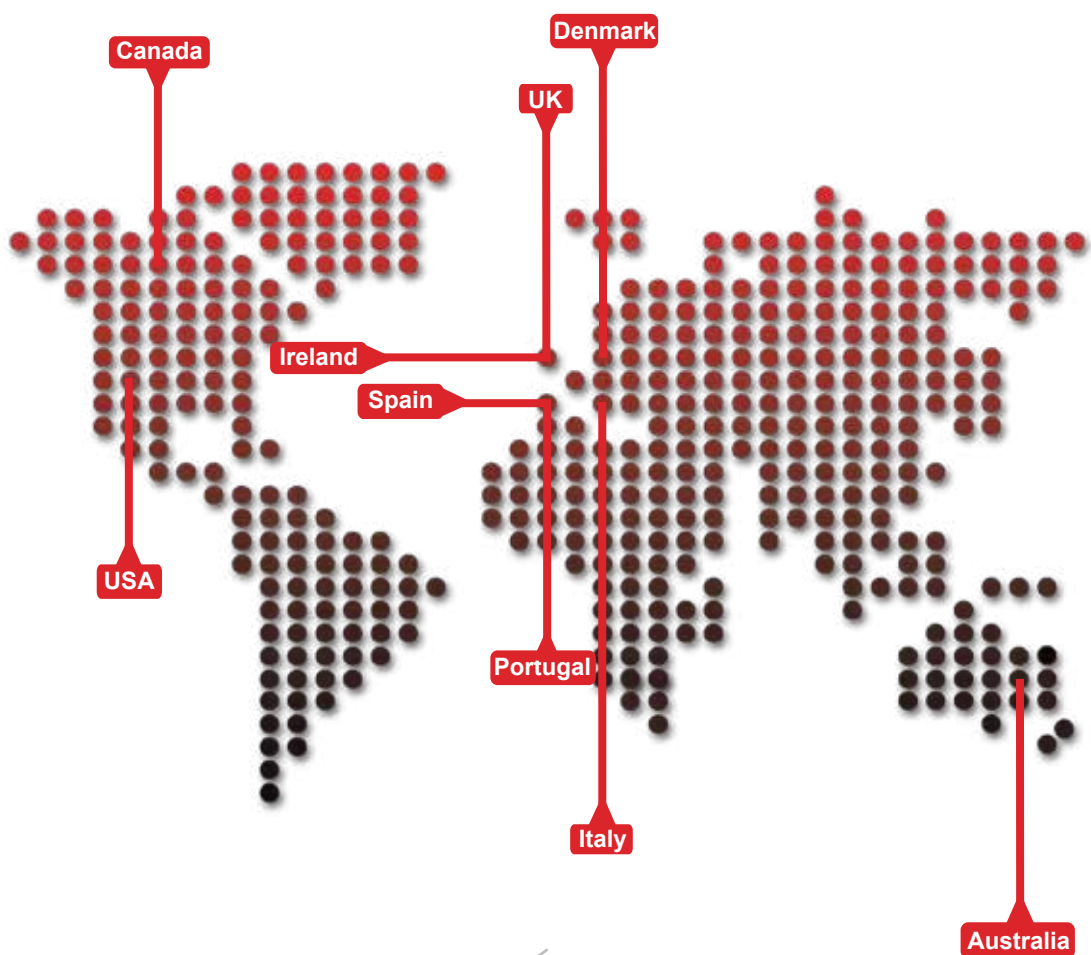
Constant Systems derives its name from our product's ability to provide continuous and constant results in a controlled and safe environment. Whether you are processing samples of 1ml or 100 litres, we can give you the same control, process after process enabling you to have confidence in results. Whether you are using our One Shot model or one of our Continuous Flow models, our unique hydraulic control ensures full repeatability and consistency giving you assurance of hassle-free scale up of your process.

We also have our "Centres of Excellence" positioned around North America, Europe and Australia. These centres can be used for meetings, trials and demonstrations relating to Constant Systems products, which we are more than happy to arrange for you.



# Centres of Excellence

Constant's Centres of Excellence are situated throughout North America, Europe and Australia. These centres can be used for meetings and demonstrations for Constant products. If you would like to arrange a meeting or demonstration at a centre then please contact us specifying which centre you would like to use and we will make the arrangements.







## Customer Comments



### **Pioneer Hi-Bred International, Inc Plant Protection Group. Discovery of Novel Insecticidal**

*"We replaced our French Press with a Constant Systems homogenizer about two years ago. It was one of the best acquisitions we have ever made. The instrument is used on an almost daily basis and works well for a variety of microbes. It has saved us time to process large sample volumes in a single pass and added more consistency to our preparations, because the temperature is much better controlled compared to the chilled French Press cell we've used before. Overall a very reliable and trouble-free experience"*



### **Bioneer A/S - Microbiology Department**

*"We have had our Cell Disrupter (TS Series Bench Top) for less than a year, and we cannot understand how we were managing without it. The reproducibility of the process is an important advantage compared to the systems we worked with before. We use it for releasing heterologous proteins from E. coli as soluble product as wells in inclusion bodies. With the One Shot Head Adapter we can disrupt cells from small scale flask experiments, and in continuous mode we have used the machine for processing material from high density fermentations in 10 liter scale. The support from Constant Systems has been fast and efficient whenever we needed advice on technical matters."*



### **UCB Celltech - UCB Celltech Antibody Centre**

*"We are very happy with the disrupter and routinely use it for lysis of bacterial cells. Compared with our previous French press method there is a 75% reduction in processing time. We would recommend this product."*



### **Wageningen University**

*"The cell disruptor from Constant Systems is an easy to use and simple piece of equipment. It proved a very useful tool for the fast and efficient lysis of gram positive as well as gram negative bacterial cells. It has become an important instrument in our daily experimental routines."*



### **Russian Cardiology Research and Production Complex Department of Genetic Engineering**

*"Constant Systems cell disrupters are successfully used at our Experimental plant mainly for bacterial cells. These efficient machines became an important part of our enzyme purification unit. We are very satisfied with the quality and reliability of Constant Systems disruption equipment. The disrupters are easy to operate and do maintenance. We thank you for friendly after sale support, information interchange and service."*



### **Scripps Research Institute**

*"The Constant Systems cell disrupter allows us to process 10L of yeast in an hour with a single pass, while retaining a cool temperature. This technology enables us to produce more recombinant protein and address complex biological problems."*



### **IRB - Department of Chemical and Environmental Engineering**

*"We have been using our 1.1kW model for the last three years to disrupt E.coli, Mammalian, Insect and Yeast cells and we are very pleased with it. The disrupter handles all of these cell types with ease and delivers efficient and reproducible lysis results that allow us to prepare high quality proteins. It has been so successful, even with membrane protein preparations, that researchers from almost every other lab in the institute come to use it."*



### **Swedish University of Agricultural Sciences Department of Molecular Biology**

*"The Constant Systems cell disrupter gives the best results in breaking bacteria cells for isolation of membrane fractions compared to other methods. The system is easy to operate, the technical supports are extremely effective and friendly."*



### **Flinders University - Paton Laboratory**

*"We use the Constant Systems Cell Disrupter on an almost daily basis and found it to be by far the best, easiest to use and time efficient way to crack open bacterial cells."*



### **Sanofi Aventis - Department of Functional Genomics**

*We are extremely pleased with our Cell Disrupter. We have used different systems in the past but none of them comes close to this system with regard to :1) User friendliness : a) --set pressure and press the button b) --very easy to clean and sanitize 2) Flexibility and Effectiveness: a) --provides a wide range of pressures for lysing different cell types b) --a single pass is all that is needed to lyse 100% of suspended E.coli cells 3) Robustness. This is a well engineered system--we have not experienced any break down or down time 4) Service (maintenance) is excellent"*

# Small Scale Models

**One Shot** - The One Shot Model offers great versatility and its strongest attribute is the ability to quickly and efficiently process all sample types including solid, frozen, re-suspended samples and even cell paste meaning re-suspension is not always required.

**Multi Shot** - The Multi Shot system is a newly modified model that has been designed around the One Shot. Using this model you can achieve all you can on the One Shot Model with the additional capability of processing up to 40mls for fluid samples.

## One Shot Model

Will process 1-20mls per shot (dependent on pressure). Ideal for samples between 1-20mls.



## Multi Shot Model

Ideal for samples between 1-80mls  
1-40mls per process

(Available January 2014)



*"This is one piece of equipment that every structural biology lab got to have! Cell lysis is thorough, easy, clean, quick and humane. The service staffs are highly professional and responsive. Andy and Kaylee make sure my cell disruptor is working all the time. Some of insoluble samples prepared by other cell lysis methods turned out to be fine once we process them using the cell disrupter. We also know that this method of cell lysis does not compromise protein's native fold because our group obtained several protein crystals and solved five crystal structures using the sample processed by the cell disrupter!"*  
Baylor College of Medicine - Department of Pharmacology, Department of Biochemistry and Molecular Biology

## Small Scale Models - Specification

- Quick and easy to use.
- No need for compressed air or connection to gas bottles, just plug in and switch on.
- No problem with having air in the disruption path, therefore no need to prime before use unlike other systems.
- Disruption pressure displayed digitally and is easily and accurately set between 1KPSI through to 40KPSI as standard.
- Can process solid, frozen and fluid samples.
- Minimal dead loss volume of less than 1ml (One Shot only).
- Collection cups provided can be transferred to and from ice or a freezer for temperature control.
- The precise hydraulic control ensures that the pressure is consistent and stable during disruption cycle.
- The unique disruption head design ensures that consistency is maintained process after process giving you confidence in repeatability.
- Full containment during operation. Secondary containment parts offer total safety during the disruption process.
- Following the disruption process, you can simply pipette or pour your sample from the collection cup.
- Cleaning is simple and easy, the procedure is just the same as processing a sample. If you are looking for a more intense clean, the disruption head can be easily dismantled for manual cleaning and/or autoclaving.
- Disrupter head mounted on stainless steel tray to capture accidental spillages and spills.
- Materials in product path, 316L and F51 duplex stainless steel or equivalent, synthetic sapphire, EPDM, GLFPTFE & PEEK 450G.

## Optional Extras

### Cart

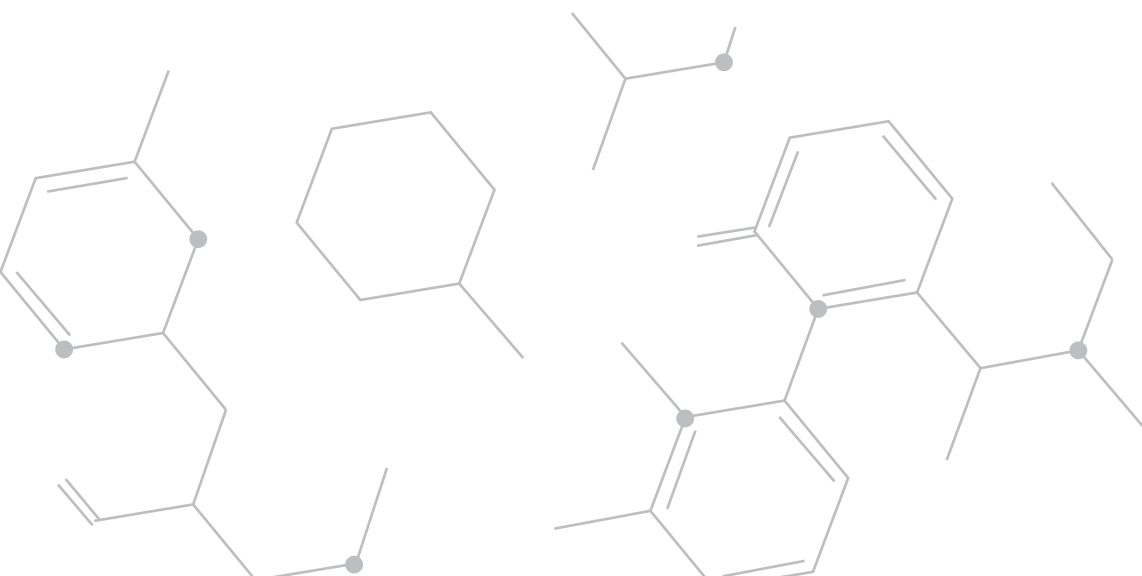
Placing your machine on a cart ensures that it is safely supported at an ideal working height at all times. The cart is fitted with four castors (two lockable) which enables you to safely move the One Shot around your lab with ease. This is an essential tool for those who find bench space a premium and/or those who share equipment between labs and user groups. Highly recommended.

### Collection Cups

Having additional collection cups enables you to run several individual samples before cleaning and re-using them. Ideal for those who wish to run multiple samples and keep the processed sample contained in the collection cup. Additionally, user groups can have their own collection cups.

### Alternative Pressure Head

These models can be supplied with maximum working pressures of 40kpsi, 30KPSI, 20KPSI and 15KPSI. The One Shot & Multi Shot has been designed so that you can have more than one maximum pressure head enabling you to easily change the pressure heads so that you can adapt these models to give you the most efficient process when processing more than one sample type. Therefore, users that process many different sample types find this option reduces the number of sample runs needed as the process volume increases with lower pressure heads.



# TS Series Continuous Flow Models

Our Continuous Flow models offer full automation of sample processing. Offered in four power ratings, this range of Cell Disrupters ideally covers sample volumes from 20mls up to 100 litres plus and are versatile enough to adapt as your needs change.



## TS Series 0.75kW

- Will process 40-115mls per minute (dependent on pressure), Ideal for samples between 20mls to 200mls.

## TS Series 1.1kW

- Will process 100-255mls per minute (dependent on pressure), Ideal for samples between 200mls to 5 ltr.

## TS Series 2.2kW

- Will process 190-310mls per minute (dependent on pressure), Ideal for samples of 5 ltr plus.

## TS Series 4kW

- Will process between 405-565mls per minute (dependent on pressure), Ideal for samples of 10 ltr plus.

## TS Series Models - Specification

- Quick and easy to use.
- No need for compressed air or connection to gas bottles, just plug in and switch on.
- No problem with having air in the disruption path, our continuous flow systems are unaffected therefore no need to prime before use unlike other systems.
- Touch screen control, simple operation means that you can be processing your sample in under one minute.
- Disruption pressure displayed and is easily and accurately set between 1KPSI through to 40KPSI as standard.
- The precise hydraulic control ensures that the pressure is consistent and stable during disruption cycle.
- Our unique cooling jacket surrounds the disruption head; simply fit your cooling medium to the disruption head to ensure that your sample is kept cool throughout the process.
- Automatic shut down when your sample has been fully processed, giving you the opportunity to carry on with other tasks.
- The unique disruption head design ensures that consistency is maintained process after process giving you confidence in repeatability.
- Secondary containment parts offer total safety during the disruption process.
- Full Bio-containment options are available for sample inlet and sample outlet.
- IQ and OQ available on request.
- Cleaning is simple and easy using forward flow method and internal relief valve is fitted so reverse flow cleaning can be achieved too. Alternatively the disruption head can be easily dismantled for manual cleaning and/or autoclaving if needed.
- Disrupter head mounted on stainless steel tray to capture accidental spillages and spills.
- Materials in product path, 316L and F51 duplex stainless steel or equivalent, synthetic sapphire, EPDM, GLFPTFE & PEEK 450G and WC.



# TS Series Continuous Flow Models

## Some Optional Extras

### **Cart - Offered on all 0.75kw and 1.1kw models**

Placing your Cell Disrupter on a cart ensures that it is safely supported at an ideal working height at all times. The cell disrupter is fitted with four castors (two lockable) which enables you to safely move the TS Series around your lab with ease. This is an essential tool for those who find bench space a premium and/or those who share equipment between labs and user groups. Highly recommended.

### **Auto Fill system (Process Pump) - Offered for use on 1.1kw, 2.2kw and 4kw power rated models**

The Auto Fill system can be provided for 1.1kw, 2.2kw and 4kw power rated models. This system enables you to process larger volumes of sample in one process without having to stand by the cell disrupter to add more of your sample. The cell disrupter controls a peristaltic pump that will continue to pump your sample into the cell disrupter inlet each time the inlet becomes empty. Once your sample has been processed, the cell disrupter will recognise that there is no sample left and automatically stop. This option can be beneficial for sample volumes over 200mls right through to 100 litres plus.

### **Alternative Pressure Head - Offered for use on all Continuous Flow models**

Alternative Pressure Heads are offered on all Continuous Flow models and can be used to fully utilise the flexibility of our systems. When working at lower pressures, an alternative pressure head will increase the flow rate of your process and enable you to process your sample more quickly. Alternative Pressure Heads are designed so that users can easily change them to suit their requirements and users that have different sample types find that using a lower pressure head can reduce cycle times. Pressure heads are offered at 40KPSI, 30KPSI, 20KPSI and 15KPSI maximum working pressures.



## One Shot Head Adaptor

Available for use on the TS Series, B Series & HAIVA models.

This option allows you to process multiple small volume samples quickly and efficiently on a continuous flow system, this enables you to change your continuous flow machine to a One Shot system and back again with ease. Volumes as low as 1mls can be processed this way and the One Shot Head incorporates all the benefits of a One Shot system in that you can process solid, frozen, re-suspended samples and even cell paste. The One Shot Head offers total versatility to users. This option is utilised most by user groups that have small and large volume samples.

# Variant Continuous Flow Models

## Variations and Options for the TS Continuous Flow Range

### HAIVA Variant (High Area Inlet Valve Arrangement)

The HAIVA variation allows you to process thicker and more viscous samples; our design includes an inlet area that is five times larger than the standard. This is advantageous for sample types such as filamentous fungi and other samples that have hard viscous particles in suspension. All other attributes are as per the standard TS Series.

**HAIVA are offered in the following power ratings 0.75kW, 1.1kW and 2.2kW**

**Not sure if the HAIVA variant is what you need?** If in doubt, speak with one of our team who will go through your details and advise you on how to proceed.

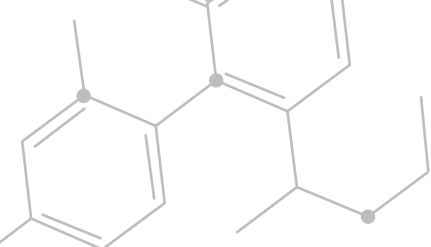
### B & C Series Variant

**B Series** – The B Series variation has all the attributes of the TS Series with the added ability to connect to CIP and SIP units. The “B Series” allows the CIP and SIP to be manually operated.

**C Series** – The C Series variation has all the attributes of the TS Series with the added ability to connect to CIP and SIP units. This model is supplied with all ports and Tri-clamp connections ready to be connected to your independent cleaning unit. The “C Series” allows the CIP and SIP to be automatically operated.

*“Both models are offered in all power ratings”*





## Your Application and Cell Success

Constant Cell Disrupter Systems are extremely versatile and have been used for the following range of applications:

### Cell Disruption, Protein & DNA Extraction, Enzyme Release, DNA Manipulation, Selective Breakage, Single Cell Isolation, Tissue Disruption

Individual organisms and samples processed by Constant Cell Disrupter Systems are too numerous to mention them all, however the following lists examples:

Algae	Disruption of <i>Ascophyllum nodosum</i>
Animal Cells	Selective breakage of chicken sperm
Bacteria	Good enzyme activity from recombinant <i>E. coli</i> . High protein recovery from. High protein recovery from <i>Mycobacterium smegmatis</i>
Fungi	High specific activity of enzyme from <i>Aspergillus nidulans</i>
Yeasts	99% protein release from <i>Saccharomyces cerevisiae</i> 99% Recombinant protein release from <i>Pichia pastoris</i>
Mammalian Cells and tissue	Disruption of cellular and intracellular plasma membranes from horse liver Isolation of viable single cells from calf spleen and lymph node
Viruses	Breakage of <i>Cytomegalovirus</i> in nucleus of human cells
Plant Cells & Tissue	Pectin extraction from banana fruit. Strawberry leaf DNA extraction
Parasites	Isolation of membrane antigens from <i>Toxoplasma gondii</i> . Separation of nucleus and membrane in amniotic cells
Environmental Samples	Extraction of DNA from soil bacteria

## E. coli Disruption & Guidance List

Constant Systems Cell Disrupters experience with *E. coli* is vast and breakage depends on the cell culture conditions, length of growth cycle and pressure utilised. We state the following as a guide to users for pressure compared to breakage with *E. coli*:

### Release of DNA -

Below 15,000 psi (1000 Bar)

### Cytoplasmic Protein -

15,000 psi - 20,000 psi (1350 Bar)

### Inclusion Bodies -

20,000 psi - 27,000 psi (1900 Bar)

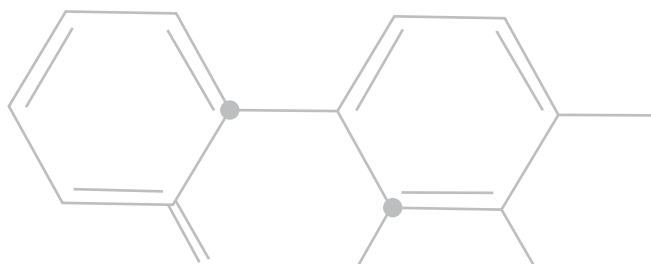
### Membrane Protein -

27,000 psi - 35,000 psi (2400 Bar)

## Other Species

Please find below a list of some common species of yeast with pressure vs. breakage:

• <i>Candida cloacae</i>	- 40 KPSI
• <i>Candida albicans</i>	- 25 - 40 KPSI
• <i>Candida utilis</i>	- 15 - 40 KPSI
• <i>Hansenula polymorpha</i>	- 25 - 40 KPSI
• <i>Pichia augusta</i>	- 40 KPSI
• <i>Pichia capsulatus</i>	- 40 KPSI
• <i>Pichia picorna</i>	- 25 - 35 KPSI
• <i>Pichia pastoris</i>	- 35 - 40 KPSI
• <i>Kluyveromyces fragilis</i>	- 05 - 40 KPSI
• <i>Rhodotorula glutinis</i>	- 40 KPSI
• <i>Schizosaccharomyces pombe</i>	- 15 - 40 KPSI
• <i>Saccharomyces cerevisiae</i>	- 27 - 35 KPSI



# After Market Support



Here at Constant Systems we are very committed to our product and customers. Our priority is to ensure you are satisfied with your purchase, therefore we provide 12 months warranty on our machines from Installation. This covers you for all parts and call out visits. In the unlikely event that you should experience an issue, a technician will be on hand to assist with your needs.

It is important to Constant Systems that you are completely satisfied with your machine, by having regular service maintenance visits you will be contributing towards the lifetime of your system. Speak to your local representative today to see what they can offer.



*"Our TS 0.75kW model is reliable, robust, easy to use and clean. Results are reproducible. Customer service is excellent. Problems are solved professionally and in due time. Students, technical personnel and PI's are happy with the purchase of this instrument and appreciate the investment every day. What more can you ask for in a scientific setting."*

**University of Saskatchewan Department of Biochemistry**



## Delivery, Training and Installation



**For every machine that is purchased, we will ensure that it is installed by a Constant Systems qualified technician. Either ourselves or our working partners will contact you to arrange a suitable installation date.**

**Q:** Will I need to contact you to arrange my installation?

**A:** No, we will monitor when your machine is due to arrive, we will then contact you to set the date.

**Q:** Will I need to prepare anything for the installation?

**A:** On the day of the installation, our technician will unpack your machine & install it in your designated area. All we require is users for training and a power socket for the equipment to be plugged into (hardwiring required on certain models)

**Q:** How will I know how to operate the machine?

**A:** Once our technicians have installed the machine, they will invite you and your colleagues to carry out user training on the machine. Once group training has been given, our technician will provide further intensive training to the main users.

**Q:** What happens if I forget part of the training?

**A:** Our technician will ensure that enough training is given to ensure you are comfortable using the machine. Following the installation, you will receive a certificate to certify that you have been given adequate training. However should you need further advice following the installation, our technicians are always happy to speak with you. We will also offer refresher training on future visits.

**Q:** If I need any advice in the future, will I be able to contact you direct?

**A:** Yes, although our technicians are travelling regularly you will always be able to discuss any issues you feel necessary with them. If we are unable to connect you via phone, we would offer a call back or direct email assistance.



*"We have the Constant Systems One Shot machine and in our opinion there is nothing to equal it on the market for cell disruption. We use it to break E. coli cells for recombinant protein production and it gives us quick, reproducible disruption. Everything from the initial machine demonstration through to ordering and delivery was easy and efficient (our machine was delivered ahead of schedule). We couldn't fault their customer service, they even made us a custom part to improve our process! We cannot recommend it highly enough." Dr Lisa Capron - Touchlight Genetics Ltd*



# Machine Dimensions

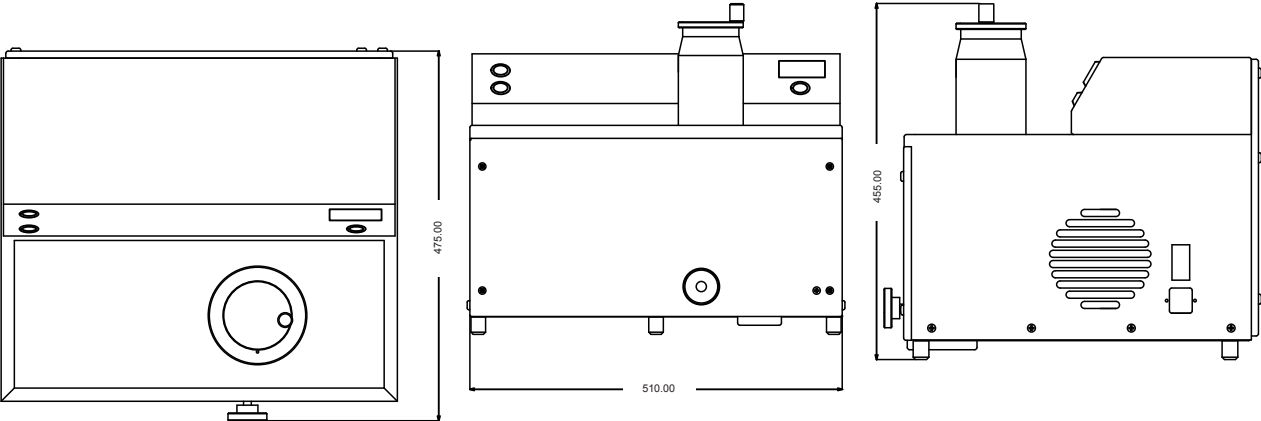
## Small Scale Models

### One Shot 0.75kW

**Footprint:** 475mm x 510mm x 455mm (DxWxH)

**Weight:** 90kgs

**Power:** Standard single-phase electricity

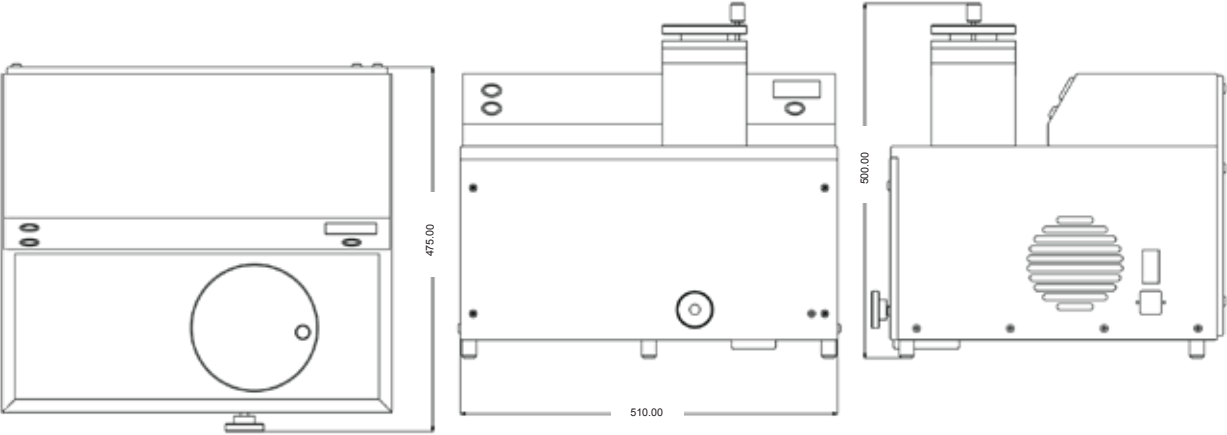


### Multi Shot 0.75kW

**Footprint:** 475mm x 510mm x 500mm (DxWxH)

**Weight:** 110kgs

**Power:** Standard single-phase electricity



## Machine Specifications

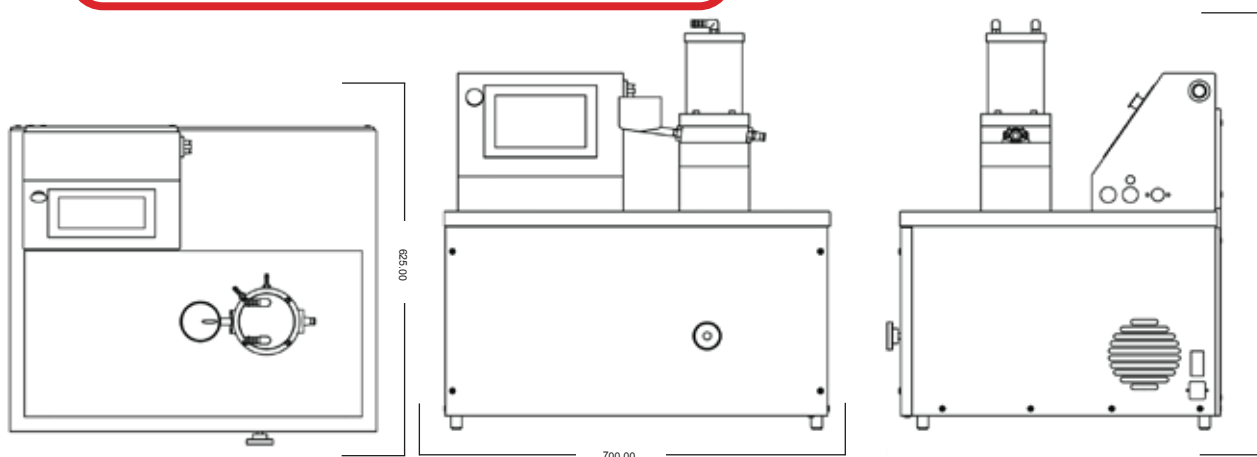
### Continuous Flow Models

#### TS Series 0.75kW and 1.1kW models (Benchtop)

**Footprint:** 625mm x 700mm x 740mm (DxWxH)

**Weight:** 110 – 130 kgs dependent on specification

**Power:** Single-phase electricity supply required. (3 phase supply in some countries)

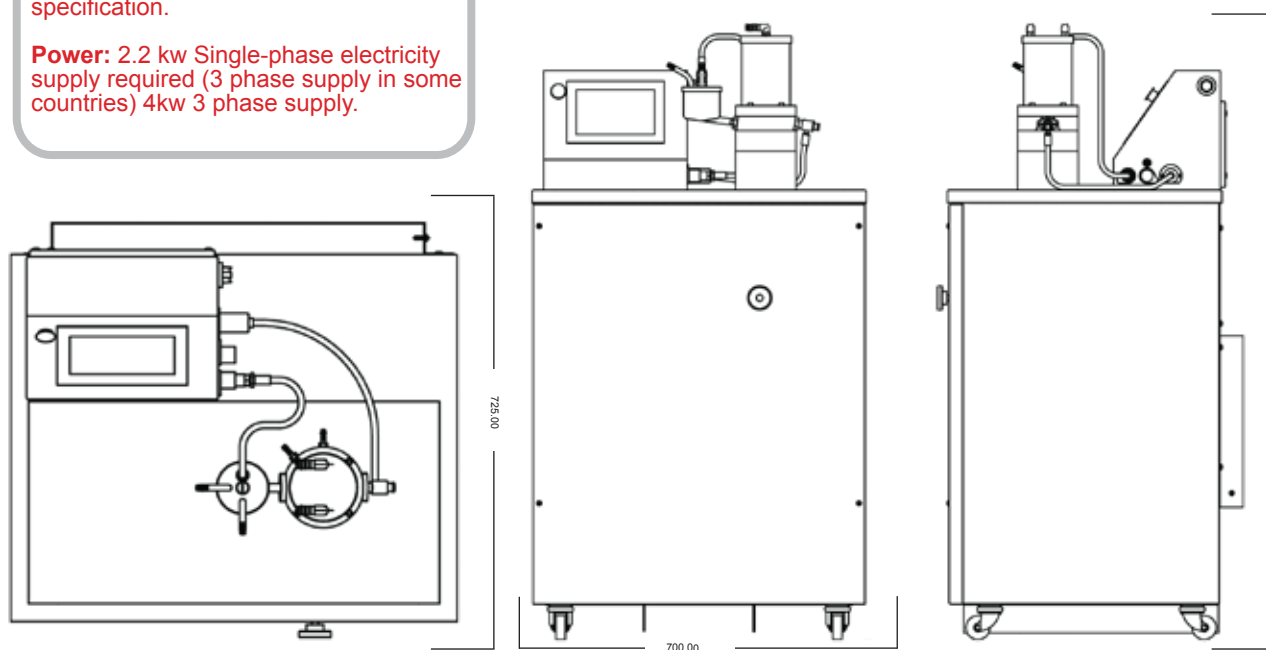


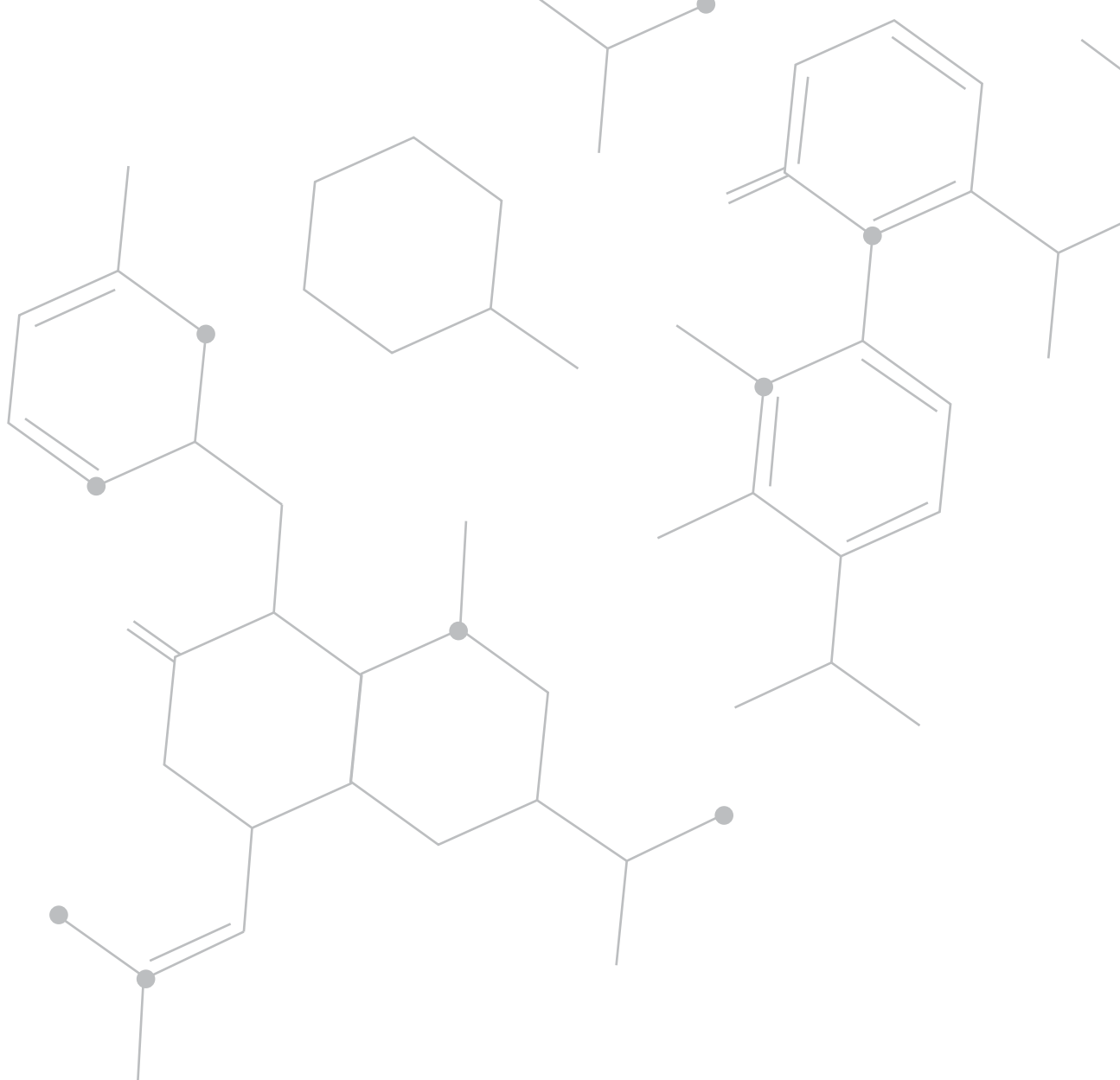
#### TS Series 2.2kW and 4kW models (Cabinet)

**Footprint:** 725mm x 700mm x 1320mm (DxWxH).

**Weight:** 220 – 240 kgs dependent on specification.

**Power:** 2.2 kw Single-phase electricity supply required (3 phase supply in some countries) 4kw 3 phase supply.





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