



# **Guide to Selling Autoclaves**

## WHAT IS STERILIZATION?

### The Sterilization Process

*Sterilization* has been defined as the complete destruction of all microorganisms, including the most resistant bacterial spores. The term *Sterilization* is distinct from *Disinfection*, which refers to the killing of most harmful microorganisms without achieving sterility.

An Autoclave or Steam Sterilizer is a vessel in which steam is held under pressure for the purposes of *Sterilization*. Saturated steam condenses immediately upon meeting a cooler object; this rapidly releases its considerable latent heat of vaporisation. This condensation also leads to a partial vacuum, which draws further steam into the area.

An effective Autoclave or Sterilizer must contain saturated steam. In order to achieve this all air must be removed from the vessel, and from the load to be sterilized. Air removal can be achieved in a number of ways. The most effective method of air removal is by a *vacuum* pump, a vacuum being pulled before the introduction of steam. An alternative and more economic method is automatic air-purging, whereby air is allowed to leave the chamber by means of a vent as the steam enters the vessel. Air passes freely through the vent valve, the valve only closing in the presence of pure steam. This method can be further advanced by means of *freesteaming* which may or may not involve pulsing. Timed freesteaming and pulsed freesteaming are facilities available on a number of Astell models.

Once the air is fully removed from the load the temperature in the vessel will rise along with the pressure until the pre-selected temperature is achieved, at which point this temperature will be held for the selected time. Once this is achieved, then the steam supply ceases, and the temperature and pressure gradually drop. In vacuum units the steam can be removed by means of the vacuum pump; on other models steam can be removed by the opening of the exhaust valve, or the unit can be allowed to cool more slowly. The chosen type and timing of cooling will depend very much on the load being sterilized. Cooling can be further enhanced by air or water-cooling systems.

Once the autoclave has finished its sterilization cycle, some loads will need to be dried to remove residual moisture. This can be achieved by means of the vacuum system or by heating, depending on the type of machine and load requirements.

In any autoclave or Sterilizer, the correlation between temperature and pressure are critical. Some simple autoclaves control only on pressure and not on temperature; such control systems are liable to inaccuracies in the event of air being trapped in the load.

## **Autoclave or Sterilizer?**

The terms Autoclave or (Steam) Sterilizer are interchangeable and mean the same thing. 'Autoclave' is used mainly in laboratories, whilst 'Sterilizer' is more commonly used for Medical and Pharmaceutical applications. Astell attempts to keep this differentiation as far as possible.

## **TYPES OF ORGANISM**

The types of micro-organisms involved in sterilization fall into three main categories:

- a) Vegetative Organisms (including bacteria, fungi and algae).
- b) Viruses
- c) Bacterial Spores

Bacterial spores tend to be the most persistent and can survive long periods of adverse conditions.

## **USES OF AUTOCLAVES**

### **Media Preparation**

This is one of the largest categories of use in laboratory situations. Please remember that Laboratories cover a variety of market sectors and can of course include medical and pharmaceutical laboratories.

Media is used to grow micro-organisms under test conditions and a wide variety of gel and liquid media is used. Details (ie. sterilization requirements) for these growth media can be obtained from the manufacturers; among the largest manufacturers are Oxoid (UK) and Difco (USA).

Removal of air from media loads is normally straightforward; however media often benefit from a short timed freesteaming period to help 'dissolve' the media powder.

Different media can withstand different sterilization temperatures, therefore any autoclave used for the sterilization of media must be capable of control at a variety of temperatures. Astell autoclaves and sterilizers are controllable at between 100°C and 138°C, this being one of the widest control ranges available. Some manufacturers (e.g. Japanese) limit the temperatures that may be selected. Some manufacturers also limit the time periods for which sterilization may be set; all Astell models allow operator selection from 1 – 254 minutes (N.B. Special software is available which allows this period to be increased).

Speed of processing is important in the sterilization of media. A quick heat up and cool down is beneficial in the maintenance of the quality of the finished product. The cool down period, however, needs to be a controlled process in order to prevent boil over and loss of media.

Media is generally sterilized in unsealed containers. There are a variety of containers which are suitable, one of the most popular types being the Duran (or Pyrex) glass bottles, often referred to as 'media bottles'. These are available in several sizes, the 500ml and 1000ml being the most popular. The Astell 40 litre unit is notable as having one of the largest bottle capacities for a unit of this size, being able to accommodate 11 one litre Duran bottles.

## **Sterilization of fluids in Sealed Containers**

A number of fluids are required to be sterilized in special sealed containers. Again air removal does not present a problem, and as solutions rarely require to be dissolved, freesteaming is not usually required. Frequently rapid high temperature cycles above 121°C are utilised to sterilize such fluids; rapid cool down is also desirable.

The utilisation of spray heating and cooling is particularly useful for the sterilization of such loads.

## **Instruments**

The sterilization of instruments falls into two main categories:

- a) Unwrapped instruments
- b) Wrapped Instruments

Both types of instruments benefit from drying at the end of the cycle. Unwrapped instruments are readily dried by heating the surrounding air at the end of the cycle, whilst wrapped instruments require a more sophisticated drying system, and benefit from the addition of Vacuum Drying.

## **Fabrics and Textiles**

A variety of fabrics and textiles can be sterilized in an autoclave/sterilizer. As these are true 'porous loads', they require pre and post vacuum. The pre-vacuum is required to remove air from the fabric and the post vacuum to remove moisture. With this type of load, drying will be enhanced by the addition of a 'jacket' on the outside of the pressure vessel; steam can be injected into the jacket at the beginning of the cycle, the resultant heat preventing excessive condensation within the vessel. Further details can be obtained from Astell's Sales department.

## **Make-Safe Processing ('Discard' or Destruct' loads)**

There is an ever-increasing need for the safe sterilization of contaminated material before disposal. The contaminated material can be of many types and in many forms. For example, all microbiological laboratory waste must be processed prior to disposal, as must all clinical samples e.g. blood, tissue etc. Loads consisting of such a variety of materials in a broad range of containers present specific sterilization problems.

One of the main problems with such mixed discard loads is that they invariably contain small pockets of trapped air, which present particular removal problems before steam penetration. Such loads are often contained in special plastic bags and comprise a variety of plastic containers; these are liable to melt and collapse before sterilization, thus increasing the likelihood of trapped air.

The ideal method of air removal is to subject the load to a powerful pulsed vacuum before sterilization. A pre-vacuum feature is now a commonly requested option for autoclaves running frequent discard cycles. However, an alternative to vacuum is a long period freesteaming, or pulsed freesteaming.

Some high risk (e.g. 'Category 3') discard loads may require the autoclave to have special filters to prevent air-borne or water-borne contamination. Such loads may also benefit from a heated jacket, since this provides the best possible heat distribution within the vessel.

In addition to the typical loads detailed above, there is an extensive range of other items that often require sterilization. Examples include:

**Glassware and vessels, pipette tips, fermentation vessels for fermentation systems, animal cages, contact lenses, specialised instruments etc.** Some of these require specific sterilization regimes or special vessel dimensions. Astell is able to quote for such specialised requirements.

### **SOME BASICS**

## **Steam Sources**

**Steam can be produced from three sources:**

### **Direct Steam**

Steam supplied from a central boiler (generator). Often found in hospitals, universities and pharmaceutical facilities, rarely elsewhere. Its main advantage is speed and economy. The steam is immediately available and therefore the autoclave heats up very quickly. All Astell units of 90 litres and above are available as direct steam units if required.

### **Steam Generated within the Chamber**

This is the method used by Astell on the standard electrically heated range. Elements situated at the base of the chamber heat the water until it boils and produces steam. (Normal tap water is generally acceptable). In basic units, the water is topped up manually by pouring water into the vessel. Autofill, which connects to the mains supply, and tops up the water in the vessel automatically, is available as an inexpensive option on units of 90L or larger. (Important Note: Astell's latest 'Autofill' 23, 40 & 60L models all have an integral water bottle. Once filled, the user will be able to run 10 – 15 cycles before having to top-up. These units therefore effectively have autofill as standard).

### **Steam Generated within a Separate Pressure Vessel**

This type of steam generation provides quicker heat-up time, and is also the preferred method for vacuum autoclaves. It is available on many of Astell's larger models.

## **SAFETY**

Autoclaves are regularly subjected to high pressures and are therefore always potential safety hazards. This is of course taken into account in the design and manufacture of Astell pressure vessels, and all associated fittings, including valves, pipework, closures and interlock mechanisms.

Pressure vessels are constructed to conform with National and International regulations. Please note: Regulations vary from country to country, and are sometimes updated, To date there is no internationally recognised standard. Astell attempts to keep up to date with varying National regulations, but we rely on local agents to specify any particular National requirements.

Astell autoclave pressure vessels are manufactured in full accordance with the European Pressure Equipment Directive PED EN/97/23/EC and to BS5500 or ASME codes of manufacture. Both of these are internationally recognised, although particular countries may stipulate further special requirements, which sometimes involve third party inspection (e.g. by Lloyds Register) during manufacture, or the fitting of special components such as extra safety valves etc. Please talk to our Sales Office regarding any special requirements you may have. We would also strongly advise that you clarify your country's requirements with your local regulatory body, or speak to your local Standards office (found in many countries). Agents around the world have found them extremely helpful; if you require details of your local office please contact us.

### **Main Safety Features**

In addition to pressure vessel construction details, Astell attaches great importance to all aspects of customer safety with systems that meet and often exceed national and international requirements

## **Important safety features of Astell Autoclaves and Sterilizers include:**

- They cannot be operated with the door open or unlocked.
- They cannot be opened whilst any steam under pressure remains in the chamber.
- Units are provided with two adjustable cooling locks to comply with HSE PM73 (and other equivalent national standards). These are present to ensure that the chamber cannot be opened at the end of a cycle before temperatures fall to 80°C. This feature is necessary where bottled fluids (e.g. media) are being sterilized, since opening the chamber before this can result in a) the 'boiling-over' of liquids and/or the hazardous breaking of glass bottles due to thermal shock. Cooling locks are now required in most countries.
- All surfaces of the machine, including the door, are kept at safe temperatures that exceed the British requirement ESCHLE (specified in BS2646), and IEC61010.

## **STRATEGIES FOR SELLING ASTELL AUTOCLAVES**

As an Astell approved agent/distributor, we are sure you are interested in exploring as many ways of selling Astell units as possible. We offer the following notes as an aid. We appreciate that many of you will be familiar with the contents of these selling notes, but perhaps there are a few points that you have not considered.

*We appreciate that we live in an ever-competitive world, and that this means that price is often the overriding factor. For this reason Astell, where feasible, regularly compares its prices with the competition, and makes adjustments where it is thought to be necessary.*

However, "PRICE IS NOT EVERYTHING", and Astell is concerned with offering *value for money*. The autoclave they buy will be with them for a long time (There are many Astell autoclaves more than 20 years' old, still functioning well in laboratories throughout the world).

The autoclave/sterilizer will be used several times each day. It may well operate for well over 10,000 cycles in a 10-year life. Therefore it is essential that the customer is making the right decision at the outset, and not simply basing their choice on a very small price advantage. The following is to assist you in helping the customer choose wisely.

*A purchasing mistake will be with them for a long time! It is our job to convince them that buying Astell will be the right choice.*

## Reasons for buying an autoclave:

- **Replacement Users**
- **New Users**
- **Expanding Users**

The **Replacement** market is driven by a number of factors, among them being:

- ✓ **Breakdown**
- ✓ **Cost of maintenance**
- ✓ **Unit no longer complying with regulatory environment e.g. ISO9000, GLP (Good Laboratory Practice), UKAS, Health & Safety Standards etc.**
- ✓ **Capacity**
- ✓ **Planned Replacement**
- ✓ **New Usage requirements**

**New user's** will be determined by:

- ✓ **New company set-up**
- ✓ **New plant, or the expansion of existing facilities**
- ✓ **New research projects**

The **expanding** market will be influenced by:

- ✓ **New procedures**
- ✓ **Bringing testing 'in-house', rather than sub-contracting (Often a feature in new markets where microbiological testing is sub-contracted until the viability of the initial plant is proved)**
- ✓ **Lack of capacity in existing units**

It is important when considering a customer requirement to understand which category the customer is in, as this will often dictate the customer needs.

For example, the customer may be replacing a tried and tested competitor's product. Then your job of selling an Astell unit is going to be more difficult than if the customer is replacing an existing Astell unit, or a competitor's product that has proved unreliable.

It is important in any situation to define the customer's needs, and then set about demonstrating how the Astell autoclave meets these needs. For example, if the customer is regularly sterilizing bottle fluids, then the discussion of the temperature ('cooling') locks will be of considerable importance. If, however, the customer is using the machine mainly for discard (or 'destruct') loads, then the cooling locks are likely to be of less interest to them than the effectiveness of the air-removal system (i.e. freesteaming or vacuum) at the start of the sterilization cycle.

*Get to know the customer; get to know their needs, and sell according to these.*

These notes are designed to help you do this, but please remember that our Sales & Marketing Office is available for advice at any time. We have come across most autoclave uses in our time, and are very happy to share our experiences.

Please note: Astell has units in many prestigious companies, establishments and organisations. Therefore we are always happy to provide details of reference sites relevant to your customer's proposed uses. If your customer is a subsidiary of a multinational organisation, it is likely that we have a unit in one of their plants somewhere. We will be happy to check.

## **Market Sectors:**

The market for autoclaves is extremely varied.

The following list will enable you to target the market. N.B. This list is not in order of priority as priorities will vary from area to area.

**Food Industry**, including Dairy, Beverages, Brewing, Food Canning, Food Freezing, Confectionery, Fast Food Producers, Bakeries, Meat and Fish Processors, Speciality Food Producers, Airline Caterers.

**Pharmaceuticals**

**Universities & Colleges**

**Agriculture & Horticulture Research**

**Healthcare (including Pathology)**

**Industrial Research**

**Water & Environmental**

**Biotechnology Industries**

An autoclave/sterilizer is used wherever Microbiological Testing or Research is undertaken.

## **PRESSURE VESSEL CONSTRUCTION AND TYPES**

All Astell pressure vessels are constructed from 316L Stainless Steel. Some manufacturers use other grades of stainless steel (e.g. 304) that have less corrosion resistance. If a competitor does not mention which steel they use, it may be safe to infer that they use a lower grade material.

Vessels are available either in circular or square section.

Smaller circular section vessels often provide equal usable space than similar sized square section vessels. In larger sizes Square section vessels often provide greater usable space than circular, but this must be offset by their higher price, which reflects higher construction costs. Square vessels are often more popular where square containers are used for sterilization, typically in Medical and Pharmaceutical facilities.

Square section vessels are available with partial (i.e. 'sectional'), or full 'jackets' These are external constructions around the vessel, which may have either steam or water passed through them, in order to improve drying and cooling performance.

Astell are now able to offer circular section vacuum units with full heated (or cooled) jackets.

**There are two orientations of autoclaves:**



**Front Loading (horizontal)**



**Top-loading (vertical)**

There is no specific reason for choosing either orientation. The decision will be made for one or more of the following reasons:

- Customer preference
- Space considerations
- Materials being sterilized

### **Double-Door Autoclaves/Sterilizers**

Larger horizontal units are sometimes required with two doors, one at either end. These are often used in situations where the units are fitted through a wall between 'dirty' (i.e. non-sterile) and 'clean' (i.e. sterile) areas. e.g. Discard Load units, Animal Cages etc



Such units are designed so that only one door can be opened at a time, ensuring the maintenance of the clean/dirty area separation. Astell is able to supply such units from its standard range or as specials for specific requirements.

## **AUTOCLAVE SIZES**

Astell, in common with other manufacturers, gives the product volume in litres. This is unfortunately an area of great confusion, and can be misleading to the customer. As far as Astell is concerned, the volume quoted is the total volume. Many manufacturers give nominal capacities only, so please check that a 'like for like' comparison is being made when looking at competitive models.

The customer needs to know what they can get in the machine, not how much air or steam it will hold. For example, the Astell 40 litre unit (AMB230 or AMB430) will hold 11 x 1 litre Duran/Pyrex bottles, which is larger 'true' capacity than the equivalent units of many competitors.

Therefore, when comparing one machine with another, it is important that you compare what you can actually fit into the autoclave, and how far this capacity meets the customer's actual needs.

Astell literature contains details of internal dimensions. Please check these and compare them with the competition and the customer's needs. Our technical department is able to calculate the usable volume for a variety of bottles and containers; please contact the Sales Department for specific information.

## **DON'T BE CAUGHT OUT!**

Please ensure that you have checked the following:

### **Electrical Supply**

Full details of standard electrical configurations are given in the literature. We can supply for alternative power requirements; please check with our sales department.

### **Will it Fit?**

Some autoclaves are very large and heavy. Please ensure that the unit required will fit in the area designated. Also, ensure that it will fit through doorways, into lifts etc., when it is being installed.

Larger autoclaves can often be supplied in a 'stripped down' form to allow for ease of access. Please ask our sales department for assistance in this area.

### **Door Swing**

On Astell's latest top-loading models, the lid opens upwards on hinges. The units will therefore easily fit into most locations, providing the width and depth of the space available is sufficient.

On front-loading units, an allowance should always be made for the door swing. I.e. you should be certain that the door can be opened fully without obstruction. Standard units have their hinges on the left of the door; however, on all units from 100 litres upwards, units can be manufactured specially with hinges on the right. This requirement needs to be specified at the time of ordering.

On square section Astell autoclaves either a pneumatically controlled sliding door, or a manual sliding door is fitted, which reduces the amount of space occupied by the open unit. This is a good selling point against similar units with hinged doors.

### **Services**

The 23, 40 and 60 litre units simply require a 13-amp power socket.

**Autofill units** have an integral reservoir bottle, which, once filled, will automatically provide sufficient water to enable 10 to 15 cycles to be run. I.e. It effectively has an autofill system. The bottle also acts as a condensate collection bottle, and at the end of the cycle any residual water in the chamber is returned to the bottle. i.e. The system is self contained.

**Classic units** have to be filled manually and have a flexible condensate outlet tube which can be positioned in a drain or waste bottle.

Larger circular section units will require a suitable electrical supply\*, a drain, and (where *autofill* is fitted) a water supply. Please check details on the sales literature, or contact us if in doubt. We normally specify that the customer provides these within two metres of the autoclave. All service/installation information should be checked carefully in order to avoid additional fitting costs. \*Check brochure for details.

All square section units will additionally require a supply of compressed air. If this is not available on site, then a suitable air compressor can be supplied with the unit (Please see literature for details).

## **CONTROL SYSTEM – 'Secure'**

All circular section Astell autoclaves/sterilizers feature the 'Secure' Microprocessor controller.

This offers a wide range of operator-selectable parameters as detailed below.

### **Timed Freesteaming**

This feature allows the operator to select via the programmer a freesteaming period to meet their specific requirements. This can be particularly beneficial for example, when autoclaving mixed discard loads in non-vacuum units.

### **Cooling lock enable/disable**

The requirement for a cooling lock is now mandatory in Europe and many other countries. This feature prevents excessive boiling over of fluids, and the explosion of glass bottles that can result from the opening of the chamber too early.

On Astell units there are two cooling locks: one is manual, and the other is controlled via the microprocessor.

The cooling lock prevents the autoclave being opened whilst the contents are above the temperature set on the cooling locks N.B. These are factory set at 80°C.

Cooling locks can be re-set and/or disabled by the customer. (Please note that Astell cannot accept any liability for any injury or damaged caused by operator-adjustment of cooling locks).

### **Sterilization Time**

The Sterilization can be set for any time between 1 and 254 minutes\*. This is unlike some competitors' products where the time can only be set for pre-determined intervals e.g. 3, 5, 10 minutes etc.

*\*Please note that Astell is able to supply modified software to enable the user to set longer cycle times than 254 minutes. Please contact the sales office for details.*

### **Sterilization Temperature**

The sterilization temperature can be set at any temperature between 100°C and 138°C, at 1°C intervals. Again, this is unlike some competitors products where the temperature can only be set at pre-selected temperatures.

### **Holdwarm (not available on 23, 40 and 60L units)**

Holdwarm is a feature whereby the autoclave can be set via the controller to hold the chamber temperature after sterilization at approximately 55°C. This is particularly useful when sterilizing media, as the unit can be set to sterilize overnight, and the media held at a suitable pouring temperature for use the next morning. This effectively increases throughput by an extra cycle each day.

### **Delayed Start**

This allows the operator to set the autoclave to start at some time in the future (up to 18 hours). The unit can thus, for example, commence a cycle before the working day commences; so that the first cycle is completed when work starts. This offers similar time-saving advantages to holdwarm, but is more acceptable to some users who are using types media that

becomes readily 'denatured' if held above room temperature for long periods.

(There are several other optional parameters that can be selected via the Secure programmer. These include: **Load Sensed Process Timing, Pulsed Freesteam, Assisted Air Cooling, Advanced Water Cooling, Deluge Cooling, Air Ballast, Pulsed Pre-Vacuum & Vacuum Drying, Data Printer.** Further details of these are given in OPTIONS).

The Secure programmer does not simply offer a pre-selected series of sterilization procedures like some manufacturers. All parameters listed above are variable, leaving the laboratory manager/supervisor to select the specific operation criteria. This is an important sales point when comparing with many other units.

In the case of all units from 90 litres upwards, all parameters may only be altered by the authorised person by use of a PIN code. This protection system ensures that the supervisor is in total control of all sterilization procedures, whether physically controlling the machine at the time or not.

In the case of 23, 40, & 60L units, the time and temperature can be manually adjusted by the user, but all other parameters require the PIN code.

The standard controls supplied on Astell autoclaves are as follows:

- Single Program (fully flexible), supplied on all non-vacuum Swiftlock (i.e. circular section) autoclaves from 90 litres upwards.
- Four Program (fully flexible), supplied on all autoclaves with vacuum option (both circular and square section).
- Four Program (pre-set/flexible), supplied on all 23, 40 and 60 litre Compact 'new' Swiftlock autoclaves. The programs are pre-set only in the sense that the basic cycle conditions (e.g. timing of exhaust, availability of drying) have been designed to suit four typical loads: Liquids, Instruments, Glassware, Discard. In all other respects, including the setting of time and temperature, the programming is fully flexible.

With all versions, once any program has been set, this program will continue to run in an identical way each time the cycle start button is pressed, until re-set by the user/supervisor (depending on the model). It is important to note that the Secure programmer has an inbuilt memory and will store programs for up to 10 years, even with the loss of power. This power failure feature is not offered by all manufacturers.

The addition of the 8 Program option (*not available on 23, 40 & 60L units*) offers greater flexibility to the customer. All programs are fully adjustable; parameters may be changed, as outlined above. The 8 Program controller is ideal where several sterilization procedures are being carried out on a regular basis.

On the units from 90 litres upwards, each cycle may be named by the user. The name will be clearly shown on the easy-to-read controller display, and, if fitted, on the optional integral data printer. The latter should

always be offered to the customer, since current quality regimes often demand a hard copy record of all cycles.

Once programmed, the operator simply loads the autoclave, closes the door, selects the program (in the case of 4 & 8 Program units), and presses the Start button.

With the 4 and 8 Program models a menu choice is included as standard, which enables the user, at the push of a button, to review all the programs that are set at any particular time. This menu can be printed via the integral data printer, if fitted.

In all cases programming is extremely simple. The membrane touch pad has a 'push and hold' feature. Thus, the required key on the panel is pushed and held until the appropriate response (both audible and visual) to simple questions is achieved. This system helps prevent accidental/unauthorised tampering. At each stage of programming, confirmation of the decision is requested, thus avoiding errors.

## **CONTROL SYSTEM – 'LogiColor' \*\* NEW \*\***



Astell's latest control system is available as standard on all square section units, and as an optional extra on vacuum versions of the circular section units:

The New LogiColor control system is an advance in sterilization control technology, bringing together years of unrivalled experience, to produce a user friendly, fully automatic control system, to meet and exceed the expectations of even the most demanding laboratories and centres of sterilization. The controller consists of a wipe clean colour touch screen measuring 188mm x 88mm and is based on an industrial PLC controller, combined with a number of analogue and digital input/output modules.

### **Controller Software**

The controller software is written in Automation Basic and has been developed by Astell for the precision control of autoclaves. The code is split into well-defined blocks, each of which performs a specific function and has been written in high level language to allow maximum clarity. The advantages of the 'LogiColor' Touch Screen Control System:

Full Colour Touch Screen ◆ Password Protected Security System ◆  
Multiple Access Levels ◆ Simple Cycle Selection ◆ RS232 Interface /  
Port ◆ Allowing connection to other peripheral devices such as a printer  
◆ Operator Interface ◆ Enables continual monitoring ◆ Individual  
analogue channels are displayed ◆ Temperature / Pressure

| <b>Controller Hardware</b> | <b>Summary of Controller features</b> |
|----------------------------|---------------------------------------|
| Display                    | 188mm x 88mm Colour QVGA touch screen |
| Input                      | Touch Screen                          |
| Program storage            | Flash Card                            |
| Real time clock            | Battery Backed                        |
| Memory                     | 64MB DRAM/256KB SRAM                  |
| Serial Interface           | RS232                                 |
| A/D / Pressure             | 12 bit                                |
| A/D / Temperature          | 16 bit                                |
| Digital inputs             | 32                                    |
| Digital outputs            | 32                                    |
| Analogue inputs            | 4                                     |

## **OPTIONS – For full details see appropriate literature**

The following range of options is available to allow the customer to specify their precise requirements (Note; Not all options are available on all models; please check literature for full details)

### **8 Program Controller**

Offers greater flexibility in situations where several different cycles are run on a regular basis.

### **Integral Data Printer**

Gives full printout of all cycle parameters. (Note independent dataloggers and chart recorders are also available – contact the sales office for details)

### **Load Sensed Process Timing**

This option comes complete with a 'wandering' armoured probe that can be inserted into the load (or load simulator). Sterilization can thus be controlled according to the temperature in the centre of the load, rather than via the chamber sensor. This is particularly recommended for bottled fluid (media) loads, where there are likely to be considerable differences between the temperature in the centre of the load, and that of the surrounding chamber.

### **Automatic Water Fill (Autofill)**

A system that allows the autoclave to fill automatically to the required level each cycle, thus avoiding the inconvenience of manually filling the chamber. This option requires a suitable water supply.

Note:

1. This option is not offered with the 23, 40, & 60L units; these have a reservoir bottle, which, once filled will run between 10 and 15 cycles before re-filling is necessary. i.e. they effectively have Autofill as standard
2. All vacuum units have Autofill as standard.

### **Pulsed Freesteaming (optional)**

Available on non-vacuum units from 90 litres and above, this is a more efficient type of freesteaming, where the cyclical opening/closing of the vent valve creates greater turbulence, and thus provides more effective air removal (N.B. Since this option results in large quantities of high temperature steam being produced, drain specification is important).

**Assisted Air Cooling** (available on non-vacuum units)

Cooling at the end of the cycle greatly reduces the cycle time. With this option, a powerful external fan is activated.

**Advanced Water Cooling** (available on non-vacuum units)

Features external cooling coils on the outside of the chamber, and provides even greater cooling efficiency. *Please note that Astell square section autoclaves are supplied as standard with a partial (sectional) jacket, which provides a very efficient water-cooling system.*

**Deluge Cooling**

A super quick internal spray cooling system for use in conjunction with sealed fluid loads. Can result in up to 50% reduction in cycle time.

**RS232 Interface**

Interface for connection to external computer.

**Vacuum**

Includes pre-vacuum, the most efficient method of air removal from problematic discard & fabric loads, and other loads with multiple air pockets including pipette tips, small items of glassware etc. The post-vacuum provides an efficient drying system, once again ideal for loads such as fabrics, glassware and wrapped instruments.

*Note: Vacuum is not currently available as an option on the 23, 40, & 60L units. These units do, however, have a simple 'pulsed heat' drying system which can be manually set at the end of the 'Instrument' and 'Glassware' cycles.*

**Full Jacket** (Available on Vacuum models)

Can be used to further improve cooling i.e. water is pumped into jacket at the end of the cycle (particularly useful for large fluid loads, *providing it is used in conjunction with air ballast* – see below). Alternatively, can be used to enhance drying performance. Steam is injected into the jacket at an early stage, which greatly reduces the risk of condensation in the chamber. Particularly useful for loads that are difficult to dry, and essential for true 'porous loads'.

**Air Ballast**

This option, available in conjunction with vacuum, provides a controlled reduction of chamber pressure during the cooling phase. Prevents boiling over of bottled fluids during assisted cooling.

**Integral Air Compressor**

Essential for door operation on square section units. (Unless customer has in-house supply of compressed air).

**Accessories**

All accessories, including baskets, shelving systems, loading systems, discard ('Morrison') containers, etc, are clearly listed in the literature.

## **ASTELL LITERATURE**

There are currently two brochures covering the Astell range of Autoclaves and Sterilizers:

### □ THE AUTOCLAVE RANGE

This literature provides full details on all Astell models from 23 litres to 490 litres.

### □ GUIDE TO AUTOCLAVING

This brochure includes comprehensive information on the steam sterilization process. It also includes advice on options required for common autoclave applications.

## **SPECIALS**

Astell attempts to include the most popular types and ranges of autoclaves and sterilizers in its range. We recognise, however, that there will always be a demand for special products. Customers often become concerned when specials are mentioned, that the price of such units will be very high. This will not necessarily be the case. We have much experience in the manufacture of such bespoke products, and are generally able to supply them at competitive prices. Therefore, if you do not see what your customer requires in the literature, do not give up. Get precise details of customer requirements and send them to us. If we are able to help, we shall send you a quotation along with a detailed technical specification.

**Typical Specials include such things as:**

- **Special Sizes, including larger units and differing dimensions to standard units.**
- **Special cycle requirements.**
- **Non-clad units (i.e. units without exterior panels)**

## **COMMISSIONING AND VALIDATION**

Most laboratories now need to validate their Sterilizing criteria to national or international standards. In the United Kingdom Astell is a UKAS accredited laboratory, approved and certified for the validation of autoclaves and other thermal equipment. Astell is able to offer validation certification before delivery of the unit. Please ask our Sales department for the cost of such validation.

In addition, Astell autoclaves are designed to allow this process to be carried out efficiently in the field after installation. Note: Re-validation is usually required on an annual basis.

Older autoclaves (and some currently produced by other manufacturers cannot be easily validated as they lack thermocouple entry ports, or the port is too small, or the design does not meet the latest requirements.

Many machines all lack a pressure calibration point. All these are standard on Astell machines.

The 'sale' of validation can be profitable on-going added value to the original sale. Please ensure that your service department is geared up to performing commissioning and validation. This will mean that:

- a) You have an added incentive for the customer to buy an Astell autoclave
- b) Your company will make added income in years to come.

Astell is happy to train in all aspects of installation, commissioning and validation. We are also happy to quote for the supply of necessary validation equipment, probes, dataloggers etc.

## **PRICING**

Astell produces standard ex-works price lists. We are happy to provide you with FOB, C&F or CIF quotations for any product, standard or special. We are also able to provide you with packed weights and dimensions for any item, usually by return. Quotations (including detailed technical specifications) for non standard items are likely to take several days to prepare. However, should you have an urgent requirement, please let us know, and we shall endeavour to provide you with a quick response

Astell aims to provide competitive prices for its products. Competitive prices do not always mean the cheapest prices. We aim to provide a product that is designed to give long, trouble-free performance, and do not compromise on this just so we can provide the cheapest product on the market.

We fully appreciate that market prices differ around the world, and that we cannot always be fully up to date on every market movement. We therefore rely greatly on our distributors to keep us informed. Therefore, if you feel that for any reason our product is uncompetitive in your market, do please let us know. We shall take what you say very seriously and if possible try to improve our offer, by either offering an alternative more suitable product or in some cases improving our pricing.